Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults

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DECLARATION

I declare that this doctoral thesis, which I hereby submit for the degree PhD (Public Health) to the University of Pretoria, is my work and that I have never submitted it before to any other tertiary institution for any degree or diploma.

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DEDICATION

To my beloved mother:

Anne Sylvia Musoke Senkubuge

In your book Deseranta you wrote: *"The struggle for the liberation of girls still continues, and the rough road towards the achievement of education continues to wind through uncompromising conditions. Many daughters of mother Africa still tread on the bumpy roads, through forests, across rivers, up the ancient hills that have stood the test of time in search of knowledge. Many are robbed of that chance because of harsh poverty, forced marriage, forced prostitution, human trafficking, but still, the fight continues for the human right for girls to have an education. Deseranta and the rest of the girls of yesterday have handed over the baton to the girls of today's generation, to continue racing for effective education for the precious daughters of mother Africa."*

These words are weaved into my heart, sit in my soul, inspired me so much, kept me going even when I wanted to give up and reminded me always of the purpose of education. To you, my precious Mom, I dedicate this work. May this PhD stand as a symbol of the baton that you have handed to me, to continue the struggle for education for the precious sons and daughters of Africa.

EXECUTIVE SUMMARY OF THE THESIS

Background

Tobacco control is a public health concern. By 2020, it is estimated that seven out of every 10 people killed by smoking will be from developing countries. Smoking ranked third after unsafe sex/sexually transmitted disease and high blood pressure in a South African study. There are numerous smoking-related conditions. While it is known that knowledge and understanding of health risks by smokers may influence their smoking behaviour, few studies have been conducted in this regard in South Africa.

Most countries communicate health risks to smokers through cigarette warning labels or media campaigns. Limited information is available on the effects of health warnings on smoking behaviour, particularly in South Africa, and on whether pictorial warnings will influence South Africans.

Additionally, to date, no current nationally representative study has been conducted among South Africans to gather information on the acceptability of pictorial warnings, even though current tobacco legislation recommends that such warnings be implemented on tobacco packs.

Aims and Objectives

Aim:

This thesis aimed to assess the knowledge of tobacco health risks among a population of South Africans and to determine the effectiveness of text-based health warning messages and pictorial warnings with brand design elements (branded) and pictorials without brand design elements (plain) on smoking behaviour.

Objectives:

The objectives of this study were:

1. To select pictorial health warning labels with brand design elements (branded) and without brand design elements (plain) on cigarette packs to prioritise for testing among South Africans.
2. To determine the reactions of a select sample of South Africans (non-smokers and

smokers) towards text-only and pictorial (on branded and plain packs) cigarette health warning labels under a quasi-experimental condition.

3. To assess the factors associated with change in motivation and plan to quit smoking following experimental exposure to test cigarette packages with text-only and pictorial (branded and plain) warning labels among smokers.
4. To determine the knowledge of smoking-related health risks among a nationally representative sample of South Africans and potential reactions to the selected pictorial warnings on branded pictorial warning packs at population level.

Methods

The thesis consists of three interrelated parts as discussed below:

- *Part One*:

In Part One, secondary data analysis using data from the 2010 South African Social Attitudes Survey (SASAS) (n ~3000) was used, together with other published sources to select the prioritised health warning themes and messages for use in Part Two of the thesis.

- *Part Two*:

Part Two of the thesis was conducted in South Africa, in the Gauteng and Western Cape provinces respectively, so as to have greater representation of the South African population. Part Two used a quasi-experimental crossover design and mixed methods, including focus group discussions, to establish the effectiveness of text and pictorial health warnings with (branded) and without (plain) brand design elements on the change in motivation and plans of a smoker to quit, which are proximal determinants of actual change in behaviour i.e. quitting. Using a crossover design, participants were requested individually to assess each of the health warnings – text and pictorial (branded or plain package). After that, they completed a post-evaluation questionnaire after being exposed to all the health warnings.

The post-evaluation questionnaire concluded the individual assessment of the health warnings. The same participants then proceeded to the next part of the evaluation, which was the focus groups. Focus group discussions were conducted – among the same participants who had previously completed the individual assessment of the health warnings – to establish and examine the prevailing attitudes, perceptions,

understanding and behaviours among the target groups of non-smokers and smokers towards the tobacco health warning labels. Participants were allocated to one of 12 categories of focus groups of 10 each (n=960) according to their race, gender, age, and smoking status. Focus groups were conducted until saturation of the focus groups, where no more new information was obtained.

Participants rated their responses (on a scale of 1 to 5) using previously validated measures of effectiveness, grounded in the constructs of persuasive communication theory, namely "attention," "communication," "identification" and "effect." After the participants' responses to the health warning labels had been analysed, the labels were revised. Focus groups were then held among a smaller select sample of participants only in Gauteng who were requested to assess the revised pictorial health warning messages: with brand design elements (branded) and those without brand design elements (plain). A structural equation model (SEM) was also constructed to understand the pathway from reaction to health warnings to changes in planning to quit.

- *Part Three:*

Part Three included secondary data analysis, using data from the 2016/17 South African Social Attitudes Survey (SASAS), which is a nationally representative household survey to assess the state of knowledge of tobacco health risks among South Africans in 2016/17 (n ~3000). Using a self-administered questionnaire, the data obtained included socio-demographics; tobacco use; and participants' reaction about whether "plain" packs, as shown on a "show card" to each participant, could make smokers think about quitting. Another structural equation model (SEM) was constructed this time to understand the pathway from response to exposure to health warnings and quit attempt at population level.

Results

This thesis showed that although South Africans have some knowledge of smoking-related health risks, this knowledge differs by the type of smoking-related health risk. South Africans have particularly limited knowledge of the vascular (hypertension, impotence, and stroke) smoking-related health consequences, compared to their knowledge about the risks related to cancer and/or respiratory diseases. Furthermore, although the participants were not the same individuals, there was no increase in the

overall knowledge of smoking-related health risks among South Africans who participated in the 2010 SASAS and those who participated in the 2016/17. These results on knowledge indicate an urgent need to implement interventions that will increase South Africans' knowledge of tobacco-related health risks, such as pictorial warnings.

The quasi-experimental study using a crossover design. There were 767 participants, with a response rate of 79.9%. There were about equal numbers of smokers and non-smokers. Before exposure to test health warnings, the majority who smoked indicated they were not planning to quit (64.6%). Overall, out of all the 20 health warnings that were evaluated before the revision of the health warnings, text-only health warnings were ranked lowest. Pictorial warnings, regardless of package design, ranked higher than text-only health warnings. However, participants most often indicated that the pictorial warnings on packages without the brand design elements (plain packages) were more effective than the pictorial warnings on packages with the brand design elements (branded packs).

The pictorial warning that was ranked as the most effective before revision was the abortion picture on plain packaging, with a mean rating score of 3.92 (SD=0.40). After revision of the pictorial warnings, which now also included lung cancer warnings, as suggested by participants, the most effective warning was lung cancer on plain packaging with a mean score of 3.77 (SD=0.68). Smokers felt that the pictorial warning on abortion, regardless of the pack (plain pack mean=3.88, SD=0,49; branded pack mean 3.88, SD=0,45) was most effective in motivating smokers to quit smoking or think about quitting. The top five pictures selected as the most effective among the pictorial warnings after revision were those related to lung cancer (62.9%), gangrene (45.2%), impotence (44.4%), abortion (34.7%), and oral disease (21.8%).

After controlling for potential confounders, some of the factors that were independently associated with higher odds of having a positive change in planning to quit smoking after exposure to health warnings were self-identifying as Indian/Asian (OR=2.70; 95% CI=1.11-6.58) compared to black African; being employed (OR=3.94; 95% CI=1.98-7.83) as compared to being unemployed; and indicating spending money on cigarettes rather than food (2.62; 1.41-4.88).

The SEM depicting pathways to changes in planning to quit after exposure to cigarette health warnings fit the data well (comparative fit index=0.997; normed fit index=0.975; root mean square error of approximation=0.026). SEM confirmed that current text-only warnings were less likely directly to influence changes in planning to quit (β= -0.29). Greater changes in planning to quit were directly influenced by a higher rating of the branded packaging (β=0.25).

Current smoking in 2017 was 19.3% (n=607), with only 49.6% (n=292) planning to quit and 59.9% (n=345) having attempted to quit in the past 12 months. Of the respondents, 70.8% (n=2071) have never or rarely read the current text-only health warnings, but 85.7%(n=2495) agreed that text-only warnings (as shown) were easy to understand. Of those who agreed that packs with pictures would make smokers think of quitting, 54.4% (n=1030) thought the current displays of cigarette packs inside stores and shops could encourage young people to take up smoking.

Only 42.0% (n=273) of the current smokers indicated that adding pictures to cigarette packs as shown would make them think about quitting, but 61.2% (n=385) agreed that displaying the pictorial warnings would encourage the youth not to smoke. Those with an educational status lower than Grade 12 (44%; n=747) and those with an educational status higher than Grade 12 (46.4%; n=196) agreed that adding pictures would make smokers think about quitting. Although the majority of respondents agreed that the text warnings shown to them were easy to understand, only 15.1% (n=509) felt that these warnings would make a smoker think of quitting, whereas 41.9% (n=1301) felt that the pictorial warnings would make smokers think of quitting.

After controlling for potential confounders, the factors that were independently associated with higher odds of believing that pictorial warnings on a “plain” pack would stop a smoker who wants a cigarette were an educational status of more than 12 years of schooling (OR=1.71; 95% CI=0.74-3.93) as compared to 12 years or less of education, believing that displaying cigarette packs in shops was a form of advertisement (3.27; 1.91-5.60), exposure to smoking at work (2.29; 1.29-4.07) and having attempted to quit smoking within the last 12 months (1.95; 1.11-3.41).

The SEM on path to attempt to quit fitted the data well (comparative fit index=0.986; normed fit index=0.956; root mean square error of approximation=0.028). Smokers' perceived health risk directly influenced their quit intention (β= 0.21), which in turn was positively directly associated with having actually attempted to quit (β= 0.43).

Conclusion

Assessing the effectiveness of cigarette pack health warning labels is a matter of public health importance, given the significant burden of disease associated with tobacco use. This thesis is the first of its kind in South Africa and comes at a time when legislation is being amended to include pictorial warnings and plain packs. The thesis provides evidence that pictorial warnings, particularly on plain packaging, would be effective in South Africa.

The findings reported in this thesis were used to assist in providing information on the implementation of pictorial warnings in South Africa that are evidence-based and tailored to the South African market. These pictorial health warnings could therefore potentially save lives by increasing cigarette smokers' motivation to quit and eventually quitting tobacco use. These findings suggest that adding pictorial warnings to the current cigarette packs in South Africa is more likely to prompt quitting and deter the youth from taking up smoking than text-only warnings.

Keywords: Cigarette smoking, tobacco use, health risk knowledge, plain packaging, standard packaging, graphic health warnings, pictorial health warnings, South Africa.

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LIST OF ACRONYMS AND ABBREVIATIONS

CDC	Centres for Disease Control and Prevention
CI	Confidence Interval
CHD	Coronary heart disease
COPD	Chronic Obstructive Pulmonary disease
DALY	Disability-adjusted life year
DOH	Department of Health
GYTS	Global Youth Tobacco Survey
GHPSS	Global Health Professions Student Survey
HIV	Human Immunodeficiency Virus
HWMs	Health Warning Messages
ICD-10	International Classification of Diseases 10
IHD	Ischemic Heart Disease
MDG(s)	Millennium Development Goal(s)
SASAS	South African Social Attitudes Survey
SDG	Sustainable Development Goals
NRT	Nicotine Replacement Therapy
OR	Odds ratio
SHS	Second-hand tobacco smoke
SD	Standard deviation
TB	Tuberculosis
TFI	Tobacco Free Initiative
TobReg	Tobacco Product Regulation
UN	United Nations
WHO	World Health Organization
WHO FCTC	World Health Organization Framework Convention on Tobacco Control

CHAPTER 1: INTRODUCTION

1.1 DEFINING THE RESEARCH PROBLEM

According to the World Health Organization (WHO), tobacco use is a matter of public health importance because it is a leading cause of death and disability throughout the world.[1,2] In South Africa,[3] tobacco use is also a leading cause of death. Although significant strides have been made to reduce tobacco use,[4,5] specific population groups' smoking rates remain high.[6,7] These smoking prevalence rates are affected by cultural factors, socio-economic status, age, gender and race.[6,8]

Recognising the economic and health burden of tobacco use, South Africa, like many other countries, has ratified the WHO Framework Convention on Tobacco Control (WHO FCTC).[9] According to the provisions of the WHO FCTC, South Africa is required to implement health warnings on cigarette packages that cover at least 30%, but preferably 50% or more, of the principal display areas and are "large, clear, visible, and legible."[9] It is argued that the implementation of such warnings allows consumers to be informed about the risks of smoking, which is a response to the primary goal of Articles 12 and 13 of the WHO FCTC,[9] namely to communicate the negative health effects of smoking.[10] By 1994, with the advent of the new democratic government, South Africa already introduced a comprehensive tobacco control law and was the first country in Africa to do so;[11] these laws included regulations on health warnings.[12] Currently, South Africa has text-only warnings on cigarette packs, and these have been used for more than 20 years. They cover not less than 60% and not more than 70% of the area on which they are displayed. [12] Reddy et al.[6] found that the 81.4% of current South African smokers who noticed the current text health warnings were 1.7 times more likely to attempt to quit.[6]

The WHO FCTC's recommendation, as stated above, on health warnings is a minimum requirement. In Article 11, the WHO FCTC advises that, in addition to the warnings covering 50% or more of the package, warnings may take the form of pictures.[9] As far back as 2008, South Africa indicated a graphic arrangement (pictorial)

should be included on cigarette packs,[14] and the country is currently in the process of introducing pictorial warning labels.[15] However, currently, in South Africa, not enough research has been done to guide the implementation of these pictorial or graphic warnings, as most of the evidence on pictorial warnings on cigarette packets comes from developed nations.[16-20] Although several countries have implemented such warnings,[21-24] and although the WHO maintains a database of different pictures for use by countries,[25] only 43 of the pictures on the database have been specifically developed and/or tested for use in sub-Saharan African countries.[26] Att present, only 10 countries in Africa have legislative and/or regulatory provisions for pictorial warning labels on cigarette packs, [21] with Mauritius being the first country in Africa to introduce such provisions.[27]

In 2005, tobacco control was already recognised a relevant and significant contributor to the conditions that affect the achievement of the Millennium Development Goals (MDGs). [28] In 2015, the MDGs were replaced by the Sustainable Development Goals (SDGs).[29] Again, recognition was given to the fact that the implementation of tobacco control measures, as prescribed by the WHO FCTC, is an important means to achieve the SDGs. [30] A limited amount of research has been conducted on the effects of cigarette text warning labels on smoking behaviour in South Africa,[6,13] but no research has been published on the appropriateness or potential effect of the pictorial warnings that are due to be introduced.[15] It is clearly essential to document the effects of warning labels on smoking behaviour at individual and population levels, and further to identify which pictorial warnings have the most significant impact among the South African population. Further, it is also essential to examine the reaction of South Africans to standardised and/or plain packaging, because plain packaging for cigarettes is due to be introduced in South Africa.[15]

It is envisaged that the information gathered in this study will provide local scientific evidence that could contribute to the decisions made in selecting appropriate pictorial warnings, and evidence about the effectiveness of plain packaging for the South African population. This study's findings will provide information on the effect of health warning labels on tobacco users' motivation to quit, especially amongst those who were not motivated to quit before exposure to these graphic warning labels and plain

packages. In line with the primary goal of Articles 12 and 13 of the WHO FCTC, this study would also determine the short-term effect of warning labels on increasing the South African population's knowledge of the health effects of smoking, which could have an impact on smoking prevalence in the long run.

1.2 BACKGROUND

Tobacco use is a critical global health issue, as smoking remains one of the most significant contributors to non-communicable diseases that constitute a major public health challenge that undermines social and economic development.[31]. The global action plan on the prevention and control of non-communicable diseases calls on governments globally to reduce the prevalence of smoking by 2020 to about 30%, because more than 200 million deaths due to the health effects of smoking could be avoided for the rest of the century.[31]

It has been estimated that globally the economic cost of smoking is about 2 trillion dollars and, therefore, the expenditure on tobacco products is detrimental to achieving the goals of the global sustainable development agenda.[32] Indeed, the 2030 Agenda for Sustainable Development recognises the importance of a focus on tobacco control as an essential aspect of sustainable development.[29] The 17 Sustainable Development Goals (SDGs) now for the first time include a Target 3a, which is a specific target on tobacco control.[29] This inclusion of a specific target on tobacco control implies that the WHO FCTC is now recognised as an essential driver of the sustainable development agenda.[9,29] A recent United Nations Development Program (UNDP) and WHO FCTC publication is aptly titled: "The WHO Framework Convention on Tobacco Control – an Accelerator for Sustainable Development'.[30] In this publication, credit is given to the importance of the WHO FCTC as a driver of the SDG agenda in order to improve and protect the lives of populations.[30] The WHO report on the global tobacco epidemic also posits that at least one measure (recommended by WHO to reduce tobacco use) will protect 63%, that is, approximately two-thirds of the global population.[33] Even with that remarkable progress, 22.8% of the global population still currently use tobacco.[34]

Since 1990, smoking-attributable deaths have increased by 20.1% globally.[1] If current

smoking patterns continue, tobacco-related deaths will climb to approximately 1 billion in the 21st century.[35] This estimate is a staggering figure, considering that the risk of death from many other diseases is also increased with tobacco use.[35] Indeed, Doll et al.'s[36] study, which includes 40 years' observations on male doctors in the UK found that death from cancers of the mouth, lung, pancreas, larynx, bladder, and pharynx were all positively associated with smoking.[36] Other diseases that were positively associated with smoking include peptic ulcers and various respiratory diseases. [36] In the 50-year study by Doll et al.,[37] smoking-related deaths were due to respiratory, vascular and neoplastic diseases that are caused by smoking.[37] Alarmingly, recent evidence shows that, worldwide, during 2016 alone, over 177.3 million disability-adjusted life years (DALYs) and over 7.1 million deaths were due to tobacco use.[1] It is a matter of concern that it is estimated that by 2020, 70% of people killed by smoking will be from developing countries.[38,39] By 2030, more than 80% of tobacco-related deaths will be in developing countries.[39]

In South Africa, in the year 2000, smoking caused approximately 8.0% to 9.0% of all adult deaths, and 3.7% to 4.3% of DALYs.[3] A degree of success in tobacco control has been achieved by reducing smoking prevalence,[40] mainly due to steep increases in cigarette prices between 1993 and 2000.[40,41] Notably, the South African Advertising and Research Foundation survey indicated that among the adult (15+ years) population, daily smoking rates fell by a fifth, decreasing from 30.2% in 1995 to 24.1% in 2004.[40] An estimated 2.5 million smokers stopped smoking during this period.[40] A study by Reddy et al.[6] found that in 2012 the prevalence of South African adults who smoked tobacco was 17.6%.[6] However, the overall reduction in the South African smoking prevalence rate has not been mimicked by cessation rates, which have remained low.[39,42] A South African study found that although 68.1% of participants had made a quit attempt, only 14.1 % of those who had ever attempted to quit were successful.[42] The low success of attempts at quitting raises concern particularly when one considers that deaths related to tobacco are more common in low socio-economic status individuals.[35,43]

In South Africa, a disparity in tobacco-related deaths is evident from the finding that among mixed-race men there is a higher percentage of smoking-related deaths than

among white men.[35] One study reported a disparity in smoking prevalence among the South African racial groups, with mixed-race men displaying the highest prevalence at 47%.[6] Considering that tobacco is the most preventable cause of death,[1,33] efforts to reduce the prevalence of tobacco use may result in notable gains. Van Walbeek,[40] as far back as 2002, found that a consistent tobacco control policy can achieve a reduction in smoking prevalence.[40] Taken together, the indications are that it is imperative to put more effort into tobacco control, notably the comprehensive implementation of the WHO FCTC.[9]

The WHO FCTC[9] is a multilateral public treaty, which South Africa has ratified. It calls for nations to inform populations about the health consequences of tobacco use (Article 13).[9,44,45] Already, more than 30 different smoking-related diseases have been identified.[46,47]

Knowledge and understanding of smoking-related diseases and health risks by smokers may influence their smoking behaviour.[48,49] A survey in India indicated that knowledge about the health risks of smoking was very low, and that only 10% of respondents planned to quit in the next six months.[49] The findings from India can be explained by the results from a study among Iraqi smokers, which found that the knowledge of the health effects of smoking was predictive of quit intentions.[50] Another study found that there was an increased number of calls to the Dutch quitline after the introduction of the EU health warnings.[51]

There are several ways to educate populations about the health effects of smoking.[10] However, cigarette warning labels are often the only intervention used to inform smokers about the risks of smoking in most countries that cannot afford regular mass media campaigns, and this is also the case in South Africa.[6,13] Health warnings on cigarette packs are a good source of information, and they are strongly associated with health knowledge both at the individual and country levels.[52]

The WHO FCTC mandates countries to communicate the health risks of smoking by introducing pictorial warnings on cigarette packs.[9] A meta-analysis on pictorial warnings found that pictorial warnings were more effective than text-only warnings,

and were more effective in compelling smoking behaviour among both smokers and non-smokers.[53] To date, only limited information is available on the effects of health warnings on smoking behaviour in South Africa.[6,13] Furthermore, so far, no research has been conducted on the acceptability of pictorial warnings South Africans, although the country's tobacco legislation recommends that pictorial warnings be implemented on tobacco packs.[14,15] The currently proposed legislation also intends to introduce plain packaging in South Africa.[15] A systematic review on standardised or plain tobacco packaging concluded that plain packaging reduced smoking and pack appeal among other things,[53] but again, no current research on the acceptability of plain packaging has been conducted among South Africans. This study, therefore, sought to address these gaps in the evidence.

1.3 OVERVIEW OF THE THESIS

This thesis examines smoking-related health-risk knowledge and also explores the reaction among South African adults to cigarette warning labels with brand design elements (branded) and those without brand design elements (plain). The research takes into account a synthesis of the evidence on smoking-related health-risk knowledge, and the evidence on pictorial warnings on plain or standardised packaging. A structure was developed to guide and present the research (see Figure 1.1). The research structure takes into account the relationship between health risk knowledge, pictorial warnings, plain packaging and reactions to health warning messages on tobacco product packs.

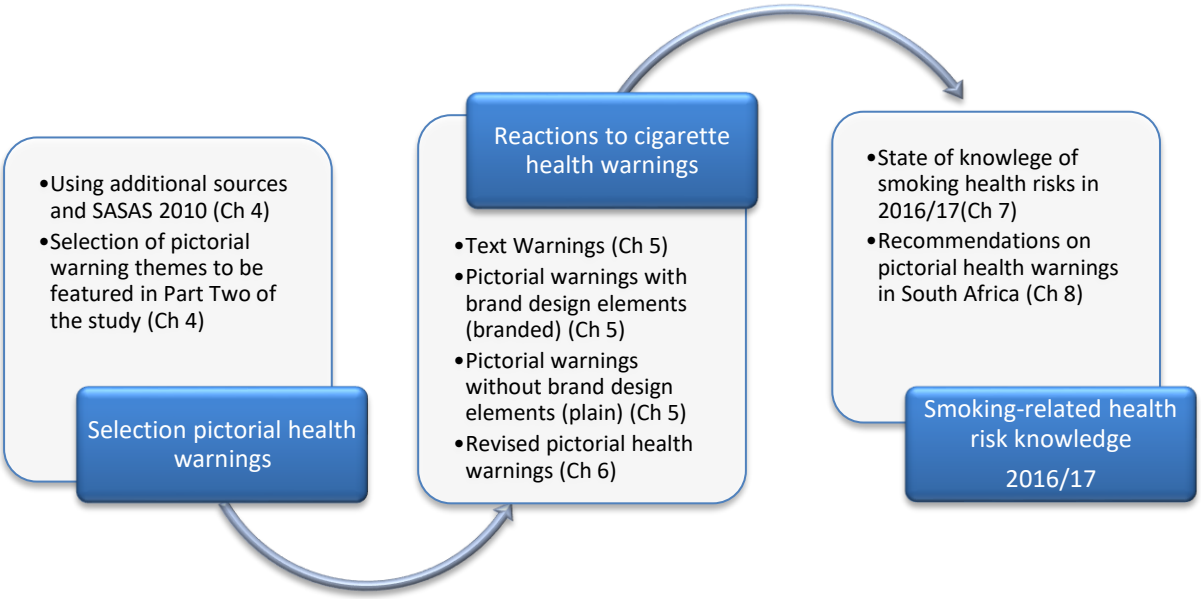

Figure 1.1: Research structure

The thesis consists of **three parts**, which are all interrelated (see Figure 1.1). The first part of the thesis used data from the 2010 South African Social Attitudes Survey (SASAS) data and additional published data sources from South Africa and elsewhere in making recommendations for pictorial health warning themes to be featured in Part Two of the study. The second part assesses the reactions of South African adults to selected health warning messages on experimental cigarette packs. Part Three of the study uses data from the 2016/17 SASAS to determine the state of smoking-related health risk knowledge among South African adults and the potential effectiveness of selected pictorial warnings on cigarette packs at a population level. Finally, recommendations were made for health warning themes to be featured nationally.

In **Chapter 2**, the literature review discusses and analyses the global tobacco epidemic and its impact on the burden of disease. The chapter provides a historical overview of tobacco use. It also discusses the WHO FCTC requirements and other tobacco control measures, highlighting key issues around smoking-related health risk knowledge. The chapter then outlines tobacco control in Africa, with a particular focus on South Africa, reviewing the history and the progress of tobacco control in South Africa. This is followed by an overview of the pathophysiology and neurophysiology of smoking. Then the discussion turns to smoking-related health consequences and knowledge of the effects of smoking. Health warnings are then considered with a

particular emphasis on pictorial health warnings and plain packaging, along with tobacco industry interference in the process of implementing such warnings. The chapter also reviews the theoretical framework for the thesis. The thesis rationale stems from a recognition of the gaps in the evidence, particularly at the individual and country level, regarding the effectiveness of pictorial warnings and plain packs in South Africa. The research questions are then identified from the thesis rationale.

Chapter 3 lists the aims, objectives and hypotheses of the thesis. As has been indicated earlier, the thesis consists of three parts, which are all interrelated. The three parts are presented from Chapter 4 till Chapter 7 with each Chapter setting out the methods used in this thesis, such as the data collection procedure, and highlighting the details of a number of processes, such as how thesis participants were selected. Furthermore, the variable measurements and definitions are provided, together with a description of the data analysis used in each of studies that constituted the different parts of this thesis presentent in the fifferent chapters.

The first part of the thesis is presented in **Chapter 4**, which discusses the selection of the text and pictorial warnings with brand design elements (branded) and ones without brand design elements (plain) on packs and also the pictorial warnings' themes for use in the second part of the thesis. **Chapter 5** presents the findings of Part Two of the study, which, adopting a mixed methods, crossover design quasi-experimental study, explored the reactions of South African participants towards different kinds of tobacco health warnings, namely text-only warnings and pictorial warnings on branded and plain packs . This chapter focuses on the quantitative data from the experimental exposure to pictorial health warnings and assessed the association between exposure to these pictorial health warnings on cigarette packages and the desire to quit smoking. Furthermore, this part of the study evaluated factors associated with the effectiveness of health warnings (text-only warnings versus pictorial warnings on branded and plain packs) and mainly explored socio-demographic differences in participants' responses to pictorial health warning labels. The effects of text-only warnings were then compared to the effects of pictorial warnings, either with brand design elements, or without them. The findings on the factors influencing quitting behaviour changes after exposure to the warnings, and on the pathways between

exposure to cigarette health warnings and changes in planning to quit smoking are presented. The chapter then considers the findings on the case for plain packaging in South Africa.

Chapter 6 contains the results regarding the revised health warnings which concluded Part Two of the thesis and informed Part Three of the thesis. In addition, the chapter makes recommendations on the potential impact of pictorial warnings on the South African smoker population.

Chapter 7 presents findings from Part Three of the study, which drew on results from Part Two of the study, and assessed the state of knowledge of tobacco-related health risks and perceptions of the effectiveness of pictorial health warning labels among the South African ≥16-year-old adult population in 2016/2017. Results from the structural equation model to understand relationships and pathways between responses to exposure to pictorial warnings on “plain” packs and motivation to quit among South African smokers (who participated in the SASAS 2016/17) are presented. The SASAS 2016/17 national survey’s findings allow for policy recommendations for pictorial warnings for South Africa.

In **Chapter 8**, a synthesis is offered of the thesis’s findings, highlighting the current knowledge of tobacco-related health risks among South African adults, together with their reactions to various forms of cigarette pack health warning labels and plain packaging. The ethical considerations and limitations of the thesis are also discussed, along with the potential benefits and risks. The ethical considerations relevant to these studies are then discussed. Lastly, the thesis concludes with views on the implications of this thesis’s findings on tobacco control policy in general. The results of each part of the thesis are reflected on by chapter, including a brief discussion and recommendations.

Figure 1.2, overleaf, illustrates the outline of the thesis. The referencing system used for the thesis is the Vancouver system, and the references relevant to each chapter are listed at the end of each chapter of the thesis, where applicable.

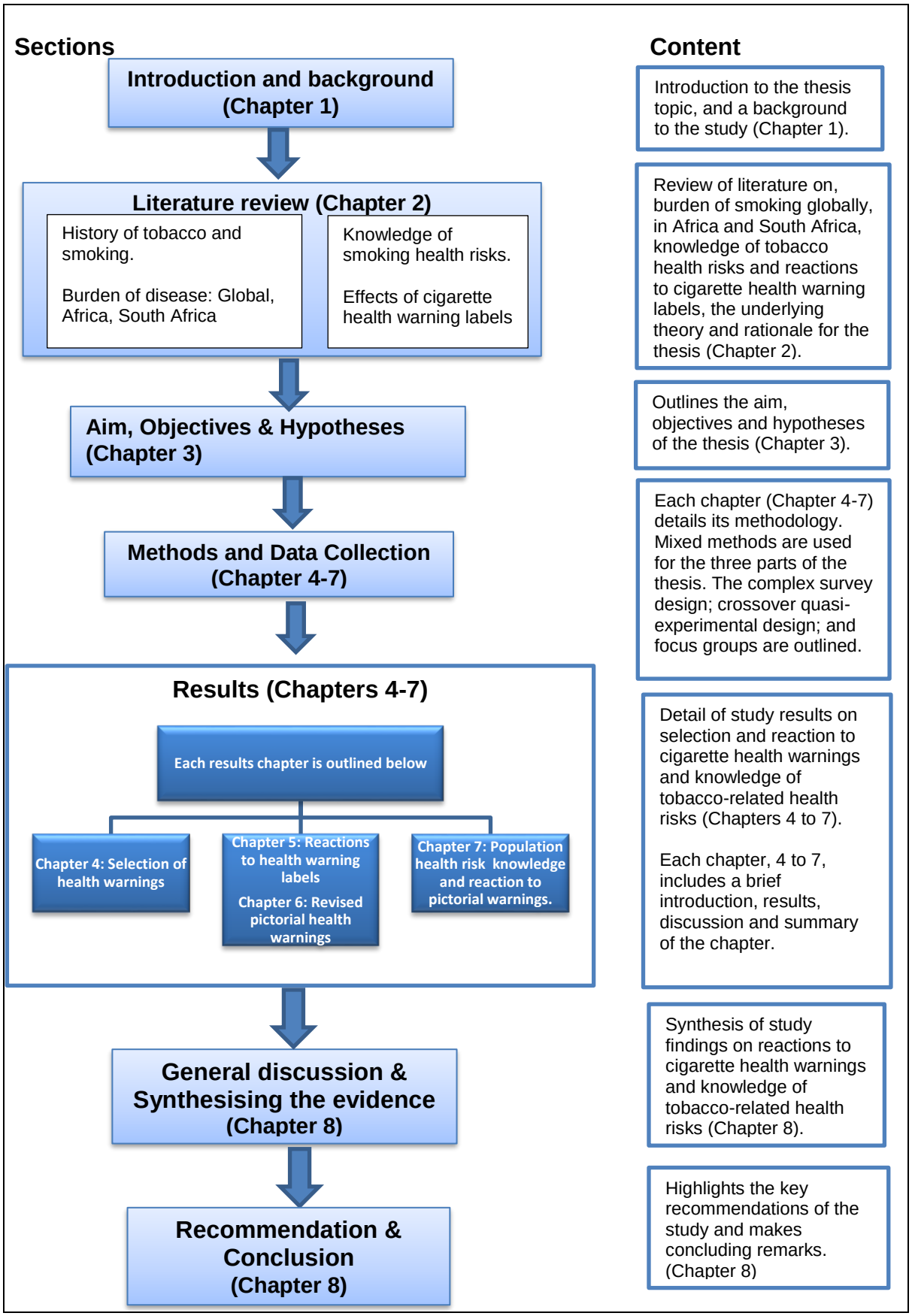

Figure 1.2: Overview of the thesis

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CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides a review of the literature to give the reader more insight into the research topic. The chapter starts with a brief history of smoking and tobacco use. An account of the global tobacco epidemic and disease burden is then set out. Smoking-related health disparities are also discussed, considering the link between poverty, tobacco and the disease burden.

The chapter then moves on to the WHO FCTC as a public treaty for tobacco control. The history of the WHO FCTC is followed by a synopsis of the relationship of the WHO FCTC with the Sustainable Development Goals (SDGs), with particular emphasis on Articles 12 and 13 of the WHO FCTC. The MPOWER (see Section 2.4) as a policy package for the implementation of the WHO FCTC is also briefly discussed. Next, the literature on tobacco control in Africa in general, and in South Africa in particular, is reviewed. In that section, key discussion points around the history of tobacco control in Africa and South Africa are discussed from the perspectives of legislative reform, the burden of disease due to tobacco use, and current progress in tobacco control efforts.

This chapter also explains the pathophysiology and neurophysiology of smoking. In addition, the chapter reviews the literature on smoking-related health consequences and on knowledge of smoking harms, drawing on analyses from various countries in the world and various population age groups for comparison. Considering that one of the possible interventions to improve people's knowledge of smoking-related health risks is introducing warning labels, the literature on warning labels is then reviewed.

A brief history of warning labels is provided, together with a historical perspective on pictorial health warnings. Factors that influence the effectiveness of warning labels such as type, colour and design are then highlighted. Furthermore, a short discussion on the emotional response to pictorial warnings is provided. The literature also covers reactance to cigarette health warnings. The consideration of pictorial health warnings

is followed by a review of the literature on standardised (plain), unbranded packaging, giving insight on what plain packaging is, together with an overview of countries that have already implemented plain packaging. Industry interference is also raised in the chapter, with a special focus on the key tactics and arguments used by the tobacco industry to block the implementation of health warnings and plain packaging.

A theoretical framework for the thesis is subsequently discussed, with a special focus on a theoretical framework for health-risk knowledge and health warnings. Theories such as Persuasive Communication Theory, the Elaboration Likelihood Model of Persuasion, the Extended Parallel Process Model (EPPM) and Theory of Planned Behaviour are discussed.

This chapter thus provides a synthesis of the literature that forms the foundation of this thesis. It concludes with the thesis rationale and the research questions emanating from the gaps identified in the literature.

2.1.1 Search strategies

In order to obtain a comprehensive literature review, a combination of search strategies were used. A combination of keywords relevant to the topic were used. These included cigarette smoking, tobacco use, tobacco control, knowledge, smoking-related health risk, reactions, warning labels, pictorial warnings and plain packaging. The literature on the history of smoking, the tobacco epidemic, and the burden of disease attributable to tobacco was sought.

Books, journal articles and reports were reviewed, and literature was also sourced from relevant organisations and individuals, as suggested by the supervisor or relevant experts known to the researcher.

Pub Med, Google Scholar and Google were used to source peer-reviewed journal articles, together with national, regional and global reports. The thesis drew only on the literature published in English. The search for the literature was conducted throughout the course of the thesis write-up.

2.2 HISTORY OF TOBACCO AND SMOKING

> *In ancient times, when the land was barren, and the people were starving, the Great Spirit sent forth a woman to save humanity. As she travelled over the world, everywhere her right hand touched the soil, there grew potatoes. And everywhere her left hand touched the soil, there grew corn. And in the place where she had sat, there grew tobacco.*
>
> **Huron Indian myth**[1]

This Huron Indian myth[1] implies that tobacco has been around for millennia. Its use in fact dates as far back as 4000 BC in Shamanistic rituals in the Americas;[2] the cultivation of the first tobacco plant was documented in the Americas in 6000 BCE, and Indigenous Americans began smoking tobacco, as well as using tobacco enemas, about 2000 years ago.[3]

Tobacco was introduced to Europe by Christopher Columbus in 1492, when he returned with tobacco leaves and seeds from the Americas.[3] Two crew members, one of whom was Rodrigo de Jerez, told Columbus about seeing the indigenous people using tobacco, and he commented in his journal entry on the fragrance of tobacco.[4] Columbus wrote: “My two men met many people crossing their path to reach their villages, men and women, carrying in their hand a burning brand and herbs which they use to produce fragrant smoke.”[4] On their return to Europe, De Jerez, who has been described as the first European tobacco user, was seen smoking. As a result, he was imprisoned for seven years by the Holy Inquisition,[3,4] because it was believed that evil spirits had possessed him.[3,4]

In 1560, Jean Nicot (from whose name the word nicotine is derived) introduced tobacco to France.[1] He apparently sent snuff (smokeless tobacco) to the Queen Consort of France, Queen Catherine de Medici, which she used to treat migraines, either her son Francis II’s,[1] or her own.[3] Many tribes in the Americas also long thought of tobacco as an important medicinal ingredient.[4] By 1560, Spanish and Portuguese traders had brought tobacco to East Africa, from where it spread to West and Central Africa.[3,5] It only arrived in South Africa about 90 years later, but soon after 1652, tobacco was being grown there by European settlers and used as a form of currency.[3,6]

In Europe, from the 1570s, tobacco was lauded for its therapeutic and health

properties,[7] even being called the "holy herb".[8] European doctors published several works detailing the health properties of tobacco and claimed that tobacco aided in treating a wide range of health conditions, such as toothache, halitosis and cancer, to name a few.[3,7,9] So, for example, in 1571, Dr Nicholás Monardes of Spain chronicled at least 36 disease conditions that tobacco could ostensibly cure.[1]

The 17th century marked a turnaround, as recognition of the dangers of tobacco use grew. In the 1600s, Fang Yishi, a Chinese philosopher, reported that smoking "scorches one's lung", especially after prolonged years of use.[3] The Qing Dynasty of China went so far in 1634 as to decree a smoking ban, which was enforced on pain of death.[3] China in effect become one of the first countries to impose punitive measures for smoking.[3] It should be noted, however, that the motivation for the decree was more about finding ways for China to deal with trade disparities with its trading partners, and less about protecting the population's health.[3]

In England, in 1604, King James I wrote the most famous anti-smoking tract of his era, entitled "A Counterblaste to Tobacco".[10] In his tract, King James I made clear his disdain for the culture of smoking, and he highlighted the effects of second-hand smoke, as well as the dangers and harms of smoking.[10] Throughout his reign, King James I, who hated the use of tobacco, would continue to wage war on tobacco users and merchants, at one point even raising the import tax on tobacco by 4 000%.[1,4]

Approximately 150 years after King James I's "A Counterblaste to Tobacco", Dr John Hill published a seminal study on the effects of tobacco in England in 1761.[1,11] Hill's study, which is recognised as probably the first clinical study to make the link between tobacco and health, was the first to suggest a relationship between the use of tobacco and cancer.[1,11] Hill noted that immoderate snuff users developed cancerous lesions, "polypuses" in the nose, which could be fatal.[11] Subsequent work by Dr Samuel Thomas von Soemmering, in 1795, also noted a correlation between lip cancer and pipe smoking,[3] as did the work of Dr John Lezars in 1859.[12] Lezars,[12] who was a surgeon of the Royal College of Surgery, reported that smoking led to cancer of the tongue and lip.[12]

Although the body of work on the harmful effects of smoking grew,[3,11,12] the 20th century still saw an increased number of smokers and a rise in manufactured cigarettes[6]. Gately[5] has eloquently described how tobacco use entrenched itself into modern society from its ancient origins.[5]

Dr Isaac Adler,[13] in his 1912 publication "Primary malignant growths of the lungs and bronchi: a pathological and clinical study", was the first to link lung cancer with smoking.[13] However, it was only in 1950 that Wynder and Graham[14] confirmed the link between smoking and lung cancer in an article published in the *Journal of the American Medical Association*, entitled "Tobacco smoking as a possible etiologic factor in bronchogenic carcinoma".[14] They conclude the article by remarking: "Among 605 men with bronchogenic carcinoma, other than adenocarcinoma, 96.5 percent were moderately heavy to chain smokers for many years, compared with 73.7 percent among the general male hospital population without cancer." [14]

The first large scale case-control study showing a link between smoking and lung cancer was conducted in 1951 by Dr Richard Doll and Prof. Austin Bradford Hill.[15] The findings were published in the *British Medical Journal*.[15] The study was conducted in 20 hospitals in London, where they interviewed 1 732 patients and had 743 controls.[15] More evidence of the health consequences of tobacco use came from the Framingham Heart Study, which found that smoking cigarettes increased the risk of heart disease.[16] In 1962, the Royal College of Physicians published its first report on Smoking and Health; it described smoking in relation to other diseases and lung cancer.[17]

The US Surgeon General, then Luther L. Terry, released the Surgeon General's Advisory Committee's first report on Smoking and Health on 11 January 1964.[18] The report found that cigarette use was an important cause of chronic bronchitis; it was also a cause of lung cancer and laryngeal cancer in men, and a probable cause of lung cancer in women.[18] In addition, the report stated that the evidence collected was suggestive, if not proof, of a causative role of smoking in other illnesses, such as cardiovascular disease, various types of cancer and emphysema. [18] In another report, 50 years after the 1964 US Surgeon General's report, recognition was given to significant strides made in tobacco control, but it also acknowledged that the disease burden of this preventable cause of death remained worrying.[19]

2.3 GLOBAL TOBACCO EPIDEMIC AND BURDEN OF DISEASE

Globally, smoking is still the leading risk factor for premature death and disability.[20] According to the WHO report on the global tobacco epidemic, 5.4 million deaths per year are now attributed to tobacco use.[21] In the 20th century, 100 million deaths were due to tobacco.[21] By 2030, the figure is expected to rise to more than 8 million deaths per year,[21] eventually totalling 1 billion deaths in the 21st century.[22]

When one considers gender differentiation in this global epidemic, the evidence is concerning. In men, smoking accounts for 9.3% of disability-adjusted life years (DALYs), and 16.3% of deaths.[23] Smoking is thus the leading risk factor attributable to disease burden (measured in DALYs) and second leading risk factor for deaths in men.[23] In women, smoking accounts for 5.8% of DALYs and for 16.3% of deaths.[23]

Despite these mortality and morbidity statistics, the world's populations continue to smoke. In 2015, one in four men was a daily smoker, and one in every 20 women was a daily smoker.[20] Admittedly, a decline has been noted in smoking prevalence over the last 25 years (1990–2015):[20] In 1990, the smoking rate among men was 34.9% and in women 8.2%; by 2015, the smoking rates had fallen to 25.0% in men and 5.4% in women.[20] The decline shown in smoking prevalence is an indication of progress in tobacco control efforts.[20,24,25]

However, even with tobacco control efforts, recent evidence indicates that of the 1 117 million current smokers (15 years and older) globally, approximately 942 million are men and 175 million are women.[24] The World Health Statistics report suggests that in 2016, 34% of men and 6% of women smoked tobacco.[26] Moreover, recent evidence has shown that smoking prevalence among the youth has increased, particularly among girls.[24] Surprisingly, smoking among young girls has been reported to be more prevalent than among young boys or even adult women, particularly in countries with a low to high human development index (HDI).[24] Taken together, these findings suggest that although progress has been made, the reduction and differentiation in smoking prevalence may be changing.

Recent evidence indicates that smoking prevalence has been arrested in most

countries with a very high HDI.[24] In countries with a medium or high HDI, smoking prevalence has stayed at high levels, or is continuing to rise.[24] In some countries with a low HDI, the recent evidence is that smoking prevalence may be increasing.[24] Bilano et al.[27] (see Figure 2.1) have projected the estimated smoking prevalence quintiles in 2025, using the current data for current smoking prevalence in 173 and 178 countries for men and women respectively.[27] The first quintile (denoted by the colour purple) indicates the lowest smoking prevalence, and the fifth quintile (denoted by the colour red) shows the highest prevalence (see Figure 2.1).[27] The prediction is then that if current smoking prevalences persist, by 2025, the predicted smoking prevalence for men will range from less than 20% in the first quintile, to more than 49% in the fifth quintile.[27] For women, the smoking predicted prevalence in 2025 will range from less than 1% in the first quintile, to more than 18% in the fifth quintile (see Figure 2.1).[27]

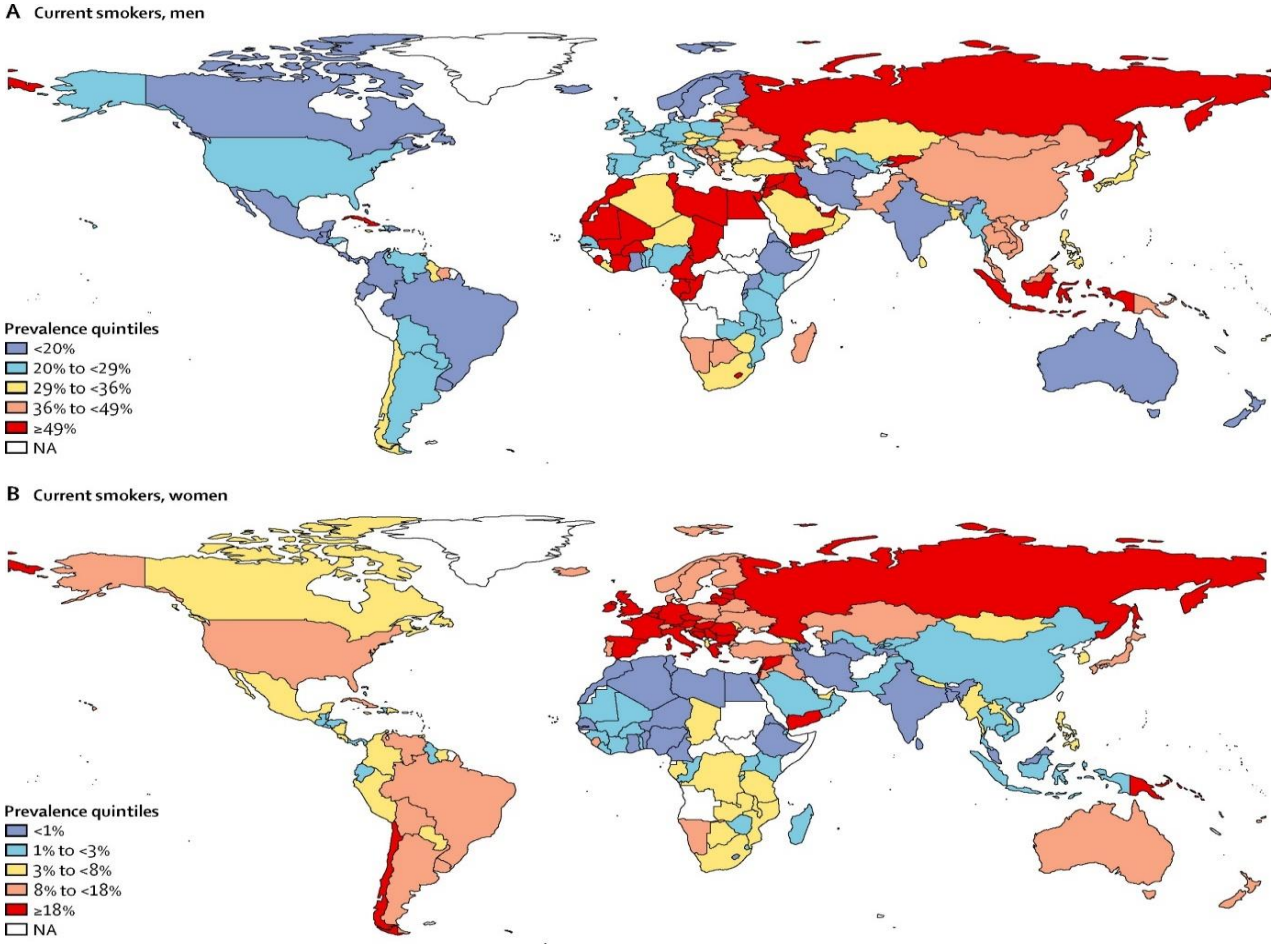


Figure 2.1: Predicted current tobacco smoking prevalence quintiles in 2025[27]

**NA = not available.*

Source: Bilano et al., Lancet 2015[27]

The global smoking prevalence projected by Bilano et al.[27] is worrying, mainly because

the indication is that inequalities related to the HDI in tobacco use globally will persist even by 2025, if current trends in prevalence continue (see Figure 2.1).[27] The disparity of tobacco use among countries is even more striking when one considers that the data show that tobacco use is rising in low- and middle-income countries.[28,29] Furthermore, of the estimated more than 1 billion smokers globally, more than 80% now live in low- and middle-income countries.[29,30]

Within countries, there are also disparities of tobacco use prevalence and deaths – the poorest in socioeconomic status are more likely to use tobacco, at a younger age, and also more likely to suffer tobacco-related deaths.[22,30] The evidence on tobacco disparity is even more significant, considering that tobacco use is a risk factor for six out of the eight leading causes of death worldwide,[21] and that tobacco use is the only leading most preventable cause of death globally.[21] The colossal harm caused by tobacco use has been reported in many publications.[20,23,26,27,30,31] The report of the US Surgeon General in 2014 goes so far as to term the tobacco epidemic "an enormous avoidable public health tragedy", and note that since 1964 more than 20 million premature deaths could be attributed to cigarette use.[19]

Most of the smoking-related premature deaths will occur in low and middle-income countries because evidence has shown that tobacco causes more harm to the poor and marginalised in society.[21,29,30] Furthermore, the dangers of smoking are not only limited to tobacco-related health effects, as tobacco-related harms also affect most of the development intentions.[28] Tobacco affects the user (the person who smokes), and it affects and kills others who are exposed to smoking.[21,24] For instance, in 2016 alone, approximately 884 000 deaths were due to second-hand smoke.[24] Tobacco use has an enormous cost to society and causes harm.[22,28]

The recognition of the egregious harm caused by tobacco has driven the world to act. For instance, in 2013, the World Health Assembly (WHA) adopted a voluntary target of a 30% relative reduction in the prevalence of current tobacco use by 2025 in persons aged 15 years or more.[32] This target will strengthen the implementation of the WHO FCTC as the first global treaty against tobacco.[33] The WHO FCTC galvanises countries and the world to fight tobacco use and ensure that society is protected.[25,33]

2.4 THE WORLD HEALTH ORGANIZATION'S FRAMEWORK CONVENTION ON TOBACCO CONTROL (WHO FCTC)

The WHO FCTC[33] is a pioneering policy document and ground-breaking global treaty for public health. The authors recognise the enormous public health catastrophe caused by tobacco use in the 20th century.[19,34] Robert West,[34] at the start of his publication, aptly says that "the history of tobacco control in the 20th century can be summed up by the phrase too little, too late".[34] Acknowledging the global tobacco use tragedy and ineffective control mechanisms at that time, Ruth Roemer and Allyn Taylor in July 1993 conceptualised and advocated for a global legal approach to the epidemic caused by tobacco use.[35]

Until then, the WHO had not exercised its power to advocate for and develop a global legal approach and make treaties for public health good, although this was within the WHO's constitutional mandate.[35,36] The constitution in Article 1 noted that the objective of the WHO is the "attainment by all peoples of the highest possible level of health".[37] The WHO was authorised to develop, adopt and implement standards, conventions, agreements and legislation that would drive the global public health agenda.[37]

In October 1994, Romer and Taylor's advocacy for an international treaty would pay off when, with the help of Judith Mackay (a British international tobacco control advocate), a resolution was adopted at the ninth World Conference on Tobacco or Health.[35,36] The resolution read as follows: "National Governments, Ministers of Health, and the World Health Organization should immediately initiate action to prepare and achieve an International Convention on Tobacco Control to be adopted by the United Nations."[38] The resolution was a precursor for the activity and action points that followed in the effort to implement the WHO FCTC.[36]

Years of debates followed and more evidence was presented.[35,36,39] As a result, in May 2003, 10 years after the Romer-Taylor meeting, the 56th World Health Assembly adopted resolution 56.1,[40] which paved the way for the WHO FCTC.[36] The WHO FCTC became the first evidence-based global treaty passed under the WHO whose aim was to deal with the worldwide tobacco epidemic.[36,38]

Tobacco as a global public health issue now had a political profile as the treaty closed for signature with 168 parties from various global organisations and member states of the UN or WHO.[36,41] The value of multinational cooperation was even included in the WHO FCTC's preamble,[33] which acknowledges "that the spread of the tobacco epidemic is a global problem with serious consequences for public health that calls for the widest possible international cooperation and the participation of all countries".[33] Consequently, the WHO FCTC is one of the most widely supported treaties in the history of the United Nations.[36] What is more, the WHO FCTC has been recognised as an important accelerator of the SDGs.[28] Also, the WHO FCTC is regularly monitored through the global progress report on the WHO FCTC.[42-44] As of 19 July 2017, the WHO FCTC has been ratified by 181 parties, representing 89.6% of the global population, and had 169 signatories, representing 92.11% of the global population.[45]

The treaty aims to deal with a range of factors that cause the global tobacco epidemic.[33,36] These causes include foreign investment, tobacco products, and illicit trading of tobacco, liberalisation of the trade, tobacco promotion, sponsorship, and advertising.[42] The WHO FCTC treaty is also comprehensive in its approach, as it goes beyond the health sector.[33] This broad approach is evidenced by its objective, which is to protect future and current generations from the devastating global economic, health, environmental and social effects of tobacco use.[33] The treaty consists of 10 parts, each with its own articles. The total number of articles is 38, each addressing a specific issue pertaining to tobacco control.[33]

The WHO FCTC stresses the significance of balancing the supply strategies with the demand reduction strategies.[33] Measures to reduce the demand for tobacco are found in Part Three, from Article 6 to Article 14, and include packaging and labelling of tobacco products (Article 11).[33] In addition, measures pertaining to reducing the supply of tobacco are found in Part Four and include Articles 15 to 17.[33] The WHO FCTC also includes critical areas such as protection of the environment (Article 18), questions related to liability (Article 19), scientific and technical cooperation and communication, institutional arrangements and financial resources, the settlement of disputes, the development of the convention and final provisions.[33] Articles 11, 12 and 13 are the main focus of this thesis.

Article 11 deals with packaging and labelling: it asks parties to adopt and implement measures outlined within three years after entry into the treaty.[33] Implementation should be in line with a party's national law. Article 11 calls for effective actions to guarantee that "tobacco product packaging and labelling do not promote a tobacco product by any means that are false, misleading, deceptive or likely to create an erroneous impression about its characteristics, health effects, hazards.".[33] Another measure in Article 11 calls for introducing health warnings on cigarette packages.[33] Article 12 of the WHO FCTC is concerned with education, communication, training, and public awareness, and calls for public awareness on the health risks of tobacco, including the effects of exposure to tobacco smoke and addictive traits of tobacco use.[33] Article 13, on the other hand, focuses on tobacco advertising, promotion and sponsorship and emphasises the ban on false, misleading or deceptive advertising and promotion.[33] Article 13 also calls for health or suitable warnings or messages on tobacco advertising, sponsorship and promotion as fitting in a country.[33]

To ensure that countries can meet their WHO FCTC mandates, the WHO introduced six evidence-based demand reduction tobacco control measures called the MPOWER package to turn around the epidemic.[21] MPOWER stands for **M**onitoring tobacco use and prevention policies, **P**rotecting people from tobacco smoke, **O**ffering help to quit tobacco use, **W**arning about the dangers of tobacco, **E**nforcing bans on tobacco advertising, promotion, and sponsorship, and **R**aising taxes on tobacco.[21] These six policies are consistent with the FCTC, and are monitored regularly by the WHO through the publication of various WHO reports on the global tobacco epidemic.[25,46-48]

Since the WHO FCTC came into force in 2005, tremendous progress has certainly been made with regard to curbing the tobacco epidemic worldwide by implementing the treaty.[25,41,43,49] The current global report on the status implementation of the WHO FCTC corroborates that significant progress has indeed been made since 2005.[44] However, the report also notes that implementation by parties of the various articles in the treaty is unequal.[44] The range of implementation is below 20% up to 80%.[43,44]

The disparity in the implementation of the WHO FCTC can be attributed to a number of factors, including industry interference.[43,44] Nevertheless, many parties have

indicated that, although remarkable progress had been made in their countries, more still needs to be done.[43,44] Conversely, the tobacco industry has become even more relentless in its interference.[43] Brandt[50] provides a powerful treatise on the history of tobacco industry tactics.[50] Brandt notes that industry interference has been going on for decades, even in the 20th century.[50] The industry at that time transformed itself and introduced a powerful public relations, marketing and innovative advertising machinery that exploits consumer culture and has developed the "social engineering" concept.[50] The concept is a formidable tool, and is still used by industry today – it is based on the premise that culture and society can be manipulated in order to create a favourable marketing environment for tobacco use.[50] This implies that, by purchasing tobacco, the consumer gives consent to use it and does so willingly.[50]

The claim of "willingness" on the part of the consumer as an industry tactic underpins the supposition that the consumer then also consents to the harms caused by tobacco. That is why even since the 1950s, when tobacco use was irrefutably linked to lung cancer, the industry tactic was not only to engage in social engineering, but also to create scientific uncertainty.[50] The tobacco industry would go on to launch a large campaigns to distort, condemn and confuse the science of the day.[50] The "not proven" claim by industry created difficulty in enforcing regulation over the industry, and therefore caused a delay in the implementation of public health policy.[50,51] Undeniably, there is evidence of industry interference in the implementation of tobacco control policy, particularly the WHO FCTC mandates.[51-53]

Sanders-Jackson et al.'s[54] analysis of more than 40 years of data on tobacco industry interference related to health warning labels revealed interesting information.[54] The authors found that, in countries where there were industry-volunteered policies, there was a delay in implementing the WHO FCTC mandate on health warning labels.[54] Furthermore, countries that started off with industry-volunteered health warning labels had delayed implementation of the WHO FCTC due to industry interference.[54] Most of the countries with industry voluntary health warning labels were in Africa.[51]The evidence, therefore, implies that the limited progress made by African countries in implementing the WHO FCTC[43,44] needs to be aggressively intensified because Africa is a key target of the tobacco industry.[25]

2.5 TOBACCO CONTROL IN AFRICA

Africa is likely to have the largest expected regional increase in smoking prevalence globally by 2030 if there are no tobacco control policies and effective prevention strategies.[55] The predicted increase in smoking prevalence is estimated to move from 15.8% in 2010 to 21.9% by 2030, which is a staggering increase of approximately 39%.[55] Most African countries have a low smoking prevalence,[31] with the current smoking prevalence lower among women than among men and ranging from 1.8% in Zambia, to 25.8% in Sierra Leone.[56] The forecasted future growth in smoking prevalence is expected to increase gradually from 77 million smokers in Africa in 2013 to 413 million smokers by 2100.[5] Africa therefore poses the greatest threat to tobacco control efforts.[57] The predictions are very concerning, because the projected rise in prevalence and subsequent devastation from tobacco use can be attributed to several factors.[24] These factors are include deceptive, aggressive advertising across the continent by the tobacco industry, the current low prevalence of smoking, increased life expectancy, a young and growing population, and more disposable income, leading to the affordability of tobacco products among Africans.[24,58]

In his publication about tobacco control in Africa, Drope[58] notes that, although the tobacco epidemic is showing signs of slowing down in developed countries, a substantial tobacco-related burden of disease is looming in the continent.[58] Africa can ill afford the devastation from tobacco use, as it is already grappling with a high burden of disease,[23,59,60] notably communicable diseases, which account for two-thirds of the total disease burden,[59] poverty-related illnesses,[60] injuries, and non-communicable diseases.[59,60] Non-communicable diseases are on the rise in Africa – together with disorders and injuries, they account for approximately one third of DALYs in this continent.[59] It is worth noting that Africa lost a staggering total of 675.41 million DALYs in 2011, 26% of those being from non-communicable diseases and the rest from, parasitic and infectious disorders (36%); maternal disorders (2%); intentional (2%) and unintentional (7%) injuries; respiratory infections (11%); neonatal illness (13%); and malnutrition (5%).[59] The DALYs statistic on non-communicable diseases is significant, bearing in mind that Africa is the second most populated continent in the world, has a growing young population, has 927 million people living in 47 countries, and is predicted to be a 21st-century demographic giant.[59,60]

Furthermore, it is of significance that tobacco use is the only risk factor that is common to the top four non-communicable diseases, namely cancer, chronic respiratory diseases, cardiovascular disease, and diabetes.[61] Evidence has shown that tobacco use is also associated with other diseases besides well-known ones such as cancer, cardiovascular disease, stroke, chronic obstructive pulmonary disease and others, contributing to comorbidities.[24] For example, tobacco use exacerbates the global tuberculosis (TB) epidemic and aggravates HIV infection,[24] both diseases which are already, independent of tobacco use, known to contribute to the high disease burden of communicable diseases in Africa.[59,60]

The consequences of tobacco use go beyond the burden of disease; it is also associated with poverty, and environmental, social, and economic harms.[22,29,62] Tobacco has been shown to have an economic cost to society (purchasing power parity) each year of approximately two trillion dollars.[24] For instance, evidence shows that although Tanzania earns $50 million per year from growing and selling tobacco, the country spends roughly $40 million for cancers related to tobacco use.[29] Moreover, tobacco is estimated to kill 175 million people globally, and more than 80% of tobacco-related deaths will be in developing countries by 2030.[21] The evidence of the projected mortality and additional consequences due to tobacco use in Africa is overwhelming, mainly because the health gains made so far in Africa will be affected,[59] and ultimately also the sustainable development agenda.[28]

Significantly, the 2030 sustainable development agenda explicitly mentions tobacco control as a critical component for sustainable development.[28,63] Sustainable development is in turn recognised as a key driver to achieve Africa's socio-economic transformation agenda 2063.[63] Notably, the report of the WHO independent high-level commission on non-communicable diseases affirms that one of the biggest threats to development and health globally is non-communicable diseases.[65] The report goes on to call among other things for multisectoral and multi-stakeholder action and strong governance in dealing with non-communicable diseases, in which tobacco use is a significant risk factor.[65] The report on tobacco control governance in Africa also supports the report of the high-level commission on non-communicable diseases.[66] What is more, the tobacco control governance report states that governance actions

that enable multisectoral collaboration are important conditions for successful tobacco control efforts and the implementation of the WHO FCTC.[66] Findings from the report on preventing a tobacco epidemic in Africa are similar. They call for a whole-of-government strategy focusing on governance for tobacco control.[62] By 19 July 2017, 42 countries belonged to the WHO African region, which is party to the WHO FCTC,[45] but Eritria, Malawi, Mozambique and South Sudan were not yet party to the treaty[45] and had yet to implement the WHO FCTC. Tumwine's study[67] on the implementation of the WHO FCTC in Africa found that there has been limited progress.[67] Husain et al.[68] also report that several Africa countries that have implemented the WHO FCTC have not met all the WHO FCTC provisions.[68] For example, several countries have implemented Article 8 on exposure to tobacco smoke, but many countries still allow for designated smoking areas.[67,68]

African countries fare much better in implementing Article 13, which relates to banning sponsorship, as well as the promotion and advertising of tobacco, although there is still room for improvement.[43,44,67] When it comes to Article 11, on packaging and labelling tobacco products, African countries still lag behind, compared to other countries.[68,69] Implementation rates of the WHO WHO FCTC have been reported to range from 78% in Kenya, all the way down to as low as 9% in Sierra Leone.[68] The findings therefore mean that there is a need to accelerate efforts in implementing the WHO FCTC in Africa, particularly because, as has been indicated, Africa is a main target for the tobacco.[45,62,68] Warner[70] suggests that it is essential to learn how to accelerate the adoption of policy interventions that are effective, as well as to understand the impact of the WHO FCTC.[70] Similarly, the report on preventing a tobacco epidemic in Africa states that "if tobacco control efforts are to be successful, the AU and African governments will need to understand, avoid, and overcome the variety of tactics used by the tobacco industry to undermine Africa's health, economy and development."[61] Indeed, with the successful implementation of interventions to tackle tobacco use, African countries could avoid an epidemic related to tobacco use.[68] For instance, in Ghana, the tobacco industry has been active for 50 years, but to date, there are still low levels of tobacco use, due to implementation of the WHO FCTC.[71] South Africa is another African country that has also seen some gains since implementing the WHO FCTC, but now needs to accelerate tobacco control efforts.[72]

2.6 TOBACCO CONTROL IN SOUTH AFRICA

The story of South Africa's initial tobacco control efforts can be linked with the early scientific evidence that was produced by Oettlè and published in the *South African Medical Journal* (*SAMJ*) in September 1963.[73-75] Oettlè linked smoking to lung cancer in a three-part series on smoking entitled "Cigarette smoking as the major cause of lung cancer".[73-75] In the recommendations limited to the third part of his paper,[75] Oettlè argues as follows: "*To those who suggest the need for more research, I would reply firmly there is no need for more research into the association between lung cancer and smoking. The association has been proved over the last 30 years*."[75] Oettlè[75] pleads: "*But let us have no further waste of time and argument about the existence of a causal relationship between smoking and lung cancer. In South African Whites the disease is responsible for more than 500 deaths a year*…"[75]

The editor of that 1963 edition of the *SAMJ*, Dr Crowhurst Archer, agrees with Oettlè, noting that he had presented local evidence that was relevant to South Africa.[76] Archer would go on to pen an editorial titled "Cigarettes and disease",[76] in which he writes:

> *The conclusions have always been the same: cigarette smoking is a major cause of lung cancer. The corollary is even more important: if cigarette smoking were to cease, there would be a substantial fall in the incidence of lung cancer…..We believe that Dr Oettle's careful and balanced presentation of the evidence will have convinced our readers of this fact and that they will now join us in considering what steps should be taken to deal with this important health problem*.[76]

Archer[76] recognised the challenges of the day in implementing steps to deal with tobacco use, as approximately 60% to 70% of White South Africans were smokers, the tobacco industry employed a substantial number of people, and was a significant contributor to national revenue.[76] Nonetheless, Archer warned even then that "the nation's health must take precedence over the nation's prosperity" and advocated that a memorandum be presented outlining the dangers of smoking cigarettes to the Minister of Health in order to protect the public.[76] At that time, globally, the dangers of tobacco use had already been established through several published reports and articles; calls to protect the public were growing worldwide.[15-18]

Some efforts were made to protect the South African public from the harms of smoking noted in Oettlè's 1963 publications. These included that in the 1970s local governments banned smoking in cinemas, and in the 1980s, smoking was restricted on domestic flights.[77] Several years would however go by before the government implemented Oettlè's 1963 recommendation of comprehensive government action to protect the public against the harms of smoking.[75]

In 1993, a full 30 years after Oettlè's recommendation,[75] the then Minister of Health of South Africa, Rina Venter, introduced the Tobacco Products Control Act of 1993[78,79] and, in effect, South Africa became the first country in Africa to have a tobacco control law.[58] This law, the main law on tobacco control in South Africa, has been criticised for not being comprehensive enough, but it provides a good basis for further regulation.[79] The Act includes the following provisions with regard to tobacco:[78]

- penalties and fines;
- giving power to local authorities to regulate smoking in public places;
- regulation of the contents on advertisements and cigarette packages together with health hazard warnings;
- vending machine restrictions; and
- the prohibition of sales of tobacco to people under 16 years of age.

From 1994, Minister Nkosazana Zuma strengthened the Tobacco Control Act of 1993[78] and made good on the promise she had earlier made at the all-Africa conference on tobacco control that was held in Harare, Zimbabwe, in November 1993[80] to take decisive action on tobacco use in South Africa.[78,80] The first regulations came in 1994 and related to specifications on the requirement of health warnings and labelling requirements on cigarette packages.[81] The Tobacco Products Control Amendment Act of 1999 then came into being, making provision for:[82]

- a ban on tobacco advertising and sponsorships;
- a ban on the free distribution of tobacco products;
- regulation of the maximum yields of tar and other constituents in tobacco products;
- a prohibition on smoking of tobacco products in public spaces, except in designated areas; and
- various penalties and fines for contravening the provisions.

On 19 April 2005, South Africa was the first African country to ratify the WHO FCTC,[83,33] the first multilateral public health treaty, which mandates South Africa to reduce both the supply and the demand for tobacco.[33] It also obliges South Africa to protect its citizens from the harms of tobacco use.[33]

In 2007, the Tobacco Products Control Amendment Act 23 of 2007,[84] which came into operation on 21 August 2009, contains stipulations regarding the following:[84]

- a ban on smoking in selected public places;
- new and amended definitions;
- increased penalties and offences;
- strengthened regulatory powers for the Minister of Health;
- a standard for manufacturing, together with product regulation of imported and exported tobacco products; and
- the removal of misleading terms, such as “mild” and “light” from packages and advertisements of tobacco products.

The next amendment, the Tobacco Products Control Amendment Act 63 of 2008,[85] came into operation on 21 August 2009 and contained the following provisions:[85]

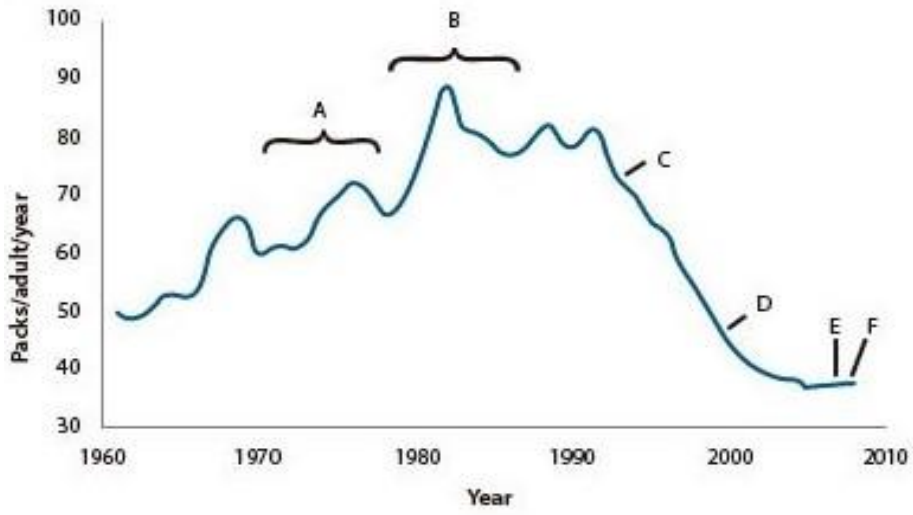
- a ban on sweets and toys that mimic tobacco products;
- a ban on sales of tobacco products at educational and health institutions;
- a ban on tobacco as rewards and free distribution of tobacco products;
- a ban on advertising one-on-one;
- an increase of the age of sale of tobacco products from 16 to 18 years;
- stricter regulation on vending machines;
- tougher regulation on
    - displays and signage of point-of-sale;
    - the labelling and packaging of tobacco products
    - the introduction of pictorial health warnings.

Following the 2008 amendment, the Reduced Ignition Propensity (RIP) 2011 regulation came into effect on 16 November 2012. It made provision for the following:[86]

- cigarettes that are Reduced Ignition Propensity (RIP);
- definitions;

- specific marking requirements and packaging; and
- retail points and display of tobacco products regulation.

Over the years, the various amendments and regulations (as discussed above) to the Tobacco Products Control Act of 1993[78] would have an impact on smoking consumption (see Figure 2.2).[77,79]



A: Ban smoking in cinemas by local governments (the 1970s)
B: Smoking on domestic flights restriction (the 1980s)
C: Tobacco Products Control Act of 1993
D: Tobacco Products Control Amendment Act No. 12 of 1999
E: Tobacco Products Control Amendment Act No. 23 of 2007
F: Tobacco Products Control Amendment Act No. 63 of 2008

Figure 2.2: Changes in cigarette consumption by South Africans (1960-2010)[77]

Source: Reddy et al., SAMJ; 2013[77]

The decrease in smoking consumption since 1994 in South Africa may be associated with the implementation of the various pieces of legislation listed in Figure 2.2.[77] In addition to the implementation of the legislation above, increases in the retail prices and excise taxes since 1994 are associated with a reduction in cigarette consumption.[87,88-90] As Figure 2.3 shows, between 1990 to 2004,[90] the total reduction by 39%[77] in cigarette consumption in South Africa is enormous.

The reduction in cigarette consumption stabilised between 2004 and 2009.[90] There was then another decrease in cigarette consumption from 2010 to 2018, except for a

three-year plateau between 2013 and 2016.[90] The periods of stability in cigarette consumption may be partly attributed to factors such as South Africa's falling behind in its tobacco control efforts.[24,91] In general, as the excise tax and retail price increased, there was a decrease in cigarette consumption (see Figure 2.3).[87,90] There is no doubt then that, as agreed globally, [92] including in South Africa, tobacco taxation since its implementation in 1994 was the foremost driver of the reduction in cigarette consumption.[93]

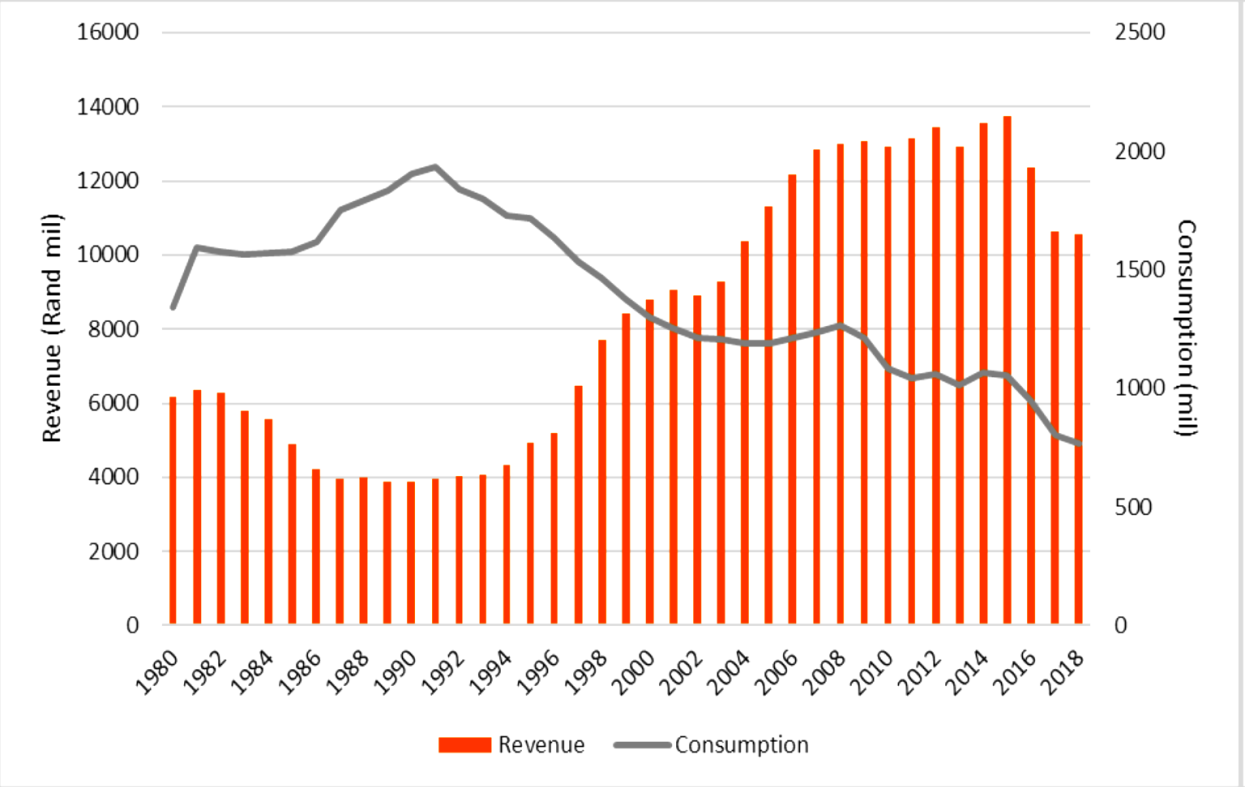


Figure 2.3: Cigarette consumption and real excise tax in South Africa, 1980-2018[90]

Source: Van der Zee K et al., SAMJ 2018[90]

The World Bank postulates that, if adult consumption of cigarette smoking was to decrease by 50% by the year 2030, approximately 180 million tobacco-related deaths can be avoided.[94] Based on current smoking patterns, it is predicted that about 500 million people alive today will eventually be killed prematurely as a result of tobacco use.[94] More than half of these are children and teenagers.[94,21] In South Africa, more than 42 100 people die from tobacco-related diseases every year.[24] This statistic is concerning, especially considering that South Africa has already been shown as

early as 2003 to be grappling with a quadruple burden of disease.[95] The quadruple burden of disease is comprised of communicable diseases, poverty-related illness, violence and injury, and non-communicable diseases.[95]

As far back as 2009, non-communicable diseases in South Africa have been shown to be adding to an already strained health system.[96] They are prevalent in both rural and urban settings, but occur most among the poor living in peri-urban areas.[96] Although South Africa has a national strategy on non-communicable diseases, there is no doubt that the prevalence of these diseases is increasing.[97] The reported emerging trends in non-communicable diseases indicated that 38.9% of the 594 071 deaths in 2010 were due to non-communicable diseases,[98] and 36% of those deaths happened before the age of 60 years.[99] The current trend is even more worrying: the 2018 global report country profile on non-communicable diseases estimates that these diseases account for 51% of all deaths in South Africa.[100]

Smoking has already been shown to have an impact on non-communicable diseases.[32,101-103] Smoking is the one risk factor that is common to the top four non-communicable diseases,[101] namely cardiovascular diseases, cancer, diabetes, and chronic lung disease.[101] When one thus considers every death related to a non-communicable disease, tobacco use on its own is responsible for one in six of these deaths.[103] Smoking is the single most preventable cause of non-communicable diseases,[21,103] so it requires urgent and immediate priority action to deal with the non-communicable disease crisis.[103]

Generally, the evidence on smoking and non-communicable diseases supports calls for more concerted efforts to control tobacco use in South Africa. Evidence shows that effective tobacco control promotes reduced tobacco use, and reduces tobacco-related non-communicable diseases in the short term, with benefits increasing over time.[104] Lightwood and Glanz,[105] as far back as 1997, in their paper on the short-term economic and health benefits of smoking cessation, showed that gaining a new non-smoker improves health and reduces medical costs related to stroke and acute myocardial infarction.[105] This finding is especially important for South Africa, whose disease burden includes both communicable and non-communicable diseases.[95]

Communicable diseases such as HIV/AIDs and TB accounted for 33.6% of deaths among South Africans in 2012, according to the second burden of disease study.[106] The recent Statistics South Africa (Stats SA) national mortality survey, published in March 2018, puts the figure of deaths for 2016 from communicable diseases at 31.3%.[107] The country's leading cause of natural deaths in 2016 in males was TB, which accounted for 7.6% (18 153) deaths.[108] Taking into account that the evidence indicates that smoking drives the global TB epidemic and aggravates HIV infection,[24] the findings on communicable diseases in South Africa are important.

Louwagie and Ayo-Yusuf,[109] in their South African study on tobacco use in patients with TB and high rates of HIV co-infection, found that particularly amongst male TB patients, smoking rates remained high.[109] Brunet et al.[110] also reported a similar finding and stated that, compared to the general South African population, there was a higher prevalence of smoking among patients with TB.[110] The findings on communicable diseases and smoking are particularly worrisome, especially considering that, globally, TB is the leading cause of death due to a single infectious agent.[111]

Additionally, the effectiveness of TB treatment declines, and the risk of developing TB is increased, by cigarette smoking.[24] In South Africa, the discussion on communicable diseases and smoking would be incomplete without mentioning the fact that the most impoverished South Africans always have had higher TB and HIV mortality, notwithstanding free TB and antiretroviral care for HIV/AIDs in the country.[108] Therefore, it goes without saying that the evidence on smoking and co-morbidities such as TB and HIV/AIDS suggests smoking-related health disparities.

There are irrefutably smoking-related disparities in South Africa.[22,77,112-116] Although there was a reduction of the tobacco smoking prevalence from 17.6%[112] in 2012 to 17.0% in 2017,[108,117-118] these disparities remain.[114,119-120] Smoking prevalence rates are typically affected by age, gender, race, cultural, economic status, geographic location, and the neighbourhood level of deprivation.[112,114,121,119,120] A study by Janse van Rensburg et al.[119] found, for instance, that although smoking prevalence had decreased in South Africa, a significant difference existed between the four race groups, within the race groups across the different ages, and between the genders.[119]

Their research showed that, although both genders displayed a reduction in prevalence, the decline was much more marked in males than in females.[119]

The disparity in smoking prevalence among genders in South Africa indicates a decline in the prevalence of smoking among males from 29.2%[112] in 2012 to 21.9% in 2017,[108,119] and a slight increase among females from 7.3%[112] in 2012 to 7.5% in 2017.[108,112,119] The increase in smoking prevalence among women was also reported in Ayo-Yusuf et al.'s[113] study. This study on smoking trends and disparities among South African adults found that the prevalence of smoking increased among women with the highest education status;[113] interestingly, the same increase in the prevalence of smoking was not found among males of a similar education status.[113]

Disparities have also been found among the racial groups.[108,112,119] Those who self-identified as Coloured (Mixed race) had the highest smoking prevalence of 40.1%, and Black Africans the lowest, at 15.1%.[112] Coloured males had the highest smoking prevalence, at 47.0%, followed by Indian males at 36.8%, White males at 18.0% and Black males at 28.5%.[112] Coloured women also had the highest smoking prevalence at 34.4%, and Black women the lowest at 3.3%.[112] Those between the ages of 45 to 54 years had the highest prevalence of smoking at 21.2%, followed by those between the ages of 35 and 44 years at 19.7%.[112] Those between the ages of 18 and 24 years had a smoking prevalence of 17.6%, with those above 65 years displaying the lowest prevalence at 10.8%.[112]

There was also no parity in smoking prevalence among the different provinces in South Africa.[112,113] The Western Cape province, for instance, had the highest prevalence of smoking at 32.9%, with the North West province having the lowest prevalence at 12.7%.[112] Gauteng had a smoking prevalence of 13%,[112] but this low prevalence masks the fact that, in some communities, the smoking prevalence remains high.[122] Teare et al.,[122] in their study conducted in Gauteng over a seven-year period, found that some communities had a significantly high smoking prevalence,[122] for instance, the community with the highest smoking prevalence had a prevalence as high as 77.4%, compared to the community with the lowest prevalence at 19.7%.[122]

Given this situation, it is essential to put in place interventions that would address smoking-related disparities and reduce tobacco use, in line with recommendations globally.[29,123-126] The interventions could be effective in reducing and even eradicating smoking-related disparities and achieve equity,[123,125-126] even though the causes have been noted to be multilevel and complex.[127]

It must be noted that smoking-related disparities often occur among the most marginalised and poor, and indeed exacerbate poverty.[29] In addition, implementing comprehensive legislation must have an impact in addressing both the tobacco use social determinants of health, and smoking-related diparities.[29,123,126] In South Africa, one of the most unequal societies in the world,[128] tobacco control policy has stalled,[91,129] so it is crucial to implement comprehensive legislation that will address smoking-related disparities and tobacco use.

If the recent South African 2018 Control of Tobacco Products and Electronic Delivery Systems Bill (Tobacco Bill)[130] passes into law, it will be the most comprehensive tobacco legislation and the tightest tobacco law in the country to date. The pending tobacco control legislation[130] includes provisions for the following:[130]

- the introduction of plain or standardised cigarette packaging;
- 100% Smoke Free areas, therefore a ban on indoor smoking;
- the regulation of vending machines;
- the regulation of Electronic Nicotine Delivery (ENDS) and Electronic Non-Nicotine Delivery Systems (ENNDS); and
- a ban on point-of-sale (POS) display and advertising.

The proposed new tobacco law,[130] as the socio-economic impact assessment on the Tobacco Bill shows, is expected to have an impact on several national priorities in South Africa, for instance, investment and economic growth.[129] Additionally, the Tobacco Bill is likely to address smoking-related inequalities[129] and also, importantly, address South Africa's partial compliance[91,129] with the WHO FCTC,[33] which calls for countries to implement the provisions of the treaty fully.[33]

South Africa's partial compliance with the WHO FCTC[33] is similar to that of other

African countries.[131] However, it is worrying is the recent evidence that strategies currently being implemented by African countries are not adequate to control the rise of tobacco use in the continent.[131] The implementation of the Tobacco Bill is envisaged to galvanise the measured success in tobacco control in South Africa.[129]

By implementing the Tobacco Bill,[130] one prognostication is that, with reduced cigarette smoking, smoking-related mortality and morbidity will decrease, which may lead to economic growth and higher productivity.[129] Furthermore, the public will gain from good health benefits: lower risk of illness means a workforce that is healthier, and this will, in turn, contribute more to the economy.[129] The Tobacco Bill forecast is undoubtedly consistent with recent evidence, which indicates that implementation of the WHO FCTC has had a successful effect on tobacco control policy in Africa by reducing the health-related effects of tobacco use and the use of tobacco.[132]

As previously discussed, South Africans' use of tobacco and, consequently, smoking prevalence, have declined over the years,[112,108,117-119] but cessation rates have remained low.[133] Also, as previously discussed, in some sections of the population, smoking rates remain high.[112,120] Smoking cessation is therefore is a priority, because it is known that quitting gives substantial and immediate health benefits,[118] including reduced cardiovascular risk, reduced risk of stroke and smoking-attributable cancers (for example, 87% of lung cancers are attributable to smoking).[21,117-118] Furthermore, a reduction in the prevalence of smoking will in time translate into fewer deaths from diseases caused by tobacco use.[121,134]

The WHO FCTC does call for a reduction in smoking prevalence in all countries,[33] in recognition of the major effects of tobacco use, and acknowledgement of the benefits of reducing tobacco use.[33] In South Africa, where disparities continue to exist even more than 20 years after the advent of democracy,[135] and where there is a quadruple burden of disease,[95] it is important to educate the population about the dangers of tobacco use and smoking-related health risks. In order to implement effective tobacco control policy, it is thus important to understand the pathophysiology of smoking.

2.7 PATHOPHYSIOLOGY OF SMOKING

Understanding the pathophysiology of smoking and how smoking causes disease is crucial because of several reasons. For instance, the evidence can assist in knowing the potential risks of smoking, identifying those who may be vulnerable, and it may assist in achieving the WHO FCTC.[33,136] The link between smoking, causation of disease and other smoking-related consequences has long been established.[3,11-13,15,17] However, the evidence on the mechanism(s) of how tobacco causes disease is still emerging.[19,136] What is already known is that disease from tobacco use is caused through several pathways, each with one mechanism or multiple mechanisms (see Figure 2.4).[136]

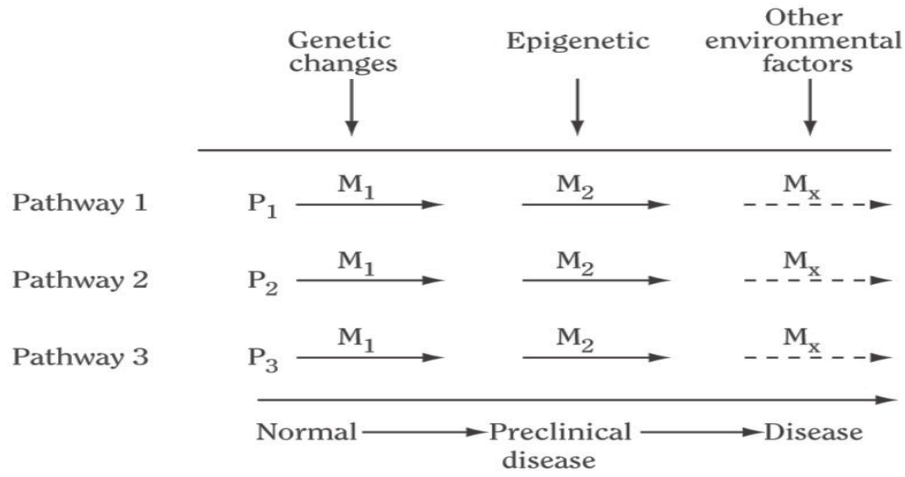


Figure 2.4: Pathways and mechanisms for disease causation by tobacco smoke[136]

P: Pathway **M**: Mechanism

Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2010.[136]

The same mechanisms may be present in different pathways; for instance, epigenetic factors through several pathways and mechanisms may cause the process of disease.[19,136] Therefore, there may be connections that are present between the pathways.[136] Understanding the pathways and mechanisms of disease causation by tobacco smoke will aid in knowing what can be used in public health for prevention, diagnosis, treatment of users of tobacco and tobacco control policy.[19,118,137]

For instance, the established pathophysiological mechanisms and pathways of

tobacco-related cardiovascular disease have led to key public health recommendations for tobacco control.[138,139] The relationship between cardiovascular disease and smoking has already been established. [138,139] Use of tobacco leads to the occurrence of atherothrombosis and eventually cardiovascular disease through several pathophysiological pathways that have been established (see Figure 2.5).[139]

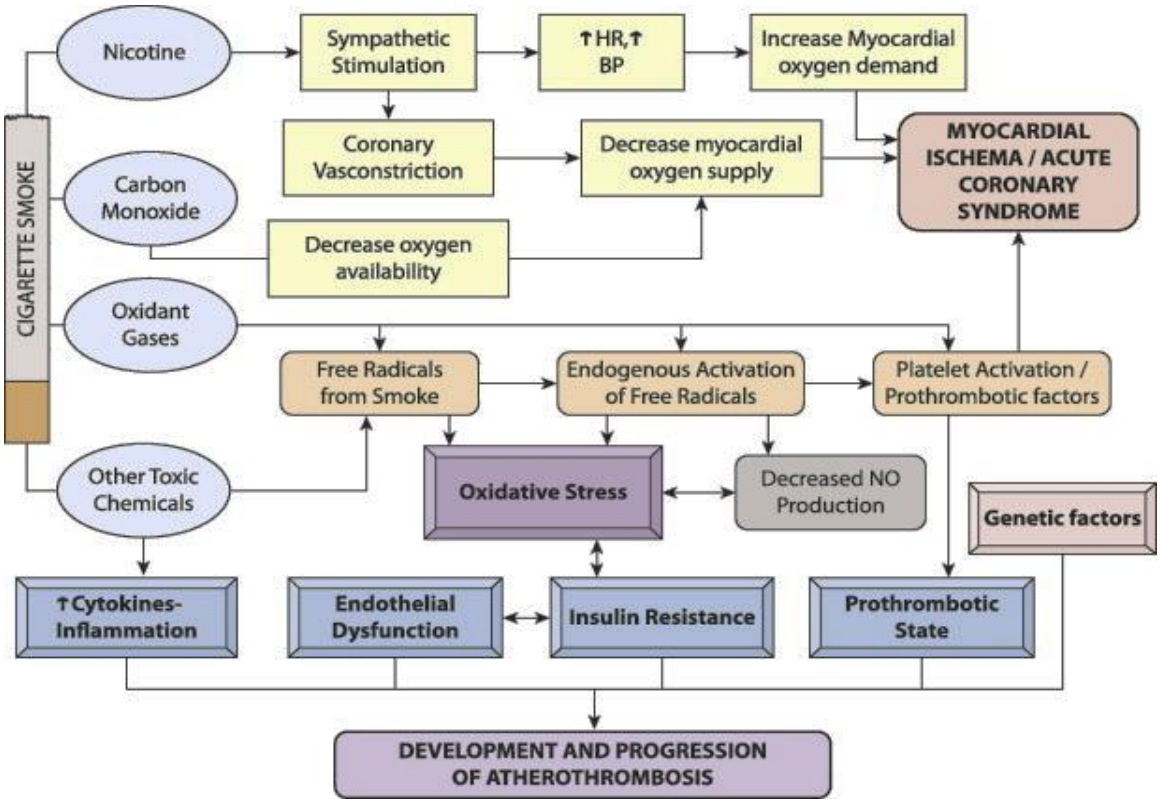


Figure 2.5: Different pathophysiological mechanisms of tobacco in the development of cardiovascular disease[139]

Key: **BP**: Blood pressure **NO**: Nitric Oxide **HR**: Heart rate

Source: Salahuddin et al., Global Heart: 2012.[139]

The main pathophysiological mechanisms that tobacco causes in the development of cardiovascular disease are activation of a hypercoagulable (prothrombotic) state, endothelial dysfunction, insulin resistance, oxidative stress that is increased, and increased cytokines-inflammation. In tobacco users, all these mechanisms work in combination as the pathophysiologic mechanism of the development and progression of atherothrombosis, as seen in Figure 2.5.[139] For example, when considering the pathophysiological mechanism that involves inflammation, it is known that smoking cigarettes is linked to chronic inflammation.[138] Moreover, in the pathogenesis of atherosclerosis, the role of inflammation is significant (see Figure 2.5) in the eventual

development of cardiovascular disease.[138] It is important to note that it is not only active smoking, but also second-hand smoke that poses a significant health risk of cardiovascular disease.[140] The mechanism by which second-hand smoke increases the risk of death could be by endothelial dysfunction of the coronary circulation.[138,141] The finding on second-hand smoke explains the increased risk of death because of cardiovascular disease in non-smokers.[142]

Another consequence of smoking whose pathophysiological mechanism is important to discuss briefly is that of cancer due to tobacco smoking. Lung cancer is the leading cause of cancer deaths globally.[24] Figure 2.6 (below) illustrates the pathway of how carcinogens in cigarette smoke cause cancer.

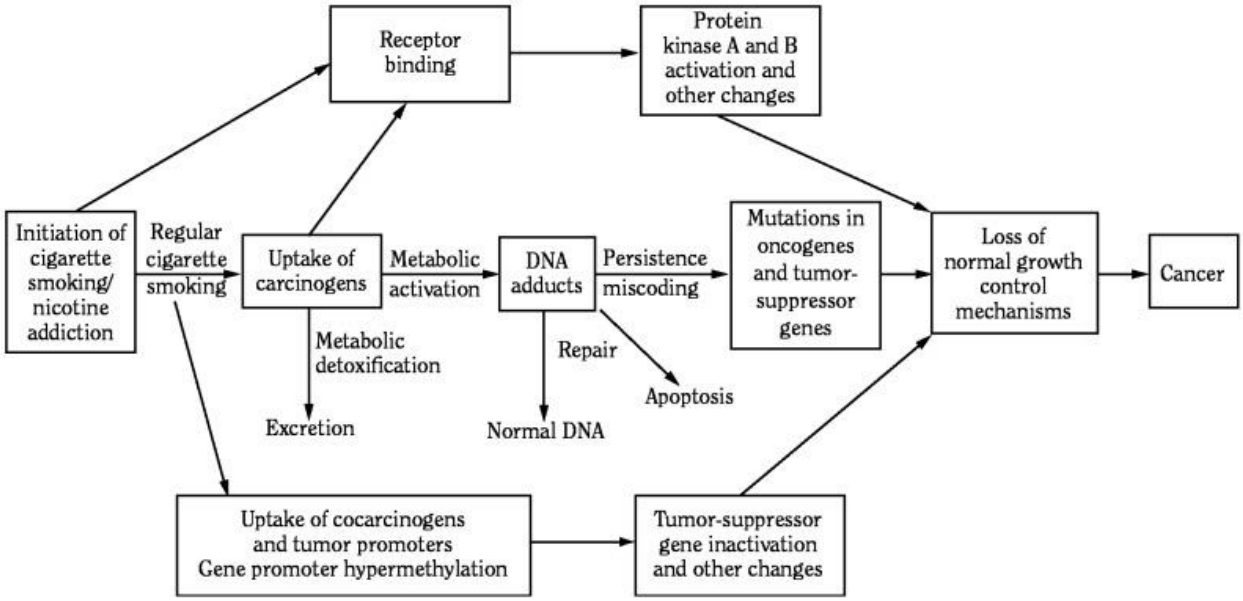


Figure 2.6: Cigarette smoking pathway for cancer causation by carcinogens in tobacco smoke[136]

Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2010.[136]

The major mechanism by which cigarette smoke causes cancer is that carcinogens in cigarette smoke lead to metabolic activation and DNA damage; subsequently, the mutations in important genes lead to a loss of the normal mechanisms of control and development of cancer[19,143] (see Figure 2.6).[19] Therefore, the evidence on the pathophysiology of smoking reveals that no exposure level is risk-free.[136,143] Hence, additional to the pathophysiology of smoking, knowledge on the neurophysiology of smoking is also key in tobacco control efforts.

2.8 NEUROPHYSIOLOGY OF SMOKING

A better understanding of the neurophysiology of smoking – its effect on brain function, among other things – is important. This knowledge may lead to novel, precise and improved tobacco control interventions especially for smokers, be they pharmacotherapies or behavioural interventions.[144-149] For example, understanding the neurophysiological mechanisms of smoking addiction can aid in improved and appropriate cessation interventions that may lead to successful quitting.[145,147,150] The information is particularly crucial when one considers that, even though the harms of smoking are known, smokers continue to smoke.[150,151]

Smokers find it difficult to quit – only 3% are able to quit successfully on their own.[151] It is particularly alarming that studies show that relapse for most who attempt to quit smoking occurs during the first week.[152,153] Furthermore, without help, only 5% to 17% of smokers have a successful quit attempt.[154] Since nicotine has already been found to be the main component that is addictive in tobacco,[144,155-158] it is vital to understand the neurophysiology of nicotine addiction, in order to grasp the difficulty of quitting.[150] The systems involved in the commencement and chronic use of tobacco need to be understood to develop appropriate and effective tobacco control interventions.[150,157]

Dani et al.[157] found that although nicotine produces its first effects by binding to acetylcholine receptors (nAChR), there are two neural systems that are important in the commencement and chronic use of tobacco.[157] Furthermore, in the entire process of nicotine addiction, there are specific nAChR subtypes in both neural systems. [157] During the commencement of nicotine addiction, to buttress behaviour, the first neural system (the mesocorticolimbic circuitry neural system) is key.[157] This meso-corticolimbic neural system is comprised of the dopaminergic pathway, which begins in the ventral tegmental area and extends to the nucleus accumbens.[157] The most critical nAChR subunits for the mesocorticolimbic neural system that cause nicotine self-administration and the recompensing features of nicotine are β2, α4, and α6.[157]

The second neural system is the epithalamic habenular complex, together with the interpeduncular nucleus.[157] This neural system is important in withdrawal symptoms and in controlling the dose of nicotine.[157] The epithalamic habenular neural system is joined through the fasciculus retroflexus.[157] In the epithalamic habenular neural

system (as opposed to the mesocorticolimbic neural system, see above), the most critical nAChR subunits, together with other subunits, are α5 and β4.[157] Together, the mesocorticolimbic circulatory and epithalamic habenular complex neural system are critical in the addiction to nicotine, and thus to chronic use of tobacco.[157]

Broady's[145] research complements Dani et al.'s[157] findings, indicating the brain function reactions as a consequence of chronic cigarette use, and thus chronic exposure to nicotine. Broady[145] found that the chronic use of cigarettes involved a significant reduction in the thalamus and putamen in the availability (together with an overall up-regulation) of β2 and α4 nAChR. What is more, the reaction to chronic cigarette use also included, in the basal ganglia, a reduction in the activity of monoamine oxidase (MAO) A and B.[145] Broady[145] noted that, following acute cigarette use or acute nicotine exposure, global brain activity was reduced, especially in smokers with personal traits of increased hostility.[145] The following reactions were also due to acute cigarette use: in the ventral striatum or nucleus accumbens, there was an increase in the dopamine (DA) concentration; during visual cognitive tasks, there was the activation of the visual cortex and thalamus; and lastly, there was activation of the visual system, prefrontal cortex and thalamus.[145]

Broady's[145] findings collectively indicate the neurophysiological changes due to acute and chronic smoking and that neurotransmission is augmented by smoking, via the cortico-basal ganglia-thalamic circuits. [145] This suggests that some of the effects of cigarette addiction, such as anxiety, irritability, increased attention and mood, may be due to the activation of these circuits,[145] which could occur as a combination of indirect stimulation – via dopamine (DA) release or monoamine oxidase (MAO) inhibition – or direct stimulation (by stimulation of nAChRs). [145]

Many other studies have also described brain function changes due to smoking.[159-162] Wang et al.[159] found that, compared to non-smokers, smokers had structural changes in the following areas: the insula, medial frontal gyrus, thalamus, inferior parietal lobe, and multiple areas of the default mode network (DMN), including the angular gyrus. [160] Moreover, Sutherland et al. [159] reported decreases in grey matter among smokers in areas such as the thalamus, prefrontal cortex, right cerebellum and left insula. Furthermore, some of the anatomical changes in the brain from chronic smoking

overlapped with the areas that showed anatomical changes from acute smoking.[159]

Wang et al.'s[160] findings detail the brain changes in chronic cigarette smokers after acute smoking (see Figure 2.7),[160] corroborating the findings of Sutherland et al.[159] and Broady.[145] Moreover, Wang et al.[160] note that, after acute cigarette smoking, as shown in Figure 2.7, smokers had decreased global brain connectivity (GBC) in the bilateral insula (**A**) and the default mode network (DMN) areas (**B**), with the bilateral inferior parietal lobule, middle frontal cortex, bilateral angular gyrus, and precuneus.[160] The DMN areas are key in cognitive performance that is goal-directed.[145,160]

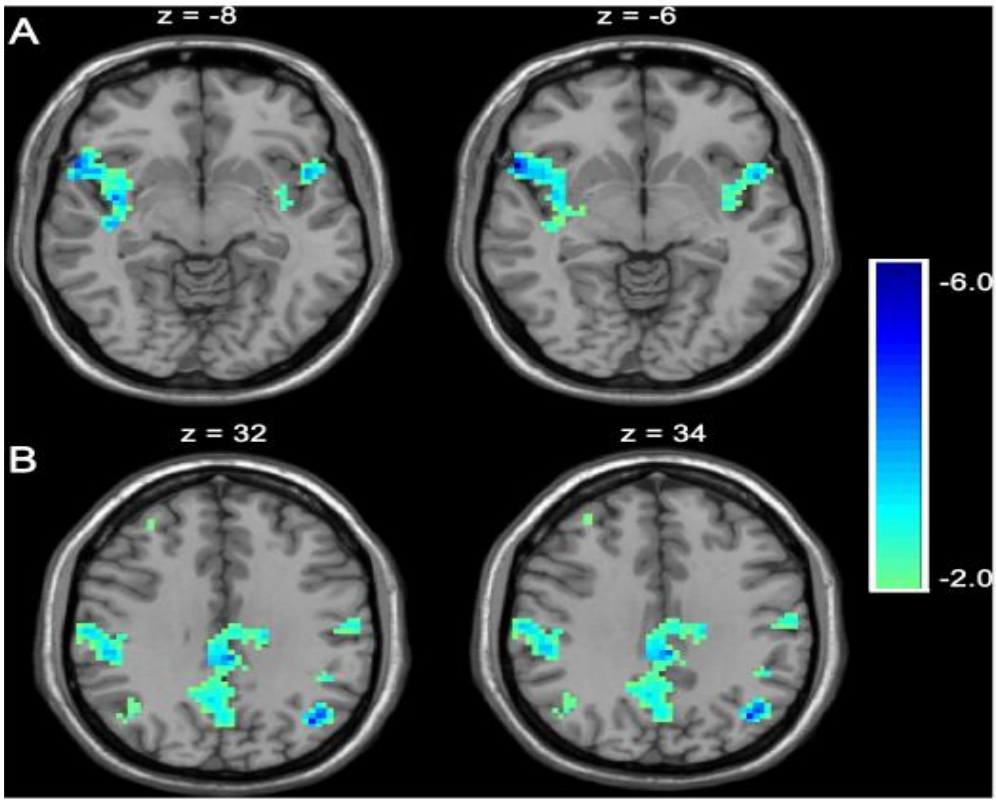


Figure 2.7: Decreased global brain connectivity (GBC) regions in smokers after acute cigarette smoking[160]

Source: Wang K et al. PLoS One; 2014[160]

Wang et al.'s[160] findings imply that relapses in smokers may involve a reduction in their global brain connectivity (GBC) and the anatomical changes in the DMN in smokers after acute smoking.[160] In sum, the findings on the neurophysiology of smoking provide evidence that may be used to develop newer and more effective cessation interventions that will aid in smoking cessation,[144-149] which may reduce the potential health consequences of smoking.[163]

2.9 HEALTH CONSEQUENCES OF SMOKING

The health consequences of smoking are numerous, and can affect almost all of the organs of the body.[18,19,22,24,136,164] Exposure to the approximately 70 known carcinogens and more than 7 000 chemicals that are toxic is what causes health consequences in tobacco users.[19,22,24] Indeed, as far back the 17th century, some of the potential dangers and health consequences of tobacco use were already recognised.[3,10] Since then, more evidence has emerged about the health consequences of smoking.[3,11-18] The seminal US Surgeon General's report of 1964 on smoking and health details key findings on the health consequences of smoking, particularly on lung cancer in both men and women.[18] The subsequent US Surgeon General's report, 50 years on, also discusses the health consequences of smoking.[19] Additionally, the report also recognises the enormity of the range of diseases caused by smoking and the general effect of poor health for the smoker.[19]

The finding on the generally poor health of smokers is particularly significant when one considers that a regular smoker loses approximately 10 to 11 years of life due to smoking.[24] Not only that, but the risk of death from all causes is increased in both men and women by cigarette smoking.[19] Furthermore, the harm caused by cigarette smoking starts with the use of even a few cigarettes; with increasing tobacco use, the risk of death and disease increases.[24]

For instance, lung cancer is one of the diseases that can be caused by tobacco use.[19.24,164] Lung cancer, as indicated previously, is the leading cause of cancer deaths globally, particularly in men, but now also in women.[24] Smoking increases the risk of developing lung cancer in women by 25.7 times, and in men by 25 times.[19] Cigarette smoking does not only cause cancer in the lungs, but can cause cancers in almost any other part of the body.[19,24,136,143,164] Some of the other cancers caused by tobacco use include cancer of the bladder, stomach, colon, oesophagus, liver and pancreas, to name only a few (see Figure 2.8, overleaf).[24]

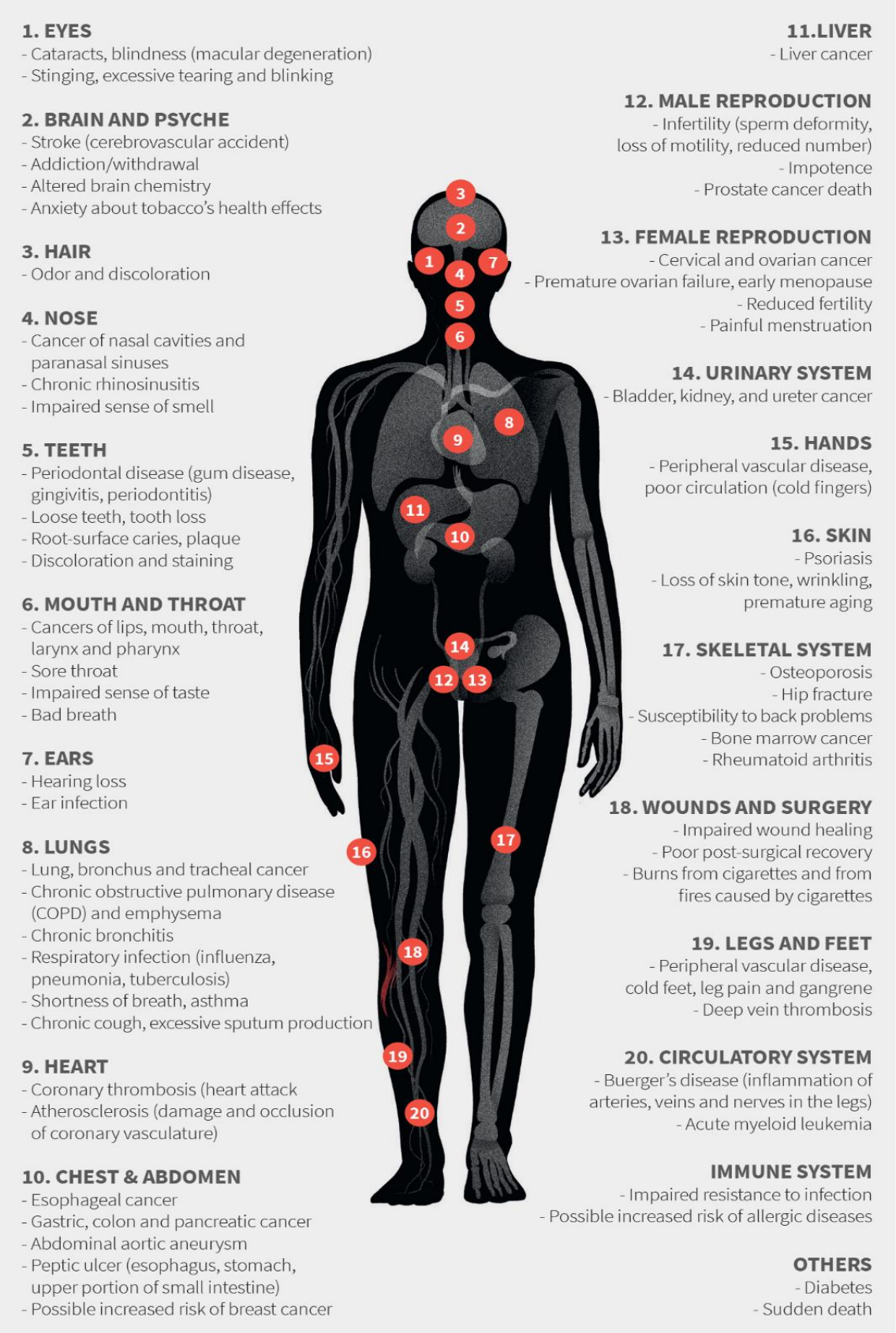


Figure 2.8: Health consequences of smoking[24]

Source: The Tobacco Atlas. 6th ed. Atlanta (GA): American Cancer Society and Vital Strategies; 2018.[24]

Another leading cause of death in the world caused by tobacco use is chronic obstructive pulmonary disease.[24] Those who smoke are about 12 to 13 times more likely to die from this disease than non-smokers.[19] Tobacco use accounts for 45% of the global death from chronic obstructive pulmonary disease.[24] Likewise, smoking is associated with stroke and heart disease.[19,24,136,139] Smokers, compared to non-smokers, have a two to four times higher risk of developing stroke and heart disease.[19] Smokers also have an increased risk of dying from stroke and heart disease, which are among the leading causes of death globally.[19,24] The various smoking-related health consequences are depicted in Figure 2.8 (previous page).[24]

Smoking-related health consequences in women require special mention, because, although women also suffer similar smoking-related health consequences to men, gender-specific differences do occur.[165,166] Additionally, women may have an increased risk of mortality and morbidity from smoking.[165,166] Smoking is associated with additional health consequences in women, including an increased risk of cervical cancer, reduced fertility, valvular cancer, and malformed menstrual function.[22,166] In pregnant mothers, smoking is associated with, among other things, preterm delivery, increased risk of ectopic pregnancies, spontaneous abortion, placenta previa, and abruptio placentae.[22,166] In their babies, smoking-related consequences include sudden infant death syndrome (SIDS), an increased risk of cleft lip and palate, childhood cancers, stillbirth and increased risk of intrauterine growth retardation (IUGR) even in mothers with second-hand smoke exposure.[22,166]

Undeniably, the health consequences of smoking are not only limited to active smokers, but also affect passive smokers, due to second-hand smoke exposure.[22,24,167,168] Indeed, many of the health consequences which affect active smokes also affect passive smokers[19,24,167,168] (see Figure 2.9, overleaf).[22]

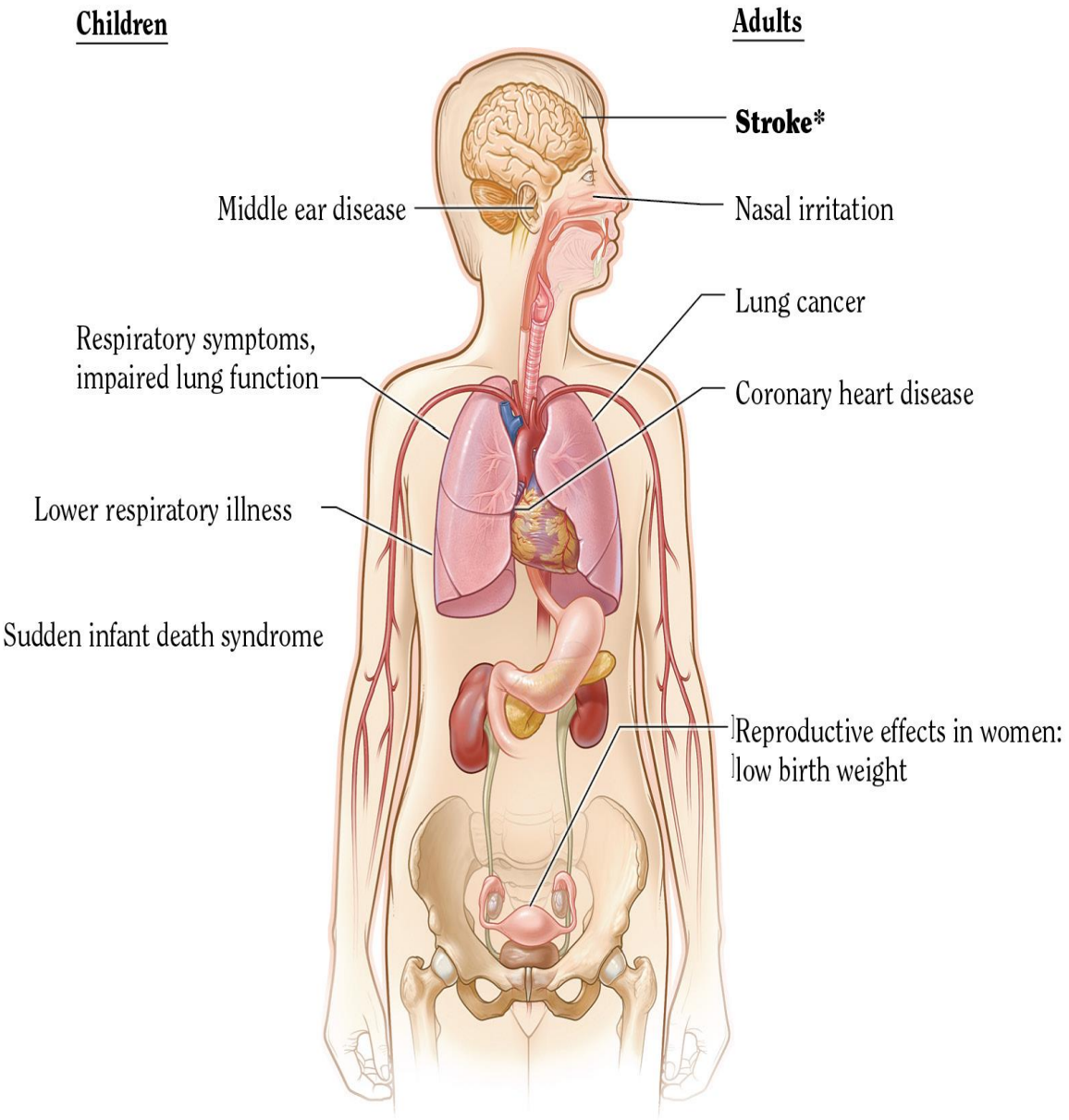


Figure 2.9: Health consequences of second-hand smoke exposure[19]

Source: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2014.[19]

***confirmed causality*

The health consequences from second-hand smoke are also significant, considering that a safe level of exposure to second-hand smoke does not exist.[22,167,168] In addition, second-hand smoke affects both children and adults.[19,22,24,166-168] Adult women had the highest number of deaths from second-hand smoke in 2016, namely 573 000 vs. 311 000 for adult men.[24] Adults who are exposed to second-hand smoke compared to those not exposed have a 25% increase in developing coronary heart disease and a

30% increase in developing lung cancer.[22,167] In children, second-hand smoke exposure is associated with (amongst other things) middle ear disease and lower respiratory illness.[19,167] The most common causes of death associated with second-hand smoke in adults are lung cancer and coronary heart disease (see Figure 2.9).[19,167]

Apart from second-hand smoke, third-hand smoke is also significant.[168-170] Third-hand smoke is defined as the toxic pollutant residue after smoking tobacco that remains on surfaces, for example, on clothing items or furniture.[22,168-170] This toxic residue can stay for many months, even after the surfaces have been cleaned or the clothes have been washed.[22,170] At present, the evidence on the health consequences of third-hand smoke is still growing.[168-170] Nonetheless, third-hand smoke has been shown, in the laboratory, to cause significant DNA damage to human cells, and it is genotoxic.[169,170] Also, third-hand smoke has been suggested to be disproportionally more harmful to vulnerable populations (such as children and infants) and it may exacerbate conditions such as asthma.[168,170]

Current evidence shows that, additionally, smoking has an enormous negative impact on other key public health conditions such as TB.[171] Smoking generally has a negative effect on the outcomes of comorbid diseases such as TB, HIV, mental illness and alcohol.[22,24,171] For instance, smoking has a negative impact on the efficacy of TB treatment and it drives the global TB epidemic.[24,171] In addition, smoking aggravates smoking harms in HIV-infected patients, and it exacerbates alcohol use and mental health conditions.[22,24,171]

Given that tobacco use accounts for more than 90% of smoking-related diseases and deaths,[24] it is imperative to ensure that populations worldwide have knowledge about smoking-related health consequences, as recommended by Article 4 of the WHO FCTC.[33] Quitting smoking has considerable health benefits.[172]

2.10 KNOWLEDGE ON SMOKING-RELATED HEALTH CONSEQUENCES

The WHO FCTC recommends informing populations about the harms of tobacco use in Article 4, which reads: ”Every person should be informed of the health consequences, addictive nature and mortal threat posed by tobacco consumption and exposure to tobacco smoke.”[33] One of the primary focuses of the WHO FCTC is raising awareness about the dangers of smoking to protect the public from these harms.[33] Sansone et al.’s[173] study found that participants who knew specific smoking-related health consequences were always more likely to have plans to quit.[173] Several studies internationally,[174-177] regionally,[178] and in South Africa[77,179,180] have examined knowledge of smoking-related harms. The studies have found, for example, that knowledge of smoking-related health consequences differed by the type of knowledge.[174-177] A study among Vietnamese adults reported that although the general knowledge of smoking-related health consequences was good, knowledge on specific health consequences such as vascular diseases was low.[174] Similarly, Mutti et al.[177] in their study conducted in Mexico and the United States found that fewer than half of the smokers knew that stroke is a potential health consequence of smoking.[177] Findings that knowledge on vascular diseases such as stroke is inadequate are concerning, since such non-communicable diseases are prevalent globally,[32] including in South Africa.[96,135]

Likewise, knowledge of smoking-related health consequences differed by socio-demographic factors such as gender,[177,181-183] age group,[177] level of education,[173,176] and geographic location.[173,178] Trofor et al.[181] in their study of six European countries noted that women had higher knowledge health risk scores compared to men in three of the six European countries (Hungary, Poland, and Germany) included in the study.[181] Other studies have also reported that, compared to men, women had significantly more knowledge of smoking-related harms.[177,182,183] Furthermore, those in older cohorts had better knowledge of smoking-related harms than those who in younger age groups.[177] Level of education was also a differentiator, since those with a higher level of education had better knowledge of smoking harms.[173,176] Higher income also tended to be associated with better knowledge of smoking-related health consequences.[176] Geographic location was another socio-demographic factor to consider. In this regard, Adeniyi et al.[178] in a study among Nigerian adults on access

to knowledge of health consequences found that knowledge of smoking harms differed, not only by level of socio-economic development, but also by geographic location.[178] Those who were living in an urban area had better knowledge of smoking harms than those living in rural areas.[178] Sasone et al.[173] reported a similar finding in India: participants in urban areas, compared to rural areas, had better knowledge of smoking-related harms.[173]

Knowledge of smoking-related health consequences also varied by tobacco smoking behaviour.[174,175,184-186] Current smokers had less knowledge of smoking-related harms than non-smokers.[174,175] Krosnick et al.[187] suggest that smokers may be underestimating their relative risk of smoking-related harms; hence, their lack of knowledge on the harms caused by smoking.[187] Moreover, Yang et al.[175] found that smokers may have an optimistic bias, in other words, they believe that smoking-related harms may not affect them, even though they smoke.[175] Weinstein[185] has suggested that, to minimise cognitive dissonance, smokers may minimise personal risk from smoking.[185] Research has confirmed that current smokers underestimate their personal risk of smoking and may want to shield themselves from worry about smoking-related harms in order to minimise cognitive dissonance.[184-186]

Studies have also suggested that smoking behaviour may be influenced by knowledge and understanding of smoking-related health risks and diseases.[173,188-189] For instance, planning to quit was positively associated with knowledge of the harms caused by smoking.[188,189] Willemsen et al.[190] found that, after the introduction of the European Union (EU) health warnings, there were an increased number of calls to the Dutch quitline.[150] Notably, exposure to health warnings, especially pictorial warnings, increases smoking-related health-risk knowledge and quit attempts.[188,191] A survey conducted among smokers in India found that only 10% of smokers planned to quit in the next six months and knowledge about smoking-related health risks was very low.[173] Dawood et al.'s[137] study conducted among Iraqi smokers reported that quit intentions were predicted by knowing smoking-related health consequences.[137] Lower knowledge levels regarding smoking-related health consequences were associated with the use of tobacco products other than cigarettes.[192-193,195] For example, current users of a waterpipe (also known as a hookah, or hubbly-bubbly) had lower knowledge

of smoking-related health risks.[192,193] What is more, generally, there is little knowledge about the health risks of waterpipe use.[194] Furthermore, smokers had less knowledge of the harms of e-cigarettes; many were not sure, and some thought e-cigarettes were less harmful.[195] Given that e-cigarette use is increasing,[196] this finding is concerning.[196] However, it is worth noting that Majeed et al.[197] and Huang et al.[198] found that, compared to 2012, there has been a progressive increase (in the US by 2015[197] and by 2017[198]) in knowledge that e-cigarettes are as harmful as, or more harmful than, other kinds of cigarettes.[197,198]

In South Africa, a national adult survey found that 87% of respondents acknowledged the harmful effects of smoking, but that just 58% were aware that cancer was associated with smoking, and only 36% associated heart disease with smoking.[180] Among youth, who are the main target of the tobacco industry,[199,200] there is some data about their knowledge of smoking-related harms.[77,201] However, although there has been a 26.5% reduction in current smoking prevalence among the youth over a period of 12 years (1999–2011), 16.9% still smoke[77] and 14.5%[201] use other non-cigarette tobacco products (mainly snuff).[201] About three-fifths of students thought that smoking was harmful to them. [77] Exposure to second-hand smoke (ETS) was reported; over one third of students lived in homes where others smoked in their presence.[201] More than 40% were exposed to smoke in public places,[201] and 29.5% had one or more parents who smoked. [77]

Knowledge of smoking-related harms is associated with second-hand smoke. Those who had no exposure to second-hand smoke had higher levels of knowledge about smoking-related health harms.[202-204] Taken together, the findings support implementation of Article 4 of the WHO FCTC, whose concluding recommendation on the importance of educating the public about smoking harms notes: "…and effective legislative, executive, administrative or other measures should be contemplated at the appropriate governmental level to protect all persons from exposure to tobacco smoke." One way to ensure that the public knows the harms of smoking is to implement health warnings on cigarette packs (Article 11),[205] as recommended by the WHO FCTC,[33] so as to increase knowledge on smoking-related health consequences.[33,205]

2.11 CIGARETTE HEALTH WARNINGS

The WHO FCTC[33] recommends that countries implement health warnings on cigarette packages.[33] This recommendation by the WHO FCTC[33] on the implementation of health warnings is a minimum requirement. Consequently, Article 11[33] and its guidelines[205] recommend that the recommended health warnings be pictorial,[33,205] because pictorial health warnings have been found to be more effective than text-only health warnings.[206-214] In 2001, Canada became the first country to replace text-only health warnings and implement pictorial health warnings.[69,215] Brazil soon followed in 2002. [69,215] A total of 100 countries had introduced pictorial health warning labels by the end of 2016,[69] following evidence mainly from developed countries about the effects of pictorial health warnings.[207-209,212,213,216] Some of the effects of pictorial warnings include increased numbers of quit attempts,[216] increased intentions to quit,[217] the prevention of smoking initiation among youth,[207] reduced cigarette consumption,[216,218] the education of smokers about smoking-related harms,[219] increased knowledge of smoking-related health risks for smokers and non-smokers,[207,216,220] as well as increased risk perception.[220,221]

Studies suggest that pictorial health warnings are easily recognisable, and more effective than text-only warnings, especially considering that they can be recognised better by youth[222,223] and people with low literacy levels.[224,225] Quisenberry et al.'s[225] study, conducted among rural smokers, found that those with low literacy levels paid longer and greater attention to pictorial warnings than those with higher literacy levels, especially among rural smokers.[225] Noar et al.[206] found that pictorial health warnings increase cognitive collaboration.[206] Pictorial health warnings are thus effective, as better cognitive collaboration arises as a result of increased attention to the health warning.[206,226] Collectively, the evidence is significant, because increased attention to cigarette health warnings is a main pathway to encourage smokers to quit.[227]

Yong et al.[227] found that prompting smokers to think about smoking-related health risks may lead smokers ultimately to attempt to quit because pictorial warnings increase their level of concern regarding smoking-related health risks.[227] Noar et al.[206] report that adding pictorial health warnings, thereby strengthening the effect of the cigarette package, increases knowledge of smoking-related health consequences.[206]

Numerous studies have also found that pictorial health warnings increase knowledge on smoking-related health consequences among smokers.[188,191,216] Compared to text-only warnings, pictorial warnings attracted and held smokers' attention better.[206,226] In addition, pictorial warnings were found by several studies to be believable, more likely to be noticed and read by smokers, easy to understand, and to be perceived to teach something new on the health effects of smoking.[206,214,224,228-230]

Moreover, pictorial warnings that make the consumer aware of a broader range of health effects of smoking were associated with greater recall and behaviour change, including more attempts and higher motivation to quit.[231,232] A study by Romer and Jamieson[189] found that intention to quit and eventually quitting smoking successfully was achieved by those smokers who perceived greater health risk from smoking.[189] Other studies found that, among smokers, provoking negative emotions increased quit intentions,[217,233,] and encouraged attention.[206,233] Brewer et al.[231] in a randomised control trial where participants were exposed to pictorial health warnings found that 5.7% of smokers had quit smoking for at least one week, and attempts to quit had an absolute increase from 34% to 40%.[231]

It is known that pictorial health warnings are effective for both smokers and non-smokers,[207] and that pictorial health warnings are effective in smoking prevention and cessation,[188,206,207] but it remains crucial to document and understand the factors that influence the effectiveness of these warning labels. The effectiveness of a pictorial health warning package depends on numerous factors, including design, position and size.[205,234] Hammond et al.[234] suggests that the effectiveness of pictorial health warnings can be measured in a number of ways, including

- measures of salience, thus the reading and noticeability of the warning;[234]
- changes in the perception of health risk and knowledge;[234] and
- motivation/intention to quit and behavioural changes, including consumption,[234] quit attempts and successful cessation.[234]

The findings by Hammond et al.[234] are consistent with the Persuasive Communication Theory[236] (see Section 2.13.1). The findings are also consistent with the recommendations of Article 11 of the WHO FCTC,[33] together with the guidelines[205] which indicate that design features that increase attention towards the health warnings

are indeed important in enhancing the effectiveness and visual impact of warning labels.[33,205] These design features include the clarity of the warning, its position and size, the colours used, the text and size of the text.[33,205] The guidelines for the implementation of Article 11[205] recommend that a pictorial health warning be clear in its message, simple, brief, clearly defined and easily understood.[205] Furthermore, for text of the pictorial heath warningbullet points should be used rather than continuous text, and words such as “Danger” and “Warning” should be applied.[205] In addition, it is also crucial to use bold type, upper case lettering, large fonts and borders around the warning text of the pictorial warning label because, all these measures have been suggested to have an impact on the effectiveness of pictorial health warnings.[33,205]

Colour has also been shown to influence the effectiveness of pictorial health warnings. The use of contrasting colours has been recommended, for example, black writing on a white background to increase noticeability and legibility.[205] Colours such as silver and gold as text colours were shown to be less legible than, for example, black text. [237,205] The position of the pictorial warning is also essential.[205] Warnings that are located on the top part of the main display are more likely to be seen and recalled, while those on the side and back of the package are more likely to be obscure and have significantly less impact.[205,234,238] Hammond et al.[234] already found that among smokers, prominent pictorial health warnings were associated with higher levels of awareness and perceived effectiveness.[234] Hammond et al.’s[234] findings are corroborated by more recent evidence, which suggests that effective pictorial health warnings are those that cover 50%[239] or more[240] of the cigarette pack.[207,239-241] Thus, the larger the size of the pictorial health warning, the more effective it is.[69,215]

It is worth mentioning research that indicates that health warnings are subject to “wear-out” and should be updated approximately every two years to maximize their impact.[207,234,243,244] Li et al.[245] suggest that to prevent wear-out, the type of pictorial health warning may be less critical than warning size.[245] Furthermore, Anshari et al.[228] found that the effectiveness of pictorial health warnings was maintained for a period of one year among smokers who had seen the pictorial health warnings.[228] Moreover, studies found that believability is maintained over time,[224,229,230] and no “wear-out” has been found for the believability effectiveness outcome.[228] Consequently, improving the

cigarette pack,[216] for instance, by improving the design and format of a warning, may enhance noticeability and believability, and can make a pictorial health warning more effective.[288] Therefore, although believability is crucial when preventing wear-out,[288] the pictorial image and content[205] of the pictorial health warning remain essential.

The choice of the warning message or message content is also crucial in the effectiveness of a warning label.[205] Health warning messages have evolved from more general warnings in the past. They now fall into roughly four content categories: health risks, impact on others, social consequences, and encouraging positive attitudes about quitting.[230,246] Perception of a substantial health risk from smoking has been suggested by studies to influence intention to quit and finally successful quitting.[232,247] Romer and Jamieson[189] also reported in their research that motivation to quit was influenced by concern about the impact of smoking on others.[189] Several studies also highlight the influence of social consequences on the effectiveness of pictorial health warning messages.[238,247] Messages that appeal to social norms and focus on undesirable social effects of smoking, such as bad skin, yellow teeth and halitosis, have been shown to be effective, especially among young people.[238,247] Messages also have to highlight the benefits of quitting, therefore encouraging a positive attitude.[238] For instance, messages that focus on the benefits of quitting encourage smokers to feel that quitting is achievable, desirable and worthwhile.[238,248]

Over and above message content, as discussed above, health warnings must execute the message in order to have the desired impact – one that results in behaviour change.[205] Recommendations that are simple, and clear messages that are communicated directly are more effective than ambiguous messages.[205,207] The above discussion highlights the importance of careful consideration of all these elements when framing messages.[248-250] Studies show that cigarette warnings use of gain-framed messages (focusing on the benefits of abstaining from a behaviour) or loss-framed messages (focusing on the negative consequences of adopting or continuing a behaviour).[248-250] Whether a message is more effective framed as a gain or loss is rooted in the Prospect Theory.[251] According to Prospect Theory, when people focus on potential gains, they are not motivated to take risks or face uncertainty. [251] Instead, people choose a definite gain over a potentially uncertain gain.[251] When focusing on

loss, though, people are more likely to accept risk and uncertainty when the risk includes the possibility of avoiding loss. [251]

Previous studies have shown that although most anti-smoking messages focused on the cost of failing to quit, smoking cessation should be emphasising the benefits of quitting, in other words, they should be gain-framed.[249,252] A study by Goodall and Appiah[248] differed, however, showing that adolescent smoking-related attitudes and behavioural intentions appeared to be positively influenced by loss-framed warnings. Goodall and Appiah[248] argue that the difference in their findings may be attributed to the fact that previous studies had investigated adults and few had looked specifically at smoking prevention and smoking cessation. [248]

It is also important to arouse the appropriate emotional response; hence, pictorial health warnings that elicit strong emotions have been found to be more effective.[207,217] A study by Strahan et al.[238] suggests that fear appeals are more effective motivators of behaviour change.[238] Similarly, Hall et al.[217] found that the main mechanism that influences quit intentions is to increase negative affect.[207] Therefore combining emotional and rational responses to health warnings is effective.[238] Several studies are consistent with these findings, where the highest ratings were generally accorded to the hardest-hitting messages, which included pictorials on the health consequences associated with smoking.[216,219,220,221]

Kennedy[253] suggests that the psychology involved in the perception of pictures and may differ across cultures.[253] In this regard, it is worth noting that, as far back as 1937, Nadel[254] recognised that although different cultures had similar identification of pictures, cultures differed in their interpretive comments.[254] Hudson,[255] in a review, also notes that the interpretation of pictorials differs across cultures.[255] Collectively, the findings on cultural differences in the interpretation of pictorials are an important consideration, at a time when South Africa prepares to implement pictorial health warnings on cigarette packages,[130] given that the South African population is made up of different population groups,[120] and therefore different cultures, which may differ in their interpretation of the effectiveness of pictorial health warnings.

Even though pictorial health warnings aim to protect the public from smoking-related health consequences,[33,] at times, reactions to these warnings can differ, and may include resistance.[217,256,257] The emotional and cognitive resistance following exposure to pictorial health warnings, due to the sentiment that a person's autonomy is being threatened, is called reactance.[258-260] Reactance is an essential consideration for pictorial warnings, as it can negatively affect the effectiveness of a pictorial health warning.[217,256,257] For instance, Hall et al.[217] found that the effect of pictorial health warnings on intentions to quit is somewhat suppressed by message reactance. Furthermore, although the perceived risk is associated with greater intentions to quit, reactance is associated with a perceived lower risk.[217] By contrast, Cho et al.[261] caution against not implementing pictorial health warnings due to the short-term effects of reactance, but instead suggest considering that there are long-term positive effects to implementing pictorial health warnings to promote smoking cessation.[261] For example, even in smokers with high affective state reactance, pictorial health warnings were effective in increasing smoking cessation.[261]

Even in the face of overwhelming evidence about the effectiveness of pictorial health warnings, it is still prudent to know that there is likely to be tobacco industry interference.[50-53,71,262] For example, Cohen et al.'s[262] 14-country study to assess the level of compliance with the WHO FCTC requirements for health warning labels found that, alarmingly, in 11 out of the 14 countries, compliance with the WHO FCTC requirements for health warning labels was less than 90%.[263] This finding by Cohen et al.[263] is worrying, considering that Kotnowski et al.[263] found that alteration of cigarette packaging could lead to an increase in cigarette sales by making the brand on the cigarette package more appealing, and distorting the perception of smoking-related health risk.[262] Certainly, current evidence shows that cigarette packaging is being used intentionally by the tobacco industry to promote and market its products.[264] Stead et al.[265] also found that the tobacco industry is using cigarette packaging to target customers, for instance, the youth[199,200] and women,[266] and to advertise.[265] Taken together, these findings led to the recommendation that the pictorial health warnings on cigarette packs should be strengthened[191,216] by introducing plain packaging,[205,267,268] as research has shown that pictorial health warnings are most effective on plain packs.[265,269-271]

2.12 PLAIN PACKAGING

The WHO FCTC[33] guidelines for Articles 11[205] and 13[267] recommend that countries introduce plain tobacco packaging to remove the influences of promotion and advertising on the cigarette pack.[33,205,267] This implies that the attractiveness of the cigarette pack is reduced, together with the ability of the tobacco industry to use cigarette packaging to advertise the product.[205,68,271] Article 11 defines plain packaging as "measures to restrict or prohibit the use of logos, colours, brand images or promotional information on packaging other than brand names and product names displayed in a standard colour and font style (plain packaging).[205]

The first publication to suggest plain packaging of cigarette packs was published by Beede and Lawson[272] in 1992. They found that presenting the pictorial health warnings on a plain pack as opposed to a branded pack produced greater recall of even the non-pictorial elements of the plain cigarette pack.[272] In 1995, Cunningham and Kyle[273] followed with a publication on the topic, and indicate that Canada planned to implement plain cigarette packaging.[273] This Canadian publication also details the benefits of implementing plain packaging over branded cigarette pictorial health warning packs.[273]

On 1 December 2012, Australia became the first country to legislate and enforce plain packaging on all its tobacco products:[274] all branding (trademarks, imagery, corporate logos and colours) was removed.[274] The law mandated tobacco industry to print the brand name only, in a prescribed size, font and place on the pack, together with the health warnings and any other legally mandated information. [274] The Australian plain packaging law's objective is to "improve public health",[274] among other reasons, to increase the effectiveness of pictorial health warnings, reduce the appeal of tobacco products, and reduce the ability of the design features of the health warnings to mislead users about the harms of tobacco use.[274] Implementation of Australia's plain packaging law[274] has elicited aggressive resistance from the tobacco industry,[275] which argues that the law infringed on its intellectual property rights as enshrined in the Paris convention[276] and the Trade-Related Intellectual Property Rights (TRIPS).[277] However, the Australian High Court ruled against the tobacco companies in August

2012, on the basis that the law is not about acquiring property,[278] but is about restricting property.[278,279]

The Australian plain packaging law's objective is to "improve public health",[274] among other reasons, to increase the effectiveness of pictorial health warnings, reduce the appeal of tobacco products, and reduce the ability of the design features of the health warnings to mislead users about the harms of tobacco use.[274] Implementation of Australia's plain packaging law[274] has elicited aggressive resistance from the tobacco industry,[275] which argues that the law infringed on its intellectual property rights as enshrined in the Paris convention[276] and the Trade-Related Intellectual Property Rights (TRIPS).[277] However, the Australian High Court ruled against the tobacco companies in August 2012, on the basis that the law is not about acquiring property,[278] but is about restricting property.[278,279] Furthermore, although the results of the studies vary, Stead et al.[265] in a systematic review established that plain packs are effective because they improve several effectiveness outcomes such as believability, recall, seriousness, and attention.[265] Believability is a critical effectiveness outcome, as it is the only outcome with no "wear-out".[228] Considering recall, Al-Hamdani[282] found that recall of the pictorial warning is far better when the pictorial warning is on a plain pack, compared to a branded pack.[282] Moreover, non-smokers recall the pictorial warning on a plain pack better than smokers.[282]

Shankleman et al.[269] found that plain packs are effective for non-smokers, as salience improves with a plain pack.[269] Besides, increased salience of the plain pack is associated with the debunking of some of the beliefs held by smokers about smoking-related harms and cigarette product attributes, for instance, that effects are altered by the strength of a cigarette[265] – ensuring that the plain pack is taken seriously.[265] Interestingly, increased salience of plain packs also has a positive effect on text-only and pictorial warnings on plain packs, as attention is given to them.[269]

Noar et al.[191] found that improving the health warning on cigarette packaging increases attention to health warnings.[191] For example, paying attention to the pictorial health warning increases among non-smokers,[283] weekly smokers,[283] and adolescents[284] when the pictorial warning is placed on plain packaging. The

effectiveness of the plain pack though, is mediated by the position, type and size of the health warning.[265] Consequently, strengthening the pictorial health warning on the cigarette pack,[216] for instance, by improving the design and format of the pictorial health warning so as to enhance noticeability and believability as discussed, may make a pictorial health warning more effective.[216] Mays et al.'s[285] study found that warnings on plain packs are effective, and increase motivation to quit much more than warnings on branded packs.[285] Kotnowski et al.[286] also found that plain packs are effective among young women, as they reduce misleading information on the pack and reduce the demand for cigarettes.[281] Moodie et al.[286] also found that young adults who use plain packs report that the plain packaging increases negative perceptions and feelings about the pack and smoking.[286] For example, respondents associated the colour on the plain pack with beliefs about product harm:[265] participants thought packs with darker colours contained more harmful cigarettes and that the cigarettes in the pack were of a lower quality.[265]

Plain packs have also been associated with poor personal perception, in other words, the notion that those who use plain cigarette packs have poor personal attributes.[265] Wakefield et al.[271] found similar sentiments about negative personal attributes, namely that smokers of plain packs are thought to be less outgoing and sociable.[271] Therefore, the implementation of plain packaging may lessen positive views about smoking and thereby promote cessation.[288] Furthermore, the implementation of plain packs may eliminate promotion and advertising on cigarette packs.[267] Consequently, it may increase the effectiveness of the messages and health warnings.[205]

However, the implementation of the plain packs is unlikely to happen without interference from the tobacco industry, as can be seen when Australia implemented its plain packs.[289] Countries such as South Africa[130] and others[280,290] that are planning to implement plain packs will need to be vigilant and deal with the potential arguments from the tobacco industry. These arguments include claims that plain packs are a violation of intellectual property law, as tobacco industries cannot use their trademarks, that plain packs will increase illicit trade and counterfeiting, that tobacco consumption will increase because of cheaper products, and that the measures required to implement plain packs will take too long to implement.[268]

2.13 THEORETICAL FRAMEWORK

This thesis was underpinned by five main theoretical frameworks, namely Persuasive Communication Theory, the Extended Parallel Process Model (EPPM), the Theory of Planned Behaviour, the Elaboration Likelihood Model of Persuasion, and the Transtheoretical Model (TTM). Collectively, these frameworks serve as a mechanism to ground the analysis and interpretation of the findings of this thesis and, finally, to reach conclusions and make recommendations emanating from the thesis's two main research questions, namely:

- What is the level of knowledge South Africans have on tobacco health risks?
- What reactions will South Africans (non-smokers and smokers) have towards the tobacco health warning messages – text-only and pictorial, those with brand design elements (branded) and those without brand design elements (plain).

2.13.1 Persuasive Communication Theory

Persuasive Communication Theory is one of the main theories that was used in this thesis to assess the effectiveness of the health warnings, namely text-only and pictorial warnings with(branded) and without (plain) brand design elements on the packs. Participants rated their responses using previously validated measures of effectiveness, grounded in the constructs of Persuasive Communication Theory, namely "attention", "communication", "identification" and "effect".[236]

2.13.2 Expanded Parallel Process Model (EPPM)

The Expanded Parallel Process Model (EPPM) was also used in this thesis. The EPPM is a theoretical framework for research dealing with fear appeals. The model defines fear appeals as messages that are persuasive, so that when people are exposed to these messages, fear is aroused to avoid a threat.[291]

However, EPPM suggests that those with low efficacy will reject the responses.[292] Such responses could, for instance, include reactance, which is when there is a perception that there is a threat to a person's autonomy, and then emotional and cognitive resistance can follow exposure to health warnings.[217] The EPPM was used to ground the part of the thesis which dealt with fear appeals. This part included the

design of pictorial warnings with fear appeals and interpretation of the findings from exposure to pictorial warnings with fear appeals.

2.13.3 Theory of Planned Behaviour

In this thesis, the Theory of Planned Behaviour was used to determine and interpret the various factors, beliefs and attitudes related to knowledge about the harms of smoking and also the effectiveness of health warnings.[293] This theory links beliefs and behaviour; it posits that an individual's behavioural intentions (plan) and behaviour are shaped by the intention toward behaviour, subjective norms, and perceived behavioural control (self-efficacy). [293]

2.13.4 Elaboration Likelihood Model of Persuasion

The thesis used the Elaboration Likelihood Model of Persuasion,[235] which theorises that, where the message is important to the participant, the central route of persuasion is used, and if the participant is not interested, the peripheral route is used. [235] The central and peripheral route to persuasion are as depicted in Figure 2.10,overleaf.[235]

This model was used to ground the findings and discussion that emanated from the experiment to determine the effectiveness of health warnings on tobacco packs – text-only and pictorial warnings with brand design elements (branded) and without brand design elements (plain). The Elaboration Likelihood Model of Persuasion thus explains the route of persuasion for the health warnings.

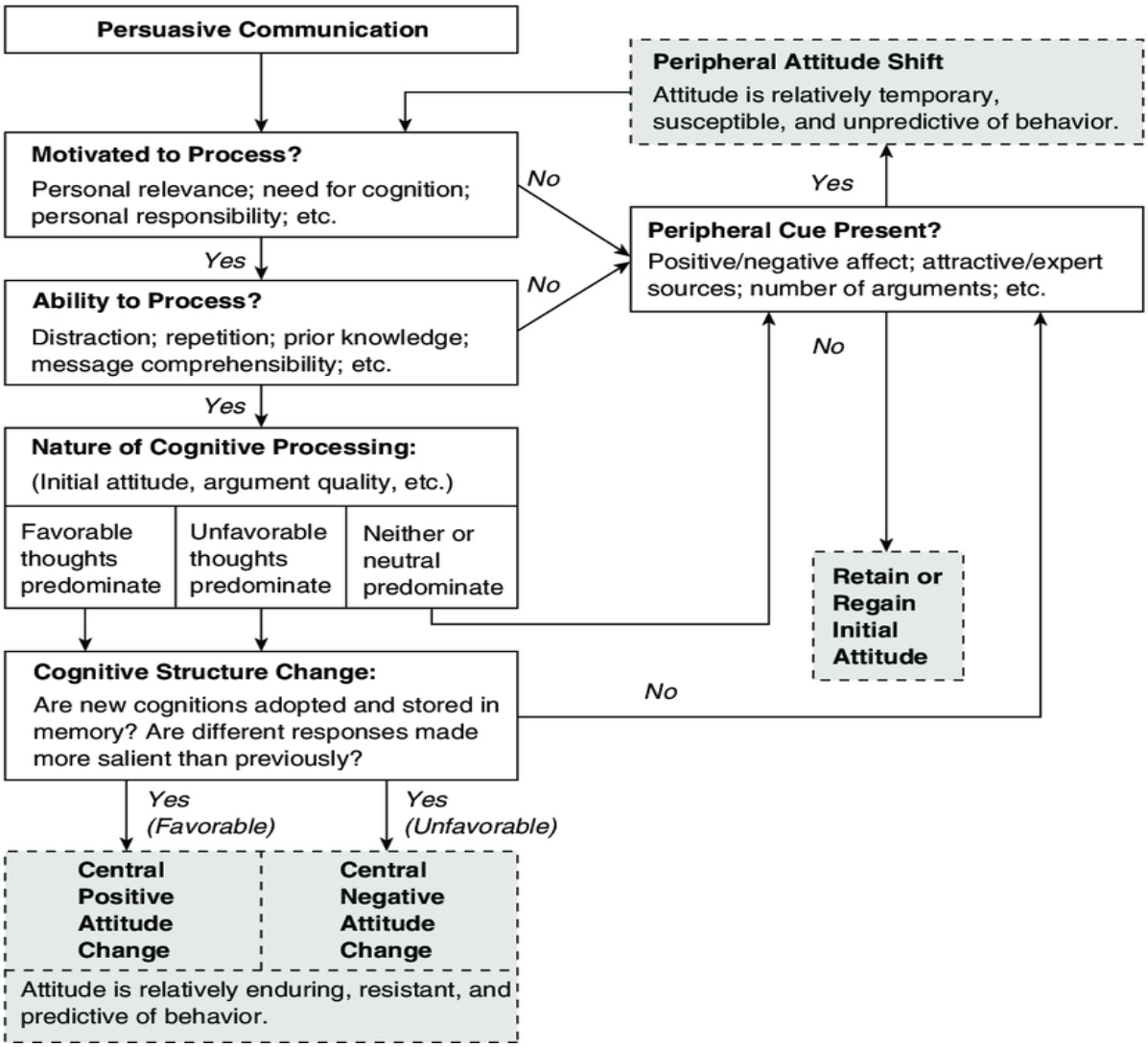


Figure 2.10: Peripheral and central routes to persuasion of the Elaboration Likelihood Model of Persuasion[235]

Source: Petty RE, Cacioppo JT. In: Communication and Persuasion. Springer Series in Social Psychology,1986[235]

2.13.5 Transtheoretical Model (TTM)

The Transtheoretical Model (TTM), also called the Stages of Change Model was used. The TTM suggests that health behaviour change involves progress through six stages of change: pre-contemplation, contemplation, preparation, action, maintenance, and termination.[294] This model was used to ground the planning to quit stages, for example, those who planned to quit within the next six months (contemplation stage); those not planning to quit (not contemplating); those planning to quit sometime in the future beyond six months (pre-contemplation stage); or those planning to quit in the next month (preparation stage).

In sum, the conceptual framework for health warnings, as seen in Figure 2.11, suggests that a cognitive process needs to be present for health warnings to be effective.[295] Furthermore, the way information is understood and appreciated determines recall and changes in smoking behaviour, for example, attempting to quit (see Figure 2.11).[295]

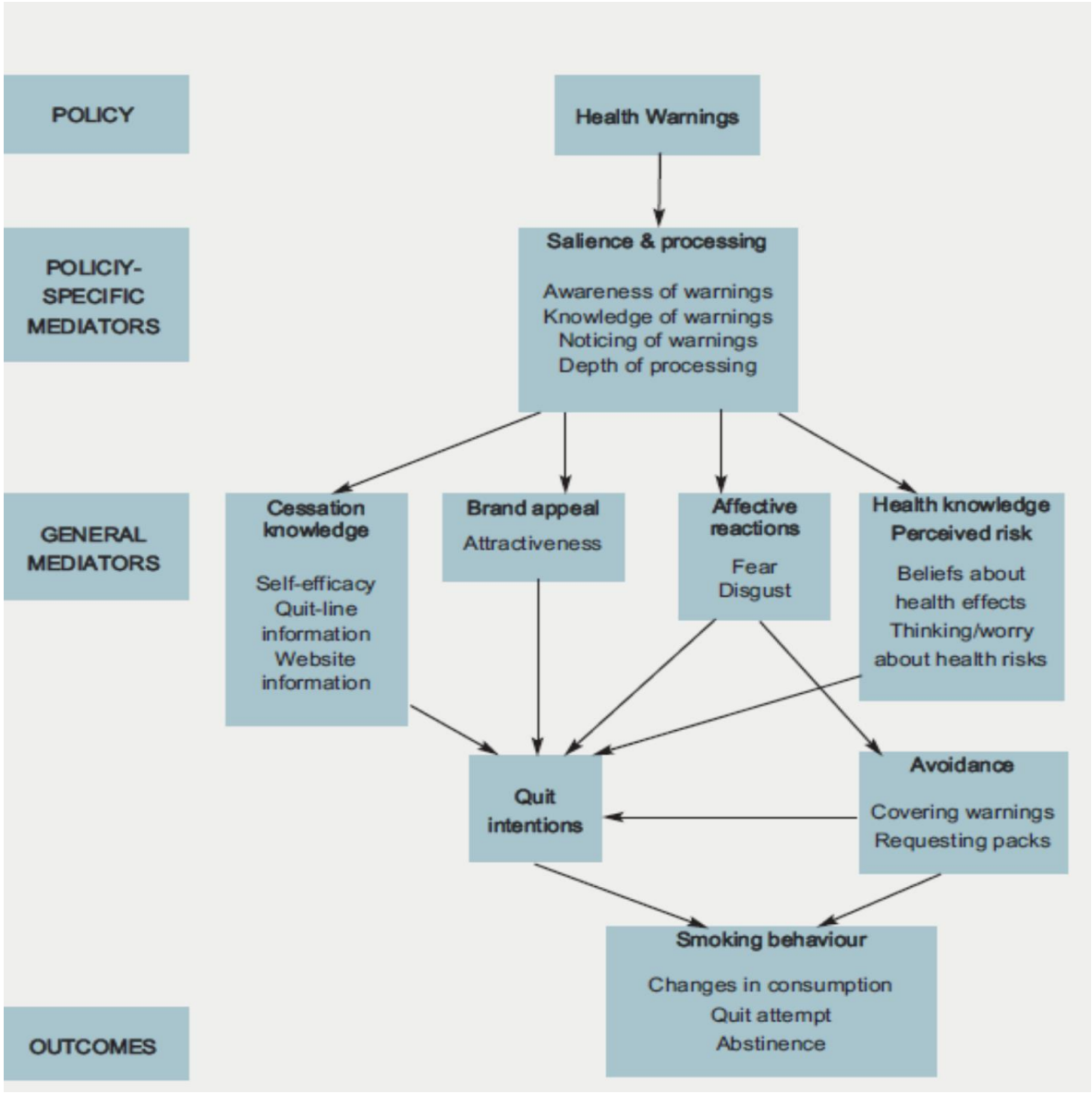


Figure 2.11: Conceptual framework health warnings and policy[295]

Source: IARC, IARC Handbooks of Cancer Prevention,2008.[295]

2.14 THESIS RATIONALE

Although there has been an overall reduction in the South African smoking prevalence rate, the cessation rates have remained low, and in some population groups smoking

rates are high.[24] Sustaining tobacco reduction will require more effort around tobacco control, notably comprehensive implementation of the WHO FCTC.

Currently, South Africa has text-only warnings. The country therefore lags behind the global recommendations provided by the WHO FCTC. However, South Africa plans to strengthen its tobacco control law by implementing pictorial health warnings, be they on branded or plain packaging, in order to protect the public and promote health.

The research reported in this thesis sought to assess the impact of health warnings on smoking behaviour among South Africans. Furthermore, the research evaluated pictorial warnings with brand design elements (branded) and those without brand design elements (plain) that were effective in order to select those that were appropriate. The information gathered will provide recommendations for the legislation and regulation on the introduction of pictorial warnings in South Africa.

2.15 RESEARCH QUESTIONS

The research questions of this thesis were the following:

1. What is the level of knowledge South Africans have on tobacco health risks?
2. What reactions will South Africans (non-smokers and smokers) have towards the tobacco health warning messages (text-only and pictorial, with brand design elements (branded) and without brand design elements (plain)) in terms of
   - **Attention**: Will smokers notice and be engaged by the warning message?
   - **Communication**: What message will the warning convey to smokers? Will they understand the message? Will they believe it?
   - **Identification**: Will smokers see the warning message as relevant to them?
   - **Effect**: What effect(s) will the warning message have on health knowledge, motivation to quit smoking, beliefs about whether the warning will help to prevent smoking initiation among youth?
3. Which of the above attributes would be most important in determining the effectiveness of the different health warnings?
4. What is the association between the reaction to health warning messages and changes in the desire or planning to quit (before and after exposure to health warning messages)?

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CHAPTER 3:
AIMS AND OBJECTIVES

3.1 AIM

The aim of this thesis was to assess the knowledge of tobacco-related health risks among a population of South Africans and to determine the effectiveness of health warning messages based on text-only and pictorial warnings on packs with brand design elements (branded) and those packs without those elements (plain) on smoking behaviour.

3.2 OBJECTIVES

The objectives of this thesis were

1. To select pictorial health warning labels with brand design elements (branded) and without brand design elements (plain) on cigarette packs to prioritise for testing among South Africans.

2. To determine reactions among a selected sample of South Africans (non-smokers and smokers) towards text-only and pictorial health warning labels on branded and plain cigarette packs .

3. To assess the factors associated with change in motivation and plan to quit smoking following exposure to experimental cigarette packages with text-only and pictorial health warning labels on branded or plain packs among smokers.

4. To determine the knowledge of smoking-related health risks among a nationally representative sample of South Africans and their potential reactions to the selected pictorial warnings on branded pictorial warning packs at population level.

3.3 HYPOTHESES

Null hypotheses

H_o: 1. There are no suitable cigarette health warning labels for testing among South Africans, regardless of whether the warnings are text-only, pictorial with brand design

elements (branded) or pictorial without brand design elements (plain).

H_o: 2. There is no notable reaction among South Africans (non-smokers and smokers) towards the selected cigarette health warning labels, irrespective of whether the labels are text-only or pictorial (on branded or plain cigarette packs).

H_o: 3. Exposures to health warning labels on cigarette packages would not change motivation or plan to quit among individual smokers, irrespective of whether the labels are text-only or pictorial (on branded or plain cigarette packs).

H_o: 4. The majority of South Africans do not have adequate knowledge of smoking-related health risks.

H_o: 5. There are no significant differences in perception of the potential effectiveness of text-only health warning labels and selected pictorial warnings on cigarette packs in motivating quitting at the population level.

CHAPTER 4: FINDINGS IN PART ONE AND SELECTION OF HEALTH WARNING MESSAGES

4.1 INTRODUCTION

As discussed in Chapter 1, this thesis consisted of three interrelated parts with four objectives, and used a mixed methods design. The methodology for this thesis is discussed separately for each part and objective.

This chapter deals with the findings in Part One, relating to Objective 1. This chapter presents the supporting data that informed the selection of the health warning messages prioritised for evaluation, as presented in Part Two of the thesis.

This chapter presents the methodology and then the results of the survey of the baseline knowledge of tobacco health consequences among adult South Africans completed by participants of the 2010 SASAS. These 2010 SASAS results, together with other sources, including the review of existing warning labels in South Africa and the published sources,[1,2,3] contributed to the choice of message themes prioritised for selection for the health warnings (text-only and pictorial) tested in this thesis. The chapter ends with the recommendations for the selected text warnings to be evaluated, together with the general layout, concept and design of the pictorial warnings on branded and plain cigarette packs, in Part Two (as discussed in Chapter 5 and 6).

4.2 METHODOLOGY: PART ONE (OBJECTIVE 1)

The first part of the thesis, in addition to sources such as the WHO health warnings data bank[1] and the tobacco labelling resource centre,[4] used the finding of deficient smoking-related knowledge from a secondary data analysis of the 2010 South African Social Attitudes Survey (SASAS) to inform which messages to prioritise, in order to meet Objective 1 of the thesis, namely to *select pictorial health warning labels with brand design elements (branded) and without brand design elements (plain) on cigarette packs to prioritise for testing among South Africans.*

4.2.1 Study design for Part One of the thesis

In order to select the pictorial warnings that would be used in Part Two of the thesis (to test reactions to the selected warning labels), a literature review of published works on knowledge of health risks among South Africans was combined with a secondary analysis of population-based cross-sectional data obtained from the 2010 SASAS.

4.2.2 Survey setting

The 2010 SASAS was conducted in all nine provinces of South Africa, namely the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West, Northern Cape, and Western Cape.

4.2.3 Data source and sample design for 2010 SASAS

The sampling procedure for the 2010 SASAS has already been published by the South African Human Sciences Research Council (HSRC),[5,] and is therefore only briefly described here. The 2010 SASAS is a repeated cross-sectional survey whose samples are obtained from the second master sample of the HSRC, designed in 2007.[5] The sampling frame included 1 000 primary sampling units (PSUs). The population census enumeration areas (EAs) of 2001 were used as PSUs drawn with probability proportional to size.[5] Each round of SASAS interviewing has a sub-sample of 500 enumeration areas drawn from the second master sample.[5] The HSRC conducts the survey annually and has been doing so since 2003.[5]

The nationally representative 2010 SASAS sample of South African adults (16 years and older) was selected using a multi-stage probability sampling method.[6] Additionally, the primary sampling unit was the enumeration area, and stratification of the enumeration areas was achieved by the four population groups, socio-demographic domains of the province, and geographical subtype.[5,6]

4.2.4 Study population

The study population included all the respondents who participated in the 2010 SASAS survey. The 2010 SASAS is a national representative sample of adults in South Africa (16 years and older).

4.2.5 Inclusion and exclusion criteria

Participants included in the 2010 SASAS were a national representative sample of adults in South Africa, 16 years and older and resident in a dwelling unit or visiting points. The survey excluded vacant enumerator areas (EAs), recreational areas, industrial areas, special institutions (such as school and university hostels, hospitals, old age homes and military camps).

4.2.6 Sample size

The sample for part one of the thesis included all South African adults (16 years and older) who participated in the 2010 SASAS (N = 3112, response rate = 88.9%) to select health warning themes for text-only and pictorial warnings to test among South Africans.

4.2.7 Recruitment of study participants

Secondary data from the 2010 SASAS, which included a sample of adult South Africans (16 years and older), were used for part one of the thesis. For the primary data collection for the 2010 SASAS, interviewers went to each visiting point that was selected from the second HSRC master sample (discussed above in section 4.2.3), and all eligible participants were listed to be included in the sample. From the eligible participants at the chosen dwelling or visiting point, the 2010 SASAS interviewer (using a random selection process that was based on a Kish grid[7]) then selected one participant to be included in the 2010 SASAS.

4.2.8 Data collection procedure and measurement tool

Data for the 2010 SASAS were gathered by means of a face-to-face interviewer-administered questionnaire survey from 1 November 2010 to 15 December 2010, completed by eligible participants. To be eligible for participation in the 2010 SASAS, potential participants were asked for informed consent. The HSRC ethics committee ethically approved the 2010 SASAS (see Appendix 1). The HSRC also permitted the use of the 2010 SASAS secondary data for the thesis. Ethical clearance for the thesis was also granted by the University of Pretoria Faculty of Health Sciences Human Ethics Research Committee (see Appendices 2a-2d).

The 2010 SASAS questionnaire was developed by the HSRC in English and then translated into and printed in all 11 official languages in South Africa. The 2010 SASAS questionnaire (see Appendix 3) asked participants, among other things, questions related to the participant's socio-demographic characteristics, smoking, and tobacco behaviour. Participants also provided their responses to smoking-related knowledge and their opinions on cigarette packaging. The thesis part one quantitative study using the 2010 SASAS sought to establish the pictorial warning themes for testing among South Africans in Part Two of the thesis.

4.2.9 Selection of health warnings for testing in part two of the thesis

The subsections below describe the selection of the cigarette health warnings, namely the text-only and pictorial health warnings, used for testing in Part Two of the thesis.

4.2.9.1 Selection of text-only health warnings

Text-only warnings and pictorial warnings were selected for testing among participants in Part Two of the thesis. The results from the 2010 SASAS study, together with the evidence of knowledge of health warnings in the study by Reddy, Meyer-Weits, and Yach,[2] provided the basis for the themes selected for the text-only warnings.

The selection of warnings is discussed extensively in this chapter of the thesis. At this point, but suffice it to say that four text-only warnings were selected from the current eight text-only warnings. The final four text-only warnings selected were:

- *DANGER: SMOKING CAUSES HEART DISEASE*
- *PREGNANT? BREASTFEEDING? YOUR SMOKING CAN HARM YOUR BABY*
- *TOBACCO IS ADDICTIVE*
- *YOUR SMOKE CAN HARM THOSE AROUND YOU*

The selected text-only health warnings for testing among participants were on a Peter Stuyvesant brand package, which was chosen because Peter Stuyvesant was the top-selling and most popular cigarette brand among South Africans in 2010.[8]

4.2.9.2 Selection of pictorial health warnings and pilot testing

The pictorial warnings for testing in part two of the thesis were based on the themes identified in part one of the thesis. The pictorial warnings were selected from a number of sources that included, a combination of pictures originating from South Africa developed by the author; the WHO health warnings data bank[1] and the tobacco labelling resource.[4] In total, 24 pictorial warnings were selected. To improve the pictorial warnings, and to make a final selection, the pictorial warnings were pilot tested among a group of 48 volunteering community members in Atteridgeville, Gauteng, Province who had come for health promotion activities at a community centre.Atteridgeville was not included among the study sites for the thesis, nor were the group of volunteering participants of the pilot study. The pilot study provided the opportunity to select the pictorial warnings for testing among study participants in Part Two of the thesis. Furthermore, the pilot testing provided an opportunity to refine the pictorial warnings.

The top eight pictorial warnings (out of the 24) that were rated by the participants as most effective in the pilot study were selected for inclusion for further testing of reaction in Part Two of the study. All the pictorial warnings were placed on tobacco packs with either (a) packs without brand design elements (plain packages) or (b) on packs with brand design elements (branded packages), using a mock brand name. Furthermore, given that the brand image on the packs could influence the effectiveness of health warnings, the use of one brand's standard pack was used to allow a standardisation of the background pack design across all warning labels. For the plain packages, a "drab dark brown colour" (Pantone 448C) was used, consistent with other studies, which indicate that this is the "ugliest" and thus most effective colour for plain packging.[9-11]

In total, there were eight pictorial warnings for further testing in Part Two of the thesis under five themes. The themes featured and pictorial warnings were the following:

- **Cardiovascular**
  - Stroke (from the WHO FCTC Health Warnings Database[1])
- **Reproductive**
  - Impotence (male) (adapted from the WHO FCTC Health Warnings Database[1],

consent obtained)
    - Abortion (female) (from the WHO FCTC Health Warnings Database[1])
- **Second-hand smoke**
    - Simulation of new-born baby/young infant being exposed (researcher's own picture, consent obtained)
- **Mouth diseases (particularly short-term effects shown to be salient to adolescents)**
    - Gum disease and brown stained teeth (adapted from the WHO FCTC Health Warnings Database[1])
- **Other**
    - Death (adapted from the WHO FCTC Health Warnings Database[1])
    - Financial (adapted from the WHO FCTC Health Warnings Database[1])

4.2.10 Measurements and definitions

The subsections below discuss the measures and definitions used for Part One, Objective 1 of the thesis.

4.2.10.1 Demographic and socio-economic features

The questionnaire contained several items for participants to provide information about their sociodemographic characteristics, such as their age, sex, race, education, and socio-economic status.

- *Age*

  Age was assessed by the statement: "Age of participant completed in years." The answers were coded as
    - 16-34 years (1)
    - 35-54 years (2)
    - 55+ years (3)
- *Sex*

  A participant's sex was coded as
    - Male (0)
    - Female (1)
- *Ethnicity /race*

  Participants self-identified as either Black, White, Indian/Asian, Coloured, or

"Other". "Other," was a category for those participants whose race could not be classified or who had not filled in their racial status (n=24).

- *Level of education*

  Level of education was assessed by the question "What is the highest level of education that you have ever completed?" The answers were coded, similar to other studies in South Africa,[12,13]as

  - <12 years (1)
  - 12 years (2)
  - >12 years (3)

- *Socio-economic status*

  Similar to other studies in South Africa,[14,15] the asset index was used as a proxy measure for socio-economic status. The index was computed from responses to owning several working household items or amenities, e.g. a Hi-Fi/music centre, hot running water, washing machine, television set, motor vehicle or tumble dryer etc. The index was assessed by the question: "Please tell me which of the following, if any, are presently in your household (in working order). Does your household have……?" The response options were coded as

  - Yes (1)
  - No (0)

Of the number of items asked, principal component analysis was performed to assess factors that loaded satisfactorily. An item scale was derived, and internal consistency was assessed using a Cronbach alpha (α). Acceptable internal consistency was considered to be $\alpha \geq 0.7$. [16,17] The asset scores were then auto-ranked to produce three socio-economic categories, with the lowest socio-economic status (SES) or those in the bottom third being those with the least assets, followed by the middle and highest SES.

4.2.10.2 Knowledge of tobacco health risks

Consistent with other findings,[18,19,20] the questionnaire contained several items to assess the knowledge of tobacco health risks as an outcome variable of interest for Objective 1 of the study. Participants answered questions regarding the likelihood that smoking cigarettes can cause different ailments.

Knowledge of tobacco health risks was assessed by the question: "In your opinion, how likely is smoking cigarettes to cause…..", using the following response options and coding:

- Not likely (0)
- Somewhat likely (1),
- Very likely (2)
- Don't know (not considered/coded missing)

Responses included:

- Stroke (blot clot in the brain)
- Impotence (a man not able to have sex)
- Lung cancer
- TB
- Gum disease
- Mouth cancer
- Hypertension
- HIV/AIDS – this was coded differently, as it was a test response. Reverse coding used was as follows "Not likely" coded (2), "Somewhat likely" coded (1), "Very likely" coded (0) and "Don't know" (not considered/coded missing)

Principal component analysis was performed, and a seven-item scale excluding HIV/AIDS was derived. The excluded items loaded below the cut-off of 0.35 commonly set for acceptable extraction factor loading.[16,17] The seven-item scale derived was considered to have good internal consistency with a Cronbach alpha of 0.77, following a scale reliability analysis. For the purpose of analysis, one category of knowledge, "Total Knowledge", was considered to consist of all seven items (stroke, impotence, hypertension, lung cancer, TB, gum disease and mouth cancer).

4.2.10.3 Tobacco use measures

The questionnaire contained several items to assess the prevalence of tobacco use. Participants answered questions regarding their use of cigarettes, waterpipe (hookah, hubbly-bubbly), and smokeless tobacco (snuff).

For means of multivariate analysis in the thesis, current cigarette smoking was used as the main outcome variable of interest to be consistent with other studies.[18,21,22]

- *Tobacco product use*

  Participants were asked questions on how they have used several tobacco products, namely manufactured cigarettes, roll-your-own cigarettes (zol), waterpipe (hookah, hubbly-bubbly), cigar or pipe, electronic cigarettes (vapour cig), nasal snuff and oral snuff. The response items and coding were

  - Every day (1)
  - Some days (2)
  - Stopped less than 6 months ago (3)
  - Stopped more than 6 month ago (4)
  - Never before (5)

  For cigarette smoking, responses were dichotomised into and coded as

  - Current cigarette smoker (“Every day” and “Some days”) (1)
  - Non-current cigarette smoker (“Completely stopped” or “Never before”) (0)

  For data analysis in the current study, a dichotomous outcome variable “Smokers” (current smokers and non-smokers) was created by recoding the responses to the item of the above question on cigarette smoking. That is, each participant was assigned either to the category of current smoker (1), for those who were cigarette smokers (“Every day” and “Some days”), or to the category of non-smoker (0), for those who were not cigarette smokers (“Stopped less than six months ago”, “Stopped more than six months ago” and “Never before”). A similar pattern of categorisation was followed for all the other tobacco products in this question as that followed for cigarette smoking.

  Other items were also used to measure cigarette smoking, practice and behaviour. These items are set out below:

  - *Duration of smoking regularly*

    Participants were asked: “In total, for how long did you or have you been smoking regularly?”

  - *Frequency of use of cigarettes*

    The frequency of cigarette use was assessed by asking: ”On the days that you

smoke(d) on average, how many cigarettes, including hand-rolled cigarettes, do (did) you smoke per day?"

Responses were categorised and coded as follows:

- <10 (cigarettes per day) (0)
- >10 (cigarettes per day) (1)

- *Brand of cigarettes*

Participants were asked: "Currently, what type/brand of cigarettes do you usually smoke?"

Response items included the following and were coded as follows:

- "Light"-strength cigarettes (1)
- Normal strength (2)
- Menthol cigarettes (3)
- Any cigarette (4)
- Do not know (8)

- *Ways in which cigarettes are bought*

Participants were asked: "At the times you buy cigarettes for yourself, do you usually buy them by the carton, the pack, or as single cigarettes?"

Participants had the following answer options: "Carton", "Pack", "Loose", 'Do not know" and "Refused" (where the participants declined to answer that question).

The analysis was limited to participants who were identified as current cigarette smokers. Responses were dichotomised and coded into

- Carton and pack (0)
- Loose (1)

All the rest ("Do not know" and "Refused") were excluded.

- *Plan to quit*

Plan to quit was assessed the statement: "I am planning to quit smoking….". Responses were as follows:

- Within the next month
- Within the next six months
- Some time in the future, beyond six months

- I am not planning to quit
- I have completely stopped smoking
- Do not know/Can't choose

The analysis was limited to participants who were identified as current cigarette smokers. Responses were dichotomised into the following and coded as follows:

- Planning ("Within the next month", "Within the next six months" and "Some time in the future", "Beyond six months") (0)
- Not planning ("I am not planning to quit") (1).

All the rest ("I have completely stopped smoking" and "Do not know/Can't choose") were excluded.

- *Self-efficacy*

Self-efficacy was assessed by the question: "And if you tried to stop, how likely do you think it is that you would succeed in giving up smoking? Is it….?" Participants had the options of answering:

- Very likely
- Fairly likely
- Not very likely
- Not all likely
- I have already completely stopped
- Do not know/Can't choose

The analysis was limited to participants who were identified as current cigarette smokers. Responses were dichotomised into and coded as

- Likely ("Very likely" and "Fairly likely") (0)
- Not likely ("Not very likely", and "Not at all likely") (1)

All the rest ("I have already completely stopped" and "Do not know"/"Can't choose") were excluded.

- *Past 12 months quit attempt help*

Participants were asked: "Within the last 12 months when you attempted to quit, did you get any help?" Response items were:

- Yes

- No
- Refused to answer
- Can't say
- I didn't think I needed help
- I did not attempt to quit in the last 12 months

The analysis was limited to participants who were identified as current cigarette users. Responses were dichotomised into and coded as

- Yes (1)
- No ("No, I didn't think I needed help",
  "I did not attempt to quit in the last 12 months") (0)

All the rest ("Refused to answer", "Can't say") were excluded.

4.2.10.4 Second-hand smoke

Second-hand smoke was measured by items asking about where smoking occurs, how important it is for the participant to have 100% smoke-free (no smoking) areas and frequency in the past 30 days where the participant was in a place where someone smoked. Second-hand smoke harm was assessed by asking participants: "Do you think that breathing smoke from other people's cigarettes is…". Responses included:

- Very harmful to one's health
- Somewhat harmful to one's health
- Not very harmful to one's health
- Not all harmful to one's health
- Don't know
- Refused

Responses were coded as

- Yes ("Very harmful to one's health", "Somewhat harmful to one's health") (1)
- No ("Not very harmful to one's health", "Not all harmful to one's health") (0)

All the rest ("Don't know" and "Refused") were excluded.

4.2.10.5 Tobacco products packaging

The questionnaire asked participants about their opinion on the warning labels on the packaging of tobacco products and counter displays. Participants had to indicate whether they: Strong agree (1), Agree (2), Neither nor (3), Disagree (4), Strongly agree (5) and Don't know (8) in respect of the following

- The current text health warnings are easy to understand
- When smokers want a cigarette, the text warnings are not going to stop them from smoking
- The text warnings are only suitable for educated people
- Adding pictured to text warnings will make smokers think more about giving up smoking
- Showing cigarette packs in shops (i.e. counter display) is a form of advertising

All the responses except one were dichotomised into and coded as:

- Agree ("Strongly agree" and "Agree") (1)
- Disagree ("Neither agree nor disagree", "Disagree", "Strongly disagree" and "Don't know") (0)

The exception was for the response on: "When smokers want a cigarette, the text warnings are not going to stop them from smoking." For this question, responses were dichotomised into and coded as:

- Agree ("Strongly agree" and "Agree") (0)
- Disagree ("Neither agree nor disagree", "Disagree", "Strongly disagree" and "Don't know") (1)

4.2.11 Data analysis: Part One (Objective 1)

The complete data set was cleaned and was exported for analysis to the statistical package STATA release 14 (Stata Corporation, College Station, Texas, USA). Data analysis was done using the STATA Version 14 statistical package. Following cleaning, variables were recoded in accordance with the definitions given above. Non-normality testing of the data was done and where appropriate non-parametric methods were used for analysis. The main outcome measure or dependent variable was

knowledge of health risks. Independent variables included those factors that were identified in similar studies as being significantly associated with knowledge of health risks,[20,22,23] such as smoking status, level of education, socio-economic status intention to quit, and geographic location (urban vs rural).

All analyses took into account the complex survey design and sampling procedure used in the SASAS survey.[4,5] The data were weighted by using the weighting factor that was given in the SASAS datasets in order to adjust for the differential probability of response and selection. Prior to the use of any of the survey estimation commands, the “svyset” function in STATA 14 was used to account for the complex survey design. The variables that described the sampling weighting, primary sampling unit, and stratification were set as svyset PSU[pweight=benchweight]IIDU.

The SASAS 2010 provided secondary data for empirical evidence on prevalence and associations between various factors associated with smoking behaviours and knowledge of health risks. Descriptive statistical analyses included frequency distributions, means and standard errors (SE). The standard error was used instead of standard deviation as the results were of a larger population and considering the complex survey design. As part of the primary analysis, cross-tabulations were conducted. Group differences were tested using chi-square analysis (for continuous variables) and independent t-tests (for categorical variables).

The variables that were significant at a 10% (α) level in bivariate analysis were entered into a stepwise multiple logistic regression model. Covariates, irrespective of the level of significance, were, age and smoking status.

Multivariate statistics such as factor analysis and principal component analysis (PCA) were used, so as to reduce data dimensionality, for example, reducing the dimensionality of the weighted sums of items used to score themes. Statistical significance was defined at $p < 0.05$ or at the 95% confidence interval.

4.3 KNOWLEDGE OF THE HEALTH CONSEQUENCES OF CIGARETTE SMOKING IN 2010 AMONG SOUTH AFRICANS

This section and its subsequent subsections present the results of Part One of the thesis. A total number of 3112 South African adults (16 years and older) participated in the 2010 SASAS, with a response rate of 88.9%. Survey participants were 16 years and older, with a mean age of 50.66 years (SD=15.45). The sample had 58.4% (n=1,725) males and 41.6% females (n=1,264). The majority were Black Africans, 76.2% (n=1,699).

Most South Africans, 94.5% (n=2,842), knew that lung cancer was likely to be a health consequence of smoking. Impotence was the least known health consequence of smoking, with only 49.1% (n=1,485) of the participants indicating that impotence could be a health consequence of smoking (see Table 4.1).

Table 4.1: Knowledge of the health consequences of smoking cigarettes SASAS 2010

Health Consequence (N=3,006)	Weighted % (n)	Confidence Interval (CI)
Impotence	49.1(1,485)	45.9-52.2
Hypertension	70.7 (2,124)	67.9-73.2
Stroke	71.0 (2,164)	68.3-73.6
Gum disease	80.3 (2,424)	77.9-82.5
TB	83.5 (2,500)	81.0-85.8
Mouth cancer	84.1 (2,555)	81.8-86.1
Lung cancer	94.5 (2,842)	93.1-95.6

As described in the methodology discussion (see section 4.2.10.2), principal component analysis was performed on the responses to questions about whether, in the participants' opinion, smoking cigarettes was likely to cause seven different types of health consequences (see the questionnaire in Appendix 3). From a scale reliability analysis, a 7-item total knowledge (Stroke +Impotence + Lung cancer +TB+ Gum

disease + Mouth cancer + Hypertension) scale with a Cronbach alpha score of 0.77 was derived. The scale whose range was 0 (Lack of knowledge) – 14 (maximum Total knowledge) was therefore considered to have good reliability.

Participants who self-identified as female had more total knowledge of the health consequences of smoking cigarettes than those who identified as male (Mean 10.19 vs 9.92; p=0.124), although this difference was not statistically significant. Those in the highest asset index had more knowledge than those in the middle and low asset index (Mean 10.14 vs 10.09 vs 9.91; p=0.531 respectively), but again this result was not statistically significant. The distributions of the sample's socio-demographic characteristics by total knowledge of health consequences are shown in Table 4.2.

Table 4.2: Knowledge of the health consequences of smoking cigarettes by socio-demographics

Variable(N)	Category(n)	Total knowledge# (0-14) Mean(SE*)	p-value**	Confidence Interval (CI)
Gender (N= 2,989)			0.124	
	Male (1,725)	9.92(0.11)		9.70-10.14
	Female (1,264)	10.19(0.13)		9.92-10.45
Age group (N=3,004)			0.110 (for trend)	
	16-34 (1,267)	9.89(0.12)	1 (referent)	9.66-10.12
	35-54 (1,074)	10.18(0.13)	0.066	9.93-10.43
	55+ (663)	10.19(0.16)	0.104	9.88-10.50
Asset Index (N=2,911)			0.531 (for trend)	
	Low (941)	9.91(0.15)	1 (referent)	9.61-10.20
	Middle (937)	10.09(0.13)	0.364	9.83-10.34
	Highest (1,033)	10.14(0.16)	0.294	9.82-10.46
Race/ethnicity (N=2,982)			0.641 (for trend)	
	Black African (1,699)	10.02(0.10)	1 (referent)	9.83-10.21
	Coloured/Mixed race (540)	9.88(0.24)	0.578	9.42-10.34
	Indian/Asian (362)	10.38(0.33)	0.289	9.74-11.02
	White (381)	10.15(0.29)	0.665	9.59-10.71

Education status (N=2,981)			0.609 (for trend)	
	<12 years (1,639)	9.97(0.10)	1 (referent)	9.77-10.16
	12 years (860)	10.14(0.16)	0.320	9.83-10.46
	>12 years (482)	10.03(0.21)	0.782	9.62-10.44
Geographic location (N=3,006)			0.402	
	Rural (831)	10.13(0.13)		9.87-10.38
	Urban (2,175)	9.98(0.11)		9.76-10.20

*Standard Error (SE)
***All p-values were derived using the Chi-Square statistic*
#Total knowledge (Stroke+Impotence+Lung cancer+TB+Gum disease+Mouth cancer+Hypertension):
Range 0 (*Lack of knowledge*) – 14 (*maximum Total knowledge*)

Of the participants, 18% (n=615) indicated that they were current smokers. Furthermore, 2.5% (n=72) reported current snuff use, but only 1.2% indicated that they were currently using a waterpipe. Non-smokers had more total knowledge of the health consequences of smoking cigarettes than current smokers (Mean 10.25 vs 9.09; p<0.001). Those who indicated no exposure to second-hand smoke at home had more total knowledge compared to those who indicated that they were exposed to second-hand smoke at home (Mean 10.20 vs 9.45; p<0.001). The pattern of knowledge of the health consequences of cigarette smoking by tobacco smoking behaviour is indicated in Table 4.3.

Table 4.3: Knowledge of health consequences from smoking cigarettes by tobacco smoking behaviour

Variable(N)	Category(n)	Total knowledge# (0-14) Mean(SE*)	Confidence Interval (CI)
Current cigarette smoker (N=2,973)	No (2,358)	10.25(0.10)	10.06-10.43
	Yes (615)	9.09(0.20)	8.69-9.48
	p-value**	<0.001	
Current snuff use (N=2,979)	No (2,891)	10.03(0.09)	9.85-10.20
	Yes (88)	10.05(0.52)	9.04-11.7
	p-value**	0.962	
Current waterpipe use (N=2,982)	No (2943)	10.06(0.09)	9.89-10.23
	Yes (39)	7.63(0.65)	6.37-8.90
	p-value**	<0.001	

Current Electric-cigarette use (N=2,980)	No (2,962)	10.04(0.09)	9.87-10.21
	Yes (18)	7.28(1.09)	5.13-9.43
	p-value**	0.012	
Exposed to smoking at home (2,931)	No (2,346)	10.20(0.10)	10.01-10.40
	Yes (585)	9.45(0.18)	9.10-9.80
	p-value**	<0.001	
Exposed to smoking at work (2,548)	No (2,199)	10.06 (0.10)	9.86-10.27
	Yes (349)	9.59(0.22)	9.15-10.02
	p-value**	0.054	
Exposed to smoking at café/restaurants (2,848)	No (2,287)	10.17(0.10)	9.96-10.34
	Yes (561)	9.31(0.18)	8.95-9.67
	p-value**	<0.001	
Exposed to smoking at shebeens/bar/club (2,713)	No (2,121)	10.21(0.11)	9.99-10.41
	Yes (592)	9.38(0.17)	9.04-9.72
	p-value**	<0.001	
Plan to quit (N=554)	No (326)	8.90(0.25)	8.40-9.40
	Yes (228)	9.32(0.33)	8.67-9.96
	p-value**	0.320	

*Standard Error (SE)
***All p-values were derived using the Chi-Square statistic*
[#]Total knowledge (Stroke+Impotence+Lung cancer+TB+Gum disease+Mouth cancer+Hypertension): Range 0 (*Lack of knowledge*) – 14 (*maximum Total knowledge*)

A total of 82% (n= 2,502) agreed that current text health warnings were easy to understand, while 27.1% (n= 791) indicated that text warnings were only suitable for educated people. The participants who agreed that current text warnings were easy to understand had more total knowledge than those who disagreed (Mean 10.22 vs 9.16; p<0.001). Similar findings were made for adding pictures to text warnings will make smokers think more about quitting (Mean 10.38 vs 9.56; p<0.001); and counter display is a form of advertising (Mean 10.25 vs 9.37; p<0.001) The knowledge of the health consequences of cigarette smoking by opinions on health warnings is indicated in Table 4.4,overleaf.

Table 4.4: Knowledge of health consequences of smoking cigarettes by opinions on health warnings

Variable(N)	Category(n)	Total knowledge[#] (0-14) Mean(SE[*])	Confidence Interval (CI)
Current text health warnings are easy to understand (N=2,983)	Disagree (481)	9.16(0.23)	8.70-9.62
	Agree (2,502)	10.22(0.10)	10.02-10.42
	p-value**	<0.001	
Text warnings will stop smokers who want a cigarette (N=2,981)	Disagree (2,330)	10.28(0.09)	10.09-10.46
	Agree (651)	9.17(0.20)	8.78-9.57
	p-value**	<0.001	
Text warnings are only suitable for educated people (N=2,979)	Disagree (2,188)	9.94(0.11)	9.73-10.15
	Agree(791)	10.56(0.16)	9.95-10.56
	p-value**	0.095	
Adding pictures to text warnings will make smokers think more about quitting (N=2,980)	Disagree (1,343)	9.56(0.14)	9.29-9.83
	Agree (1,637)	10.38(0.12)	10.15-10.61
	p-value**	<0.001	
Counter display is a form of advertising (N=2,980)	Disagree (746)	9.37(0.18)	9.03-9.72
	Agree (2,234)	10.25(0.10)	10.05-10.44
	p-value**	<0.001	

*Standard Error (SE)
***All p-values were derived using the Chi-Square statistic*
[#]*Total knowledge (Stroke+Impotence+Lung cancer+TB+Gum disease+Mouth cancer+Hypertension):* Range 0 (*Lack of knowledge*) – 14 (*maximum Total knowledge*)

4.4 DISCUSSION

This part of the thesis aimed to select and design the health warnings (text-only and pictorial warnings on branded and plain cigarette packs) to prioritise for testing among South Africans in Part Two of the thesis. Results of the 3,112 South African adults (16 years and older) who participated in the 2010 SASAS showed that South Africans have some total knowledge (Stroke +Impotence + Lung cancer +TB+ Gum disease + Mouth cancer + Hypertension) (hereafter referred to as knowledge), of smoking-

related health consequences. This knowledge of smoking-related health consequences was not significantly associated with any specific socio-demographic factors.

The study's finding therefore differs from those of other studies, which found that smoking-related knowledge was associated with sociodemographic factors, including age group and gender.[23,24,25] For instance, a study conducted by Trofor et al.[23] in six European countries reported that in three of the six participating European countries, namely in Hungary, Poland and Germany, women had higher knowledge health risk scores than men.[23] Those who self-identified as female had significantly more knowledge of the risks of cigarette use compared to those who self-identified as male.[23]

The difference lies in this study's finding that there is no significant association between knowledge of smoking-related health risks and socio-demographics, and the difference may be attributed to the fact that this study was assessing Total knowledge. In this regard it should be noted that the study by Trofor et al.[23] found that smoking-related knowledge differed depending on the specific *type* of knowledge.[23] For instance, in all six countries surveyed, most of the smokers knew about smoking-related health consequences such as an increase in the risk of lung cancer and pulmonary disease.[23] However, there was a lower level of knowledge among smokers that smoking is also associated with harms such as blindness and impotence.[23] The finding that smoking-related knowledge differed according to the type of knowledge has also been reported in other studies.[25,26,27]

More research is needed to examine South Africa's knowledge according to the type of knowledge, for instance, vascular knowledge. Total knowledge of smoking-related health consequences was, however, significantly associated with tobacco use behaviour and opinions on health warnings, as discussed in detail below.

4.4.1 Knowledge of tobacco health risks among South Africans in 2010

The data of the 2010 SASAS showed that knowledge of smoking-related health consequences differed by smoking status. Non-smokers had significantly more

smoking-related health risk knowledge than current smokers, who accounted for an 18% prevalence. The finding on the difference in knowledge based on smoking status is not surprising and corroborates that in other studies.[25,26,28-30] One could posit that current smokers have less knowledge because they have less exposure to smoking-related health knowledge, or because they have an optimistic bias, or both.[26] Else, as in other studies, current smokers may want to shield themselves from worry about smoking-related risks to minimise cognitive dissonance, and therefore underestimate the personal risk of smoking.[28-30]

The demonstrated lack of knowledge about smoking-related health risks among smokers is indeed the reason why it is crucial to ensure that knowledge is available to smokers through what smokers themselves consider to be likely to be more effective, namely the use of pictorial warnings. This availability of knowledge to smokers is, in fact, the very premise of the WHO FCTC's[31] Article 13 guideline on introducing pictorial health warnings on tobacco packs in order to educate the public, including smokers, about the health risks of smoking. Moreover, a recent publication by Krosnick et al.[32] suggests that the lack of knowledge among smokers may be due to smokers' underestimating their relative risk of smoking-related health consequences. This then implies that there is a need to improve communication that will inform smokers about their increased health risk of smoking, therefore "how much" that risk increases.

The SASAS 2010 shows that those who were not current users of waterpipes had significantly better knowledge of smoking-related health consequences than those who were users. The current users of waterpipes have little or no knowledge of its dangers and harms, and there are no current policies in South Africa to regulate the use of waterpipes. This deduction is consistent with Mazaik et al.'s[33] study, which suggests that there is a lack of policy and knowledge on waterpipes.[33] Alternatively, waterpipe users may not consider the practice to be harmful,[34] although evidence has clearly indicated the harmful health effects of waterpipe use.[33,35,36] More public health efforts need to be put in place so that waterpipe users and non-users can be informed of the harms of waterpipe use,[25] particularly considering that current evidence is indicating that the use of waterpipes is increasing globally.[36]

Current electronic cigarette (e-cigarette) users had significantly less knowledge of smoking-related health consequences than non-users. One explanation could be that non-users of e-cigarettes are not convinced that e-cigarettes are less harmful than combustible cigarettes (hereafter referred to as cigarettes). Majeed et al.'s[37] US study among adults found that perceptions of harm had changed from 2012, and noted that by 2015, more adults have come to believe that e-cigarettes are just as harmful as cigarettes.[37] Similarly, Huang et al.[38] report that by 2017 there was a substantial increase in US adults who thought that e-cigarettes are as harmful or more harmful than cigarettes, compared to 2012.[38] However, current users of e-cigarettes may have been never users who perceive e-cigarettes as less harmful.[39] Alternatively, current e-cigarettes users may be current cigarette smokers who may not be sure of the harmful effects of e-cigarettes or perceive them to be less harmful,[40] therefore they hope to minimise their smoking-related risk. Furthermore, e-cigarette users may have a less negative affect towards e-cigarettes than to cigarettes,[41] or may already be addicted to cigarettes and seeking alternative methods to deal with smoking restrictions.[42] The finding of less knowledge among e-cigarette users is worrying, considering that e-cigarette use is increasing.[43] This mainly because there is no accurate public message on the harms of e-cigarettes and no clear differentiation between the relative and absolute harm of e-cigarettes.[37,38] It is worth noting that e-cigarette users and smokers appear to support adding warning labels to e-cigarettes as a way to communicate smoking-related health risks.[44]

Higher levels of smoking-related knowledge were significantly associated with no exposure to second-hand smoke, possibly because those who have had no second-hand exposure knew that second-hand smoke is harmful. Those who indicated that they were not exposed to second-hand smoke, whether at home, work, café/restaurants or shebeens/bar/clubs, had significantly more knowledge of smoking-related health risks than those who indicated that they were exposed to second-hand smoke. This observation may be related to the fact that those who were not exposed to second-hand smoke might have sought knowledge of smoking-related health effects. At the same time, those who are not exposed may have learned about the health risks of mainstream smoke, and therefore have better knowledge than those who are exposed and thus not prompted to seek knowledge of health risks.

The finding on second-hand smoke exposure may indicate that those who are exposed to second-hand smoke are ignorant of the effects of second-hand smoke and thus have no knowledge of the effects of second-hand smoke. However, it may also be that those exposed, despite some knowledge of the health risk, have not been able to remove themselves from the exposure, either because they themselves smoke, or because close family members or household members or friends are the smokers who expose them to second-hand smoke, and they are not able to avoid these people. Further, the association between knowledge and exposure status may be confounded by the smoking status of those exposed to second-hand smoke. Therefore, the true factor associated with low knowledge may be the smoking status. The relative contributions could only be determined by multiple linear regression analysis. This study's finding that having no second-hand smoke exposure is associated with higher levels of knowledge is consistent with reports in other studies[45-47] which note that those who indicated no exposure to second-hand smoke had better knowledge of the health risks of smoking. [45-47] However, our findings contradict those of a Nigerian study[48] which found that second-hand smoke exposure was associated with lower levels of smoking-related knowledge.[48] Nonetheless, this study's findings underscore the urgent need to implement Article 8 of the WHO FCTC[31] and the WHO policy recommendations on second-hand smoke,[30] which protects people from second-hand smoke.[31,49]

As expected, participants who agreed that current text health warnings are easy to understand had better knowledge than those who disagreed. This finding is similar to that of a study in Nigeria by Adeniyi et al.,[24] who reported that those who understood text warnings were more likely to have more smoking-related knowledge than those who did not. Therefore, those who understood the text warnings were probably more likely to benefit from the knowledge of health risks of cigarette smoking on text warnings.

Those who disagreed that text warnings will stop smokers who want a cigarette had better knowledge of the health risks of smoking. It is indeed conceivable that those with enough knowledge of the health risks of cigarettes would not believe that the well-known limited effect of text-only warnings like the type in South Africa would be enough

to dissuade a smoker from continuing to smoke. Conversely, those who agreed that adding pictures to text-only warnings will make smokers think more about quitting had significantly more knowledge than those who disagreed. This finding is similar to that of Hammond et al.'s study,[50] which indicated that adding pictures increases knowledge of tobacco health risks. Borland et al.[51] also found that adding pictures to text warnings increases knowledge of health risks.[51] Noar et al.[52] found that the increase in the knowledge of health risks after adding pictures to cigarette packs is more significant among smokers.[52]

Those who agreed that counter displays are a form of advertising had higher levels of knowledge than those who disagreed. The finding is consistent with studies which show that counter displays increase knowledge and increase thoughts of quitting.[53,54] The result is significant, given the global evidence that a ban on point-of-sales advertising of cigarettes reduces the overall daily smoking of adults.[55]

These findings taken together lead to the discussion on the emerging themes of the study that were used to select the text-only warnings and design of the pictorial warnings on branded and plain packs for use in Part Two of the thesis.

4.4.2 Themes for health warnings

The following themes were identified from the 2010 SASAS results and combining them with the additional literature reviewed:[1,2.3]

- *Cardiovascular*

  The results of the study indicated that there was relatively lower knowledge of the vascular consequences of smoking among South Africans, as discussed above.

- *Reproductive*

  The majority of South Africans had no knowledge of the fact that impotence, which results from compromised vascular flow of blood, is one of the health consequences of smoking. Since impotence affects the male reproductive system, spontaneous abortion was also considered under this theme, as it affects the female reproductive system, as evidenced in the literature.[56,57]

- *Second-hand smoke*

  Exposure to second-hand smoke was also an important emerging theme from the results, as those who are exposed to second-hand smoke had significantly less knowledge of smoking-related health risks than those who had no second-hand smoke exposure.

- *Lung and mouth diseases (particularly short-term effects shown to be salient to adolescents)*

  Although most participants knew about the lung consequences of smoking cigarettes, about one in every five South Africans still did not know that mouth cancer and gum diseases are possible consequences of smoking.

- *Other*

  Other emerging themes that were identified from the literature that are a consequence of smoking are death[56,57] and the financial cost [57] (particularly for a country such as South Africa, which, as has already been discussed, is not only grappling with a quadruple burden of disease, but also with various inequalities and poverty[58]).

Using the health warning themes identified above from the results and literature sources, recommendations regarding the text-only warnings to be selected, together with the general layout, concept, and design of the pictorial warnings with branded and plain packs for testing in Part Two of the thesis are presented below.

4.5 RECOMMENDATIONS

The following are the recommendations made with regard to the text-only warnings and pictorial health warnings on branded and plain packs for evaluation in Part Two of the thesis.

4.5.1 Text warnings

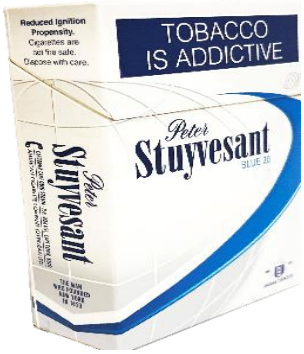
The following recommendations were made regarding the text-only warnings for testing in Part Two of the thesis:

- The text-only warnings on the Peter Stuyvesant brand package should be

considered for selection, as this was the most popular brand of cigarettes in 2010[8] (see Section 4.2.9.1).

- Text-only health warnings should be selected taking into consideration particularly those health conditions that were found to be less well-known to participants, based on the results.
- Therefore, taking into consideration the findings of the SASAS 2010 study, a total of four text warnings was recommended for selection from the current eight text warnings in South Africa, which are
  - *DANGER: SMOKING CAN KILL YOU*
  - *DANGER: SMOKING CAUSES CANCER*
  - *DANGER: SMOKING CAUSES HEART DISEASE*
  - *SMOKING DAMAGES YOUR LUNGS*
  - *PREGNANT? BREASTFEEDING? YOUR SMOKING CAN HARM YOUR BABY*
  - *WARNING: DON'T SMOKE NEAR CHILDREN*
  - *TOBACCO IS ADDICTIVE*
  - *YOUR SMOKE CAN HARM THOSE AROUND YOU*
- Taking into consideration the identified thematic areas and the least knowledge demonstrated by participants, the final four text warnings (from the above eight) recommended for testing in Part Two of the thesis were the following (see Table 4.5, overleaf):

Table 4.5: Recommended text warnings for testing in Part Two of the thesis

Theme	Text warning	Theme	Text warning
1.Other	 TOBACCO IS ADDICTIVE	**2.Cardiovascular**	 DANGER: SMOKING CAUSES HEART DISEASE
3. Reproductive & Second-hand smoke	 PREGNANT? BREASTFEEDING? YOUR SMOKING CAN HARM YOUR BABY	**4.Second-hand smoke**	 YOUR SMOKE CAN HARM THOSE AROUND YOU

4.5.2 Pictorial warnings

The recommendations made with regard to the pictorial health warnings for testing in Part Two of the thesis are discussed in detail in the subsections below.

4.5.2.1 Recommendations on pictorial health warnings

This section discusses the themes, together with the recommended pictorial health warnings under each theme, and then presents the pictorials to be placed on the tobacco packs with or without brand design elements. The following recommendations are made:

- In keeping with international recommendations,[3] a total of eight individual pictorial warnings were recommended that would be rotated every two years, with a maximum of four years.[3]

- For evaluation in Part Two of the thesis, the following pictorials were recommended under the five identified themes. The pictorials were also recommended considering the emotive potential of the pictorial health warnings, as discussed in Chapter 2:
  - *Cardiovascular*
    - Stroke
  - *Reproductive*
    - Impotence (male)
    - Abortions (female)
  - *Second-hand smoke*
    - Simulation of newborn baby/young infant being exposed
  - *Mouth diseases* (particularly short-term effects shown in the literature to be salient to adolescents)
    - Gum disease and brown, stained teeth
  - *Other*
    - Death
    - Poverty/Financial
    - Addiction

The identified themes and recommended images of the eight individual pictorial warnings for further evaluation in Part Two of the thesis are presented in Table 4.6, overleaf.

Table 4.6: Recommended pictorial warning images for evaluation in Part Two of the study

Theme	Picture	Theme	Picture
1. Reproductive (male)	 Impotence	**5.Other**	 Death
2.Reproductive (female)	 Abortion	**6.Mouth diseases**	 Oral disease
3.Cardiovascular	 Stroke	**7. Second-hand smoke**	 Second Hand Smoke
4.Other	 Poverty/financial	**8.Other**	 Addiction

The eight individual pictorial warnings should be placed on tobacco packs with either brand design elements (branded packages), using a mock brand name, and on packages without a brand design elements (plain packages). One brand standard pack should be used to allow standardisation of the background pack design across all warning labels.

4.5.2.2 General recommendations on pictorial warnings

This section discusses the general recommendations on the pack design of the pictorial warnings, with and without brand design elements. The discussion includes

the following amongst others, the general layout and design which will consist of the general appearance, colour, size, position and boarders of the cigarette packs.

4.5.2.2.1 Layout and design

Informed by the literature, the key elements discussed under the layout and design of the pictorial health warnings are the size, borders, position and general look of the pictorial health warning.

- *Size of warnings*

  The pictorial warning should cover at least 75% of the principal display area front and back. As discussed in Chapter 1 and 2 of the study, the WHO Framework Convention Tobacco Control (WHO FCTC) recommends that the pictorial warning should be a minimum of 30% and cover at least 50% of the principal display areas of the pack.[31]

- *Position of warning*

  The pictorial warning should be positioned at the front (75%) and back (80%) of the pack and should include descriptive text.

- *Position of pictures and text*

  The pictorial warning should occupy most of the front (75%) and back (80%) with the text description beside the picture, but not obscuring the picture, and following on the marker word.

- *Marker word*

  The marker word for the pictorial warnings should be "**WARNING**" and written in bold red before the descriptive text, with a minimum point size of 12 Arial.

- *Tagline*

  The taglines should summarise the main message of the picture, be positioned beside the picture, be large enough and be bold enough to stand out. The tag line should stand out from the warning, and therefore contrasting colours should be used. Taking into consideration the themes and proposed pictorial warnings, eight taglines are proposed for the eight pictorial warnings (see Table 4.7, overleaf).

Table 4.7: Proposed taglines for recommended pictorial warnings for Part Two of the thesis

PICTORIAL WARNING	TAGLINE
Stroke	**Warning:** Smoking causes stroke and heart disease
Impotence (Male)	**Warning:** Smoking causes impotence
Abortions (female)	**Warning:** Smoking causes spontaneous abortions
Simulation of new born baby/young infant being exposed	**Warning:** Don't let children breathe your smoke
Gum disease and brown-stained teeth	**Warning:** Smoking causes mouth cancer
Death	**Warning:** Smoking: leading cause of death
Poverty/Financial	**Warning:** Smoking causes poverty
Addiction	**Warning:** Smoking is addictive

- *Explanatory text*

  The proposed current pictorial warnings should be devoid of explanatory text, as the emphasis with these warnings should be on the tagline to minimise lengthy text descriptions.

- *Attribution of message*

  If consideration is given to the attribution of a message, this attribution should be in small text and be clear.

- *Interior of package*

  If a message is to be placed in the interior of the package, the health warning should be included in the message.

Figure 4.1 overleaf, presents the proposed layout and cigarette pack design of the pictorial health warnings.

Pictorial health warning pack (branded)	**Pictorial health warning pack (branded)**
Front and side 1	**Back and side 2**

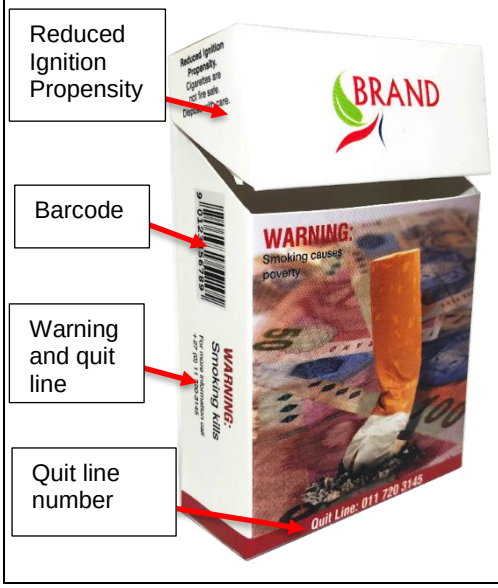


Figure 4.1: Proposed layout and cigarette pack design of pictorial health warnings

- *Colour*

  The packs will either have brand design elements nor none. For the evaluation in Part Two of the thesis, the branded tobacco pack had the pictorial health warning placed on a white background with a mock brand. For the plain pack, the pictorial health warning was placed on packs that are “drab dark brown colour” (Pantone 448C).

- *Brand design*

  Pictorial health warnings should be placed on branded packs (with a mock brand name) or plain tobacco packs. Use should be made of one brand standard pack to allow standardisation of the background pack design across all warning labels.

Figure 4.2 overleaf, presents the package design of the pictorial health warnings on branded and unbranded packs.

Figure 4.2: Cigarette packs with or without brand design elements

4.5.2.2.2 Tobacco pack spine pictorial collage

It was recommended that the cigarette pack design should include all eight pictorial health warnings in a collage. That way the pack will display to some measure the various health warnings on one pack, although a particular health warning will be emphasised on the front and back design.

Figure 4.3 overleaf, shows the collage of health warning images on the spine of the cigarette pack, with only one image emphasised on the front and back of the pack for pictorial health warnings with branded and plain packs.

Figure 4.3: Tobacco pack spine pictorial collage

4.5.2.3 Full set of recommendations on pictorial warnings with (branded) or without (plain) brand design elements

This section presents the full set of pictorial warnings on branded packs (see Table 4.8) and plain packs (see Table 4.9) as recommended for testing in Part Two of the thesis. Table 4.8 presents the set of eight recommended pictorial health warnings with brand design elements (branded) for evaluation in part two of the thesis.

Table 4.8: Set of eight recommended pictorial health warnings on branded packs for evaluation in Part Two of the thesis

Table 4.9 presents the set of of eight recommended pictorial health warnings on a "drab dark brown colour" (Pantone 448C) package without brand design elements (plain) for evaluation in part two of the thesis.

Table 4.9: Set of eight recommended pictorial warnings on plain packs for evaluation in Part Two of the thesis

4.6 SUMMARY

Generally, South Africans have a reasonable level of knowledge of the effects of smoking cigarettes, but there is a need to educate South Africans further on the dangers of smoking. As has been discussed, the most effective way is to educate the public through the introduction of pictorial warnings on cigarette packs. Therefore, the recommendation is that the proposed four text warnings and the eight pictorial warnings with brand design elements (branded) and eight pictorial warnings without brand design elements (plain) be evaluated for effectiveness among South African adults and, if necessary, be revised following recommendations from the participants.

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CHAPTER 5:
FINDINGS IN PART TWO – REACTIONS AMONG SOUTH AFRICANS TO CIGARETTE HEALTH WARNINGS, TEXT-ONLY AND PICTORIAL WARNINGS WITH (BRANDED) OR WITHOUT(PLAIN) DESIGN ELEMENTS ON THE PACKS

5.1 INTRODUCTION

This chapter uses the recommendations from Part One of the thesis, reported in Chapter 4, and presents the results for Part Two (reflecting Objectives 2 and 3) of the thesis. The chapter reports on the results regarding the reactions among South African participants towards tobacco health warnings labels, namely the current text-only warnings and the proposed pictorial warnings with (branded) or without (plain) design elements on the cigarette packs.

This chapter starts with the methods then findings on the demographic characteristics of the study participants and goes on to discuss the effectiveness of the various health warnings. Additionally, results from before and after exposure to the health warnings are presented. Finally, results of the significant pathways to change in plan to quit after exposure to cigarette health warnings are presented. The results regarding the revised pictorial health warnings are presented in Chapter 6 of the thesis.

5.2 METHODOLOGY: PART TWO (OBJECTIVES 2 AND 3)

In Part Two of the study, data were collected from November 2012 to April 2013, using a quasi-experimental crossover mixed methods study design in order to meet Objectives 2 and 3. Objective 2 was to *determine reactions among a selected sample of South Africans (non-smokers and smokers) towards text-only and pictorial health warning labels on branded and plain cigarette packs* . Objective 3 was to *assess the factors associated with change in motivation and plan to quit smoking following exposure to experimental cigarette packages with text-only and pictorial warning labels on branded or plain cigarette packs among smokers.*

A baseline questionnaire was given to recruited participants from Gauteng and the

Western Cape province to complete. Using a crossover design,[1,2,3] participants were thereafter requested to assess each of the pre-selected health warnings, namely (a) text-only (b) pictorial warnings on cigarette packs with brand design elements (branded), and (c) pictorial warnings on cigarette packs without brand design elements (plain), and complete a health warning rating questionnaire for each of the health warnings. After that, participants were further requested to complete a comparative rating questionnaire comparing all the pictorials of the health warnings. Finally, participants were requested to complete a post-exposure questionnaire after exposure to all the the different cigarette health warnings namely, text-only, branded and plain pictorial warnings on cigarette packs.

After completing the post-evaluation questionnaire, focus group discussions were held to establish and examine the attitudes and perceptions of non-smokers and smokers towards the different cigarette health warnings (text-only and pictorial on branded or plain packs). Focus groups were held until saturation was reached, where no more new information was obtained.

After the focus groups, only the pictorial health warnings were revised according to the participants' suggestions. Chapter 6 presents the reactions of participants to the revised pictorial warning labels on packs with brand design elements (branded) and ones without brand design elements (plain).

5.2.1 Study design

The study used a mixed-methods study with a quasi-experimental crossover experiment and focus group discussion.

5.2.2 Setting

The study was conducted in South Africa, in Gauteng and the Western Cape province. The two different provinces were selected specifically to evaluate the effectiveness of the various health warning labels on participants' desire to quit in the various focus groups.

South Africans still live mainly in racially segregated areas, due to the legacy of the

political system of apartheid (1948–1994). To ensure representation of the four main South African cultural groupings, the study was conducted at eight study sites that were geographically representative of the cultural population of South Africa. Participants were met at schools or community halls in their community so that they did not incur transport costs.

Gauteng and the Western Cape sites were selected because these provinces are among the most urbanised provinces in South Africa, have population diversity in terms of racial grouping and are thus most representative of the broader South African population. These provinces also have high smoking prevalence rates among their populations.

The sites were selected in consultation with the National Department of Health (Health Promotion Cluster), the Gauteng Department of Health, together with the Tshwane District, and the Western Cape Department of Health. The sites were the following – in Gauteng:

- Eesterust (Coloured/Mixed race)
- Laudium (Indian)
- Shoshanguve (Black)
- Gezina/Moot/Danville (White)

in the Western Cape:

- Gugulethu (Black)
- Mitchell's Plain (Coloured/Mixed race)
- Rhylands (Indian)
- Bellville (White)

The study protocol was presented to the National Department of Health, the Gauteng Department of Health, and the Western Cape Department of Health. All these departments expressed their support for the thesis and permission was granted by the Director-General of the National Department of Health to conduct the study (see Appendices 4a and 4b).

5.2.3 Study population

As has been indicated previously, the mainstay of Part Two of the study was to meet Objectives 2 and 3. Participants were drawn from the provinces of Gauteng and the Western Cape. These participants were aged 18 years and older, and represented the four racial/population groups in South Africa, namely Black, White, Indian and Coloured/Mixed race. Furthermore, the sample took into account the dimensions of gender (male, female) and smoking status (smoker or non-smoker/ex-smoker).

5.2.4 Inclusion and exclusion criteria

The study population as indicated above in section 5.2.3 included participants representing the four racial/population groups in South Africa and aged 18 years and above. The dimensions of gender (male, female) and smoking status (smoker or non-smoker/ex-smoker) were also taken into account when determining the sample. Focus groups were conducted in the indigenous language of the respective areas, therefore in Afrikaans, isiXhosa, English, and Setswana. Participants who could not speak the language and found themselves in the focus group were not excluded. The focus group leader translated for the participants so that they could to be part of the group discussions, in keeping with recommended translation guidelines.[4,5]

Individuals who were not in the provinces of Gauteng or the Western Cape, and who were not in the designated sites and age groups, were excluded.

5.2.5 Sample size

In keeping with proposed international protocol[6] of having 8 to 10 participants in a focus group and at least two focus groups from each key demographic group in order to determine the effectiveness of health warning labels, a total of 960 participants was calculated as the sample to be included in the study. The participants were divided as set out below.

In Gauteng, the following sample of participants was calculated to be included in the study (N=480; with 120 for each racial/population group):

- Eesterust (Coloured/Mixed race) - 120

- Laudium (Indian) - 120
- Shoshanguve (Black) - 120
- Gezina/Moot/Danville (White) - 120

In the Western Cape, the following sample of participants was calculated to be included in the study (N = 480; with 120 for each racial/ethnic group):

- Gugulethu (Black) - 120
- Mitchell's plain (Coloured/Mixed race)- 120
- Rhylands (Indian) - 120
- Bellville (White) - 120

Focus group discussions were held until saturation was reached, and at that point, no further focus groups were conducted.

5.2.6 Recruitment of study participants

The current South African health system makes use of community health workers, health promoters, and environmental health officers. These individuals in all provinces are responsible for community health. The study participants were recruited during the normal day-to-day house visits that were routinely conducted by the health promoters. This was to ensure that a high response rate was achieved and that participants could be reached to communicate information. The health promoters in both provinces are assisted by the environmental health officers and community health workers. The health promoters, environmental health officers and community health workers were selected instead of field workers for recruitment, after discussion with the Gauteng and Western Cape Departments of Health, because they knew the community and could also ensure that a high response rate could be achieved.

As previously described, the recruitment of participants took the form of door-to-door house visits, using a recruitment guide (see Appendix 5). The health promoters visited all houses that they normally visit, and gave the participants invitation cards to participate in the study. The cards had the date, time and venue of where the participants were to meet for the focus group discussion.

The health promoters were trained for a week by the researcher at their respective Departments of Health about the various elements that would be their responsibility during the study. The training involved how to recruit the participants and also how to administer the questionnaire. The training also included how to conduct the focus groups using an adapted version of an internationally validated protocol[6] containing semi-structured moderator guides.

A total sample of 960 participants was calculated to be included in the study, as carried out in Gauteng and the Western Cape. The participants who were selected were scheduled to be allocated to one of 12 focus groups of 10 participants each, namely:

- Male groups
  - Group 1: Smokers 18-24 years
  - Group 2: Smokers 25-35 years
  - Group 3: Smokers 36 years and above
  - Group 4: Non-Smokers/ex-smokers 18-24 years
  - Group 5: Non-Smokers/ex-smokers 25-35 years
  - Group 6: Non-Smokers/ex-smokers 36 and above
- Female groups
  - Group 7: Smokers 18-24 years
  - Group 8: Smokers 25-35 years
  - Group 9: Smokers 36 years and above
  - Group 10: Non-Smokers/ex-smokers 18-24 years
  - Group 11: Non-Smokers/ex-smokers 25-35 years
  - Group 12: Non-Smokers/ex-smokers 36 and above

The diagram in Figure 5.1 overleaf, shows the composition of the planned focus groups:

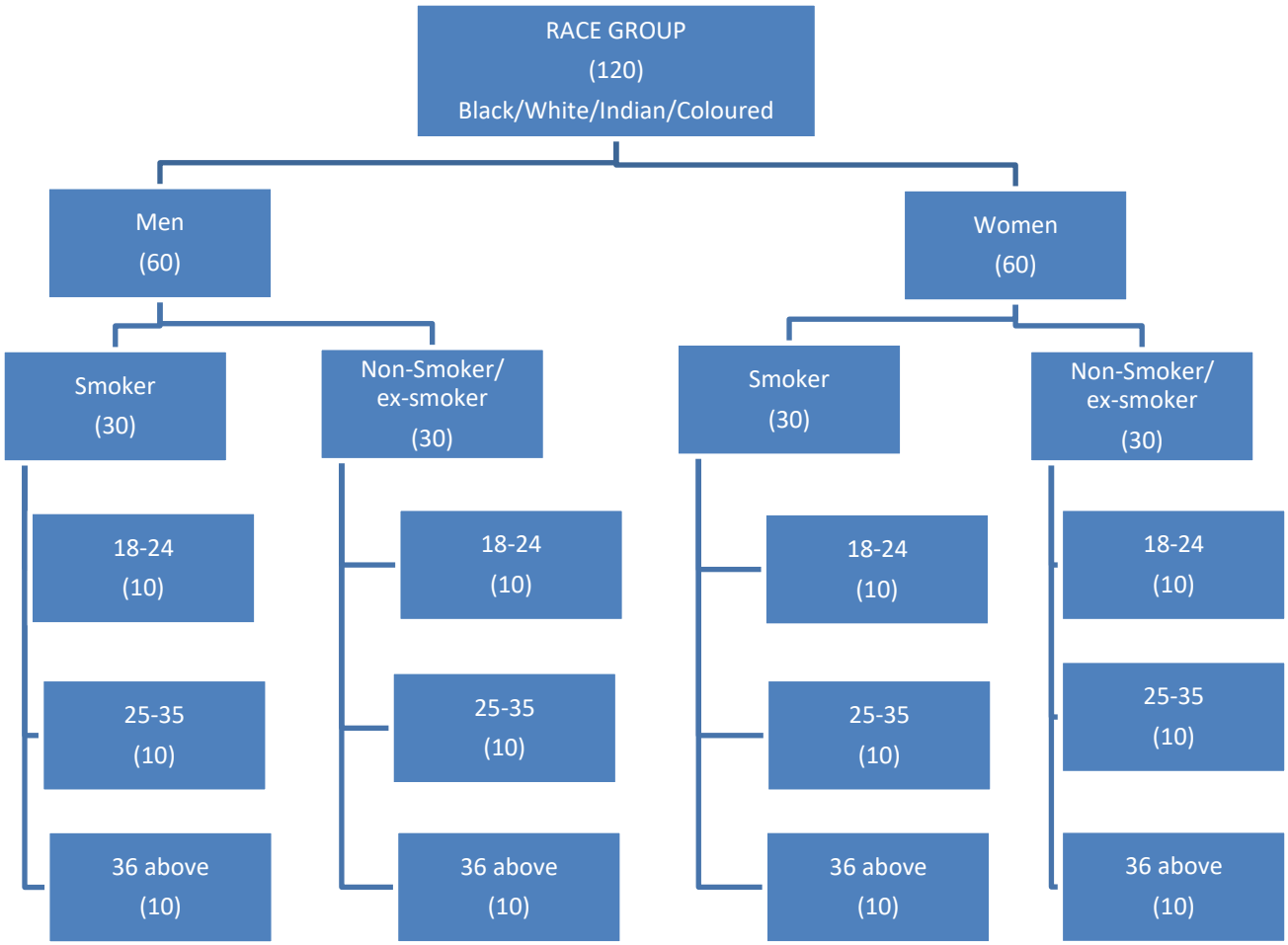


Figure 5.1: Planned focus group discussion categories

5.2.7 Data collection tools

Part Two of the study made use of four questionnaires that were self-administered by participants. The three questionnaires were

- the baseline rating questionnaire, used among other things to assess the demographic characteristics of the participants and obtain baseline data on knowledge of smoking cigarettes and associated health risks, opinions on warning labels and state of desire to quit (see Appendix 6);
- health warning rating questionnaire, for completion with the intervention of text-only or pictorial health warnings, either with brand design elements (branded) or without brand design elements (plain) (see Appendix 7);
- the comparative rating questionnaire, among other things, to rank the pictures on the health warnings on the packs in order from most effective to least effective, (see Appendix 8); and

- the post-exposure questionnaire, to obtain, among other things, post-exposure data on knowledge of smoking cigarettes and associated health risks, opinions on warning labels and state of desire to quit (see Appendix 9).

To improve validity and reliability, the baseline rating questionnaire, health warning rating questionnaires and the post-exposure questionnaire were pilot tested among a group of 20 volunteering participants who were not part of the sample population. The piloting provided an opportunity to refine the questions for clarity and local cultural adaptation of meanings.

5.2.8 Data collection procedure

The main study participants were met at the venues proposed by the researcher's local partners (the Provincial Departments of Health), which were a school hall or community hall, during their scheduled time. A second visit was conducted to allow those who were eligible to participate but might not have participated in the study (for example, those who were absent due to illness) and wished to do so voluntarily, to participate.

The researchers assured the participants of anonymity and explained to participants what the procedures were going to be. Participants were told up front that they would be completing four questionnaires namely: a baseline questionnaire, then the health warning rating questionnaire during the intervention, then a comparative rating questionnaire and lastly a post-exposure questionnaire, all individually. Finally, participants would be part of a focus group. As has been indicated in the previous section (5.2.7 above), the questionnaires were self-administered; therefore, participants completed the questionnaire themselves.

5.2.8.1 Questionnaire and individual ratings

After the welcome and introduction of the subject and consent procedure had been completed, participants were asked to complete a baseline questionnaire (see Appendix 6) on the following topics:

- knowledge of tobacco health effects
- tobacco use status and where applicable level of nicotine dependence (heaviness

of smoking index)

- past quit attempts
- self-efficacy to quit
- past advice to quit
- experience of smoking restrictions at work, home, and public places
- awareness of text warning labels (if noticed and if read? which one(s) can the participant remember?)
- intrinsic and extrinsic motivation/reasons to quit

After completion of the baseline questionnaire, the participants were told that the next part of the study was to involve their rating the warning packages individually and not to discuss their ratings with anyone. Participants were informed that they would be given time to discuss the health warnings during the focus group discussions that would be held after their individual ratings of the health warnings.

Using a crossover design (three interventions/experimental conditions, three exposure periods), the three interventions (text-only warnings, pictorial warnings on branded and on plain packs) were assessed and were denoted by:

- A: text-only warnings
- B: pictorial warnings with brand design elements (branded)
- C: pictorial warnings without brand design elements (plain)

This crossover design was used to minimise bias that may result as a consequence of rating health warnings in a predetermined order. [2,3,7] The sequence in which the participants evaluated or rated the health warnings varied. There were six possible orders (see Table 5.1) that a participant could receive. Each participant was randomly allocated a specific order to evaluate. Furthermore, within the experimental conditions (allocated order, for example, Order 1), participants also randomly rated the different health warnings (for example, within B: pictorial warnings, Order 2), and participants did not rate the same picture at the same time. Thus Participant 1, in Order 2, might start with Picture 1, while Participant 2, in Order 2, might start with Picture 4. Therefore, within each experimental condition or allocated order, participants rated the health warning in a random sequence. The orders allocated are shown in Table 5.1.

Table 5.1: Number of possible orders for crossover design

ORDER			
Order 1	A	B	C
Order 2	A	C	B
Order 3	B	A	C
Order 4	B	C	A
Order 5	C	A	B
Order 6	C	B	A

Using the crossover design over three periods ensured that differences among the interventions were detected with greater power and nullified the crossover effect.[2,3,7] Participants were requested to assess each of the health warnings sequentially (text and pictorial warnings, with or without brand design elements) and to rate each health warning using a structured questionnaire. In between the assessment of each warning, participants were exposed to pictures not related to health (washout pictures), such as panoramic views of a lake or the ocean (see Appendix 10). These washout pictures were added to neutralize the affect from exposure to the pictorial health warning and reduce fatigue that could result from consecutive exposure to the pictorial health warning pictures (see Figure 5.2 for the diagrammatic representation of the sequence of the crossover design for the health warnings).

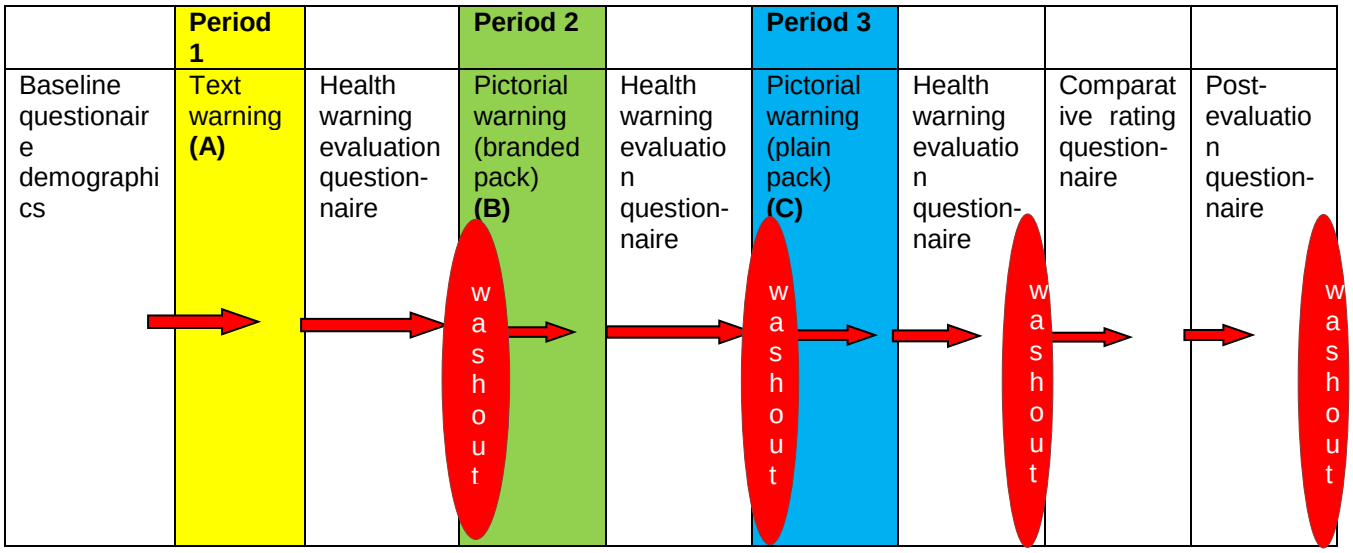


Figure 5.2: Sequence of crossover design

An example of the sequence of individual evaluations of health warnings (intervention) using Order 1 of the crossover design (see Figure 5.2) after the completion of the baseline questionnaire is given below:

- Experimental condition (4 text-only warnings) (2 minutes each, total 8 minutes)

- Complete health warning rating questionnaire text-only warnings (1 minute each, total 4 minutes)
    - Break (5 minutes and washout pictures)

- Experimental condition (8 pictorial warnings with brand design elements (branded)) (2 minutes each, total 16 minutes)

- Complete health warning rating questionnaire pictorial warnings with brand design elements (branded)) (1 minute each, total 8 minutes)
    - Break (5 minutes and washout pictures)

- Experimental condition (8 pictorial warnings without brand design elements (plain)) (2 minutes each, total 16 minutes)

- Complete health warning rating questionnaire pictorial warnings without brand design elements (plain)) (1 minute each, total 8 minutes)
    - Break (5 minutes and washout pictures)

- Comparative rating questionnaire (3 minutes)

- Post-exposure questionnaire (7 minutes)
    - Lunch break (30 minutes and washout pictures)

Each participant received text-only warnings, pictorial warnings on packs with brand design elements (branded), and those without brand design elements (plain) to assess, but participants received these health warnings in different orders to adhere to the crossover design.

After the individual assessment of each group of health warnings (text-only, pictorial on branded and plain packs) and after being exposed to all the health warning labels, participants completed a comparative rating questionnaire of all the pictorials on the health warnings and thereafter, finally a post-exposure questionnaire (which was adapted and previously validated)[6]. The post-exposure questionnaire concluded the individual assessment of the health warnings by the participants. The next part of the evaluation was the focus groups.

5.2.8.2 Focus groups

Focus group discussions were conducted after the conclusion of the individual assessment of health warnings by the participants. This qualitative method ensured greater understanding of the effects and consequences[6] of the health warnings (text-only vs pictorial warnings on branded or plain packs. The focus group method also ensured that in-depth data were collected. It is the best method for exploring attitudes, perceptions and reactions:[6,8,9] it has been shown that complex phenomena such as how individuals process and make sense of messages in the social marketing context are tested better using qualitative methods,[9,10] which can inform the future development of quantitative evaluation tools.

After the individual assessment of the health warnings, participants had a break of 30 minutes, during which they were given lunch. Completed questionnaires were collected by the researcher and the participants were thanked for completing the questionnaires. The researcher then proceeded to explain that focus groups would be conducted after the individual assessment of the health warnings.

Where there were more than 12 participants in a group (this happened in 11 groups), random selection occurred in order to select 10 participants to be included in the focus group. In total, 87 focus groups were conducted (see Table 5.2). Where there were fewer than three participants in a group, no focus group discussion was conducted (this happened with five groups).

Focus group discussions were held among participants in their respective cultural groups, according to age, smoking status, and gender. The focus groups were

conducted using the indigenous language of the population group concerned, for example, English, Afrikaans, isiXhosa or Setswana. For the study, efforts were made to run between four to six parallel focus group discussions per day. A total of 12 focus group facilitators were trained to assist the researcher of the thesis.

After returning from lunch, for each focus group discussion, participants were welcomed and asked to sit down in order to move into the next phase. Participants were informed that during the session minutes would be taken. Participants were then requested to give consent for the session to be audiorecorded to assist the minute taker. Where participants refused consent to be audiorecorded, no recording was done and only minutes were taken. Participants were assured of anonymity.

A standard moderator guide was used (see Appendix 11) for all focus groups, following a one-week training of focus group facilitators. Participants in each focus group were randomly, one at a time, shown all the health warnings that they had previously rated individually – the current text-only warnings and the pictorial warnings on branded and plain packs – and then a discussion was held after each warning.

Using the example of Order 1, the focus group discussion started by showing the participants all the current text-only warnings, and then these were discussed. Next, the participants were shown the pictorial warnings branded packs, one at a time. A total of eight pictorial warnings were viewed and discussed by the participants. Finally, participants discussed the pictorial warnings on plain packs. These were the same eight pictures (as on the branded pack) but on a drab darkbrown colour (Pantone 448C) cigarette box, without the background of branded colours/a trademark of the manufacturer.

Washout pictures were then shown to participants to conclude the focus group discussion. The purpose of showing the washout pictures was to minimise the influence that the previous procedure may have had.[2,3,7] The researcher assured the participants again of anonymity and switched off the audiorecorder where recordings were consented to and collected all minute forms, and thanked the participants for their participation.

All participants, irrespective of whether or not they continued with the focus group, were also given a 10-minute talk at the end of the focus group on the dangers of tobacco use. Materials (booklet, pen, cap and pin) from the National Council Against Smoking (NCAS) were also handed out to them at the end of the focus group and the participants were thanked for their participation. The data were recorded anonymously into the database.

Table 5.2: Groups and number of participants in the focus groups

Smoking status	Age Category				Location	
					Gauteng	Western Cape
Current Smoker	18-24	Female	Race	Black	3	2
				Coloured	4	6
				Indian/Asian	5	5
				White	11	1
		Male	Race	Black	7	15
				Coloured	6	6
				Indian/Asian	4	6
				White	2	5
	25-35	Female	Race	Black	6	9
				Coloured	8	7
				Indian/Asian	5	4
				White	7	6
		Male	Race	Black	11	9
				Coloured	9	8
				Indian/Asian	9	6
				White	8	9
	≥36	Female	Race	Black	7	5
				Coloured	15	17
				Indian/Asian	4	7
				White	17	8
		Male	Race	Black	8	11
				Coloured	12	7
				Indian/Asian	12	14
				White	13	15
Non Smoker	18-24	Female	Race	Black	4	6
				Coloured	10	5
				Indian/Asian	7	3

Smoking status	Age Category				Location	
					Gauteng	Western Cape
				White	1	7
		Male	Race	Black	8	9
				Coloured	3	5
				Indian/Asian	8	4
				White	4	8
	25-35	Female	Race	Black	10	11
				Coloured	4	7
				Indian/Asian	8	8
				White	5	3
		Male	Race	Black	5	6
				Coloured	4	8
				Indian/Asian	10	9
				White	2	4
	≥36	Female	Race	Black	31	22
				Coloured	16	14
				Indian/Asian	6	9
				White	11	8
		Male	Race	Black	15	6
				Coloured	6	10
				Indian/Asian	11	8
				White	7	3

*Key: no focus group conducted – fewer than 3 participants

*Key: random selection to 10 participants per focus group

After the initial analysis of the qualitative data, the pictorial health warnings were revised according to any recommendations. Revised pictorial health warnings (branded or plain packs) were developed and results are discussed in Chapter 6. The revised set of pictorial warning labels was shown to a select group of different participants to assess their reactions using a focus group procedure and adhering to the same focus group procedures as discussed above. The participants evaluating the revised pictorial health warnings, as previously, were also given a 10-minute talk at the end of the session on the dangers of tobacco use and had materials (booklet), pen, cap and pin) from the National Council Against Smoking (NCAS) handed out to them and they were thanked for their participation. The data for the revised warnings

were recorded anonymously into a database and results are presented in this chapter.

An overview of the procedure used for Part Two of the study is shown in Figure 5.3.

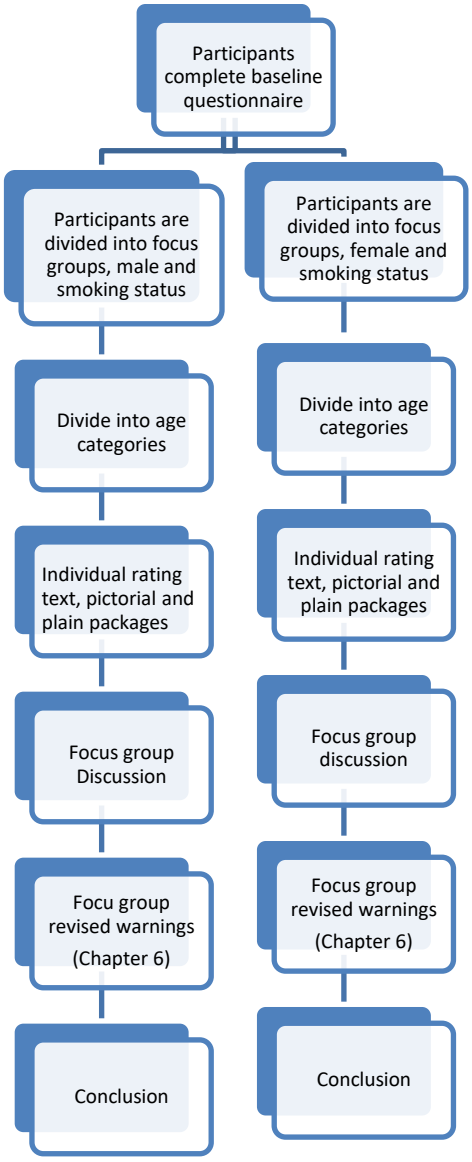


Figure 5.3: Overview of procedure of Part Two of the study

5.2.9 Measurements and definitions

The subsections below discuss the measures and definitions used.

5.2.9.1 Sociodemographic features

Similar to the measurements for Part One of the study, the questionnaire for Part Two

of the study contained several items for participants to provide information about sociodemographic characteristics such as their age, sex, race, level of education, and employment status.

- *Age*

  Age was assessed by the question: "How old are you?" Answers were coded as follows:

  - 18-24 years (1)
  - 25-35 years (2)
  - ≥ 36 years (3)

- *Gender*

  The participant's gender was coded as

  - Male (0)
  - Female (1)

- *Ethnicity /race*

  As in Part One of the study, participants self-identified as Black/African, Coloured (Mixed race), Indian/Asian or White.

- *Level of education*

  Level of education was assessed by the question "What is the highest level of education that you have ever completed?" The answers were coded, as in other studies in South Africa,[11,12] as follows:

  - <12 years ("No schooling", "Primary school", "Secondary school" and "Do not know") (1)
  - 12 years ("High school") (2)
  - >12 years ("Diploma/certificate", "Degree" and "Other, specify") (3)

- *Current employment status*

  Current employment status was assessed by the question: "Which of the following best describes your current employment status?" and coded as follows:

  - Unemployed (1)
  - Employed (2)
  - Other ("Student", "Pensioner", "Other, specify" (3)

- *Children*

  Participants were asked: "Do you have any children?" Responses were coded as

follows:

- Under five years (1)
- Early adolescent (2)
- Adolescents (3)
- 18 years or older (4)

5.2.9.2 Opinion on smoking and knowledge of tobacco health risk

As in Part One of the study, the Part Two questionnaires contained several items to assess reactions to health warnings and participants' desire to quit as outcome variables of interest for Objectives 2 and 3 of the study.

- *Opinion on smoking and warning labels*

  Participants were asked the same 26 questions before (Background baseline questionnaire, Appendix 6) and after exposure to the health warnings (Post-exposure questionnaire, Appendix 9). The 26 questions asked the participants about their opinion on smoking and health warning labels on the packaging of tobacco products and counter displays. The questionnaire was phrased as follows: "Here are some comments people made about smoking and the warnings labels on the packaging of tobacco products and counter displays in South Africa. To what extent do you agree or disagree with them?"

  Participants had to indicate whether they "Strongly agree" (1), "Agree" (2), "Neither agree nor disagree" (3), "Disagree" (4), "Strongly disagree" (5), or "Don't know" (8). As in Part One of the study, all the responses were dichotomised into "Agree" ("Strongly agree" and "Agree", coded 1) or "Disagree" ("Neither agree nor disagree", "Disagree", "Strongly disagree" and "Don't know", coded 0).

  The exception was the responses to the statement "When smokers want a cigarette, the text warnings are not going to stop them from smoking", which were reverse coded. In other words, for this question, responses were dichotomised into the same categories, but "Agree" ("Strongly agree" and "Agree") was coded 0, and "Disagree" ("Neither agree nor disagree", "Disagree", "Strongly disagree" and "Don't know") was coded 1.

  For the purposes of analysis in this thesis and in order to reduce the data, principal

component analysis was performed from responses to the 26 questions about the extent to which participants agreed or disagreed with comments on the 26 questions. The excluded items loaded below the cut-off of 0.35 commonly set for acceptable extraction factor loading.[11,12] After principal component analysis and scale reliability tests, four different scales ("smoking cognition"; "smoking emotions"; "reactions to text warnings"; and "advertising and pictorial warnings reactions") were derived to assess opinions on smoking and warning labels or packaging of tobacco products. Reliability testing of the different scales was conducted using the Cronbach alpha.

- *Knowledge of what cigarette smoking can cause*

  Participants were asked the same items to assess the knowledge of tobacco health risks before the exposure (Baseline background questionnaire, Appendix 6) and after (Post-exposure questionnaire, Appendix 9)exposure to the health warnings. The questionnaire, as in Part One of the study, contained several questions regarding the likelihood that smoking cigarettes can cause different ailments. Knowledge of tobacco health risks was assessed by the question: "In your opinion, how likely is smoking cigarettes to cause…".

  The response options were similar to those in Part One, namely: "Not likely" (coded 0), "Somewhat likely" (coded 1), "Very likely" (coded 2) and "Don't know" (not considered/coded missing). Responses were similar to those in Part One, with some additions:

  - Stroke (blood clot in the brain)
  - Impotence (a man not able to have sex)
  - Lung cancer
  - Tuberculosis
  - Abortions
  - Gum disease
  - Mouth cancer
  - Financial problems
  - Illness in children
  - Death

- Addiction
- Gangrene
- Amputations

Similar to Chapter 4, principal component analysis was performed on responses to the 13 questions about the knowledge of smoking-related health risks for the purposes of analysis. As previously, items were excluded if they loaded below the cut-off of 0.35 usually considered adequate for extraction factor loading.[11,12] After a scale reliability analysis using Crobach alpha, three different item scales ("Real risk knowledge"; "Lung cancer and addiction knowledge"; and "Total knowledge") were derived to assess participants' knowledge of smoking-related health consequences before and after their exposure to health warnings.

5.2.9.3 Reaction to health warnings, text-only and pictorial (on branded or plain packs)

Participants were asked about their reaction to the text-only health warnings and the pictorial warnings (on branded or plain cigarette packs). There were four text-only health warnings, and eight pictorial health warnings on branded packs, and eight pictorial health warnings on plain packs). The questions on reaction to health warnings considered the constructs of the persuasive communication theory, namely attention, communication, identification, and effect. Participants were asked: "Please complete the following page for each warning message". The questions for each construct of the persuasive communication theory were on whether:

- Attention
  - grabs my attention
- Communication
  - easy to understand
  - makes me stop and think
  - taught me something new
  - is believable
- Identification
  - is relevant to me
  - is frightening

        - makes me feel more concerned about smoking
        - makes me think about the health risks of smoking
        - would make me think about quitting
        - makes me feel smoking is extremely dangerous to my health
        - makes me feel I spend too much money on cigarettes
    - Effect
        - making people think about the health risks of smoking
        - motivating smokers to quit smoking or think about quitting
        - helping to prevent youth from starting smoking
        - overall, how effective is this warning

Participants had to indicate whether they "Strongly agree" (coded 1), "Agree" (coded 2), "Neither agree nor disagree" (coded 3), "Disagree" (coded 4), "Strongly disagree" (coded 5), or "Don't know" (coded 8). All the responses were dichotomised into "Agree" ("Strongly agree" and "Agree", coded 1) and "Disagree" ("Neither agree nor disagree", "Disagree", "Strongly disagree" or "Don't know", coded 0).

- *Effectiveness of picture*

  Using a 10-item Likert scale, participants were then asked: "Please rate the effectiveness of the picture in this warning by circling one number on the scale below." The Likert 10 item scale ranged from 1, "least effective", to 10, "most effective". Participants were also asked to write down what they liked or disliked about the picture.

- *Effectiveness of text*

  Using a 10-item Likert scale, participants were asked: "Please rate the effectiveness of the text in this warning by circling one number on the scale below." The Likert 10 item scale ranged from 1, "least effective", to 10, "most effective". Participants, as in the question on the picture, were also asked to write down what they liked or disliked about the text.

- *Effectiveness of warning in different ways*

  Participants were asked about the effectiveness of the warning message in different formats using the question "How effective would this warning message be in each of the following ways?" Participants had the following options:

- Making people think about the health risks of smoking
- Motivating smokers to quit smoking or think about quitting
- Helping to prevent youth from starting smoking
- Overall, how effective is this warning

Responses were dichotomised into "Effective" ("Somewhat effective" and "Very effective", coded 1) and "Not effective" ("Not all effective", "Not very effective", coded 0).

- *Comparison of pictorials*

  Participants were given a summary of the group of the pictorials which were numbered in random order. Participants were told: "Please look at the pictures below from your cigarette packs and answer the following…". Participants were then asked to rank the eight pictures in order from most effective to least effective overall, in their opinion. Furthermore, participants were asked to insert the number of the picture that in their opinion, answers the following:

  - Which one of the warning messages most made you stop and think?
  - Which one of the warning messages do you think would be most effective for informing people about the health effects of tobacco?
  - Which one of the warning messages do you think would be most effective for encouraging smokers to reduce their tobacco use?
  - Which one of the warning messages do you think would be most effective for preventing youth from starting smoking?

  Finally, participants were then asked to look at all the messages and different cigarette packs in front of them and answer the following: "Please choose the top five health warning messages in order from most effective to least effective overall in your opinion." Participants entered their choices by writing the corresponding number of the specific health warning in the space provided.

5.2.9.4 Cigarette smoking measures

As in Part One of the thesis the Part Two questionnaires also contained several measures to assess cigarette smoking, as explained below.

- *Ever experimented with smoking*

  Participants were asked: "Have you ever tried or experimented with cigarette

smoking, even one or two puffs?" Responses were coded into "Yes" (1) and "No" (0).

- *Current and past month smoking*

  Two questions were used to assess current cigarette smoking.

  Firstly, participants were asked: "Do you currently smoke cigarettes?" Responses were coded into "Yes" (1) and "No" (0).

  Secondly, they were asked: "During the past 30 days (one month), on how many days did you smoke cigarettes?" This question was scored on a 7-point scale from "0 days" (1) to "All 30 days" (7) (see Appendix 6).

  Response items were recoded to express this as the dichotomous outcome of past-month cigarette use; that is, each participant was categorised as either as a past-month cigarette user (coded 1), for those who scored from 2-7, or as a non-cigarette smoker (coded 0), for those who scored 1.

  For the purpose of data analysis, the dichotomous outcome variable Smokers (current smokers and non-smokers) was created by combining and recoding the responses to the items of the above two questions about past-month cigarette use and currently smoking. That is, each participant was assigned to either be a current smoker (1) for those who were past-month cigarette users and additionally answered. "yes" to being current smokers. Further, non-smoker (0) for those who were non-cigarette smokers above and furthermore said, "no" to being current smokers. If there was a discrepancy between the responses regarding past month cigarette use and current smoker, the record was excluded.

Several other items were also used to measure cigarette smoking practice. These items are set out below:

- *Frequency of smoking*

  Smoking frequency was assessed by two questions. The first was"On the days that you smoke(d), on average, how many cigarettes, including hand-rolled cigarettes, do (did) you smoke per day?" Responses were categorised and coded as follows:

  - <10 (cigarettes per day) (0)
  - >10 (cigarettes per day) (1)

  The second was "If you smoke(d) daily, how soon after you wake up do (did) you

take your first cigarette?". The responses options and coding were

- Within 5 minutes (1)
- Within 30 minutes (2)
- Between 30 and 60 minutes (1 hour) (3)
- After 1 hour (4)
- Stopped smoking daily more than 3 months ago (5)
- I have never been a daily smoker (6)

- *Desire to quit*

  Desire to quit was assessed by the question: "Do you want to stop smoking cigarettes now?" The analysis was limited to participants who were identified as current cigarette smokers. Response options and coding were as follows:

  - I have never smoked cigarettes (excluded, not coded)
  - I do not smoke now (excluded, not coded)
  - Yes (1)
  - No (0)

  The questionnaire had five questions that asked participants about quitting smoking, as discussed below.

- *Planning to quit*

  Planning to quit was assessed before (background baseline questionnaire) and after (post-exposure questionnaire) exposure to the health warnings by the question "When are you planning to quit smoking?" The response options were the following:

  - I do not smoke
  - Not planning to quit
  - Some time in the future beyond six months
  - Within the next six months
  - Within the next month

  The analysis was limited to participants who were identified as current cigarette smokers. Responses were dichotomised into "Planning" ("Within the next month", "Within the next six months", "Some time in the future beyond six months", coded 1) and "Not planning" ("Not planning to quit", coded 0). "I do not smoke" was excluded and not coded. Further, change in plan to quit after exposure to health

warnings was measured as the difference between responses to plan to quit after and plan to quit before exposure to health warnings. The analysis was limited to participants who were identified as cigarette smokers and dichotomised as " positive change in plan to quit after exposure to health warnings" (coded as 1) and "No or negative change in plan to quit after exposure to health warnings" (coded as 0)

- *Motivation to quit now*

  Motivation to quit was also assessed before and after exposure to the health warnings by the following question: "On a scale from 0 to 10 (0 meaning not at all motivated and 10 very motivated), how much do you want to stop smoking now?"

  The participants were scored on a 10-point Likert-scale. Participants were limited to smokers, and the higher the score, the more motivated the participant was in wanting to stop smoking.

- *Quit attempt in past 12 months*

  The attempt to quit in the past 12 months was assessed before and after the experiment by the question: "During the 12 months, have you ever tried to quit smoking?" Participants had the options of answering:

  - Never
  - Once
  - Twice
  - Three times or more
  - I did not smoke now at all
  - do not know/can't choose

  The analysis was limited to participants who were identified as cigarette smokers. Responses were dichotomised into "Yes" ("Once", "Twice", "Three times or more", coded 1) and "No" ("Never", "I did not smoke now at all", "Do not know/can't choose", coded 0).

- *Duration of stopping smoking*

  Participants were asked "How long ago did you stop smoking cigarettes?" They had the following response options:

  - I have never smoked cigarettes

- I have not stopped smoking cigarettes
- Less than one month
- 1-5 months
- 6-11 months
- One year
- Two years
- Three years or longer

The analysis was limited to participants who were identified as cigarette smokers, so the option of "I have never smoked cigarettes" was excluded, and the rest of the responses were coded as follows:

- Not stopped ("I have not stopped smoking cigarettes") (1)
- < 1 year ("Less than one month", "1-5 months", "6-11 months") (2)
- ≥ 1 year ("one year", "two years", "three years or longer") (3)

- *Advice to quit*

  Advice to quit was assessed with the following question: "Have you ever received help or advice to help you stop smoking cigarettes?" The analysis was limited to participants who were identified as cigarette smokers and dichotomised as "Yes" (coded as 1) and "No" (coded as 0). The response "I have never smoked cigarettes" was excluded.

- *Self-efficacy*

  Self- efficacy was assessed by two questions, both asked before and after exposure to the health warnings, namely:

  - *Self-efficacy in the next six months*

    Self-efficacy in the next six months was assessed by the question: "And if you tried in the next six months, how likely do you think it is that you would succeed in giving up smoking? Is it…" As with the self-efficacy question in Part One of the study, there were five response options ranging from "Very likely" (coded 1) to "Do not know/Can't choose" (coded 8). Analysis of self-efficacy in the next six months was dealt with as in Part One, by dichotomising responses into "Likely" (coded 1) and "Not likely" (coded 0).

- *Self-efficacy now*

  Self-efficacy now was assessed before and after exposure to the health warnings by the question: “On a scale from 0 to 10 (0 meaning not at all confident and 10 very confident), how strongly do you believe/how confident are you that you could give up smoking now and remain a non-smoker if you tried? The participants were scored on a 10-point Likert scale. Participants were limited to smokers, and the higher the score, the more confident in succeeding in giving up smoking the participant was deemed to be.

- *Switching from cigarettes to snuff*

  Participants were asked before and after exposure to the health warnings: “If you currently smoke and were told that snuff is 99% safer than smoking and it would give you the same amount of nicotine you crave from your cigarette, how likely would you be to switch?” The response options were

  - Very likely
  - Somewhat likely
  - Somewhat unlikely
  - Very unlikely
  - Do not know/Can’t choose

  The analysis was limited to participants who were identified as current cigarette smokers. Responses were dichotomised into “Likely” (“Very likely” and “Somewhat likely”, coded 1) and “Unlikely” (“Somewhat unlikely”, “Very unlikely” and “Do not know/can’t choose”, coded 0).

- *Spending money on cigarettes*
  - Participants were asked: “Have you or any other smoker in your household spent money on cigarettes that you knew would be better spent on household essentials like food?” The response options and their coding were:
  - Yes (1)
  - No (0)
  - Refused (excluded, not coded)
  - Can’t say (excluded, not coded)
  - Do not know (excluded, not coded)
  - I am not a smoker (excluded, not coded)

5.2.9.5 Snuff use

Participants were asked three questions relating to snuff use.

- *Ever use*

  Participants were asked: "Have you ever used snuff?" Responses were coded into "Yes" (1) and "No" (0).

- *Past month snuff use*

  To assess smokeless tobacco use, participants were asked: "During the past 30 days (one month), on how many days did you use snuff?" The question was scored on a 7-point scale from "0 days" (1) to "All 30 days" (7). For data analysis in the current study, the item was recoded to be expressed as the dichotomous outcome of past month snuff use. That is, each participant was coded as either a past-month snuff user (1), for those who scored from 2 to 7 on the 7-point scale, or as a non-snuff user (0), for those who scored 1 on the 7-point scale.

- *Frequency of snuff use*

  Participants were asked:" On the days that you use(d) snuff, how many times per day do (did) you use snuff?"

5.2.9.6 Second-hand smoke

Second-hand smoke was measured by items asking about where smoking occurs: "Which of the following best describes smoking at your work, home or car?" Responses were coded into "Allowed" ("Smoking is allowed", coded as 1), "Partial ban" ("Smoking generally banned with few exceptions", coded 2) and "Banned" ("Smoking is never allowed", coded as 3). The rest ("Refused to answer") was excluded.

5.2.10 Piloting

Part two of the thesis was pilot tested in a non-participating sub-district of Atteridgeville in Tshwane, in the Gauteng province. The pilot study provided the opportunity to pilot test the selected health warnings (text-only, pictorial with (branded) and without (plain) brand design elements), as discussed in Chapter 4, for testing among study participants in Part Two of the thesis. Further as has been indicated in Section 5.2.7 the questionnaires used for Part Two of the study were also pilot tested so as improve

validity and reliability. The questionnaires were: Baseline questionnaire, Health warning rating questionnaire (text-only, branded, plain health warnings), Comparative rating questionnaire (pictorial health warnings), and Post-exposure questionnaire.. Additionally the pilot testing offered an opportunity to clarify the questionnaires and revise them accordingly for the local and cultural context.

5.2.11 Quality control and training

Health promoters, community workers, and environmental officers received training on how to recruit subjects, follow up, and scribe. Furthermore, extensive training in conducting a focus group discussion was held among the 12 focus group facilitators and two researchers. The training occurred at the respective Departments of Health in the Gauteng and Western Cape provinces respectively. The training was over one week, and the afternoons were spent in role play and practising.

At the end of the day of each focus group, the researcher ensured that each focus group had their questionnaires validated by immediately transcribing them verbatim, together with the health promoter. The researcher can speak, write, and understand all the indigenous languages of the study areas (isiXhosa, English, Afrikaans and Setswana). Where there were recordings in other indigenous languages for example isiZulu, siPedi, seSotho etc these were transcribed by a health promoter who understood the language. Together, the research team that included the researcher and health promoters speak, write, and understand all the indigenous languages in South Africa.

Only the pictorial health warnings were then revised according to the suggestions made by participants. Chapter 6 deals with the revised pictorial health warnings where a select number of new participants from Gauteng Province were recruited to assess reactions to the revised pictorial health warning labels on packages with (branded) and those without (plain) brand design elements. Focus groups for the revised pictorial warnings were not extended to Western Cape as the recommendations for revision of the pictorial health warnings were not considerably different from those of Gauteng .

5.2.12 Data analysis: Part Two (Objectives 2 and 3) – original health warnings

The completed questionnaires were captured and entered using Epi Info statistical software version 3.5.1, and all data were entered twice (double data verification). Data were then exported using Start Transfer to the Statistical Package for Social Science (SPSS) version 25. Data analysis was done using the following statistical packages: STATA release 14 (Stata Corporation, College Station, Texas, USA), SPSS version 25, IBM SPSS Amos, and Statistical Package R version 3.5.3.

After cleaning the data, the variables were recoded according to the definitions given in section 5.2.9. Testing for non-normality was done and non-parametric statistical test methods were used where appropriate. Although selection of participants was done in a stratified manner, this stratification had no implications for the statistical analysis. In computing sample characteristics and frequency distributions, descriptive statistical analysis was conducted. Where appropriate, data were further reduced to manageable dimensions using statistical methods, such as exploratory factor analysis or principal component analysis.

- **Ratings of reactions to health warnings**

Analysis for reaction toward cigarette health warning labels (text-only, branded and plain packs), was conducted using the components of the persuasive communication theory (attention, communication, identification, and effect) as discussed in section 5.2.9.3. Analysis was limited to only participants who completed ratings for all the health warnings (text-only, branded and plain packs). Further analysis included smokers and non-smokers except for questions that were specific only to smokers. Questions analysed as being specific only to smokers included: ‘makes me stop and think’; ‘is relevant to me’; ‘makes me feel more concerned about smoking’; ‘would make me think about quitting’; ‘makes me feel smoking is extremely dangerous to my health’; ‘makes me feel I spend too much money on cigarettes’; and ‘motivating smokers to quit smoking or think about quitting’.

For descriptive statistics, the difference within-group ratings – as indicated by the standard deviation (SD) from the mean – was reported as the extent of variability in the ratings of the health warnings. The mean and standard deviation together with the

median and interquartile range (IQ range) were used in describing effectiveness of the health warnings. The health warnings with the highest mean were considered most effective. Meaningfully different variability was considered and reported when the difference in variability was greater than 10%.

In determining the top ranking health warning, an average score per health warning was used to compare all 20 health warnings. The average score for each warning was computed from the four measures of effectiveness as discussed in section 5.2.9.3 namely: making people think about the health risks of smoking; motivating smokers to quit smoking or think about quitting; helping to prevent youth from starting smoking; and overall, how effective is this warning. The health warning with the highest mean was regarded as top ranking.

- **Cross tabulations**

Crosstabulation analysis was conducted. Group differences were tested for categorical variables by means of Independent samples t-tests and Pearson Chi-Square statistic. For analysis of continuous variables, the repeated analysis of variance (ANOVA) was used. Variables were considered statistically significant if the variables were significantly associated at a 95% significance level in bivariate analysis.

- **Comparison of before and after exposure to health warnings**

The mainstay of the study involved the crossover experimental design, which was analysed using a Paired samples t-test for categorical variables and Wilcoxon signed ranks test for continuous variables for differences in proportions between different interventions or periods within the same subjects.

    - *Opinion on smoking and warning labels*

As discussed in section 5.2.9.2, the same questions were asked about opinion on smoking and warning labels before and after exposure to health warnings. There was a total of 26 questions about smoking, health warning labels on cigarette packs and counter displays in South Africa (see Appendix 6). Principal component analysis from responses about the extent to which participants agree or disagreed with comments on the 26 questions was performed as discussed in section 5.2.9.2. After principal

component analysis and scale reliability tests, four different scales (as discussed in section 5.2.9.2) were derived to analyse opinions on smoking and warning labels or packaging of tobacco products for the purpose of analysis. The Cronbach alpha score was considered to have excellent reliability if it was above 0.90 ($\alpha \geq 0.90$) and of poor reliability if the Cronbach alpha score was below 0.60 ($0.60 > \alpha \geq 0.50$).

- *Knowledge of what cigarette smoking can cause*

In order evaluate the knowledge of tobacco health risks, participants were asked the same questions before exposure (Appendix 6) and after (Appendix 9) exposure to health warnings. Principal component analysis was performed from the responses to the questions on smoking-related health risk knowledge. Thereafter, scale reliability testing was done using the Cronbach alpha and again reliability was deemed excellent if Cronbach alpha was above 0.90 ($\alpha \geq 0.90$) and poor below 0.60 ($0.60 > \alpha \geq 0.50$). The three different scales were used (as discussed in section 5.2.9.2) in the analysis of smoking-related health risk knowledge.

- **Change in plan to quit after exposure to health warnings**

The main outcome measure or dependent variable was change in plan to quit after exposure to health warnings measured from the difference between plan to quit after and before exposure to health warnings as discussed in section 5.2.9.4. Independent variables included factors which had been identified in similar studies as being significantly associated with change in plan to quit. These variables were namely: attempt to quit, level of education, employment status, exposure to second hand smoke and whether the smoker received advice to quit smoking. The control variables or covariates were age and gender.

Bivariate analysis was conducted and variables significantly associated at a 90% level of significance were entered into a multiple logistic regression model. The stepwise backward elimination procedure was used. A multiple logistic regression model was constructed to determine the independent association of factors associated with changes in planning to quit after exposure to health warnings. The odds ratios (ORs) were derived as a representation of the effect estimates. The adequacy of the fitted logistic regression model was assessed by using a number of standard diagnostic

procedures namely: the chi-square test of the model, Hosmer-Lemeshow goodness-of-fit test and pseudo R^2. In order to make a decision on the adequacy of the estimated model, the following were the considerations for the Hosmer-Lemeshow goodness-of fit test. H_0: Not enough reason exists to doubt adequacy of the estimated model. H_1: Enough reason exists to doubt adequacy of the estimated model. Therefore, reject H_0 when $p < \alpha$ and fail to reject H_0 when $p \geq \alpha$. Associations were considered statistically significant when the $p < 0.05$ or at the 95% confidence interval.

- **Structural equation modelling**

In order to tease out inherent or latent or underlying factors, more advanced analysis such as structural equation modelling (SEM) was used, in determining the factors mediating the change in plan to quit, using elements of the Integrated behaviour change model as a framework (see Figure 5.4).

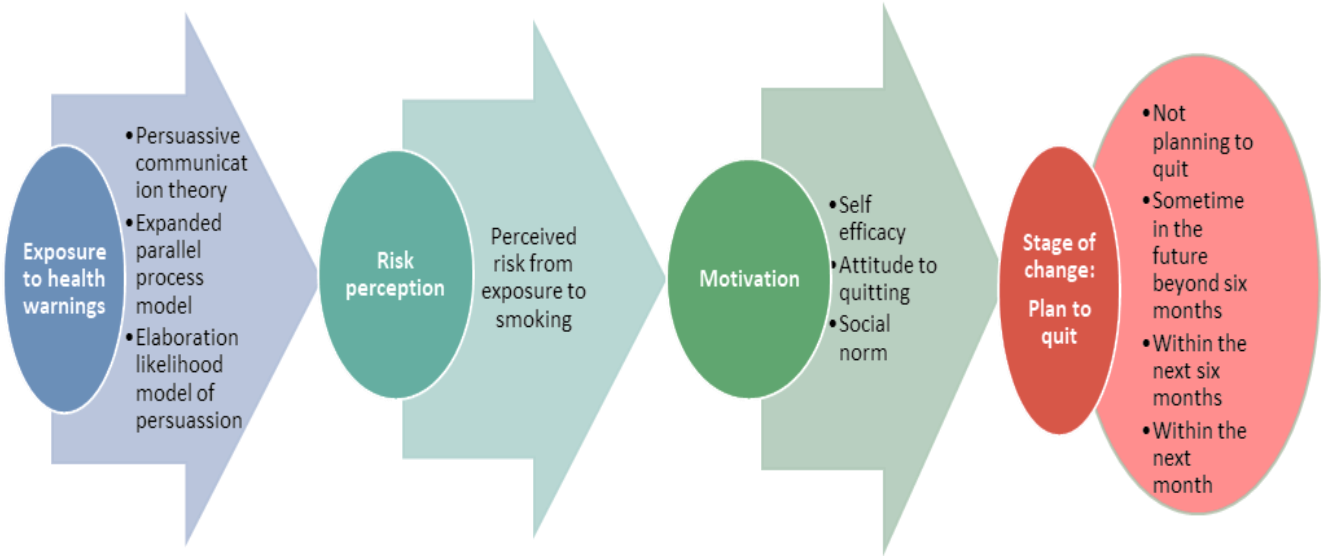


Figure 5.4: Integrated behaviour change model with exposure to pictorial health warning plus risk perception and motivation as mediators for change in plan to quit

For data analysis, the statistical package STATA version 14 for Windows and IBM Amos version 25 for Structural Equation Model (SEM) was used.

- **Focus group analysis**

For the analysis of the **focus groups**, and to ensure that a coherent design framework in this study was maintained, the interviews were transcribed and then translated into

English, where the focus group was in an indigenous language. Back translation into the indigenous language of the translated transcript was also performed to ensure that the translation was correct and consistent. All transcriptions were analysed for content (lived experiences) and context. All the tape-recorded and interview minutes were transcribed verbatim by the researcher for both content and context, coded and thematically analysed and independently verified by two others to obtain consensus. If there was a difference, a third person was called in to verify again. The analysis was conducted using the software programme Atlas.ti 7.0.

Data were transcribed immediately for ease of data analysis. Qualitative data analysis methods included the researcher's reading and rereading of field notes and interview scripts. The researcher also conducted the analysis.[8] Most of the information themes after coding were generated deductively from the interview guide. The information from the focus groups was summarized and grouped into specific themes after coding. The themes and codes included both known ones from the prior literature, but also new themes that emerged around the core question. Illustrative quotations were selected.

Towards the end of the analysis, the researcher grouped the focus groups into specific clusters (such as health risks) to investigate the similarities and differences. Finally, the information obtained from the focus groups was part of the data from the analysis of the questionnaires. It was assumed that it was possible to arrive at a valid set of findings, due mainly to the stringent application of the method of coding and categorizing.[8,10]

5.3 SOCIO-DEMOGRAPHIC CHARACTERISTICS, CIGARETTE SMOKING, TOBACCO USE, AND SECOND-HAND SMOKE EXPOSURE

This section and its subsequent subsections present the results of the initial phase of Part Two of the thesis. The detailed study methods used to obtain the results reported in this chapter have already been described in the methodology in Section 5.2 and its subsections. In total, 767 adults participated in this study, with a response rate of 79.9%. Participants' ages ranged from 18 to 83, with a mean age of 37.6 years (SD =14.54). Those who were aged ≤ 35 years old and considered as youths[13] accounted

for 53.5% (n=410) of the sample. Black Africans, at 29.9% (n=229), were represented slightly more than the other race groups (see Table 6.1).

The sample had almost equal numbers of female participants, 50.5% (n=387), and male participants, 49.5% (n=380). A total of 47.1% (n=347) participants indicated that they or other smokers in their household spent money on cigarettes that they knew would be better spent on household essentials such as food (see Table 5.3).

Table 5.3: Socio-demographic characteristics of participants

Variable (N)		%	n
Age group (767)	18-24	23.5	180
	25-35	30.0	230
	≥36	46.5	357
Gender (767)	Male	49.5	380
	Female	50.5	387
Population group (767)	Black	29.9	229
	Coloured/Mixed race	25.7	197
	Indian/Asian	22.6	173
	White	21.9	168
Education level (767)	Primary School	12.9	99
	High School	54.6	419
	>High school	32.5	249
Employment status (762)	Unemployed	45.3	345
	Employed	30.7	234
	Other(student/pensioner/other)	24.0	183
Spend money on cigarettes rather than food (737)	No	52.9	390
	Yes	47.1	347

5.3.1 Pattern of cigarette smoking

Of the participants, 50.3% (n=385) were current cigarette smokers, and the majority of these indicated that they were not planning to quit (64.5% (n=238)) or had planned to quit sometime beyond six months in the future (16.0% (n=59)), before exposure to the health warnings. The patterns of cigarette smoking are shown in Table 5.4.

Table 5.4: Cigarette smoking pattern

Variable (N)		%	n
Current smokers (765)	No	49.7	380
	Yes	50.3	385
Plan to quit before exposure to health warnings (369)	Not planning to quit	64.5	238
	Sometime in the future beyond six months	16.0	59
	Within the next six months	8.4	31
	Within the next month	11.1	41
Ever experimented with cigarette smoking (763)	No	35.5	272
	Yes	64.0	491
Past month cigarette smoking (378)	1-9 days	15.1	57
	10-19 days	13.0	49
	>20 days	72.0	272
Smoke per day (371)	Range:0 to 89		
	Mean=11.74		
	SD=9.31		
Daily smokers report of time from waking up to first cigarette (269)	Within 5 minutes	24.9	67
	Within 30 minutes	14.5	39
	Between 30 and 60 minutes (1 hour)	10.0	27
	After 1 hour	50.6	136
Desire to quit cigarettes now before exposure to health warnings (371)	No	68.5	254
	Yes	31.5	117
Quit attempt in the past year (361)	No	71.5	258
	Yes	28.5	103
Duration of stopping smoking among those who attempted in the past (n=101)	Less than one month	71.3	72
	1-5 months	6.9	7
	≥ 6 months	21.8	22
Ever received advice to quit smoking cigarettes among smokers(370)	No	84.6	313
	Yes	15.4	57

**Responses did not always add up to the expected numbers because of missing data*

5.3.2 Pattern of snuff use

Of the study participants, 12.8% (n=98) had used snuff, while 7.8% (n=54) were current snuff users. Of the current snuff users, during the past month, 74.1% (n=40) used snuff for 1 to 9 days. The pattern of snuff use is shown in Table 5.5.

Table 5.5: Snuff use pattern

Variable (N)		%	n
Ever snuff (738)	No	83.4	640
	Yes	12.8	98
Current snuff use (689)	No	92.2	635
	Yes	7.8	54
Past month snuff use (54)	1-9 days	74.1	40
	≥10 days	25.9	14
Snuff per day (371)	Range:0 to 13	-	-
	Mean=3	-	-
	SD=2.82	-	-

5.3.3 Second-hand smoke exposure

A total of 37.4% (n=193) of the participants indicated that smoking at work was banned, but 47.7% (n=328) indicated that smoking was allowed at home. Smoking in the car was banned by 58.3% (n=333) of the participants. The results for second-hand smoke exposure are summarised in Figure 5.5.

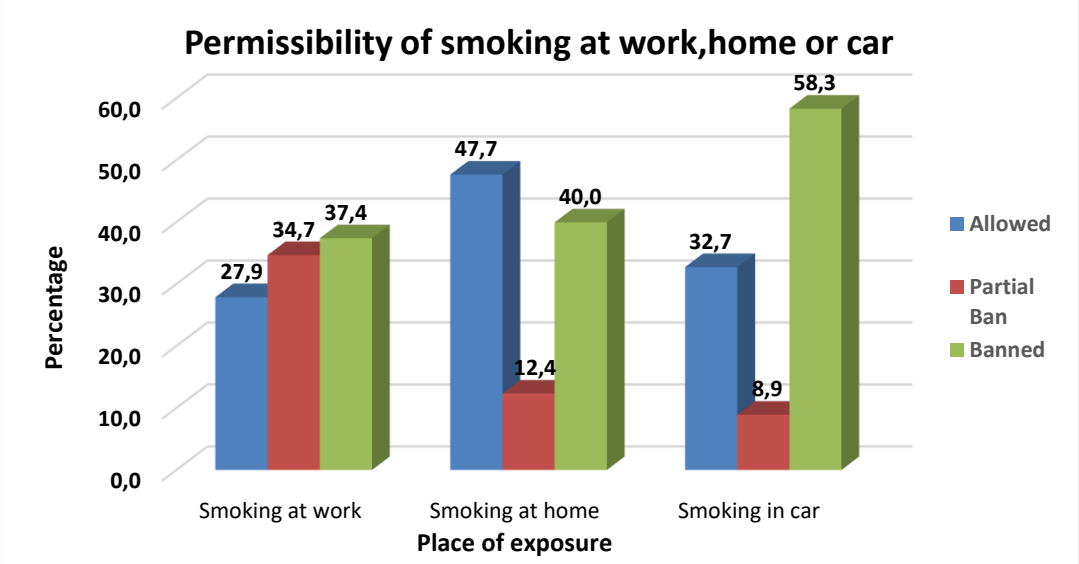


Figure 5.5: Second-hand smoke exposure (SHS) at work, home or car

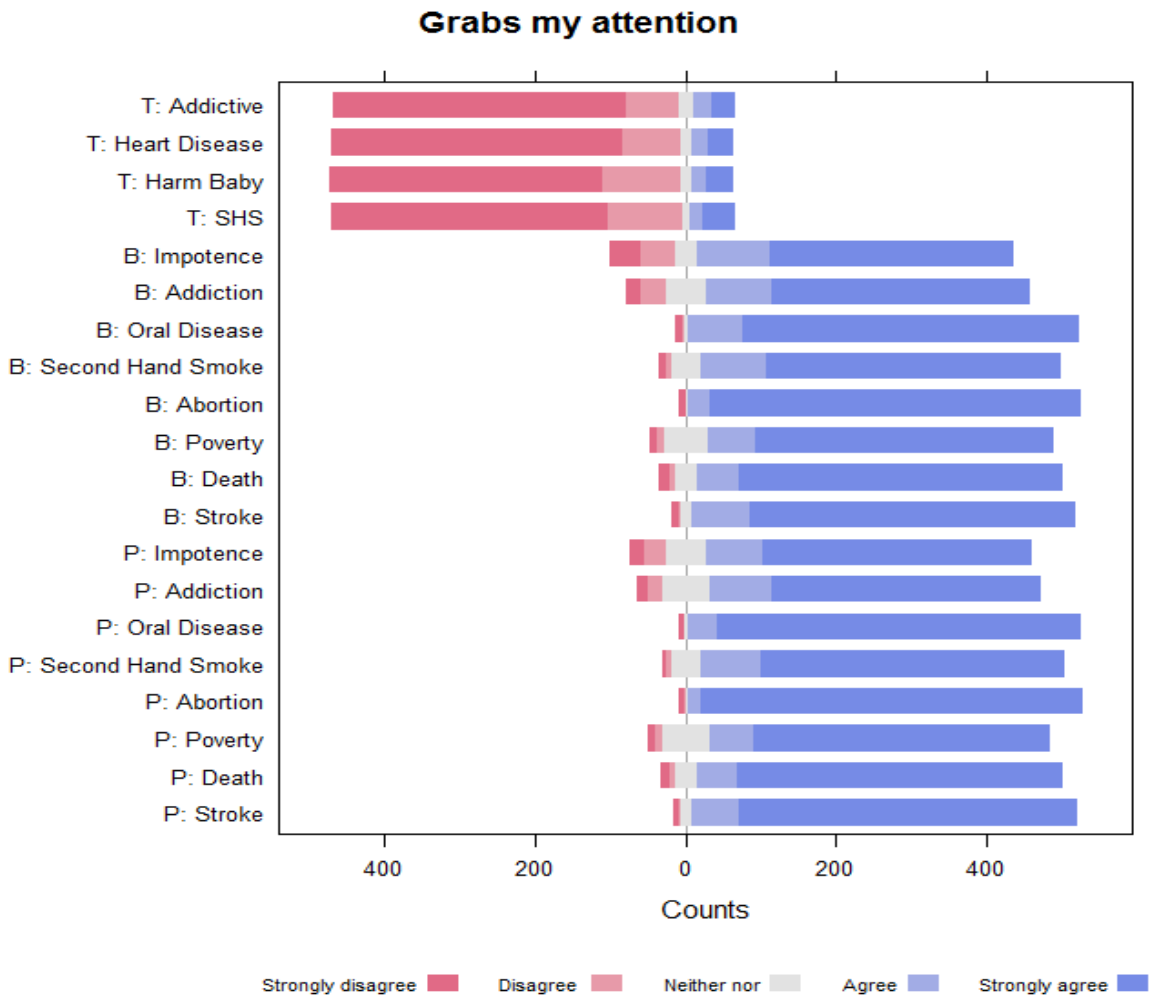
5.4 REACTIONS AMONG SOUTH AFRICAN NON-SMOKERS AND SMOKERS TO TOBACCO HEALTH WARNINGS, TEXT-ONLY AND PICTORIAL, ON BRANDED AND PLAIN PACKS

This section presents the results for each of the health warnings with regard to their effectiveness (text-only, and pictorial health warnings on branded or plain packs. Results are presented for the individual ratings by both smokers and non-smokers (except where specified for questions that applied only to smokers). These results include only the responses from participants who completed all the health warning ratings.

The section presents the results pertaining to reactions to health warnings according to the categories contained in the constructs of Persuasive Communication Theory, namely attention, communication, identification, and effect. The section concludes with a presentation of the total effectiveness of the text-only and pictorial health warnings, together with the overall effectiveness of the individual health warnings.

5.4.1 Attention

Participants strongly disagreed that text-only warnings caught their attention and strongly felt that all the pictorial warnings caught their attention, particularly the pictorial warning on abortion on a plain pack (Mean=4.91, SD=0.45 on a 5-point Likert scale). The warning that least caught the participants' attention was the text-only warning (T: Addictive) message on addiction (Mean=1.56, SD=1.11), (see Figure 5.6, overleaf).



Key: T=Text-only, B=Branded pack, P=Plain Pack

Figure 5.6: Ratings of attention to various cigarette health warning labels

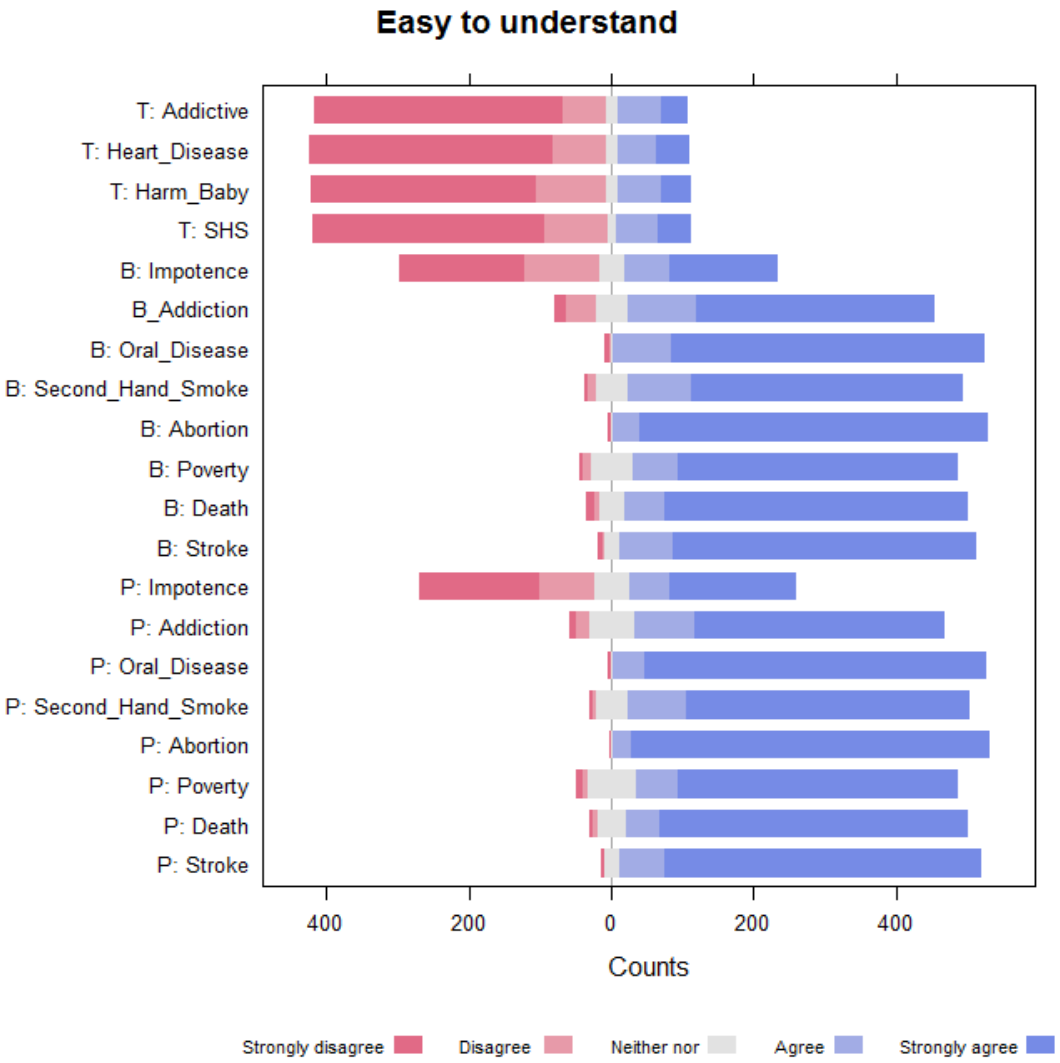
5.4.2 Communication

This section 5.4.2 and its subsections present the results for the questions that explored what and how well the health warnings were communicating their message, using a 5-point Likert scale.

5.4.2.1 "Easy to understand'"

Participants strongly disagreed that text-only warnings were easy to understand, but mostly keenly agreed that the pictorial warnings were easy to understand, except for the pictorial warning on impotence, where participants strongly disagreed that it was easy to understand (Mean=2.83, SD=1.65) on the branded pack. The pictorial warning on abortion on a plain pack (Mean=4.93, SD=0.32) was rated as the easiest to

understand. The results are presented in the diagram in Figure 5.7.



Key: T=Text-only, B=Branded pack, P=Plain Pack

Figure 5.7: Ratings of ease of understanding of various health warning labels

5.4.2.2 Smokers' reactions to the statement that a given health warning, "Makes me stop and think"

There was firm disagreement by smokers that text-only warnings, particularly the one on addiction (Mean=1.55, SD=1.04), made them stop and think. However, smokers firmly agreed that the pictorial warnings made them stop and think. The exceptions were the impotence and addiction pictorial health warnings, regardless of the packaging. The pictorial warning on abortion on a plain pack (Mean=4.00, SD=0.54) was again rated as the one that most made smokers stop and think (see Table 5.6, overleaf).

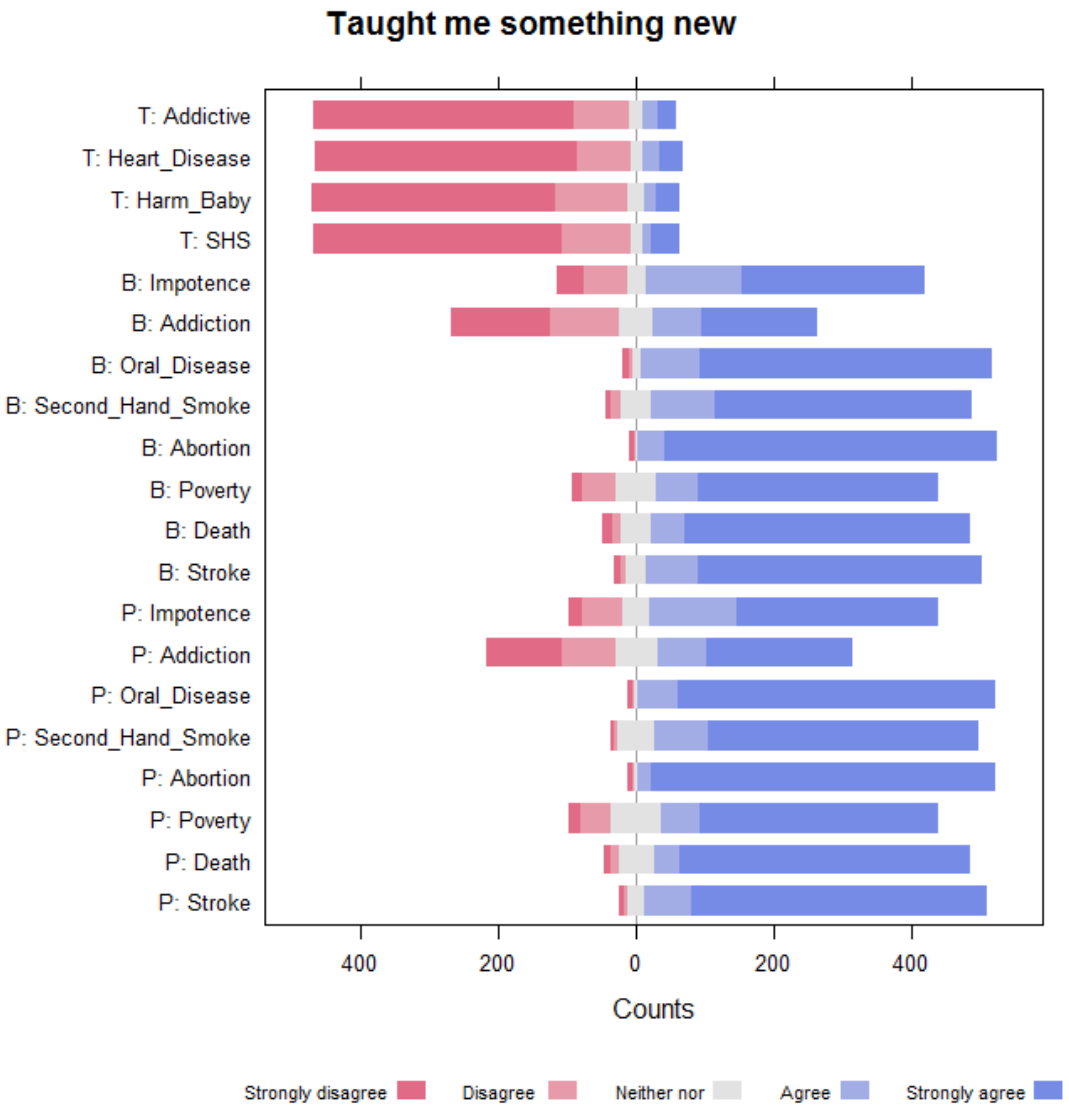
Table 5.6: Health warning ratings on the ability to make smokers stop and think

Category	Health warning	n	Mean(SD)*	Median(IQ range#)
Text-only warnings	**T_Harm_Baby**	260	1.67(1.17)	1.0(1.0-3.0)
	T_SHS	258	1.67(1.23)	1.0(1.0-3.0)
	T_Heart_Disease	259	1.61(1.15)	1.0(1.0-3.0)
	T_Addictive	256	1.55(1.04)	1.0(1.0-3.0)
Pictorial warnings on branded packs	**B_Abortion**	260	4.82(0.62)	5.0(5.0-5.0)
	B_Oral_Disease	258	4.74(0.65)	5.0(4.0-5.0)
	B_Stroke	260	4.67(0.76)	5.0(4.0-5.0)
	B_Second_Hand_Smoke	258	4.57(0.81)	5.0(4.0-5.0)
	B_Death	259	4.56(0.96)	5.0(4.0-5.0)
	B_Poverty	259	4.50(0.89)	5.0(4.0-5.0)
	B_Addiction	259	4.29(1.09)	5.0(4.0-5.0)
	B_Impotence	258	3.95(1.28)	4.0(3.0-5.0)
Pictorial warnings on plain packs	**P_Abortion**	258	4.88(0.54)	5.0(5.0-5.0)
	P_Oral_Disease	259	4.83(0.54)	5.0(5.0-5.0)
	P_Stroke	259	4.67(0.71)	5.0(4.0-5.0)
	P_Death	258	4.56(0.95)	5.0(4.0-5.0)
	P_Poverty	259	4.52(0.88)	5.0(4.0-5.0)
	P_Second_Hand_Smoke	260	4.60(0.78)	5.0(4.0-5.0)
	P_Addiction	258	4.36(1.01)	5.0(4.0-5.0)
	P_Impotence	259	4.28(1.11)	5.0(4.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
 # IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.2.3 "Taught me something new"

The text-only warnings were rated as not having taught participants something new, as were the pictorial warnings on impotence, addiction and poverty. Participants strongly agreed that the pictorial warning that most taught them something new was the health warning on abortion on a plain pack (Mean=4.89, SD=0.15) (see Figure 5.8, overleaf).

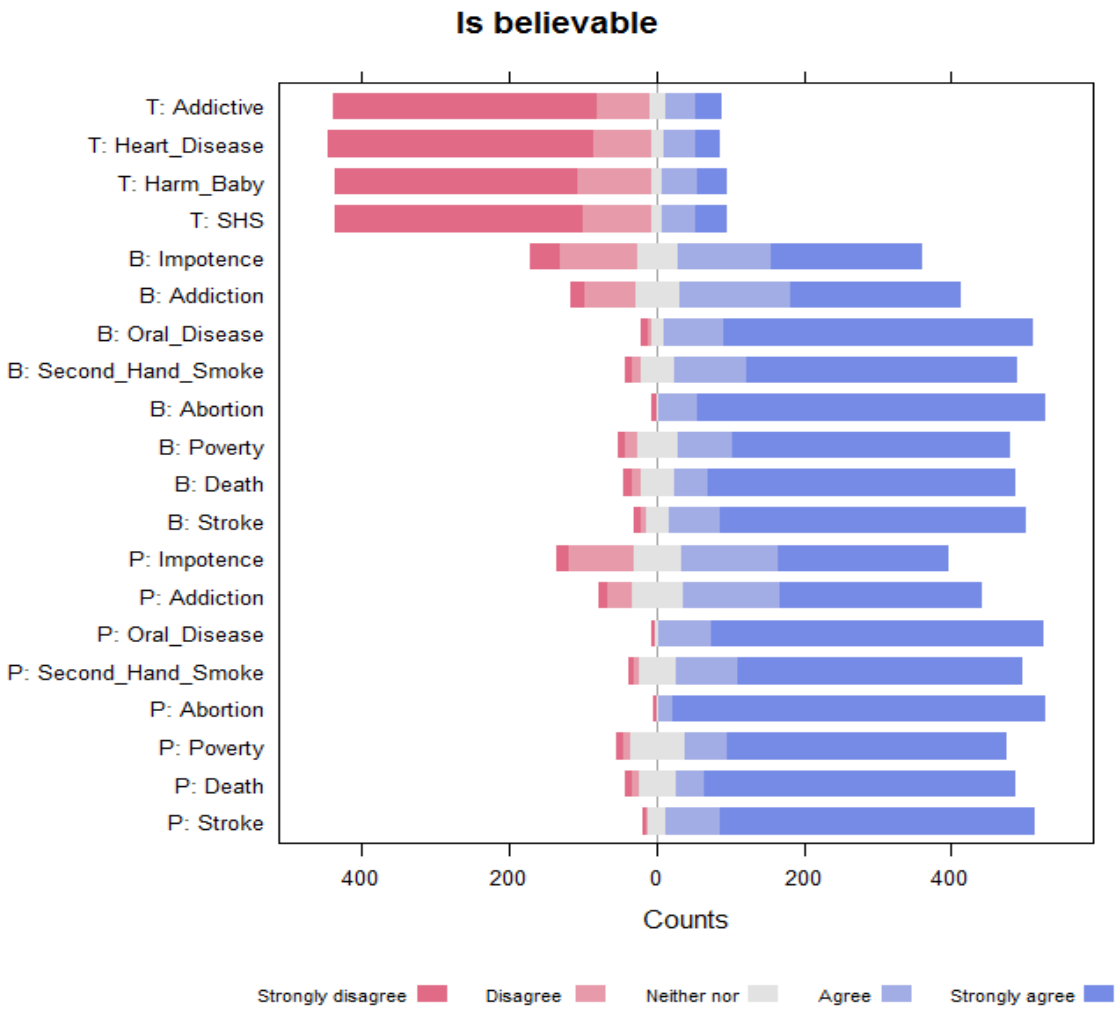


Key: T=Text-only, B=Branded pack, P=Plain Pack

Figure 5.8: Ratings of health warning on the extent to which it taught participants something new

5.4.2.4 "Believable"

Participants firmly disagreed that text-only warnings were believable. The text-only warning on heart disease yielded the most disagreement on believability (Mean=1.70, SD=1.21). The pictorial warnings on impotence were rated low on believability, particularly the impotence warning on the branded pack, where participants strongly disagreed that it was believable (Mean=3.66, SD=1.35). Participants agreed that the pictorial warning on abortion on a plain pack (Mean=4.92, SD=0.40) was the most believable (see Figure 5.9, overleaf).



Key: T=Text-only, B=Branded pack, P=Plain Pack

Figure 5.9: Ratings of health warning on the extent to which it is believable

5.4.3 Identification

In Section 5.4.3 and its subsections, the results for the questions that educed the relevance of the health warnings to the participants, using a 5-point Likert scale, are presented.

5.4.3.1 Health warnings' relevance to smokers

The pictorial warning on abortion on a plain pack, with a mean of 4.78 (SD=0.75), was agreed to be most relevant by both male and female smokers. There was generally strong disagreement by smokers that text-only warnings were relevant to them. They firmly disagreed particularly that the text-only warning on addiction was relevant to them (Mean=2.08, SD=1.51). They also firmly disagreed that the pictorial warnings on

impotence and addiction were relevant to them (see Table 5.7).

Table 5.7: Ratings of the relevance of various health warnings to smokers

Category	Health warning	N	Mean(SD)*	Median(IQ range#)
Text-only warnings	**T_SHS**	257	2.16(1.55)	2.0(1.0-4.0)
	T_Harm_Baby	259	2.14(1.51)	2.0(1.0-4.0)
	T_Heart_Disease	256	2.09(1.56)	1.0(1.0-4.0)
	T_Addictive	252	2.08(1.51)	2.0(1.0-4.0)
Pictorial warnings on branded packs	**B_Abortion**	259	4.65(0.93)	5.0(5.0-5.0)
	B_Oral_Disease	257	4.65(0.78)	5.0(4.0-5.0)
	B_Stroke	256	4.49(1.06)	5.0(5.0-5.0)
	B_Death	257	4.41(1.17)	5.0(5.0-5.0)
	B_Second_Hand_Smoke	256	4.37(1.09)	5.0(4.0-5.0)
	B_Poverty	259	4.37(1.09)	5.0(4.0-5.0)
	B_Addiction	255	4.11(1.16)	4.0(3.0-5.0)
	B_Impotence	257	3.66(1.38)	4.0(2.0-5.0)
Pictorial warnings on plain packs	**P_Abortion**	259	4.78(0.75)	5.0(5.0-5.0)
	P_Oral_Disease	259	4.65(0.87)	5.0(4.0-5.0)
	P_Stroke	258	4.56(0.92)	5.0(4.0-5.0)
	P_Death	256	4.49(1.04)	5.0(4.0-5.0)
	P_Second_Hand_Smoke	260	4.46(0.98)	5.0(4.0-5.0)
	P_Poverty	259	4.41(1.02)	5.0(4.0-5.0)
	P_Addiction	258	4.10(1.18)	4.0(3.0-5.0)
	P_Impotence	259	3.85(1.33)	4.0(3.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
 # IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.3.2 "Health warning is frightening"

Participants strongly disagreed that text-only warnings were frightening, especially the text-only warning on addiction, which had the lowest mean=1.55 (SD=1.10) of all the health warnings. Consistent with the other results, the pictorial warnings which participants disagreed were frightening were those on impotence and addiction. The pictorial warning on abortion on a plain pack (Mean=4.92, SD=0.42) was generally agreed to be the most frightening to the participants (see Table 5.8). It is worth noting that there was a 19.2% lower variability (a difference in SD of -0.10) when the ratings

of the ability of the abortion warning on a plain pack to evoke fear was compared to the same picture on a branded pack.

Table 5.8: Ratings of health warnings on the extent to which they evoked fear

Category	Health warning	n	Mean(SD)*	Median(IQ range#)
Text-only warnings	**T_Harm_Baby**	531	1.63(1.14)	1.0(1.0-2.0)
	T_SHS	528	1.61(1.16)	1.0(1.0-2.0)
	T_Heart_Disease	524	1.57(1.15)	1.0(1.0-2.0)
	T_Addictive	525	1.55(1.10)	1.0(1.0-3.0)
Pictorial warnings on branded packs	**B_Abortion**	531	4.84(0.52)	5.0(5.0-5.0)
	B_Oral_Disease	528	4.72(0.67)	5.0(4.0-5.0)
	B_Stroke	528	4.64(0.77)	5.0(4.0-5.0)
	B_Death	527	4.58(0.90)	5.0(4.0-5.0)
	B_Second_Hand_Smoke	525	4.50(0.87)	5.0(4.0-5.0)
	B_Poverty	526	4.45(0.96)	5.0(4.0-5.0)
	B_Addictive	523	3.67(1.29)	4.0(2.0-5.0)
	B_Impotence	526	3.37(1.40)	4.0(2.0-5.0)
Pictorial warnings on plain packs	**P_Abortion**	531	4.92(0.42)	5.0(5.0-5.0)
	P_Oral_Disease	528	4.79(0.56)	5.0(5.0-5.0)
	P_Stroke	529	4.70(0.66)	5.0(5.0-5.0)
	P_Death	529	4.61(0.85)	5.0(4.0-5.0)
	P_Second_Hand_Smoke	529	4.54(0.81)	5.0(4.0-5.0)
	P_Poverty	529	4.45(0.95)	5.0(4.0-5.0)
	P_Addictive	519	3.91(1.18)	4.0(3.0-5.0)
	P_Impotence	526	3.58(1.30)	4.0(2.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
 # IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.3.3 Smokers' reactions to the statement, "health warning makes me feel concerned about smoking"

There was disagreement by smokers that the pictorial warnings on addiction and impotence made them feel concerned about smoking. The pictorial warning on impotence on the branded pack had the lowest mean of 3.33 (SD=1.34), compared to all the other pictorial warnings. Smokers firmly disagreed that text-only warnings made them feel concerned about smoking. Smokers generally agreed that the pictorial

warning on abortion on a plain pack (Mean=4.89, SD=0.46) did make them feel concerned about smoking (see Table 5.9). It is also worth noting that there was a 24.6% lower variability (difference in SD of -0.15) between ratings of the ability of the abortion pictorial health warning on a plain pack to prompt more concern about smoking, compared to ratings of the same picture on a branded pack.

Table 5.9: Ratings of health warnings' making smokers feel more concerned about smoking

Category	Health warning	n	Mean(SD)*	Median(IQ range#)
Text-only warnings	**T_Harm_Baby**	255	1.70(1.20)	1.0(1.0-3.0)
	T_SHS	258	1.69(1.24)	1.0(1.0-3.0)
	T_Addictive	251	1.69(1.25)	1.0(1.0-4.0)
	T_Heart_Disease	258	1.62(1.18)	1.0(1.0-3.0)
Pictorial warnings on branded packs	**B_Abortion**	259	4.81(0.61)	5.0(5.0-5.0)
	B_Oral_Disease	259	4.69(0.70)	5.0(4.0-5.0)
	B_Stroke	258	4.63(0.81)	5.0(4.0-5.0)
	B_Second_Hand_Smoke	259	4.51(0.86)	5.0(4.0-5.0)
	B_Death	260	4.50(1.04)	5.0(4.0-5.0)
	B_Poverty	258	4.40(0.99)	5.0(4.0-5.0)
	B_Addiction	257	3.53(1.27)	4.0(2.0-5.0)
	B_Impotence	257	3.33(1.34)	4.0(2.0-5.0)
Pictorial warnings on plain packs	**P_Abortion**	260	4.89(0.46)	5.0(5.0-5.0)
	P_Oral_Disease	259	4.77(0.63)	5.0(5.0-5.0)
	P_Stroke	259	4.66(0.70)	5.0(4.0-5.0)
	P_Second_Hand_Smoke	257	4.56(0.83)	5.0(4.0-5.0)
	P_Death	255	4.53(0.96)	5.0(4.0-5.0)
	P_Poverty	258	4.46(0.91)	5.0(4.0-5.0)
	P_Addictive	256	3.77(1.18)	4.0(3.0-5.0)
	P_Impotence	257	3.48(1.31)	4.0(2.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.3.4 "Health warning makes me think about the health risks of smoking"

There was strong agreement among the participants that the pictorial warning that most made them think about the health risks of smoking was that of abortion on a plain pack, with a mean of 4.88 (SD=0.55). All the text-only warnings elicited strong

disagreement about making participants think about the health risks of smoking. Participants also disagreed that the pictorial warnings on impotence, addiction and poverty, regardless of whether the pack was branded or plain, made them think about the health risks of smoking. The pictorial warning on impotence on the branded pack had the lowest mean of 3.35 (SD=1.38). These results are set out in Table 5.10.

Table 5.10: Ratings of health warning on making participants think about the health risks of smoking

Category	Health warning	n	Mean(SD)*	Median(IQ range[#])
Text-only warnings	**T_Harm_Baby**	532	1.64(1.14)	1.0(1.0-3.0)
	T_SHS	532	1.63(1.19)	1.0(1.0-2.0)
	T_Heart_Disease	531	1.57(1.15)	1.0(1.0-3.0)
	T_Addictive	524	1.58(1.15)	1.0(1.0-3.0)
Pictorial warnings on branded packs	**B_Abortion**	533	4.81(0.56)	5.0(5.0-5.0)
	B_Second_Hand_Smoke	531	4.48(0.87)	5.0(4.0-5.0)
	B_Oral_Disease	532	4.69(0.70)	5.0(4.0-5.0)
	B_Stroke	533	4.63(0.77)	5.0(4.0-5.0)
	B_Death	532	4.55(0.92)	5.0(4.0-5.0)
	B_Poverty	532	3.49(1.60)	4.0(2.0-5.0)
	B_Addiction	533	3.46(1.32)	4.0(2.0-5.0)
	B_Impotence	533	3.35(1.38)	4.0(2.0-5.0)
Pictorial warnings on plain packs	**P_Abortion**	531	4.88(0.55)	5.0(5.0-5.0)
	P_Oral_Disease	532	4.80(0.58)	5.0(5.0-5.0)
	P_Stroke	532	4.69(0.68)	5.0(4.0-5.0)
	P_Death	531	4.62(0.82)	5.0(4.0-5.0)
	P_Second_Hand_Smoke	532	4.53(0.82)	5.0(4.0-5.0)
	P_Addiction	530	3.72(1.23)	4.0(3.0-5.0)
	P_Poverty	533	3.58(1.57)	4.0(2.0-5.0)
	P_Impotence	**532**	3.51(1.32)	4.0(2.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
[#] *IQ range: Inter-quartile range (25 – 75)*
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.3.5 Smokers' reactions to the statement that, "health warning would make me think about quitting"

Smokers agreed strongly that the top three pictorial warnings that would most make them think about quitting were abortion on a plain pack (Mean= 4.87, SD=0.53),

abortion on a branded pack (Mean=4.78, SD=0.63) and oral disease on a plain pack (Mean=4.75, SD=0.65). It is noteworthy that there was a 15.9% lower variability (difference in SD of -0.10) when ratings of the ability of the abortion warning on a plain pack to prompt quitting was compared to variability on ratings of the same picture on a branded pack. All the text-only warnings yielded strong disagreement about the assertion that text-only warnings would make them think about quitting. The text-only warning on heart disease had the lowest mean of 1.62 (SD=1.18), (see Table 5.11).

Table 5.11: Ratings of the extent to which the health warnings would make smokers think about quitting

Category	Health warning	n	Mean(SD)*	Median (IQ range#)
Text-only warnings	**T_SHS**	259	1.68(1.24)	1.0(1.0-3.0)
	T_Harm_Baby	258	1.66(1.15)	1.0(1.0-3.0)
	T_Addictive	255	1.63(1.17)	1.0(1.0-3.0)
	T_Heart_Disease	258	1.62(1.18)	1.0(1.0-3.0)
Pictorial warnings on branded packs	**B_Abortion**	259	4.78(0.63)	5.0(5.0-5.0)
	B_Oral_Disease	259	4.69(0.67)	5.0(4.0-5.0)
	B_Stroke	259	4.63(0.82)	5.0(4.0-5.0)
	B_Death	260	4.51(1.00)	5.0(4.0-5.0)
	B_Second_Hand_Smoke	258	4.48(0.87)	5.0(4.0-5.0)
	B_Poverty	259	4.28(1.05)	5.0(3.0-5.0)
	B_Addiction	258	3.34(1.28)	4.0(2.0-5.0)
	B_Impotence	259	3.20(1.37)	3.0(2.0-4.8)
Pictorial warnings on plain packs	**P_Abortion**	259	4.87(0.53)	5.0(5.0-5.0)
	P_Oral_Disease	259	4.75(0.65)	5.0(4.0-5.0)
	P_Stroke	258	4.65(0.73)	5.0(4.0-5.0)
	P_Death	258	4.55(0.93)	5.0(4.0-5.0)
	P_Second_Hand_Smoke	259	4.51(0.86)	5.0(4.0-5.0)
	P_Poverty	259	4.35(0.94)	5.0(4.0-5.0)
	P_Addiction	258	3.64(1.24)	4.0(2.0-5.0)
	P_Impotence	259	3.42(1.31)	4.0(2.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
 # IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.3.6 Smokers' reactions to the statement that, "health warning makes me feel smoking is extremely dangerous to my health"

Smokers disagreed that text health warnings made them feel smoking was extremely dangerous to their health. The text-only warning on heart disease had the lowest mean of 1.66 (SD=1.27). Participants agreed that the pictorial warning on abortion most made them feel that smoking was extremely dangerous to their health, irrespective of whether the pack was branded (Mean=4.80, SD=0.60) or plain (Mean=4.83, SD=0.65), (see Table 5.12).

Table 5.12: Ratings of the extent to which the health warnings made smokers feel smoking is extremely dangerous to their health

Category	Health warning	n	Mean(SD)*	Median(IQ range#)
Text-only warnings	**T_Harm_Baby**	260	1.71(1.20)	1.0(1.0-3.0)
	T_SHS	260	1.68(1.25)	1.0(1.0-3.0)
	T_Addictive	255	1.68(1.25)	1.0(1.0-4.0)
	T_Heart_Disease	258	1.66(1.27)	1.0(1.0-3.0)
Pictorial warnings on branded packs	**B_Abortion**	260	4.80(0.60)	5.0(5.0-5.0)
	B_Oral_Disease	257	4.67(0.68)	5.0(4.0-5.0)
	B_Stroke	260	4.63(0.82)	5.0(4.0-5.0)
	B_Death	260	4.53(0.98)	5.0(4.0-5.0)
	B_Second_Hand_Smoke	258	4.46(0.90)	5.0(4.0-5.0)
	B_Poverty	259	3.34(1.64)	4.0(2.0-5.0)
	B_Addiction	260	3.30(1.31)	3.0(2.0-5.0)
	B_Impotence	259	3.21(1.38)	3.0(2.0-5.0)
Pictorial warnings on plain packs	**P_Abortion**	260	4.83(0.65)	5.0(5.0-5.0)
	P_Oral_Disease	260	4.73(0.72)	5.0(4.0-5.0)
	P_Stroke	260	4.66(0.70)	5.0(4.0-5.0)
	P_Death	258	4.58(0.89)	5.0(4.0-5.0)
	P_Second_Hand_Smoke	260	4.53(0.84)	5.0(4.0-5.0)
	P_Addiction	259	3.59(1.26)	4.0(2.0-5.0)
	P_Poverty	259	3.43(1.59)	4.0(2.0-5.0)
	P_Impotence	260	3.43(1.32)	4.0(2.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
 # IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.3.7 Smokers' reactions to the statement that a health warning "makes me feel I spend too much money on cigarettes"

As expected, there was agreement among smokers that the health warning that most made them feel they spend too much money on cigarettes was the pictorial warning on poverty, irrespective of whether the pack was branded (Mean=4.80, SD=0.60) or plain (Mean= 4.83, SD=0.65). Smokers disagreed that text-only warnings made them feel they spent too much money on cigarettes, with the text-only warning on heart disease having the lowest mean of all the warnings (Mean=1.62, SD=1.22), (see Table 5.13).

Table 5.13: Ratings of the extent to which the health warnings made smokers feel they spend too much money on cigarettes

Category	Health warning	n	Mean(SD)*	Median(IQ range[#])
Text-only warnings	**T_Harm_Baby**	260	1.72(1.23)	1.0(1.0-3.0)
	T_Addictive	256	1.68(1.25)	1.0(1.0-4.0)
	T_SHS	259	1.67(1.23)	1.0(1.0-3.0)
	T_Heart_Disease	259	1.62(1.22)	1.0(1.0-3.0)
Pictorial warnings on branded packs	**B_Poverty**	258	4.55(0.90)	5.0(4.0-5.0)
	B_Abortion	259	3.97(1.54)	5.0(3.0-5.0)
	B_Oral_Disease	259	3.92(1.50)	5.0(3.0-5.0)
	B_Death	260	3.79(1.60)	5.0(3.0-5.0)
	B_Stroke	259	3.77(1.60)	5.0(2.0-5.0)
	B_Second_Hand_Smoke	256	3.66(1.50)	4.0(2.0-5.0)
	B_Addiction	260	3.15(1.38)	3.0(2.0-5.0)
	B_Impotence	260	3.01(1.43)	3.0(2.0-4.8)
Pictorial warnings on plain packs	**P_Poverty**	258	4.56(0.84)	5.0(4.0-5.0)
	P_Abortion	259	4.09(1.55)	5.0(4.0-5.0)
	P_Oral_Disease	259	4.02(1.52)	5.0(3.0-5.0)
	P_Stroke	259	3.92(1.53)	5.0(3.0-5.0)
	P_Death	258	3.81(1.58)	5.0(3.0-5.0)
	P_Second_Hand_Smoke	259	3.72(1.52)	4.0(2.0-5.0)
	P_Addiction	258	3.27(1.45)	3.0(2.0-5.0)
	P_Impotence	259	3.17(1.45)	3.0(2.0-5.0)

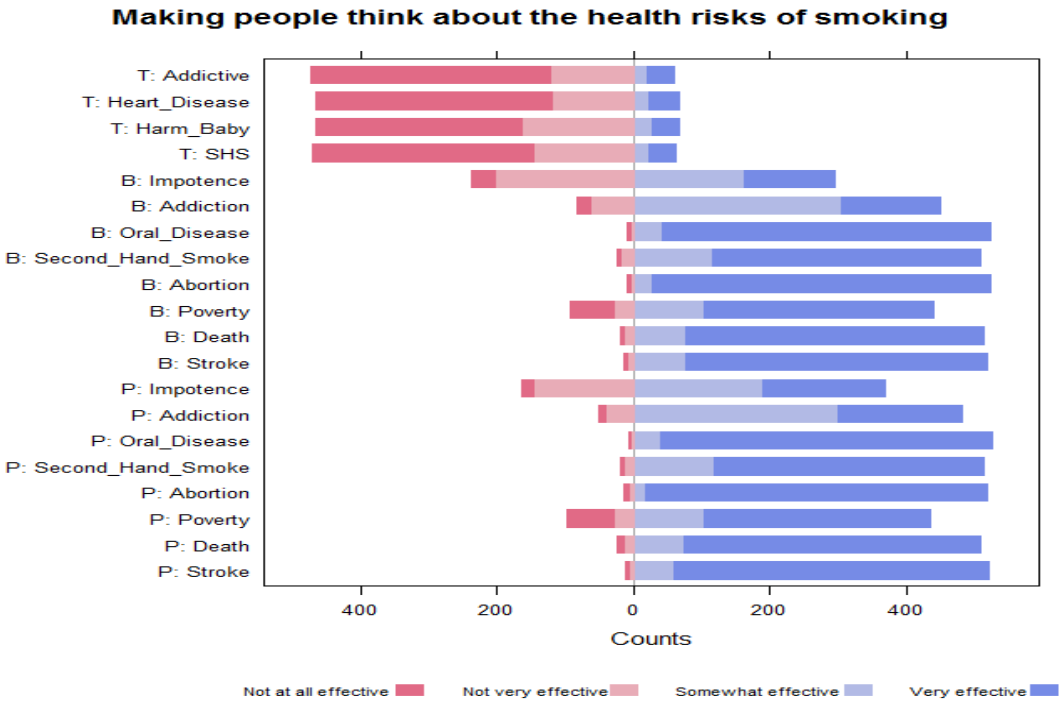
SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
[#] *IQ range: Inter-quartile range (25 – 75)*
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.4 Effectiveness in several different ways

Section 5.4.4 and its subsections present the results of the questions on how effective the health warning messages would be in several different ways, for example, in helping to prevent youth from starting smoking. The section concludes by indicating the overall effectiveness of individual health warnings.

5.4.4.1 Health warning effectiveness in making people think about the health risks of smoking

Overwhelmingly, participants indicated that pictorial warnings, be they on branded or plain packs, would be effective in making people think about the health risks of smoking. The pictorial warning on abortion had the highest mean on the branded pack (Mean=3.91, SD=0.38) and the plain pack (Mean=3.90, SD=0.45). Although the ratings did not differ meaningfully, there was an 18.4% greater within-group variability of these ratings for the same pictorial warning on plain packs compared to the branded packs. Participants mostly indicated that text-only warnings would not be effective at all in making people think about the health risks of smoking. The text-only warning on addiction had the lowest mean, at 1.52 (SD=0.88), (see Figure 5.10).

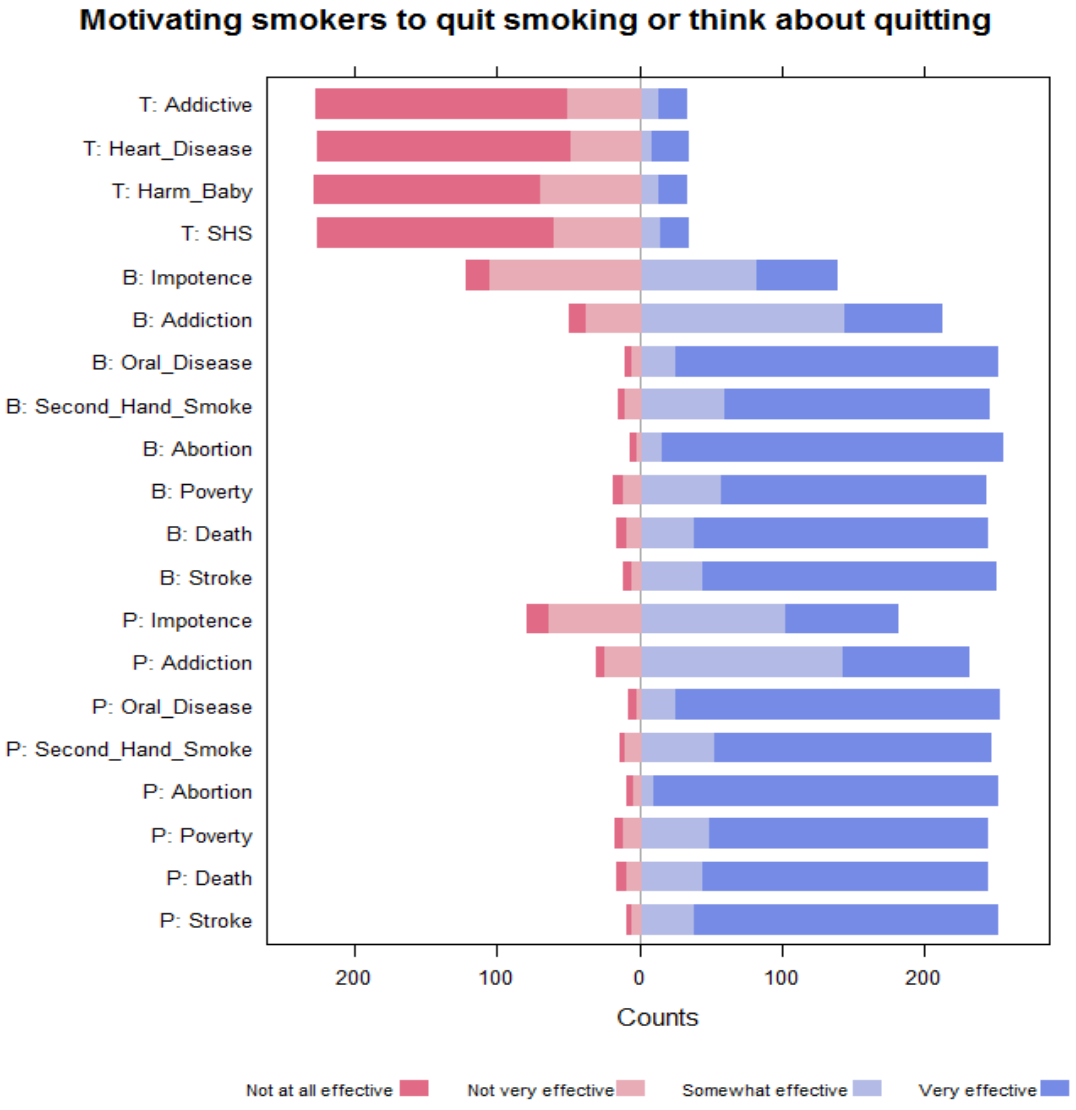


Key: T=Text-only, B=Branded pack, P=Plain pack

Figure 5.10: Ratings of health warnings' effectiveness in making people think about the health risks of smoking

5.4.4.2 Smokers' ratings of health warning effectiveness in motivating smokers to quit smoking or think about quitting

Smokers indicated the top three pictorial warnings in terms of effectiveness in motivating smokers to quit smoking or think about quitting were abortion, regardless of the pack, on a plain pack (Mean=3.88, SD=0.49) and a branded pack (Mean=3.88, SD=0.45), and oral disease on a plain pack (Mean=3.82, SD=0.54). The text-only warnings were not seen as effective in motivating smokers to quit smoking or think about quitting; the ones with the lowest means were addiction (Mean=1.52, SD=0.89) and heart disease (Mean=1.55, SD=0.95), (see Figure 5.11).

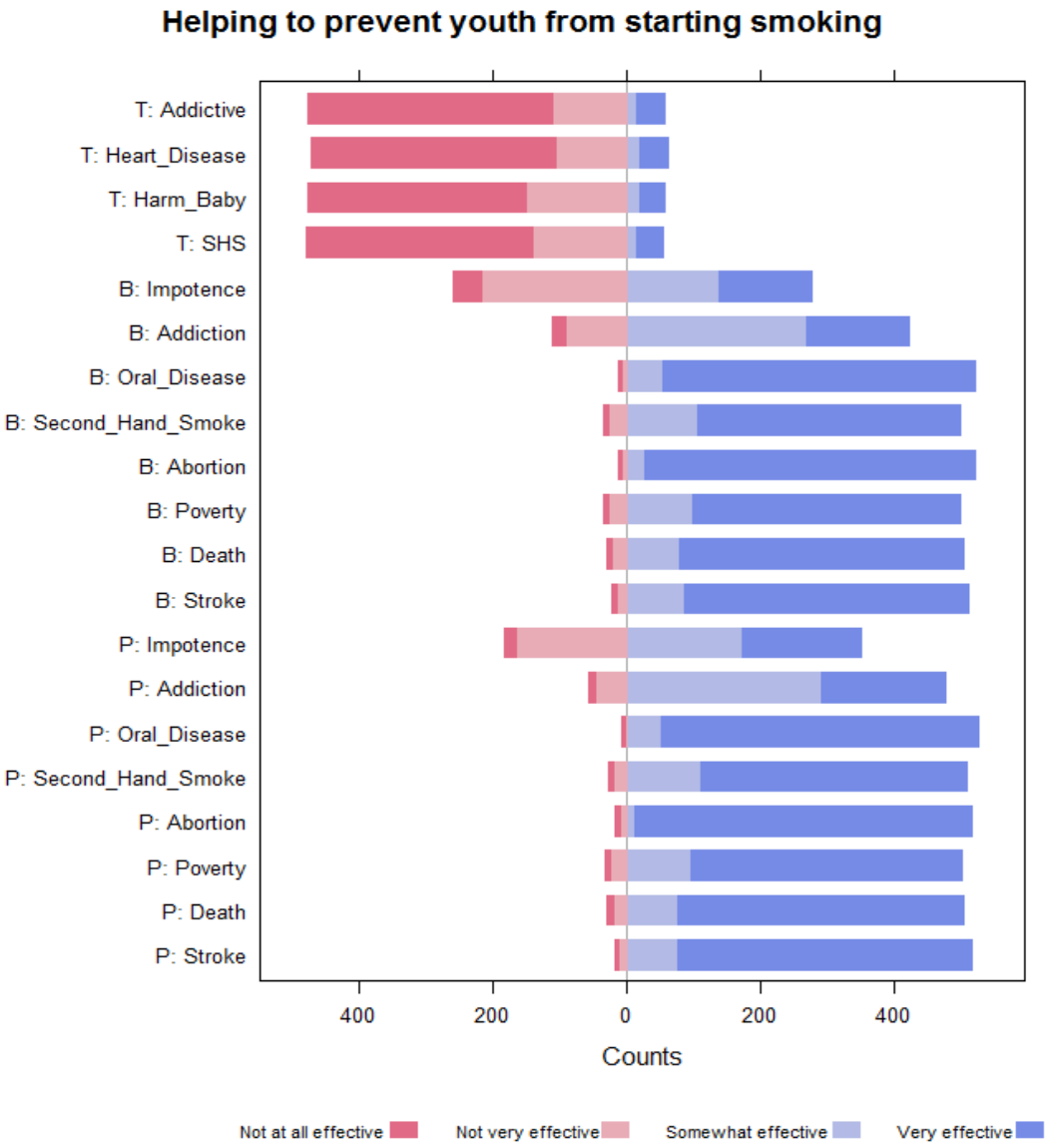


Key: T=Text-only, B=Branded pack, P= Plain pack

Figure 5.11: Ratings of health warnings' effectiveness in motivating smokers to quit smoking or think about quitting

5.4.4.3 Health warning effectiveness in helping to prevent youth from starting smoking

Participants said that text-only warnings would not be effective in helping to prevent youth from starting smoking. The text-only warnings that had the lowest means were addiction and heart disease, both with means of 1.50 and SD=0.88. Participants generally indicated that the pictorial warning on abortion on a plain pack (Mean=3.90, SD=0.47) and a branded pack (Mean=3.89, SD=0.44) was very effective in helping to prevent youth from starting smoking (see Figure 5.12).

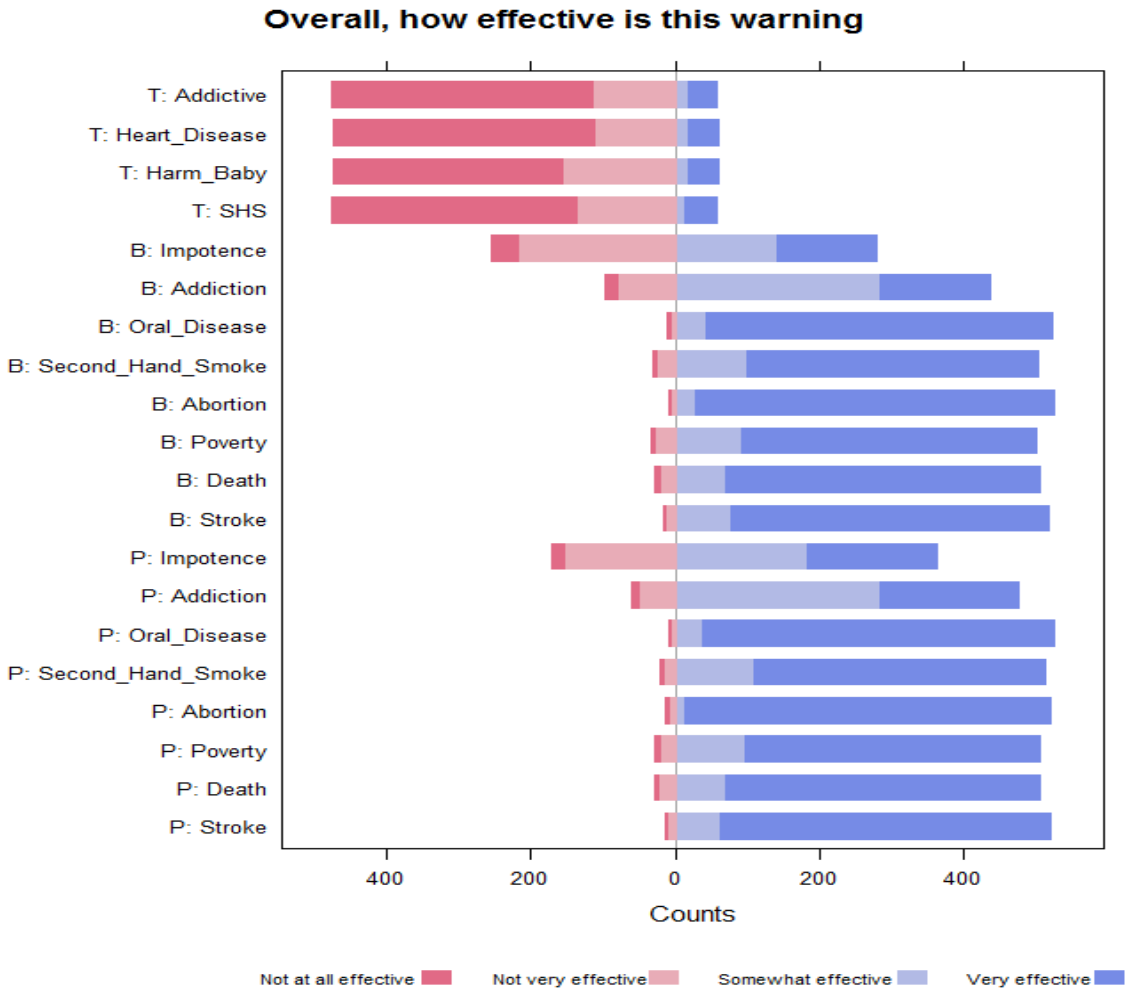


Key: T=Text-only, B=Branded pack, P=Plain pack

Figure 5.12: Ratings of health warnings' effectiveness in helping to prevent youth from starting smoking

5.4.4.4 Overall effectiveness of a health warning

The most effective health warnings overall were the pictorial warning on abortion on a plain pack (Mean 3.92, SD=0.40), the pictorial abortion warning on a branded pack (Mean= 3.91, SD=0.37), followed by the pictorial warning on oral disease on a plain pack (Mean= 3.90, SD=0.41) and a branded pack (Mean= 3.87, SD=0.43). The least effective pictorial warning overall was impotence on a branded pack (Mean 2.71, SD=0.93). The least effective health warning overall was the text-only warning on addiction (Mean=1.51, SD=0.87), followed by that on heart disease (Mean=1.52, SD=0.89), (see Figure 5.13).



Key: T=Text-only, B=Branded pack, P=Plain pack

Figure 5.13: Ratings of the overall effectiveness of the health warning

5.4.5 Effectiveness of the text and picture on the health warning

Results of questions on the effectiveness of the health warnings with regard to the

text-only and pictorial, using a 10-point Likert-type scale are now presented.

5.4.5.1 Effectiveness of the text in the health warning

Participants agreed that the text on the text-only health warnings was not effective. Participants rated the text on the addiction text-only health warning as least effective (Mean=2.50, SD=2.53). The most effective text was that on the pictorial health warning on abortion, regardless of the pack – plain pack (Mean= 9.48, SD=1.51), branded pack (Mean= 9.30, SD=1.64). The text on the stroke pictorial warning came a close second, with the plain pack (Mean=9.09, SD=1.77) and branded pack (Mean=9.00, SD=1.90), (see Table 5.14).

Table 5.14: Overall effectiveness of text in the health warning

Category	Health warning	n	Mean(SD)*	Median(IQ range#)
Text-only warnings	**T_SHS**	528	2.68(2.54)	2.0(1.0-4.0)
	T_Harm_Baby	529	2.66(2.53)	2.0(1.0-5.0)
	T_Heart_Disease	529	2.53(2.52)	2.0(1.0-4.0)
	T_Addictive	527	2.46(2.53)	2.0(1.0-5.0)
Pictorial warnings on branded packs	**B_Abortion**	526	9.30(1.64)	10.0(9.0-10.0)
	B_Stroke	528	9.00(1.90)	10.0(8.0-10.0)
	B_Oral_Disease	528	8.86(1.92)	10.0(8.0-10.0)
	B_Death	527	8.86(2.13)	10.0(8.0-10.0)
	B_Poverty	529	8.65(2.18)	10.0(7.0-10.0)
	B_Second_Hand_Smoke	526	8.63(2.13)	10.0(7.0-10.0)
	B_Addiction	531	6.63(2.62)	6.0(5.0-10.0)
	B_Impotence	530	6.06(2.89)	6.0(4.0-9.0)
Pictorial warnings on plain packs	**P_Abortion**	528	9.48(1.51)	10.0(8.0-10.0)
	P_Oral_Disease	527	9.12(1.77)	10.0(8.0-10.0)
	P_Stroke	528	9.09(1.77)	10.0(8.0-10.0)
	P_Death	527	8.91(2.04)	10.0(8.0-10.0)
	P_Second_Hand_Smoke	530	8.82(1.97)	10.0(7.0-10.0)
	P_Poverty	529	8.69(2.15)	10.0(7.0-10.0)
	P_Addiction	527	7.48(2.47)	8.0(6.0-10.0)
	P_Impotence	530	7.09(2.64)	7.0(5.0-10.0)

SD= Standard Deviation
**Range: 1 (Least effective) – 10 (Most effective)*
 # IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.4.5.2 Effectiveness of the picture on the health warning

The text-only warnings were not scored, as they had no pictures. The most effective picture was that on abortion, regardless whether it was on a plain pack (Mean=9.71, SD=1.17) or a branded pack (Mean=9.51, SD=1.14). The picture on oral disease came second, with a plain pack (Mean=9.40, SD=1.34) and a branded pack (Mean=9.15, SD=1.60).

The least effective picture among the pictorial warnings was that on impotence on a branded pack (Mean 2.74, SD=0.91); interestingly, the mean increased noticeably on the plain pack, to 7.27 (SD=2.58), (see Table 5.15).

Table 5.15: Overall effectiveness of pictures on the health warning

Category	Health warning	n	Mean(SD)*	Median (IQ range#)
Pictorial warnings on branded packs	**B_Abortion**	515	9.51(1.14)	10.0(9.0-10.0)
	B_Oral_Disease	512	9.15(1.60)	10.0(8.0-10.0)
	B_Stroke	516	9.08(1.66)	10.0(8.0-10.0)
	B_Death	512	9.02(1.85)	10.0(8.0-10.0)
	B_Poverty	518	8.82(1.91)	10.0(8.0-10.0)
	B_Second_Hand_Smoke	522	8.72(1.84)	10.0(7.0-10.0)
	B_Addiction	511	6.72(2.46)	6.0(5.0-10.0)
	B_Impotence	511	6.01(2.80)	6.0(4.0-10.0)
Pictorial warnings on plain packs	**P_Abortion**	515	9.71(1.17)	10.0(10.0-10.0)
	P_Oral_Disease	512	9.40(1.34)	10.0(9.0-10.0)
	P_Stroke	521	9.28(1.44)	10.0(9.0-10.0)
	P_Death	515	9.06(1.85)	10.0(8.0-10.0)
	P_Second_Hand_Smoke	515	9.00(1.66)	10.0(8.0-10.0)
	P_Poverty	517	8.83(1.90)	10.0(7.0-10.0)
	P_Addiction	519	7.62(2.26)	8.0(6.0-10.0)
	P_Impotence	515	7.27(2.58)	7.0(5.0-10.0)

SD= Standard Deviation
**Range: 1 (Least effective) – 10 (Most effective)*
 # IQ range – inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.5 TOP RANKING HEALTH WARNINGS BEFORE REVISION

This section and its subsections presents the results of the top-ranking health warnings, before the revision of the health warnings, after considering all four measures of effectiveness presented in this chapter's methods Section 5.2.9.3 above. An average score per warning was determined and these scores were compared across all 20 health warnings to obtain the top-ranking health warnings.

5.5.1 Top-ranking health warnings before revision

Pictorial warnings, regardless of whether they were on a branded or plain pack, were by far the higher-ranking health warnings compared to the text health warnings. The top-ranking pictorial warnings were those that were placed on the plain packs and these were said to be the most effective health warnings out of all the health warnings.

The text-only health warnings, conversely, were generally not effective. The health warning that was ranked last and therefore not at all effective overall was the text-only health warning on addiction (Mean=1.51, SD=0.86), followed by the text-only health warning on heart disease (Mean=1.52, SD=0.88).

The top, and therefore most effective, health warning overall was the pictorial warning on abortion on a plain pack (Mean=3.92, SD=0.41). The abortion pictorial warning on a branded pack (Mean=3.91, SD=0.37) came second, followed by the pictorial warning on oral disease on a plain pack (Mean=3.88, SD=0.39), and fourth was the oral disease warning on a branded pack (Mean=3.86, SD=0.43).

The least effective pictorial warning overall among all the pictorial warnings was the impotence warning on a branded pack (Mean=2.71, SD=0.93), which came 16th out of the 20 health warnings (see Table 5.16 overleaf, for the rankings).

Table 5.16: Top ranking health warnings before revision

Ranking	Health warnings	n	Mean(SD)*	Median(IQ range#)
1	**P_Abortion**	533	3.91(0.41)	4.0(4.0-4.0)
2	**B_Abortion**	533	3.90(0.38)	4.0(4.0-4.0)
3	**P_Oral_Disease**	533	3.88(0.38)	4.0(4.0-4.0)
4	**B_Oral_Disease**	533	3.86(0.43)	4.0(4.0-4.0)
5	**P_Stroke**	533	3.81(0.46)	4.0(4.0-4.0)
6	**B_Stroke**	533	3.77(0.51)	4.0(4.0-4.0)
7	**P_Death**	533	3.74(0.57)	4.0(4.0-4.0)
8	**B_Death**	533	3.74(0.57)	4.0(4.0-4.0)
9	**P_Second-hand_Smoke**	533	3.70(0.54)	4.0(3.0-4.0)
10	**B_Second-hand_Smoke**	533	3.67(0.58)	4.0(3.0-4.0)
11	**P_Poverty**	533	3.59(0.59)	4.0(3.0-4.0)
12	**B_Poverty**	533	3.59(0.60)	4.0(3.0-4.0)
13	**P_Addiction**	533	3.23(0.65)	3.0(3.0-4.0)
14	**B_Addiction**	533	3.06(0.73)	3.0(3.0-4.0)
15	**P_Impotence**	533	2.98(0.84)	3.0(2.0-4.0)
16	**B_Impotence**	533	2.71(0.90)	3.0(2.0-4.0)
17	**T_Harm_Baby**	533	1.59(0.85)	1.0(1.0-2.0)
18	**T_SHS**	533	1.56(0.86)	1.0(1.0-2.0)
19	**T_Heart_Disease**	533	1.52(0.88)	1.0(1.0-2.0)
20	**T_Addictive**	533	1.51(0.86)	1.0(1.0-2.0)

SD= Standard Deviation
**Range: 1 (Not at all effective) – 4 (Very effective)*
 # IQ range: Inter-quartile range (25 – 75)
Key: T=Text-only, B=Branded pack, P=Plain Pack

5.5.2 Most effective pictorial health warning from the set of pictorial warnings (on branded or plain packs) before revision

The results of the top three most effective pictorial warnings are presented below, considering each pictorial health warning set, in other words, the highest-ranked pictorial warnings per set, for example, the abortion set (on branded or plain packs). The top three pictorial warnings for each set were all on plain packaging and were abortion, oral disease and stroke. The results of these most effective pictorial warnings sets, all on plain packs, are discussed by socio-demographics, tobacco use and changes in desire and planning to quit.

5.5.2.1 Most effective pictorial health warnings set by socio-demographics

Before the revision of the pictorial health warnings, the pictorial warning on abortion on the plain pack was considered as significantly most effective by participants aged between 25 and 35 years compared to other age groups 18-24 and above 36 years old (Mean 3.91 vs 3.88 vs 3.80; p=0.039 respectively). Also, participants with a level of education higher than high school considered the abortion pictorial warning on a plain pack significantly as the most effective than participants with other levels of education namely primary school and high school (Mean 3.89 vs 3.71 vs 3.87; p=0.022 respectively). The pictorial warning on oral disease on a plain pack was considered as significantly most effective by the Indian/Asian than Black, Coloured/Mixed race and White population groups (Mean 3.97 vs 3.85 vs 3.78 vs 3.67; p<0.001 respectively). The pictorial warning on stroke on a plain pack was also considered similarly by the Indian/Asian than other population groups (Mean 3.96 vs 3.72 vs 3.76 vs 3.62; p<0.001 respectively). Table 5.17 sets out the top three most effective pictorial health warnings for each set of warnings before revision by socio-demographics.

Table 5.17: Top three most effective pictorial health warnings from the set by socio-demographic characteristics of participants

Variable (N)	Category (n)	Plain pack Abortion (1-4)* Mean (SD**)	p-value	Plain pack Oral disease (1-4)* Mean (SD**)	p-value	Plain pack Stroke (1-4)* Mean (SD**)	p-value
Age group (663)			0.039#		0.052#		0.084#
	18-24(158)	3.88(0.45)	1(referent)	3.85(0.51)	1(referent)	3.84(0.49)	1(referent)
	25-35(202)	3.91(0.37)	0.850	3.88(0.37)	0.900	3.79(0.45)	0.641
	≥36(303)	3.80(0.60)	0.296	3.78(0.56)	0.378	3.73(0.56)	0.084
Gender (663)			0.719§		0.388§		0.042§
	Male(330)	3.85(0.53)		3.84(0.48)		3.81(0.52)	
	Female(333)	3.86(0.47)		3.81(0.53)		3.73(0.51)	

Population group (663)			<0.001#		<0.001#		<0.001#
	Black(189)	3.87(0.47)	1(referent)	3.85(0.40)	1(referent)	3.72(0.54)	1(referent)
	Coloured/Mixed race (175)	3.88(0.39)	1.000	3.78(0.56)	0.620	3.76(0.48)	0.985
	Indian/Asian (167)	3.98(0.14)	0.024	3.97(0.18)	0.005	3.96(0.19)	<0.001
	White(132)	3.64(0.82)	0.021	3.67(0.72)	0.055	3.62(0.71)	0.613
Education level (663)			0.022#		0.011#		0.009#
	Primary School(76)	3.71(0.72)	1(referent)	3.67(0.69)	1(referent)	3.60(0.68)	1(referent)
	High School (363)	3.87(0.49)	0.197	3.84(0.49)	0.112	3.78(0.52)	0.116
	>High school(224)	3.89(0.43)	0.123	3.86(0.42)	0.071	3.82(0.43)	0.041
Employment status (661)			0.004#		0.006#		0.193#
	Unemployed (296)	3.84(0.55)	1(referent)	3.82(0.53)	1(referent)	3.77(0.55)	1(referent)
	Employed (213)	3.94(0.29)	0.019	3.90(0.31)	0.123	3.82(0.42)	0.537
	Other[student/pensioner/ other](152)	3.77(0.62)	0.563	3.73(0.62)	0.309	3.71(0.56)	0.801
Spend money on cigarettes rather than food (645)			0.391§		0.373§		0.164§
	No(342)	3.88(0.45)		3.82(0.52)		3.75(0.52)	
	Yes(303)	3.84(0.52)		3.85(0.45)		3.81(0.48)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
#All p-values (for trend) were derived using Analysis of variance (ANOVA)
§ All p- values derived using Independent samples t-test

5.5.2.2 Most effective pictorial health warnings set by tobacco use

Non-smokers considered the oral disease pictorial warning on a plain pack as significantly effective compared to current smokers (Mean 3.88 vs 3.77; p=0.008). Further, the pictorial warning on abortion (Mean 3.85 vs 3.56; p=0.002), as well as on

oral disease (Mean 3.82 vs 3.49; p=0.001) and on stroke (Mean 3.78 vs 3.40; p<0.001) all on the plain pack were considered as significantly most effective by participants who had never received advice to quit smoking cigarettes than who had received advice.

The pictorial warning on abortion on the plain pack was considered as significantly most effective by participants who had positive change in their plan to quit after exposure to health warnings compared to those with no change (Mean 3.92 vs 3.64; p<0.001). The pictorial warning on oral disease (Mean 3.87 vs 3.65; p=0.001) and stroke on a plain pack (Mean 3.84 vs 3.55; p<0.001) were also considered similarly by those who had change in their plan to quit after exposure to health warnings than those with no change.

The pictorial warning on abortion on a plain pack was considered as significantly most effective by those who had a partial ban of smoking at work than those allowed or had a total ban on smoking (Mean 3.95 vs 3.73 vs 3.94; p<0.001 respectively). The pictorial warning on oral disease (Mean 3.92 vs 3.70 vs 3.91; p<0.001 respectively) and stroke (Mean 3.89 vs 3.57 vs 3.88; p<0.001 respectively) all on a plain pack were also considered similarly by those who had a partial ban of smoking at work than those allowed or had a total ban. See Table 5.18 below for the top three most effective pictorial health warnings for each set of warnings before revision by tobacco smoking behaviour.

Table 5.18: Top three most effective pictorial health warnings from the set by tobacco smoking behaviour

Variable (N)	Category (n)	Plain pack Abortion (1-4)* Mean (SD**)	p-value	Plain pack Oral disease (1-4)* Mean (SD**)	p-value	Plain pack Stroke (1-4)* Mean (SD**)	p-value
Current smokers (663)			0.059§		0.008§		0.048§
	No(334)	3.89(0.44)		3.88(0.38)		3.81(0.46)	
	Yes(329)	3.82(0.56)		3.77(0.59)		3.73(0.57)	

Change in plan to quit after exposure to health warnings (307)			<0.001§		0.001§		<0.001§
	No change(107)	3.64(0.81)		3.65(0.71)		3.55(0.71)	
	Change(200)	3.92(0.34)		3.87(0.46)		3.84(0.44)	
Change in desire to quit after exposure to health warnings (299)			<0.001§		<0.001§		<0.001§
	No change(137)	3.66(0.77)		3.61(0.79)		3.54(0.75)	
	Change(162)	3.96(0.18)		3.92(0.32)		3.90(0.31)	
SHS at work(462)			<0.001#		<0.001#		<0.001#
	Allowed(119)	3.73(0.70)	1(referent)	3.70(0.71)	1(referent)	3.57(0.74)	1(referent)
	Partial Ban(171)	3.95(0.22)	0.003	3.92(0.30)	0.005	3.89(0.31)	<0.001
	Banned(172)	3.94(0.31)	0.008	3.91(0.34)	0.010	3.88(0.34)	<0.001
SHS at home(607)			0.186#		0.048#		0.051#
	Allowed(281)	3.84(0.51)	1(referent)	3.79(0.54)	1(referent)	3.75(0.54)	1(referent)
	Partial Ban(77)	3.88(0.45)	0.911	3.89(0.34)	0.137	3.77(0.44)	0.976
	Banned(249)	3.92(0.38)	0.174	3.88(0.45)	0.076	3.85(0.43)	0.050
SHS in car(519)			0.003#		0.027#		<0.001#
	Allowed(168)	3.79(0.62)	1(referent)	3.76(0.59)	1(referent)	3.68(0.62)	1(referent)
	Partial Ban(45)	3.97(0.17)	0.003	3.85(0.34)	0.521	3.73(0.45)	0.869
	Banned(306)	3.92(0.36)	0.030	3.89(0.44)	0.046	3.88(0.39)	0.001

Past month cigarette smoking (325)			0.218#		0.089#		0.006#
	1-9 days(51)	3.74(0.73)	1(referent)	3.65(0.70)	1(referent)	3.51(0.63)	1(referent)
	10-19 days(49)	3.93(0.23)	0.209	3.91(0.25)	0.044	3.87(0.28)	0.002
	>20 days(225)	3.81(0.57)	0.885	3.77(0.61)	0.596	3.75(0.59)	0.060
Quit attempt in past year <u>before</u> exposure to health warnings (311)			0.128§		0.048§		0.006§
	No(229)	3.85(0.54)		3.83(0.57)		3.80(0.54)	
	Yes(82)	3.74(0.61)		3.69(0.56)		3.61(0.55)	
Ever received advice to quit smoking cigarettes(318)			0.002§		0.001§		<0.001§
	No(274)	3.85(0.50)		3.82(0.50)		3.78(0.50)	
	Yes(44)	3.56(0.87)		3.49(0.96)		3.40(0.87)	
Current snuff use(605)			0.413§		0.708§		0.219§
	No(562)	3.85(0.51)		3.83(0.50)		3.78(0.52)	
	Yes(43)	3.90(0.35)		3.85(0.40)		3.86(0.35)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
#All p-values (for trend) were derived using Analysis of variance (ANOVA)
§ All p- values derived using Independent samples t-test

5.6 COMPARISON OF PICTORIAL WARNINGS PACKAGING WITH (BRANDED) AND WITHOUT (PLAIN) BRAND DESIGN ELEMENTS

This section compares the results on the effectiveness of the pictorial health warnings packaging with (branded) and without (plain) brand design elements in several ways, namely making people think about the health risks of smoking, motivating smokers to

quit smoking or think about quitting, helping to prevent youth from starting smoking, and overall effectiveness of the packaging.

5.6.1 Effectiveness of branded versus plain packaging in a number of different ways

The most effective pictorial warnings overall were those on the plain packaging (Mean=3.60; SD=0.46) compared to those on the branded packs (Mean=3.52; SD=0.47), implying that the plain packaging performed better. The plain packaging was also more effective than the branded packaging across the various effectiveness measures, for example, motivating smokers to quit, plain packs (Mean=3.59; SD=0.48) versus branded packs (Mean=3.50; SD=0.50), (see Table 5.19).

Table 5.19: Effectiveness of branded and plain packaging in a number of different ways

Category	Effectiveness elements	N	Mean(SD)*	Median(IQ range#)
Branded packs	**B: Think health risks**	617	3.50(0.46)	3.6(3.3-3.8)
	B: Prevent youth from smoking	614	3.50(0.51)	3.6(3.3-3.8)
	B: Motivate smokers to quit	614	3.50(0.50)	3.6(3.4-3.8)
	B: Overall effectiveness	611	3.52(0.47)	3.6(3.3-3.8)
Plain packs	**P: Think health risks**	609	3.56(0.46)	3.6(3.4-4.0)
	P: Motivate smokers to quit	607	3.59(0.48)	3.6(3.5-4.0)
	P: Prevent youth from smoking	605	3.58(0.48)	3.6(3.5-4.0)
	P: Overall effectiveness	605	3.60(0.46)	3.7(3.5-3.9)

SD= Standard Deviation
**Range: 1 (Not at all effective) – 4 (Very effective*
 # IQ range – inter-quartile range (25 – 75)
Key: B= Branded pack, P= Plain pack

5.6.1.1 Effectiveness of branded packaging

This subsection discusses the effectiveness of branded packaging in several different ways, namely making people think about the health risks of smoking, motivating smokers to quit smoking or think about quitting, and helping to prevent youth from

starting smoking, by socio-demographic and tobacco smoking behaviour.

Younger participants (18-24 years) compared to older participants namely 25-35 and above 36 years old felt that the branded packs were significantly effective in making people think about the health risks of smoking (Mean 3.58 vs 3.55 vs 3.42; p=0.001 respectively); motivating smokers to quit smoking or think about quitting (Mean 3.61 vs 3.56 vs 3.40; p<0.001 respectively) and helping to prevent youth from starting smoking (Mean 3.60 vs 3.57 vs 3.39; p<0.001 respectively).

Participants who self-identified as Indian/Asian compared to other population groups (Black, Coloured/Mixed race and White population groups) considered that the branded packs were significantly effective in making people think about the health risks of smoking (Mean 3.66 vs 3.47 vs 3.50 vs 3.29; p=0.001 respectively); motivating smokers to quit smoking or think about quitting (Mean 3.70 vs 3.46 vs 3.50 vs 3.28; p=0.001 respectively) and helping to prevent youth from starting smoking (Mean 3.69 vs 3.46 vs 3.49 vs 3.29; p=0.001 respectively). Table 5.20, shows the socio-demographic characteristics of participants in relation to their ratings of the effectiveness of branded packaging.

Table 5.20: Socio-demographic characteristics of participants and the effectiveness of branded packaging

Variable (N)	Category(n)	Think health risks (1-4)* Mean (SD**)	p-value	Motivate smokers to quit (1-4)* Mean (SD**)	p-value	Prevent youth from smoking (1-4)* Mean (SD**)	p-value
Age group (617)			0.001#		<0.001#		<0.001#
	18-24(151)	3.58(0.41)	1(referent)	3.61(0.42)	1(referent)	3.60(0.45)	1(referent)
	25-35(191)	3.55(0.38)	0.869	3.56(0.41)	0.672	3.57(0.42)	0.856
	≥36(275)	3.42(0.52)	0.002	3.40(0.55)	<0.001	3.39(0.57)	<0.001
Gender (617)			0.075§		0.001§		0.002§
	Male(311)	3.53(0.41)		3.56(0.43)		3.56(0.44)	
	Female(306)	3.46(0.51)		3.43(0.54)		3.43(0.56)	

Population group (617)			0.001#		0.001#		0.001#
	Black(169)	3.47(0.46)	1(referent)	3.46(0.49)	1(referent)	3.46(0.49)	1(referent)
	Coloured/Mixed race (168)	3.50(0.40)	0.990	3.50(0.44)	0.967	3.49(0.47)	0.991
	Indian/Asian (162)	3.66(0.27)	<0.001	3.70(0.25)	<0.001	3.69(0.26)	<0.001
	White(118)	3.29(0.65)	0.060	3.28(0.68)	0.061	3.29(0.71)	0.131
Education level (617)			0.004#		0.004#		0.002#
	Primary School(67)	3.36(0.62)	1(referent)	3.32(0.63)	1(referent)	3.31(0.65)	1(referent)
	High School(336)	3.49(0.42)	0.082	3.50(0.46)	0.018	3.50(0.49)	0.016
	>High school(214)	3.56(0.46)	0.004	3.55(0.48)	0.002	3.56(0.48)	0.001
Employment status (614)			0.158#		0.210#		0.267#
	Unemployed (271)	3.46(0.48)	1(referent)	3.47(0.51)	1(referent)	3.47(0.53)	1(referent)
	Employed (203)	3.55(0.38)	0.113	3.55(0.40)	0.171	3.55(0.42)	0.228
	Other[student/pensioner/ other](140)	3.51(0.52)	0.810	3.49(0.56)	0.984	3.50(0.57)	0.946
Spend money on cigarettes rather than food (602)			0.203§		0.208§		0.197§
	No(317)	3.48(0.48)		3.48(0.50)		3.48(0.50)	
	Yes(285)	3.53(0.42)		3.53(0.46)		3.53(0.49)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
#All p-values (for trend) were derived using Analysis of variance (ANOVA)
§ All p- values derived using Independent samples t-test

Non-smokers felt that the branded packs were effective in making people think about the health risks of smoking compared to current smokers (Mean 3.54 vs 3.45; p=0.019). Participants who had positive changes in their plan to quit after exposure to health warnings than those with no change felt that the branded packs were significantly effective in making people think about the health risks of smoking (Mean

3.56 vs 3.25; p<0.001), motivating smokers to quit smoking or think about quitting (Mean 3.59 vs 3.23; p<0.001), and helping to prevent youth from starting smoking (Mean 3.60 vs 3.21; p<0.001). Participants who indicated that smoking was banned at work compared to others (allowed and partial ban) considered that the branded packs were significantly effective in making people think about the health risks of smoking (Mean 3.62 vs 3.30 vs 3.61; p<0.001 respectively); motivating smokers to quit smoking or think about quitting (Mean 3.64 vs 3.29 vs 3.61; p<0.001 respectively) and helping to prevent youth from starting smoking (Mean 3.64 vs 3.27 vs 3.62; p<0.001 respectively). See Table 5.21 for the tobacco smoking behaviour smoking and the effectiveness of branded packaging.

Table 5.21: Tobacco smoking behaviour and the effectiveness of branded packaging

Variable (N)	Category (n)	Think health risks (1-4)* Mean (SD**)	p-value	Motivate smokers to quit (1-4)* Mean (SD**)	p-value	Prevent youth from smoking (1-4)* Mean (SD**)	p-value
Current smokers (617)			0.019§		0.117§		0.121§
	No(316)	3.54(0.42)		3.52(0.46)		3.53(0.46)	
	Yes(301)	3.45(0.50)		3.47(0.52)		3.46(0.55)	
Plan to quit <u>before</u> exposure to health warnings (292)			0.169#		0.049#		0.062#
	Not planning to quit?(208)	3.47(0.50)	1(referent)	3.51(0.51)	1(referent)	3.51(0.52)	1(referent)
	Sometime in the future beyond 6 months(41)	3.47(0.43)	1.000	3.42(0.51)	0.863	3.38(0.63)	0.785
	Within the next 6 months(20)	3.42(0.51)	0.998	3.43(0.46)	0.976	3.41(0.43)	0.930

	Within the next month(23)	3.22(0.65)	0.427	3.18(0.69)	0.246	3.21(0.66)	0.237
Plan to quit <u>after</u> exposure to health warnings (286)			<0.001[#]		<0.001[#]		<0.001[#]
	Not planning to quit?(47)	3.19(0.74)	1(referent)	3.19(0.78)	1(referent)	3.19(0.80)	1(referent)
	Sometime in the future beyond 6 months(80)	3.45(0.50)	0.239	3.48(0.50)	0.164	3.46(0.53)	0.265
	Within the next 6 months(105)	3.56(0.31)	0.010	3.59(0.32)	0.007	3.60(0.33)	0.007
	Within the next month(74)	3.50(0.46)	0.071	3.50(0.48)	0.093	3.49(0.48)	0.115
Change in plan to quit after exposure to health warnings (282)			<0.001[§]		<0.001[§]		<0.001[§]
	No change(95)	3.25(0.66)		3.23(0.69)		3.21(0.73)	
	Change(187)	3.56(0.34)		3.59(0.35)		3.60(0.34)	
Desire to quit <u>before</u> exposure to health warnings (293)			0.012[§]		0.002[§]		0.001[§]
	No(221)	3.50(0.45)		3.53(0.46)		3.53(0.51)	
	Yes(72)	3.30(0.62)		3.26(0.64)		3.24(0.61)	

Desire to quit <u>after</u> exposure to health warnings (280)			0.020§		0.008§		0.009§
	No(67)	3.28(0.73)		3.26(0.76)		3.24(0.80)	
	Yes(213)	3.50(0.41)		3.53(0.42)		3.52(0.44)	
Change in desire to quit after exposure to health warnings (277)			<0.001§		<0.001§		<0.001§
	No change(123)	3.28(0.67)		3.25(0.69)		3.23(0.71)	
	Change(154)	3.57(0.28)		3.61(0.28)		3.62(0.30)	
SHS at work(434)			<0.001#		<0.001#		<0.001#
	Allowed(107)	3.30(0.66)	1(referent)	3.29(0.68)	1(referent)	3.27(0.68)	1(referent)
	Partial Ban(162)	3.61(0.26)	<0.001	3.61(0.27)	<0.001	3.62(0.30)	<0.001
	Banned(165)	3.62(0.38)	<0.001	3.64(0.38)	<0.001	3.64(0.41)	<0.001
SHS at home(576)			<0.001#		<0.001#		<0.001#
	Allowed(262)	3.41(0.50)	1(referent)	3.41(0.52)	1(referent)	3.41(0.54)	1(referent)
	Partial Ban(75)	3.58(0.31)	0.001	3.57(0.33)	0.002	3.60(0.33)	0.004
	Banned(239)	3.59(0.39)	<0.001	3.58(0.43)	<0.001	3.58(0.45)	<0.001
SHS in car(495)			<0.001#		<0.001#		<0.001#
	Allowed(157)	3.40(0.52)	1(referent)	3.38(0.56)	1(referent)	3.38(0.58)	1(referent)
	Partial Ban(43)	3.59(0.31)	0.007	3.56(0.38)	0.044	3.54(0.37)	0.094

	Banned(295)	3.58(0.41)	0.001	3.61(0.41)	<0.001	3.60(0.43)	<0.001
Past month cigarette smoking (297)			0.851[#]		0.774[#]		0.759[#]
	1-9 days(45)	3.49(0.54)	1(referent)	3.44(0.56)	1(referent)	3.42(0.61)	1(referent)
	10-19 days(45)	3.45(0.36)	1.000	3.51(0.35)	1.000	3.51(0.37)	1.000
	>20 days(207)	3.44(0.52)	1.000	3.46(0.55)	1.000	3.46(0.57)	1.000
Quit attempt in past year <u>before</u> exposure to health warnings (286)			0.110[§]		0.010[§]		0.002[§]
	No(213)	3.49(0.48)		3.52(0.49)		3.54(0.48)	
	Yes(73)	3.39(0.49)		3.34(0.52)		3.30(0.60)	
Ever received advice to quit smoking cigarettes(291)			0.095[§]		0.015[§]		0.009[§]
	No(254)	3.47(0.47)		3.50(0.48)		3.51(0.49)	
	Yes(37)	3.27(0.70)		3.18(0.74)		3.13(0.80)	
Current snuff use(567)			0.965[§]		0.375[§]		0.478[§]
	No(526)	3.50(0.46)		3.50(0.50)		3.50(0.51)	
	Yes(41)	3.50(0.48)		3.57(0.44)		3.56(0.44)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
[#]All p-values (for trend) were derived using Analysis of variance (ANOVA)
[§] All p- values derived using Independent samples t-test

5.6.1.2 Effectiveness of plain packaging

This section discusses the findings on the effectiveness of plain packaging in several different dimensions of effectiveness, namely making people think about the health risks of smoking, motivating smokers to quit smoking or think about quitting, and helping to prevent youth from starting smoking by socio-demographic and tobacco smoking behaviour.

As with branded packs, the younger participants rated the plain pack as being significantly more effective in the dimensions of effectiveness. Indian/Asian participants compared to other population groups (Black, Coloured/Mixed race and White population groups) felt that the plain packs were significantly effective in making people think about the health risks of smoking (Mean 3.74 vs 3.55 vs 3.52 vs 3.38; p=0.001 respectively); motivating smokers to quit smoking or think about quitting (Mean 3.77 vs 3.56 vs 3.57 vs 3.38; p=0.001 respectively) and helping to prevent youth from starting smoking (Mean 3.78 vs 3.55 vs 3.55 vs 3.40; p=0.001 respectively).

Participants whose education level was more than high school compared to other levels of education (primary school and high school) considered plain packaging as being significantly effective in making people think about the health risks of smoking (Mean 3.61 vs 3.43 vs 3.55; p=0.017 respectively), motivating smokers to quit smoking or think about quitting (Mean 3.63 vs 3.45 vs 3.59; p=0.034 respectively), and helping to prevent youth from starting smoking (Mean 3.62 vs 3.46 vs 3.58; p=0.053 respectively). See Table 5.22 for the socio-demographic characteristics of participants and effectiveness of plain packaging.

Table 5.22: Socio-demographic characteristics of participants and the effectiveness of plain packaging

Variable (N)	Category(n)	Think health risks (1-4)* Mean (SD**)	p-value	Motivate smokers to quit (1-4)* Mean (SD**)	p-value	Prevent youth from smoking (1-4)* Mean (SD**)	p-value
Age group (609)			0.001#		<0.001#		<0.001#
	18-24(148)	3.65(0.40)	1(referent)	3.70(0.38)	1(referent)	3.70(0.42)	1(referent)
	25-35(184)	3.59(0.43)	0.367	3.63(0.45)	0.320	3.62(0.46)	0.337
	≥36(277)	3.50(0.50)	0.001	3.50(0.52)	<0.001	3.50(0.51)	<0.001
Gender (609)			0.178§		0.044§		0.043§
	Male(307)	3.58(0.43)		3.63(0.44)		3.62(0.44)	
	Female(302)	3.53(0.48)		3.55(0.51)		3.54(0.52)	
Population group (609)			0.001#		0.001#		0.001#
	Black(161)	3.55(0.41)	1(referent)	3.56(0.41)	1(referent)	3.55(0.41)	1(referent)
	Coloured/Mixed race (165)	3.52(0.40)	0.983	3.57(0.44)	1.000	3.55(0.50)	1.000
	Indian/Asian (164)	3.74(0.28)	<0.001	3.77(0.27)	<0.001	3.78(0.24)	<0.001
	White(119)	3.38(0.67)	0.101	3.38(0.69)	0.088	3.40(0.68	0.181
Education level (609)			0.017#		0.034#		0.053#
	Primary School(65)	3.43(0.60)	1(referent)	3.45(0.58)	1(referent)	3.46(0.58)	1(referent)
	High School(331)	3.55(0.42)	0.111	3.59(0.46)	0.108	3.58(0.47)	0.175
	>High school(213)	3.61(0.45)	0.014	3.63(0.46)	0.028	3.62(0.46)	0.046
Employment status (608)			0.126#		0.332#		0.196#
	Unemployed (267)	3.52(0.49)	1(referent)	3.56(0.52)	1(referent)	3.55(0.54)	1(referent)
	Employed (202)	3.60(0.37)	0.098	3.63(0.40)	0.348	3.63(0.38)	0.159

	Other[student/pensioner/other](139)	3.57(0.49)	0.646	3.57(0.49)	0.997	3.58(0.50)	0.899
Spend money on cigarettes rather than food (595)			0.502§		0.131§		0.137§
	No(315)	3.56(0.43)		3.57(0.46)		3.56(0.46)	
	Yes(280)	3.58(0.46)		3.62(0.47)		3.62(0.48)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
#All p-values (for trend) were derived using Analysis of variance (ANOVA)
§ All p- values derived using Independent samples t-test

Participants who non-smokers indicated that the plain packs were effective in making people think about the health risks of smoking compared to current smokers (Mean 3.60 vs 3.51; p=0.037). Those who had positive changes in their plan to quit after exposure to health warnings than those with no change considered that the plain packs were significantly effective in making people think about the health risks of smoking (Mean 3.62 vs 3.34; p<0.001), motivating smokers to quit smoking or think about quitting (Mean 3.70 vs 3.32; p<0.001), and helping to prevent youth from starting smoking (Mean 3.69 vs 3.32; p<0.001).

Participants who indicated that smoking was banned at home compared to others (allowed or partial ban) felt that the plain packs were significantly effective in making people think about the health risks of smoking (Mean 3.67 vs 3.46 vs 3.64; p<0.001 respectively); motivating smokers to quit smoking or think about quitting (Mean 3.69 vs 3.50 vs 3.64; p<0.001 respectively) and helping to prevent youth from starting smoking (Mean 3.68 vs 3.50 vs 3.63; p<0.001 respectively). See Table 5.23 overleaf, for the tobacco smoking behaviour smoking and the effectiveness of plain packaging.

Table 5.23: Tobacco smoking behaviour, and effectiveness of plain packaging

Variable (N)	Category(n)	Think health risks (1-4)* Mean (SD**)	p-value	Motivate smokers to quit (1-4)* Mean (SD**)	p-value	Prevent youth from smoking (1-4)* Mean (SD**)	p-value
Current smokers (609)			0.037§		0.103§		0.121§
	No(312)	3.60(0.40)		3.61(0.41)		3.61(0.42)	
	Yes(297)	3.51(0.51)		3.55(0.53)		3.55(0.54)	
Plan to quit <u>before</u> exposure to health warnings (286)			0.737#		0.092#		0.035#
	Not planning to quit?(208)	3.53(0.50)	1(referent)	3.60(0.50)	1(referent)	3.60(0.49)	1(referent)
	Sometime in the future beyond 6 months(41)	3.49(0.59)	0.998	3.42(0.57)	0.555	3.44(0.72)	0.675
	Within the next 6 months(19)	3.56(0.41)	1.000	3.56(0.44)	1.000	3.51(0.46)	0.960
	Within the next month(18)	3.40(0.57)	0.921	3.35(0.56)	0.371	3.27(0.61)	0.188
Plan to quit <u>after</u> exposure to health warnings (280)			0.007#		0.004#		0.017#
	Not planning to quit?(45)	3.31(0.75)	1(referent)	3.32(0.79)	1(referent)	3.35(0.79)	1(referent)
	Sometime in the future beyond six months(62)	3.46(0.54)	0.810	3.53(0.53)	0.164	3.52(0.52)	0.757

	Within the next six months(104)	3.58(0.39)	0.148	3.64(0.41)	0.007	3.62(0.40)	0.175
	Within the next month(69)	3.62(0.43)	0.091	3.62(0.44)	0.093	3.62(0.45)	0.220
Change in plan to quit after exposure to health warnings (275)			0.003§		<0.001§		<0.001§
	No change(87)	3.35(0.66)		3.35(0.69)		3.34(0.72)	
	Change(188)	3.59(0.41)		3.65(0.41)		3.65(0.37)	
Desire to quit <u>before</u> exposure to health warnings (290)			0.033§		0.001§		0.001§
	No(221)	3.56(0.46)		3.63(0.45)		3.61(0.49)	
	Yes(69)	3.38(0.65)		3.31(0.70)		3.32(0.64)	
Desire to quit <u>after</u> exposure to health warnings (272)			0.022§		0.008§		0.016§
	No(64)	3.33(0.76)		3.33(0.79)		3.34(0.81)	
	Yes(208)	3.56(0.41)		3.61(0.42)		3.60(0.41)	
Change in desire to quit after exposure to health warnings (268)			<0.001§		<0.001§		<0.001§
	No change(113)	3.34(0.70)		3.32(0.73)		3.32(0.74)	
	Change(155)	3.62(0.29)		3.70(0.26)		3.69(0.27)	

SHS at work(432)			<0.001[#]		<0.001[#]		<0.001[#]
	Allowed(105)	3.40(0.63)	1(referent)	3.42(0.64)	1(referent)	3.42(0.64)	1(referent)
	Partial Ban(164)	3.64(0.30)	0.001	3.69(0.28)	<0.001	3.68(0.32)	0.001
	Banned(163)	3.71(0.35	<0.001	3.73(0.34)	<0.001	3.73(0.38)	<0.001
SHS at home(566)			<0.001[#]		<0.001[#]		<0.001[#]
	Allowed(260)	3.46(0.50)	1(referent)	3.50(0.53)	1(referent)	3.50(0.53)	1(referent)
	Partial Ban(69)	3.64(0.28)	<0.001	3.64(0.31)	0.025	3.63(0.31)	0.041
	Banned(237)	3.67(0.34)	<0.001	3.69(0.37)	<0.001	3.68(0.41)	<0.001
SHS in car(491)			<0.001[#]		<0.001[#]		<0.001[#]
	Allowed(154)	3.43(0.55)	1(referent)	3.46(0.59)	1(referent)	3.44(0.59)	1(referent)
	Partial Ban(43)	3.60(0.28)	0.017	3.58(0.32)	0.189	3.55(0.36)	0.353
	Banned(294)	3.66(0.37)	<0.001	3.70(0.37)	<0.001	3.70(0.39)	<0.001
Past month cigarette smoking (293)			0.813[#]		0.372[#]		0.162[#]
	1-9 days(45)	3.49(0.49)	1(referent)	3.46(0.50)	1(referent)	3.42(0.59)	1(referent)
	10-19 days(45)	3.56(0.35)	1.000	3.61(0.39)	0.527	3.63(0.40)	0.213
	>20 days(203)	3.52(0.55)	1.000	3.56(0.57)	0.742	3.56(0.55)	0.313

Quit attempt in past year <u>before</u> exposure to health warnings (281)			0.232§		0.018§		0.004§
	No(210)	3.54(0.50)		3.61(0.50)		3.62(0.45)	
	Yes(71)	3.46(0.55)		3.41(0.59)		3.37(0.66)	
Ever received advice to quit smoking cigarettes (286)			0.453§		0.172§		0.102§
	No(253)	3.53(0.49)		3.57(0.50)		3.58(0.49)	
	Yes(33)	3.43(0.69)		3.38(0.75)		3.32(0.84)	
Current snuff use(567)			0.222§		0.003§		0.142§
	No(526)	3.56(0.47)		3.59(0.49)		3.59(0.49)	
	Yes(41)	3.66(0.33)		3.74(0.24)		3.71(0.29)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
#All p-values (for trend) were derived using Analysis of variance (ANOVA)
§ *All p- values derived using Independent samples t-test*

5.6.1.3 Overall effectiveness of branded and plain packaging

This section presents the overall effectiveness of branded and plain packaging by socio-demographic and tobacco smoking behaviour.

Participants aged between 18 and 24 years, compared to other age groups 25-35 and above 36 years), indicated that the branded packs (Mean 3.61 vs 3.58 vs 3.43; p<0.001 respectively), and plain packs (Mean 3.70 vs 3.64 vs 3.52; p<0.001 respectively) were significantly more effective overall. Female participants rated branded packs as being overall less effective than male participants (Mean 3.70 vs 3.48 vs 3.56; p=0.033).

Furthermore, considering overall effectiveness of the packs, Indian/Asian participants, than other population groups (Black, Coloured/Mixed race and White), felt that the branded packs (Mean 3.70 vs 3.47 vs 3.52 vs 3.34; p=0.001 respectively) and plain packs (Mean 3.79 vs 3.56 vs 3.58 vs 3.44; p=0.001 respectively) were significantly effective.

Participants whose level of education was more than high school, compared to the other levels of education (primary school or high school), felt that the branded packs (Mean 3.58 vs 3.35 vs 3.51; p=0.003 respectively), and plain packs (Mean 3.64 vs 3.47 vs 3.60; p=0.029 respectively) were significantly effective overall. See Table 5.24 for the socio-demographic characteristics of participants and the overall effectiveness of branded and plain packaging.

Table 5.24: Overall effectiveness of branded and plain packaging by socio-demographics

Variable (N)	Category(n)	Overall effectiveness branded pack (1-4)* Mean(SD**)	p-value	Overall effectiveness plain pack (1-4)* Mean(SD**)	p-value
Age group (611)			<0.001#		<0.001#
	18-24(49)	3.61(0.41)	1(referent)	3.70(0.38)	1(referent)
	25-35(190)	3.58(0.41)	0.808	3.64(0.44)	0.358
	≥36(272)	3.43(0.53)	<0.001	3.52(0.50)	<0.001
Gender (611)			0.033§		0.145§
	Male(310)	3.56(0.43)		3.62(0.45)	
	Female(301)	3.48(0.51)		3.58(0.48)	
Population group (611)			0.001#		0.001#
	Black(165)	3.47(0.47)	1(referent)	3.56(0.43)	1(referent)
	Coloured/Mixed race (165)	3.52(0.43)	0.871	3.58(0.44)	0.998
	Indian/Asian (162)	3.70(0.25)	<0.001	3.79(0.23)	<0.001
	White(119)	3.34(0.67)	0.371	3.44(0.66)	0.432

Education level (611)			0.003[#]		0.029[#]
	Primary School(65)	3.35(0.64)	1(referent)	3.47(0.59)	1(referent)
	High School(335)	3.51(0.46)	0.033	3.60(0.45)	0.115
	>High school(211)	3.58(0.43)	0.002	3.64(0.44)	0.024
Employment status (608)			0.335[*]		0.381[#]
	Unemployed (270)	3.49(0.49)	1(referent)	3.58(0.49)	1(referent)
	Employed (199)	3.56(0.40)	0.304	3.64(0.40)	0.373
	Other[student/pensioner/ other](139)	3.52(0.53)	0.934	3.60(0.50)	0.959
Spend money on cigarettes rather than food (596)			0.103[§]		0.175[§]
	No(314)	3.49(0.49)		3.58(0.44)	
	Yes(282)	3.56(0.44)		3.63(0.47)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
[#]*p-values (for trend) were derived using Analysis of variance (ANOVA)*
[§]*p- values derived using Independent samples t-test*

Participants who planned to quit (after exposure to the health warnings) within the next six months (contemplation stage), compared to those who were not planning to quit (not contemplating), or who planned to quit some time in the future beyond six months (precontemplation stage), or planned to quit in the next month (preparation stage), felt that the branded packs (Mean 3.63 vs 3.19 vs 3.49 vs 3.52; $p<0.001$ respectively), were significantly more effective overall.

However, those who planned to quit in the next month compared to those who were not planning to quit, or planned to quit planned to quit some time in the future beyond six months or within the next six months felt that the plain packs (Mean 3.66 vs 3.32 vs 3.56 vs 3.65; $p<0.001$ respectively), were significantly effective overall.

Participants who reported a positive change in their plan to quit smoking after exposure to health warnings compared to those who had no change felt that the branded (Mean 3.62 vs 3.23; p<0.001) and plain packs (Mean 3.68 vs 3.35; p<0.001) were significantly effective overall.

Generally, the branded and plain packs were considered significantly effective overall by those participants with the most restrictive rule for smoking at work, in the home and cars. See Table 5.25 for the overall effectiveness of branded and plain packaging by tobacco smoking behaviour.

Table 5.25: Overall effectiveness of branded and plain packaging by tobacco smoking behaviour

Variable (N)	Category(n)	Overall effectiveness branded pack (1-4)* Mean(SD**)	p-value	Overall effectiveness plain pack (1-4)* Mean(SD**)	p-value
Current smokers (611)			0.176§		0.270§
	No(312)	3.54(0.44)		3.62(0.42)	
	Yes(299)	3.49(0.51)		3.58(0.51)	
Plan to quit <u>before</u> exposure to health warnings (290)			0.051#		0.071#
	Not planning to quit?(207)	3.54(0.48)	1(referent)	3.63(0.47)	1(referent)
	Sometime in the future beyond 6 months(41)	3.41(0.53)	0.639	3.47(0.65)	0.606
	Within the next 6 months(19)	3.43(0.50)	0.941	3.56(0.42)	0.990
	Within the next month(23)	3.26(0.64)	0.277	3.36(0.54)	0.292
Plan to quit <u>after</u> exposure to			<0.001#		0.001#

health warnings (284)					
	Not planning to quit?(47)	3.19(0.80)	1(referent)	3.32(0.81)	1(referent)
	Sometime in the future beyond 6 months(58)	3.49(0.43)	0.119	3.56(0.45)	0.430
	Within the next 6 months(105)	3.63(0.29)	0.003	3.65(0.39)	0.078
	Within the next month(74)	3.52(0.47)	0.700	3.66(0.40)	0.068
Change in plan to quit after exposure to health warnings (280)			<0.001§		<0.001§
	No change(94)	3.23(0.71)		3.35(0.70)	
	Change(186)	3.62(0.28)		3.68(0.34)	
Desire to quit <u>before</u> exposure to health warnings (291)			0.001§		0.004§
	No(220)	3.55(0.46)		3.63(0.46)	
	Yes(71)	3.30(0.59)		3.39(0.62)	
Desire to quit <u>after</u> exposure to health warnings (278)			0.014§		0.016§
	No(67)	3.31(0.72)		3.38(0.76)	
	Yes(211)	3.54(0.41)		3.62(0.40)	
Change in desire to quit after exposure to health warnings (275)			<0.001§		<0.001§
	No	3.28(0.66)		3.36(0.70)	

	change(122)				
	Change(153)	3.64(0.26)		3.71(0.25)	
SHS at work(430)			<0.001#		<0.001#
	Allowed(105)	3.32(0.65)	1(referent)	3.45(0.62)	1(referent)
	Partial Ban(162)	3.64(0.27)	<0.001	3.69(0.28)	0.001
	Banned(163)	3.65(0.37)	<0.001	3.74(0.34)	<0.001
SHS at home(572)			<0.001#		<0.001#
	Allowed(261)	3.45(0.50)	1(referent)	3.54(0.50)	1(referent)
	Partial Ban(74)	3.61(0.32)	0.003	3.64(0.31)	0.100
	Banned(237)	3.59(0.42)	0.001	3.70(0.38)	<0.001
SHS in car(492)			<0.001 (for trends)		<0.001 (for trends)
	Allowed(157)	3.41(0.53)	1(referent)	3.49(0.55)	1(referent)
	Partial Ban(43)	3.58(0.41)	0.092	3.57(0.33)	0.557
	Banned(292)	3.62(0.41)	<0.001	3.71(0.38)	<0.001
Past month cigarette smoking (295)			0.840#		0.212#
	1-9 days(45)	3.45(0.54)	1(referent)	3.46(0.51)	1(referent)
	10-19 days(45)	3.51(0.36)	1.000	3.64(0.38)	0.296
	>20 days(205)	3.49(0.53)	1.000	3.59(0.53)	0.384
Quit attempt in past year <u>before</u> exposure to health warnings (284)			0.003§		0.012§
	No(212)	3.55(0.46)		3.63(0.46)	
	Yes(72)	3.36(0.53)		3.43(0.60)	
Ever received advice to			0.016§		0.095§

quit smoking cigarettes (289)					
	No(253)	3.53(0.46)		3.60(0.47)	
	Yes(36)	3.21(0.74)		3.36(0.78)	
Current snuff use(563)			0.634§		0.179§
	No(522)	3.52(0.48)		3.61(0.48)	
	Yes(41)	3.56(0.42)		3.72(0.29)	

**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
#p-values (for trend) were derived using Analysis of variance (ANOVA)
§p-values derived using Independent samples t-test

5.7 PARTICIPANTS' VOICES

This section and its subsections present a short selection of the qualitative responses and therefore the voices of the participants on the health warnings to complement the quantitative responses reported earlier. The comprehensive qualitative responses are presented in appendix 18. The section reflects particularly the voices of the participants concerning text warnings and pictorial warnings on branded versus plain packs. Qualitative responses on the pictorial health warning collage situated on the spine of the cigarette pack are also provided. The section concludes with the recommendations of the participants with regard to the health warnings. The verbatim quotations from the participants' comments are printed in italics.

5.7.1 Text-only health warnings

Four text-only health warnings were shown to the participants, and they were asked for their responses to the messages. The participants all agreed that the text-only health warnings are not effective. Some smokers indicated that they had not realised that the text-only health warnings on the cigarette packs shows were actual health warnings on cigarette packs. The following are indicative: *"You know, I always see the wording, but I have never read it and had not realised that this was a warning message" (18-24 yrs, male, smoker).* Another participant said*: "I really don't care about these word messages; they really mean nothing to me. It is just words and in any case most people here cannot read; these are not good" (36 yrs or above, male, smoker).*

Participants also said that it was difficult to see any warning messages when packs had fancy branding. One smoker stated: *"I just look at the fancy pack and truthfully that is what attracts me to the pack, when my friends see that my pack is different from theirs then I receive a lot of attention" (25-35 yrs, male, smoker)*. A non-smoker commented: "*How do you expect people to look at these messages? They are so boring. Look at this pack and its colours, it's sophisticated and attractive, and everyone can see the type of brand that you are smoking. It's cool, actually, I must say*" *(25-35 yrs, female, non-smoker).*

All participants agreed that if pictorial warnings were added to the packs, perhaps people would notice, but it would depend on the type of picture(s) chosen.

5.7.2 Health warning pictures

The participants' voices concerning the health warning pictures are reflected below.

5.7.2.1 Abortion baby

All the participants reported that the warning on the abortion baby caught their attention. One smoker said: *"When I saw this one with the baby in the bottle – neh neh, I just told myself enough, yho enough!" (25-35 yrs, female, smoker).*

5.7.2.2 Impotence

Most participants acknowledged that they were not very clear about what the impotence picture was trying to show: *"This one – I don't know – I thought it was just another way of holding a cigarette, but now I see (laugh); yes, yes, I see but I would put a bed or something with this finger!" (25-35 yrs, male, non-smoker).*

5.7.2.3 Stroke

Participants noted that the stroke pictorial health warning communicated a health message that they did not know. One non-smoking participant said: *"No, I must say I don't smoke, but I know many people who do and I will now tell them they can get a stroke. I did not know, but I will tell them" (36 yrs or above, female, non-smoker).* Yet another smoker said about the stroke picture: *"You know I really did not know that*

smoking could cause stroke, I really did not know. It just means you don't have to be old to get a stroke, you just have to buy yourself this stroke when you buy cigarettes, you really buy this stroke. This picture has really touched me and I need to stop really" (36 yrs or above, female, smoker).

5.7.2.4 Second-hand smoking

The participants, particularly females of childbearing age, also noted that the picture of the baby and second-hand smoke was very effective. A non-smoking participant stated: *"Now this one with the baby really shows the selfishness of smokers. I like it; it will make somebody to say yes I am selfish" (25-35 yrs, female, non-smoker).* Another smoking participant said: *"This picture really broke my heart. I usually smoke when my small children are in the house, and I did not know that this affects them. It says I am an evil father but now I know, so I can now go outside and smoke without my kids. I also am thinking I must stop because my children always follow me, so even if I go outside, I will still smoke with them. Usually, I smoke with my baby on the lap and now I see that my baby is smoking also. I did not know. This is too bad. I am going to stop it. I do not want to kill my kids!" (25-35 yrs, male, smoker)*

5.7.2.5 Death

Many participants said that the picture with the grave made them feel uncomfortable and they would request another packet. A black African smoking participant said: *"Let me tell you, in our culture, you do not walk around with pictures of graves, it is a taboo. No one does that and I really would not buy such cigarettes; they are just crazy, crazy – no, I would not buy them" (36 yrs or above, male, smoker).*

Other cultural groupings noted that the pictorial warning on death could have been more instructive. One Indian/Asian participant said: *"This should say smoking will kill you. That way it says to me, not others. So when I buy my cigarette I know it will kill me, not others" (36 yrs or above, male, smoker).*

5.7.2.6 Poverty

Young participants were particularly concerned with the picture of poverty. A young participant said: *"I noticed this one with the money because I have dreams of making*

it big, so I really did not know smoking will stop me from that" (18-24 yrs, male, smoker).

Some participants felt it conveyed another message. One participant noted: *"This one with the cigarette burning money says yes if you smoke you have too much money and you can now burn it. It says I don't need this money. I have it; so why not burn it" (18-24 yrs, female, smoker).*

5.7.2.7 Addiction

Many participants felt that the addiction pictorial warning was not so effective, but had an important message. One participant said: "*Let me tell you, in this community of ours were everyone knows someone in jail, this picture is powerful. It says you have no self-control. You are stupid enough to handcuff yourself to cigarettes; the cigarettes own you. You see, if you are in jail, you are not in charge of yourself, man; someone else is, so now your cigarette is in charge!" (25-35 yrs, female, smoker).*

5.7.2.8 Oral disease

Many smoking participants, particularly younger smokers, felt that the oral disease health warning was good, with a very informative message. A smoking participant admitted: *"When I see this picture, I see me; I see my teeth because my teeth are yellow. I then think to myself, well, my lip could be like this too. I don't want that!" (18-24 yrs, male, smoker).* Another smoking participant said; *"There really is no reason to have these sorts of things. I mean, if you think about it, who would want to talk or look at someone with sores on their mouth and black teeth? Who?" (36 yrs or above, female, smoker).*

5.7.3 Pictorial health warnings on branded packs

As recommended in Chapter 4 of this study, eight pictorial health warnings were placed on cigarette packs, on branded and another eight on plain packs. This section discusses the eight pictorial health warnings on the branded packs.

Among the initial eight health pictorial warnings, those on abortion and oral disease were perceived as most effective, and the pictorial warning on impotence was

perceived as least effective (see Table 5.16). The participants made suggestions on how to improve on the pictorial health warnings, including having additional health warnings on the risk of lung cancer and cardiovascular disease.

Participants gave their impressions of the pictorial health warnings that were on cigarette packs with a mock brand name. All participants indicated that the pictorial warnings on the cigarette packs were a good step and helped in providing knowledge on the dangers of smoking. Participants, especially younger smokers, also said that the brand of the cigarette influenced their smoking habit. A smoking participant noted: *"I don't want to lie; I only smoke a specific brand and will not be caught dead with some brands; people will laugh at me" (18-24 yrs, male, smoker).*

Participants said they were astonished at the range of pictorial warnings, especially those that had no direct effect on health. In reaction to the pictorial warning on poverty, one participant said: *"You know, I thought that it is only the issues that affect your health, but this smoking thing actually affects your whole life. This picture of the money really says to me that it is not just your health, my dear, but your pocket as well. No one wants to be poor, I tell you, no one" (18-24 yrs, female, smoker).*

Some smoking participants noted that although the pictorial warnings would not necessarily make them stop smoking, they would certainly make them think about it. The following statement was indicative: *"If I walked into a shop to buy these cigarettes with the pictures, I would not buy them with the same spirit that I usually buy them with. I would think, chief, are you sure about what you are going to do? But because I need to satisfy that thing, I would buy, but in my mind I would think eish! But this is not good, I need to stop" (36 yrs or above, male, smoker).*

5.7.4 Pictorial health warnings on plain packs

As indicated, there were eight pictorial health warnings on packs without brand design elements (plain packs). Most participants agreed that the pictorial warnings without the brand design elements (on the plain packs) were more effective than the pictorial warnings on branded packs. A smoking participant said: *"Let me tell you, I would not buy these cigarettes. This brown colour of the box makes me feel like the cigarettes inside are dirty or bad. No, I would not buy" (36 yrs or above, male, smoker).*

Participants evaluated the plain packs, and most were in favour of the cigarettes being in a plain package. One participant said: "*You know, this brown is a very dirty colour but it makes the pictures stand out. They just stand out, really, and you cannot see anything else" (36 yrs or above, female, smoker).*

Participants felt that the standardisation of the brand name would also affect sales: *"Now, how do you pack these in your shop, you really have no idea of what to do, but everything is the same and I must say I really buy my brand only, not any other, and I would not trust my brand if all brands were written this way. I would just ask myself, no, how do I know it's the one?" (36 yrs or above, male, smoker).*

5.7.5 Side of the pack elements

Participants noted that having the side of the pack displaying all the messages was a good idea, as it showed the many issues one dealt with when smoking. A participant said: "*Also, these pictures on the side tell me that all these things, someone can get them when they smoke. You know it is great, because now instead of showing one picture, you can show them all. It's like saying this is what is in the series. It's great!" (25-35 yrs, female, non-smoker).*

5.7.6 Suggestions for improvement

Participants suggested that the pictorial warning on impotence needed to be clear so that the sexual connotation would be better understood. Participants felt that the picture on poverty could also be changed; one participant said: *"I think you should add some shacks or something with the burning money, that will be a shock and say you will be poor" (36 yrs or above, female, non-smoker).*

Participants were overall happy with the effectiveness of the picture with the graves depicting death, but felt that the wording needed to be more direct. Many participants felt there was no need to improve on the abortion, stroke, oral disease, second-hand smoke and addiction pictures.

Participants felt the text on the pictorial health warnings on the cigarette packs needed to be bigger and bolder, and that the quit line number had to be more visible. Some

participants also felt it would be worth removing the brand, as it still affected the picture and affected their decision to buy.

5.8 COMPARISON OF VARIABLES MEASURED BEFORE AND AFTER EXPOSURE TO HEALTH WARNINGS

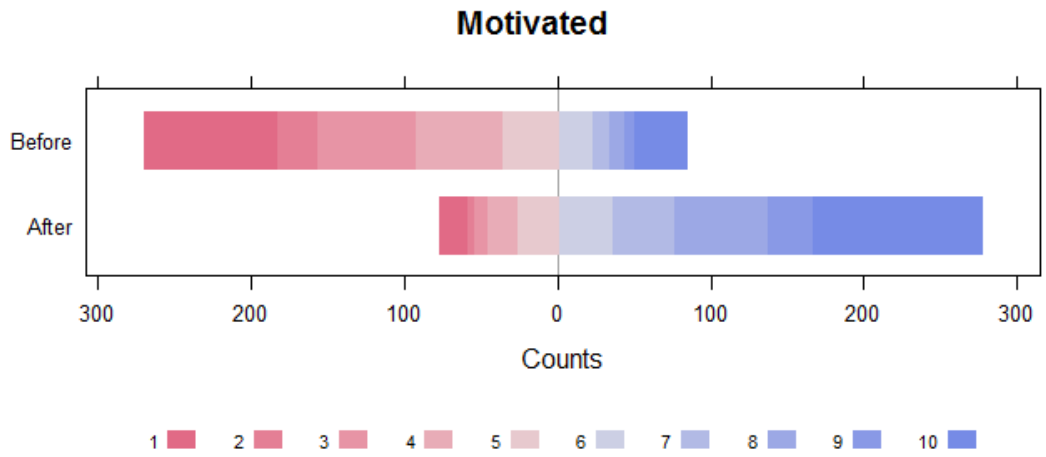
This section and its subsections present detailed results on several variables that were measured before and after exposure to the pictorial health warnings among the participants. Only results where there was a before and after exposure evaluation are included.

5.8.1 Smokers' motivation to quit and confidence regarding quitting smoking before and after exposure to health warnings

This section presents the results on the participants' motivation to stop smoking now on a scale of 1 to 10 (1, meaning not at all motivated, and 10, very motivated). The section also presents the results on how strongly participants believe/how confident they are that they could give up smoking now and remain a non-smoker if they tried, on a scale of 1 to 10 (1, meaning not at all confident, and 10, very confident). The results visually compare the ordinal results obtained before and after exposure to health warnings. The Wilcoxon signed ranks test was used in order to determine if the results obtained in the two depended groups are similar or differ significantly. When the p-value is less than 0.05 we can reject the null hypothesis which mean there is significant evidence to show that the median difference between the two groups is larger than 0.

5.8.1.1 Motivation

After their exposure to pictorial health warnings, the participants' motivation to quit smoking significantly increased, from a mean of 4.04 (Standard Deviation (SD)=2.77) before, to a mean of 7.40 (SD=2.55); $p<0.001$ (see Figure 5.14, overleaf).

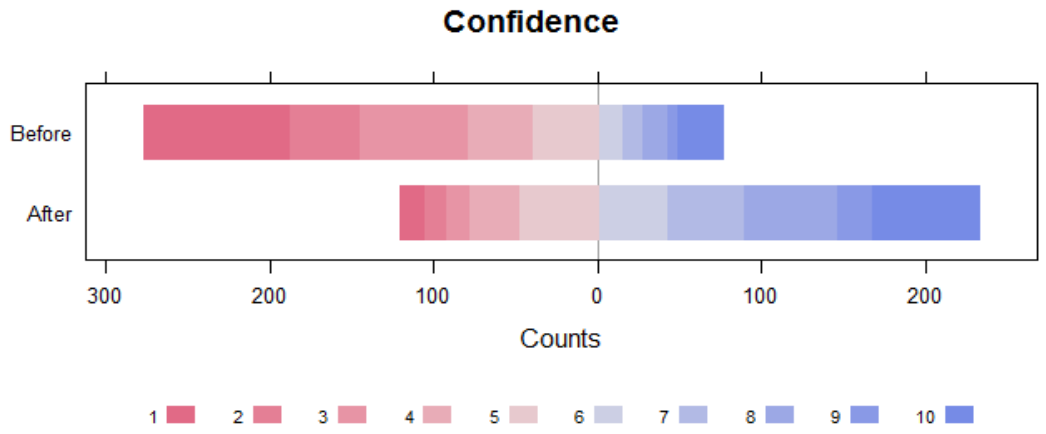


*Range: 1 (Not at all motivated) – 10 (Very motivated)
** p- values derived using Wilcoxon signed ranks test

Figure 5.14: Motivation to quit smoking before and after exposure to health warnings

5.8.1.2 Confidence

After exposure to the pictorial health warnings, the participants' confidence in their ability to quit smoking increased significantly, from a mean of 3.84 (Standard Deviation (SD)=2.72) before the exposure to a mean of 6.59(SD=2.52); p<0.001 (see Figure 5.15).



*Range: 1 (Not at all confident) – 10 (Very confident)

** p- values derived using Wilcoxon signed ranks test

Figure 5.15: Confidence in ability to quit smoking before and after exposure to health warnings

5.8.2 Opinions on smoking, health warnings on cigarette packs and counter displays before and after exposure to health warnings

As discussed in the methodology section (see section 5.2), principal component analysis was performed on responses to 26 questions about the extent to which participants agreed or disagreed with comments on the 26 questions.

The comments on the 26 questions were about smoking, health warning labels on cigarette packs and counter displays in South Africa (see Appendix 6). After principal component analysis and scale reliability tests, four different scales were derived to assess opinions on smoking and warning labels or packaging of tobacco products.

Based on logical interpretation on factors that clustered together, the first scale was a 10-item scale called "**Smoking cognition**" composed from the items: "danger to health", "ruining health", "unpleasant smell", "bad breath", "spend money", "bothers others", "second-hand smoke dangerous", "bad skin", "dependent" and "energy", with a Cronbach alpha score of 0.983. The higher the score, the greater the extent to which the participants thought thinking that smoking poses a risk to their well-being and the health of others.

The second scale was a 9-item scale called "**Smoking emotions**", composed of the items: "calms me when stressed", "calms me when upset", "deal with difficult situations", "concentrate", "like motions", "feels good", "love smoking", "like to hold a cigarette", and "deter from smoking", with a Cronbach alpha score of 0.964. The higher the score, the lower the emotional attachment to or appeal of cigarette smoking.

The third scale was a 4-item scale "**Reactions to text warning**", composed from the items: "think about quitting", "think about chemicals", "believable", and "easy to understand", with a Cronbach alpha score of 0.945. The higher the score, the more negative the reaction.

The fourth scale was a 3-item scale, "**Advertising and pictorial warnings reactions**", composed from the items: "text-only warnings are for educated people", "adding pictures will make smokers quit" and "counter display is a form of advertising", with a

Cronbach alpha score of 0.828. The higher the score, the more positive the reaction. The four different scales: smoking cognition; smoking emotions; reactions to text warnings; and advertising and pictorial warnings reactions, were considered to have excellent reliability because the Cronbach alpha scores were above 0.90.

5.8.2.1 Opinions on smoking, warning labels and advertising among smokers

Compared to before their exposure to the health warnings, smokers' extent of emotional attachment to their cigarettes significantly decreased after exposure, as the significantly higher level of disagreement with the composite emotional items shows (Mean=14.46 vs 19.68; p<0.001).

Smokers also expressed a significantly higher degree of disagreement with statements related to current text-only health warnings as being effective after their exposure to health warnings (Mean=14.66 vs 15.51; p<0.001). Table 5.26 shows the distributions of opinions on smoking, warning labels and advertising.

Table 5.26: Opinions on smoking, warning labels and advertising among smokers

Variable	Category (N)	Period of exposure to health warnings Mean(SD*)	Paired difference		
			Mean(SD*)	p-value§	CI**
Smoking cognition ***[10(min)- (50-max)]***			16.86(15.48)	**<0.001**	15.16-18.56
	After(320)	45.12(7.32)			
	Before(320)	28.26(13.47)			
Smoking emotions ***[(9- min)-45(max – less attachment)]***			5.22(10.69)	**<0.001**	4.03-6.41
	After(312)	19.68(10.21)			
	Before(312)	14.46(7.59)			
Reactions to text warnings ***[(4- min)-20(max – negative reaction)]***			0.85(3.24)	**<0.001**	0.50-1.21
	After(328)	15.51(5.41)			
	Before(328)	14.66(5.60)			

Advertising and pictorial warnings reactions ***[(3- min)-15(max – positive reaction)]***			4.95(5.08)	**<0.001**	4.35-5.55
	After(278)	13.01(2.46)			
	Before (278)	8.06(3.70)			

**SD=Standard deviation*
***CI= Confidence Interval*
§ *All p- values derived using paired samples t-test*

5.8.3 Knowledge of smoking-related health consequences before and after exposure to health warnings

Similar to Chapter 4, and as discussed in the methodology section (see section 5.2), principal component analysis was performed on responses to 13 questions about the knowledge of smoking-related health consequences (see Appendices 6 and 9). After a scale reliability analysis, three different item scales were derived to assess participants' knowledge of smoking-related health consequences before and after their exposure to health warnings. Out of the three different scales, two were considered to have had excellent reliability as the Cronbach alpha score was above 0.90 ($\alpha \geq 0.90$) and one was considered to have poor reliability as Cronbach alpha score was below 0.60 ($0.60 > \alpha \geq 0.50$) . The three different scales were as follows:

The first scale was an 11-item scale called "**Real risk knowledge**" composed from the items "stroke", "impotence", "abortions", "gangrene", "amputations", "TB", "gum disease", "mouth cancer", "finance", "illness in children" and "death", with a Cronbach alpha score of 0.960, which was considered indicative of excellent reliability.

The second scale was a 2-item scale called "**Lung cancer and addiction knowledge**", composed from the items "lung cancer" and "addiction", with a Cronbach alpha score of 0.563. The items for this scale were analysed separately as lung cancer knowledge and addiction knowledge.

The combined 13-item scale, "**Total knowledge**", was composed from the items of the "Real risk knowledge" scale and "lung cancer" and "addiction" knowledge combined. This scale had a Cronbach alpha score of 0.950 and was considered to be

of excellent reliability.

5.8.3.1 Knowledge ("Real risk", "lung cancer", "addiction", and "Total") of smoking-related health consequences before and after exposure to health warnings

Total knowledge significantly increased after exposure to health warnings, compared to before exposure (Mean=46.83 vs 29.41; p<0.001). Participants' knowledge of lung cancer also increased after exposure to health warnings compared to before their exposure to the warnings (Mean=3.71 vs 3.14; p<0.001). Table 5.27 shows the distributions of knowledge on "Real risk", "lung cancer", "addiction" and "Total knowledge" of the smoking-related health consequences of smoking.

Table 5.27: Opinions on "Real risk", "lung cancer", "addiction" and "Total knowledge" of smoking-related health consequences

Variable	Category(N)	Period of exposure to health warnings Mean(SD*)	Paired difference		
			Mean(SD*)	p-value§	CI**
Real risk knowledge [(11-*poor knowledge*)-44 - adequate *knowledge*)]			16.35(12.06)	**<0.001**	15.43-17.26
	After(667)	39.18(6.12)			
	Before(667)	22.84(11.65)			
Lung Cancer knowledge [(1-*poor knowledge*)-4- ***adequate*** *knowledge*)]			0.57(1.11)	**<0.001**	0.49-0.65
	After(725)	3.71(0.72)			
	Before(725)	3.14(1.10)			
Addiction knowledge [(1-*poor knowledge*)-4- ***adequate*** *knowledge*)]			0.50(1.13)	**<0.001**	0.41-0.58
	After(714)	3.88(0.48)			
	Before(714)	3.38(1.06)			

Total knowledge [(13-*poor knowledge*)-52-***adequate knowledge***)]			17.42(13.17)	**<0.001**	16.41-18.43
	After (660)	46.83 (6.81)			
	Before (660)	29.41 (12.56)			

**SD=Standard deviation*
***CI= Confidence Interval*
§ *All p- values derived using paired samples t-test*

5.8.4 Change in planning to quit and desire to quit after exposure to health warnings

Before their exposure to the health warnings, 64.5% (n=238) of smokers were not planning to quit smoking, but after exposure, only 18.4% (n=66) indicated they were not planning to quit. After exposure to health warnings, 25.9% (n=93) reported they were planning to quit smoking within the next month, an increase from 11.1% (n=41) before exposure to the health warnings (see Figure 5.16).

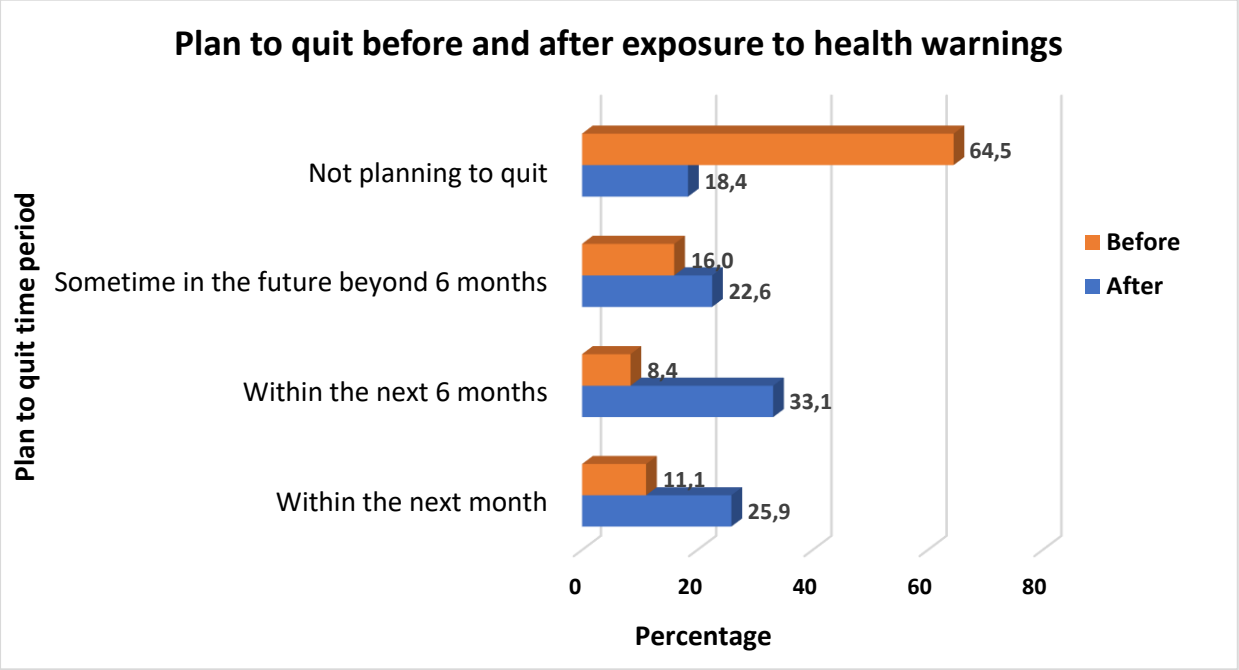


Figure 5.16: Plan to quit before and after exposure to health warnings

The percentage of participants who did not desire to quit before exposure to the health warnings decreased from 68.5% (n=254) to 26.2% (n=93) after their exposure to the

health warnings (see Figure 5.17).

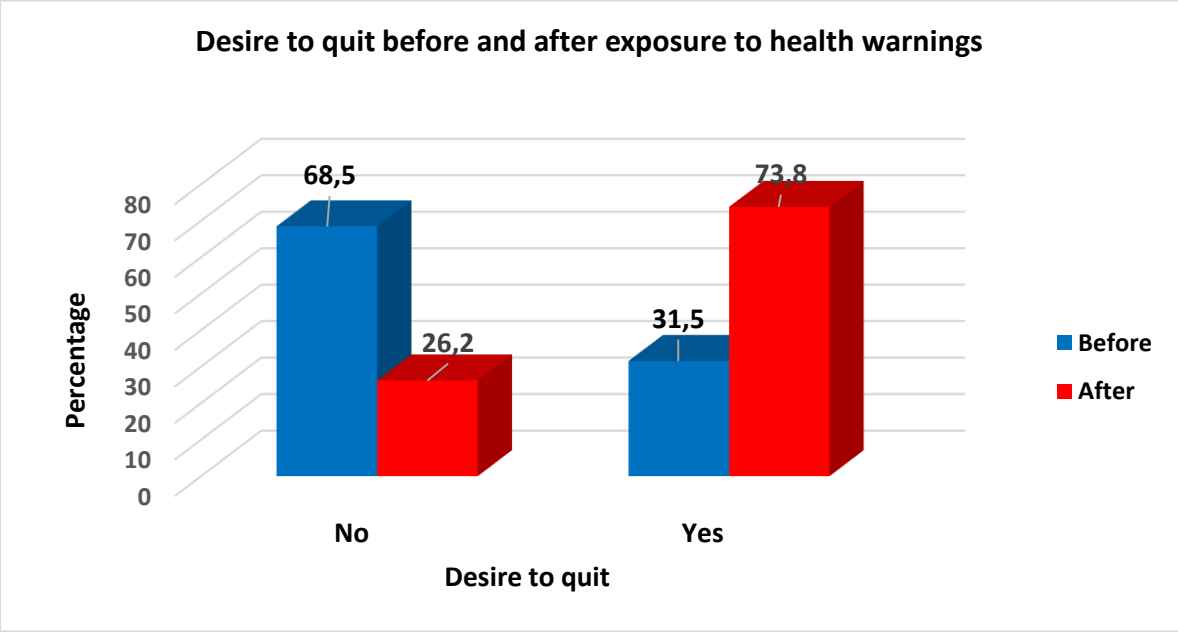


Figure 5.17: Desire to quit before and after exposure to health warnings

5.8.4.1 Change in planning to quit after exposure to health warnings

More than half – 58.9% (n=208) – of participants reported a positive change in planning to quit smoking after their exposure to the health warnings. Educational status was significantly associated with positive changes in planning to quit. A significantly greater proportion of those with more than a high school education level noted a positive change in planning to quit after their exposure to the health warnings, compared to those with high school and those with primary school education (72.1% vs 57.1% vs 30.8%; p<0.001 respectively). See Table 5.28, overleaf, for the changes in planning to quit smoking after exposure to the health warnings by socio-demographic characteristics of participants.

Table 5.28: Changes in plans to quit after exposure to health warnings by socio-demographic characteristics of participants

Variable (N)	Category(n)	Percentage who changed plans to quit after exposure to health warnings %(n)	p-value[§]
Age group (353)			0.099
	18-24(81)	69.1(56)	
	25-35(116)	56.9(66)	
	≥36(156)	55.1(86)	
Gender (353)			0.743
	Male(202)	59.9(121)	
	Female(151)	57.6(87)	
Population group (353)			**<0.001**
	Black(86)	54.7(47)	
	Coloured/Mixed race(98)	56.1(55)	
	Indian/Asian(78)	83.3(65)	
	White(91)	45.1(41)	
Education level (353)			**<0.001**
	Primary School(39)	30.8(12)	
	High School(203)	57.1(116)	
	>High school(111)	72.1(80)	
Employment status (352)			**0.001**
	Unemployed(167)	50.9(85)	
	Employed(114)	72.8(83)	
	Other[student/pensioner/other](71)	56.3(40)	
Spend money on cigarettes rather than food (346)			**<0.001**
	No(90)	55.6(50)	
	Yes(235)	65.1(153)	
	Don't know(21)	14.3(3)	

[§]*All p-values were derived using the Pearson Chi-Square statistic*

A significantly higher proportion of those who smoked between 10 and 19 days a month reported a positive change in planning to quit after their exposure to the health warnings, compared to those who smoke less often (1 to 9 days) or more often for more than 20 days (82.6% vs 62.0% vs 54.1%; p=0.001 respectively).

Those with more restrictive smoking rules at work, in their homes and cars were also more likely to have changed plans to quit after their exposure to the pictorial warnings. See Table 5.29 for the changes in planning to quit after exposure to the health warnings by tobacco smoking behaviour.

Table 5.29: Changes in planning to quit after exposure to health warnings by tobacco smoking behaviour

Variable (N)	Category(n)	Percentage change in plan to quit after exposure to health warnings %(n)	p-value§
Change in desire to quit after exposure to health warnings (340)			**<0.001**
	No change(173)	25.4(44)	
	Change in desire to quit (167)	96.4(161)	
SHS at work(237)			**<0.001**
	Allowed(102)	52.0(53)	
	Partial Ban(97)	77.3(75)	
	Banned(38)	73.7(28)	
SHS at home(333)			0.225
	Allowed(241)	58.5(141)	
	Partial Ban(38)	65.8(25)	
	Banned(54)	70.4(38)	
SHS in car(267)			**0.031**
	Allowed(140)	61.4(86)	
	Partial Ban(22)	50.0(11)	
	Banned(105)	74.3(78)	

Past month cigarette smoking (353)			**0.001**
	1-9 days(50)	62.0(31)	
	10-19 days(46)	82.6(38)	
	>20 days(257)	54.1(139)	
Quit attempt in past year (344)			**<0.001**
	No(246)	67.9(167)	
	Yes(98)	40.8(40)	
Ever received advise to quit smoking cigarettes(346)			**<0.001**
	No(294)	67.3(198)	
	Yes(52)	13.5(7)	
Current snuff use(322)			1.000
	No(303)	60.1(182)	
	Yes(19)	63.2(12)	

§*All p-values were derived using the Pearson Chi-Square statistic*

5.8.4.2 Multi-variable adjusted logistic regression model on factors associated with changes in planning to quit smoking after exposure to health warnings

A model was constructed to assess the factors associated with positive changes in planning to quit smoking after exposure to the health warnings. The variables that were significant at a 10% (α) level in the bivariate analysis were entered into multi-variable adjusted analysis (see Tables 5.28 to 5.29 above).

Only those variables that were significant at a 0.05 level were retained in the final model. In the final model, the following were significantly associated with higher odds of experiencing a positive change in planning to quit after exposure to health warnings: self-identifying as Indian/Asian, being employed, indicating spending money on cigarettes rather than food (see Table 5.30).

The adequacy of the fitted model was assessed. The pseudo R^2 was 0.376 and was considered adequate; the Hosmer-Lemeshow goodness-of-fit test Chi-square was

6.427, and the p-value was 0.600. Therefore, the null hypothesis that there was not enough reason to doubt the adequacy of the estimated model could not be rejected.

Table 5.30: Final logistic regression model of factors associated with change in plan to quit after exposure to health warnings

Variable		**Change in plan to quit after exposure to health warnings *OR*(95%CI)**	***p-value***
Age group			0.022
	18-24	1(referent)	
	25-35	0.39(0.17-0.87)	
	≥36	0.34(0.15-0.74)	
Population group			0.017
	Black	1(referent)	
	Coloured/Mixed race	0.89(0.43-1.87)	
	Indian/Asian	2.70(1.11-6.58)	
	White	0.64(0.30-1.38)	
Employment status			<0.001
	Unemployed	1(referent)	
	Employed	3.94(1.98-7.83)	
	Other (student/ pensioner/other)	1.45(0.69-3.06)	
Spend money on cigarettes rather than food			0.002
	No	1(referent)	
	Yes	2.62(1.41-4.88)	
Ever received advise to quit smoking cigarettes			<0.001
	No	1(referent)	
	Yes	0.04(0.02-0.12)	

Variables entered into model: *population group, education level, employment status, spend money on cigarettes rather than food, change in desire to quit after exposure to health warnings, SHS at work, SHS in car, past month cigarette smoking, quit attempt in past year, ever received advice to quit smoking.*

5.9 STRUCTURAL EQUATION MODEL TO STRUCTURALLY MODEL PATHWAYS TO CHANGES IN PLANNING TO QUIT AFTER EXPOSURE TO CIGARETTE HEALTH WARNINGS

A structural equation model was constructed to understand relationships and pathways between exposure to cigarette health warnings and changes in planning to quit smoking. The *A priori* model that was specified and tested was informed by the integrated-behaviour change model using extent of information processing namely, the frequency of reading text warnings or extent to which pictorial warnings on branded or plain packs were perceived as effective.

Additionally, the model was informed by risk perception, as respectively distant and proximal constructs leading to behavioural action, namely changes in planning to quit. Changes in emotional and cognitive reactions to cigarettes were considered mediating variables. Reactions to health warnings were also hypothesised directly to influence changes in planning to quit (see Figure 5.18 overleaf).

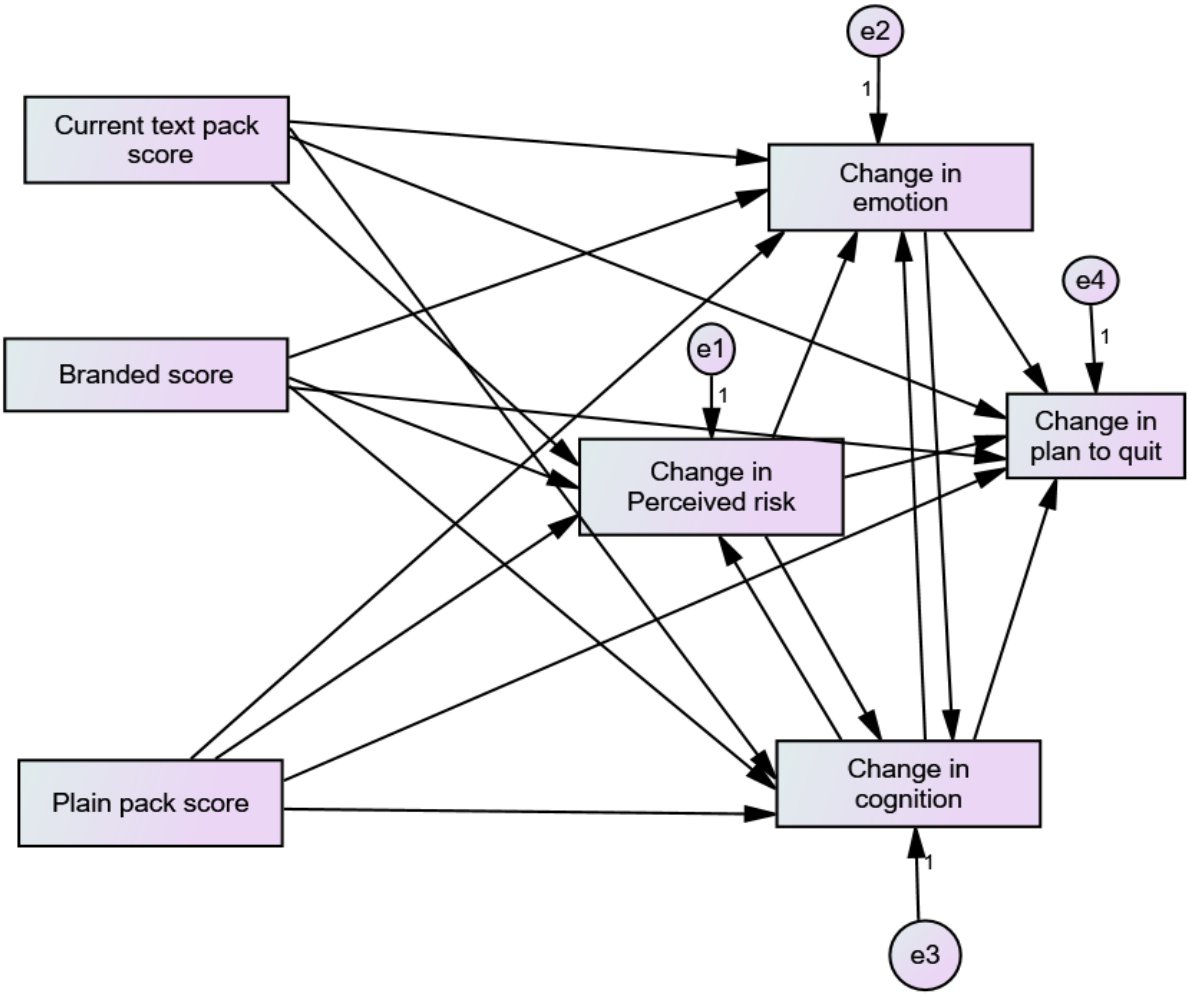
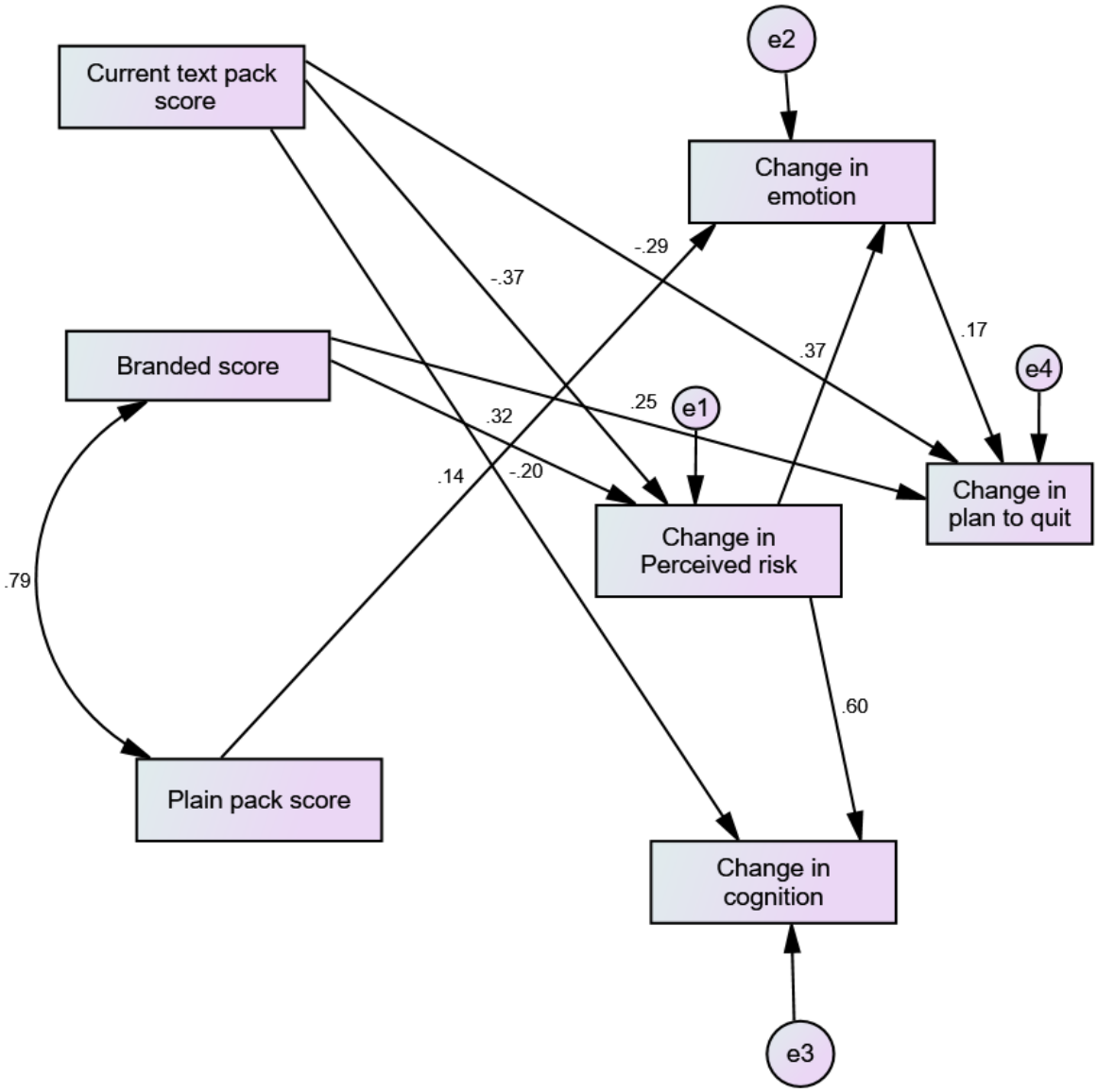


Figure 5.18: *A priori* structural equation model to predict factors associated with changes in planning to quit after exposure to cigarette health warnings

The final model shows that smokers considered current text-only warnings to be less likely to directly influence changes in planning to quit (β= -0.29, p<0.001) and to be less likely to lead to changes in perceived risk (β= -0.37, p<0.001) or changes in cognitive reactions to smoking (β= -0.20, p<0.001). Higher ratings for plain packaging, which was perceived to lower emotional attachment to cigarettes (β= 0.14, p<0.001), led to positive changes in planning to quit (β= 0.17, p<0.001). Branded pack exposure led to changes in the perceived risk (β= 0.32, p<0.001), which in turn influenced a change in the emotional response to cigarettes (β= 0.37, p<0.001), which led to changes in planning to quit (β= 0.17, p<0.001). Greater changes in planning to quit were directly influenced by higher ratings of the branded packaging (β= 0.25, p<0.001). However, neither the ratings of the plain packaging nor changes in cognitive

response to cigarettes nor changes in perceived health risk were directly associated with changes in planning to quit. The final structural equation model that best fitted the current data is depicted in Figure 5.19.



***Change in plan to quit** (after exposure to health warnings)= No change(0), Positive change(1).*
****Change in perceived risk** =Change in Total knowledge: ("Stroke"+ "Impotence"+ "Abortions" + "Gangrene" + "Amputations" + "Tuberculosis" + "Gum disease" + "Mouth cancer" + "Finance" + "Illness in children" + "Death" +"Lung cancer"+ "Addiction")*
*****Change in smoking cognition=** "danger to health"+ "ruining health"+ "unpleasant smell" + "bad breath", "spend money"+ "bothers others"+ "second-hand smoke dangerous"+ "bad skin"+ "dependent" + "energy".*
******Change in emotion=** "calms me when stressed" + "calms me when upset"+ "deal with difficult situations"+ "concentrate"+ "like motions"+ "feels good"+ "love smoking"+ "like to hold a cigarette"+ "deter from smoking".*

Figure 5.19: Final structural equation model depicting only significant pathways to change in plan to quit after exposure to cigarette health warnings

The sample size was 202 participants. The model fit was considered adequate, with the following fit statistics: p-value =0.331; Comparative Fit Index (CFI)=0.997; Normed Fit Index (NFI)=0.975; and the root mean square error of approximation (RMSEA)=0.026. To consider the model fit to be adequate, the following values should be obtained: P-value >0.05, NFI > 0.95, CFI > 0.95, and RMSEA < 0.08.[14,15]

5.10 DISCUSSION

The aim of Part Two of the thesis was to determine reactions among a sample of South Africans (non-smokers and smokers) towards text-only and pictorial cigarette health warning labels on branded and plain packs, and to assess the baseline factors associated with motivation and changes in planning to quit smoking among smokers following exposure to cigarette packages with text-only and pictorial warning labels (branded and plain) among smokers.

This section discusses the results of the final analysis of the 767 South African adults (18 years and older) from Gauteng and the Western Cape who participated in determining the effectiveness of cigarette health warnings described above. The section discusses how each of the health warnings was rated individually, according to the following component categories that make up the Persuasive Communication Theory[16] (attention, communication, identification, and effect). Then the top-ranking health warnings are considered. The section also discusses the results for pictorial warnings on branded and plain packs and presents the findings of prior to and after exposure to these health warnings. Finally, the section closes with the factors associated with smokers' changes in planning to quit after exposure to health warnings.

5.10.1 Reaction among South African smokers and non-smokers to cigarette health warnings (text-only or pictorial on branded or plain packs

This section explores the findings on the effectiveness of health warnings among both smokers and non-smokers, or only smokers, where applicable. The results on the effectiveness categories examined in this thesis are discussed, namely attention, communication, identification, and effect, together with results of the total 16 effectiveness outcomes that make up the effectiveness categories.

The health warning effectiveness outcomes (see section 5.2.9.3) are only briefly touched on in this section but are elaborated on in the relevant subsections below:

- The attention component was measured by one effectiveness outcome for both smokers and non-smokers combined.
- There were four effectiveness outcomes for the communication component: three for both smokers and non-smokers and one for smokers only.
- A total of seven effectiveness outcomes were measured for the identification component: three for both smokers and non-smokers and one for smokers only.
- Four effectiveness outcomes were measured for the effect component: three measured for smokers and non-smokers, and one for smokers only.

When considering all 16 effectiveness outcomes for health warnings measured for this thesis, pictorial warnings, regardless of the cigarette packaging, were by far more effective in all 16 measures, compared to the current text-only warnings. This finding is similar to that of Noar et al.,[17] whose meta-analysis found that pictorial warnings were more effective than text-only warnings in most of the 17 effectiveness outcomes measured.[17] There are a number of reasons for the difference in effectiveness between the current text-only warnings and pictorial health warnings, regardless of packaging. For example, after more than 20 years of seeing the same health warnings in South Africa (the current text warnings), "wear-out"[18-20,21] may have been reached. That may be one reason why participants regarded current text-only warnings as being less effective than the pictorial health warnings.

Cantrell et al.[22] also found a difference in effectiveness between text-only and pictorial warnings.[22] Text-only warnings were regarded as the least effective, compared to pictorial warnings, similar to the findings of this thesis. Therefore, the finding that text-only warnings are less effective than pictorial warnings is not surprising, and it is consistent with the international literature,[17,21-28] which is the raison d'être for the WHO FCTC's recommendation that countries to implement pictorial warnings on their cigarette packaging[29].

Furthermore, pictorial warnings on plain packs were mostly regarded as more effective in all the 16 effectiveness outcomes than those on branded packaging. This finding is

also consistent with a number of studies which have indicated that plain packaging is more effective than branded packs[27,30-33] and underpins the global recommendation to implement plain packaging.[29,34-36] It is important to note that the guidelines on the implementation of Articles 11 and 13[34,35,] of the WHO FCTC indicate that countries that adopt and implement plain packaging may abolish the promotion of tobacco products and advertising on the cigarette pack.[35] Doing so may increase the effectiveness and noticeability of the warning messages and health warnings.[34]

5.10.1.1 Attention

As indicated, the attention component was measured by one effectiveness outcome, which enquired about whether the health warning could "grab" the participants' attention. The results of this study indicate that pictorial health warnings caught the participants' attention better than text-only health warnings did. This study's finding is similar to those of a systematic review by Noar et al.,[17] which found that pictorial warnings not only held attention better but also attracted attention.[17] Lochbuehler et al.[37] also found that, pictorial warnings held and captured the attention, particularly of smokers, better than text-only warnings could.[37] Moreover, a study conducted among rural smokers found that those with low literacy levels, especially among rural smokers, paid longer and greater attention to pictorial warnings than smokers with higher literacy levels.[38] The explanation for the difference in attention between the pictorial warnings and text-only warnings may be that pictorial warnings increase cognitive collaboration,[17] and increased attention results in greater cognitive collaboration.[17,37] The findings on attention are noteworthy, particularly when considering that, as Yong et al.[39] found, smokers are prompted to quit smoking through the main pathway of increased attention to cigarette health warnings.[39]

This study further found that pictorial health warnings on plain packs held the participants' attention best, compared to text-only and pictorial warnings on branded packs. This finding confirms that of other studies that reported that attention was increased for health warnings on plain packaging, particularly among non-smokers, weekly smokers[40] and adolescents.[41] The current evidence indicates that improving the cigarette health warning packaging increases attention to the health warning,[42] additionally, the WHO FCTC global policy[29] calls for improving cigarette packaging by

implementing plain packaging.[33-35] Therefore, this study's finding is significant, because it gives credence not only to the WHO FCTC[29] but also to South Africa's plans to implement plain packaging on cigarette packs.[43]

Considering each of the pictorial warnings, the pictorial warning on abortion on the plain packs held the participants' attention the most, regardless of smoking status, age, population group or gender. The pictorial warning on oral disease on the plain pack came second and was also considered to hold the participants' attention. These pictorial warnings elicited negative emotions about smoking and were remarked on by participants as unpleasant or bad : *"…the baby in the bottle and also the teeth, it is bad, it makes a person not want to smoke" (18-24 yrs, male, smoker).* Evidence has demonstrated that eliciting negative emotions promotes attention,[44] and increases quit intentions[44,45] among smokers.

5.10.1.2 Communication

The communication component had four effectiveness outcomes: three for both smokers and non-smokers and one for smokers only. The three effectiveness outcomes for both smokers and non-smokers for the communication component were whether the health warning was easy to understand, taught them something new, and was believable. The one effectiveness outcome for smokers for the communication component was whether the health warnings made smokers stop and think.

As with the attention finding, pictorial warnings were regarded as by far the most effective, compared to text-only health warnings in all four effectiveness outcomes of the communication component. This finding is similar to that in other studies, which have shown that not only were pictorial warnings easy to understand, but they were believable and taught something new.[17,28,46-49,] Noar et al.[50] found that strengthening the cigarette package, especially by adding pictorial warnings, increased knowledge of smoking-related harms.[50] This finding by Noar et al.[50] explains why, in this study, participants indicated that the pictorial health warnings particularly on plain packs (which is the most "strengthened" tobacco pack) taught them something new.

This study's findings on the believability of the pictorial health warnings is significant,

especially when considering that evidence has shown that believability is maintained over time,[47-49] with no "wear-out"' found for the believability effectiveness outcome.[46]

This study also found that smokers found that the pictorial warnings made them stop and think, particularly the pictorial warnings on plain packs, and especially the abortion pictorial warning on a plain pack. This finding suggests that the pictorial health warnings may have evoked smokers' concern and thoughts about smoking-related risks. That is why the pictorial warnings made them stop and think. Participants commented as follows: *"You know, I think all of them are telling us what can happen, but the ones that are really saying stop smoking, is the one with the brown teeth, like you can get sick like that, or the ones with the stroke and graves" (18-24 yrs, male, smoker).* Yong et al.[39] also found that pictorial warnings increased the level of concern around smoking-related health risks by inducing smokers' thinking about smoking risks, and that ultimately there was an effect on quit attemps.[39]

Again, the pictorial warning on abortion on the plain pack was rated as the most effective, considering all four effectiveness outcomes for the communication component, compared to all the other health warnings. The warning stimulated smokers' emotions and intention to quit: *"The baby in the bottle makes me feel strange. It is so sad, just because of smoking. I must quit, no... no" (25-35 yrs, female, smoker).* The pictorial warning on oral disease on the plain pack came second. These pictorial warnings aroused fear and negative affect, including in younger smokers.[17,51,52] This finding is similar to the attention effectiveness outcome discussed previously.

5.10.1.3 Identification

The identification component had seven effectiveness outcomes: two for both smokers and non-smokers, and five for smokers only. The two effectiveness outcomes for both smokers and non-smokers were whether the health warning was frightening, and whether the warning made them think about the health risks of smoking. The five identification effectiveness outcomes for smokers only were whether the health warnings were relevant to them, made smokers feel concerned about smoking, would make smokers think about quitting, would make smokers feel smoking is extremely dangerous to their health, and makes smokers feel that they spend too much money

on cigarettes.

Again, similar to the thesis's earlier findings, participants rated the pictorial warnings, regardless of packaging, as more effective in all seven effectiveness outcomes, compared to text-only warnings. Pictorial warnings on plain packaging were again rated as the most effective for all seven effectiveness outcomes for this component, compared to pictorial warnings on branded packs.

Both smokers and non-smokers indicated that the pictorial warning on abortion on plain packaging was the most frightening, and most made them think about the health risks of smoking. The expanded parallel process model posits that fear is the most important motivator for change in behaviour.[53] Exposure to pictorial warnings that arouse fear has been linked with avoidance, which in turn has been linked to quitting.[54] This thesis's findings confirm this. For instance, participants said: *"For me the brown one with the baby, it scares me because I still want to have a baby and also I don't want to look at it, sorry, please put a paper" (25-35 yrs, female, smoker).* Non-smokers also had similar sentiments and said*: "I feel like the one with the baby – this tiny baby in the bottle – we can all identify with, both men and women, young and all. That really gets to a person, hey; it makes you scared" (25-35 yrs, female, smoker).*

By contrast, Boshoff and Toerien[55] found that pictorial warnings with great fear appeal could remove attention or distract from the information given by a text message that is factual.[55] This thesis found differently to Boshoff and Toerien,[55] and in fact found that the text message on the abortion pictorial warning on a plain pack was still ranked the highest out of all the health warnings. Participants felt that the text on the pictorial warnings was now strengthened, commenting: *"The best thing about the boxes with these pictures is that now you can see what the written words tell you, you can't ignore it, especially the brown box with the dead baby"(25-35, female, smoker).* The finding of this thesis of congruency of greater effectiveness of both the pictorial warning and the text on the pictorial warning that had the highest fear appeal, particularly on the plain pack is significant. Thus the finding supports the evidence that plain packaging increases salience, which has an effect on the text and the pictorial warning on the packaging.[32]

This thesis interestingly found that the most relevant pictorial warning, to both female and male smokers was the one on abortion on the plain pack. Male participants' sentiments included the following: *"Me… my girl is pregnant and we both smoke, so this one with the burnt baby in the bottle, this brown one, eish, ya…it is bad*" (*18-24 yrs, male, smoker)*. Yet another male smoker said: *"Noooo, what about the baby in the bottle, that really make same think hard…we all want [to] have children to carry on our name. If you or your wife smoke, you could kill your kids before they are born" (18-24 yrs, male, smoker).*

The health warning on impotence was the lowest ranked pictorial warning on relevance before revision, but, although impotence is a male condition, it was interesting to note that women felt that the warning was also relevant to them. One female participant said: *"It's what I was saying, that my husband became like this (points to impotence picture), so I identify with this one" (36 yrs or above, female, smoker).* Yet another woman said: *"No, honestly for me… guys, this one with the sleeping manhood, for my person to be like this and no tlof tlof [slang for sex], no, I can't… sorry, better we stop smoking" (25-35 yrs, female, smoker).* These findings are important and imply that when cigarette packages are strengthened and are deemed effective, they may be relevant not only to the obvious target group (in the case of the impotence warning, men) but also to other target groups who may not be the obvious intended target group. The explanation for this finding could be that regardless of the intended audience, pictorial warnings, especially those which arouse fear, will affect all.[45,51]

The pictorial warning on abortion on the plain pack was ranked as most effective for six out of the seven identification effectiveness outcomes. This warning furthermore made smokers feel more concerned about smoking and made them feel smoking is dangerous to their health, and would make them think about quitting. This finding is consistent with the evidence that indicated that pictorial health warnings reduce consumption of cigarettes,[50,56] educate smokers about smoking-related health risks,[57] increase knowledge of health risks,[50,58] increase risk perception,[58,59] increase quit intentions[45,58] and increase quit attempts.[50]

The pictorial warning on poverty on the plain packaging was regarded by smokers as

most effective in making them feel that they spend too much money on cigarettes. This finding is noteworthy because with all the other previous effectiveness outcomes, the high fear appeal pictorial warning on a plain pack on abortion was regarded as the most effective. The explanation for this finding could be that the poverty pictorial warning made participants realise their susceptibility to poverty because of their spending money on cigarettes. This explanation would be consistent with the paradigm of negative priming in advertising theories of selective attention.[60] The theories suggest that health warnings may cause individuals to correlate negative effects (in this case, susceptibility to poverty) to a brand or product (in this case the pictorial warning on poverty).[60] Furthermore, this thesis' finding is consistent with a recent Australian study which indicated that a pictorial warning portraying financial susceptibility (poverty) was effective in indicating financial vulnerability and was commonly relatable to a broader population.[61]

5.10.1.4 Effect

The effect component had four effectiveness outcomes – three measured for smokers and non-smokers, and one for smokers only. The effectiveness outcomes for both smokers and non-smokers were whether the health warning was effective in making people think about the health risks of smoking, and helping youth not to start smoking, and the overall effectiveness of the health warning. For smokers only, the effectiveness outcome was whether the health warning motivated smokers to quit smoking or think about quitting. As previously, all the outcomes were measured for the current text-only warnings and pictorial warnings on branded and plain packs.

Similar to the thesis's earlier findings, participants indicated that pictorial warnings, regardless of packaging, were more effective in all four effect outcomes than text-only warnings. Pictorial warnings on plain packaging were again regarded as the most effective in all four effectiveness outcomes for the effect component, compared to pictorial warnings on branded packs.

The pictorial warning on abortion on the plain pack was again regarded as the most effective by smokers and non-smokers in making people think about the health risks of smoking, helping to prevent youths from starting smoking, and overall effectiveness

of the health warning. Since the pictorial health warnings show smoking-related health risks,[57] it goes without saying that the pictorial warning on abortion on a plain pack would make people think about smoking-related health risks. Evidence has also indicated that pictorial warnings, especially on plain packs,[52,62,63] are effective among the youth.[62-64] Furthermore, pictorial warnings appear to lower cigarette cravings among the youth, [65] decreases smokers' intention and may thus reduce smoking among youth.[64]

Pictorial warnings on plain packaging were also said to be the most effective in motivating smokers to quit. Prior studies have shown that increased quit intentions[45,58] and increased quit attempts[50] among smokers were associated with pictorial warnings. The pictorial warning on abortion on the plain pack was rated as the most effective health warning in 15 out of the total 16 effectiveness outcomes for health warnings measured for this thesis. Therefore, it is not surprising that the abortion pictorial health warning on the plain pack was ranked overall as the most effective health warning, considering all other health warnings measured in this thesis.

5.10.2 Top-ranking health warnings

This section discusses the top-ranking health warnings before the revision of the health warnings. The discussion focuses on the top health warnings by socio-demographics and by the pattern of smoking cigarettes.

The text-only warnings ranked lowest in four of the 20 health warnings evaluated in the study. Pictorial health warnings, regardless of packaging, ranked higher than text-only warnings. This finding is consistent with the current evidence that indicates that pictorial warnings, especially those that cover 50%[66] or more[67] of the cigarette pack, are effective.[21,67-69] Pictorial warnings on the plain packs were ranked higher than pictorial warnings on branded packaging. This finding is not surprising and is, in fact, the reason why strengthening cigarette packaging[42,50] by introducing plain packs is a key global recommendation[34-36] for tobacco control policy.

Among the sets of pictorial warnings, regardless of packaging, the top three ranked pictorial warnings were abortion, oral disease, and stroke. For each set, the pictorial

warning on plain packaging was ranked best, for example, the stroke pictorial warning on plain packaging ranked higher than that on the branded pack. Again, the finding is not surprising that when considering the pictorial warnings, those on plain pack fared better. Our finding is consistent with global evidence that pictorial warnings are even more effective on plain packs.[32,33,71,72]

This thesis found that there were significant socio-demographic differences in the determination of the pictorial warnings that were considered to be effective, especially the socio-demographic differences, for instance: age, population group, level of education, and employment status.

Although the abortion pictorial warning was considered to be the most effective by all age groups, it was most effective for those who indicated being in the age group of 25 to 35 years. This finding is not surprising as this would be considered to be the primary reproductive age group, which is therefore most likely to be affected by reproductive complications.[73]

Those in the age group from 25 to 35 years were the ones who considered the oral disease pictorial health warning as effective more than participants in other age groups. The Elaboration Likelihood Model of Persuasion,[74] could in part explain the finding, because this model posits that, if a message is important to a participant, the central route of persuasion is used.[74] Therefore, the oral disease pictorial was rated as effective as it may have more immediate salience or relevance because participants can see their mouths every day in the mirror, unlike with other diseases that require a doctor's diagnosis. One participant said the following about the oral diseases pictorial health warning: *"When I see this picture, I see me, I see my teeth because my teeth are yellow. I then think to myself, well, my lip could be like this too. I don't want that!" (18-24 yrs, male, smoker).*

The stroke pictorial warning was considered by younger participants (18-24 years) as more effective than the other age groups did. This finding is surprising, as one would expect the older participants to consider this pictorial warning as most effective because strokes would be more prevalent in the older age group. Perhaps the younger

age group did not understand the stroke pictorial warning, or the younger age group considered for this thesis have had exposure to either family members or community members with strokes. Nonetheless, this finding would need to be investigated further.

The top three pictorial health warnings were most effective among those who indicated being Indian/Asian, compared to the other population groups. This finding is consistent with the earlier findings reported from the SASAS 2010 in Chapter 4 and the later findings noted in Chapter 7, namely that the Indian/Asian population group have more knowledge on smoking-related risks. Therefore, it is not surprising that the top three pictorial warnings are most effective for this population group. Furthermore, the Indian/Asian population group has a disproportionately higher prevalence of non-communicable diseases such as diabetes and hypertension among others, whose complications can be a stroke.[73,75] Hence, the stroke pictorial warning would be most effective for this population group.

The top three pictorial warnings were also mostly significant for those whose level of education was more than high school. This finding may be explained by the likelihood that those with the highest level of education benefited most from the text explanation on the pictorial warning in instances where the pictorial warning was not understood. This postulation would be similar to the suggestion made by Noar et al.[50] that those with higher education benefit from text on a pictorial warning.[50]

The pictorial warnings on abortion and oral disease were also significantly positively associated with being employed, compared to not being employed. This finding would be consistent with the education level finding, as those who have education are more likely to be employed. Those who are employed would also be of a younger age group and therefore be at reproductive age, and that is why the pictorial warning on abortion would be considered effective. The oral disease pictorial warning finding suggests that those who are employed and presumably better educated, may consider oral health of higher priority. Alternatively, may observe a higher prevalence of oral diseases such as the one depicted in the oral disease pictorial warning, compared to those who are unemployed. Other studies have shown that those in the lower socio-economic group who are less educated and who mostly live in the rural areas have a higher prevalence

of advanced oral disease.[50,76]

The effectiveness of pictorial health warnings also differed by the pattern of cigarette smoking, namely smoking status, changes in planning and desire to quit after exposure to health warnings, second-hand smoke exposure at work, in the home and car, quit attempts, and advice to quit smoking cigarettes.

The top three pictorial warnings were more effective for the non-smokers than for current smokers. This finding corroborates the findings from studies that have indicated that although smokers generally find pictorial warnings effective, they tend to minimise this effect by denying or distancing themselves from the smoking-related health consequence so that they can protect themselves from cognitive dissonance.[61,68,69] Hall et al.[77] found that pictorial warnings generate social communication about smoking-related health effects, the health warning, and about quitting.[77] Pictorial health warnings could perhaps then act as a community intervention beyond an individual because of social interactions. Smokers would benefit from social interactions with non-smokers; therefore, social interaction could potentially be a mediator of the effect that pictorial warnings have on the behaviour of smokers. More studies are needed to investigate this postulation.

Notably, the top three pictorial health warnings were most effective for those who had a positive change in the desire and their planning to quit after exposure to the pictorial health warnings. The finding on the effectiveness of the pictorial health warnings is an important finding for this thesis, as this finding shows that pictorial health warnings are perceived to be effective for South African smokers. The finding is also consistent with results around the world that exposure to pictorial health warnings reduces demand for cigarettes,[56] increases the desire to quit and planning to quit.[78,79] In time, the smoking prevalence may be reduced by implementing pictorial health warnings on cigarette packs, as has been evidenced from countries that have implemented pictorial health warnings,[80-82] especially on plain packs.[83]

The top three pictorial health warnings were also most effective for those who indicated that there was a partial ban on smoking at work, compared to others. The

finding is particularly important when one considers the evidence on social interactions[76] discussed earlier in this section. Therefore those who have a partial ban on smoking at work could potentially be influential advocates for a total ban of smoking at work, especially after being empowered with knowledge on smoking-related health risks from exposure to pictorial health warnings. The pictorial warning on oral disease was most effective for those who had a partial ban on smoking at home, compared to others, whereas the stroke pictorial warning was most effective for those who had a total smoking ban at home. The reason could be that those who have a partial ban on smoking at home have imposed or accepted this because they may have partial knowledge of the smoking-related health risks. Those who had a total ban at home may either have better knowledge of smoking-related health risks compared to others, or may have been more exposed to the complications caused by smoking such as a stroke, and hence the total ban on smoking in their homes.

The pictorial warning on abortion was most effective for those who had a partial ban in their cars, compared to others. The pictorial warning on oral disease and stroke was effective for those who had a total ban on smoking in their cars, compared to others. These findings have to be investigated further, as second-hand smoke exposure in cars is a critical policy intervention in South Africa's tobacco control policy.[84]

The top three pictorial warnings were most effective for smokers who had never received advice to quit smoking, compared to those who had received such advice. The reason for this finding can be that perhaps exposure to the pictorial health warnings may have given those who had never received advice before some realisation of the full spectrum of smoking-related health risks, whereas those who have already received advice would already have some knowledge of the smoking-related health risks. This finding is interesting especially when one considers that the oral disease and the stroke pictorial warnings were most effective for smokers who had not had a quit attempt in the past year. Taken together, these findings again strengthen the global call to implement pictorial health warnings on cigarette packs, because pictorial warnings will have an effect on increasing knowledge and even quit intentions and attempts among smokers after exposure to such warnings.[45,50,58]

5.10.3 Comparison of pictorial warnings' packaging, branded or plain

This section discusses the effectiveness, in several different ways, of branded versus plain packaging, irrespective of the pictorial warning on the tobacco pack . The effectiveness of branded and plain packs varies by socio-demographics and by tobacco use behaviour. Finally, the section briefly discusses the pictorial health warnings on the side of the cigarette pack (side pack elements).

Considering the four effectiveness outcomes discussed in Section 5.2.9.3, namely thoughts about health risks, preventing youth from starting smoking, motivating smokers to quit, and overall effectiveness, the plain packaging was considered more effective in all four effectiveness outcomes than branded packs. This finding is consistent with the earlier findings reported in this section on the effectiveness of the individual health warnings and with evidence in other studies that plain packaging is more effective than branded packaging.[31,40,52] Hence, the global recommendation to strengthen cigarette packs by implementing plain packaging.[36,50]

5.10.3.1 Branded packaging

This thesis found that there were significant socio-demographic and tobacco use behaviour differences in the effectiveness of branded packaging.
In terms of **age**, the branded packaging was rated as effective by younger participants (18-24 years) in all four effectiveness outcomes, compared to the other age groups. This finding is consistent with O'Hegarty et al.'s[85] study on young adults in the age group of 18-24 years, which found that the branded packaging with text and a pictorial warning was more effective than a text-only pack.[85] Also, branded packaging was rated as more effective in motivating smokers to quit, preventing youth from starting to smoke, motivating ex-smokers to maintain abstinence from smoking, and thinking about the health effects of smoking.[85]

The result on the effectiveness of branded packs by younger participants may also be explained by Messaris's[86] findings that people are more likely to pay attention to messages with pictorials, unlike those without, like text-only messages.[86] The Elaboration Likelihood Model of Persuasion[74] explains the route of persuasion for the branded pack:[74] if the message is important to a participant, the central route of

persuasion is used, but if the participant is not interested, the peripheral route is used.[74] The peripheral route is applicable in understanding the effectiveness of branded packs,[74] since the use of a text message together with a pictorial warning on branded packs may draw attention to branded packs, and may even lead to a change in smoking behaviour.[74]

Gender appears to play a role in effectiveness ratings. Male participants were more inclined than female participants to rate branded packs as more effective overall, in motivating smokers to quit, and preventing youth from smoking. This gender difference needs to be investigated further, but may simply be due to smoking prevalence being highest among men.[73] Thus men are more likely to be exposed to the current text-only cigarette packs than women, and may find a strengthened tobacco pack such as the branded pack more effective than the text-only pack. Noar et al.[50] found that strengthened tobacco packs like the branded packs were not only effective, but did influence smoking behaviour.[50]

In terms of **population groups**, the branded packs were regarded as effective for all four effectiveness outcomes by those who self-identified as Indian/Asian. The finding is again consistent with earlier findings where the top three pictorial warnings were mostly effective for the Indian/Asian population group. It is also consistent with the earlier findings from the SASAS 2010 in Chapter 4 and the SASAS 2016/17 in Chapter 7, which showed that the Indian/Asian population group had more knowledge on smoking-related harms.

Those whose **level of education** was more than high school (compared to others) indicated that the branded packs were effective across all four effectiveness outcomes. Again, the result on level of education is consistent with earlier findings on the effectiveness of the top three health warnings. An explanation for the finding could be that those with more than a high school education would benefit even more from an “additive benefit” such as a strengthened cigarette pack[50] than those with less education, because of the increased number of effectiveness elements such as the addition of a pictorial warning. Therefore, those with more than a high school education would find the branded pack effective, compared to those with less education.

When it comes to **smoking status** as a factor, compared to non-smokers, current smokers rated the branded pack as effective in making people think about the health risks of smoking. This finding could be explained by considering that the addition of pictorials on the cigarette packs increases smokers' knowledge of smoking-related health risks and therefore more thoughts about health risks from smoking occur.[42,50] Other studies have also reported that branded packs increase knowledge on smoking-related harms among smokers.[42,50,81]

Those who had attempted to quit before in the past year rated the effectiveness of the branded packs lower (in all three of the effectiveness outcomes, except making people think about the health risks of smoking) than smokers who had not attempted to quit. However, these same people were then more likely to have improved their motivation to quit after exposure to these warnings. In fact, participants who had a positive change in planning and desire to quit after exposure to health warnings rated the branded pack as effective across all four effectiveness outcomes. Taken together, the findings indicate that branded pack health warnings are effective in motivating behaviour change among these smokers, even among those who may not have been motivated to quit previously (who made no past quit attempt). Furthermore, the results are consistent with findings globally on the reduction of cigarette demand after exposure to pictorial health warnings.[56] Additionally, the findings are indicative of the effectiveness of implementing pictorial health warnings in increasing planning and desire to quit smoking.[78,79]

Branded packs were effective for those who had a total **ban on smoking at work**. The finding is particularly important considering that Farrelly et al.[87] found that a total ban on smoking in the workplace had the greatest impact on those who smoked most.[87] Total bans in the workplace saw smoking across most sectors and in all population groups decline: it decreased average daily smoking among current smokers by 14%, and reduced the prevalence of smoking in the workplace by 6%.[87] Collectively, these findings are especially important because they give strong justification and support for South Africa's plans to implement 100% smoke-free areas including in the workplace.[43]

The branded pack was effective for those who had a **partial ban on smoking at home** for two of the effectiveness elements, namely prevent youth from smoking, and overall effectiveness. Those who had a **total ban on smoking at home** rated the branded pack as effective for the other two effectiveness elements, namely making people think about the health risks of smoking, and motivating smokers to quit. The reason could be similar to what was postulated earlier, that those who have a partial ban on smoking at home may have incomplete knowledge of the consequences of smoking, but support the prevention of youth from smoking. Nonetheless, those who had a total ban at home, as explained earlier, may have better knowledge of smoking-related health risks compared to others and may therefore subsequently also know the benefits of quitting.

Those who had a **partial ban on smoking in their cars** regarded the branded pack as effective in making people think about the health risks of smoking. However, participants who had a **total ban in their cars** rated the branded pack as most effective in motivating smokers to quit, preventing youth from smoking, and overall effectiveness. The explanation for the finding may be that participants who had a partial ban on smoking in their cars may be aware of the legislation on second-hand smoke exposure in the car.[84] Therefore, even though they may not fully implement the law, they are cognisant of the harms of smoking. Still, those who have a total ban in their cars may have better knowledge of smoking harms compared to others, and is perhaps the reason for rating branded packs as effective in three out of the four effectiveness outcomes.

Branded packs were less effective for those who had received **advice to quit** smoking cigarettes compared to those who had not been so advised in three of the effectiveness outcomes, except making people think about the health risks of smoking. Therefore, branded packs were more effective for those who had not been advised by a health professional to quit smoking. This finding perhaps means that those who were advised to do so were already convinced on their plans to quit, so the branded packs were not effective.

In sum, these findings on branded packs support the proposed legislation to implement

pictorial health warnings on cigarette packs in South Africa.[43]

5.10.3.2 Plain packaging

This thesis found that there were significant socio-demographic and tobacco use behaviour differences in the effectiveness of plain packaging.

Age again played a role. Similar to the branded packaging, plain packs were rated effective by younger participants (18-24 years) in all the four effectiveness outcomes compared to the other age groups. The means were higher for plain packs than for branded packs. The finding is consistent with Mays et al.'s[88] study, which found that although branded packaging was effective, plain packaging was more effective, and the motivation to quit created by the plain packs on the youth was higher.[88] This finding is important because the WHO FCTC as a tobacco control policy[29] recognises the importance of preventing young people from starting to smoke or at least ensure that quitting occurs before smoking-related harm occurs.[29]

In terms of **gender**, female participants rated branded packs as being overall less effective than plain packs. This finding is important as it means that on the whole, plain packs would be effective for most people, as compared to the branded packs, which came out lower in the overall effectiveness outcome. Male participants rated the plain packs as effective in motivating smokers to quit, and preventing youth from smoking. This finding needs to be investigated further.

Of all the **population groups**, those who self-identified as Indian/Asian, just like with the branded packs rated the plain packs as effective on all four effectiveness outcomes. Again, this finding is not surprising and is consistent with earlier findings on the branded pack which was also rated as effective by the Indian/Asian population compared to others. Also, the finding as indicated earlier is consistent with findings in Chapter 4 and later findings in Chapter 7.

Those whose **level of education** was more than high school compared to others rated the plain packs as effective across all four effectiveness outcomes. Again, this finding is not surprising and is consistent with the earlier finding on branded packs. Again, the

explanation as advanced for the branded pack still holds for the plain packs that, participants with a level of education that is beyond high school benefit more than others from a strengthened cigarette pack such as a plain pack.[32,33,50]

Current smokers compared to non-smokers rated the plain pack as effective in making people think about the health risks of smoking. This finding is similar to the branded pack, but with the strengthened plain pack, visual attention to the warning is increased,[32] which may mean that knowledge on smoking-related harms is increased. Additionally, plain packs reduce the pack appeal, and smoking is also reduced,[33] perhaps because of the perceived harm from smoking.

Similar to the branded pack, those who had attempted to quit before in the past year compared to those who had not attempted to quit, rated the effectiveness of the plain pack lower (in all three of the effectiveness outcomes, except making people think about the health risks of smoking). Yet, these same participants were again more likely to have improved their motivation to quit after exposure to these warnings. Again, participants who had a positive change in planning and desire to quit after exposure to health warnings rated the plain pack as effective across all four effectiveness outcomes. This finding is similar to the one obtained before with branded packs – together these findings indicate that plain pack health warnings are effective in motivating behaviour change among smokers, including among smokers not previously motivated, such as those who had made no past quit attempts. Additionally, the findings support the implementation of plain packs.

Plain packs were effective across all four effectiveness outcomes for those who had a total ban on smoking at work, home, and car compared to others. In this regard, McNeil et al.[83] found that plain packs may reduce smoking prevalence. In addition, Stead et al.[33] found that plain packs reduced smoking in general, making the finding reported in this thesis significant. For instance, the reduction in smoking and prevalence of smoking would ultimately mean a reduction in exposure to second-hand smoke. Further, the finding suggests that the plain pack warning labels may enhance the effect of other legislation such as banning public smoking, including legislation restricting smoking in the workplace and in cars with children. Besides, Hughes et al.[89]found that

plain packs were effective for difficult populations and also effective for low to middle-income countries (LMIC) like South Africa.[89] Together, the findings demonstrate that plain packs are effective, in line with the findings of other studies[33,89-91] and support the implementation of plain packaging[36] as part of a comprehensive approach to control tobacco use.[36]

Plain packs were rated less effective on the overall effectiveness outcome and not the other effectiveness outcomes by those who had received **advice to quit smoking** cigarettes compared to those who had not been advised to do so. Again, this finding is similar to that of the branded packs and the same reasoning would apply, namely that perhaps those who were advised to quit were already further along in their plans to quit, and were therefore less likely to increase their motivation any further (ceiling effect), compared to those who had never been advised on this before.

Unlike with branded packs that were not significantly different, plain packs were rated as significantly more effective in prompting quitting smoking among snuff users who also smoke. Therefore, plain packs could potentially promote harm reduction, as quitting smoking could then leave dual users with a less risky product, such as snuff.

In sum, the findings on the comparison of branded and plain packs support the global recommendations to strengthen tobacco product packs by implementing pictorial warnings,[45] and plain packaging.[36] Additionally, they corroborate the current evidence on the effectiveness of plain packs as part of a comprehensive approach to tobacco control.

Effectiveness ratings differed for both branded and plain packs by age. Both packs are effective for the youngest people, who should preferably not initiate smoking or should at least quit before harm is done to their health due to smoking. Education also mattered, as both the plain and branded packs with warning are effective for those with more education. The education finding supports the WHO FCTC's[29] recommendations for a comprehensive approach to tobacco control. For instance, although the branded and plain packs were mostly effective for those who were more educated, the less educated could benefit from other tobacco control measures such

as the taxation of cigarettes.[45] The effectiveness of the branded and plain packs also differed by population group (they were most effective for Indians/Asians, who have a disproportionate incidence of cardiovascular disease compared to other population groups). The findings collectively strengthen and support the recommendations proposed by South Africa to implement plain packaging as part of a strategy to strengthen legislation on tobacco control in South Africa.[43]

5.10.3.3 Pictorial health warning collage on the side of the pack

Participants indicated that the addition of a collage of the eight featured pictorial health warnings on the side of the pack assisted them in learning about more of the smoking-related health consequences. One participant stated: *"All these pictures on the side of the box mean that I now know about more diseases because do you see here in the front there is only one picture of the mouth but... jis like ...turn on the side and you see that there is more, much more diseases" (25-35 yrs, female, smoker).* Yet another said: *"You know these pictures on the side tell me that all these things someone can get them when they smoke. You know it is great because now instead of showing one picture you can show them all. It's like saying this is what is in the series. It's great!" (25-35 yrs, female, non-smoker).*

There is no current evidence from other studies on the side-of-pack collage of pictorial health warnings on the tobacco pack. However, the findings in this study suggest that consideration should be given to including a side pack that will feature the complete set of pictorial health warnings introduced as a collage on the side of the pack. The side pack collage of pictorial health warnings may improve the broad range of smoking-related health risk knowledge.

5.10.4 Comparison of ratings before and after exposure to health warnings

This section discusses the results obtained considering several variables that were measured before and after exposure to the pictorial health warnings. Before and after measurements included motivation and confidence to quit smoking; opinions on smoking, health warning labels and advertising; and knowledge on smoking-related harms.

5.10.4.1 Smokers' motivation and confidence to quit smoking before and after exposure to health warnings

This thesis found that among smokers, motivation, and confidence to quit smoking positively increased significantly after exposure to health warnings. Consequently, smokers felt more confident and more motivated to quit smoking after exposure to health warnings compared to before they were exposed to health warnings.

Smokers may have developed more confidence and motivation to quit smoking because of obtaining information about the health risks of smoking after exposure to health warnings, especially pictorial health warnings – all of the following increased: smoking-related health risk knowledge,[50] quit intentions,[45,58] motivation to quit,[17,92] quit attempts,[50] and increased planning and desire to quit.[78,79] Another explanation could be that exposure to health warnings meant that attention was given to health warnings and positively influenced motivation and confidence to quit. Indeed, Yong et al.[39] found that smokers were encouraged to quit smoking through the pathway of increased attention to cigarette health warnings.[39] Cigarette health warnings increased attention to the health warnings,[17] particularly the attention of smokers.[37] Increased attention to health warnings, in turn, led to greater cognitive collaboration,[17,37] which is associated with quit attempts. [17,37]

Overall, the findings suggest that health warning messages have a positive effect on motivation and confidence to quit smoking among smokers and support the implementation of the WHO FCTC[29] and strengthening the cigarette packs[42] in South Africa by implementing pictorial health warnings[43] on branded or plain cigarette packs.

5.10.4.2 Smoking and reaction to health warning labels on the packaging of tobacco products and counter displays before and after exposure to health warnings

This section discusses the results of the four different item scales obtained from responses to 26 questions assessing opinions about smoking and warning labels on the packaging of tobacco products and counter displays in South Africa before and after exposure to health warnings. Results of the four different scales "Smoking cognition", "Smoking emotions", "Reactions to text warnings" and "Advertising and

pictorial warnings reactions" indicated significant positive changes after exposure to health warnings, compared to before exposure.

This thesis found that there was a significant positive increase in "Smoking cognition" (danger to health, ruining health, unpleasant smell, bad breath, spend money, bothers others, second-hand smoke dangerous, bad skin, dependent and energy) after exposure to health warnings, compared to before exposure. The positive increase in smoking cognition suggests that after exposure to health warnings, participants' thinking increased about the fact that smoking was a risk to their well-being and the health of others. The finding is significant, as increased cognition (recognition of the risk of smoking to the well-being of the smoker and others) may encourage quitting. Indeed, exposure to health warnings not only increased smoking-related health risk knowledge,[50] but also increased motivation to quit,[17,92]quit intentions,[45,58] and quit attempts.[50]

Smokers had less emotional attachment to cigarettes smoking, and cigarettes held less appeal for them after exposure to health warnings, compared to before exposure. "Smoking emotions" (calms me when stressed, calms me when upset, deal with difficult situations, concentrate, like motions, feels good, love smoking, like to hold a cigarette and deter from smoking) elicited a significantly higher level of disagreement after exposure to the health warnings, suggesting that the smokers' extent of emotional attachment to their cigarettes had significantly decreased. This finding is important because reduced emotional attachment to cigarettes could discourage smoking. This is in line with Brewer et al.'s[78] finding that implementing pictorial health warnings discouraged smoking.[78]

There was a significant increase in negative reaction after exposure to health warnings to text-only warnings. This dimension was tested with "reactions to text warning" (think about quitting, think about chemicals, believable, easy to understand). Therefore, this finding suggests that after exposure to health warnings, smokers expressed a significantly higher degree of disagreement with statements related to current text health warnings as being effective compared to before exposure. This finding is not surprising, as it corroborates this thesis's earlier finding that the current text-only

warnings were rated as less effective than pictorial warnings on branded or plain packs. The finding also supports the WHO FCTC's recommendation to implement pictorial warnings on cigarette packs,[29] and plain packaging.[29,36] Additionally, this finding validates South Africa's plans to strengthen its tobacco control policy by implementing pictorial warnings and plain packaging.[43]

After exposure to health warnings, there was a significant positive increase in "advertising and pictorial warnings reactions" (text warnings for educated, adding pictures will make smokers quit and counter display is a form of advertising) compared to before exposure. This increase in positive reactions suggests that after exposure to health warnings, there was a significantly higher degree of agreement with statements that counter displays are a form of advertising and that adding pictures to text warnings would make smokers think more about quitting. Again, exposure to pictorial warnings increases knowledge about the harms of smoking,[50] and increases quit intentions.[45,58] The finding on counter displays is validated by the earlier finding reported in Chapter 4 of this thesis that those who agreed that counter displays are a form of advertising have higher levels of knowledge. The result is significant because the literature suggests that conversely displays of pictorial health warnings at the point of sale may increase knowledge and thoughts about quitting.[93,94] Furthermore, a ban on brand-advertising counter displays has a positive effect on smoking behaviour by reducing adult daily smoking;[95] hence the global recommendations to ban point of sales branding and displays.[29]

5.10.4.3 Knowledge of smoking-related health consequences before and after exposure to health warnings.

This section discusses the results of the three different item scales obtained from responses to 13 questions about knowledge of smoking-related health consequences before and after exposure to health warnings. Results of the three different scales "Real risk knowledge," "Lung cancer and addiction knowledge" and "Total knowledge" found that knowledge increased significantly after exposure to health warnings.

The thesis found that after exposure to health warnings, there was a significant increase in "Real risk knowledge" (stroke, impotence, abortions, gangrene,

amputations, TB, gum disease, mouth cancer, finance, illness in children, and death). The finding suggests that smoking-related health risk knowledge increases significantly after exposure to health warnings. The finding is important especially considering the SASAS 2010 findings reported in Chapter 4 and those of the SASAS 2016/17 reported later in Chapter 7 that South Africans do have some knowledge of the health risks of smoking. Thus the proposed introduction of pictorial warnings[43] in South Africa may increase knowledge of smoking-related harms and influence smoking behaviour. This postulation is consistent with evidence that found that exposure to health warnings increases knowledge of smoking-related harms[50] and smoking behaviour such as quitting.[17,39,45,58,92,96]

After exposure to health warnings, there was a significant increase in "Lung cancer and addiction knowledge" compared to before exposure. This increase is valuable especially considering that lung cancer is the leading cause of tobacco-related deaths globally for both men and women.[97] Furthermore, increased knowledge of addiction[98,99] may encourage smokers to seek advice on smoking cessation and may influence positive changes in smoking behaviour.

Similarly, after exposure to the health warnings, there was a significant increase in "Total knowledge" ("Real risk knowledge" and "Lung cancer and addiction knowledge" combined). Again, the significant increase in total knowledge after exposure to health warnings supports the introduction of legislation and recommendations[29,43] that will strengthen the tobacco pack to protect the public.

5.10.4.4 Changes in planning and desire to quit before and after exposure to health warnings

The thesis found that there was a positive change in planning to quit and desire to quit after exposure to health warnings. There was a noteworthy decrease in those who were not planning to quit from 64.5% to 18.4%. This finding on smoking behaviour suggests that exposure to health warnings improves the prospects of planning to quit. Indeed, the percentage of those who planned to quit within the next month increased after exposure to health warnings from 25.9% to 11.1%. This finding is not surprising and is in line with those of other studies that found that exposure to health warnings

influences smoking behaviour. [17,39,45,58,92]

After exposure to health warnings, there was a remarkable decrease in those who had no desire to quit from 68.5% to 26.2%. This finding suggests that exposure to health warnings improves desire to quit; those who desired to quit increased after exposure to health warnings from 31.5% to 73.8%. This finding corroborates prior findings and supports the implementation of pictorial health warnings, as smoking behaviour will influenced positively. [17,45,50,58]

5.10.5 Changes in planning to quit after exposure to health warnings

The results of this thesis showed that the following were significantly associated with higher odds of experiencing a positive change in plans to quit after exposure to health warnings: self-identifying as Indian/Asian, being employed, and indicating spending money on cigarettes rather than food. The findings are discussed individually below.

Those who indicated being Indian/Asian were twice as likely to have had a positive change in plan to quit after exposure to health warnings. The finding is in line with the earlier finding that the top three pictorial warnings were mostly effective among those who indicated their population group as Indian/Asian. These results may also explain why this population group is more likely than others to report a positive change in plans to quit after exposure to health warnings. More knowledge of the smoking-related health risks may mean better understanding of the smoking-related health risks and facilitated a positive change in plans to quit after exposure to health warnings. Additionally, the Indian and White population groups were reported to have better access to health services than the other racial groups.[73] Therefore, advice on smoking-related health risks could be sought and this additional knowledge might influence a positive change in planning to quit or reinforce existing plans to do so.

Participants who were employed were three times as likely to have a positive change in plans to quit after exposure to health warnings. This finding may be explained by the fact that those who are employed are more likely to have an education. Indeed,, as the earlier findings show, both branded and plain packs were effective across all four effectiveness outcomes for those who were educated. Therefore, they will benefit

from a strengthened cigarette pack,[50] which will offer better knowledge of smoking-related health risks. Consequently, those who are employed were likely to have a positive change in planning to quit after exposure to the health warnings because of increased health risk knowledge. The literature already shows that exposure to health warnings improves knowledge of smoking-related harms[50] and smoking behaviour. Therefore, policies that recognise the planning to quit stages (from pre-contemplation, to action and maintenance) are essential, so that quit attempts can be made with the possibility of succeeding. Indeed, studies have indicated that smokers who attempt to quit are more likely to succeed in quitting smoking.[70,71]

Conversely, the above finding also means that those who were unemployed were less likely to have a positive change in planning to quit after exposure to health warnings. The opposite explanation to that for those who are employed may apply: the unemployed may have less education and less access to health services.[73] Therefore, those who are unemployed are also likely to have less knowledge of the smoking-related health risks and would not be able to get this information readily. Therefore, they would be less likely to have had a positive change in planning to quit after exposure to health warnings. As a result this population would require a more comprehensive tobacco control intervention, as proposed by the WHO FCTC[29] to ensure positive change in smoking behaviour. One such intervention together with others is to increase taxes,[29] making cigarettes less affordable. Studies indicate that an increase in taxes has an impact on reducing cigarette consumption,[100] and promoting cessation among current smokers.[101]

Those who indicated that they spent money on cigarettes rather than food were three times as likely to have a positive change in planning to quit after exposure to health warnings. This finding is encouraging for South Africa, which is grappling with poverty and disparity,[102] and given that that smoking is usually consumed by people living in conditions of poverty.[103] Smoking has already been established as influencing poverty, because of reducing the disposable income.[103] Consequently, this finding is essential in support of South Africa's proposed new tobacco control legislation,[43] which may be more far-reaching than only tobacco control if it can influence conditions of poverty and the development agenda through the sustainable development goals.[104]

Implementation of tobacco control measures, as prescribed by the WHO FCTC[29], has been acknowledged as essential to achieving the SDGs.[105]

Significantly associated with lower odds of a change in planning to quit were: being in an older age group (25-35 years or 36 years or above), self identifying as Coloured/Mixed race and receiving advice to quit smoking cigarettes. This study's finding on age group implies that exposure to health warnings was most effective in motivating the youngest smokers (18-24 years) to change their plans to quit after exposure to health warnings. The finding is consistent with other studies that found that pictorial health warnings on branded[85] or plain[88] packs were effective in motivating youth to quit smoking.[85,88] As discussed earlier, this finding is important because young people are the main targets of the tobacco industry,[107,107] and, hence, the WHO FCTC[29] acknowledges the importance of preventing young people from starting to smoke or at least ensuring that they quit early enough.[29]

The finding that being Coloured/Mixed race was significantly associated with lower odds of a change in planning to quit after exposure to health warnings is important especially considering that the population group has among the highest prevalence of smoking in South Africa.[73] This finding means that for this population group there may be a need to have additional tobacco control measures, such as taxation, as recommended by the WHO FCTC[29] .

The finding that receiving advice to quit smoking cigarettes was significantly associated with lower odds of a change in planning to quit after exposure to health warnings is surprising. One would expect that those who had previously received advice to quit smoking would to be more motivated by exposure to the health warnings. Arguably, those advised to quit smoking were perhaps already advanced in their plans to quit and exposure to warnings was thus less probable to increase their desire to do so any further (ceiling effect) compared to those who were never advised to quit before, thus coming from a low base and therefore experiencing a larger increase in the desire to quit or change. The finding nonetheless means that exposure to health warnings may be effective to motivate those who have never been advised by a health professional to quit smoking.

5.10.5.1 Pathways to change planning to quit after exposure to text-only cigarette health warnings

The Structural Equation Model (SEM) suggests that exposure to the current text-only warnings is less likely to lead to a change in planning to quit, because they have less likelihood of leading to a change in cognitive reactions to smoking or a change in the perceived risk of smoking. The finding corroborates the earlier findings of this thesis that the current text-only warnings were considered less effective (on all 16 effectiveness outcomes measured) than the pictorial warnings, regardless of packaging. Many studies have reported similar findings regarding text-only warnings versus pictorial warnings.[17,21-28] In South Africa, one of the reasons for the text-only warnings' not being effective is "wear-out",[18-21] because the current text-only warnings have been in use for more than 20 years. That is why the WHO FCTC[29] recommends that countries should implement pictorial health warnings, on branded or plain packs,[29] as they are more effective in positively influencing smoking behaviour such as planning to quit.[78,79]

Exposure to branded packs was likely to lead to a change in planning to quit, as it led to a change in the perceived risk of smoking, which in turn prompted a change in the emotional response to cigarettes, and subsequently a change in planning to quit. The salience of the branded pack was thus associated with the quit intention through an increased risk perception, which evoked emotions and subsequently quit intentions. Yong et al.[39] found that the main pathway which influences quitting in smokers is by eliciting thoughts on smoking-related harms, which raises concern about the harms, which leads to greater quit intentions.[39] Another study found that an increase in the perceived health risk of smoking leads to increased knowledge and to planning to quit,[50] and Evans et al.[58] indicate that a crucial component in the effectiveness of pictorial health warnings is the ability to elicit emotion. Collectively, this evidence [39,50,58] explains the finding of this thesis that changes in planning to quit are influenced by an increase in perceptions of smoking-related harms, which lowers emotional attachment and the appeal of cigarette smoking and then subsequently leads to intentions to quit. A second pathway is through higher ratings of the warnings on branded packaging, which directly influence greater changes in planning to quit. This finding means that branded packs in this pathway largely elicited emotional responses to quitting, which

have been found by Hall et al.[45] to precede responses such as perceived risk.[45]

Plain packaging is also effective in lowering emotional attachment to cigarettes, leading to positive changes in planning to quit. The salience of the plain pack was associated with the quit intention because it elicited an emotional response, which led to quit intentions. Plain packaging has been found to reduce the appeal of the pack,[33] and participants' comments confirmed this. Therefore, it is not surprising that with the reduced appeal of the pack there might be a less emotional attachment or appeal to cigarette smoking, which will subsequently lead to quit intentions. The finding is important considering that plain packs have been found most likely to reduce smoking[33] and smoking prevalence in adults, and more so in youths,[108] and have been recommended for implementation globally[27,29,36,108,109] and in South Africa.[43]

The thesis found no direct association with changes in planning to quit by the ratings of plain packaging, and changes in cognitive response to cigarettes nor changes in perceived health risk. This result differs from our initially proposed *A* priori model, but supports Evans et al.'s[58] finding that eliciting emotions is critical in the effectiveness of pictorial warnings. This implies that for both branded and plain packs, the main pathway to changes in planning to quit included eliciting an emotional reaction.

When combined, these findings support South Africa's plans to implement pictorial warnings on branded and plain packs, as this policy change[43] may have a positive effect on smoking behaviour such as changes in planning to quit.

When combined, these findings in chapter 5 lead to the recommendations for South Africa on current text-only warnings and the pictorial warnings with (branded) and without (plain) brand design elements.

5.11 RECOMMENDATIONS

This section and its subsections discuss the recommendations based on the results of the reactions among South African participants towards health warnings, both text-only and pictorial (on branded or plain packs).

5.11.1 Text-only warnings

Regarding the text-only health warnings used in South Africa for the last two decades, this study's findings suggest that these text-only warnings are not as effective as pictorial health warnings (regardless of whether the pictorial warnings are on branded or plain packaging) in urging smokers to plan or desire to quit.

5.11.2 Pictorial warnings

The following recommendations are made with regard to the pictorial warnings proposed for use in South Africa:

- Pictorial warnings, regardless of whether they are on plain or branded packaging, do encourage smokers to plan to quit and also increase their desire to quit, so they should be introduced to cigarette packs.
- The type of warning is important; the abortion picture is the most effective with the unrevised impotence picture as the least effective.

5.11.3 Pictorial warnings on plain packs

This study's findings support the introduction of pictorial health warnings on plain packs in South Africa.

5.11.4 Revise pictorial health warnings on branded and plain packs

- Pictorial warnings should be revised based on the recommendations of participants as follows:
    - The font size of the text on all the pictorial health warnings should be increased.
    - The message on the pictorial warning on death should be changed to be more instructive: "**Smoking can kill you.**"
    - The following pictorial warnings should be revised, because they were rated as not being very effective:
        - Impotence
        - Poverty
    - Two pictorial warnings should be added to the initial eight warnings because participants overwhelmingly recommended their inclusion. These pictorial

warnings are on

- Vascular disease - Gangrene
- Lung cancer

The revised set of pictorial warning labels should still kept the previously featured themes as recommended in Chapter 4, and the additional two pictures should be added under the theme "Other."

The themes featured for the revised pictorial health warnings should be as follows:

- **Vascular**
  - Stroke
  - Gangrene *(now added)*
- **Reproductive**
  - Impotence (Male)
  - Abortions (female)
- **Second-hand smoke**
  - Simulation of new-born baby/young infant being exposed
- **Mouth diseases (particularly short-term effects shown to be salient to adolescents)**
  - Gum disease and brown stained teeth
- **Other**
  - Death
  - Financial
  - Addiction
  - Lung Cancer *(now added)*

- Therefore, 10 pictorial warnings, which include new warnings and revised warnings, should be shown to a smaller select group of participants to assess their reactions to the revised pictorial warnings. The pictorial health warnings should be placed on branded and plain packs. See Table 5.31 for the set of 10 recommended pictorial warnings, for evaluation including the revised warnings and those added (based on recommendations from participants).

Table 5.31: Recommended set of pictorial health warnings for evaluation including revised and suggested warnings

NUMBER	Picture	NUMBER	Picture
1	 Impotence	4	 Death
2	 Abortion	5	 Oral disease
3	 Stroke	6	 Second-hand Smoke
7	 Poverty	8	 Addiction
9	 Gangrene	10	 Lung Cancer

5.12 SUMMARY

This study is the first of its kind in South Africa, and comes at a time when legislation is being amended to include pictorial warnings. Within the limitations of the study, the study's findings suggest that exposure to pictorial health warning messages increases smokers' and non-smokers' knowledge of health risks associated with smoking and

that such exposure motivates smokers to think more about quitting.

Furthermore, this study's findings suggest that the effectiveness of the various pictorial warnings differed by smoking status, age and race/ethnicity. In general, the unrevised pictorial warnings on packs without brand design elements (plain packs) were thought to be qualitatively more effective, although quantitative data showed no statistically significant differences. The study provides insight into which pictorial warnings may be effective in South Africa.

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CHAPTER 6: FINDINGS IN PART TWO – REACTIONS AMONG SOUTH AFRICANS TO REVISED CIGARETTE PICTORIAL HEALTH WARNINGS, ON BRANDED AND PLAIN PACKS

6.1 INTRODUCTION

As indicated in chapter 5 of this thesis, the pictorial health warnings were subsequently revised according to the participants' recommendations. The effectiveness of the revised pictorial health warnings was evaluated among a select smaller group of participants. This chapter starts with the methods then the results regarding the revised pictorial health warnings. The chapter then provides the recommended set of eight pictorial warnings on branded and plain packs for implementation in South Africa. Finally, the chapter makes recommendations that include pictorial warnings tested in a nationally representative sample as reported in Part Three of the thesis.

6.2 REVISED PICTORIAL HEALTH WARNINGS

This section and its subsections use the results that were presented in Chapter 5, including the recommendations from the focus groups, to give the results of the revised pictorial warnings. The section sets out the results of the effectiveness of the revised pictorial health warnings on branded or plain packaging.

The section first details the study methods regarding the revised pictorial health warnings. The demographic characteristics of the selected study participants for the revised pictorial warnings are then discussed, and the section lists the set of revised pictorial health warnings on branded and plain packs. The section concludes with the effectiveness of the branded or plain packaged revised pictorial health warnings.

6.3 METHODS

Part Two of the study was concluded by the revision stage of the health warnings presented in this Chapter. Only the pictorial health warnings for use on branded or plain packs were revised following the suggestions from the participants who participated in the initial phase of Part Two (Chapter 5) of the study. After the revision

of the pictorial health warnings, data were collected from November 2013 to January 2014 from a different smaller selected group of participants. A quasi-experimental crossover mixed methods study design (two periods and two interventions, including focus group discussions, was used to access the reactions of participants to the revised pictorial warning labels.

As in the initial stage of Part Two of the study, participants were asked for some demographic information, together with information on their smoking habits. Using a crossover design,[1,2] participants were requested to complete a health warning rating questionnaire for each of the revised pictorial health warnings. Participants assessed each of the revised pictorial health warnings on branded and plain packs. Finally, they completed a comparative rating questionnaire for the revised pictures of the pictorial warnings.

After completing the questionnaires, focus group discussions were held to establish and examine the attitudes and perceptions of non-smokers and smokers towards the different cigarette pictorial health warnings on the branded and plain packs. Focus groups were conducted until saturation was reached, where no more new information was obtained. The detailed discussion of the methods used to assess the reactions to the revised pictorial health warnings is set out below. The discussion follows the same pattern as and clarifies where and how this procedure differed from that used with the original pictorial warnings presented in Chapter 5.

6.3.1.1 Study design

Again, mixed methods were used with a quasi-experimental crossover design and focus group discussion.

6.3.1.2 Setting

The effectiveness of the revised pictorial health warnings was evaluated only in South Africa's Gauteng Province, because the recommendations from the Western Cape participants in the initial stage of Part Two of the study were not significantly different from those of Gauteng participants, and the researcher was more easily able to access Gauteng.

Participants again met at schools or community halls in their community so that transport costs did not have to be incurred. These sites were selected in consultation with the National Department of Health (Health Promotion Cluster), Gauteng Department of Health, together with the Tshwane district. The sites were

- Eesterust (Coloured/Mixed race participants)
- Shoshanguve/Atteridgeville (Black participants)

6.3.1.3 Study population

The main purpose of the revision stage of Part Two of the study was to validate the earlier recommendations of participants in the initial stage of Part Two by assessing the effectiveness of the revised pictorial health warnings. The population group of the smaller selected group to evaluate the effectiveness of the health warnings was limited to the black African and Coloured/Mixed race populations, because the Coloured/Mixed race population has the highest prevalence of smoking,[3] whereas the black African population has the lowest smoking prevalence in South Africa.[3] Participants were 18 years and older from Gauteng. The 18-24 year age group was combined with the 25-35 year age group, because in the initial stage of Part Two, the age group 25-35 had few participants.

6.3.1.4 Inclusion and exclusion criteria

As indicated above, the study population included a smaller group of participants aged 18 years and above, representing only the Black African and Coloured/Mixed race population groups (see section 6.3.1.3 above). The sample for the revised pictorial health warnings took into account the dimensions of sex (male, female) and smoking status (smoker or non-smoker/ex-smoker).

Focus groups were conducted in the indigenous language of the area; therefore, Afrikaans, English, and Setswana. As with the previous procedure for the original health warnings, the focus group leader translated for any participants who did not speak the language used in the discussion according to published guidelines.[4,5] Anyone not in Gauteng or not in the designated sites and age groups was excluded.

The consideration of only a smaller select group of participants is a limitation of the

study, because ideally, the evaluation of the revised health warnings should have been considered using the same participants who evaluated the pictorial health warnings initially. The same group of participants would have enabled an indication of whether the pictorial health warnings had been improved or not by revision. However, the evaluation by the smaller select group of participants is still significant because the main aim of this part of the thesis was to validate the earlier recommendations by participants who took part in the initial evaluation of the health warnings.

6.3.1.5 Sample size

As in the initial stage of Part Two of the study and in keeping with the proposed international protocol,[4] there were 8 to 10 participants in a focus group. There were at least two focus groups per demographic group. A total of 160 participants was calculated as the sample to be included in the study. The participants were divided as follows (n=160):

- Eesterust (Coloured/Mixed race) - 80
- Shoshanguve/Atteridgeville (Black) - 80

Focus group discussions were held until saturation was reached, and at that point, no more focus groups were conducted.

6.3.1.6 Recruitment of study participants

A procedure similar to the recruitment procedure used in the initial stage of evaluating the health warnings (Chapter 5) was used for evaluating the revised pictorial health warnings (Section 5.2.6). Therefore, community health workers, health promoters and environmental health officers again assisted in recruiting participants, using the normal day-to-day house visits routinely conducted by the health promoters to ensure a high response rate. The same health promoters who were part of the initial stage of Part Two of the study (Chapter 5) were used, because they had already been trained, but they underwent a refresher training on how to conduct the focus groups using a version of an internationally validated protocol containing semi-structured moderator guides, adapted for the revised pictorial warnings that were to be tested among participants.

A total sample of 160 participants was calculated to be included in the study. Participants were scheduled to be allocated to one of eight focus groups of 10

participants each, namely:

- Male
  - Smoker 18-35 years
  - Smoker 36 years or above
  - Non-Smoker/ex-smoker 18-35 years
  - Non-Smoker/ex-smoker 36 years or above
- Female
  - Smoker 18-35 years
  - Smoker 36 years or above
  - Non-Smoker/ex-smoker 18-35 years
  - Non-Smoker/ex-smoker 36 years or above

The diagram in Figure 6.1 shows the composition of the planned focus groups.

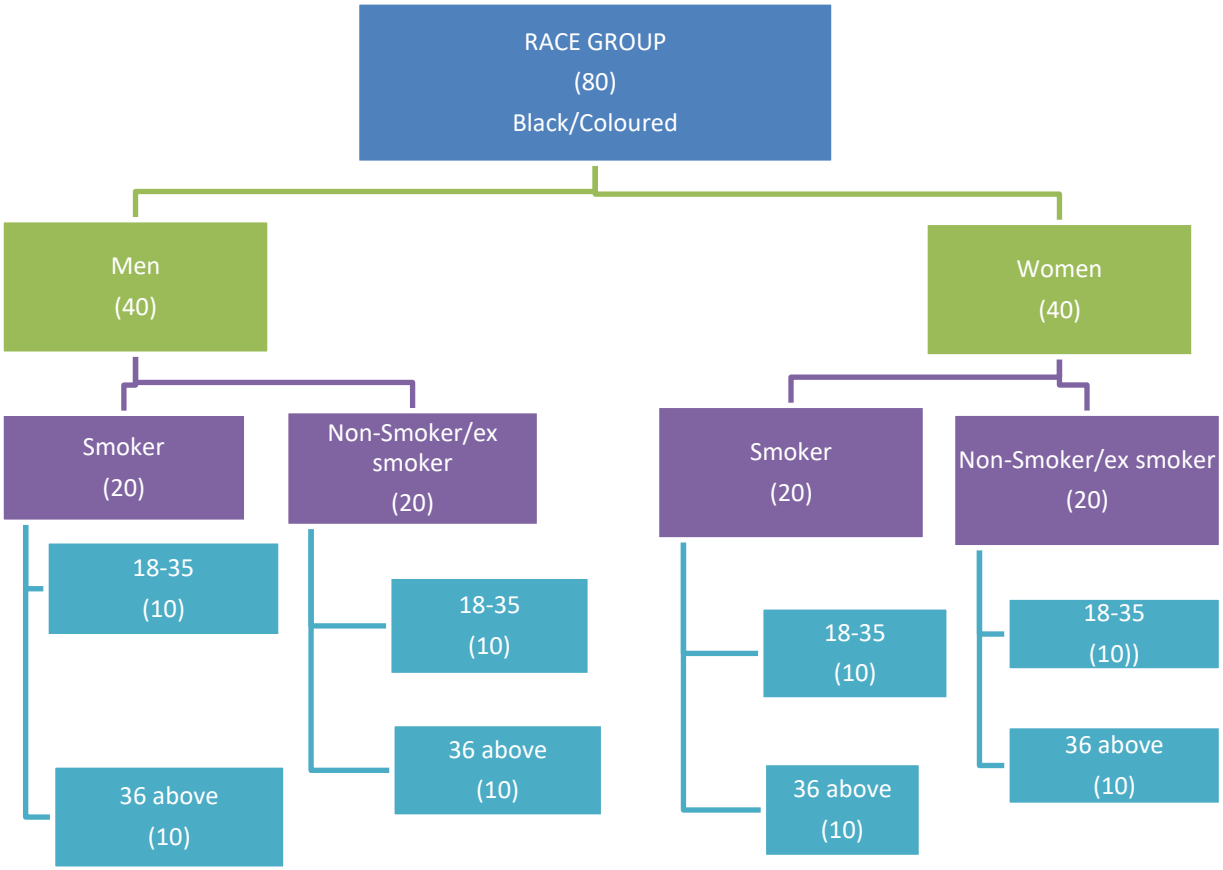


Figure 6.1: Composition of the focus groups for the revised pictorial health warnings

6.3.1.7 Data collection tools for revised pictorial warnings

For the testing of the revised pictorial health warnings, use was made of two questionnaires that were self-administered by participants:

- Individual revised pictorial health warning rating questionnaires, for completion with the revised pictorial health warnings on branded and plain packs. The questionnaire also had brief questions on demographics and the smoking habits of the participant (see Appendix 13)
- The comparative revised pictorial health warning questionnaire, to rank the most effective pictures of the revised pictorial health warnings (see Appendix 14).

To improve reliability, both questionnaires were pilot-tested among a group of 10 volunteering participants who were not part of the sample population. This piloting provided an opportunity to refine the questions for clarity and local cultural adaptation of meanings.

6.3.1.8 Data collection procedure

As in the initial stage of Part Two of the study, the participants were met at the venue proposed by our local partner (the Provincial Health Department), namely a school hall or community hall, during their scheduled time. A second visit was again conducted to allow those who were eligible to participate but may have not participated in the study (for example, those who were absent due to illness) and wished to do so voluntarily, to participate.

The researchers assured the participants of anonymity and explained what the procedures were going to be. Participants were told that they would individually complete two self-administrated questionnaires (as described in the section above) on their own and then participate in a focus group. After informed consent was obtained, two questionnaires were given to participants to complete and assess the revised pictorial health warnings.

The **first questionnaire** established some demographic data and required participants to evaluate the effectiveness of a total of eight pictorial health warnings: the two revised pictorial health warnings (poverty and impotence) on branded and

plain packs, and the two new pictorial health warnings (gangrene and lung cancer) on branded and plain packs.

The individual revised pictorial warning rating questionnaire (see Appendix 13) had the following topics to establish the participants' details:

- demographic details (e.g. age, gender)
- current smoking status
- self-efficacy to quit
- past advice to quit
- individual rating of the revised pictorial health warnings (four with (branded) and four without (plain) brand design elements).

Participants were then asked to rate the revised pictorial health warning packages individually and not to discuss their answers with anyone, but that they would be given time to discuss the revised pictorial health warnings during the focus group discussions to be held after their individual ratings of the revised warnings.

The **second questionnaire** (see Appendix 14) required participants to rate the most effective picture among the pictorial health warnings, comparing all 10 pictures of the pictorial health warnings as recommended in Chapter 5 section 5.11. The pictorials used to evaluate the effectiveness of the revised warnings were randomly allocated to participants by means of a crossover design.[1,2]Using the crossover design (two interventions/experimental condition, two exposure periods),[1,2] the two interventions (pictorial warnings on branded and plain packs) were assessed. They were denoted by

- D - pictorial warnings with brand design elements (branded)
- E - pictorial warnings without brand design elements (plain)

This crossover design was used to minimise bias that may result as a consequence of rating the revised pictorial health warnings in a predetermined order.[1,2] The sequence in which the participants evaluated or rated the health warnings varied. Each participant was randomly allocated to one of two possible orders (see Table 6.1) to evaluate the warnings. Further, within the experimental conditions (allocated order e.g.

order 1) participants also randomly rated the different revised pictorial health warnings (e.g. among the D - pictorial health warnings, participants did not evaluate the same picture at the same time, so Participant 1 might start with Picture 1, while Participant 2 started with Picture 4). The orders allocated are shown in Table 6.1.

Table 6.1: Possible orders (crossover design) for revised pictorial health warnings

ORDER		
Order 1	D	E
Order 2	E	D

The crossover design using two periods ensured that differences among the interventions were detected with greater power and nullified the crossover effect.[1,2] Participants were requested to sequentially assess each of the revised pictorial warnings (with or without brand design elements) and, using a structured questionnaire, rated each of the pictorial health warnings. Again, after the assessment of each pictorial health warning, participants were exposed to pictures not related to health (washout pictures), such as panoramic views of a lake or the ocean (see Appendix 10) .

The use of the washout pictures was done to neutralize the affect from exposure to the pictorial health warning and to reduce fatigue that may result from consecutive exposure to the pictorial health warning pictures. See Figure 6.2 for a diagrammatic representation of the sequence of the crossover design for the revised pictorial health warnings.

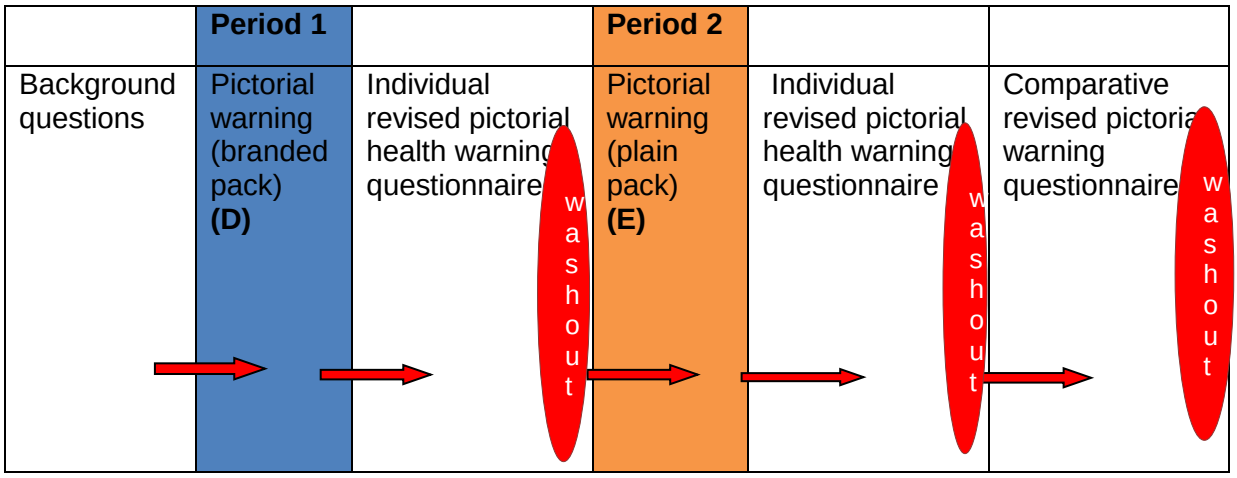


Figure 6.2: Sequence of crossover design for revised pictorial health warnings

An example of the sequence of individual evaluations of the revised pictorial health warnings using Order 1 of the crossover design for revised pictorial warnings (see Figure 6.3) after completion of the background questions was as follows:

- Revised pictorial health warnings (4 pictorial warnings on branded packs) (2 minutes each, total 8 minutes)

- Complete revised pictorial health warning rating questionnaire, pictorial warnings on branded or plain packs (1 minute each, total 4 minutes)
    - Break (5 minutes and washout pictures)

- Revised pictorial health warnings, 4 pictorial warnings on plain packs (2 minutes each, total 8 minutes)

- Complete revised pictorial health warnings rating questionnaire, pictorials on plain packs (1 minute each, total 4 minutes)
    - Break (5 minutes and washout pictures)

- Comparative rating questionnaire revised pictures (10 minutes)
    - Break (5 minutes and washout pictures)

    - Lunch break (25 minutes and washout pictures)

The researcher collected completed questionnaires of the revised pictorial health warnings and the participants were thanked for completing the questionnaires. The researcher then explained that focus groups would be conducted after lunch.

6.3.1.9 Focus groups

As with the initial testing of the pictorial warnings (Chapter 5), focus group discussions were conducted to establish and examine the attitudes, perceptions, understanding and behaviours among the target groups of non-smokers and smokers towards the revised pictorial warning labels. The package test measurements evaluated among participants remained the same as previously, and so did the procedure for focus groups.

In keeping with the assessment of the original pictorial warnings, only one group (where there were more than 12 participants in a group) had a random selection of participants in order to select 10 participants to be included in the focus group. There were no groups that had fewer than three participants. A total of 16 focus groups were conducted (see Table 6.2 below). Consistent with the initial stage of the assessment of the original pictorial warnings (Chapter 5), at the end of the focus group session, participants who continued with the focus group and the participants who did not continue with the focus group discussion part of the study were afforded a 10-minute talk on the dangers of tobacco use at the end of the focus group session. Materials (booklet, pen, cap and pin) from the National Council Against Smoking (NCAS) were handed out to the participants, who were thanked for their participation in the study.

Table 6.2: Groups and number of participants in the focus groups for revised pictorial warnings

Smoking status	Age Category				Location
					Gauteng
Current Smoker	18-35	Female	Race	Black	5
				Coloured	6
		Male	Race	Black	10
				Coloured	11
	≥ 36	Female	Race	Black	9
				Coloured	7
		Male	Race	Black	8
				Coloured	8
Non Smoker	18-35	Female	Race	Black	14
				Coloured	7
		Male	Race	Black	4
				Coloured	9
	≥ 36	Female	Race	Black	3
				Coloured	5
		Male	Race	Black	11
				Coloured	6

*Key: random selection to 10 participants for focus group

As the table 6.2 above shows, focus group discussions were held among participants in their respective cultural groups according to age, smoking status, and gender in the

home language of the population group (English, Afrikaans or Setswana). As far as possible, between two and four parallel focus group discussions were run per day. The same 12 focus group facilitators who were trained for the assessment of the original health warnings again assisted the researchers for the assessment of the revised health warnings.

After returning from lunch, the participants were requested to sit down again and were informed that during the session, minutes would be taken. Participants were asked for consent to audiorecord the session in order to assist the minute taker, but where they refused consent only minutes were taken. Participants were assured of anonymity. A standard moderator guide was used (see Appendix 15), following the half-day refresher training of focus group facilitators on the guide for revised health warnings. Participants in each focus group were shown 10 warnings, randomly, one at a time – all eight revised pictorial health warnings that they had previously rated individually (four on branded and four on plain packs), plus six unrevised warnings (on branded and plain packs, from the original pictorial warnings), with a discussion after each warning. For example, Order 1 looked first at all the warnings on branded packs, and then on plain packs.

Washout pictures were then shown to participants to conclude the focus group discussion. The purpose of showing the washout pictures was to minimise the influence of the previous procedure. [2,6,7] The researcher assured the participants again of anonymity and switched off the audiorecorder (where recordings were consented to) and collected all the minute forms. At the end, the participants were given a 10-minute talk on the dangers of tobacco use and had handed out to them materials (booklet, pen, cap and pin) from the National Council Against Smoking (NCAS) and they were thanked for their participation.

The data were then immediately recorded anonymously into the database. After the initial analysis of the qualitative data, the pictorial health warnings were revised according to any recommendations and revised pictorial health warnings (on branded or plain packs) were developed. An overview of the procedure for Part Two of the study is shown in Figure 6.3.

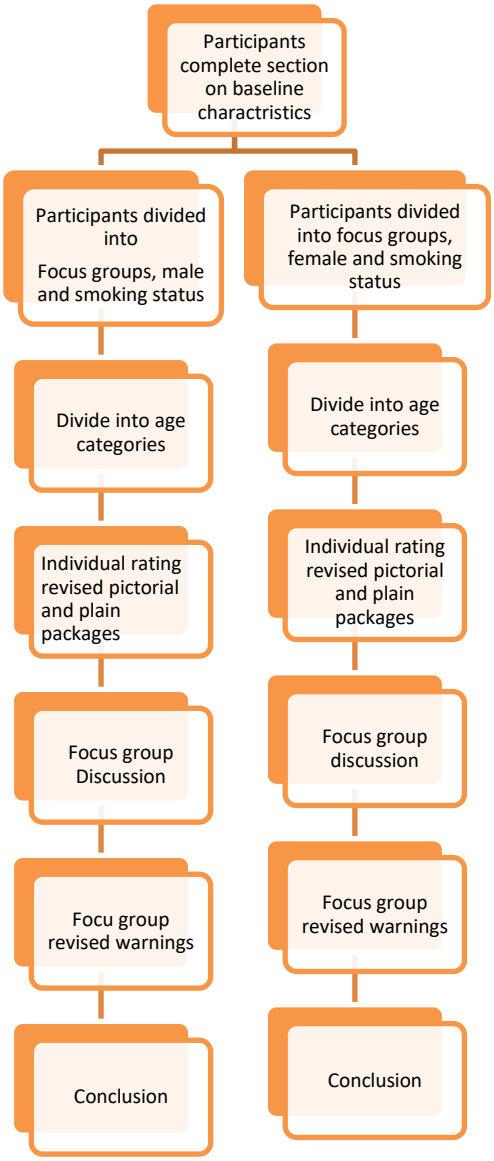


Figure 6.3: Overview of procedure of assessing the revised pictorial health warnings as the second stage of Part Two of the study

6.3.1.10 Measurements and definitions for the revised pictorial health warnings

6.3.1.10.1 Sociodemographic features

Brief sociodemographic measures were required for this stage of Part Two of the study. The questionnaire requested participants to provide information about the sociodemographic characteristics of age, gender and race.

- *Age*

  Age was assessed by the question: ”How old are you?” The answers were coded as “18-35 years” (1) or “≥ 36 years” (2).

- *Gender*

  The participants’ gender was coded as “Male” (0) or “Female” (1).

- *Ethnicity /race*

  Participants self-identified as either “Black/African” (1) or “Coloured/Mixed race” (2).

6.3.1.10.2 Reaction to revised pictorial health warnings (on branded and plain packs)

Participants were asked about their reaction to the eight revised pictorial health warnings (four on branded and four on plain packs). Participants were asked: “Please complete the following page for each warning message..”.

Again participants had to indicate whether they “Strongly agree” (1), “Agree” (2), “Neither agree nor disagree” (3), “Disagree” (4), “Strongly disagree” (5) or “Don’t know” (8). All the responses were dichotomised into “Agree” (“Strongly agree” and “Agree”, coded 1) or “Disagree” (“Neither agree nor disagree”, “Disagree”, “Strongly disagree” and “Don’t know”, coded 0).

- *Effectiveness of the revised picture*

  Using a 10-item Likert scale, participants were asked: “Please rate the effectiveness of the picture in this warning by circling one number on the scale below.” The 10-item Likert scale ranged from 1, least effective to 10, most effective. Participants were asked to write down what they liked or disliked about the picture.

- *Effectiveness of text of the revised pictorial warning*

  Participants were asked: “Please rate the effectiveness of the text in this warning by circling one number on the scale below”, using the same 10-item Likert scale as above. Again they were asked to write down what they liked or disliked about the text.

- *Effectiveness of revised pictorial warning in different ways*

Participants were asked about the effectiveness of the revised pictorial warning message in different ways: "How effective would this warning message be in each of the following ways?" Participants had the following options:

- Making people think about the health risks of smoking
- Motivating smokers to quit smoking or think about quitting
- Helping to prevent youth from starting smoking
- Overall, how effective is this warning

Responses were dichotomised into "Effective" ("Somewhat effective" and "Very effective", coded 1) and "Not effective" ("Not all effective", Not very effective", coded 0).

- *Comparison of pictures*

  Participants were given a summary of the group of 10 pictures which were numbered in random order. Participants were then asked to "look at the pictures below from your cigarette packs and answer the following…". Participants were then asked to rank the 10 pictures in order from most effective to least effective overall, in their opinion. Furthermore, participants were asked to insert the number of the picture that, in their opinion, answers the following:
  - Which one of the warning messages most made you stop and think?
  - Which one of the warning messages do you think would be most effective for informing people about the health effects of tobacco?
  - Which one of the warning messages do you think would be most effective for encouraging smokers to reduce their tobacco use?
  - Which one of the warning messages do you think would be most effective for preventing youth from starting smoking?

  Finally, participants were asked to look at all the pictures of the revised pictorial health warnings and "choose the top 5 warning messages in order from most effective to least effective overall in your opinion". Participants entered their choices by writing the number of pictorial health warning in the space provided.

6.3.1.10.3 Cigarette smoking measures of revised warnings

The revision stage of Part Two of the study contained four measures that were similar to those of the initial stage (Chapter 5) of Part Two of the study to assess cigarette smoking, as explained below.

- *Ever experimented with smoking*

  Participants were asked: ”Have you ever tried or experimented with cigarette smoking, even one or two puffs?” Responses were coded “Yes” (1) and “No” (0).

- *Currently smoking and past month smoking*

  Two questions were used to assess current cigarette smoking. First, participants were asked: “Do you currently smoke cigarettes?” Responses were coded as “Yes” (1) or “No” (0). Second, participants were asked: “During the past 30 days (one month), on how many days did you smoke cigarettes?” This question was scored on a 7-point scale from ”0 days” (1) to “All 30 days” (7) (see Appendix 13). Response items were recoded to express this as the dichotomous outcome of past month-cigarette use. That is, each participant was assigned to either be a past-month cigarette user (coded 1) for those who scored from 2 to 7 on the point scale or a non-cigarette smoker (coded 0) for those who scored 1 on the point scale.

  As in the initial stage of Part Two of the study, a dichotomous outcome variable Smokers (current smokers and non-smokers) was created by combining and recoding the responses to the items of the above two questions about past month cigarette use and currently smoking, in other words, each participant was assigned to either be a current smoker (1) (past-month cigarette users and ones who said “yes”, they were current smokers) of a non-smoker (0) (non-cigarette smokers and ones who said “no”, to being current smokers). If there was a discrepancy between the responses of past month cigarette use and current smoker, the record was excluded.

- *Quit smoking*

  The questionnaire had a question that asked participants about quitting smoking, namely

- *Planning to quit*

  Planning to quit was assessed before exposure to the warnings (background baseline questionnaire) and after such exposure (post-exposure questionnaire) by the question: “When are you planning to quit smoking?” Response options were the following:

  - I do not smoke
  - Not planning to quit

- Some time in the future beyond six months
- Within the next six months
- Within the next month

The analysis was limited to participants who were identified as current cigarette smokers. Responses were dichotomised into “Planning’ (“Within the next month”, “Within the next six months”, “Some time in future beyond six months”, coded 1) or “Not planning” ("Not planning to quit”, coded 0). “I do not smoke” was excluded.

6.3.1.11 Piloting

As has been indicated previously, the study was pilot tested in a non-participating sub-district of Garankuwa in Tshwane, in the Gauteng province.

6.3.1.12 Quality control and training

The quality control and training were similar to those for the initial stage of Part Two of the study (see Chapter 5,Section 5.2.11). The same community health workers used for the initial stage of Part Two of the study were used for the revised health warning stage.

6.3.1.13 Data analysis for revised pictorial health warnings

As for the initial stage of Part Two of the study Chapter 5), the completed **questionnaires** were entered using Epi Info statistical software version 3.5.1, and all data were entered twice (double data verification). Data were then exported using Start Transfer to the Statistical Package for Social Science (SPSS) version 25. Data analysis was conducted using the following statistical packages: STATA release 14 (Stata Corporation, College Station, Texas, USA), SPSS version 25, IBM SPSS Amos and Statistical Package R version 3.5.3. Similar to Chapter 5, tests for non-normaility of the data were conducted and non-parametric methods were used for analysis where appropriate. Analysis of reaction toward the revised pictorial health warnings labels, was similar to that of Chapter 5 section 5.2.12, and used the components of the Persuasive Communication Theory (attention, communication, identification and effect) discussed in section 5.2.9.3.

Analysis was confined to only to the cases where all the pictorial health warning

ratings were completed for individual rating of the revised pictorial health warnings. The analysis of the **focus groups** for the revised pictorial health warnings was similar to that used for the original health warnings (see Chapter 5, section 5.2.12 .

6.3.2 Socio-demographic characteristics of the select participants for the revised pictorial health warnings

The following section and subsequent subsections discuss the results of the revised pictorial health warnings. A smaller select group of 124 adults participated in evaluating the effectiveness of the revised pictorial health warnings on branded and plain packaging, with a response rate of 77.5%. There were slightly more males than females (n=66), more participants below 36 years of age (n=67), and current smokers accounted for 51.6% (n=64). See Table 6.3 for the socio-demographic characteristics of the participants for the revised pictorial health warnings.

Table 6.3: Socio-demographic characteristics of participants for revised pictorial health warnings

Variable (N)	Category	Percentage(%)	n
Age(124)	18-35	54	67
	>35	46	57
Gender(124)	Male	53.2	66
	Female	46.8	58
Population group(124)	Black	52.4	65
	Coloured	47.6	59
Ever experimented with cigarette smoking(124)	No	28.2	35
	Yes	71.8	89
Current smokers(124)	No	48.4	60
	Yes	51.6	64
Past month cigarette smoking(64)	1-9 days	8	12.5
	10-19 days	11	17.2
	>20 days	45	70.3
Plan to quit(64)	Not planning to quit	47	73.4
	Some time in the future beyond six months	9	14.1
	Within the next six months	4	6.3
	Within the next month,	4	6.3

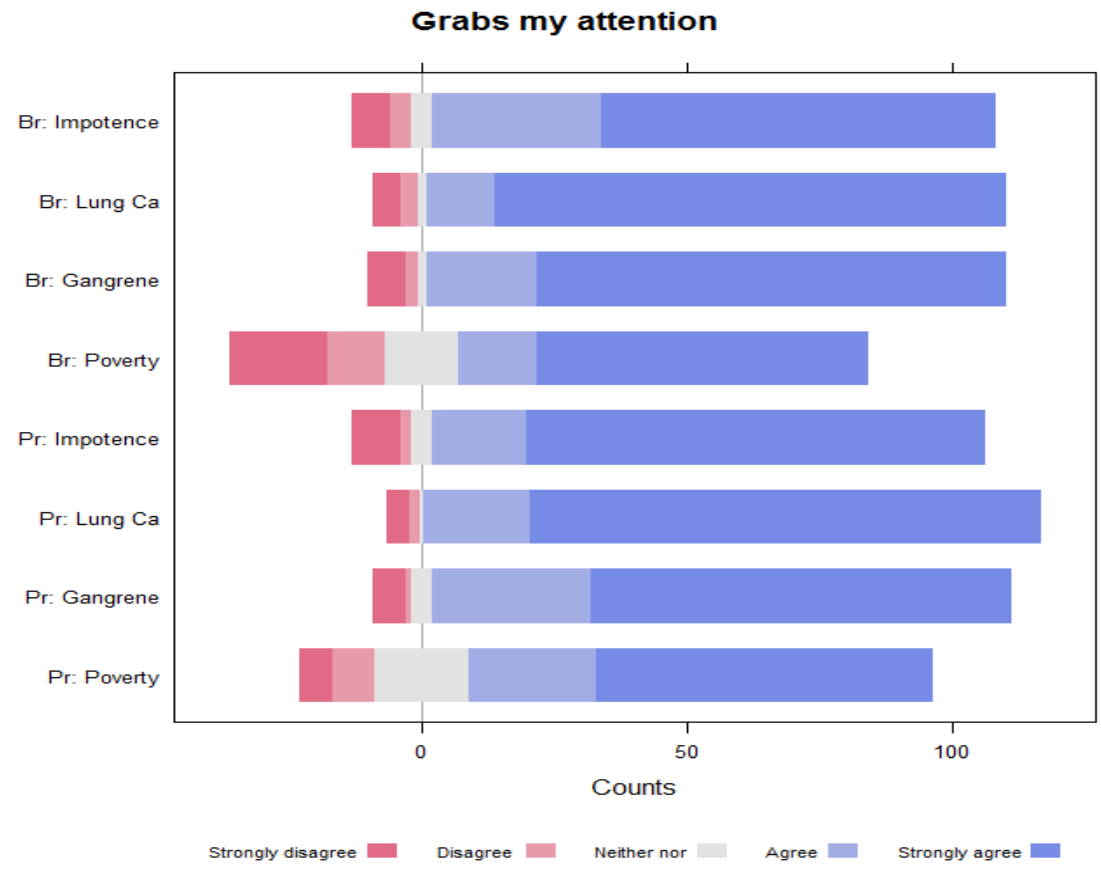
6.3.3 Reactions to revised pictorial health warnings (on branded and plain packaging) among smokers and non-smokers

As indicated earlier, revisions on the pictorial health warnings were made after recommendations from Chapter 5 (section 5.11). The complete set of 10 pictorial health warnings included two revised warnings (impotence and poverty), two new health warnings (gangrene and lung cancer), and the same ones with minor revisions on text (e.g. the warning on death). This section deals with individual responses on the effectiveness of the pictorial health warnings of only the four pictorial health warnings, namely the revised warnings (impotence and poverty) and the two new pictorial health warnings (gangrene and poverty). The remainder of the pictorial health warnings, which were evaluated individually for their effectiveness in Chapter 5, are discussed in Section 6.3.4, showing a comparative rating on the effectiveness of all 10 revised pictorial warning.

As in Chapter 5, the results of the reactions to the four pictorial health warnings are presented according to the components that make up the constructs of the Persuasive Communication Theory (attention, communication, identification, and effect). The section concludes with a presentation of the overall effectiveness of the pictorial warnings.

6.3.3.1 Attention, revised pictorial health warning

The revised warning that least caught the participants' attention was the pictorial warning on poverty on the branded pack (Mean=3.77, SD=1.52). Participants strongly agreed that the added pictorial warning on lung cancer on a plain pack most caught their attention (Mean=4.64, SD=0.86). The revised pictorial warning that closely followed the lung cancer plain pack was the branded pack on lung cancer (Mean=4.61, SD=0.97) (see Figure 6.4, overleaf), with 11.3% lower variability in the ratings for the plain packs.



Key: Br= Branded pack revised, Pr= Plain pack revised

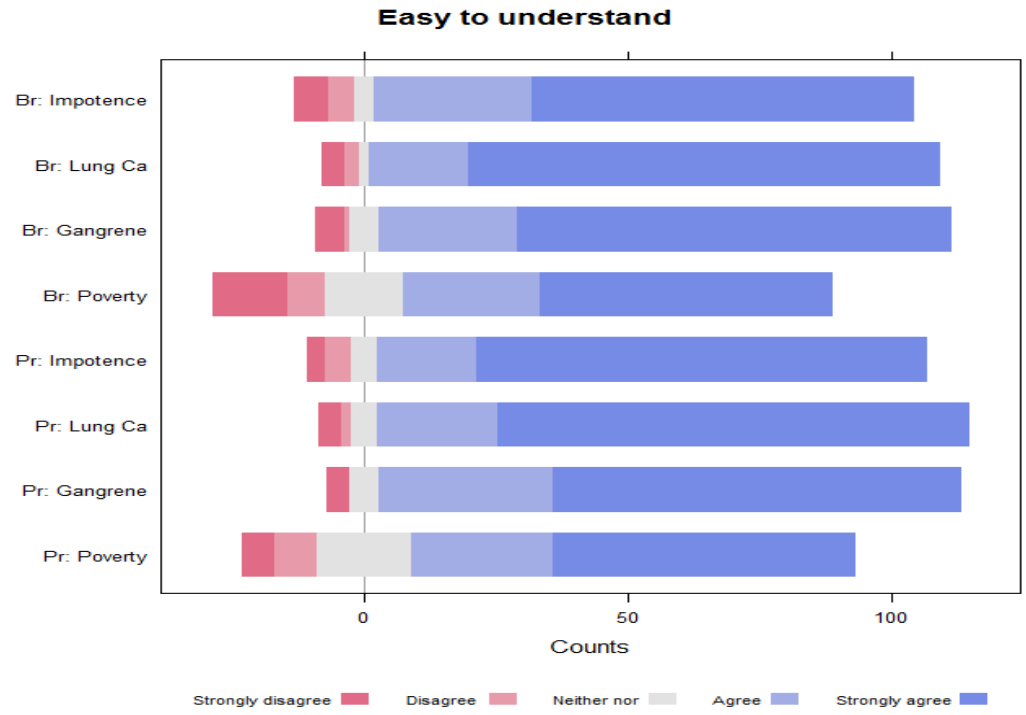
Figure 6.4: Ratings of the extent to which the revised pictorial health warning grabbed participants' attention

6.3.3.2 Communication, revised pictorial warning

This section presents the results on communication for the four pictorial health warnings that formed part of the revised pictorial health warnings set.

6.3.3.2.1 Revised pictorial health warning is easy to understand

Participants generally agreed that the revised pictorial health warnings were easy to understand, except the revised pictorial health warning on poverty, particularly on the branded pack (Mean=3.86, SD=1.38). The revised pictorial health warning on lung cancer on the branded pack was the easiest to understand (Mean=4.59, SD=0.92), (see Figure 6.5, overleaf).



Key: Br= Branded pack revised, Pr= Plain pack revised

Figure 6.5: Ratings of revised pictorial health warning ease of understanding

6.3.3.2.2 Revised pictorial health warning makes me stop and think

Smokers strongly agreed that the revised pictorial health warning on lung cancer made them stop and think, with a higher rating for the plain pack (Mean=4.48, SD=1.16) than for the branded pack (Mean=4.43, SD=1.13).

The revised pictorial warning on impotence on the plain pack came second (Mean=4.47, SD=1.08). The revised pictorial health warning on poverty on the branded pack was least likely to make smokers stop and think (Mean=3.73, SD=1.52), (see Table 6.4, overleaf).

Table 6.4: Ratings of revised pictorial health-warning in making smokers stop and think

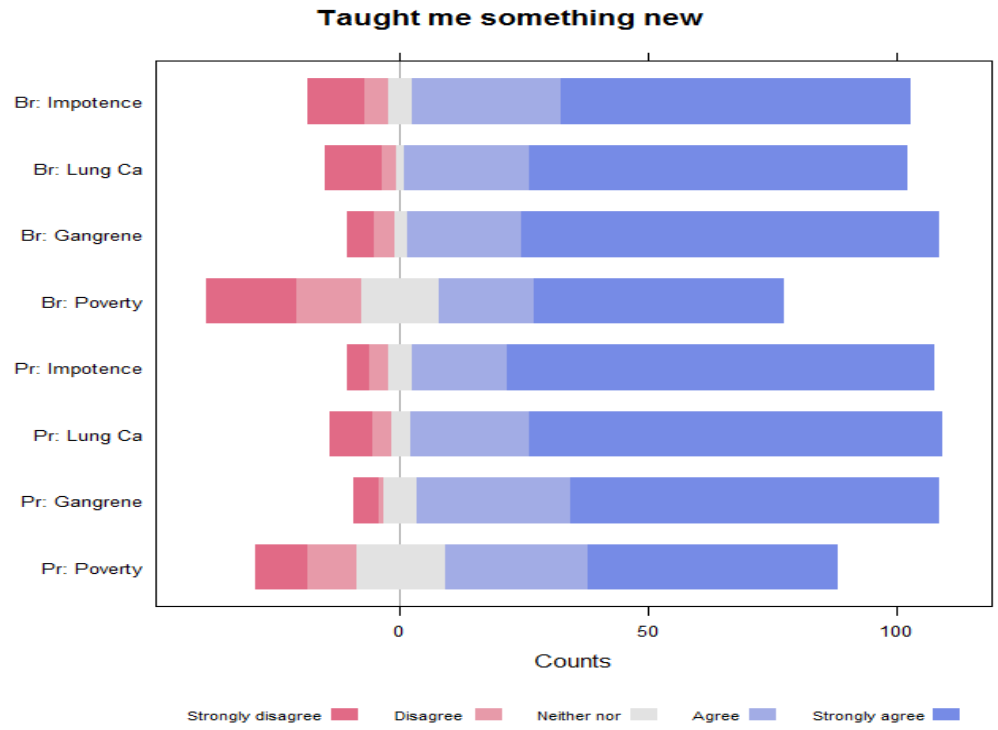
Category	Revised pictorial health warning (N=64)	Makes me stop and think		
		n	Mean(SD)*	Median(IQ range#)
Branded packs revised	Br_LungCa	61	4.43(1.13)	5.0(4.0-5.0)
	Br_Gangrene	62	4.29(1.23)	5.0(4.0-5.0)
	Br_Impotence	61	4.10(1.31)	5.0(4.0-5.0)
	Br_Poverty	64	3.73(1.52)	4.0(2.3-5.0)
Plain packs revised	Pr_LungCa	61	4.48(1.16)	5.0(4.0-5.0)
	Pr_Impotence	62	4.47(1.08)	5.0(4.5-5.0)
	Pr_Gangrene	63	4.38(1.08)	5.0(4.0-5.0)
	Pr_Poverty	61	4.00(1.30)	5.0(3.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
#*IQ range: Inter-quartile range (25 – 75)*
Key: Br=Revised Branded pack, Pr=Revised Plain Pack

6.3.3.2.3 Revised pictorial health warning taught me something new

Participants disagreed that the revised pictorial health warning on poverty taught them something new, especially the revised pictorial health warning on poverty on the plain pack (Mean=3.60, SD=1.51).

The revised pictorial health warning on impotence on the plain pack was rated by participants as having most taught them something new (Mean=4.52, SD=0.98). The revised pictorial health warning on gangrene on the branded pack came next (Mean=4.49, SD=1.01), (see Figure 6.6, overleaf).



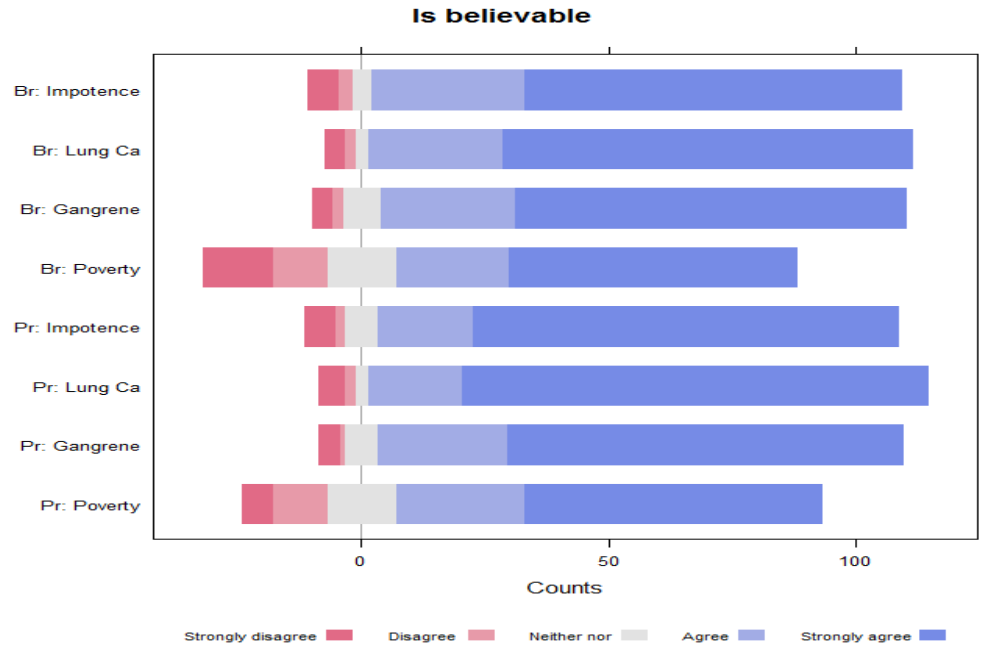
Key: Br= branded pack revised, Pr= Plain pack revised

Figure 6.6: Ratings of revised pictorial health warning on extent to which it taught participants something new

6.3.3.2.4 Revised pictorial health warning is believable

Generally, all the revised pictorial health warnings were rated as believable, except for the one denoting poverty, especially the revised pictorial warning on poverty on the branded pack (Mean=3.83, SD=1.42).

The revised pictorial warning on lung cancer was rated as the most believable, especially on the plain pack (Mean=4.59, SD=0.94), followed by the same picture on the branded packaging (Mean=4.54, SD=0.90), (see Figure 6.7, overleaf).



Key: Br= branded pack revised, Pr= Plain pack revised

Figure 6.7: Ratings of revised pictorial health warning on the extent to which it is believable

6.3.3.3 Identification, revised pictorial health warning

The following section presents the results on identification for the four pictorial health warnings that formed part of the revised pictorial warnings set.

6.3.3.3.1 Revised pictorial health warning is frightening to me and makes me think about the health risks of smoking

The most frightening revised pictorial health warning was the lung cancer warning on the plain pack (Mean=4.63, SD=0.87). Participants further agreed that the revised pictorial health warning on lung cancer on the plain packaging (Mean=4.66, SD=0.83) again made them think about the health risks of smoking.

The pictorial warning on poverty on the branded packaging was rated the least effective in making participants think about the health risks of smoking (Mean=3.85, SD=1.42), (see Table 6.5, overleaf).

Table 6.5: Ratings of revised pictorial health warning on the extent to which they evoked fear and thinking about smoking-related health risks

Category	Revised pictorial health warning (N=124)	Is frightening to me			Makes me think about the health risks of smoking		
		n	Mean(SD)*	Median(IQ range#)	n	Mean(SD)*	Median(IQ range#)
Branded pack revised	Br_Gangrene	117	4.54(0.99)	5.0(4.0-5.0)	118	4.51(1.02)	5.0(4.0-5.0)
	Br_LungCa	116	4.53(1.02)	5.0(4.0-5.0)	120	4.53(1.02)	5.0(4.0-5.0)
	Br_Impotence	119	4.36(1.09)	5.0(4.0-5.0)	120	4.27(1.21)	5.0(4.0-5.0)
	Br_Poverty	116	3.78(1.48)	4.5(3.0-5.0)	118	3.85(1.42)	5.0(3.0-5.0)
Plain pack revised	Pr_LungCa	121	4.63(0.87)	5.0(4.0-5.0)	122	4.66(0.83)	5.0(4.0-5.0)
	Pr_Impotence	116	4.51(1.00)	5.0(5.0-5.0)	120	4.50(0.98)	5.0(5.0-5.0)
	Pr_Gangrene	119	4.51(0.93)	5.0(4.0-5.0)	119	4.51(0.88)	5.0(4.0-5.0)
	Pr_Poverty	117	4.02(1.24)	5.0(3.0-5.0)	118	3.99(1.28)	5.0(3.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
#*IQ range: Inter-quartile range (25 – 75)*
Key: Br=Revised Branded pack, Pr=Revised Plain Pack

6.3.3.3.2 Revised pictorial health warning is relevant for smokers and makes smokers feel more concerned about smoking

The warning that was most relevant to the smokers was the revised pictorial health warning on lung cancer on the plain pack (Mean=4.41, SD=1.26). Smokers generally agreed that the revised pictorial health warnings made them feel more concerned about smoking.

The revised pictorial warning on lung cancer on the plain pack (Mean=4.42, SD=1.12), most made smokers feel more concerned about smoking. Smokers disagreed that the revised pictorial warning on poverty, especially on the branded pack, was relevant to them (Mean=3.65, SD=1.56), nor did this pictorial health warning make the smokers feel more concerned about smoking (Mean=3.58, SD=1.59), (see Table 6.6, overleaf).

Table 6.6: Smokers' ratings of revised pictorial health warnings on relevance for smokers and in making smokers feel more concerned about smoking

Category	Revised pictorial health warning (N=64)	Is relevant to me			Makes me feel more concerned about smoking		
		n	Mean(SD)*	Median(IQ range#)	n	Mean(SD)*	Median(IQ range#)
Branded pack revised	Br_LungCa	61	4.21(1.38)	5.0(4.0-5.0)	63	4.37(1.24)	5.0(4.0-5.0)
	Br_Gangrene	63	4.17(1.33)	5.0(4.0-5.0)	63	4.33(1.19)	5.0(4.0-5.0)
	Br_Impotence	62	4.05(1.43)	5.0(4.0-5.0)	63	4.08(1.39)	5.0(4.0-5.0)
	Br_Poverty	62	3.65(1.56)	4.0(2.0-5.0)	62	3.58(1.59)	4.0(2.0-5.0)
Plain pack revised	Pr_LungCa	64	4.41(1.26)	5.0(4.3-5.0)	64	4.42(1.12)	5.0(4.0-5.0)
	Pr_Impotence	61	4.36(1.21)	5.0(4.0-5.0)	63	4.29(1.21)	5.0(4.0-5.0)
	Pr_Gangrene	62	4.29(1.25)	5.0(4.0-5.0)	63	4.33(1.14)	5.0(4.0-5.0)
	Pr_Poverty	60	3.82(1.42)	5.0(3.0-5.0)	61	3.97(1.26)	4.0(3.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
#IQ range: Inter-quartile range (25 – 75)
Key: Br=Revised Branded pack, Pr=Revised Plain Pack

6.3.3.3.3 Revised pictorial health warning would make me think about quitting and makes me feel smoking is extremely dangerous to my health

As compared to other pictorial warnings tested, smokers significantly rated the revised pictorial warning on poverty lower, especially on the branded pack, concerning the extent it made them think about quitting (Mean=3.48, SD=1.62), and the extent to which the warning made them feel smoking was extremely dangerous to their health (Mean=3.55, SD=1.59).

The revised pictorial warning that most made participants think about quitting was the lung cancer warning on the plain packaging (Mean=4.39, SD=1.18). The revised pictorial health warning that most made participants feel that smoking was extremely dangerous to their health was also the lung cancer warning on the plain packaging (Mean=4.55, SD=1.05), (see Table 6.7, overleaf).

Table 6.7: Ratings of revised pictorial health warning on the extent to which it would make smokers think about quitting and make them feel smoking is extremely dangerous to their health

Category	Revised pictorial health warning (N=64)	Would make me think about quitting			Make me feel smoking is extremely dangerous to my health		
		n	Mean(SD)*	Median(IQ range#)	n	Mean(SD)*	Median(IQ range#)
Branded pack revised	Br_LungCa	61	4.21(1.33)	5.0(4.0-5.0)	63	4.38(1.22)	5.0(4.0-5.0)
	Br_Impotence	62	4.18(1.41)	5.0(4.0-5.0)	63	4.25(1.33)	5.0(4.0-5.0)
	Br_Gangrene	63	4.17(1.34)	5.0(4.0-5.0)	64	4.25(1.32)	5.0(4.0-5.0)
	Br_Poverty	63	3.48(1.62)	4.0(2.0-5.0)	62	3.55(1.59)	4.0(2.0-5.0)
Plain pack revised	Pr_LungCa	64	4.39(1.18)	5.0(4.0-5.0)	64	4.55(1.05)	5.0(4.0-5.0)
	Pr_Impotence	63	4.27(1.23)	5.0(4.0-5.0)	63	4.33(1.23)	5.0(4.0-5.0)
	Pr_Gangrene	63	4.25(1.18)	5.0(4.0-5.0)	63	4.38(1.13)	5.0(4.0-5.0)
	Pr_Poverty	61	3.95(1.32)	4.0(3.0-5.0)	61	4.05(1.27)	5.0(3.0-5.0)

SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
#*IQ range: Inter-quartile range (25 – 75)*
Key: Br=Revised Branded pack, Pr=Revised Plain Pack

6.3.3.3.4 Revised pictorial health warning makes me feel I spend too much money on cigarettes

Smokers rated the revised pictorial health warning on poverty on the branded pack last in making them feel they spend too much money on cigarettes (Mean =3.81, SD=1.52).

The warning that most made smokers feel that they were spending too much money on cigarettes was again the pictorial health warning on lung cancer on the plain pack (Mean=4.27, SD=1.38), followed by gangrene on the plain pack (Mean=4.22, SD=1.29), (see Table 6.8, overleaf).

Table 6.8: Ratings of revised pictorial health warning on the extent to which it made smokers feel they spend too much money on cigarettes

Category	Revised pictorial health warning(N=64)	Makes me feel I spend too much money on cigarettes		
		n	Mean(SD)*	Median(IQ range#)
Branded pack revised	Br_LungCa	63	4.03(1.51)	5.0(4.0-5.0)
	Br_Impotence	63	3.94(1.60)	5.0(4.0-5.0)
	Br_Gangrene	64	3.92(1.55)	5.0(4.0-5.0)
	Br_Poverty	63	3.81(1.52)	5.0(2.0-5.0)
Plain pack revised	Pr_LungCa	64	4.27(1.38)	5.0(4.0-5.0)
	Pr_Gangrene	63	4.22(1.29)	5.0(4.0-5.0)
	Pr_Poverty	61	3.93(1.40)	5.0(3.0-5.0)
	Pr_Impotence	63	3.92(1.54)	5.0(3.0-5.0)

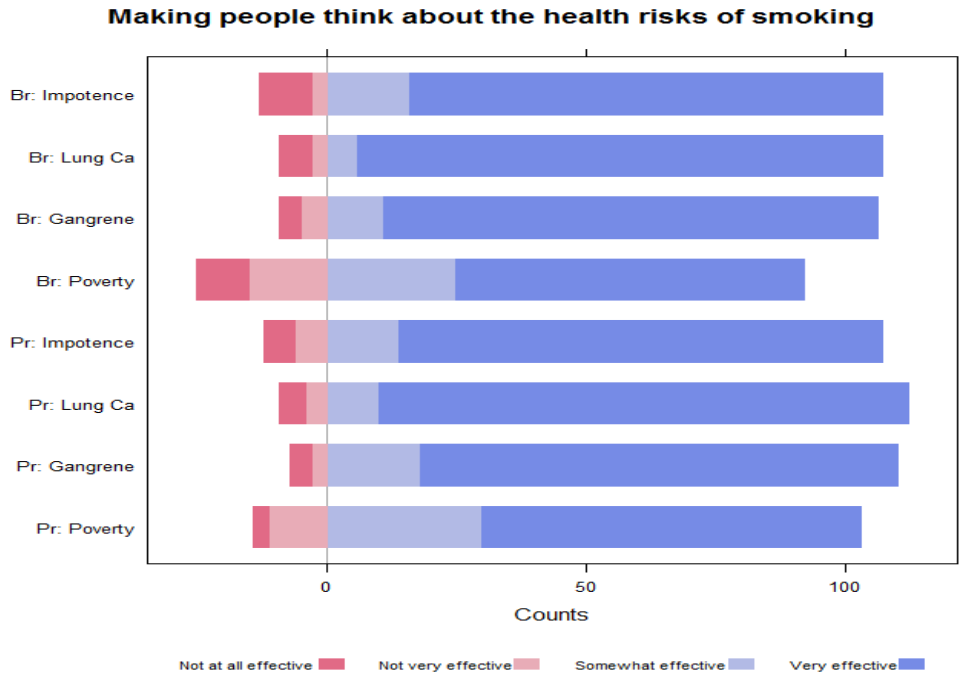
SD= Standard Deviation
**Range: 1 (Strongly disagree) – 5 (Strongly agree)*
#*IQ range: Inter-quartile range (25 – 75)*
Key: Br=Revised Branded pack, Pr=Revised Plain Pack

6.3.3.4 Effectiveness of revised pictorial warning in several ways

The following section presents the results of the effectiveness of four revised pictorial health warnings in several ways. The section concludes by indicating the overall effectiveness of four revised pictorial health warnings.

6.3.3.4.1 Revised pictorial health warning effectiveness in making me think about the health risks of smoking

Participants rated the additional pictorial health warning on lung cancer on the branded pack (Mean=3.74, SD=0.75) as the most effective in making people think about the health risks of smoking. The lung cancer warning on a plain pack was a close second (Mean=3.73, SD=0.72). The least effective revised pictorial warning in making people think about the health risks of smoking was the poverty warning, regardless of packaging; the lowest mean was the branded pack (Mean=3.27, SD=0.99), (see Figure 6.8, overleaf).



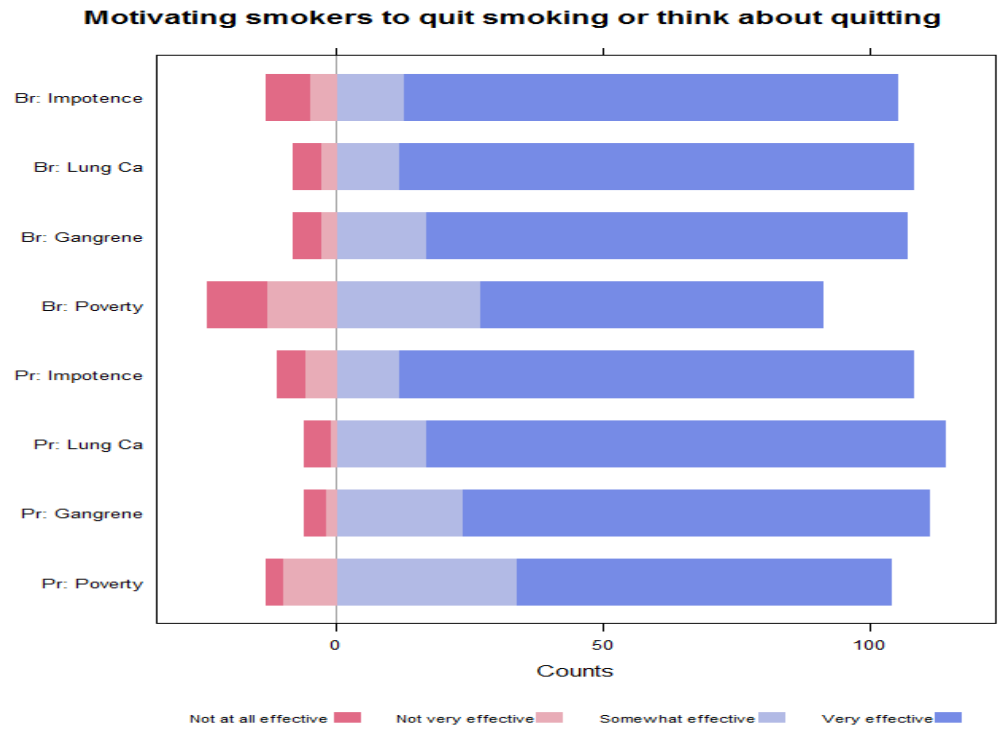
Key: Br= branded pack revised, Pr= Plain pack revised

Figure 6.8: Revised pictorial health warning effectiveness in making people think about the health risks of smoking

6.3.3.4.2 Revised pictorial health warning makes me want to quit smoking or think about quitting

The revised pictorial health warning on lung cancer, irrespective of the packaging – branded pack (Mean=3.72, SD=0.72) and plain pack (Mean==3.72, SD=0.69) – was reported to be most effective in motivating smokers to quit or think about quitting.

A close second was the revised pictorial warning on gangrene on a branded pack (Mean=3.67, SD=0.73), and impotence on a plain pack (Mean=3.67, SD= 0.76). The least effective revised pictorial health warning in making smokers quit smoking or think about quitting was poverty on a branded pack (Mean=3.25, SD=1), (see Figure 6.9, overleaf).



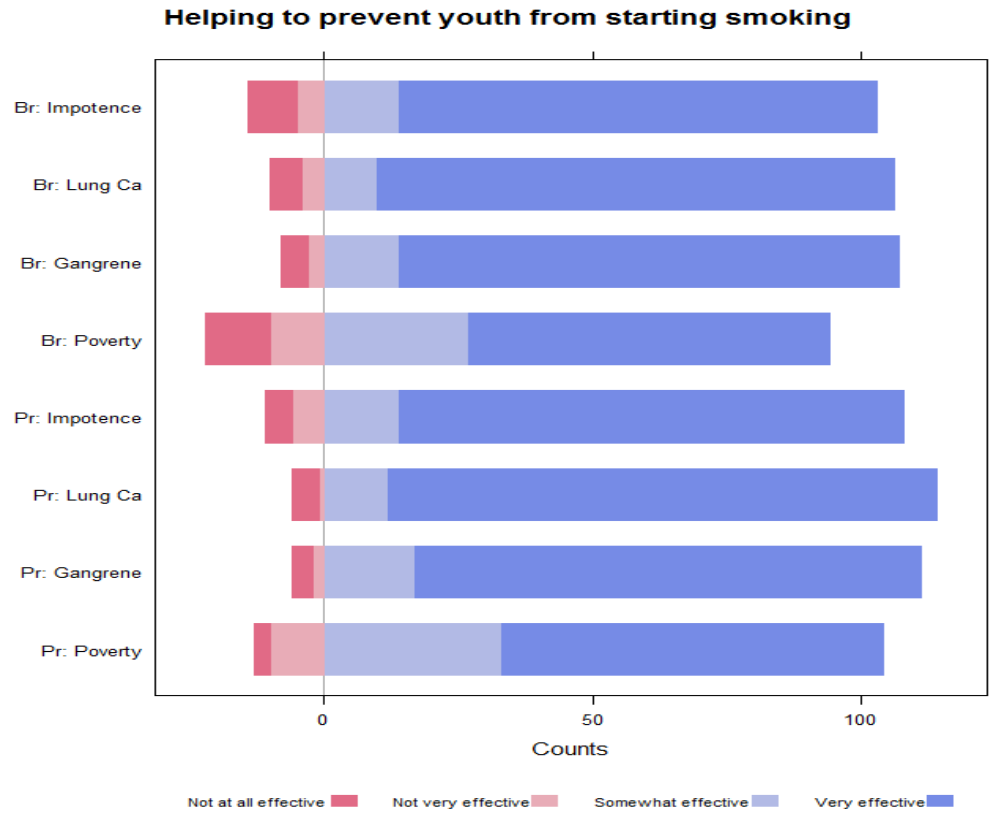
Key: Br= branded pack revised, Pr= Plain pack revised

Figure 6.9: Revised pictorial health warning effectiveness in motivating smokers to quit smoking or to think about quitting

6.3.3.4.3 Revised pictorial health warning effectiveness in helping to prevent youth from starting smoking

Participants indicated that the least effective revised pictorial health warning in helping to prevent youth from starting smoking was the poverty warning on the branded packaging (Mean=3.28, SD=1.00).

The most effective revised pictorial health warning in helping to prevent youth from starting smoking was the one for lung cancer on plain packaging (Mean=3.76, SD=0.67), followed closely by the revised pictorial health warning on gangrene on the plain pack (Mean=3.72, SD= 0.67), (see Figure 6.10, overleaf).



Key: Br= Branded pack revised, Pr= Plain pack revised

Figure 6.10: Revised pictorial health warning effectiveness in helping to prevent youth from starting smoking

6.3.3.4.4 Effectiveness of text and picture of the revised pictorial health warning

Participants indicated that the most effective text (Mean=9.08, SD=2.16), and the most effective picture (Mean=9.16, SD=1.88), was that of the revised pictorial health warning on lung cancer on the branded packaging, followed by the lung cancer warning on the plain packaging with effectiveness of the text (Mean=8.99, SD=2.25) and effectiveness of the picture (Mean=9.04, SD=2.20).

The revised pictorial health warning on poverty on the branded pack had the least effective text (Mean=7.66, SD= 3.01) and picture (Mean=7.49, SD=3.11), compared to the other revised pictorial health warnings (see Table 6.9, overleaf).

Table 6.9: Effectiveness of text and picture of the revised pictorial health warning

Category	Revised pictorial health warning (N=124)	Effectiveness of text			Effectiveness of picture		
		n	Mean (SD)*	Median(IQ range#)	n	Mean (SD)*	Median(IQ range#)
Branded pack revised	Br_LungCa	107	9.08(2.16)	10.0(9.0-10.0)	109	9.16(1.88)	10.0(9.5-10.0)
	Br_Gangrene	109	8.75(2.30)	10.0(8.0-10.0)	110	8.80(2.22)	10.0(8.0-10.0)
	Br_Impotence	109	8.45(2.66)	10.0(8.0-10.0)	115	8.34(2.73)	10.0(8.0-10.0)
	Br_Poverty	108	7.66(3.01)	10.0(5.0-10.0)	116	7.49(3.11)	9.0(5.0-10.0)
Plain pack revised	Pr_LungCa	111	8.99(2.25)	10.0(10.0-10.0)	114	9.04(2.20)	10.0(10.0-10.0)
	Pr_Gangrene	106	8.89(2.14)	10.0(9.0-10.0)	112	8.88(2.21)	10.0(9.0-10.0)
	Pr_Impotence	109	8.72(2.45)	10.0(8.0-10.0)	112	8.85(2.31)	10.0(8.0-10.0)
	Pr_Poverty	103	7.95(2.73)	10.0(6.0-10.0)	107	7.97(2.67)	10.0(6.0-10.0)

SD= Standard Deviation
**Range: 1 (Least effective) – 10 (Most effective)*
#IQ range: Inter-quartile range (25 – 75)
Key: Br=Revised Branded pack, Pr=Revised Plain Pack

6.3.3.4.5 Revised pictorial health warning overall effectiveness and ranking

The participants indicated that the most effective revised pictorial warning, which was ranked at the top, was that of lung cancer, especially on the plain packaging (Mean=3.77, SD=0.68), followed by that on the branded packaging (Mean=3.74, SD=0.66).

The lowest-ranked and least effective revised pictorial health warning was that on poverty on the branded packaging (Mean=3.28, SD= 1.00), (see Table 6.10, overleaf).

Table 6.10: Overall effectiveness and top-ranking revised pictorial health warnings

Ranking	Revised pictorial health warning(N=124)	n	Mean(SD)*	Median(IQ range#)
1	**PR_LungCa**	120	3.77(0.68)	4.0(4.0-4.0)
2	**BR_LungCa**	116	3.74(0.66)	4.0(4.0-4.0)
3	**BR_Gangrene**	115	3.71(0.73)	4.0(4.0-4.0)
4	**PR_Impotence**	119	3.70(0.74)	4.0(4.0-4.0)
5	**PR_Gangrene**	117	3.69(0.68)	4.0(4.0-4.0)
6	**BR_Impotence**	118	3.62(0.86)	4.0(4.0-4.0)
7	**PR_Poverty**	118	3.44(0.81)	4.0(3.0-4.0)
8	**BR_Poverty**	116	3.28(1.00)	4.0(4.0-4.0)

SD= Standard Deviation
**Range: 1 (Not at all effective) – 4 (Very effective)*
#*IQ range: Inter-quartile range (25 – 75)*
Key: Br=Revised Branded pack, Pr=Revised Plain Pack

6.3.4 Reactions to all 10 revised pictorial health warnings among smokers and non-smokers

Below, the results for all 10 revised pictorial health warnings are presented, first the top-ranked revised pictorial health warnings, followed by effectiveness in several different ways. Finally, the section present the results of the five top-ranked pictorial health warnings by socio-demographics and tobacco use.

6.3.4.1 Top-ranking revised pictorial health warnings

When comparing all 10 revised pictorial health warnings, the revised pictorial health warning on lung cancer was top-ranked by 62.9% (n= 78) of the participants. The warning for gangrene came second for 45.2% (n=56) of participants and poverty came last with only 3.2% (n=4) of participants rating this as their top-ranked pictorial warning (see Figure 6.11, overleaf).

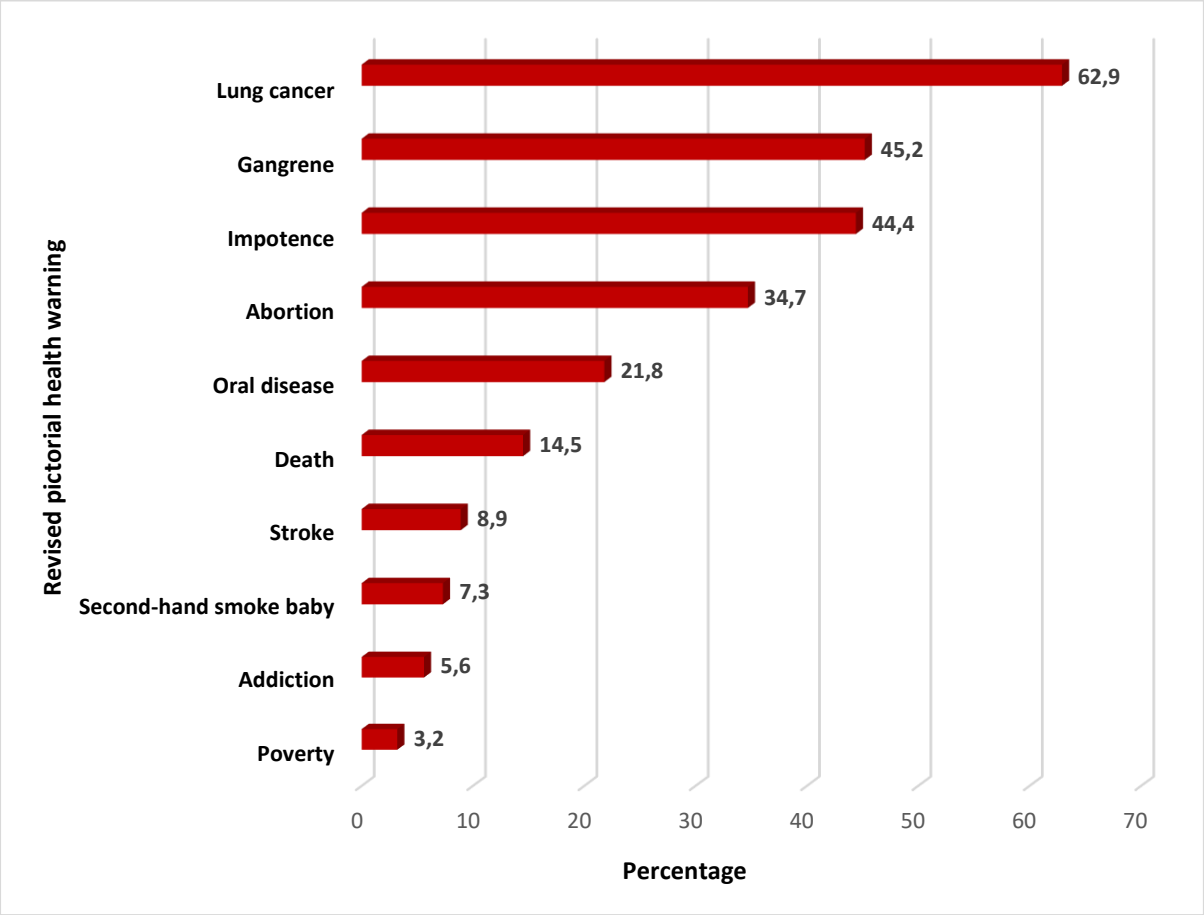


Figure 6.11: Most effective pictorial health warning after revision

6.3.4.2 Effectiveness of all 10 revised pictorial health warnings in several ways

The revised pictorial health warning on lung cancer was rated as the most effective in encouraging smokers to reduce their use of tobacco (34.5%, n=39) and also in informing people of the health effects of smoking (29.2%, n=33).

The revised abortion pictorial warning made participants stop and think (29.2%, n=33). The revised pictorial warning on impotence was ranked as the most effective in preventing youth from starting smoking (25.7%, n=29) (see Table 6.11, overleaf).

Table 6.11: Effectiveness of all 10 revised pictorial health warnings in several ways

Revised pictorial health warning (N=124)	Encourage smokers to reduce their tobacco usage (N=113)	Informing people of health effects (N=113)	Made you stop and think (N=113)	Preventing youth from starting smoking (N=113)
	%(n)	%(n)	%(n)	%(n)
Lung cancer	34.5(39)	29.2(33)	23.0(26)	20.4(23)
Gangrene	10.6(12)	9.7(11)	7.1(8)	8.0(9)
Impotence	15.9(18)	22.1(25)	15.0(17)	25.7(29)
Abortion	11.5(13)	15.0(17)	29.2(33)	12.4(14)
Oral disease	10.6(12)	9.7(11)	15.0(17)	7.1(8)
Death	8.9(10)	7.1(8)	3.5(4)	9.7(11)
Stroke	2.7(3)	4.4(5)	5.3(6)	8.0(9)
Second-hand smoke baby	1.8(2)	0.0(0)	0.0(0)	3.5(4)
Addiction	0.0(0)	0.9(1)	0.9(1)	3.5(4)
Poverty	3.5(4)	1.8(2)	0.9(1)	1.8(2)

6.3.4.3 Most effective pictorial health warnings from the set of pictorial health warnings (on branded or plain packs) after revision

This section presents the results on the top three most effective (with regards to overall effectiveness) revised pictorial warnings for each set, in other words, the highest-ranking revised warnings, considering each set, either on branded or plain packaging. The top three revised pictorial health warnings were those for lung cancer on plain packaging, gangrene on branded packaging and impotence on plain packaging.

After the revision of the health warnings, males, compared to females, rated the pictorial warning on lung cancer on the plain pack as significantly effective (Mean 3.86 vs 3.60; p=0.034). Participants from the Coloured/Mixed race group, compared to Blacks, considered the lung cancer warning on a plain pack (Mean 3.91 vs 3.59; p=0.008) and impotence on a plain pack (Mean 3.88 vs 3.47; p=0.002) as effective.

Results for the top three most effective revised pictorial warnings by a selected group by socio-demographics (as discussed in section 6.3.1.10.1), and cigarette use are

presented in Table 6.12.

Table 6.12: Top three most effective revised pictorial health warnings by a select group of socio-demographics and cigarette use patterns

Variable(N)	Category(n)	Pr_Lung Cancer Mean (SD*)	p-value	Br_Gangrene Mean (SD*)	p-value	Pr_Impotence Mean (SD*)	p-value
Age (120)			0.160§		0.182§		0.376§
	18-35(65)	3.82(0.36)		3.78(0.44)		3.72(0.54)	
	>35(55)	3.65(0.88)		3.61(0.87)		3.60(0.90)	
Gender(120)			0.034§		0.029§		0.017§
	Male(65)	3.86(0.46)		3.82(0.50)		3.81(0.61)	
	Female(55)	3.60(0.81)		3.54(0.85)		3.49(0.82)	
Population group (120)			0.008§		0.075§		0.002§
	Black(62)	3.59(0.84)		3.60(0.83)		3.47(0.92)	
	Coloured(58)	3.91(0.28)		3.82(0.40)		3.88(0.31)	
Current Smokers (120)			0.166§		0.297§		0.720§
	No(57)	3.83(0.38)		3.77(0.48)		3.69(0.59)	
	Yes(63)	3.66(0.82)		3.64(0.82)		3.64(0.83)	
Plan to quit <u>after</u> exposure to revised pictorial health warnings (63)			0.277#		0.344#		0.230#
	Not planning to quit?(46)	3.54(0.94)	1(referent)	3.52(0.93)	1(referent)	3.51(0.95)	1(referent)
	Sometime in the future beyond 6 months (9)	4.00(0.00)	0.760	3.89(0.33)	1.00	4.00(0.00)	0.636
	Within the next 6 months(4)	4.00(0.00)	1.00	4.00(0.00)	1.00	4.00(0.00)	1.00
	Within the next month(4)	4.00(0.00)	1.00	4.00(0.00)	1.00	4.00(0.00)	1.00

Past month cigarette smoking (63)			0.277#		0.277#		0.277#
	1-9 days(7)	4.00(0.00)	1(referent)	4.00(0.00)	1(referent)	3.96(0.09)	1(referent)
	10-19 days(11)	4.00(0.00)	1.00	3.49(0.92)	1.00	4.00(0.00)	1.00
	>20 days(45)	3.53(0.94)	0.468	3.64(0.82)	0.454	3.50(0.96)	0.504

Key: Br=Branded pack revised, Pr =Plain pack revised
**Range: 1 (Not at all effective) – 4 (Very effective)*
***SD=Standard deviation*
#All p-values (for trend) were derived using Analysis of variance (ANOVA)
§ *All p- values derived using Independent samples t-test*

6.3.4.4 Participants' voices on the revised pictorial health warnings

The picture on poverty was not clearly understood. One participant noted: *"Some of them, I don't understand the poverty one, what the warning sign is telling you. The way I see it, it's like if I keep up smoking I'll end up in the street" (18-35 yrs, female, smoker).*

There were also participants who were negatively influenced by co-morbidities: *"I'm already busy dying from AIDS, so I have better things to worry about besides smoking" (36 yrs or above, male, smoker).*

Conversely, some participants had preconceptions about smoking: *"At our age if you stop smoking you will end up dead. I have seen of my friend; he was taken to an old age home, and he was told not to smoke and now he's dead*" *(36 yrs or above, male, smoker).*

The lung cancer picture was seen as most effective by many participants: *"You see this lung cancer is really terrible. My husband used to smoke for many, many, many years and he got this lung cancer. He died last year and when we were burying him there was no person at all there. You see many people know someone who has died of lung cancer; it is true. This picture it really brings very bad, bad memories" (36 yrs or above, female, non-smoker).*

The added gangrene pictorial health warning was rated second after that of lung cancer: *"Sies, this foot is so bad and it looks like it is smelling. I don't want a smelling*

foot, but this one of the lungs, 'hayibo', they are so black it's like you are walking with a dead something in your body. Yho, smoking is so bad, yho" (18-35 yrs, female, smoker).

Even among the participants for the revised pictorial health warnings, the oral disease pictorial warning was still seen as one of the most effective among younger smokers: *"Mouth cancer, it looks real and you can see the damage that smoking does to your mouth" (18-35 yrs, male, smoker).*

The newly revised impotence picture was now rated as one of the most effective. "*This one now will make all the men stop because no one wants their thing to do like that. You might as well just die, really" (36 yrs above, female, non-smoker).* One young participant said of the impotence pictorial: "*Eish, eish, yho! This one, ha ha ha, it's a bad one. It's bad for the young people, both the ladies and the men because if you are a man, you cannot perform your duties, and you just are useless. You definitely cannot have a girlfriend or a wife. But also it will help young women because they also don't want to be hungry you see. The ladies also want something – you see now if your man is like this, it's a problem. I feel it's the best at making our young ones to can stop smoking, maybe also the old ones, if they are still active" (18-35 yrs, female, smoker).*

The pictorial warning on lung cancer was thought to be most effective for informing people about the health effects of tobacco use and in encouraging smokers to reduce their smoking: *"I did not know that this thing is killing me; I started smoking because of stress but now I see I am not reducing stress but I am reducing life. Now I know I just have to find my life; this thing of smoking is going to finish me, no" (36 yrs or above, male, smoker).*

Even after revision, the warnings on the plain packs, except for gangrene, were still rated as more effective by participants: "*These brown boxes they tell somebody that you are putting dirty things like mud in your body. These brown boxes are just terrible; I would not want this kind of box anywhere near my cigarettes; it makes me feel like I will be smoking dirty things" (36 yrs or above, male, smoker).*

6.4 DISCUSSION REVISED PICTORIAL HEALTH WARNINGS

This section briefly discusses the revised pictorial health warnings, which, after the initial analysis, were revised according to the recommendations from participants. They were then exposed to a smaller group of participants, as discussed in Section 6.3 on the methodology . The smaller select group was limited to Coloured/Mixed race particpants (the population group with the highest smoking prevalence) and Black Africans (the population group with the lowest smoking prevalence).[3] This part of the thesis was conducted in the Gauteng province.

A limitation of the thesis is that the evaluation of the revised health warnings was confined to one province and only to a smaller group of participants. Therefore, direct comparison is not possible between the rating scores for the revised pictorial health warnings and those for the original pictorial health warnings, especially given that two different sets of participants rated the pictorial health warnings before and after the revision of the health warnings. It would have been better to be able to indicate whether the effectiveness improved or not before and after revision. Nonetheless, the results are still significant as the main aim of this part of the thesis was to validate the earlier recommendations of participants.

There was a complete set of 10 pictorial health warnings which included two revised images (impotence and poverty), two new additional health warnings (gangrene and lung cancer), and the rest contained minor revisions in the text (e.g. in the pictorial warning on death), but largely remained the same.

6.4.1.1 Effectiveness of revised pictorial health warnings

This subsection deals with individual reactions on the effectiveness of the pictorial warning of only four pictorial health warnings, namely the two revised warnings (impotence and poverty) and the two new pictorial health warnings (gangrene and lung cancer). The rest of the pictorial health warnings are discussed in the next section.

Similar to the findings on the non-revised health warnings discussed in Chapter 5, the results of the reactions to the four revised pictorial health warnings are presented according to the components that make up the constructs of persuasive

Communication Theory (attention, communication, identification, and effect) and the 16 effectiveness outcomes measured for the revised pictorial health warnings (similar to the original, non-revised, pictorial health warnings discussed in Chapter 5).

This thesis found that the revised pictorial warnings on the plain cigarette packaging were more effective in all 16 measures, compared to the branded packs. This finding is not surprising and is similar to the findings which found that the plain pack is more effective than the branded pack.[8,9-12] The revised plain packs were regarded as more effective than the revised branded packs for the four component categories of the effectiveness outcomes – attention, communication, identification, and effect.

Overall, of the four revised/new pictorial warnings, the highest-ranking pictorial health warnings on branded or plain packs in order of rank were the lung cancer warning (new) on a plain pack, the gangrene warning (new) on a branded pack and the impotence warning (revised) on a plain pack.

The pictorial warning on lung cancer on the plain pack was rated as the most effective, and that of lung cancer on the branded pack was second. This finding is not surprising, as lung cancer one of the most prevalent cancers in South Africa,[3] and is the leading form of cancer death globally.[13] Therefore, knowledge of lung cancer may be prevalent among the population, which could explain this effectiveness rating.

The finding that the gangrene pictorial warning was rated as the second most effective of the four revised/new pictorial warnings is interesting and will need further investigation. The finding could possibly be explained by considering that tobacco use contributes to most of the leading causes of death, including diabetes,[13] which is prevalent in South Africa.[3] Macro-vascular complications of diabetes such as gangrene are worsened by smoking.[14]

Similarly, the finding that the revised impotence warning on a plain pack was rated as third most effective confirms that the revision was successful, although the sample rating the revised pictorial warnings was different from the one rating the non-revised pictorial warnings. The pictorial warning on impotence was consistently among the

lowest ranked non-revised pictorial warnings, regardless of the pack. A possible explanation for the increased effectiveness of the revised impotence pictorial could be that the revised pictorial evoked strong emotions. Evans et al.[15] indicated that a crucial component in the effectiveness of pictorial health warnings is the ability to elicit emotion. One participant said: *"This one now – let me tell you, will make all the men stop, because no one wants their thing to do like that. You might as well just die, really" (36 yrs or above, female, non-smoker).*

6.4.1.2 Top ranking pictorials after revision of all 10 pictorials

This section discusses the complete set of 10 pictorial health warnings, which included the two revised warnings (impotence and poverty), two new health warnings (gangrene and lung cancer) and the rest with minor revisions, for instance, on the accompanying text (as in the pictorial warning on death).

Considering all 10 revised pictorial health warnings, the three top-ranked pictorial warnings in order of rank were the warnings for lung cancer, gangrene and impotence. Poverty was the lowest ranked, therefore the least effective pictorial health warning. The reasons for why the lung cancer, gangrene and impotence warnings are rated most effective have been already advanced in Section 6.4.1.1. Additionally, the reason why these revised pictorial warnings were ranked as the top three over for example the original abortion pictorial warning which was ranked higher in Chapter 5 will need to be investigated. A possible explanation could be the fact that the participants who accessed the original warnings in Chapter 5 diffed from those who assed the revised warnings. This fact has already been discussed earlier as a limitation.

The pictorial warning on poverty on the branded pack was rated as the least effective. It is worth noting that although the population that evaluated the revised pictorial health warnings was different from that which evaluated the original pictorial warnings, the pictorial warning on poverty, regardless of the pack, was ranked low by both evaluating populations. The finding suggests that there is a need to improve the pictorial warning on poverty because the depiction of poverty as a smoking-related consequence is essential, especially in South Africa, which is still grappling with disparities and poverty, as indicated in the earlier discussion,[16] and further smoking influences

poverty, as it worsens poverty.[17]

When combined, the findings reported in Chapter 6 lead to recommendations for South Africa on the pictorial warnings on branded or plain packs proposed for implementation .

6.5 RECOMMENDATIONS

This section and its subsections discuss the recommendations based on the results of the reactions among South African participants towards the revised pictorial health warnings, (on branded or plain packs)..

6.5.1 Pictorial warnings

The following recommendations are made with regard to the pictorial warnings:

- Similar to the findings in Chapter 5 the revised pictorial warnings also show that pictorial warnings, on plain or branded packaging, should be introduced on cigarette packs as they effective.
- Again the type of warning matters; the added lung cancer picture is the most effective with the revised poverty picture as the least effective.

6.5.2 Pictorial warnings on plain packs

- The findings in this Chapter corroborate those of Chapter 5 that pictorial health warnings on plain packs are effective and should be introduced in South Africa.

6.5.3 Final full set of recommended eight pictorial warnings on branded and plain packs

In the last stage (revised pictorial health warning) of Part Two of this study, 10 pictures were assessed, including two new pictures and two complete revisions of pictorial warnings, as well as six pictures with minor text revisions, on branded and plain packs. This section presents the final full set of pictorial warnings on branded packs (see Table 6.13) and on plain packs (see Table 6.14) that are recommended for implementation in South Africa.

Table 6.13: Final full set of recommended pictorial warnings on branded packs (mock brand design elements)

Table 6.14: Final full set of recommended pictorial warnings on plain packs

6.6 SUMMARY

The findings of the revised pictorial health warnings are consistent with those in Chapter 5 and therefore provide additional evidence for South Africa to implement pictorial warnings be they on branded or plain packaging.

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CHAPTER 7: FINDINGS IN PART THREE ON KNOWLEDGE OF SMOKING-RELATED HEALTH RISKS AND PERCEIVED EFFECTIVENESS OF PICTORIAL HEALTH WARNINGS AMONG SOUTH AFRICANS IN 2016/17

7.1 INTRODUCTION

As indicated in Chapter 1, this thesis consisted of three interrelated parts. This chapter presents the results of Part Three, related to meeting Objective 4. In this chapter, the recommendations from Chapter 6 of the study are used. Results are reported on the state of knowledge of cigarette smoking-related health consequences among a nationally representative sample of South Africans surveyed in 2016/17.

Building on the previous chapters, this chapter first presents the methodology, then results of the study participants' knowledge of cigarette smoking-related health consequences and reactions to selected pictorial health warnings on cigarette packs by participants of the 2016/17South African Social Attitudes Survey (SASAS). Finally, the chapter makes recommendations for South Africa on cigarette health warnings.

7.2 METHODOLOGY: PART THREE (OBJECTIVE 4)

Part Three of the study used secondary data from the 2016/17 South African Social Attitudes Survey (SASAS) to meet Objective 4, which was *[t]o determine the knowledge of smoking-related health risks among a nationally representative sample of South Africans and potential reaction to the selected pictorial warnings on branded pictorial warning packs at population level.*

7.2.1 Study design

The study was a quantitative, population-based cross-sectional study design using secondary data from the 2016/17 South African Social Attitudes Survey (SASAS) to assess the knowledge of tobacco health risks among South Africans.

7.2.2 Setting

The study was conducted in South Africa, which is divided into nine provinces.

7.2.3 Study population

The study population included all the participants who participated in the 2016/17 SASAS study. The 2016/17 SASAS is a representative sample of adults in South Africa (16 years and older) who were selected using a multi-stage probability sampling method.[1] The sample in SASAS was drawn from the second master sample of the South African Human Sciences Research Council (HSRC). [2] The ethics committee of the HSRC ethically approved the 2016/17 SASAS (see Appendix 16).

7.2.4 Inclusion and exclusion criteria

Participants who were part of the 2016/17 SASAS study, a national representative sample of adults in South Africa (16 years and older), were included in the current study. The exclusion criteria were similar to those used in Part One (Chapter 4, section 4.2.5) of the study, namely that vacant enumerator areas (EAs), recreational areas, industrial areas, special institutions (e.g school and university hostels, hospitals, old age homes and military camps) were excluded.

7.2.5 Sample size

Participants (16 years and older) who were part of the 2016/17 SASAS (N =3 079, response rate 88%) were included in the study to assess the knowledge of smoking-related health risks among South Africans.

7.2.6 Recruitment of study participants

The recruitment of study participants for the 2016/17 SASAS is the same as what has been described in Part One of the study Chapter 4, section 4.2.7.

7.2.7 Data source and sample design

The sampling procedure for the 2016/17 SASAS is the same as what has been described in (Chapter 4, section 4.2.3) part one of the study.

7.2.8 Data collection procedure and measurement tool

The procedure for data collection of the 2016/17 SASAS study is the same as what has been described in (Chapter 4, section 4.2.8) Part One of the study, except that the

2016/17 SASAS was collected from 17 January 2017 till 31 March 2017.

Ethical clearances were also granted by the HSRC (see Appendix 16) and the University of Pretoria Faculty of Health Sciences Human Research Ethics Committee (see Appendix 2c and 2d).

7.2.9 Data measurements and definitions

The 2016/17 SASAS, as indicated, sought to establish the knowledge of tobacco health risks at a population level. Furthermore, the revised pictorials from Part Two (Chapter 5 and 6) of the current study were used in the 2016/17 SASAS to determine the likely reaction to pictorial health warnings on branded packs in the South African population.

The measures and definitions of the 2016/17 SASAS are the same as those previously described in part one of the study (Chapter 4, section 4.2.10) as it relates to the analysis of the 2010 SASAS. The focus on describing measures here will be where there is a difference from the 2010 SASAS.

7.2.9.1 Demographic and socio-economic factors:

All the demographic and socio-economic factors have been previously described in part one (Chapter 4) of the study (see Section 4.2.10.1).

7.2.9.2 Knowledge of tobacco health risks

Similar to the 2010 SASAS, the questionnaire for the 2016/17 SASAS (see Appendix 17) contained items to assess knowledge of tobacco health risks. The same health conditions were assessed, but the response options used in 2016/17 SASAS were different. Participants answered questions regarding their opinion on whether smoking cigarettes increases the risk for various health conditions. The question assessing knowledge of cigarette smoking health risks was: “In your opinion, does smoking cigarettes increase risk for…..”. Response options were dichotomised into: “Yes” (1) if participants selected the health condition, or “No” if the participant did not choose the health condition. “None of the above”, “Don’t know”, and “Refused to answer” were coded as (0). The response options were:

- Stroke (blot clot in the brain)
- Impotence (a man not able to have sex)
- Lung cancer
- TB
- Gum disease
- Mouth cancer
- Hypertension
- HIV/AIDS (a dummy test response which was not included in the final analysis)

As with the SASAS 2010, principal component analysis was performed, and a 7-item scale excluding HIV/AIDS was derived. The excluded items loaded below the cut-off of 0.35 commonly set for acceptable extraction factor loading.[3,4] The 7-item scale obtained was considered to have good internal consistency, with a Cronbach alpha of 0.64. The factors loaded in two different categories. For analysis in our current study three categories of knowledge were then considered, namely “Vascular knowledge”, (stroke, impotence and hypertension), “Other knowledge”, (Lung cancer, TB, Gum disease, Mouth cancer) and “Total knowledge”, (a combination of the factors of vascular and other knowledge).

7.2.9.3 Tobacco use measures

The tobacco use measures have already been described in Section 4.2.10.3 (they are the same as those of the 2010 SASAS) except that, additionally, the 2016/17 SASAS asked a question on product harm. Participants were asked: “In your opinion, are the following products less harmful, more harmful, or just as harmful as smoking ‘regular’ cigarettes?” Participants had the following options:

- Smoking tobacco in a hookah or waterpipe?
- Smokeless tobacco such as snuff or chewing tobacco?
- Light or ultra-light cigarettes?
- Menthol cigarettes?
- Roll-your-own cigarettes?
- Electronic cigarettes (e-cigarettes)

Responses were dichotomised into “Less harmful” (“Less”, coded 1) and “More

harmful" ("More" and "Just as", coded 0). All the rest ("Don't know" and "Never heard of the product") were excluded.

7.2.9.4 Passive smoking

Passive smoking was measured by items asking: "In the past 30 days, about how many days would you say you were in a place where someone smoked close to you (no complete physical barrier, i.e., smoke got to you)?" The response options were:

- At home
- At work
- Café, restaurants
- Sheebens, bar or clubs

Responses were coded into "No exposure" ("Never", coded 0) and "Exposure" (Days from 1 to 20 days", coded 1). "Refused to answer" was excluded and treated as missing.

7.2.9.5 Health warnings

Three questions assessed health warnings. In the first question, participants were asked: "In the last month, how often if at all, have you noticed health warnings on cigarette packs?" Response options were

- Never
- Once in a while
- Often
- Very often
- Refused
- Can't say/Don't know about warnings

Responses were coded as: Never notice" ("Never" and "Can't say/Don't know about warnings", coded 1), "Once in a while", (coded 2) and Often ("Often" and "Very often", coded 3). Where participants who refused to answer, the answer was excluded.

In the second question, participants were asked: "In the last month, how often, if at all, have you read or looked closely at the health warnings on cigarette packages?" The responses were the same as those of the question above on noticing the health

warnings. Responses for the second question were coded into “Never read” (“Never” and “Can’t say/Don’t know about warnings”, coded 1) and “Once in a while (coded 2) and Often (“Often”and “Very often”, coded 3). Where participants who refused to answer, the answer was excluded.

The third question on the warnings stated: “Here are some comments that people make about the health warnings on cigarette packs and shop counter displays. Please tell me to what extent you agree or disagree with them.” Participants were then shown a show-card of the current text warnings, and the responses included:

- The written health warnings are easy to understand
- When smokers want a cigarette, the written health warnings are not going to stop them from smoking.
- The health warning pictures on “plain” packs will make smokers think more about giving up smoking. (Show-card of ‘plain packages shown to participants)
- The current displays of cigarette packs inside stores and shops may encourage young people to take up smoking

Participants had to indicate whether they Strongly agree (1), Agree (2), Disagree (3), Strongly disagree (4), or Refuse to answer (8). All the responses were dichotomised into “Agree” (“Strongly agree” and “Agree”, coded 1) and “Disagree” (“Disagree”, “Strongly disagree” and “Refuse to answer”, coded 0).

7.2.10 Data analysis

The SASAS 2016/17 provided secondary data for empirical evidence on the prevalence and associations between various factors affecting smoking behaviours. Similar to Chapter 4, after cleaning, the variables were recoded according to the above definitions. definitions given above. Non-parametric methods were used for analysis where appropriate after assessing the data for non-normality.

The main outcome measure or dependent variable was knowledge of health risks. Independent variables included those factors that were identified in similar studies as being significantly associated with knowledge of health risks.[5-7] These factors included tobacco use, alcohol use and problem drinking, and employment status. Covariates or

control variables included age and educational status.

Data analysis was performed using the statistical package STATA version 14 for Windows. All analyses took into account the multistage or complex survey design and sampling procedure used in the 2016/17 SASAS survey.[1,2] Similar to Chapter 4, Part One of this thesis, the weighting factor given in the SASAS datasets were used to weight the data so as for the differential probability of response and selection to be adusted for. In order to account for the complex survey design, the "svyset" function in STATA 14 was used before using any of the survey estimation commands. The sampling weighting, primary sampling unit, and stratification variables were set as svyset PSU[pweight=benchweight]IIDU.

Descriptive statistical analyses were used to compute frequency distributions, means and standard errors (standard error was used instead of standard deviation because of the larger population based results analysed by accounting for the complex survey design). As part of the primary analysis, cross-tabulations were conducted. Group differences were tested using chi-square analysis (for continuous variables) and independent t-tests (for categorical variables).

The variables that were significant at a 10% (α) level in bivariate analysis were entered into a stepwise multiple logistic regression model. Covariates, irrespective of the level of significance, were, age and smoking status.

Multivariate statistics such as factor analysis and principal component analysis (PCA) were used to reduce the dimensionality of the data where for instance, weighted sums of items used to score themes. Effect estimates or odds ratios (OR) with a 95% confidence interval (CI) were derived, using multiple logistic regression analysis (stepwise backward elimination method). Statistical significance was defined at $p < 0.05$.

Effect size estimates presented as odds ratios (ORs) were derived. To assess the adequacy of the fitted logistic regression models, standard diagnostic procedures such as the pseudo R^2, the Hosmer-Lemeshow goodness-of-fit test, and the model chi-

square test were used. For the Hosmer-Lemeshow goodness-of-fit test, the following were used for decisions: H_0: There is not enough reason to doubt the adequacy of the estimated model. H_1: There is enough reason to doubt the adequacy of the estimated model. The decision rule was made as follows: reject H_0 if $P < \alpha$ and do not reject H_0 if $P >= \alpha$. The statistical significance was defined at $p < 0.05$ or at the 95% confidence interval.

7.3 KNOWLEDGE OF CIGARETTE SMOKING-RELATED HEALTH CONSEQUENCES AND RISKS IN 2016/17 AMONG SOUTH AFRICANS

This section and the subsequent subsections present the results of Part Three of the thesis (Objective 4). In total, 3,063 South African adults (16 years and older) participated in the 2016/17 SASAS, with a response rate of 88%. The sample contained 48.3% (n=1,199) male and 51.7% female (n=1,864) participants. The mean age of the surveyed participants was 43.28 years (SD=17.43), and the majority were Black Africans (78.5%, n=1,872).

Most of the South Africans surveyed (80.1%; n=2,429) knew that lung cancer was likely to be a health consequence of smoking. Impotence, with only 10.3% (n=331), was the least known health consequence of smoking cigarettes (see Table 7.1).

Table 7.1: Knowledge of the health consequences of smoking cigarettes, SASAS 2016/17

Health consequences (N=3,063)	Variable	Weighted %(n)	Confidence interval (CI)
Impotence	Yes	10.3(331)	8.7-12.2
Hypertension	Yes	15.1(512)	12.9-17.5
Stroke	Yes	22.1(822)	19.7-24.8
Gum disease	Yes	32.6(1,038)	29.7-35.7
Mouth cancer	Yes	37.5(1,206)	34.5-40.7
Tuberculosis	Yes	57.4(1,715)	53.7-60.9
Lung cancer	Yes	80.1(2,429)	77.4-82.6

As discussed in the methodology, Section 7.2, principal component analysis was performed on the responses to questions about whether, in the participants' opinion, smoking cigarettes was likely to cause seven different types of smoking-related health consequences (see Appendix 12).

After principal component analysis, two-component knowledge scales were derived to assess knowledge, namely a 3-item scale called "**vascular knowledge**" (stroke, impotence and hypertension) with a Cronbach alpha reliability score of 0.55, and a 4-item scale called "**other knowledge**" (lung cancer, TB, gum disease and mouth cancer) with a Cronbach alpha reliability score of 0.54 were considered fair, considering the limited number of items in these scales. The combined 7-item scale, "**total knowledge**" (vascular and other knowledge combined) with a Cronbach alpha score of 0.64 was deemed to be satisfactory.

Participants who self-identified as Indian/Asian generally had greater knowledge of the health consequences of smoking cigarettes than participants in the other racial groups (namely, Black African, Coloured/Mixed race and White), especially regarding vascular knowledge (Mean 0.71 vs 0.45 vs 0.61 vs 0.50; p=0.011). Those in the highest socio-economic group, as indicated by the asset index, had significantly greater vascular knowledge than those in the low and middle socio-economic groups (Mean 0.56 vs 0.30 vs 0.44 respectively; p=0.002).

Participants whose residence or geographic location was classified as rural had greater "other" knowledge than those who resided in an urban location (Mean 2.20 vs 2.02; p=0.031). The distributions of the sample's socio-demographic characteristics by vascular and "other" knowledge of health consequences from smoking cigarettes are shown in Table 7.2, overleaf.

Table 7.2: Vascular and "other" knowledge of the health consequences of smoking cigarettes by socio-demographics, SASAS 2016/17

Variable (N)	Category(n)	Vascular knowledge (1-3)* Mean(SE**)	p-value§	Confidence Interval(CI)	Other knowledge (1-4)# Mean(SE**)	p-value §	Confidence Interval (CI)
Gender (3,063)			0.905			0.251	
	Male (1,199)	0.48(0.03)		0.41-0.54	2.04(0.06)		1.92-2.15
	Female (1,864)	0.47(0.03)		0.42-0.53	2.11(0.05)		2.02-2.21
Age group (3,063)			0.102(for trend)			0.708 (for trend)	
	16-34 (1,135)	0.44(0.03)	1(referent)	0.38-0.50	2.07(0.06)	1(referent)	1.97-2.18
	35-54 (1,050)	0.49(0.04)	0.250	0.42-0.57	2.10(0.06)	0.692	1.99-2.22
	55+ (878)	0.55(0.05)	0.037	0.45-0.64	2.03(0.07)	0.602	1.90-2.17
Asset Index/socio-economic status (2,777)			0.002 (for trend)			0.099 (for trend)	
	Low (144)	0.30(0.06)	1(referent)	0.18-0.43	2.11(0.13)	1(referent)	1.86-2.36
	Middle (1,396)	0.44(0.03)	0.048	0.37-0.50	2.15(0.05)	0.767	2.05-2.25
	Highest (1,237)	0.56(0.04)	0.001	0.48-0.64	1.97(0.07)	0.351	1.83-2.11
Race/ethnicity (3,063)			0.011 (for trend)			0.001 (for trend)	
	Black African (1,872)	0.45(0.03)	1(referent)	0.39-0.50	2.14(0.05)	1(referent)	2.04-2.23
	Coloured/Mixed race (495)	0.61(0.06)	0.018	0.48-0.73	1.87(0.12)	0.030	1.64-2.09
	Indian/Asian (348)	0.71(0.10)	0.009	0.52-0.90	2.25(0.11)	0.346	2.03-2.47

	White (348)	0.50(0.07)	0.510	0.36-0.64	1.73(0.13)	0.002	1.48-1.97
Education status (3,041)			0.130 (for trend)			0.435 (for trend)	
	<12 years (1,646)	0.44(0.03)	1(referent)	0.38-0.50	2.06(0.05)	1(referent)	1.96-2.16
	12 years (895)	0.49(0.04)	0.238	0.42-0.57	2.14(0.07)	0.284	2.01-2.27
	>12 years (500)	0.58(0.06)	0.048	0.46-0.70	2.02(0.11)	0.761	1.80-2.24
Geographic location /residence (N=3,063)			0.805			0.031	
	Rural (739)	0.47(0.04)		0.38-0.55	2.20(0.06)		2.07-2.33
	Urban (2,324)	0.48(0.03)		0.42-0.54	2.02(0.05)		1.91-2.13

***Vascular knowledge** (stroke + impotence + hypertension):*
Range 1 (*Lack of knowledge*) – 3 (*maximum Vascular knowledge*),
[#]***Other knowledge** (lung cancer +TB + gum disease + mouth cancer):*
Range 1 (*Lack of knowledge*) – 4 (*maximum Other knowledge*)
**Standard Error (SE)
[§]*All p-values were derived using the Chi-Square statistic*

Again, participants who self-identified as Indian/Asian also had significantly greater total knowledge of the health consequences of smoking cigarettes than Black African, Coloured/Mixed race, and White participants (Mean=2.96 vs 2.59 vs 2.48 vs 2.23; p=0.005 respectively). The distributions of the sample's socio-demographic characteristics by total knowledge of health consequences are shown in Table 7.3.

Table 7.3: Total knowledge of the health consequences from smoking cigarettes by socio-demographics, SASAS 2016/17

Variable(N)	Category(n)	Total knowledge (1-7)[¥] Mean(SE**)	p-value[§]	Confidence interval (CI)
Gender (3,063)			0.651	
	Male (1,199)	2.52(0.07)		2.38-2.65
	Female (1,864)	2.59(0.08)		2.43-2.75

Age group (3,063)			0.651(for trend)	
	16-34 (1,135)	2.52(0.07)	1(referent)	2.38-2.65
	35-54 (1,050)	2.59(0.08)	0.395	2.43-2.75
	55+ (878)	2.58(0.10)	0.539	2.39-2.78
Asset Index/socio-economic status (2,777)			0.475(for trend)	
	Low (144)	2.41(0.13)	1(referent)	2.15-2.66
	Middle (1,396)	2.58(0.07)	0.226	2.45-2.72
	Highest (1,237)	2.53(0.10)	0.431	2.34-2.72
Race/ethnicity (3,063)			0.005(for trend)	
	Black African (1,872)	2.59(0.06)	1(referent)	2.47-2.70
	Coloured/Mixed race (495)	2.48(0.17)	0.532	2.14-2.80
	Indian/Asian (348)	2.96(0.17)	0.034	2.63-3.29
	White (348)	2.23(0.17)	0.044	1.89-2.56
Education status (3,041)			0.414(for trend)	
	<12 years (1,646)	2.50(0.07)	1(referent)	2.36-2.64
	12 years (895)	2.63(0.09)	0.185	2.45-2.80
	>12 years (500)	2.60(0.15)	0.550	2.31-2.89
Geographic location/residence (3,063)			0.121	
	Rural (739)	2.67(0.09)		2.50-2.84
	Urban (2,324)	2.50(0.07)		2.36-2.64

¥***Total knowledge*** *(stroke + impotence + hypertension + lung cancer +TB + gum disease + mouth cancer):*
Range 1 (*Lack of knowledge*) – 7 (*maximum Total knowledge*)
**Standard Error (SE)
§*All p-values were derived using the Chi-Square statistic*

Of the participants, 19.3% (n=607) indicated that they were current smokers. The number of cigarettes smoked per day ranged from 1 to 80 (Mean=8.81, SE=7.94). Furthermore, 3.9% (n= 130) reported that they were currently using snuff, 3.1% (n=57) indicated currently using a waterpipe, and only 1.6% (n=35) reported that they were using e-cigarettes.

Compared to current users of waterpipes, those participants who were non-current users of waterpipes had significantly more "other" knowledge (Mean 2.10 vs 1.71; p=0.011) of the health consequences of smoking cigarettes. In addition, the non-current users of waterpipes had significantly greater total knowledge (Mean 2.58 vs 2.12; p=0.020) than the current users.

Those who planned to quit smoking cigarettes had more total knowledge (Mean 2.67 vs 2.19; p=0.037) than those not planning to quit cigarettes. The patterns of knowledge of the health consequences of cigarette smoking by tobacco smoking behaviour are indicated in Table 7.4.

Table 7.4: Knowledge of health consequences from smoking cigarettes by tobacco smoking behaviour, SASAS 2016/2017

Variable(N)	Category (n)	Vascular knowledge (1-3)* Mean(SE**)	Confidence Interval (CI)	Other Knowledge (1-4)# Mean(SE**)	Confidence Interval (CI)	Total knowledge (1-7)¥ Mean(SE**)	Confidence Interval (CI)
Current cigarette smoker (3,011)	No (2,404)	0.49(0.03)	0.44-0.54	2.11(0.05)	2.02-2.20	2.60(0.06)	2.48-2.72
	Yes (607)	0.43(0.04)	0.35-0.51	1.98(0.07)	1.83-2.12	2.41(0.09)	2.22-2.59
	p- value	0.217		0.086		0.061	
Current snuff use (3,011)	No (2,881)	0.48(0.02)	0.43-0.53	2.09(0.04)	2.00-2.18	2.57(0.06)	2.46-2.68
	Yes (130)	0.46(0.10)	0.26-0.66	1.94(0.12)	1.70-2.18	2.40(0.16)	2.09-2.72
	p- value	0.879		0.244		0.320	
Current hookah/ water pipe use (3,011)	No (2,954)	0.48(0.02)	0.43-0.53	2.10(0.04)	2.01-2.18	2.58(0.06)	2.27-2.68
	Yes (57)	0.41(0.10)	0.22-0.60	1.71(0.15)	1.41-2.00	2.12(0.20)	1.72-2.51
	p- value	0.471		0.011		0.020	

Current Electric-cigarette use (3,013)	No (2,978)	0.48(0.02)	0.43-0.53	2.09(0.04)	2.00-2.18	2.57(0.06)	2.46-2.68
	Yes (35)	0.48(0.16)	0.17-0.80	1.77(0.23)	1.32-2.22	2.25(0.27)	1.72-2.78
	p- value	0.975		0.172		0.258	
Exposed to smoking at home (3,063)	No (2,451)	0.49(0.03)	0.43-0.55	2.12(0.05)	2.02-2.21	2.61(0.07)	2.48-2.73
	Yes (612)	0.45(0.04)	0.38-0.52	2.00(0.06)	1.89-2.13	2.46(0.08)	2.30-2.62
	p- value	0.426		0.118		0.114	
Exposed to smoking at work (3,063)	No (2,737)	0.57(0.03)	0.42-0.53	2.12(0.05)	2.01-2.20	2.58(0.06)	2.46-2.70
	Yes (326)	0.49(0.04)	0.40-0.57	1.95(0.08)	1.80-2.11	2.44(0.10)	2.24-2.64
	p- value	0.761		0.074		0.226	
Exposed to smoking at café/restaurants (3,063)	No (2,683)	0.48(0.03)	0.42-0.53	2.09(0.05)	1.98-2.19	2.56(0.07)	2.43-2.70
	Yes (380)	0.47(0.03)	0.40-0.54	2.05(0.08)	1.92-2.19	2.52(0.09)	2.35-2.70
	p- value	0.922		0.686		0.727	
Exposed to smoking at shebeens/bar/club (3,063)	No (2,630)	0.49(0.03)	0.44-0.55	2.08(0.05)	1.98-2.18	2.58(0.07)	2.44-2.71
	Yes (433)	0.43(0.04)	0.36-0.51	2.06(0.07)	1.93-2.19	2.49(0.08)	2.34-2.65
	p- value	0.170		0.785		0.400	
Plan to quit	No (285)	0.34(0.08)	0.26-0.57	1.78(0.13)	1.53-2.02	2.19(0.17)	1.86-2.53

(577)							
	Yes (292)	0.56(0.08)	0.41-0.72	2.10(0.12)	1.87-2.33	2.67(0.17)	2.34-3.00
	p- value	0.174		0.047		0.037	
Quit attempt (572)	No (227)	0.41(0.06)	0.29-0.53	1.84(0.12)	1.60-2.09	2.24(0.15)	1.96-2.54
	Yes (345)	0.45(0.06)	0.34-0.57	2.05(0.09)	1.87-2.23	2.51(0.12)	2.27-2.74
	p- value	0.571		0.167		0.169	
Advised to quit (375)	No (244)	0.47(0.07)	0.34-0.60	1.88(0.11)	1.66-2.09	2.35(0.45)	2.06-2.63
	Yes (131)	0.51(0.08)	0.34-0.68	2.00(0.14)	1.73-2.27	2.51(0.19)	2.13-2.89
	p- value	0.687		0.466		0.482	

***Vascular knowledge** (stroke + impotence + hypertension):*
Range 1 (*Lack of knowledge*) – 3 (*maximum Vascular knowledge*)
#***Other knowledge** (lung cancer +TB + gum disease + mouth cancer):*
Range 1 (*Lack of knowledge*) – 4 (*maximum Other knowledge*)
¥***Total knowledge** (stroke + impotence + hypertension + lung cancer +TB + gum disease + mouth cancer):*
Range 1 (*Lack of knowledge*) – 7 (*maximum Total knowledge*)
**Standard Error (SE)
§*All p-values were derived using the Chi-Square statistic*

Of the participants, only 35.3% (n=1,120) indicated they had often noticed current health warnings in the past month. Conversely, 42.9% (n= 1,302) indicated they had never read current health warnings in the past month.

In total, 85.7% (n= 2,495) agreed that current text-only health warnings were easy to understand, while 58.2% (n=1,794) agreed that counter displays are a form of advertising.

The participants who disagreed that text-only warnings would stop smokers who want a cigarette had slightly more vascular disease-related knowledge than those who agreed (Mean 0.49 vs 0.39; p=0.039). The “vascular” and “other” knowledge of the health consequences of cigarette smoking by opinions on health warmings are indicated in Table 7.5, overleaf.

Table 7.5: Vascular and "other" knowledge of health consequences of smoking cigarettes by opinions on current text health warnings SASAS 2016/2017

Variable (N)	Category(n)	Vascular knowledge (1-3)* Mean(SE**)	*p*-value§	Confidence Interval (CI)	Other Knowledge (1-4)# Mean(SE**)	*p*-value§	Confidence Interval (CI)
Notice health warnings in past month (3,002)			0.691(for trend)			0.195(for trend)	
	Never (1,156)	0.48(0.04)	1 (referent)	0.41-0.55	2.03(0.06)	1 (referent)	1.91-2.16
	Once in a while (726)	0.46(0.04)	0.581	0.38-0.53	2.10(0.06)	0.404	1.99-2.21
	Often (1,120)	0.50(0.04)	0.729	0.42-0.57	2.17(0.06)	0.071	2.05-2.29
Read health warnings in past month (3,001)			0.056(for trend)			0.741(for trend)	
	Never(1,302)	0.45(0.03)	1 (referent)	0.39-0.52	2.10(0.06)	1 (referent)	1.98-2.22
	Once in a while (769)	0.43(0.04)	0.629	0.36-0.51	2.07(0.06)	0.657	1.94-2.20
	Often (930)	0.56(0.05)	0.048	0.47-0.65	2.13(0.06)	0.705	2.01-2.25
Current text-only health warnings are easy to understand (2,999)			0.773			0.079	
	Disagree (504)	0.46(0.05)		0.36-0.57	1.98(0.08)		1.82-2.13

	Agree (2,495)	0.48(0.03)		0.43-0.53	2.12(0.04)		2.03-2.21
Text-only warnings will stop smokers who want a cigarette (3,000)			0.039			0.379	
	Disagree (2,491)	0.49(0.03)		0.44-0.55	2.11(0.05)		2.02-2.20
	Agree (509)	0.39(0.04)		0.30-0.48	2.03(0.07)		1.89-2.18
Health warning on 'plain' packs will make smokers think more about quitting (2,999)			0.879			0.661	
	Disagree (1,698)	0.48(0.03)		0.42-0.54	2.09(0.05)		1.98-2.19
	Agree (1,301)	0.47(0.04)		0.40-0.54	2.12(0.05)		2.01-2.22
Counter display is a form of advertising (N=2,998)			0.370			0.085	
	Disagree (1,204)	0.50(0.04)		0.43-0.57	2.17(0.07)		2.06-2.28
	Agree (1,794)	0.46(0.03)		0.40-0.52	2.05(0.05)		1.95-2.15

***Vascular knowledge** (stroke + impotence + hypertension):*
Range 1 (*Lack of knowledge*) – 3 (*maximum Vascular knowledge*)
[#]***Other knowledge** (lung cancer +TB + gum disease + mouth cancer):*
Range 1 (*Lack of knowledge*) – 4 (*maximum Other knowledge*)
**Standard Error (SE)
[§]*All p-values were derived using the Chi-Square statistic*

There was no significant difference in total knowledge between participants who often noticed health warnings in the past month and those who never noticed, or only noticed health warnings occasionally (Mean 2.67 vs 2.51 vs 2.55; p=0.285 respectively). The total knowledge of the health consequences of cigarette smoking by opinions on health warmings is set out in Table 7.6.

Table 7.6: Total knowledge of health consequences of smoking cigarettes by opinions on health warnings, SASAS 2016/2017

Variable(N)	Category(n)	Total knowledge (1-7)[¥] Mean(SE**)	*p*- value[§]	Confidence Interval (CI)
Notice health warnings in past month (3,002)			0.285(for trend)	
	Never (1,156)	2.51(0.08)	1 (referent)	2.35-2.68
	Once in a while (726)	2.55(0.08)	0.713	2.40-2.71
	Often (1,120)	2.67(0.08)	0.133	2.51-2.83
Read health warnings in past month (3,001)			0.222(for trend)	
	Never(1,302)	2.56(0.08)	1 (referent)	2.41-2.71
	Once in a while (769)	2.50(0.08)	0.589	2.33-2.67
	Often (930)	2.69(0.09)	0.208	2.51-2.87
Current text-only health warnings are easy to understand (2,999)			0.155	
	Disagree (504)	2.44(0.11)		2.22-2.65
	Agree (2,495)	2.60(0.05)		2.49-2.71
Text-only warnings will stop smokers who want a cigarette (3,000)			0.099	
	Disagree (2,491)	2.60(0.06)		2.48-2.72
	Agree (509)	2.43(0.09)		2.25-2.61
Health warning on 'plain' packs will make smokers think more about quitting (2,999)			0.801	

	Disagree (1,698)	2.57(0.07)		2.43-2.71
	Agree (1,301)	2.59(0.07)		2.45-2.74
Counter display is a form of advertising (N=2,998)			0.088	
	Disagree (1,204)	2.67(0.08)		2.52-2.82
	Agree (1,794)	2.51(0.07)		2.38-2.64

¥***Total knowledge*** *(stroke + impotence + hypertension + lung cancer +TB + gum disease + mouth cancer):* Range 1 (*Lack of knowledge*) – 7 (*maximum Total knowledge*)
**Standard Error (SE)
§*All p-values were derived using the Chi-Square statistic*

7.4 OPINIONS ON THE EFFECTS OF HEALTH WARNINGS (SASAS 2016/17) AMONG SOUTH AFRICANS

This section and its subsections report on the opinions of South Africans who participated in the SASAS 2016/17 with regard to the effects of health warnings (text-only and pictorial warnings on a plain pack).

7.4.1 Opinions on the effect of text health warnings, SASAS 2016/17

Only 15.1% (n= 509) of participating South Africans felt that, when smokers want a cigarette, the text-only warnings would stop them from smoking. Conversely, 41.9% (n=1,301) agreed that the health warning pictures on plain packs shown to them on cue cards would make smokers think more about quitting.

The middle socio economic class had the lowest proportion of those who agreed that text warnings will stop smokers who want a cigarette compared to the lowest and highest socio economic class (13.8% vs 30.0% vs 14.0%; p=0.004). A lower proportion of those who resided in urban areas indicated that text-only warnings would stop smokers who want a cigarette compared to those residing in rural areas (12.5% vs 20.8%; p<0.001).

Table 7.7 overleaf, shows the opinions of participants on the perceived effect of current text-only warnings on stopping a smoker from smoking, stratified by socio-demographic characteristics.

Table 7.7: Opinions on the effects of current text health warnings by socio-demographics SASAS 2016/17

Variable (N)	Category(n)	Text-only warnings will stop smokers who want a cigarette Weighted % (n)	*p*-value§
Gender (3,000)			0.411
	Male (1,171)	14.2(199)	
	Female (1,829)	15.8(310)	
Age group (3,000)			0.365
	16-34 (1,117)	15.0(197)	
	35-54 (1,028)	13.9(154)	
	55+ (855)	17.5(158)	
Asset Index (Socio-economic class) (2,758)			0.004
	Low (144)	30.0(43)	
	Middle (1,382)	13.8(218)	
	Highest (1,232)	14.0(197)	
Race/ethnicity (3,000)			0.750
	Black African (1,837)	14.9(333)	
	Coloured/Mixed race (485)	13.6(56)	
	Indian/Asian (342)	18.0(70)	
	White (336)	16.8(50)	
Education status (2,979)			0.153
	<12 years (1,636)	16.5(285)	
	12 years (888)	13.0(148)	
	>12 years (455)	13.2(68)	
Geographic location/residence (3,000)			<0.001
	Rural (722)	20.8(154)	
	Urban (2,278)	12.5(355)	

All p-values were derived using the Pearson Chi-Square statistic

There was no significant difference of opinion between smokers and non-smokers about whether current text-only warnings would stop smokers who want a cigarette (11.6% vs 15.9%; p=0.060). There was also no significant difference of opinion between current snuff users and non users (22.2% vs 14.8%; p=0.158); those who were exposed to smoking at work and those not exposed (16.5% vs 14.9%; p=0.651); and those advised to quit compared to those who were not advised (14.8% vs 16.4%; p=0.807 respectively). Table 7.8 indicates the opinions on the effects of current text-only health warnings by tobacco use behaviour.

Table 7.8: Opinions on the effects of current text-only health warnings by tobacco use behaviour, SASAS 2016/17

Variable (N)	Category (n)	Text-only warnings will stop smokers who want a cigarette Weighted % (n)	*p*-value[§]
Current cigarette smoker (2,984)			0.060
	No (2,382)	15.9(431)	
	Yes (602)	11.6(74)	
Current snuff use (2,985)			0.158
	No (2,858)	14.8(483)	
	Yes (127)	22.2(24)	
Current hookah/waterpipe use (2,985)			0.960
	No (2,929)	15.1(499)	
	Yes (56)	15.4(48)	
Current electric-cigarette use (2,987)			0.348
	No (2,953)	15.0(502)	
	Yes (34)	24.6(5)	
Exposed to smoking at home (3,000)			0.214
	No (2,446)	15.7(441)	
	Yes (554)	12.5(68)	

Variable (N)	Category (n)	Text-only warnings will stop smokers who want a cigarette Weighted % (n)	*p*-value§
Exposed to smoking at work (3,000)			0.651
	No (2,732)	14.9(466)	
	Yes (268)	16.5(43)	
Exposed to smoking at café/restaurant (3,000)			0.425
	No (2,678)	15.3(458)	
	Yes (322)	13.1(51)	
Exposed to smoking at shebeen/bar/club (3,000)			0.785
	No (2,625)	15.0(443)	
	Yes (375)	15.7(66)	
Plan to quit (573)			0.194
	No (282)	9.2(29)	
	Yes (291)	13.9(41)	
Quit attempt (568)			0.221
	No (224)	8.7(24)	
	Yes (344)	13.5(46)	
Advised to quit (371)			0.807
	No (241)	16.4(36)	
	Yes (130)	14.8(14)	

**SHS = *Second-hand smoke*
§*All p-values were derived using the Pearson Chi-Square statistic*

Those who noticed the health warnings once in a while significantly had the lowest proportion of agreeing that text-only warnings will stop smokers who want a cigarette compared to those who never or often noticed the health warnings (11.6% vs 18.2% vs 14.3%; p=0.030 respectively).

Similarly, those who read the health warnings once in a while had the lowest proportion of agreeing that text-only warnings will stop smokers who want a cigarette compared to those who never or often read the health warnings (10.9% vs 17.5% vs 15.5%; p=0.025 respectively).

A significantly lower proportion of those who agreed that current text-only health warnings were easy to understand indicated that text-only warnings would stop smokers who want a cigarette compared to those who disagreed (10.4% vs 43.2%; p<0.001).

The finding was similar for those who agreed that health warning pictures on 'plain' packs would make smokers think more about quitting (10.4% vs 18.4%; p<0.001). Table 7.9 indicates the perceptions of the current text-only health warnings, divided by smokers' opinion on health warnings and advertising.

Table 7.9: Perceptions of current text-only health warnings by smokers' opinions on health warnings and advertising, SASAS 2016/17

Variable (N)	Category (n)	Text-only warnings will stop smokers who want a cigarette Weighted % (n)	*p*-value§
Notice of health warnings (2,998)			0.030
	Never (1,153)	18.2(266)	
	Once in a while (726)	11.6(91)	
	Often (1,119)	14.3(151)	
Read health warnings (2,997)			0.025
	Never (1,299)	17.5(281)	
	Once in a while (769)	10.9(92)	
	Often (929)	15.5(134)	
Current text-only health warnings are easy to understand (2,998)			<0.001
	Disagree (504)	43.2(247)	
	Agree (2,494)	10.4(262)	
Health warning pictures on plain packs will make smokers think more about quitting (2,998)			<0.001
	Disagree (1,698)	18.4(371)	
	Agree (1,300)	10.4(138)	

Counter display is a form of advertising (2,997)			<0.001
	Disagree (1,203)	24.9(356)	
	Agree (1,794)	7.9(152)	

§All p-values were derived using the Pearson Chi-Square statistic

7.4.2 Opinions on the effect of pictorial warnings on a plain pack

Compared to those with 12 years of education a significantly higher proportion of those with less than 12 years or more than 12 years education agreed that health warning pictures on plain packs would make smokers think more about quitting (36.4% vs 44.4% vs 46.4%; p=0.018 respectively).

The perceived effectiveness of pictorial warning was not significantly associated with age, gender, race, or the socio-economic status of participants (see Table 7.10).

Table 7.10: Opinions on the effects of pictorial health warnings on plain packs by socio-demographics, SASAS 2016/17

Variable (N)	Category (n)	Health warning pictures on plain packs will make smokers think more about quitting Weighted %(n)	*p*-value§
Gender (2,999)			0.404
	Male (1,170)	40.6(505)	
	Female (1,829)	43.1(796)	
Age group (2,999)			0.167
	16-34 (1,115)	39.7(468)	
	35-54 (1,029)	45.2(459)	
	55+ (855)	42.1(374)	
Asset Index/socio-economic status (2,757)			0.352
	Low (144)	46.4(59)	
	Middle (1,380)	43.2(620)	
	Highest (1,233)	39.1(519)	

Variable (N)	Category (n)	Health warning pictures on plain packs will make smokers think more about quitting Weighted %(n)	*p*-value[§]
Race/ethnicity (2,999)			0.320
	Black African (1,836)	42.5(798)	
	Coloured/Mixed race (484)	36.1(206)	
	Indian/Asian (343)	47.2(171)	
	White (336)	40.3(126)	
Education status (2,978)			0.018
	<12 years (1,635)	44.4(747)	
	12 years (888)	36.4(353)	
	>12 years (455)	46.4(196)	
Geographic location/residence (2,999)			0.189
	Rural (721)	45.1(321)	
	Urban (2,278)	40.5(980)	

[§]*All p-values were derived using the Pearson Chi-Square statistic*

Compared to current users of electronic cigarettes, a significantly higher proportion of those who were not current electronic cigarette users agreed that pictorial health warnings on plain packs would make smokers think more about quitting (21.8% vs 42.3%; p=0.037).

A higher proportion of those who had made a quit attempt in the past were also more likely to believe that pictorial warnings on plain packs would make smokers think more about quitting (47.3% vs 31.5%; p=0.017). Table 7.11 overleaf, indicates the opinions on the potential effects of pictorial health warnings on plain packs by tobacco use behaviour.

Table 7.11: Opinions on the effects of pictorial health warnings on plain packs by tobacco use behaviour, SASAS 2016/17

Variable (N)	Category (n)	Health warning pictures on plain packs will make smokers think more about quitting Weighted %(n)	*p*-value§
Current cigarette smoker (2,983)			0.974
	No (2,381)	42.1(1,024)	
	Yes (602)	42.0(273)	
Current snuff use (2,984)			0.555
	No (2,857)	41.8(1,241)	
	Yes (127)	45.6(54)	
Current waterpipe use (2,984)			0.211
	No (2,927)	42.3(1,271)	
	Yes (57)	31.3(24)	
Current electric-cigarette use (2,986)			0.037
	No (2,951)	42.3(1,285)	
	Yes (35)	21.8(12)	
Exposed to smoking at home (2,999)			0.924
	No (2,447)	41.8(1,055)	
	Yes (552)	42.2(246)	
Exposed to smoking at work (2,999)			0.075
	No (2,733)	41.3(1,173)	
	Yes (266)	47.6(128)	
Exposed to smoking at café/restaurant (2,999)			0.175
	No (2,678)	41.0(1,154)	
	Yes (321)	49.3(147)	
Exposed to smoking at shebeen/bar/club (2,999)			0.096
	No (2,626)	40.9(1,125)	
	Yes (373)	47.6(176)	

Variable (N)	Category (n)	Health warning pictures on plain packs will make smokers think more about quitting Weighted %(n)	*p*-value§
Plan to quit (573)			0.300
	No (282)	38.0(115)	
	Yes (290)	44.0(143)	
Quit attempt (568)			0.017
	No (225)	31.5(84)	
	Yes (343)	47.3(170)	
Advised to quit (372)			0.209
	No (242)	36.8(100)	
	Yes (130)	47.2(64)	

§All p-values were derived using the Pearson Chi-Square statistic

A significantly higher proportion of those participants who agreed that counter displays were a form of advertising (54.4% vs 24.6%; p=<0.001) also agreed that pictorial health warnings on plain packs would make smokers think more about quitting (24.6% vs 54.4%; p=<0.001) compared to those who disagreed.

Furthermore, a significantly higher proportion of those who disagreed that text-only warnings would make smokers quit, compared to those who agreed(44.2% vs 29.0%; p=<0.001), agreed that pictorial warnings would make smokers think of quitting (see Table 7.12).

Table 7.12: Pictorial health warnings on plain packs by opinion on health warnings and advertising

Variable (N)	Category (n)	Health warning on plain packs will make smokers think more about quitting Weighted % (n)	*p*-value§
Notice of health warnings (2,997)			0.245
	Never (1,153)	41.3(481)	
	Once in a while (725)	45.8(317)	
	Often (1,119)	39.5(502)	

Variable (N)	Category (n)	Health warning on plain packs will make smokers think more about quitting Weighted % (n)	*p*-value[§]
Read health warnings (2,996)			0.302
	Never (1,299)	40.5(535)	
	Once in a while (767)	45.5(337)	
	Often (930)	40.4(428)	
Current text-only health warnings are easy to understand (2,997)			0.127
	Disagree (504)	36.6(160)	
	Agree (2,493)	42.8(1,141)	
Text-only warnings will stop smokers who want a cigarette (2,998)			<0.001
	Disagree (2,489)	44.2(1,162)	
	Agree (509)	29.0(138)	
Counter display is a form of advertising (2,997)			<0.001
	Disagree (1,204)	24.6(271)	
	Agree (1,793)	54.4(1,030)	

[§]*All p-values were derived using the Pearson Chi-Square statistic*

7.4.3 Final logistic regression models on opinions of the effects of health warnings among South Africans SASAS 2016/17

Two separate models were constructed to predict the factors associated with the opinions on the effects of health warnings. Model 1 was designed to predict opinion on whether current text warnings will stop a smoker who wants a cigarette. The variables that were significant at 10% (α) level in a bivariate analysis were entered into a multivariate analysis (see Tables 7.6 to 7.8 above). Only those variables that were significant at p< 0.05 level were retained in the final model.

The following were significantly associated with lower odds of agreeing that text-only warnings would stop a smoker who wants a cigarette: geographic location, agreement

that "current text-only health warnings are easy to understand", and that a "counter display is a form of advertising", as shown in Table 7.13.

Table 7.13: Final logistic regression model of factors associated with opinions on the effects of health warnings, SASAS 2016/17

Variable		**Model 1: Text-only health warnings will stop smokers who want a cigarette *OR* (95%CI)**	***p-value***	**Model 2: Health warning on plain packs will make smokers think more about quitting *OR* (95%CI)**	***p-value***
Geographic location			0.003	-	-
	Rural	1(referent)		-	
	Urban	0.60(0.43-0.84)		-	
Education status			-		0.017
	<12 years	-		1(referent)	
	12 years	-		0.55(0.32-0.93)	
	>12 years	-		1.71(0.74-3.93)	
Current Electronic-cigarette use					0.020
	No	-		1(referent)	
	Yes	-		0.21(0.06-0.79)	
Counter display is a form of advertising			<0.001		<0.001
	Disagree	1(referent)		1(referent)	
	Agree	0.29(0.21-0.41)		3.27(1.91-5.60)	
Exposed to smoking at work					0.005
	No	-		1(referent)	
	Yes	-		2.29(1.29-4.07)	
Quit attempt					0.019
	No			1 (referent)	
	Yes			1.95(1.11-3.41)	

Variable		Model 1: Text-only health warnings will stop smokers who want a cigarette *OR* (95%CI)	*p-value*	Model 2: Health warning on plain packs will make smokers think more about quitting *OR* (95%CI)	*p-value*
Current text-only health warnings are easy to understand			<0.001		
	Disagree	1 (referent)		-	
	Agree	0.17 (0.12-0.25)		-	

Variables entered into model 1: *Asset index (socio-economic class),geographic location (residence), current cigarette smoker, notice of health warnings, read health warnings, current text-only health warnings are easy to understand, health warning pictures on 'plain' packs will make smokers think more about quitting, counter display is a form of advertising.*

Variables entered into model 2: *Education status, current electronic cigarette use, exposed to smoking at work, exposed to smoking at shebeens/bar/club, quit attempt, current text-only health warnings are easy to understand, text-only warnings will stop smokers who want a cigarette, counter display is a form of advertising.*

The adequacy of the above fitted models was assessed. For Model 1, the pseudo R^2 was 0.213 and was considered adequate.

In Model 2, to predict belief about whether pictorial warnings on a plain pack would stop a smoker who wants a cigarette, the variables that were significant at a 10% (α) level in a bivariate analysis were also entered into a multivariate analysis (see Tables 7.10 to 7.12 above). Only those variables that were significant at $p< 0.05$ level were retained in the final model.

The following were significantly associated with higher odds of believing that pictorial warnings on a plain pack would stop a smoker who wants a cigarette: an education status of more than 12 years, believing that showing cigarette packs in shops was a form of counter display, exposure to smoking at work and attempting to quit smoking within the last 12 months (see Table 7.13 above). The adequacy of the fitted model 2 was assessed, and a pseudo R^2 of 0.188 was obtained and considered as adequate.

7.5 ATTEMPT TO QUIT AMONG SOUTH AFRICANS, SASAS 2016/17

According to SASAS 2016/17, considering the current cigarette smokers, 50.5% (n=338) planned to quit and 60.0% (n=361) had attempted to quit smoking within the last 12 months. Only 37.4% (n=140) of the smokers who attempted to quit in the last 12 months received advice to do this.

Significantly more male participants had attempted to quit than female participants (63.6% vs 46.9%; p=0.034). Table 7.14 indicates attempt to quit by socio-demographics.

Table 7.14: Attempt to quit by socio-demographics, SASAS 2016/17

Variable (N)	Category (n)	Quit attempt Weighted % (n)	*p*-value§
Gender (598)			0.034
	Male (396)	63.6(253)	
	Female (202)	46.9(108)	
Age group (598)			0.679
	16-34 (218)	62.6(138)	
	35-54 (232)	57.3(136)	
	55+ (148)	58.7(87)	
Asset Index/ socio-economic status (566)			0.572
	Low (35)	72.9(24)	
	Middle (247)	59.3(156)	
	Highest (284)	58.1(166)	
Race/ethnicity (598)			0.000
	Black African (253)	67.0(175)	
	Coloured/Mixed race (172)	35.0(80)	
	Indian/Asian (71)	77.4(48)	
	White (102)	56.3(58)	
Education status (596)			0.191
	<12 years (336)	60.6(205)	
	12 years (170)	54.2(100)	
	>12 years (90)	71.7(55)	

Variable (N)	Category (n)	Quit attempt Weighted % (n)	*p*-value§
Geographic location/residence (598)			0.204
	Rural (104)	68.5(66)	
	Urban (494)	57.2(295)	

§*All p-values were derived using the Pearson Chi-Square statistic*

A higher proportion of users of electronic cigarettes had significantly attempted to quit cigarette smoking compared to non-users (85.4% vs 59.3%; p=0.010). Furthermore, a significantly higher proportion of those who were exposed to smoking at shebeens, bars or clubs had also attempted to quit smoking, compared to those who were not exposed (73.6% vs 53.2%; p=0.010). Table 7.15 indicates the attempt to quit by smoking behaviour.

Table 7.15: Attempt to quit by smoking behaviour, SASAS 2016/17

Variable (N)	Category (n)	Quit attempt Weighted % (n)	*p*-value§
Current cigarette smoker (596)			0.496
	No (24)	68.9(15)	
	Yes (572)	59.9(345)	
Current snuff use (593)			0.165
	No (585)	60.0(354)	
	Yes (8)	82.5(4)	
Current hookah/waterpipe use (593)			0.336
	No (557)	59.4(334)	
	Yes (36)	70.5(25)	
Current Electronic-cigarette use (593)			0.010
	No (574)	59.3(346)	
	Yes (19)	85.4(13)	
Exposed to smoking at home (598)			0.931
	No (337)	60.3(206)	
	Yes (261)	59.7(155)	

Variable (N)	Category (n)	Quit attempt Weighted % (n)	*p*-value§
Exposed to smoking at work (598)			0.701
	No (467)	60.7(289)	
	Yes (131)	57.9(72)	
Exposed to smoking at café/restaurant (598)			0.998
	No (487)	60.0(290)	
	Yes (111)	60.0(71)	
Exposed to smoking at shebeen/bar/club (598)			0.001
	No (431)	53.2(243)	
	Yes (167)	73.6(118)	
Plan to quit (598)			0.000
	No (293)	40.3(110)	
	Yes (305)	79.7(251)	
Advised to quit (392)			0.288
	No (254)	64.7(166)	
	Yes (138)	73.6(104)	

§*All p-values were derived using the Pearson Chi-Square statistic*

A significantly higher proportion of participants who agreed that health warning pictures on plain packs would make smokers think more about quitting had attempted to quit cigarette smoking within the past 12 months compared to those who disagreed (69.6% vs 53.7%; p=0.012). Table 7.16 indicates the attempt to quit by opinion on health warnings and advertising.

Table 7.16: Attempt to quit by opinion on health warnings and advertising, SASAS, 2016/17

Variable (N)	Category (n)	Quit attempt Weighted %(n)	*p*-value§
Notice of Health warnings (595)			0.937
	Never (80)	59.6(51)	
	Once in a while (99)	62.5(54)	
	Often (416)	59.6(255)	

Variable (N)	Category (n)	Quit attempt Weighted %(n)	*p*-value§
Read Health warnings (595)			0.840
	Never (99)	62.0(64)	
	Once in a while (158)	57.6(85)	
	Often (338)	61.0(211)	
Current text-only health warnings are easy to understand (595)			0.904
	Disagree (54)	61.3(32)	
	Agree (541)	60.0(328)	
Text-only warnings will stop smokers who want a cigarette (594)			0.060
	Disagree (515)	58.1(306)	
	Agree (79)	73.5(54)	
Health warning pictures on plain packs will make smokers think more about quitting (594)			0.012
	Disagree (330)	53.7(181)	
	Agree (264)	69.6(178)	
Counter display is a form of advertising (595)			0.119
	Disagree (224)	54.5(115)	
	Agree (371)	64.1(245)	

§*All p-values were derived using the Pearson Chi-Square statistic*

7.5.1 Final logistic regression models on attempt to quit among South Africans, SASAS 2016/17

A model was constructed to predict the factors associated with attempting to quit within the last 12 months. Consistent with the methodology used for the other models, the variables that were significant at a 10% (α) level in a bivariate analysis were entered into a multivariate analysis (see Tables 7.14 to 7.16 above). Only those variables that

were significant at a 0.05 level were retained in the final model.

The following were significantly associated with higher odds of attempting to quit within the last 12 months: planning to quit, being of Indian/Asian or White ethnicity/race and indicating that health warnings pictures on plain packs would make smokers think more about quitting (see Table 7.17).

Table 7.17: Final logistic regression model of factors associated with quit attempt, SASAS 2016/17

Variable		**Quit attempt within the last 12 months *OR*(95%CI)**	***p-value***
Gender			0.025
	Male	1(referent)	
	Female	0.47(0.24-0.91)	
Race/ethnicity			0.004
	Black African	1(referent)	
	Coloured/Mixed race	0.44(0.23-0.86)	
	Indian/Asian	1.41(0.56-3.56)	
	White	1.53(0.67-3.51)	
Plan to quit			<0.001
	No	1(referent)	
	Yes	6.28(3.40-11.58)	
Health warning pictures on plain packs will make smokers think more about quitting			0.042
	Disagree	1(referent)	
	Agree	1.88(1.02-3.44)	

Variables entered into model: *Gender, race/ethnicity, current electronic cigarette use, exposed to smoking at shebeens/bar/club, plan to quit, text-only warnings will stop smokers who want a cigarette, health warning pictures on 'plain' packs will make smokers think more about quitting, counter display is a form of advertising.*

The adequacy of the above fitted model was assessed and the pseudo R^2 was 0.281, therefore the estimated model was considered adequate.

7.6 STRUCTURAL EQUATION MODEL ON PATHWAYS TO QUIT ATTEMPT IN A NATIONAL HOUSEHOLD POPULATION OF SOUTH AFRICAN SMOKERS

A structural equation model was constructed to understand relationships and pathways between response to exposure to pictorial warning on plain packs and quit attempts among South African smokers who participated in the SASAS 2016/17.

The *a priori* model that was specified and tested was informed by the Integrated Behaviour Change Model with information processing (reading text-only or perceiving a pictorial warning as effective) and stage of change, as respectively distant and proximal constructs leading to behavioural action, namely quit attempt (see Figure 7.1 below).

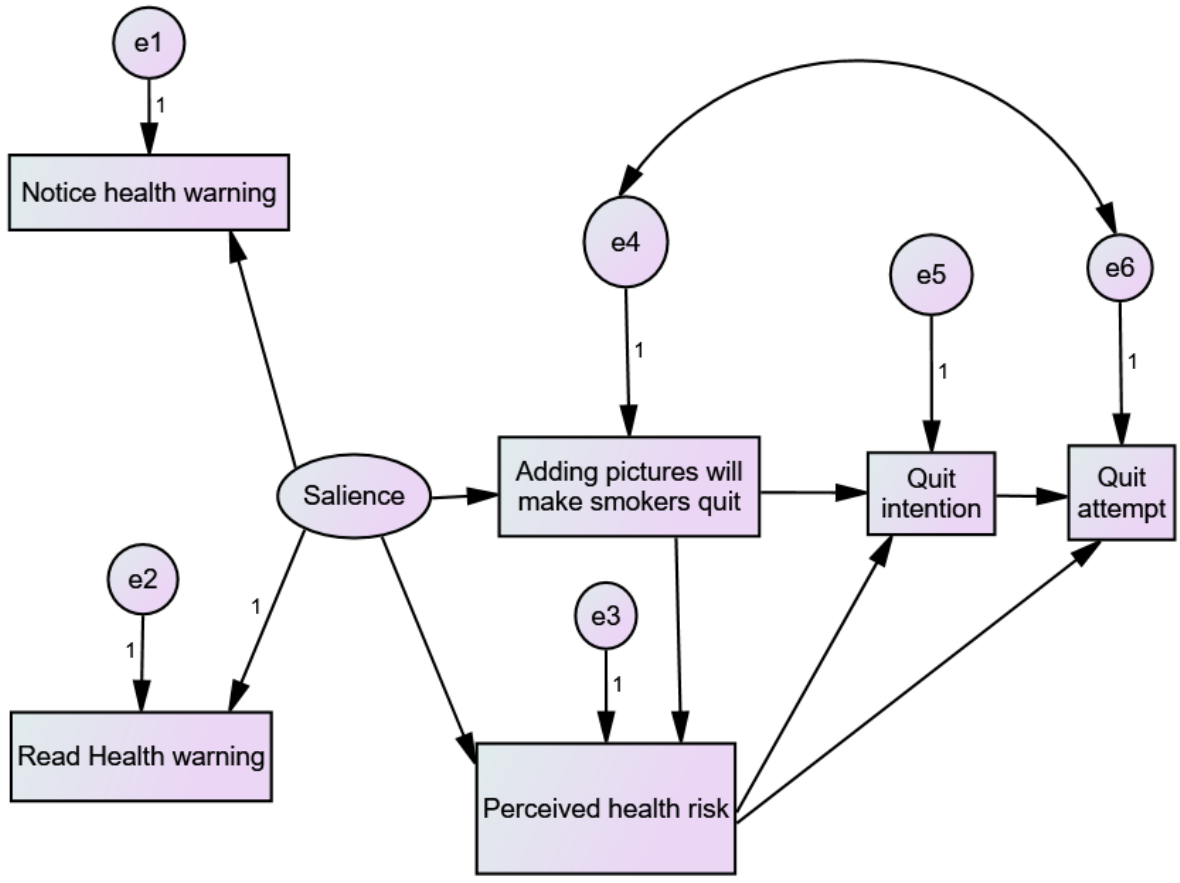
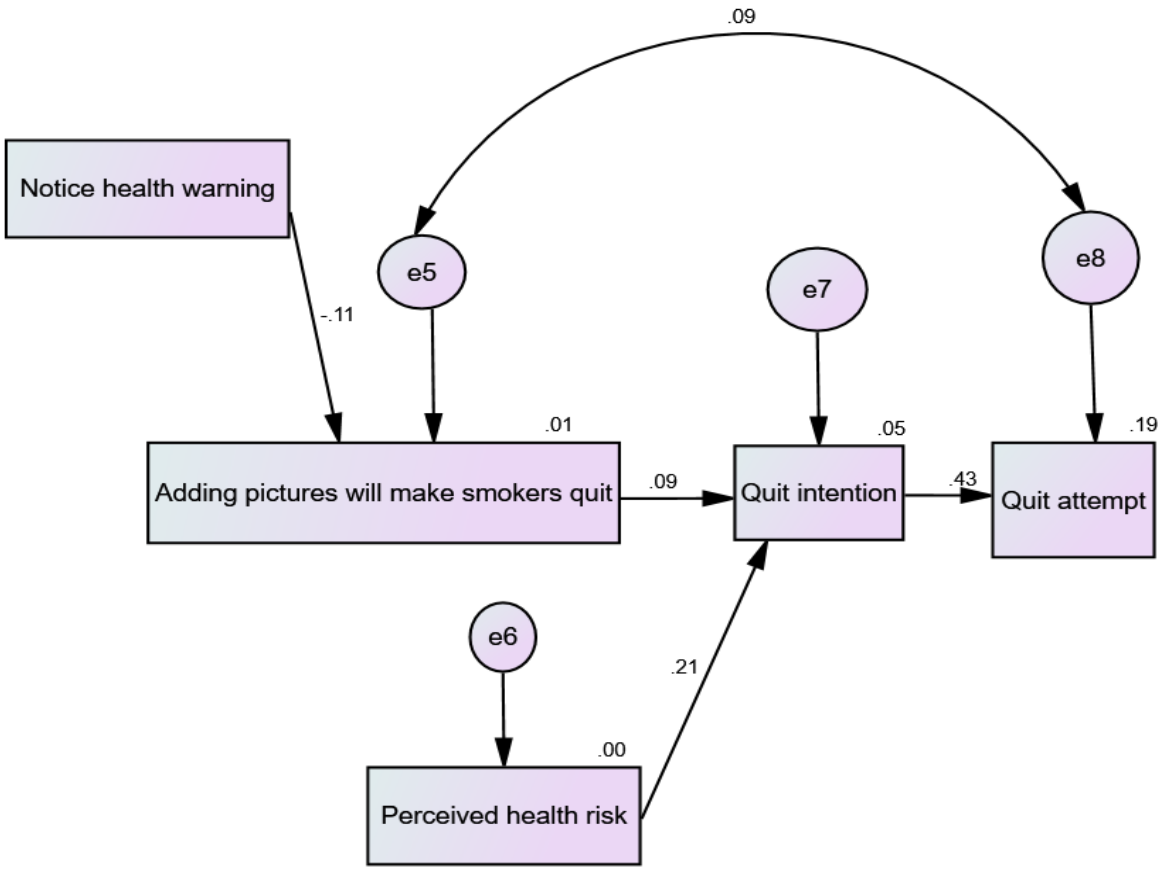


Figure 7.1: *A priori* structural equation model to predict factors associated with quit attempt, SASAS 2016/17

The final model shows that smokers who reported that they often noticed current text-only warnings were less likely to report that the pictorial warning would be likely to motivate quitting (β= - 0.11, p<0.001), which in turn was associated with being more likely to be in a more advanced stage of quitting (quit intention), (β= 0.09, p<0.001). Greater interest in quitting was then directly associated with quit attempt (β= 0.43, p<0.001). However, neither the frequent reading of current text-only warnings nor the perceived effectiveness of pictorial warning was associated with perceived risk, which was also directly associated with greater quit intent (β= 0.21, p<0.001),. The final structural equation model that best fits current data is depicted in Figure 7.2.



***Notice health warning**= Never (1), Once in a while(2), Often(3).*
****Adding pictures will make smokers quit**= disagree (0), agree (1).*
*****Perceived health risk** = **Total knowledge** (stroke + impotence + hypertension + lung cancer +TB + gum disease + mouth cancer):* Range 1 (*Lack of knowledge*) – 7 (*maximum Total knowledge*)
****** Quit intention (plan to quit)** =Not planning (1), next month(2), next 6 months(3), in the future sometime beyond 6 months(4)*
******* Quit attempt** = No(0), Yes (1)*

Figure 7.2: Structural equation model to predict factors associated with quit attempt, SASAS 2016/17

The sample size was 542 participants. The model fit was considered adequate due to the following fit statistics: p-value=0.211; Comparative Fit Index (CFI)=0.986; Normed Fit Index (NFI)=0.956; and the root mean square error of approximation (RMSEA)=0.028. To consider the model fit adequate, the following values should be obtained: Chi square>0.05; probability level>0.05; NFI>0.95; CFI>0.95; RMSEA<0.08.[8,9]

7.7 DISCUSSION

The aim of this part of the thesis was to determine the knowledge of smoking-related health risks among a nationally representative sample of South Africans and potential reaction to selected pictorial warnings on plain packs at a population level.

This section and its subsections discusses the results of the final analysis of the 3,063 South African adults (16 years and older) who participated in the 2016/17 SASAS. The section presents the discussion of the results pertaining to knowledge of tobacco health risks, opinions on the effects of health warnings (particularly on plain packs), and finally, factors associated with an attempt to quit smoking among South Africans.

7.7.1 Knowledge of tobacco health risks among South Africans, SASAS 2016/17

The final analysis indicated that 19.3% of the participants were current smokers, which was higher than the 17% prevalence reported in 2017.[10-12] Consistent with the thesis's earlier findings in Chapter 5, among participants of the SASAS 2010, the results of the 2016/17 SASAS suggest that overall knowledge of tobacco health risks was fair, but when it came to specific diseases, there was a difference: knowledge of tobacco health risks varied according to the type of knowledge.

Vascular disease knowledge was generally lower than "other" and total knowledge. The finding is similar to those in various international studies;[13-15] for example, in a study among Vietnamese adults, Mihn An[13] found that knowledge of vascular diseases as a health consequence of smoking was low.[13] A possible explanation for this finding could be the fact that, in South Africa, the prevalence of vascular diseases is lower

than that of "other" smoking-related health consequences.[16,17]

The "other" smoking-related health consequences, which include lung and mouth cancer and TB, are indeed more prevalent in the general population in South Africa,[17] especially TB compared to vascular conditions. In their study on the burden of disease in South Africa, Bradshaw et al.[18] noted that communicable diseases are still the leading cause of death (although non-communicable diseases have also become significant).[19] It is therefore logical that the general population would be better informed about and more familiar with the smoking-related health consequences that are most prevalent in the country, such as lung cancer and TB.

Alternatively, mass communication about smoking-related health consequences in South Africa may be more focused on the most commonly occurring smoking-related health consequences and co-morbidities than on the less common ones, for example, vascular diseases such as impotence. In the Vietnamese context, Mihn An[13] concluded that messages or images on specific diseases should be communicated to increase knowledge on all smoking-related health risks,[13] and the same argument might apply in South Africa too. Hence, Article 4 of the WHO FCTC[20] calls on countries to implement measures that will ensure that every person is informed of *all* the smoking-related health consequences.[20]

This thesis further found that knowledge of smoking-related health consequences was positively associated with socio-demographic factors such as a higher asset index (socio-economic status), race or ethnicity (particularly being Indian/Asian, as compared to Black Africans), and residing in a rural geographic location. Those with the highest socio-economic status significantly had better vascular knowledge, followed by those of middle and finally those of low socio-economic status. The finding is not surprising, because those in the higher socio-economic groups have been shown to face more risk factors for, and a higher prevalence of vascular diseases[21,22] than those in the lower socio-economic groups.

Those who indicated being Indian/Asian had significantly better vascular, "other" and total knowledge than those of other ethnicity/in the other race groups. This disparity of

knowledge between ethnic groups could be due to the fact that South Africa is still largely segregated by race,[23] and that the risk of disease and disease still disproportionately affect the population along racial lines.[24,25] The vascular knowledge finding, for instance, was to be expected because the Indian/Asian population group generally s has risk factors and a higher prevalence of vascular diseases.[24,26] The higher burden of vascular diseases in the Indian/Asian population could explain their significantly better vascular and total knowledge.

In this regard, it should be noted that the Indian/Asian population has the highest age-standardised death rate (ASDRs) from ischaemic heart disease, compared to the other population groups.[19] Indeed, ischaemic heart disease is the second leading cause of death among the South African Indian/Asian population.[27] The finding that they also lead on "other" knowledge is surprising and needs further investigation, because in South Africa, with its quadruple burden of disease,[25] the Indian/Asian population does not suffer a disproportionately higher burden of lung cancer, TB, gum disease or mouth cancer, compared to the other population groups. [19,25,27]

The Coloured/Mixed race population group had the second highest vascular knowledge. Again, the finding is not surprising, as this population has high age-standardised death rates (ASDRs) for vascular diseases such as cardiovascular diseases (CVD) at 107/100 000 population and ischaemic heart disease at 108/100 000 population.[19] The Black Africans had the second highest "other" and total knowledge. Again, this finding is not surprising as the leading cause of death of Black Africans is TB[27] and Black Africans also have the second highest ASDRs for cardiovascular disease at 140/100 000 population.[19]

Interestingly, in this study, those in the rural areas had significantly greater "other" knowledge of smoking-related health consequences than those in urban areas. This finding is surprising because one would expect that living in an urban area means more access to information and therefore more knowledge, which is what Adeniyi et al.[28] found in Nigeria.[28] However, the poorest in South Africa have been consistently shown to live in rural areas,[23] and they are Black Africans, whose leading cause of death, as has already been indicated, is TB.[10,27] In South Africa, rural areas have also

been shown to have a significant emerging high prevalence of cancers, including smoking-related cancers,[19,29] and are disproportionally affected by communicable diseases. For instance, those in rural areas have a high prevalence of TB, which was one of the diseases that made up “other” knowledge. Therefore, those in the rural areas have more knowledge of smoking-related “other” knowledge because, unlike vascular diseases, these “other” smoking-related risks and diseases are prevalent in the rural areas.

This thesis’s findings on knowledge and socio-demographics (as discussed above) are therefore similar to those of other studies that report that knowledge of tobacco health risks is influenced by a number of factors, including socio-demographic factors.[13,28] In this regard, Adeniyi et al.[28] in their study on access to knowledge of health consequences among adults in Nigeria found that knowledge varied by region and level of socio-economic development.

Knowledge of smoking-related health consequences was also significantly associated with tobacco smoking behaviour. Those who were not current users of waterpipes had significantly better “other” and total knowledge than current users. This finding on waterpipes is also consistent with those of other studies[30,31] which indicate that those who use a waterpipe have lower knowledge of the health risks of smoking.[30,31] Furthermore, there is generally lower knowledge about the health risks of using waterpipes.[32] This thesis’s finding of lower knowledge of smoking-related health risks among current users of waterpipes perhaps explains why these smokers currently use thewaterpipes. The knowledge of smoking-related health risks among non-current waterpipe users means that smoking-related health risk knowledge may be beneficial not only for those who smoke cigarettes, but also for users of non-cigarette products such as waterpipes. This finding in this study is important, especially when taken together with the findings of Senkubuge et al.[33] that a significant proportion of the student population in South Africa uses waterpipes.

Those participants who planned to quit smoking also had significantly more “other” and total knowledge of smoking-related health risks. This finding is not surprising as those planning to quit may have sought knowledge on the harms of smoking.

Otherwise, they may have been exposed to knowledge about the harms of smoking and therefore would have made the decision to consider quitting smoking. Indeed, similar to this thesis's finding, other studies also found that knowledge of smoking-related health risks was positively associated with planning to quit.[34,35] Furthermore, participants' current health status could be associated with knowledge of health risks and therefore their plan to quit. For instance, participants who may have been diagnosed with TB, for example, would, on receiving the diagnosis, have been told by a health professional about the dangers of smoking as a risk factor for complications.[36] Furthermore, the finding on less knowledge of smoking-related health risk among those who do not plan to quit smoking is important, given the finding by Yang et al.[14] that smokers may have optimistic bias,[14] and Weinstein's[37] finding that smokers tend to minimise personal risk from smoking, perhaps to minimise cognitive dissonance.

Knowledge of the health risks of smoking did not significantly differ by smoking status in this study. The finding that there was no significant difference in knowledge based on smoking status may be explained by the fact that even where there is significance, the margin of the mean is so small that it is difficult to interpret that meaningful significance. Nonetheless, the finding is surprising, because in other studies knowledge did differ by smoking status.[13,14,37,38] The findings on tobacco smoking behaviour and knowledge give credence to why it is important to ensure that knowledge is available to smokers. That is the very premise of the WHO FCTC[20] Article 13 on introducing pictorial health warnings on tobacco packs in order to educate people about the health risks of smoking.

7.7.2 Opinions on the effects of health warnings among South Africans, SASAS 2016/17

The results on opinions on the effects of health warnings among South Africans are discussed below, focusing on whether warnings on plain packs will make smokers think about quitting, and text-only warnings will stop smokers who want a cigarette.

7.7.2.1 Opinions on whether health warnings on plain packs will make smokers think about quitting

The results show that the factors that were significantly associated with higher odds

of agreeing that health warnings on plain packs would make smokers think more about quitting were agreeing that counter displays are a form of advertising, being exposed to smoking at work, attempting to quit in the past year, and education status. Each of these findings is discussed below.

The perceived effectiveness of pictorial warnings in promoting quitting among smokers did not differ across any socio-demographic characteristics, except for the level of education. The level of education was indeed a significant predictor of participants' belief that pictorial warnings on plain packaging would stop a smoker who wants a cigarette: those with only a high school level of education were significantly less likely to believe in this possibility than those with an education level lower or higher than high school.

Those who had matric (Grade 12) were less likely to believe that pictorial warnings on plain packs would stop a smoker who wants a cigarette, compared to those who had more than or less than a matric education level. The reason for the educational level difference in appreciating the effectiveness of plain packs could be due to several reasons. Arguably, those with a higher education level have a better understanding and are appreciative of the smoking-related risk factors and diseases that are depicted on the plain packaging and can identify with them. Those with less than matric appreciate the plain packs more because they may have elicited an emotive response. This postulation would be consistent with Thrasher et al.'s[39] study, which reported that in Brazil low education was associated with stronger emotional or cognitive responses among smokers to health warnings, especially those with gruesome pictures.[39] Conversely, those with matric may be desensitised to the plain pack, as they have enough understanding, but may not identify with what is being depicted.

Another factor associated with a greater likelihood of belief that pictorial warnings on plain packs would make smokers quit was agreeing that showing cigarette packs in shops is a form of advertising. In other words, those who feel that counter displays promote cigarette smoking were more likely to feel that the pictorial warnings on plain packs are likely to motivate quitting. It is thus indeed conceivable that when the pictorial warnings packs are stacked up, they would be more effective than the current

counter display format, because the pictorial warnings would be more visible to a smoker. It is worth noting that, although smokers agreed that displays were a form of promoting cigarettes, they felt that such displays with the current text-only health warnings would remain ineffective in prompting smokers to quit. The findings on counter displays taken together might explain why those who see the current cigarette stack-up displays agreed that putting pictures on them would increase the likelihood of prompting smokers to quit.

Participants who indicated that they had made a quit attempt (46.4%) in the past year were twice as likely to believe that pictorial warnings on plain packs would stop a smoker who wants a cigarette, compared to those who had not attempted to quit. The finding suggests that pictorial warnings could enhance the motivation of those who had previously attempted to quit to attempt again and eventually succeed, since chances of succeeding in quitting increases with more quit attempts. Brewer et al.[40] in their randomised control trial showed that implementing pictorial warnings discouraged smoking and increased intentions to quit.[40] This thesis's findings are therefore not surprising.

Those who agreed that the current text-only health warnings were easy to understand were less likely to agree that text-only warnings will stop smokers who want a cigarette. Therefore, even though they knew that the current text-only health warnings are easy to understand, these smokers were less likely to believe they have a big enough effect to prompt quitting, as we observed in the findings reported in Chapter 5. The finding may be related to the fact that the text-only warnings suppress any new cognitive response or risk perceptions, both of which have been found to be mediators of change in quit intentions.

Those who were exposed to smoking at work were slightly more than twice as likely to believe that pictorial warnings on plain packs would stop a smoker who wants a cigarette, compared to those who had not attempted to quit. Exposure to second-hand smoke at work is a reality and occurs often.[41,41] Those exposed at work would possibly support plain packs because they may have knowledge of the consequences of second-hand smoke. These consequences include disease, disability and death as

articulated in Article 8 of the WHO FCTC.[20] Furthermore, they may also be aware of the specific diseases associated with exposure to second-hand smoke, which include an increased risk of lung cancer, stroke and coronary heart disease.[43-45] That is the reason for the WHO policy recommendations on exposure to second-hand smoke, which recognise that there are no safe levels for second-hand smoke.[45] Therefore, Article 8 of the WHO FCTC calls for protection from second-hand smoke, including in workplaces.[20]

Those who were current electronic cigarette (e-cigarette) users were less likely to believe that pictorial warnings on plain packs would stop a smoker who wants a cigarette, compared to those who were not current users of e-cigarettes. One explanation may be that e-cigarette users are currently using other cessation aids or are already likely to be motivated to quit.[46,47] Alternatively, it might be that e-cigarettes are an effective replacement for cigarettes, as supported by findings in the UK,[48] although that claim has been refuted by others.[49] Nonetheless, the result means that e-cigarette use may possibly dissuade people from accepting new policy interventions. Alternatively, perhaps e-cigarette smokers think that they do not need this additional policy on plain packs, possibly because they are using e-cigarettes, which indicates that they have already decided to quit cigarettes, so they are less likely to think cigarette health warnings on plain packs will motivate quitting. Nonetheless, it is essential to recognise potential unintended consequences at a population level that have been reported in the literature if e-cigarettes were to be encouraged as cessation aids.

7.7.2.2 Opinions on whether text-only warnings will stop smokers who want a cigarette

Three factors that were significantly associated with lower odds of agreeing that text-only warnings will stop smokers who want a cigarette were agreeing that counter displays are a form of advertising, residing in an urban setting, and agreeing that the current text-only health warnings are easy to understand. These findings are discussed below.

Data from this thesis indicate that participants residing in urban areas were less likely

to agree that text-only warnings will stop smokers who want a cigarette. This finding regarding geographic location is expected, as in South Africa those who reside in urban settings are more likely to be educated, with high literacy levels and access to health information compared to those residing in the rural areas, due to the country's apartheid legacy.[23,24] The difference of opinion on whether text warnings would stop smokers who want a cigarette can be explained by the fact that evidence shows that subgroups in a population can vary in their ability to interpret health messages.[50,51] Several studies have indicated that individuals who fall under the subgroup of low literacy or low health literacy have a lower ability to understand health messages.[52-54]

Therefore, because those living in the urban areas are more literate they can read the current text-only health warning messages a number of times and have perhaps reached saturation – hence their opinion that the text-only warnings were less likely to stop smokers who want a cigarette. This finding supports the earlier finding on 'plain packs being supported by those whose educational status is more than matric, and who probably reside in the urban areas. This finding is noteworthy considering that reports on the social determinants of health,[55] and others[56-58] link poor education to poor health.

Taken together, these findings indicate that there is a recognition that current text-only warnings are inadequate in stopping a smoker who wants a cigarette. An explanation could be that the current text-only warnings may have reached saturation in South Africa (after being in use for two decades) and therefore no longer have an effect on stopping smokers from smoking or aiding in a quit attempt. Therefore, there is significant support to add pictures to the current text warnings. This study's findings are similar to those of other studies[34,50,54,59,60] that indicated the effect of adding pictures to text warnings would lead to a quit attempt and be effective even amongst people with lower education status. [53,54]

Those who agreed that counter displays are a form of advertising and those who indicated that the current text-only health warnings were easy to understand were less likely to agree that the current text-only warnings would stop smokers who want a cigarette. The difference may be related to the effectiveness of communicating the

message about the risks of smoking cigarettes. Thus those who did not consider counter displays a form of advertising may be convinced that the current text-only warnings were adequate in communicating the dangers of smoking. However, those who believed otherwise may want stronger measures to deter populations from purchasing tobacco products. Hence the support for pictorial warnings and the less likely agreement that the current text-only warnings would stop smokers who want to quit, even though the warnings were deemed to be easy to understand.

Kim et al.'s study[61] on point-of-sale tobacco displays (counter displays) and graphic health warnings concludes that the purchase behaviour of would-be buyers of cigarettes was influenced by counter displays.[61] Adding pictures would reduce the appeal of the display and increase knowledge of the health risks associated with smoking, and subsequently increase thoughts about quitting, as evidenced by Coady et al.'s[62] study on the impact of New York's point-of-sale pictorial health warnings. The finding is important for South Africa, as the proposed new bill now regulates the point of sale.[63]

7.7.3 Attempt to quit among South Africans, SASAS 2016/17

The results of this thesis show that the factors that were significantly associated with higher odds of attempting to quit in the past year were being Indian/Asian or White, planning to quit, and agreeing that health warnings pictures on plain packs will make smokers think more about quitting. These findings are discussed below.

Those who were Indian/Asian or White were more likely to have made a quit attempt in the last 12 months. The finding may be explained by the earlier finding that these two racial groups had better knowledge of vascular diseases, "other" and total knowledge that enabled them to understand smoking-related health risks and that they therefore made a quit attempt. Additionally, as has been reported in the current findings on access to health services, the Indian/Asian and White population segments had better access to health care than the other racial groups.[24] Access to a health service would probably result in their receiving advice on smoking-related health risks and therefore in their making a quit attempt.

The finding on disparities in quit attempts is a matter for concern, especially considering that those racial groups who were less likely to make a quit attempt included the Coloured/Mixed race group, which has the highest prevalence of smoking.[24] For South Africa, there is thus a need for targeted tobacco control measures that will deal with racial disparities in quitting smoking.

Participants who were planning to quit were more than six times as likely to have attempted to quit in the past year. This finding is consistent with other findings[63-65] that those who were planning to quit had made at least one quit attempt in the past year. The importance of this finding is that policies that would recognise the planning to quit stages from the pre-contemplation to the action and the maintenance stages are important, because quit attempts can be made with possibility of succeeding. Indeed, studies have shown that smokers who attempt to quit are more likely to succeed in quitting smoking.[65,66]

Those who agreed that health warning pictures on plain packs would make smokers think more about quitting were likely to have made a quit attempt in the past 12 months. This finding was expected, because the value would be recognised in the plain pack's providing additional support to smokers by giving knowledge on health risks in order to aid quitting. The finding is consistent with those of other studies that reported that plain packaging was associated with higher quitting-related behaviour, which may in turn lead to quit attempts.[67-69] The finding is crucial in support of South Africa's proposed legislation on implementing plain packs and suggests that if South Africa implements plain packaging, the policy change may promote quitting attempts. Eventually quitting among smokers will reduce smoking prevalence, as recent evidence from countries that have already implemented plain packaging shows.[70,71]

Two factors that were significantly associated with lower odds of attempting to quit in the past year were being Coloured/Mixed race and female. This study's finding is consistent with findings from other studies[24,72] which suggest that females might find it more difficult to quit and thus are less likely to report past quit attempts. This finding also suggests the need to prioritise women in providing smoking cessation support in primary care in South Africa. The fact that there was no gender difference in opinions of the effectiveness of pictorial warnings in prompting quit attempts means that the

introduction of pictorial warnings might also help to alleviate this gender disparity in quit attempts.

The fact that the Coloured/Mixed race group, who have the highest smoking prevalence,[24] were less likely to have made a quit attempt is worrying. The lower odds of a past quit attempt in this group might be related to higher levels of addiction to smoking, making it more difficult for this group to quit on their own. The findings suggest that pictorial warnings alone may not be enough to promote quitting, and it may therefore be necessary to prioritise smoking cessation support particularly for the Coloured/Mixed race population.

7.7.3.1 Pathways to quit attempt among South Africans

The Structural Equation Model (SEM) suggests that smokers who noticed text-only warnings less often, perhaps due to their perceived lack of salience, were more likely to perceive pictorial warnings to be more effective, in other words, of greater salience to motivate smokers to quit. This study's findings in relation to the SEM is consistent with findings from a similar study by Hall et al. in the USA.[73] However, contrary to the findings by Hall et al.[73] and the originally specified model in the current study, the salience for pictorial health warnings was not associated with a greater risk perception.

Instead, the pictorial warnings' salience was directly associated with intention to quit, which was in turn associated with a quit attempt. The fact that the salience of the pictorial warning was directly associated with quit intention, instead of through risk perception, may be related to the fact that the pictorials evoked predominantly emotional responses to quit, which have been reported to precede cognitive responses such as perceived risk.[73]

The difference in findings may also be related to different study methods employed, in particular, the fact that this study did not specifically measure negative affect or message reaction, which were the mediators of the association between pictorial warning exposure and perceived risk in the study by Hall et al.[73] Also, the pictorial warnings in the current study may have evoked stronger emotional responses among South Africans than the pictorial warnings used in the study amongst Americans by

Hall et al.[73] Indeed, the experimental study reported in Chapter 5 suggested that the main pathway to quitting intention was emotional reaction, rather than risk perception or cognitive reaction.

When combined, these findings lead to recommendations for South Africa on the current text-only warnings and the pictorial warnings on branded or plain packs.

7.8 RECOMMENDATIONS

The recommendations with regard to the text-only and pictorial warnings are set out below.

7.8.1 Text-only warnings

This study's findings suggest that the current text-only warnings are not effective in encouraging smokers to quit and must therefore be discontinued.

7.8.2 Pictorial warnings

The following recommendations are made with regard to the pictorial warnings for South Africa:

- Although South Africans have a fair knowledge of smoking-related health consequences, there are some gaps in knowledge, particularly knowledge related to vascular diseases.
- Pictorial warnings should be introduced on cigarette packs, not only to improve knowledge of smoking-related health risks among South Africans, but also to motivate quitting smoking.

7.8.3 Pictorial warnings on plain packs

This study's findings suggest that there is support for the introduction of pictorial health warnings on plain packs in South Africa, and the proposed pictorial health warnings on plain packs may evoke a strong enough emotional response to motivate increased interest in quitting directly.

7.9 SUMMARY

South Africans have some knowledge of smoking-related health risks, particularly "other" knowledge (lung cancer, TB, gum disease and mouth cancer), but they have limited knowledge of the vascular consequences of smoking (hypertension, impotence, and stroke).

Although South Africans agree that the current text-only health warnings are easy to understand, they disagree that the current text-only warnings will stop smokers who want a cigarette. Notably, South Africans support the argument that health warnings on plain packs will make smokers think more about quitting.

Attempting to quit smoking within the last 12 months was positively associated with being male, belonging to a self-identified race/ethnicity other than Coloured/Mixed race, planning to quit and support for health warnings on plain packs. The perceived health risk leads to a quit intention, and then an attempt to quit among South Africans.

The findings of this chapter support the introduction of pictorial health warnings on South African tobacco packs, because improved knowledge of smoking-related health risks will influence the attempt to quit and thus have an impact on reducing smoking among South Africans.

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CHAPTER 8:
CONCLUSION AND RECOMMENDATIONS

8.1 INTRODUCTION

This final chapter of the thesis presents the conclusion and recommendations. The thesis consisted of three interrelated parts to assess knowledge of tobacco health risks among a population of South Africans and to determine the effectiveness of health warning messages using text-only health warnings, and pictorial warnings on packs with brand elements (branded packs) and without such elements (plain packs). The four objectives of the thesis were

- To select pictorial health warning labels with brand design elements (branded) and without brand design elements (plain) on cigarette packs to prioritise for testing among South Africans.
- To determine reactions among a selected sample of South Africans (non-smokers and smokers) towards text-only and pictorial health warning labels on branded and plain cigarette packs.
- To assess the factors associated with change in motivation and plan to quit smoking following exposure to experimental cigarette packages with text-only and pictorial warning labels (on branded or plain packs) among smokers.
- To determine the knowledge of smoking-related health risks among a nationally representative sample of South Africans and their potential reactions to the selected pictorial warnings on branded pictorial warning packs at population level.

The thesis used mixed methods for the three interrelated parts. Part One used secondary data from the nationally representative 2010 South African Social Attitudes Survey (SASAS), together with other sources, to inform the selection of pictorial warnings for testing among South Africans for Part Two of the thesis.

Part Two of the research was conducted in the Gauteng and Western Cape provinces of South Africa respectively and was quasi-experimental, using a crossover design of three periods and three interventions to determine the effectiveness of text-only and pictorial cigarette health warnings on branded and plain packs.

Part Three used secondary data from the nationally representative 2016/17 SASAS to determine the knowledge of smoking-related health risks among South Africans and opinions on the effectiveness of the selected pictorial warnings on branded and plain packs, adapted on the basis of the results of Part Two of the thesis.

8.2 SELECTION OF HEALTH WARNINGS

The selection of health warnings was dealt with in Chapter 4, focusing on the results from Part One, and on Objective 1 of the thesis. The chapter presented results that informed the selection and design of the health warnings for use in Part Two of the thesis. The chapter first presented the results regarding knowledge of smoking-related health consequences and opinions on the effects of health warnings by participants of the 2010 SASAS.

Results from the 3112 South African adults (16 years and older) who participated indicated that 94.5% knew that lung cancer is a smoking-related health consequence, whereas impotence was the least known health consequence, at 49.1%. Knowledge varied according to the type of knowledge concerned, with vascular-related smoking health risks being the least known among the participants.

As expected, non-smokers had significantly greater total knowledge of smoking-related health consequences than smokers did. This result was similar for non-users of tobacco products other than cigarettes. Non-current users of waterpipes and electronic cigarettes had significantly more total knowledge of smoking-related health risks. This result is not surprising and supports the association of knowledge of smoking-related health risks with smoking behaviour.

Knowledge of smoking-related health consequences was expected to have an influence on smoking habit, for instance, acting as an incentive to quit. Not surprisingly, the participants who agreed that the current text-only health warnings were easy to understand and those who indicated that adding pictures to text warnings would make smokers think more about quitting had greater total knowledge.

The significant contribution of the results of Chapter 4, together with the literature, was

the emerging themes used to select the cigarette health warnings for testing in Part Two of the thesis. The themes included cardiovascular, reproductive, second-hand smoke, other (e.g. death and financial), lung and mouth diseases.

8.2.1 Recommendations and summary

- The current text-only and pictorial cigarette health warnings on branded and plain packs should be selected for testing among a select population of South Africans.
- The selected health warnings should be consistent with the identified themes.
- Four current text-only warnings, eight branded and eight plain pack pictorial health warnings should be evaluated (as was done in Part Two of the thesis).

8.3 REACTIONS AMONG SOUTH AFRICANS TO CIGARETTE HEALTH WARNING LABELS

The reaction among South Africans towards cigarette health warnings, namely the current text-only and pictorial ones on branded and plain packs, were dealt with in Chapter 5 and 6, Part Two, Objectives 2 and 3 of the thesis. Part Two of the thesis was conducted in Gauteng and in the Western Cape, taking into consideration their smoking prevalences. The reactions of the 767 adults (18 years and older) who participated and the association between exposure to pictorial health warnings on cigarette packs and desire to quit were presented.

Factors associated with the effectiveness of the health warnings (socio-demographics) and a comparison of the effects of text-only versus pictorial health warnings on branded or plain packages on changes in desire to quit by smokers were presented.

Of the participants, 49.7% were current cigarette smokers, and 26.2% indicated that they had no desire to quit before exposure to the cigarette warnings; after exposure the percentage who desired to quit increased to 73.8%. Only 28.5% had made a quit attempt in the past year, and alarmingly, up to 84.6% of smokers indicated that they had never received advice on quitting smoking. The introduction of pictorial warning packs would, therefore, be an urgently required population-level intervention to promote smoking cessation in South Africa significantly.

The most effective health warning across several elements and overall was the pictorial warning on abortion on a plain pack, followed by the same warning on a branded pack. The top five pictorial health warnings before revising the pictorial health warnings were the warnings relating to abortion, oral disease, stroke, death, and second-hand smoke. The least effective health warnings were the current text-only warnings, especially the text-only warning on addiction.

The effectiveness of health warnings differed significantly by socio-demographic characteristics, such as population group, education level, and employment status. For instance, the Indian/Asian population group demonstrated the strongest reactions to pictorial warnings, compared to the other population groups, including in ranking all the top five pictorial health warnings as effective. Those with more than high school education also came out topmost, compared to those with lesser educational achievement levels, in ranking all top five pictorial health warnings as effective. Those who were employed significantly ranked the pictorial warning on stroke as more effective compared to the others. In general, the pictorial warnings on plain packs had a slightly higher mean (Mean=3.59, SD=0.45) than those on the branded packs (Mean=3.50, SD=0.47) and were therefore marginally more effective.

Participants improved in several aspects after exposure to the health warnings, compared to before exposure. These aspects included improved motivation and confidence to quit. Knowledge of smoking-related health consequences also improved, particularly vascular knowledge, after exposure to the health warnings. In total, 64.5% of current cigarette smokers indicated they were not planning to quit before exposure to the cigarette warnings, whereas after exposure, the percentage who did not plan to quit declined to 18.4%. Factors significantly associated with a change in planning to quit included being Indian/Asian or White, being employed and spending money on cigarettes rather than food.

Exposure to the current text-only warnings was less likely to lead to a change in planning to quit than exposure to pictorial warnings on branded packs, to because the exposure led to a change in the perceived risk of smoking, which prompted a change in emotional response to cigarettes, and subsequently a change in planning to quit.

Also, pictorial warnings on branded packs directly influenced greater changes in planning to quit by eliciting emotional responses to quitting. Plain packaging led to a positive change in planning to quit by lowering emotional attachment to cigarettes.

After revising the pictorial health warnings (Chapter 6), the pictorial health warning on lung cancer on the plain pack was the top-ranked warning, followed by that on the branded pack. The top five pictorial warnings after revision were lung cancer, gangrene, impotence, abortion and oral disease.

8.3.1 Recommendations and summary

The findings of Part Two of the study show the following:

- The current text-only warnings in South Africa are not effective.
- Pictorial health warnings are effective among South Africans.
- Although pictorial warnings on both branded and plain packs are effective, those on the plain packs were consistently ranked higher.

It is therefore recommended that

- plain packs be introduced in South Africa; and
- a select number of pictorial health warnings should be evaluated among a nationally representative sample of South Africans (as was done in Part Three of the thesis).

8.4 KNOWLEDGE AND PICTORIAL WARNINGS

Part Three of the study and Objective 4 were dealt with in Chapter 7, which presented the results of the 2016/2017 SASAS. Knowledge of tobacco health risks among South Africans was presented, and key recommendations were made concerning pictorial warnings for implementation in South Africa.

Of the 3,063 participants (16 years and older), 80.1% knew that lung cancer was a smoking-related health consequence, but, as in the 2010 SASAS, impotence at 10.3% was the least known health consequence of smoking.
As in the 2010 SASAS, knowledge of smoking-related health consequences differed by the type of knowledge and socio-demographics. Vascular knowledge (stroke,

impotence and hypertension) was the least known by participants. Indian/Asian participants had greater knowledge of smoking-related health consequences than other racial groups. Those who resided in rural areas had greater "other" knowledge (lung cancer, TB, gum disease and mouth cancer) and those in the highest socio-economic group had greater vascular knowledge. These results can be explained by the highest prevalence of these particular harms among the respective groups.

Participants who agreed that current text warnings would stop smokers who want a cigarette were in the highest socio-economic group and, surprisingly, those who lived in rural areas. Significantly more males than females agreed that the current text-only warnings were easy to understand, as did those who were in the age group 35 to 54. Additionally, those who lived in urban areas also agreed that the current text-only warnings were easy to understand, as did current smokers and current snuff users.

The factors associated with higher odds of believing that health warnings on plain packs would make smokers think more about quitting included having an education status of more than 12 years, agreeing that counter displays are a form of advertising, being exposed to smoking at work and attempting to quit in the past year. Additionally, the factors associated with lower odds of making a quit attempt in the past year included being female and being Coloured/Mixed race. Interest in quitting smoking was directly associated with having made a quit attempt in the past.

Smokers who had not often read current text-only warnings were more likely to indicate that pictorial warnings would be more effective. Furthermore, the pictorial warning salience was directly associated with intention to quit, which was associated with a quit attempt.

8.4.1 Recommendations and summary

- The current text-only warnings are not effective among South Africans.
- There is significant support for the implementation of pictorial health warnings on plain packs as an effective way to motivate smokers to quit.
- Adding pictorial warnings on cigarette packs will have an effect on quitting among smokers; therefore, pictorial warnings should be implemented.

8.5 POTENTIAL BENEFITS AND RISKS

This section and its subsections present the potential benefits and risks of the thesis.

8.5.1 Benefits

This thesis provides information on the current state of knowledge of smoking health risks among South Africans, highlights the attitudes and perceptions about health warnings and gives an indication of the types of pictorial health warnings that are effective among South Africans. The thesis also informs the selection of cigarette health warnings for inclusion in South Africa. The methodologies used in this thesis can also be adapted and used in other provinces and settings, for example, a countrywide study or a study in the wider African region.

8.5.2 Risks

As with any assessment, participants may have shied away from being truthful about their knowledge of health risks for fear of victimisation. The risk was counteracted by the full assurance of anonymity and confidentiality and the focus on the sharing of information that was beneficial to tobacco control initiatives.

8.6 ETHICAL CONSIDERATIONS

- The thesis was consistent with the provisions of the National Health Act (2003) Section 72.[1] The thesis was therapeutic research, which refers to descriptive studies with interventions directed at enhancing the wellbeing of the individual or community involved,[2] and at interventions that may hold the prospect of direct benefit for the participants.[2]

- Ethics approval for the thesis was granted by the University of Pretoria Faculty of Health Sciences Human Ethics Research Committee (210/2012), see Appendices 2a, 2b and 2c.

- Participants' increased risk perception with regard to the health risks of cigarette smoking may lead to quitting smoking, which in turn begins to reverse some of the health damages associated with smoking immediately. Some of the smokers who

participated in this study did indeed report becoming more motivated to quit smoking and improve their health, and some indicated that they would give up smoking eventually.

- Part One of the thesis
  - The HSRC ethics committee ethically approved the 2010 SASAS (see Appendix 1). The HSRC also permitted the use of the 2010 SASAS secondary data for the thesis.

- Part Two of the thesis
  - Informed consent was obtained from all participants for participation in Part Two of the study.
  - Participants completed one consent form therefore consenting to participation in Part Two of the study which included completion of questionnaires and the recording of focus group discussions.
  - Participants' autonomy was respected and participants were allowed to withdraw at any stage of the study.
  - Participants were not compensated for the study. At the end of the focus group session, participants were given lunch. Furthermore, participants who continued with the focus group together with those who did not continue with the focus group discussion part of the study were afforded a 10-minute talk on the dangers of tobacco use. Materials (booklet, pen, cap and pin) from the National Council Against Smoking (NCAS) were also handed out to the participants.
  - Participants were assured of the confidentiality of focus group discussions.
  - The questionnaire survey information was kept confidential. The participants were assigned unique numbers, and only for the purposes of being able to link their baseline responses to their responses after exposure to each warning label (health warning questionnaire and post-evaluation questionnaire).
  - Participating smokers were referred to the national quitline, run by the study partner – the National Council Against Smoking – for further assistance to quit for those who expressed a desire to quit (i.e. they were offered treatment for tobacco dependence).
  - Approval for Part Two of the thesis was granted by the National Department of

Health (NDOH) South Africa to conduct the study in Gauteng Province (see Appendix 4a) and the Western Cape Province (Appendix 4b).

- Part Three of the thesis
  - The HSRC ethics committee ethically approved the 2016/17 SASAS (see Appendix 16). The HSRC also permitted the use of the 2016/17 SASAS secondary data for the thesis.

8.7 STRENGTHS AND LIMITATIONS

The thesis used cross-sectional data, with some limitations, to make causal inferences. This thesis also depended on participants' self-reporting, which implies that participants had to be trusted to be truthful about their responses. Confining the evaluation of the revised health warnings in Part Two of the study to one province and to only a smaller group of participants is a limitation of this thesis. Nonetheless, the results are still significant, as the main aim of revising the pictorial health warnings in the thesis was to validate the earlier recommendations of participants on pictorial health warnings.

Further, the revised pictorial health warnings include two pictorial warnings (lung cancer and gangrene) as recommended for inclusion by participants although not in the initial selection of pictorial warnings. Therefore, the interpretation of the ranking of the initial and revised pictorial warnings may not be directly comparable and should be read separately.

Participants may have provided what they believed to be socially desirable responses. Nonetheless, the findings remain comparable to those in the published literature that has, for the most part, also used similar self-administered questionnaires. Furthermore, no systematic bias in such socially desirable responses is expected, if there was one.

The use of a crossover design would have reduced possibilities for a biased response generated by single ordered visuals of pictorial health warnings. Additionally, possibility exists that some cross-over effect from the cross-over study may have

occurred to influence the focus group discussions. However, the cross-over effect would have been limited by the additional washout procedure which was undertaken.

Another limitation of the current thesis is the fact that not all the variables of the constructs of the theories applied were measured, because the researcher was constrained by the use of secondary data from national surveys, which forced her to consider only data on variables that were already collected.

A major strength of the thesis was the use of the three parts of the thesis, which allowed for the use of multiple and complementary approaches to studying the same phenomenon, including the use of mixed methods (a quantitative and qualitative study).

Furthermore, the thesis was underpinned by well-grounded theoretical constructs and rigorous statistical analyses, including the use of the Structural Equation Model (SEM) which attempts to provide causal pathways even though observational data are used. Furthermore, the use of the quasi-experimental crossover design (with three periods and three interventions) proved to be a strength, as indicated earlier. The large nationally representative sample used from national surveys is yet another study strength.

8.8 FINAL RECOMMENDATIONS

The final recommendations made regarding the current text-only health warnings, and the proposed pictorial health warnings on branded or plain packs, are set out below.

8.8.1 Text health warnings

The following are the recommendations are made concerning the text health warnings for South Africa:

TThis thesis's findings suggest that the current text-only warnings used in South Africa are not effective in encouraging smokers to quit and they should therefore be discontinued.

8.8.2 Pictorial health warnings

The following are the recommendations made about the pictorial health warnings for South Africa:

- Although South Africans have a fair knowledge of smoking-related health consequences, there are some gaps in knowledge, particularly vascular knowledge. Pictorial health warnings should be introduced on cigarette packs to improve knowledge of the use of tobacco products among South Africans.

8.8.3 Pictorial health warnings on plain packs

The following are the recommendations made concerning the pictorial health warnings on plain packs for South Africa:

- The findings of this thesis suggest that there is support for the introduction of pictorial health warnings on plain packs in South Africa.
- The country should therefore introduce legislation and regulations that support the implementation of pictorial health warning labels, especially on plain packs.

8.8.4 General recommendations

- Consideration should be given to the introduction of standardised cigarette packages with no brand design elements (plain packages).
- A population-based evaluation of the impact of pictorial health warnings should be carried out no longer than one year after implementation.
- Pictorial health warnings should be rotated at least every two years.
- The full set of 16 pictorial health warnings with eight warnings on branded packs and eight on plain packs (see Tables 8.1 and 8.2) is recommended for implementation in South Africa.

Table 8.1: Full set of pictorial warnings on branded packs recommended for implementation in South Africa

Table 8.2: Full set of eight pictorial warnings on plain packs recommended for implementation in South Africa

8.9 WHAT THIS THESIS CONTRIBUTES

This thesis is the first of its kind in South Africa and contributes to the evidence on the country's knowledge of smoking-related health risks, using a nationally representative sample. The thesis used a quasi-experimental crossover design study method, which adds to the body of various methodologies that have been used to test the effectiveness of pictorial warnings. This method is robust enough to be replicated by other countries and might be less expensive than other methods that have been used.

Evidence among South Africans on the potential impact of the introduction of pictorial warnings on branded or plain cigarette packs is provided to support the current legislative process. In addition, the thesis provides evidence from an African country on plain packaging, which has yet to be implemented in the region and South Africa.

8.10 DISSEMINATION OF FINDINGS FROM THE THESIS

The results of the thesis have been presented at local and international congresses and are to be published in peer-reviewed journals. Four articles will be written following the completion of the thesis. The articles will focus on smoking-related health risks among South Africans, the effectiveness of cigarette warning labels in informing smokers about the risks of smoking, understanding the effectiveness of pictorial warning labels on branded or plain packs in South Africa, and the use of a structural equation model to predict factors associated with planning to quit and quit attempts in South Africa.

The results of the research have been shared with tobacco control stakeholders in South Africa, including non-governmental organisations (NGOs) and the National Department of Health (NDOH) together with the Provincial Departments of Health, in particular, those in Gauteng and the Western Cape. The complete thesis is reported here in the requisite formal format for a thesis as required for a PhD degree at the School of Health Systems and Public Health, University of Pretoria.
A report for the National Department of Health on the introduction of pictorial health warnings in South Africa was written based on the findings of this thesis. The thesis further informed the regulations on the pictorial health warnings in South Africa.

8.11 CONCLUDING REMARKS

This thesis is the first of its kind in South Africa and comes at a time when legislation is being amended to include pictorial warnings. Within the limitations of the thesis, the thesis's findings suggest that exposure to pictorial health warning messages increases smokers' and non-smokers' knowledge of the health risks associated with smoking, and motivates smokers to think more about quitting.

Furthermore, the findings of this thesis suggest that the effects of the various pictorial warnings differed by smoking status, age, and race/ethnicity. In general, pictorial health warnings on packs without brand design elements (plain packages) were thought to be qualitatively more effective, although the quantitative data showed no statistically significant differences. The thesis provides insight into the pictorial warnings that may be effective in South Africa.

8.12 FUTURE RESEARCH

More research is required to determine smoking-related health risk knowledge, and reactions to cigarette warning labels among South African adolescents and youth below 18 years, particularly considering they are the main target of the tobacco industry. Research is also required on pictorial warning labels that will be effective on tobacco products other than cigarettes, as evidence has shown that South Africans use products such as snuff and waterpipes/hookahs. A cohort study will be beneficial in providing a continuous track of smoking-related health-risk knowledge and reactions to warning labels among South Africans.

8.13 REFERENCES

1. National Department of Health. National Health Act, Act 61 of 2003. Available from: http://www.doh.gov.za/docs/legisltation-f.html (accessed on 19 April 2012).

2. National Department of Health. Ethics in health research principles, structures and processes. Research ethics guidelines; 2004. Available from: http://www.hsrc.ac.za/Document-3952.phtml (accessed on 19 April 2012).

APPENDICES

9.1 APPENDIX 1: SASAS 2010 ETHICS APPROVAL

HSRC
Human Sciences Research Council

Human Sciences Research Council
Lekgotla la Dinyakisišo tša Semahlale tša Setho
Raad vir Geesteswetenskaplike Navorsing
Umkhandlu Wezokucwaninga Ngesayensi Yesintu
Ibhunga Lophando Ngenzulu-Lwazi Kantu

HSRC Research Ethics Committee
FWA Registration: Organisation No. 0000 6347
IRB No. 00003962
NHREC No. REC-290808-015

RESEARCH ETHICS COMMITTEE ADMINISTRATION

Room 1418 - HSRC Building
134 Pretorius Street, Pretoria
Gauteng, South Africa
Tel: 27 12 3022006/2012 - Fax: 27 12 3022005
Email: jebotha@hsrc.ac.za - Website: www.hsrc.ac.za
REC tollfree no 0800 212 123

12 November 2010

Mr Benjamin Roberts
Coordinator: South African Social Attitudes Survey (SASAS)
Democracy, Governance and Service Delivery programme

Ethics clearance of HSRC Research Ethics Committee Protocol REC No 6/22/09/10 6: South African Social Attitudes Survey (SASAS), 2010

Thank you for your application for ethics approval of the above study. This was considered by the Research Ethics Committee at its meeting on 22 September 2010.

Ethics clearance of the study is hereby granted, and the Committee wishes you success in your research.

Yours sincerely,

Prof. D R Wassenaar PhD
Chairperson: HSRC REC

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9.2 APPENDIX 2: ETHICS CERTIFICATES, THESIS

9.2.1 Appendix 2a: Ethics certificate, Faculty of Health Sciences Research Ethics Committee

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

* **FWA** 00002567, Approved dd 22 May 2002 and Expires 20 Oct 2016.
* **IRB** 0000 2235 IORG0001762 Approved dd 13/04/2011 and Expires 13/04/2014.

Universiteit van Pretoria
University of Pretoria

Faculty of Health Sciences Research Ethics Committee
Fakulteit Gesondheidswetenskappe Navorsingsetiekkomitee
DATE: 6/11/2012

NUMBER	**210/2012**
TITLE OF THE PROTOCOL	Effectiveness of cigarette warning labels on smoking behaviour: Towards implementation of Pictorial warning labels on South African tobacco packs.
PRINCIPAL INVESTIGATOR	Dr Flavia Senkubuge **Dept:** School of Health Systems and Public Health, University of Pretoria. **Cell:** 0834024493 **E-Mail:** flavia.senkubuge@up.ac.za
SUB INVESTIGATOR	None
STUDY COORDINATOR	Flavia Senkubuge
SUPERVISOR	Prof OA Ayo Yusuf **E-Mail:** lekan.ayoyusuf@up.ac.za
STUDY DEGREE	PHD(Public Health)
SPONSOR COMPANY	National Council Against Smoking
CONTACT DEATAILS OF SPONSOR	**Representative: E-Mail:** ucko@iafrica.com
SPONSORS POSTAL ADDRESS	National Council Against Smoking, NIOH Building Room D3 25 Hospital Street , Braamfontein
MEETING DATE	31/10/2012

The Protocol and Informed Consent Document were approved on 31/10/2012 by a properly constituted meeting of the Ethics Committee subject to the following conditions:

1. The approval is valid for 3 years period [till the end of December 2015], and
2. The approval is conditional on the receipt of 6 monthly written Progress Reports, and
3. The approval is conditional on the research being conducted as stipulated by the details of the documents submitted to and approved by the Committee. In the event that a need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

Members of the Research Ethics Committee:

Prof M J Bester	(female)BSc (Chemistry and Biochemistry); BSc (Hons)(Biochemistry); MSc(Biochemistry); PhD (Medical Biochemistry)
Prof R Delport	(female)BA et Scien, B Curationis (Hons) (Intensive care Nursing), M Sc (Physiology), PhD (Medicine), M Ed Computer Assisted Education
Dr NK Likibi	MBB HM – Representing Gauteng Department of Health) MPH
Dr MP Mathebula	(female)Deputy CEO: Steve Biko Academic Hospital; MBCHB, PDM, HM
Prof A Nienaber	(female) BA(Hons)(Wits); LLB; LLM; LLD(UP); PhD; Dipl.Datametrics(UNISA) – Legal advisor
Mrs MC Nzeku	(female) BSc(NUL); MSc(Biochem)(UCL, UK) – Community representative
Prof L M Ntlhe	MbChB (Natal) FCS (SA)
Snr Sr J Phatoli	(female) BCur(Eet.A); BTec(Oncology Nursing Science) – Nursing representative
Dr R Reynders	MBChB (Prêt), FCPaed (CMSA) MRCPCH (Lon) Cert Med. Onc (CMSA)

2019/07/16MS: dd 2019/07/16: C:\Users\u04413776\Documents\Protokolle\2~Approval letters ~ Grade Briewe\Letters 2012\210.doc

9.2.2 Appendix 2b: Ethics certificate, Approval Notice amendment

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.
- FWA 00002567, Approved dd 22 May 2002 and Expires 20 Oct 2016.
- IRB 0000 2235 IORG0001762 Approved dd 13/04/2011 and Expires 13/04/2014.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences Research Ethics Committee

3/06/2013

Approval Notice
Amendment

Ethics Reference No.: 210/2012

Title: Smoking-related health risk knowledge and reactions to cigarette worning labels among South African adults.
Dept: School of Health Systems and Public Health, University of Pretoria.

Dear Dr Flavia Senkubuge

The **Amendment** as described in the documents dated 24/04/2013 and that we received on 3/05/2013 was approved by the Faculty of Health Sciences Research Ethics Committee on the 29/05/2013. Amendment No 1 Version 2, dd 22/04/2013 ~ Title / Quality Control / Plain Packs / Language / Phases

Please note the following about your ethics amendment:
- Please remember to use your protocol number (**210/2012**) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committe may ask further questions, seek additional information, require further modification, or monitor the conduct of your research.

Ethics amendment is subject to the following:

Standard Conditions:
- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

The Faculty of Health Sciences, Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

We wish you the best with your research.

Yours sincerely

Dr R Sommers; MBChB; MMed (Int); MPharMed.
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

♦ Tel:012-3541330 ♦ Fax:012-3541367 Fax2Email: 0866515924 ♦ E-Mail: manda@med.up.ac.za
♦ Web: //www.healthethics-up.co.za ♦ H W Snyman Bld (South) Level 2-34 ♦ Private Bag x 323, Arcadia, Pta, S.A., 0007

9.2.3 Appendix 2c: Ethics certificate, Approval certificate, New Application

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.

• FWA 00002567, Approved dd 22 May 2002 and Expires 20 Oct 2016.

• IRB 0000 2235 IORG0001762 Approved dd 22/04/2014 and Expires 22/04/2017

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences Research Ethics Committee

01-Nov-2017

Approval Certificate

New Application

Ethics Reference No.: 210/2012

Title: 210/2012: Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults [Amendment to original protocol V3 dd 31/05/2017]

Dear Dr Flavia Senkubuge

The **New Application** as supported by documents specified in your cover letter for your research received on the , was approved by the Faculty of Health Sciences Research Ethics Committee on the 27-Sep-2017.

Please note the following about your ethics approval:

- Ethics Approval is valid from to .
- Please remember to use your protocol number (210/2012) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, or monitor the conduct of your research.

Ethics approval is subject to the following:

- The ethics approval is conditional on the receipt of 6 monthly written Progress Reports, and
- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

Dr R Sommers
MBChB MMed(Int) MPharMed
Deputy Chairperson: Faculty of Health Sciences Research Ethics Committee

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

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9.2.4 Appendix 2d: Ethics certificate, Approval Certificate, Amendment

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.
- FWA 00002567, Approved dd 22 May 2002 and Expires 03/20/2022.
- IRB 0000 2235 IORG0001762 Approved dd 22/04/2014 and Expires 03/14/2020.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Health Sciences Research Ethics Committee

28/09/2017

Approval Certificate
Amendment
(to be read in conjunction with the main approval certificate)

Ethics Reference No: 210/2012

Title: Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults [Amendment to original protocol V3 dd 31/05/2017]

Dear Dr Flavia Senkubuge

The **Amendment** as described in your documents specified in your cover letter dated 31/05/2017 received on 31/05/2017 was approved by the Faculty of Health Sciences Research Ethics Committee on its quorate meeting of 27/09/2017.

Please note the following about your ethics amendment:
- Please remember to use your protocol number (**210/2012**) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committe may ask further questions, seek additional information, require further modification, or monitor the conduct of your research.

Ethics amendment is subject to the following:
- The ethics approval is conditional on the receipt of **6 monthly written Progress Reports**, and
- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

We wish you the best with your research.

Yours sincerely

*** Kindly collect your original signed approval certificate from our offices, Faculty of Health Sciences, Research Ethics Committee, Tswelopele Building, Level 4-60*

Dr R Sommers; MBChB; MMed (Int); MPharMed; PhD
Deputy Chairperson of the Faculty of Health Sciences Research Ethics Committee, University of Pretoria

The Faculty of Health Sciences Research Ethics Committee complies with the SA National Act 61 of 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 and 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes, Second Edition 2015 (Department of Health).

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9.3 APPENDIX 3: SOUTH AFRICAN SOCIAL ATTITUDES SURVEY QUESTIONNAIRE 2010

HSRC CLIENT SURVEY
November 2010

HSRC Human Sciences Research Council

ADAPTED

SMOKING & TOBACCO BEHAVIOUR

Do you use or have you used any of the following tobacco products?

		Every day	Some days	Stopped less than 6 months ago	Stopped more than 6 months ago	Never before
1.	Manufactured cigarettes	1	2	3	4	5
2.	Roll-your-own cigarettes (Zol)	1	2	3	4	5
3.	Hubbly or hookah or water pipe	1	2	3	4	5
4.	Cigar or pipe	1	2	3	4	5
5.	Electronic cigarettes (vapour cig)	1	2	3	4	5
6.	Nasal Snuff	1	2	3	4	5
7.	Oral Snuff	1	2	3	4	5

IF THE RESPONDENT HAS NEVER USED NASAL OR ORAL SNUFF BUT HAS USED ONE OF THE OTHER TOBACCO PRODUCTS, SKIP, AND GO TO Q10

IF THE RESPONDENT HAS NEVER USED ANY OF THE TOBACCO PRODUCTS LISTED ABOVE, SKIP, AND GO TO Q20

SMOKELESS TOBACCO (ORAL AND NASAL SNUFF)

8. In total, for how long did you or have you been using snuff?

Years…… | | |

Can't remember/uncertain…… ……98

Not applicable, never used snuff……..99 → Skip to Q.171

9. On the days that you use (used) snuff, how many times per day do (did) you use snuff?

Times per day…… | | |

If none, record '00'

CIGARETTES, PIPES & CIGARS

IF THE RESPONDENT HAS NEVER SMOKED ANY OF THE TOBACCO PRODUCTS ACCORDING TO QUESTIONS 162-168, SKIP, AND GO TO Q20. THOSE WHO HAVE EVER SMOKED SHOULD STILL COMPLETE THE QUESTIONS

10. In total, for how long did you or have you been smoking regularly?

Years…… | | |

Can't remember/uncertain……..…….98

Not applicable, never smoked……..99 → Skip to Q. 181

11. On the days that you smoke (smoked), on average, how many cigarettes, including hand rolled cigarettes, do (did) you smoke per day?

Cigarettes per day…… | | |

If none, record '00'

12. Currently, what type/brand of cigarettes do you usually smoke?

'Light' -strength cigarettes	1
Normal strength	2
Menthol cigarettes	3
Any cigarette	4
(Do not know)	8

13. How important do you think each of the following was in your decision to smoke the current brand based?

	How important was…	Very important	Important	Neither important nor not important	Not Important	Not important at all	(Can't Choose)
a.	How they taste	1	2	3	4	5	8
b.	How satisfying they are	1	2	3	4	5	8
c.	Price of the cigarettes	1	2	3	4	5	8
d.	Flavour or strength of the cigarettes	1	2	3	4	5	8
e.	It may not be as bad for your health	1	2	3	4	5	8
f.	The appearance of the packaging or cigarette	1	2	3	4	5	8

14. **At the times you buy cigarettes for yourself, do you usually buy them by the carton, the pack, or as singles cigarettes?**

Carton	1
Pack	2
Loose	3
(Do not know)	8
(Refused)	9

15. In the past 30 days, did you use any of the following product(s) when in a place(s) you could not smoke regular cigarettes? [Multiple response]

a	Snuff	1
b	Snus (tobacco in tea-bag like pack)	2
c	Electronic cigarettes	3
d	None of the above	4

GIVING UP SMOKING

16. **I am planning to quit smoking...**

Within the next month	1
Within the next 6 months	2
Sometime in future, beyond 6 months	3
I am not planning to quit	4
I have completely stopped smoking	5

(Do not know/ Can't choose)	8

17. And if you tried to stop, how likely do you think it is that you would succeed in giving up smoking? Is it . . .

Very likely,	1
Fairly likely,	2
Not very likely,	3
Not at all likely?	4
I have already completely stopped	5
(Do not know/ Can't choose)	8

18. Within the last 12 months when you attempted to quit, did you get any help?

Yes	1
No	2
(Refused to answer)	7
(Can't say)	8
I didn't think I needed help	9
I did not attempt to quit in the last 12 months	98

19. In the last 12 months, has a doctor, nurse/health worker or dentist advised you to quit smoking?

FIELDWORKER: PLEASE CIRCLE ONE NUMBER ONLY

Doctor	1
Nurse/Health worker	2
Dentist	3
Doctor and Nurse	4
Dentist and Nurse	5
Doctor and Dentist	6
All of the above	7
None of the above	8

In your opinion, how likely is smoking cigarettes to cause.....

		Not likely	Somewhat likely	Very likely	(Don't know)
20.	Stroke (blood clot in brain)	1	2	3	8
21.	Impotence (a man not able to have sex)	1	2	3	8
22.	Lung cancer	1	2	3	8
23.	Tuberculosis	1	2	3	8
24.	HIV/AIDS	1	2	3	8
25.	Gum disease	1	2	3	8
26.	Mouth cancer	1	2	3	8
27.	Hypertension	1	2	3	8

In your opinion, are any of the following products less harmful, more harmful, than than or just as harmful as smoking regular cigarettes?

		Less	More	Just as	(Refused)	(Don't know)
28.	Smoking tobacco in a hookah or water pipe?	1	2	3	9	8
29.	Smokeless tobacco such as snuff or chewing tobacco?	1	2	3	9	8
30.	Light or ultra light cigarettes?	1	2	3	9	8
31.	Menthol cigarettes?	1	2	3	9	8
32.	Roll-your-own cigarettes?	1	2	3	9	8
33.	Electronic cigarettes (E-cigarette)	1	2	3	9	8

PASSIVE SMOKING

Which of the following best describes smoking at your work, home or car?

		Smoking is allowed anywhere	Smoking is generally banned with few exceptions	Smoking is never allowed	(Refuse to answer)
34.	Work	1	2	3	9
35.	Home	1	2	3	9
36.	Car	1	2	3	9

In the <u>past 30 days</u>, about how many days would you say you were in a place where <u>someone smoked close</u> to you <u>(no complete physical barrier, i.e. smoke got to you)</u>?

		Never	1-6 days	7-10 days	11-15 days	16-20 days	More than 20 days	(Refuse to answer)
37.	At home	1	2	3	4	5	6	9
38.	At work	1	2	3	4	5	6	9
39.	Café, restaurants	1	2	3	4	5	6	9
40.	Shebeens, bar or clubs	1	2	3	4	5	6	9

How important is it to you to have <u>100% smoke-free</u> (no smoking areas) environment in the following places? Is it…

		Very important	Somewhat important	Not too important	Not at all important	(Don't know)	(Refused)
41.	Home	1	2	3	4	8	9
42.	At work places	1	2	3	4	8	9
43.	Hospitals	1	2	3	4	8	9
44.	Café, restaurants	1	2	3	4	8	9
45.	Shebeens, bars or clubs	1	2	3	4	8	9

46. Do you think that breathing smoke from other people's cigarettes is….

Very harmful to one's health	1
Somewhat harmful to one's health	2
Not very harmful to one's health	3
Not at all harmful to one's health	4
(Don't know)	8
(Refused)	9

TOBACCO PRODUCTS PACKAGING

Here are some comments people made about the warnings labels on packaging of tobacco products and counter displays. To what extent do you agree or disagree with them? [*Showcard 1*]

		Strongly agree	Agree	Neither nor	Disagree	Strongly disagree	(Do not know)
47.	The current text health warnings are easy to understand	1	2	3	4	5	8
48.	When smokers want a cigarette, the text warnings are not going to stop them from smoking	1	2	3	4	5	8

49.	The text warnings are only suitable for educated people	1	2	3	4	5	8
50.	Adding pictures to text warnings will make smokers think more about giving up smoking	1	2	3	4	5	8
51.	Showing cigarette packs in shops (i.e. counter display) is a form of advertising.	1	2	3	4	5	8

52. In the last 12 months, have you tried to call the Quit line telephone number mentioned on the cigarette package?

No, I do not smoke	00
No, I do not have a telephone	01
No, it is too expensive to phone	02
No, I'm not interested	03
No, I don't need more information	04
No. I don't think they will be able to help	05
No, I don't want to stop smoking	06
Yes, I have but it was not helpful	07
Yes, I have tried but could not get through	08
Yes, I have and it was helpful	09
(Not heard of the Quit line)	10

53. Have you been told by any health professional (doctor or nurse) that you have any of the following:

FIELDWORKER: MULTIPLE RESPONSES ALLOWED – CIRCLE ALL THAT APPLY

a	Hypertension (high blood pressure)	1
b	Tuberculosis	2
c	Diabetes or Sugar in the blood	3
f	None of the above	4
g	(Do not know/ Can't choose)	8

ALCOHOL USE

54. In the past 12 months, how frequently have you had at least one drink?

5 or more days a week	1	
1-4 days per week	2	
1-3 days a month	3	
Less than once a month	4	
Not currently consuming alcohol	5	
Never consumed alcohol	8	→ Skip to Q.220

55. With respect to your drinking, have you had any of the following experiences? (Multiple response.

		Yes	**No**
a	Have you ever felt bad or guilty about your drinking?	1	2

b	Have you ever felt you should cut down on your drinking?	1	2
c	Have people annoyed you by criticizing your drinking?	1	2
d	Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (eye-opener)?	1	2

RESPONDENT CHARACTERISTICS

56. Sex of respondent [copy from contact sheet]

Male	1
Female	2

57. Race of respondent [copy from contact sheet]

Black African	1
Coloured	2
Indian/Asian	3
White	4
Other	5

58. Age of respondent in completed years [copy from contact sheet]

			Years

(Don't know) = 998

59. What is the highest level of education that you have ever completed?

No schooling	00
Grade 0/Grade R	01
Sub A/Grade 1	02
Sub B/Grade 2	03
Grade 3/Standard 1	04
Grade 4/Standard 2	05
Grade 5/Standard 3	06
Grade 6/Standard 4	07
Grade 7/Standard 5	08
Grade 8/Standard 6/Form 1	09
Grade 9/Standard 7/Form 2	10
Grade 10/Standard 8/Form 3	11
Grade 11/Standard 9/Form 4	12
Grade 12/Standard 10/Form 5/Matric	13
NTC I	14
NTC II	15
NTC III	16
Diploma/certificate with less than Grade 12/Std 10	17
Diploma/certificate with Grade 12/Std 10	18
Degree	19
Postgraduate degree or diploma	20
Other, specify	21
(Do not know)	98

THANK YOU FOR YOUR COOPERATION

9.4 APPENDIX 4: PROVINCIAL APPROVALS

9.4.1 Appendix 4a: Approval Gauteng

DIRECTOR GENERAL
HEALTH
REPUBLIC OF SOUTH AFRICA

PRETORIA
Private Bag X828, PRETORIA, 19th Floor,)Civitas Building, Cnr Andries & Struben Street, PRETORIA, 0002 Tel (012) 395 9150 Fax (012) 395 8422
CAPE TOWN
P.O. Box 3875, CAPE TOWN, 8000, Room 404, 120 Plain Street, CAPE TOWN, 8000 Tel (021) 461 2040 Fax (021) 461 6864

Dr N Xundu
Private Bag X085
MARSHALLTOWN
2107

Fax: (011) 355 7694

PERMISION TO CONDUCT FOCUS GROUP STUDY FOR INTRODUCTION OF GRAPHIC HEALTH WARNINGS IN SOUTH AFRICA.

Dear Dr Xundu

South Africa has made significant gains in the fight against tobacco use. Tobacco control remains a high priority in the government's plans to achieve health for all South Africans. Government plans the introduction of graphic health warnings on cigarette packets in South Africa.

The National Department of Health, Directorate: Health Promotion in partnership with The University of Pretoria are in the process of Developing Tobacco Product Regulations on Pictorial messaging on packaging and this process needs to be tested.

Focus groups will be established in your province to determine graphic warnings that are appropriate for use in the South African population.

Phase 1 of the study will be conducted in the Gauteng Province. The study sites have been selected due to their population diversity and high smoking prevalence rate and in order to have greater representation of the South African population

In the Gauteng Province the following number of participants is proposed to be included in the study (N=480; with 120 for each racial/population group):

- Eesterust (Coloured)- 120
- Laudium (Indian)- 120
- Shoshanguve (Black)- 120
- Gezina/Moot/Danville (White)- 120

The Directorate: Health Promotion will communicate with the Provincial Health Promotion Co-ordinator to discuss the logistics and details.

Attached, please find the concept paper for further information.

We look forward to your support and co-operation.

Kind regards

MS MP MATSOSO
DIRECTOR-GENERAL
DATE: 08/05/2012

9.4.2 Appendix 4b: Approval Western Cape

DIRECTOR GENERAL
HEALTH
REPUBLIC OF SOUTH AFRICA

PRETORIA
Private Bag X828, PRETORIA, 19th Floor,)Civitas Building, Cnr Andries & Struben Street, PRETORIA, 0002 Tel (012) 395 9150 Fax (012) 395 8422
CAPE TOWN
P.O. Box 3875, CAPE TOWN, 8000, Room 404, 120 Plain Street, CAPE TOWN, 8000 Tel (021) 461 2040 Fax (021) 461 6864

Prof Craig Household
P O Box 2060
CAPE TOWN
8000

Fax: (021) 483 5677

PERMISION TO CONDUCT FOCUS GROUP STUDY FOR INTRODUCTION OF GRAPHIC HEALTH WARNINGS IN SOUTH AFRICA.

Dear Prof Household

South Africa has made significant gains in the fight against tobacco use. Tobacco control remains a high priority in the government's plans to achieve health for all South Africans. Government plans the introduction of graphic health warnings on cigarette packets in South Africa.

The National Department of Health, Directorate: Health Promotion in partnership with The University of Pretoria are in the process of Developing Tobacco Product Regulations on Pictorial messaging on packaging and this process needs testing.

Focus groups will be established in your province to determine graphic warnings that are appropriate for use in the South African population.

Phase 2 the study will be conducted in the Western Cape Province. The study sites have been selected due to their population diversity and high smoking prevalence rate and in order to have greater representation of the South African population.

In Cape Town, the following number of participants is proposed to be included in the study (N = 480; with 120 for each racial/ethnic group):

- Gugulethu (Black)- 120
- Mitchell's plain (Coloured)- 120
- Rhylands (Indian)- 120
- Bellville (White)- 120

The Directorate: Health Promotion will communicate with the Provincial Health Promotion Co-ordinator to discuss the logistics and details.

Attached, please find the concept paper for further information.

We look forward to your support and co-operation.

Kind regards

MS MP MATSOSO
DIRECTOR-GENERAL
DATE: 08/05/2012

9.5 APPENDIX 5: RECRUITMENT OF PARTICIPANTS

INTRODUCTION

"Hello my name is **[say your name]** and I'm from the Department of Health. We are recruiting people 18 years and over and who are smokers and non-smokers to take part in a research discussion group.

We are not conducting a survey now, but are asking individuals to take part in a focus group discussion on **[tell them the days].**

I would like to ask you a few qualifying questions which will take only 3 or 4 minutes. If you are eligible, you will be invited to participate in a discussion group [where you will receive information about smoking in appreciation for your time].

Your participation is voluntary and your answers will be kept confidential and will be combined with those of other participants.

Could I please ask you a few questions to find out if you are eligible for the research?"

1. *Record sex: **[do not read]***

Female (*check quotas*)	1
Male (*check quotas*)	2

2. What is your age?

3. Do you smoke cigarettes?

Yes	1
No	2

4. On average, how many cigarettes do you smoke per day?

5. In the last 2 years, have you or anyone in your household worked in any of the following industries? **[*read*]**

The tobacco industry (*thank and do not continue*)	**1**
Provincial or National Government	2
None of the above	3

If eligible [tell the participant the following]:

Based on your answers to those questions, you are eligible to participate in the research project. Participating in this research would involve attending a focus group session with about 8-10 people to talk about issues related to smoking. A focus group is made up of approximately 8-10 people and a moderator who gathers the opinions and the reactions of all participants. The group will last between one and a half and two hours.

Participation in this study is entirely voluntary and there are no known or anticipated risks to participation. You may decline to answer any of the questions you do not wish to answer and may terminate the study at any time.

All of the information you provide will be treated confidentially, and comments made during the discussion will be combined in order to ensure they remain confidential.

All information collected will be kept in a secure location and used for research purposes only. In addition, you will be given information about smoking as a token of our appreciation for your time.

6. Are you interested in participating in the research?

Yes (*continue*)	1
No (*thank and terminate*)	2

The group you are eligible for is on [say the date] at [say the time time], and will be held at [say the location].

7. Are you able to attend at this time?

Yes (*continue*)	1
No (*thank and terminate*)	2

8. The discussion you are invited to participate in will be audio-taped to facilitate collection of information, and later transcribed for analysis. Please be assured that your comments and responses are strictly confidential and we require the material and topics discussed in the focus group to be held confidential by you. Would this be a problem for you?

Yes (*continue*)	1
No (*thank and terminate*)	2

9. Participants will be asked to look at materials and give out some responses. Are you able to take part in these activities?

Yes (*continue*)	1
No (*thank and terminate*)	2

10. As I mentioned, you are being invited to a group discussion with 8-10 other people. How comfortable are you in participating and speaking out in group discussions of this size?

Not at all comfortable (*thank and terminate*)	1
Not very comfortable (*thank and terminate*)	2
Somewhat comfortable (*continue*)	3
Very comfortable (*continue*)	4

If ineligible (e.g. 'thank and stop the interview and say'):

"I'm sorry; you are not eligible to participate in this research, but thank you for your time today."

If participating say:
"Thank you for agreeing to participate.

Again, the session will be held on **[date] at [time], at [location],** which is located on **[address, directions].**

HAND OUT THE CARD WITH THE DATE TIME AND VENUE.

Please ensure that you show up about 10 minutes prior to the start of the discussion, so that the discussion can start on time. The focus group will last no longer than 2 hours.

If for any reason you cannot attend the session, please notify us as soon as possible at **[give the phone number]** so we can find a replacement.

We will telephone a few days before the session to confirm your attendance – when would be the best time to reach you? (*record*)

Thank you for your time today."

If you have any questions or concerns regarding the study, please feel free to contact us.

Protocol Queries	**Ethics Enquiries**
School of health systems and Public Health **University of Pretoria** **P.O. Box 667** **Pretoria, South Africa** **Tel: +2712 354 1755** **Fax: +2712 354 2071** **Email: flavia.senkubuge@up.ac.za**	**The Research Ethics Office:** **University of Pretoria** **Private Bag X323** **ARCADIA, 0007** **Tel: 012 354 1330 or 012 354 1677** **Fax: 012 354 1367** **E Mail: manda@med.up.ac.za - Main Committee**

9.6 APPENDIX 6: BACKGROUND QUESTIONNAIRE (QUESTIONNAIRE 1)

QUESTIONNAIRE 1 (Q1)

School of Health Systems and Public Health, University of Pretoria

PARTICIPANT'S INFORMATION LEAFLET & INFORMED CONSENT FOR QUESTIONNAIRES

Researcher's name: Dr Flavia Senkubuge

School of Health Systems and Public Health University of Pretoria
Dear Participant

Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults.
I am a PHD (Public Health student at the School of Health Systems and Public Health, University of Pretoria. You are invited to volunteer to participate in our research project on ***Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults.***
This letter gives information to help you to decide if you want to take part in this study. Before you agree you should fully understand what is involved. If you do not understand the information or have any other questions, do not hesitate to ask us. You should not agree to take part unless you are completely happy about what we expect of you.

The purpose of the study is to understand the effects that warning labels have on smoking behaviour among South Africans. We would like you to complete a questionnaire. This may take about 15 minutes. We will collect the questionnaire from you before you leave. It will be kept in a safe place to ensure confidentiality. Please do not write your name on the questionnaire.

We will be available to help you with the questionnaire or to fill it in on your behalf. The Research Ethics Committee of the University of Pretoria, Faculty of Health Sciences granted written approval for this study.

Your participation in this study is voluntary. You can refuse to participate or stop at any time without giving any reason. As you do not write your name on the questionnaire, you give us the information anonymously. Once you have given the questionnaire back to us, you cannot recall your consent. We will not be able to trace your information. Therefore, you will also not be identified as a participant in any publication that comes from this study.
Note: The implication of completing the questionnaire is that informed consent has been obtained from you. Thus any information derived from your form (which will be totally anonymous) may be used for e.g. publication, by the researchers.

We sincerely appreciate your help.
Yours truly,
Dr Flavia Senkubuge

Please complete the questions below to help give us a better understanding of your background.

BEGIN: WRITE YOUR UNIQUE NUMBER HERE:

1. How old are you?

   ☐

   Years

2. What is your gender?

Female	1
Male	2

3. In which population group would you be placed?

Black/African	1
Coloured	2
Indian/Asian	3
White	4

4. What is the highest level of education that you have ever completed?

No schooling	1
Primary School	2
Secondary School	3
High School	4
Diploma/certificate	5
Degree	6
Other, specify	7
Do not know	8

5. Which of the following best describes your current employment status?

Unemployed (full time o/ part time)	1
Student	2
Pensioner	3
Employed	4
Other (specify) ……	5

6. Do you have any children?

	1. Yes	**2. No**
Under one year old		
Between 1 and 5 years old		
Between 6 and 12 years old		
Between 13 and 17 years old		
18 years or older		

7. Have you ever tried or experimented with cigarette smoking, even one or two puffs?

Yes	1
No	2

8. Do you currently smoke cigarettes?

Yes	1
No	2

9. During the past 30 days (one month), on how many days did you smoke cigarettes?

0 days	1
1 or 2 days	2
3 to 5 days	3
6 to 9 days	4
10 to 19 days	5
20 to 29 days	6
All 30 days	7

10. On the days that you smoke (d), on average, how many cigarettes, including hand rolled cigarettes, do (did) you smoke per day?

Cigarettes per day

11. If you smoke (d) daily, how soon after you wake up do (did) you take your first cigarette?

Within 5 minutes	1
Within 30 minutes	2
Between 30 and 60 minutes (1 hour)	3
After 1 hour	4
Stopped smoking daily more than 3 months ago	5
I have never been a daily smoker	6

.

12. Do you want to stop smoking cigarettes now?

I have never smoked cigarettes	1
I do not smoke now	2
Yes	3
No	4

13. When are you planning to quit smoking?

I do not smoke	1
Not planning to quit?	2
sometime in the future beyond 6 months	3
within the next 6 months	4
within the next month,	5

14. **And if you tried in the <u>next six months</u>, how likely do you think it is that you would succeed in giving up smoking? Is it . . .**

Very likely,	1
Fairly likely,	2
Not very likely,	3
Not at all likely?	4
(Do not know/ Can't choose)	8

15. **If you currently smoke and were told that snuff is 99% safer than smoking and it would give you the same amount of nicotine you crave from your cigarette, how likely would you be to switch?**

Very likely	1
Somewhat likely	2
Somewhat unlikely	3
Very unlikely	4
(Do not know/ Can't choose)	8

16. **In past 12 months, have you ever tried to quit smoking?**

Never	1
Once	2
Twice	3
Three times or more	4
I do not smoke now at all	5
(Do not know/ Can't choose)	8

17. On a scale from 0 to 10 (0 meaning not at all motivated and 10 very motivated), how much do you want to stop smoking now?

1	2	3	4	5	6	7	8	9	10
Not at all									Very much

18. On a scale from 0 to 10 (0 meaning not at all confident and 10 very confident), how strongly do you believe/how confident are you that you could give up smoking now and remain a non-smoker if you tried?

1	2	3	4	5	6	7	8	9	10
Not at all confident in succeeding in giving up smoking									Very confident in succeeding in giving up smoking

19. How long ago did you stop smoking cigarettes?

I have never smoked cigarettes	1
I have not stopped smoking cigarettes	2
Less than 1 month	3
1-5 months	4
6 – 11 months	5
One year	6
2 years	7
3 years or longer	8

20. Have you ever received help or advice to help you stop smoking cigarettes?

Yes	1
No	2
I have never smoked cigarettes	3

21. Have you ever used snuff?

Yes	1
No	2

22. During the past 30 days (one month), on how many days did you use snuff?

0 days	1
1 or 2 days	2
3 to 5 days	3
6 to 9 days	4
10 to 19 days	5
20 to 29 days	6
All 30 days	7

23. On the days that you use (used) snuff, how many times per day do (did) you use snuff?

Times per day…… | | |

24. **Have you or any other smoker in your household spent money on cigarettes that you knew would be better spent on household essentials like food?**

Yes	1
No	2
Refused	7
Can't say	8
Don't know	9
I am not a smoker	98

25. **Which of the following best describes smoking at your work, home or car?**

		Smoking is allowed	Smoking is generally banned with few exceptions	Smoking is never allowed	(Refuse to answer)
A.	Work	1	2	3	8
B.	Home	1	2	3	8
C.	Car	1	2	3	8

26. **Here are some comments people made about smoking and the warnings labels on packaging of tobacco products and counter displays in South Africa. To what extent do you agree or disagree with them?**

		Strongly agree	Agree	Neither nor	Disagree	Strongly disagree	(Do not know)
a	Smoking is extremely dangerous to my health	1	2	3	4	5	8
b	Smoking is ruining my health	1	2	3	4	5	8
c	My cigarette smoke leaves an unpleasant smell	1	2	3	4	5	8
d	Smoking gives me very bad breath	1	2	3	4	5	8
e	I spend too much money on cigarettes	1	2	3	4	5	8
f	My cigarette smoke bothers other people a great deal	1	2	3	4	5	8
g	My second-hand smoke is dangerous to those around me	1	2	3	4	5	8
h	Smoking is bad for my skin	1	2	3	4	5	8
i	It bothers me to be dependent on cigarettes	1	2	3	4	5	8
j	I would have more energy if I did not smoke	1	2	3	4	5	8
k	A cigarette calms me down when I am stressed	1	2	3	4	5	8
l	Smoking calms me down when I am upset	1	2	3	4	5	8
m	A cigarette helps me deal with difficult situations	1	2	3	4	5	8
n	After a cigarette, I am able to concentrate better	1	2	3	4	5	8
o	I like the motions of smoking	1	2	3	4	5	8
p	It feels so good to smoke	1	2	3	4	5	8
q	I love smoking	1	2	3	4	5	8
r	I like to hold a cigarette between my fingers	1	2	3	4	5	8

x	The current text health warnings make me think about quitting smoking	1	2	3	4	5	8
y	The current text health warnings make me think about chemicals in cigarettes/smoke	1	2	3	4	5	8
z	The current text health warnings are believable	1	2	3	4	5	8
aa	The text warnings are only suitable for educated people	1	2	3	4	5	8
bb	Adding pictures to text warnings will make smokers think more about giving up smoking	1	2	3	4	5	8
cc	Showing cigarette packs in shops (i.e. counter display) is a form of advertising.	1	2	3	4	5	8
dd	The current text health warnings are easy to understand	1	2	3	4	5	8
ee	When smokers want a cigarettehas the health warnings are not going to stop them from smoking	1	2	3	4	5	8

27. **In your opinion, how likely is smoking cigarettes to cause.....**

		Not likely	Somewhat likely	Very likely	(Don't know)
a	Stroke (blood clot in brain)	1	2	3	8
b	Impotence (a man not able to have sex)	1	2	3	8
c	Lung cancer	1	2	3	8
d	Tuberculosis	1	2	3	8
e	Abortions	1	2	3	8
f	Gum disease	1	2	3	8
g	Mouth cancer	1	2	3	8
h	Financial problems	1	2	3	8
i	Illness in children	1	2	3	8
j	Death	1	2	3	8
k	Addiction	1	2	3	8
L	Gangrene	1	2	3	8
m	Amputations	1	2	3	8

Thank you!

Please wait quietly for other people to finish.

9.7 APPENDIX 7: HEALTH WARNING RATING QUESTIONNAIRE (TEXT-ONLY, PICTORIAL WARNINGS WITH (BRANDED) OR WITHOUT (PLAIN)BRAND DESIGN ELEMENTS

QUESTIONNAIRE 2 (Q2)

School of Health Systems and Public Health, University of Pretoria

PARTICIPANT'S INFORMATION LEAFLET & INFORMED CONSENT FOR QUESTIONNAIRES

Researcher's name: Dr Flavia Senkubuge

School of Health Systems and Public Health University of Pretoria
Dear Participant

Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults.I am a PHD (Public Health student at the School of Health Systems and Public Health, University of Pretoria. You are invited to volunteer to participate in our research project on ***Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults.***
This letter gives information to help you to decide if you want to take part in this study. Before you agree you should fully understand what is involved. If you do not understand the information or have any other questions, do not hesitate to ask us. You should not agree to take part unless you are completely happy about what we expect of you.

The purpose of the study is to understand the effects that warning labels have on smoking behaviour among South Africans. We would like you to complete a questionnaire. This may take about 15 minutes. We will collect the questionnaire from you before you leave. It will be kept in a safe place to ensure confidentiality. Please do not write your name on the questionnaire.

We will be available to help you with the questionnaire or to fill it in on your behalf. The Research Ethics Committee of the University of Pretoria, Faculty of Health Sciences granted written approval for this study.

Your participation in this study is voluntary. You can refuse to participate or stop at any time without giving any reason. As you do not write your name on the questionnaire, you give us the information anonymously. Once you have given the questionnaire back to us, you cannot recall your consent. We will not be able to trace your information. Therefore, you will also not be identified as a participant in any publication that comes from this study.
Note: The implication of completing the questionnaire is that informed consent has been obtained from you. Thus any information derived from your form (which will be totally anonymous) may be used for e.g. publication, by the researchers.

We sincerely appreciate your help.
Yours truly,
Dr Flavia Senkubuge

HEALTH WARNING RATING QUESTIONNAIRE (TEXT-ONLY, BRANDED, PLAIN HEALTH WARNINGS)

QUESTIONNAIRE 2 (Q2)

Session information:
Place: _____ Packet: _____

Please complete the following page for each warning message.

Draw a circle around the number that best shows your response to each statement:

This warning message...	Strongly Disagree	Disagree	Neither nor	Agree	Strongly Agree
grabs my attention	1	2	3	4	5
is easy to understand	1	2	3	4	5
makes me stop and think	1	2	3	4	5
taught me something new	1	2	3	4	5
is believable	1	2	3	4	5
is relevant to me	1	2	3	4	5
is frightening	1	2	3	4	5
makes me feel more concerned about smoking	1	2	3	4	5
makes me think about the health risks of smoking	1	2	3	4	5
would make me think about quitting	1	2	3	4	5
makes me feel smoking is extremely dangerous to my health	1	2	3	4	5
makes me feel I spend too much money on cigarettes	1	2	3	4	5

Thinking about the TEXT in this warning:

Please rate the effectiveness of the **text** in this warning, by circling one number on the scale below.

LEAST effective	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	***MOST effective***

What do you **LIKE** about the **text/ words**, if anything?

_____
_____
_____

What do you **DISLIKE** about the **text/words**, if anything?

_____
_____
_____
_____

Thinking about the PICTURE in this warning:

Please rate the effectiveness of the picture in this warning, by circling one number on the scale below.

LEAST effective	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	***MOST effective***

What do you **LIKE** about the **picture**, if anything?

_____
_____

What do you **DISLIKE** about the **picture**, if anything?

_____
_____
_____

How effective would this warning message be in each of the following ways?	Not at all effective	Not very effective	Somewhat effective	Very effective
Making people think about the health risks of smoking	1	2	3	4
Motivating smokers to quit smoking or think about quitting	1	2	3	4
Helping to prevent youth from starting smoking	1	2	3	4
Overall, how effective is this warning	1	2	3	4

Once you have completed this form for all warnings, please complete the comparative form (Q3).

9.8 APPENDIX 8: COMPARATIVE RATING QUESTIONNAIRE (TEXT-ONLY, PICTORIAL WARNINGS WITH (BRANDED) OR WITHOUT (PLAIN) BRAND DESIGN ELEMENTS

COMPARATIVE RATING QUESTIONNAIRE (TEXT-ONLY, BRANDED, PLAIN HEALTH WARNINGS)

QUESTIONNAIRE 3 (Q 3)

Session information:

Date: _____ Place: _____

Please complete the following as a summary of the group of warning messages.

Please look at the pictures below from your cigarette packs and answer the following:

NUMBER	Picture	NUMBER	Picture
1	 Impotence	4	 Death
2	 Abortion	5	 Oral disease
3	 Stroke	6	 Second Hand Smoke

7	 Poverty	**8**	 Addiction

Please put the warning messages in order from most effective to least effective overall, in your opinion.

Indicate your choices by writing the **[number]** of the warning in the appropriate space below.

Least effective									Most effective

PLEASE INSERT NUMBER ONLY:

	PICTURE NUMBER….?
Which one of the warning messages most made you stop and think?	
Which one of the warning messages do you think would be most effective for informing people about the health effects of tobacco?	
Which one of the warning messages do you think would be most effective for encouraging smokers to reduce their tobacco use?	
Which one of the warning messages do you think would be most effective for preventing youth from starting smoking?	

Please look at all the messages and different cigarette packs in front of you and answer the following

Please choose the top 5 warning messages in order from least effective to most effective overall, in your opinion.

Indicate your choices by writing the **[number]** of the warning in the appropriate space below.

Least effective									Most effective

THANK YOU!!

9.9 APPENDIX 9: POST-EXPOSURE QUESTIONNAIRE

POST-EXPOSURE QUESTIONNAIRE

QUESTIONNAIRE 4 (Q4)

School of Health Systems and Public Health, University of Pretoria

PARTICIPANT'S INFORMATION LEAFLET & INFORMED CONSENT FOR QUESTIONNAIRES

Researcher's name: Dr Flavia Senkubuge

School of Health Systems and Public Health University of Pretoria
Dear Participant

Smoking-related health risk knowledge and reactions to cigarette warning labels amongst South African adults.I am a PHD (Public Health student at the School of Health Systems and Public Health, University of Pretoria. You are invited to volunteer to participate in our research project on ***Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults.***
This letter gives information to help you to decide if you want to take part in this study. Before you agree you should fully understand what is involved. If you do not understand the information or have any other questions, do not hesitate to ask us. You should not agree to take part unless you are completely happy about what we expect of you.

The purpose of the study is to understand the effects that warning labels have on smoking behaviour among South Africans. We would like you to complete a questionnaire. This may take about 15 minutes. We will collect the questionnaire from you before you leave. It will be kept in a safe place to ensure confidentiality. Please do not write your name on the questionnaire.

We will be available to help you with the questionnaire or to fill it in on your behalf. The Research Ethics Committee of the University of Pretoria, Faculty of Health Sciences granted written approval for this study.

Your participation in this study is voluntary. You can refuse to participate or stop at any time without giving any reason. As you do not write your name on the questionnaire, you give us the information anonymously. Once you have given the questionnaire back to us, you cannot recall your consent. We will not be able to trace your information. Therefore, you will also not be identified as a participant in any publication that comes from this study.
Note: The implication of completing the questionnaire is that informed consent has been obtained from you. Thus any information derived from your form (which will be totally anonymous) may be used for e.g. publication, by the researchers.

We sincerely appreciate your help.
Yours truly,
Dr Flavia Senkubuge

Please complete the questions below to help give us a better understanding of your background.

BEGIN: WRITE YOUR UNIQUE NUMBER

THAT IS THE SAME AS QUESTIONNAIRE 1 HERE:

1. Do you want to stop smoking cigarettes now?

I have never smoked cigarettes	1
I do not smoke now	2
Yes	3
No	4

2. When are you planning to quit smoking?

I do not smoke	1
Not planning to quit?	2
sometime in the future beyond 6 months	3
within the next 6 months	4
within the next month,	5

3. **And if you tried in the next six months, how likely do you think it is that you would succeed in giving up smoking? Is it . . .**

Very likely,	1
Fairly likely,	2
Not very likely,	3
Not at all likely?	4
(Do not know/ Can't choose)	8

4. **If you currently smoke and were told that snuff is 99% safer than smoking and it would give you the same amount of nicotine you crave from your cigarette, how likely would you be to switch?**

Very likely	1
Somewhat likely	2
Somewhat unlikely	3
Very unlikely	4
(Do not know/ Can't choose)	8

5. **In past 12 months, have you ever tried to quit smoking?**

Never	1
Once	2
Twice	3
Three times or more	4
I do not smoke now at all	5
(Do not know/ Can't choose)	8

6. On a scale from 0 to 10 (0 meaning not at all motivated and 10 very motivated), how much do you want to stop smoking now?

1	2	3	4	5	6	7	8	9	10
Not at all									Very much

7. On a scale from 0 to 10 (0 meaning not at all confident and 10 very confident), how strongly do you believe/how confident are you that you could give up smoking now and remain a non-smoker if you tried?

1	2	3	4	5	6	7	8	9	10
Not at all confident in succeeding in giving up smoking									Very confident in succeeding in giving up smoking

8. **Here are some comments people made about smoking and the warnings labels on packaging of tobacco products and counter displays in South Africa. To what extent do you agree or disagree with them?**

		Strongly agree	Agree	Neither nor	Disagree	Strongly disagree	(Do not know)
a	Smoking is extremely dangerous to my health	1	2	3	4	5	8
b	Smoking is ruining my health	1	2	3	4	5	8
c	My cigarette smoke leaves an unpleasant smell	1	2	3	4	5	8
d	Smoking gives me very bad breath	1	2	3	4	5	8
e	I spend too much money on cigarettes	1	2	3	4	5	8
f	My cigarette smoke bothers other people a great deal	1	2	3	4	5	8
g	My second-hand smoke is dangerous to those around me	1	2	3	4	5	8
h	Smoking is bad for my skin	1	2	3	4	5	8
i	It bothers me to be dependent on cigarettes	1	2	3	4	5	8
j	I would have more energy if I did not smoke	1	2	3	4	5	8
k	A cigarette calms me down when I am stressed	1	2	3	4	5	8
l	Smoking calms me down when I am upset	1	2	3	4	5	8
m	A cigarette helps me deal with difficult situations	1	2	3	4	5	8
n	After a cigarette, I am able to concentrate better	1	2	3	4	5	8

o	I like the motions of smoking	1	2	3	4	5	8
p	It feels so good to smoke	1	2	3	4	5	8
q	I love smoking	1	2	3	4	5	8
r	I like to hold a cigarette between my fingers	1	2	3	4	5	8
x	The current text health warnings make me think about quitting smoking	1	2	3	4	5	8
y	The current text health warnings make me think about chemicals in cigarettes/smoke	1	2	3	4	5	8
z	The current text health warnings are believable	1	2	3	4	5	8
aa	The text warnings are only suitable for educated people	1	2	3	4	5	8
bb	Adding pictures to text warnings will make smokers think more about giving up smoking	1	2	3	4	5	8
cc	Showing cigarette packs in shops (i.e. counter display) is a form of advertising.	1	2	3	4	5	8
dd	The current text health warnings are easy to understand	1	2	3	4	5	8
ee	When smokers want a cigarette the health warnings are not going to stop them from smoking	1	2	3	4	5	8

9. **In your opinion, how likely is smoking cigarettes to cause.....**

		Not likely	Somewhat likely	Very likely	(Don't know)
a	Stroke (blood clot in brain)	1	2	3	8
b	Impotence (a man not able to have sex)	1	2	3	8
c	Lung cancer	1	2	3	8
d	Tuberculosis	1	2	3	8
e	Abortions	1	2	3	8
f	Gum disease	1	2	3	8
g	Mouth cancer	1	2	3	8
h	Financial problems	1	2	3	8
i	Illness in children	1	2	3	8
j	Death	1	2	3	8
k	Addiction	1	2	3	8
L	Gangrene	1	2	3	8
m	Amputations	1	2	3	8

Thank you! PLEASE TAKE A BREAK

9.10 APPENDIX 10: WASHOUT PICTURES

Number	Picture	Number	Picture
1	 Misty Mountain	2	 Serene Mountain
3	 Blue water	4	 Waterfall
5	 Rolling hills	6	 Beach
7	 Sunset	8	 Still water

THANK YOU!

9.11 APPENDIX 11: MODERATOR GUIDE

Purpose of the Discussion Guide

This discussion guide has been developed for the use of the group Moderator to prompt discussion amongst the participants. This guide will be used to steer discussion to the topic areas to be covered, and the specific questions of interest within each topic area.

For the purposes of qualitative research, it is not necessarily intended that these questions be asked exactly as they are worded here. Focus group discussions are more like a conversation than a set of structured questions. The discussion should be as informal as possible and participants should be encouraged to speak openly and freely.

The Moderator will need to probe with questions such as “Why?” and “What does that mean to you?” in order to understand participants’ responses. The Moderator will also need to make sure that all participants in the group have an opportunity to express their opinions.

Because each group of participants may be different, a responsive approach should be used for the research. Therefore, a level of flexibility should be taken in the conduct of each group to allow individual and group reactions to issues and to the warning messages. For this reason, the groups may vary in terms of the detailed topics and the order in which issues are discussed.

MODERATOR GUIDE

PART 1: BACKGROUND QUESTIONNAIRE	COMPLETED TICK
1. **Introduce yourself and explain confidentiality and recording. Explain that there is no need to worry and participants should feel comfortable** 2. **Explain that: '*We're here to talk about issues to do with smoking and tobacco warning labels.*** 3. **Explain we will have 3 parts:** **a) Filling in questionnaire** **b) Individual rating of messages** **c) Finally, group discussion**	
4. **Ask Participants to fully complete background questionnaire (Questionnaire 1 – white paper)**	
PART 2: INDIVIDUAL RATING	
1. **Explain that you are now going to look at and evaluate different cigarette packets <u>individually/ alone</u>. We will discuss together later at the focus group. DO NOT DISCUSS WITH YOUR NEIGHBOUR AT THIS TIME.** 2. **The different cigarettes and questionnaires are in three different envelopes marked:** - **A (text warnings)** - B **(pictorial packs, white boxes with pictures)** - **C (plain packs, brown boxes with pictures** 3. **Everyone will rate the packs in the envelopes in a different sequence e.g. one will rate: A, B C another C B A etc.** ***Don't worry! In the end you will rate all 3 envelopes and packs.*** 4. **Hand out all 3 different envelopes to participants. <u>Make sure each participant gets all 3 envelope s A B and C.</u>** 5. **Make sure the sequence of rating is different e.g. one rates starting with envelope A B C the other C B A etc**	

6. After each envelope is rated take a 5 minute break and show washout pictures e.g. envelope A washout, B washout etc.	
<u>Let the rating begin!!!</u> **<u>RATING 1:</u>** ***1.*** **Ask participants: *Open your 1st envelope, take out 1st cigarette pack look at it and complete its questionnaire.*** - **Each pack has its own questionnaire.** - **Look at top right hand corner for the picture on the pack and fill out that packs questionnaire.** **2. Take out 2nd cigarette pack look at it and complete its questionnaire. DO THIS UNITIL ALL CIGARETTE PACKS IN THE EVELOPE HAVE BEEN RATED!!** ***3. Now participants should put all packs in the envelope together do a comparative rating (green paper)*** **4. Collect questionnaires (take 5 minutes break and show washout pictures)** **<u>RATING 2:</u>** ***5.*** **Ask participants: *Open your 2nd envelope, take out 1st cigarette pack look at it and complete its questionnaire.* Each pack has its own questionnaire. Look at top right hand corner for the picture on the pack and fill out that packs questionnaire.** **6. Take out 2nd cigarette pack look at it and complete its questionnaire. DO THIS UNITIL ALL CIGARETTE PACKS IN THE EVELOPE HAVE BEEN RATED!!** **7. Now participants should put all packs in the envelope together do a comparative rating (green paper)** **8. Collect questionnaires (take 5 minutes break and show washout pictures)** **<u>RATING 3:</u>** **9. Move to last envelope and do the same until all packs in all 3 envelopes have been evaluated.** **10. Collect all questionnaires for individual rating and all envelopes**	**COMPLETED TICK**

TEA BREAK (10 Mins)	
PART 3: FOCUS GROUP DISCUSSION	**COMPLETED TICK**
1. Explain that you are now going to look at and evaluate the cigarette packets <u>together</u> and we will discuss together. **2. There is no right or wrong answer participants should just give their honest opinion even if different from the group.**	
<u>Let the rating begin!!!</u> ➢ **Have participants view each cigarette pack, in the same order this time. All packs in all three envelopes A B C should be viewed.** ➢ **After viewing each message, prompt the group with the following questions for each topic area.** **<u>QUESTIONS FOR DISCUSSION</u>** 1. **Attention - noticing:** • **"Does this warning catch your attention? What in particular catches your attention?"** 2. **Communication – message, comprehension, credibility:** • **"What message is this warning trying to get across?"** • **"Does this warning message tell you anything new or anything you didn't already know? What?"** • **"Is this important information?"** • **"Was there anything you didn't understand, or that wasn't clear in the warning message? What?** • **"Do you believe what this warning is saying? What don't you believe?"** • **"What do you think/how do you feel about the picture?"** • **"What do you think/how do you feel about the headline text?"** • **"What do you think/how do you feel about the explanatory text?"**	

3. **Identification – personal relevance:** • **"Who do you think this warning message is aimed at? Why?"** • **"Is this message relevant to you personally? Why/why not?"** 4. **Effect – call to action:** • **"Is there anything in this warning message that leaves you feeling more concerned about your smoking? What?"** • **"Is there anything about this warning message that would get you to think about quitting? What?"** • **"Does this message change how you think about the chemicals in cigarettes/smoke? How?"** 5. **Suggestions for improvement:** • **"How would you improve this warning?"** **"Any other comments?"**	**COMPLETED TICK**
<u>FINAL Comparison:</u> 1. ***Finally after each warning has been viewed and discussed, show all warnings together and prompt participants to compare them*.** **<u>QUESTIONS FOR DISCUSSION</u>** • **"Of all the messages you've seen today, which group of cigarette packs do you think is the best? A B or C Why?"** • **"Of all the messages you've seen today, which warning message do you think is the best? Why?"** • **"Of all the messages you've seen today, which warning message do you think is the worst? Why?"** • **"Which of these warning messages is most likely to help to prevent youth from starting smoking?"** • **"Which of these warning messages are you most likely to notice? Why?"**	
<u>CONCLUSION</u> 1. **Give brief health talk and hand out smoking cessation booklet** 2. **Give quit line number to participants** 3. **Thank participants for their participation**	
LUNCH (30 Mins)	

9.12 APPENDIX 12: ASSISTANT NOTE-TAKING GUIDE

(Ensure that you copy Part A for each warning message; complete for each group)

Session information:

Date: _____ Time:_____

Place:_____

Draw a seating plan including respondents' first names (and basic characteristics) for reference, and include with the notes. In the appropriate spaces below, record participants' responses (in their own words if possible), as well as the general conclusions reached for each point/warning.

Also, note any emotional reactions, the interactions of the group (such as level of participation and interest, whether there are dominant/non-participating members), and any other observations that you think may be helpful when interpreting the findings.

Part A. Rating each warning message

Attention
Do participants notice the warning message? What do they notice?

_____
_____
_____
_____
_____
_____
_____
_____
_____

Communication
What message does this warning convey to participants?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

What issues are there with comprehension?

Do the participants believe the warning message?

What do participants think of the picture?

What do participants think of the headline text?

What do participants think of the explanatory text?

Identification
Will smokers see the warning message as relevant to them?

Effect
What effect will the warning message have?

Suggestions for improvement:
How could the warning message be improved?

Part B. Comparing warning messages

Comparison:
Which is the BEST warning message?

Which is the WORST warning message?

Other Notes:

9.13 APPENDIX 13: REVISED HEALTH WARNING RATING QUESTIONNAIRE (PICTORIAL WARNINGS BRANDED AND PLAIN PACKS)

School of Health Systems and Public Health, University of Pretoria

PARTICIPANT'S INFORMATION LEAFLET & INFORMED CONSENT FOR QUESTIONNAIRES

Researcher's name: Dr Flavia Senkubuge

School of Health Systems and Public Health University of Pretoria

Dear Participant

Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults.I am a PHD (Public Health student at the School of Health Systems and Public Health, University of Pretoria. You are invited to volunteer to participate in our research project on ***Smoking-related health risk knowledge, and reactions to cigarette warning labels amongst South African adults.***
This letter gives information to help you to decide if you want to take part in this study. Before you agree you should fully understand what is involved. If you do not understand the information or have any other questions, do not hesitate to ask us. You should not agree to take part unless you are completely happy about what we expect of you.

The purpose of the study is to understand the effects that warning labels have on smoking behaviour among South Africans. We would like you to complete a questionnaire. This may take about 15 minutes. We will collect the questionnaire from you before you leave. It will be kept in a safe place to ensure confidentiality. Please do not write your name on the questionnaire.

We will be available to help you with the questionnaire or to fill it in on your behalf. The Research Ethics Committee of the University of Pretoria, Faculty of Health Sciences granted written approval for this study.

Your participation in this study is voluntary. You can refuse to participate or stop at any time without giving any reason. As you do not write your name on the questionnaire, you give us the information anonymously. Once you have given the questionnaire back to us, you cannot recall your consent. We will not be able to trace your information. Therefore, you will also not be identified as a participant in any publication that comes from this study.
Note: The implication of completing the questionnaire is that informed consent has been obtained from you. Thus any information derived from your form (which will be totally anonymous) may be used for e.g. publication, by the researchers.

We sincerely appreciate your help.
Yours truly,
Dr Flavia Senkubuge

REVISED HEALTH WARNING RATING QUESTIONNAIRE (REVISED PICTORIAL WARNING BRANDED AND PLAIN PACKS)

REVISED WARNING

QUESTIONNAIRE R1 (R 1)

Session information:
Place: _____ Packet: _____

Please complete the following page for each warning message.

Draw a circle around the number that best shows your response to each statement:

This warning message...	Strongly Disagree	Disagree	Neither nor	Agree	Strongly Agree
grabs my attention	1	2	3	4	5
is easy to understand	1	2	3	4	5
makes me stop and think	1	2	3	4	5
taught me something new	1	2	3	4	5
is believable	1	2	3	4	5
is relevant to me	1	2	3	4	5
is frightening	1	2	3	4	5
makes me feel more concerned about smoking	1	2	3	4	5
makes me think about the health risks of smoking	1	2	3	4	5
would make me think about quitting	1	2	3	4	5
makes me feel smoking is extremely dangerous to my health	1	2	3	4	5
makes me feel I spend too much money on cigarettes	1	2	3	4	5

Thinking about the TEXT in this warning:

Please rate the effectiveness of the **text** in this warning, by circling one number on the scale below.

LEAST effective	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	***MOST effective***

What do you **LIKE** about the **text/ words**, if anything?

_____
_____
_____
_____

What do you **DISLIKE** about the **text/words**, if anything?

_____
_____
_____
_____

Thinking about the PICTURE in this warning:
Please rate the effectiveness of the picture in this warning, by circling one number on the scale below.

LEAST effective	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	***MOST effective***

What do you **LIKE** about the **picture**, if anything?

_____
_____
_____
_____
_____

What do you **DISLIKE** about the **picture**, if anything?

_____
_____
_____
_____

How effective would this warning message be in each of the following ways?	Not at all effective	Not very effective	Somewhat effective	Very effective
Making people think about the health risks of smoking	1	2	3	4
Motivating smokers to quit smoking or think about quitting	1	2	3	4
Helping to prevent youth from starting smoking	1	2	3	4
Overall, how effective is this warning	1	2	3	4

Once you have completed this form for all warnings, please complete the comparative form (Q R2).

9.14 APPENDIX 14: COMPARATIVE RATING QUESTIONNAIRE (REVISED PICTORIAL WITH AND WITHOUT PLAIN PACKS)

COMPARATIVE RATING QUESTIONNAIRE (REVISED, PICTORIAL WARNING WITH AND WITHOUT PLAIN PACKS)

QUESTIONNAIRE R2 (Q R2)

Session information:

Date: _____ Place: _____

Please complete the following as a summary of the group of warning messages.

Please look at the pictures below from your cigarette packs and answer the following:

NUMBER	Picture	NUMBER	Picture
1	**REVISED WARNING**	**4**	**REVISED WARNING**
2	**REVISED WARNING**	**5**	**REVISED WARNING**
3	**REVISED WARNING**	**6**	**REVISED WARNING**
7	**REVISED WARNING**	**8**	**REVISED WARNING**

Please put the warning messages in order from most effective to least effective overall, in your opinion.

Indicate your choices by writing the **[number]** of the warning in the appropriate space below.

Least effective									Most effective

PLEASE INSERT NUMBER ONLY:

	PICTURE NUMBER….?
Which one of the warning messages most made you stop and think?	
Which one of the warning messages do you think would be most effective for informing people about the health effects of tobacco?	
Which one of the warning messages do you think would be most effective for encouraging smokers to reduce their tobacco use?	
Which one of the warning messages do you think would be most effective for preventing youth from starting smoking?	

Please look at all the messages and different cigarette packs in front of you and answer the following

Please choose the top 5 warning messages in order from most effective to least effective overall, in your opinion.

Indicate your choices by writing the **[number]** of the warning in the appropriate space below.

Least effective									Most effective

THANK YOU!

9.15 APPENDIX 15: MODERATOR GUIDE REVISED WARNINGS

MODERATOR GUIDE

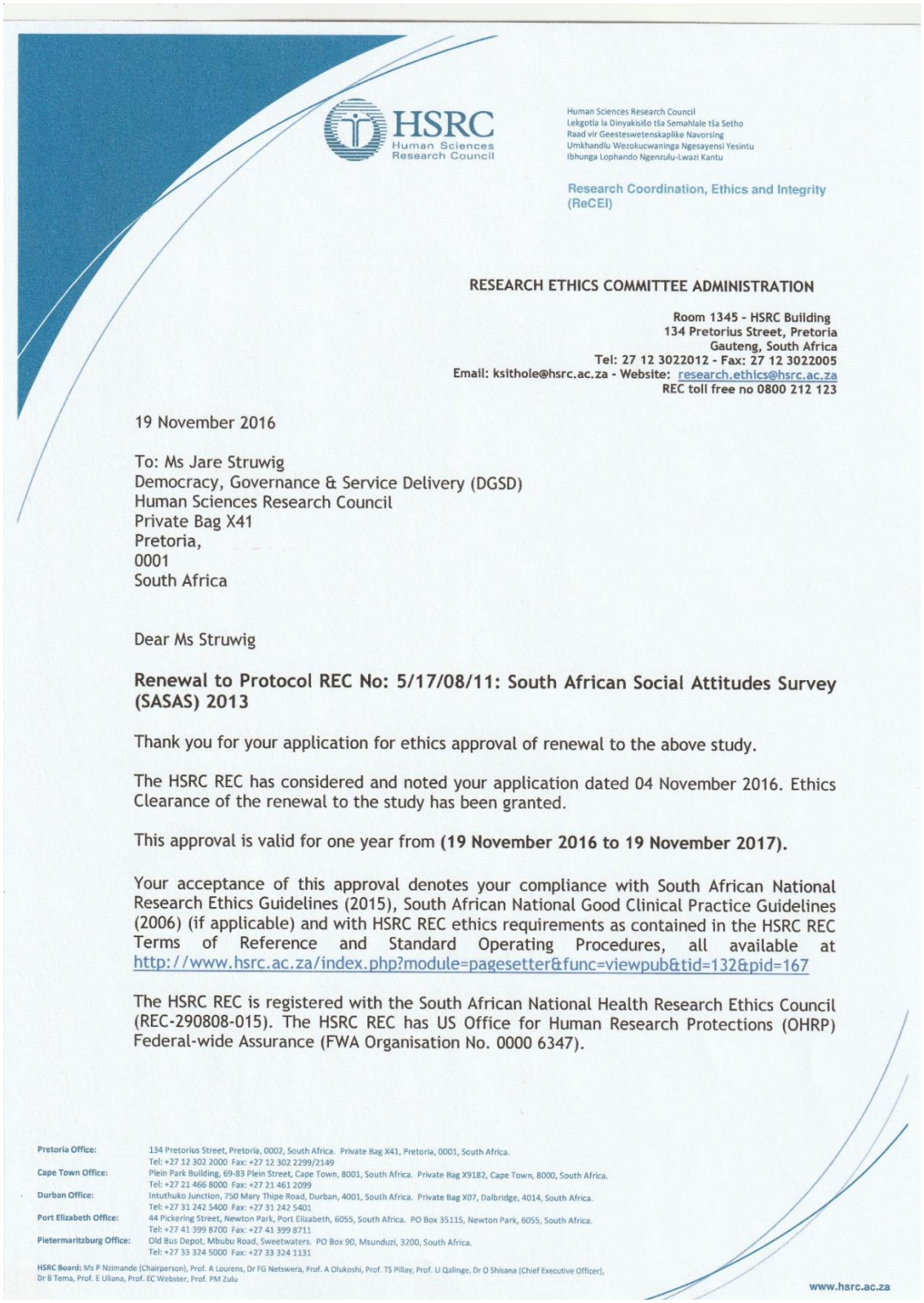
PART 1: BACKGROUND QUESTIONNAIRE	COMPLETED TICK
60. Introduce yourself and explain confidentiality and recording. Explain that there is no need to worry and participants should feel comfortable 61. Explain that: '*We're here to talk about issues to do with smoking and tobacco warning labels.* 62. Explain we will have 2 parts: a) Individual rating of messages b) Group discussion	
PART 2: INDIVIDUAL RATING	
63. Explain that you are now going to look at and evaluate different cigarette packets <u>individually/ alone</u>. We will discuss together later at the focus group. DO NOT DISCUSS WITH YOUR NEIGHBOUR AT THIS TIME. 64. The different cigarettes and questionnaires are in two different envelopes marked: - D (pictorial packs, white boxes with pictures) - E (plain packs, brown boxes with pictures 65. Everyone will rate the packs in the envelopes in a different sequence e.g. one will rate: B, E another E, B etc. *Don't worry! In the end you will rate all 2 envelopes and packs.* 66. Hand out both different envelopes to participants. <u>Make sure each participant gets both envelope s D and E.</u> 67. Make sure the sequence of rating is different e.g. one rates starting with envelope D E the other E D etc 68. After each envelope is rated take a 5 minute break and show washout pictures e.g. envelope D washout, E washout etc.	

Let the rating begin!!! **RATING 1:** **69. Ask participants: *Open your 1st envelope, take out 1st cigarette pack look at it and complete its questionnaire.*** **- Each pack has its own questionnaire.** **- Look at top right hand corner for the picture on the pack and fill out that packs questionnaire.** **70. Take out 2nd cigarette pack look at it and complete its questionnaire. DO THIS UNITIL ALL CIGARETTE PACKS IN THE EVELOPE HAVE BEEN RATED!!** ***71. Now participants should put all packs in the envelope together do a comparative rating (green paper)*** **72. Collect questionnaires (take 5 minutes break and show washout pictures)** **RATING 2:** ***73. Ask participants: Open your 2nd envelope, take out 1st cigarette pack look at it and complete its questionnaire.*** **Each pack has its own questionnaire. Look at top right hand corner for the picture on the pack and fill out that packs questionnaire.** **74. Take out 2nd cigarette pack look at it and complete its questionnaire. DO THIS UNITIL ALL CIGARETTE PACKS IN THE EVELOPE HAVE BEEN RATED!!** **75. Now participants should put all packs in the envelope together do a comparative rating (green paper)** **76. Collect questionnaires (take 5 minutes break and show washout pictures)** **77. Collect all questionnaires for individual rating and all envelopes**	**COMPLETED TICK**
TEA BREAK (10 Mins)	
PART 3: FOCUS GROUP DISCUSSION	**COMPLETED TICK**
3. Explain that you are now going to look at and evaluate the	

cigarette packets <u>together</u> and we will discuss together. **4. There is no right or wrong answer participants should just give their honest opinion even if different from the group.**	
<u>Let the rating begin!!!</u> ➢ **Have participants view each cigarette pack, in the same order this time. All packs in both envelopes D and E should be viewed.** ➢ **After viewing each message, prompt the group with the following questions for each topic area.** **<u>QUESTIONS FOR DISCUSSION</u>** 6. **Attention - noticing:** • **"Does this warning catch your attention? What in particular catches your attention?"** 7. **Communication – message, comprehension, credibility:** • **"What message is this warning trying to get across?"** • **"Does this warning message tell you anything new or anything you didn't already know? What?"** • **"Is this important information?"** • **"Was there anything you didn't understand, or that wasn't clear in the warning message? What?** • **"Do you believe what this warning is saying? What don't you believe?"** • **"What do you think/how do you feel about the picture?"** • **"What do you think/how do you feel about the headline text?"** • **"What do you think/how do you feel about the explanatory text?"** 8. **Identification – personal relevance:** • **"Who do you think this warning message is aimed at? Why?"**	**COMPLETED**

• **"Is this message relevant to you personally? Why/why not?"** 9. **Effect – call to action:** • **"Is there anything in this warning message that leaves you feeling more concerned about your smoking? What?"** • **"Is there anything about this warning message that would get you to think about quitting? What?"** • **"Does this message change how you think about the chemicals in cigarettes/smoke? How?"** 10. **Suggestions for improvement:** • **"How would you improve this warning?"** **"Any other comments?"**	**TICK**
<u>FINAL Comparison:</u> 2. ***Finally after each warning has been viewed and discussed, show all warnings together and prompt participants to compare them*.** **<u>QUESTIONS FOR DISCUSSION</u>** • **"Of all the messages you've seen today, which group of cigarette packs do you think is the best? D or E Why?"** • **"Of all the messages you've seen today, which warning message do you think is the best? Why?"** • **"Of all the messages you've seen today, which warning message do you think is the worst? Why?"** • **"Which of these warning messages is most likely to help to prevent youth from starting smoking?"** • **"Which of these warning messages are you most likely to notice? Why?"**	
<u>CONCLUSION</u> 4. **Give brief health talk and hand out smoking cessation booklet** 5. **Give quit line number to participants** 6. **Thank participants for their participation**	
LUNCH (30 Mins)	

9.16 APPENDIX 16: SASAS 2016/17 ETHICS APPROVAL



HSRC Human Sciences Research Council

Human Sciences Research Council
Lekgotla la Dinyakisišo tša Semahlale tša Setho
Raad vir Geesteswetenskaplike Navorsing
Umkhandlu Wezokucwaninga Ngesayensi Yesintu
Ibhunga Lophando Ngenzulu-Lwazi Kantu

Research Coordination, Ethics and Integrity (ReCEI)

RESEARCH ETHICS COMMITTEE ADMINISTRATION

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Tel: 27 12 3022012 - Fax: 27 12 3022005
Email: ksithole@hsrc.ac.za - Website: research.ethics@hsrc.ac.za
REC toll free no 0800 212 123

19 November 2016

To: Ms Jare Struwig
Democracy, Governance & Service Delivery (DGSD)
Human Sciences Research Council
Private Bag X41
Pretoria,
0001
South Africa

Dear Ms Struwig

Renewal to Protocol REC No: 5/17/08/11: South African Social Attitudes Survey (SASAS) 2013

Thank you for your application for ethics approval of renewal to the above study.

The HSRC REC has considered and noted your application dated 04 November 2016. Ethics Clearance of the renewal to the study has been granted.

This approval is valid for one year from **(19 November 2016 to 19 November 2017).**

Your acceptance of this approval denotes your compliance with South African National Research Ethics Guidelines (2015), South African National Good Clinical Practice Guidelines (2006) (if applicable) and with HSRC REC ethics requirements as contained in the HSRC REC Terms of Reference and Standard Operating Procedures, all available at http://www.hsrc.ac.za/index.php?module=pagesetter&func=viewpub&tid=132&pid=167

The HSRC REC is registered with the South African National Health Research Ethics Council (REC-290808-015). The HSRC REC has US Office for Human Research Protections (OHRP) Federal-wide Assurance (FWA Organisation No. 0000 6347).

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We wish you well with this study. We would appreciate receiving copies of all publications arising out of this study.

Yours sincerely

Professor D.R Wassenaar
Chair: HSRC Research Ethics Committee

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9.17 APPENDIX 17: SOUTH AFRICAN SOCIAL ATTITUDES SURVEY QUESTIONNAIRE 2016/17

SOUTH AFRICAN SOCIAL ATTITUDES SURVEY
Questionnaire 2: January/March 2017

HSRC Human Sciences Research Council

ADAPTED

SMOKING & TOBACCO BEHAVIOUR

I am now going to ask some questions about smoking and the use of tobacco products. I should like to remind you that yours answers to all these questions are confidential.

Do you use or have you used any of the following tobacco products?

		Currently Every day	Currently Some days	Stopped Completely less than 6 months ago	Stopped Completely more than 6 months ago	Never smoked before
1.	Manufactured Cigarettes	1	2	3	4	5
2.	Roll-your-own cigarettes (Zol)	1	2	3	4	5
3.	Hubbly or hookah or water pipe	1	2	3	4	5
4.	Electronic cigarettes (vapour cig)	1	2	3	4	5
5.	Cigars or Pipes	1	2	3	4	5
6.	Snuff (nasal or oral)	1	2	3	4	5

SMOKELESS TOBACCO (ORAL AND NASAL SNUFF)

INTERVIEWER:

IF THE RESPONDENT HAS <u>NEVER</u> USED SNUFF (NASAL OR ORAL) BUT HAS USED ONE OF THE OTHER TOBACCO PRODUCTS, SKIP, AND GO TO Q8.

IF THE RESPONDENT HAS <u>NEVER</u> USED ANY OF THE TOBACCO PRODUCTS LISTED ABOVE OR HAS COMPLETELY STOPPED USING ANY TOBACCO PRODUCT, SKIP AND GO TO Q14.

7. **On the days that you use (used) snuff, how many times per day do (did) you use snuff?**

Times per day…… | | |

If none, record '00'

CIGARETTES, PIPES & CIGARS

INTERVIEWER: IF THE RESPONDENT HAS <u>NEVER</u> SMOKED OR HAS COMPLETELY STOPPED USING ANY TOBACCO PRODUCT ACCORDING TO QUESTIONS 1-5, GO TO QUESTION 14

8. **On the days that you smoke, on average, how many cigarettes, including hand rolled cigarettes, do you smoke per day?**

Cigarettes per day…… | | |

If less than one per day, record '00'

9. **Currently, what (brand)/type of cigarettes do you usually/mostly smoke?**

Light-strength cigarettes	1
Normal strength	2
Menthol cigarettes	3
Menthol 'on demand' (Crush)	4

Any cigarette	5

10. Which of following best describes you: I am planning to quit smoking...

Within the next month	1
Within the next 6 months	2
Sometime in future, beyond 6 months	3
I am not planning to quit	4
(Do not know/ Can't choose)	8

11. And if you tried to stop, how likely do you think it is that you would succeed in giving up smoking ? Is it . . .

Very likely,	1
Fairly likely,	2
Not very likely,	3
Not at all likely?	4

12. Within the last 12 months when you attempted to quit, did you get any help?

Yes	1
No	2
Can't say	8
I didn't think I needed help	9
I did not attempt to quit in the last 12 months	98

13. Within the past 12 months, has a doctor, nurse/health worker or dentist advised you to quit smoking?

INTERVIEWER: PLEASE CIRCLE ONE NUMBER ONLY

Doctor	1
Nurse/Health worker	2
Dentist	3
Doctor and Nurse	4
Dentist and Nurse	5
Doctor and Dentist	6
All of the above	7
None of the above	8
I did not see a doctor or dentist or nurse in the past 12 months	9

ASK ALL RESPONDENTS:

14. In your opinion, does smoking cigarettes increase risk for.....

INTERVIEWER: MULTIPLE RESPONSES ALLOWED. PLEASE CIRCLE ALL THAT APPLY.

a.	A stroke (blood clot in brain)	1
b.	Impotence (a man not able to have sex)	2
c.	Lung cancer	3
d.	Tuberculosis (TB)	4
e.	HIV/AIDS	5
f.	Gum disease	6
g.	Mouth cancer	7
h.	Hypertension (high blood pressure)	8
i.	(None of the above)	9
J.	(Do not know)	10
k.	(Refused to answer)	11

In your opinion, are the following products less harmful, more harmful, or just as harmful as smoking 'regular' cigarettes?

		Less	More	Just as	(Don't know)	(Never heard of product)
15.	Smoking tobacco in a hookah or water pipe?	1	2	3	8	9
16.	Smokeless tobacco such as snuff or chewing tobacco?	1	2	3	8	9
17.	Light or ultra-light cigarettes?	1	2	3	8	9
18.	Menthol cigarettes?	1	2	3	8	9
19.	Roll-your-own cigarettes?	1	2	3	8	9
20.	Electronic cigarettes (E-cigarette)	1	2	3	8	9

INTERVIEWER: IF THE RESPONDENT HAS NEVER HEARD OF ELECTRONIC CIGARETTES (E-CIGARETTES) (CODE 9 IN Q.20), SKIP TO Q.27.

ELECTRONIC CIGARETTES (E-CIGARETTES)

21. In the past 12 months, have you seen advertisements or promotions for e-cigarettes (including e-shisha, e-pipe) on any of the flowing media?… , newspapers / magazines, billboards, in the malls or any other source?

INTERVIEWER: MULTIPLE RESPONSES ALLOWED. PLEASE CIRCLE ALL THAT APPLY.

a.	Television	1
b.	Radio	2
c.	Retail stores	3
d.	Newspapers/magazines	4
e.	Billboards	5
f.	In malls/shopping centres	6
g.	Elsewhere (specify)	7
i.	(None of the above)	8
J.	(Do not know)	9
k.	(Refused to answer)	10

To what extent do you agree or disagree with the following statements about e-cigarettes? [*Showcard 1*]

		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	(Refuse to answer)
22.	e-cigarette advertisements and promotion may make adolescents think of smoking traditional cigarettes	1	2	3	4	5	8
23.	e-cigarette advertisements and promotions may make ex-smokers think of starting smoking cigarettes again	1	2	3	4	5	8
24.	e-cigarette smoking should be banned indoors just as traditional cigarette smoking.	1	2	3	4	5	8
25.	e-cigarette advertisement and promotions should be banned just as with traditional cigarettes	1	2	3	4	5	8
26.	Seeing people smoke e-cigarettes in public makes smoking look acceptable	1	2	3	4	5	8

PASSIVE SMOKING

In the <u>past 30 days</u>, about how many days would you say you were in a place where <u>someone smoked close</u> to you <u>(no complete physical barrier, i.e. smoke got to you)</u>?

		Never	1-6 days	7-10 days	11-15 days	16-20 days	More than 20 days	Refuse to answer
27.	At home	1	2	3	4	5	6	9
28.	At work	1	2	3	4	5	6	9
29.	Café, restaurants	1	2	3	4	5	6	9
30.	Shebeens, bar or clubs	1	2	3	4	5	6	9

TOBACCO ADVERTISEMENT AND MARKETING

31. In the last month, how often, if at all, have you <u>NOTICED</u> health warnings on cigarette packages?

Never	1
Once in a while	2
Often	3
Very often	4
Refused	7
Can't say/Don't know about warnings	8

32. In the last month, how often, if at all, have you <u>READ</u> or looked closely at the health warnings on cigarette packages?

Never	1
Once in a while	2
Often	3
Very often	4
Can't read	6
Refused	7
Can't say/Don't know about warnings	8

Here are some comments people make about the health warnings on cigarette packs and shop counter displays. Please tell me to what extent you agree or disagree with them? [*Showcard 1*]

		Strongly agree	Agree	Disagree	Strongly disagree	(Refuse to answer)
33.	The written health warnings are easy to understand	1	2	3	4	8
34.	When smokers want a cigarette, the written health warnings are not going to stop them from smoking	1	2	3	4	8
35.	The health warning pictures on 'plain' packs will make smokers think more about giving up smoking **(Showcard 34)**	1	2	3	4	8
36.	The current displays of cigarette packs inside stores and shops may encourage young people to take up smoking	1	2	3	4	8

ORAL and GENERAL HEALTH

37. How would you rate your oral health status?

Very good	1
Good	2
Neither nor	3
Poor	4
Very poor	5
(Do not know/ Can't choose)	8

38. How would you rate your general health status?

Very good	1
Good	2
Neither nor	3
Poor	4
Very poor	5
(Do not know/ Can't choose)	8

RESPONDENT CHARACTERISTICS

39. Sex of respondent [copy from contact sheet]

Male	1
Female	2

40. Race of respondent [copy from contact sheet]

Black African	1
Coloured	2
Indian/Asian	3
White	4
Other	5

41. Age of respondent in completed years [copy from contact sheet]

Years

(Don't know) = 998

42. Do you have a spouse/partner and if yes, do you share the same household?

Yes, I have a spouse/partner and we live in the same household	1
Yes, I have a spouse/partner but we don't live in the same household	2
No spouse/partner	3
(Refused)	9

43. What is your current marital status?

Married	1
Civil partnership	2
Separated from spouse/civil partner	3
Divorced from spouse/ legally separated from my civil partner	4
Widowed/civil partner died	5
Never married/never in civil partnership	6
(Refused to answer)	7
(Don't know)	8

44. What is the highest level of education that you have ever completed?

No schooling	00
Grade R/ Grade 0	01
Grade 1/ Sub A/Class 1	02

Grade 2 / Sub B/Class 2	03
Grade 3/Standard 1/ ABET 1 (Kha Ri Gude, Sanli)	04
Grade 4/ Standard 2	05
Grade 5/ Standard 3/ ABET 2	06
Grade 6/Standard 4	07
Grade 7/Standard 5/ ABET 3	08
Grade 8/Standard 6/Form 1	09
Grade 9/Standard 7/Form 2/ ABET 4	10
Grade 10/ Standard 8/ Form 3	11
Grade 11/ Standard 9/ Form 4	12
Grade 12/Standard 10/Form 5/Matric	13
NTC 1/ N1/NC (V) Level 2	14
NTC 2/ N2/ NC (V) Level 3	15
NTC 3/ N3/NC (V) Level 4	16
N4/NTC 4	17
N5/NTC 5	18
N6/NTC 6	19
Diploma	20
Advanced diploma (AD)	21
Bachelor degree	22
Post graduate diploma (PGD)	23
Honours degree	24
Master degree	25
Doctorate degree, Laureatus in Technology	26
Other (specify)	27
(Do not know)	88

45. How many years of full time education have you completed?

INTERVIEWER: INCLUDE ALL PRIMARY AND SECONDARY SCHOOLING, UNIVERSITY AND OTHER POST-SECONDARY EDUCATION, AND FULL-TIME VOCATIONAL TRAINING, BUT DO NOT INCLUDE REPEATED YEARS. IF RESPONDENT IS CURRENTLY IN EDUCATION, COUNT THE NUMBER OF YEARS COMPLETED SO FAR.

☐☐ years

(No formal schooling) = 00
(Don't know) = 98

46. Are you currently working for pay, did you work for pay in the past, or have you never been in paid work?

I am currently in paid work	01	→ Ask Q.47
I am currently not in paid work but I had paid work in the past	02	→ Skip to Q.48
I never had paid work	03	→ Skip to Q.55
No answer	08	

47. How many hours, on average, do you usually work for pay in a normal week, including overtime?

☐☐☐ Hours

96 hours or more	96
(Do not know)	98

48. Are/were you an employee, self-employed or working for your own family's business? (Refer to your main job)

An employee	1	→ Skip to Q.50
Self-employed without employees	2	→ Skip to Q.**Error! Reference source not found.**
Self-employed with employees	3	→ Ask Q.49
Working for your own family's business	4	→ Ask Q.49
(No answer)	9	
NAP (Never had work)	0	

49. How many employees do/did you have, not including yourself?

[ ][ ][ ] employees

9995 employees or more	9995
(No answer)	9999
(Not applicable)	0000

50. Do/did you supervise other employees?

INTERVIEWER: IF NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT JOB

Yes	1	
No	2	→ Skip to Q.**Error! Reference source not found.**
(Don't know)	8	
(No answer)	9	
(Not applicable - never had a job)	0	

51. How many other employees do/did you supervise?

[ ][ ][ ] employees

9995 employees or more	9995
(No answer)	9999
(Not applicable)	0000

52. What is your current occupation (the name or title of your main job)?

INTERVIEWER: WRITE DOWN RESPONSE IF NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT JOB

_____ [ ][ ]

(Refused to answer)	97
(Don't know, inadequately described)	98
(Not applicable – never had a job)	99

53. What kind of activities do you do most of the time (In your main job)?

INTERVIEWER: WRITE DOWN RESPONSE IF NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT JOB

_____ | | |

(Refused to answer)	97
(Don't know, inadequately described)	98
(Not applicable – never had a job)	99

54. What does the firm/organisation you work for mainly make or do – what kind of production/function is performed at your workplace?

INTERVIEWER: IF RESPONDENT WORKED FOR MORE THAN ONE EMPLOYER, OR IF HE/SHE IS BOTH EMPLOYED AND SELF-EMPLOYED, PLEASE REFER TO THE MAIN JOB. IF HE/SHE IS RETIRED OR NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT JOB

_____ | | |

(Refused to answer)	97
(Don't know, inadequately described)	98
(Not applicable – never had a job)	99

55. If you are married or have a partner, is he or she currently working for pay, did he/she work for pay in the past, or has he/she never been in paid work?

Currently in paid work	1	→ Ask Q.56
Currently not in paid work, paid work in the past	2	→ Skip to Q.57
Never had paid work	3	→ Skip to Q. 62
Not applicable (No partner)	0	→ Skip to Q.63

56. How many hours, on average, does your spouse /partner usually work for pay in a normal week, including overtime?

			Hours

96 hours or more	96
(Do not know)	98
(No answer)	99
(Not applicable - not currently working)	00

57. Is/was your spouse/partner an employee, self-employed, or working for his/her own family's business?

An employee	1
Self-employed without employees	2
Self-employed with employees	3
Working for your own family's business	4
(No answer)	9
(Not applicable - Never had a job)	0

58. Does/did your spouse/partner supervise other employees?

INTERVIEWER: IF NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT JOB

Yes	1
No	2
(Don't know)	8
(No answer)	9
(Not applicable - never had a job)	0

59. What is /was your spouse's/partner's occupation (the name or title of your main job)?

INTERVIEWER: WRITE DOWN RESPONSE IF NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT JOB

_____ | | |

(Refused to answer)	97
(Don't know, inadequately described)	98
(Not applicable – never had a job)	99

60. In his/her main job, what kind of activities does/did he/she do most of the time (in the main job)?

INTERVIEWER: WRITE DOWN RESPONSE IF NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT JOB

_____ | | |

(Refused to answer)	97
(Don't know, inadequately described)	98
(Not applicable – never had a job)	99

61. What does/did the firm/organisation he/she work/worked for mainly make or do – what kind of production/function is /was performed at his/her workplace?

INTERVIEWER: IF SPOUSE/PARTNER WORKED FOR MORE THAN ONE EMPLOYER, OR IF HE/SHE IS BOTH EMPLOYED AND SELF-EMPLOYED, PLEASE REFER TO THE MAIN JOB. IF HE/SHE IS RETIRED OR NOT CURRENTLY EMPLOYED, ASK FOR MOST RECENT MAIN JOB

_____ | | |

(Refused to answer)	97
(Don't know, inadequately described)	98
(Not applicable – never had a job)	99

62. Which of the following best describes your spouse's / partner's current situation?

In paid employment	1
Unemployed and looking for a job	2
In education (student / learner)	3
Apprentice or trainee	4
Permanently sick or disabled	5
Pensioner / retired	6
Looking after the household	7
In community service	8
Other (specify) ……	9

63. Are you or have you ever been a paid-up member of a Trade Union?

Yes, I am currently a member	1
Yes, previously but not currently	2
No, never a member	3
(Refused)	7

64. Would you say that you and your family are…

Wealthy	1
Very comfortable	2
Reasonably comfortable	3
Just getting along	4
Poor	5
Very poor	6

65. People sometimes describe themselves as belonging to the working class, the middle class, or the upper or lower class. Would you describe yourself as belonging to the…?

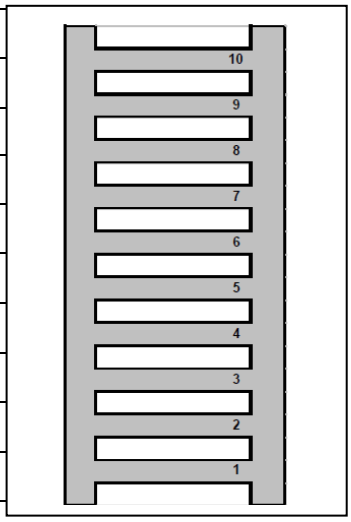
Lower class	1
Working class	2
Middle class	3
Upper middle class	4
Upper class	5
(Don't know)	8

66. In our society, there are groups which tend to be towards the top and groups which tend to be towards the bottom. Below is a scale that runs from the top to the bottom. Where would you put yourself on this scale?

TOP ….

10
9
8
7
6
5
4
3
2
1

BOTTOM ….



67. Taking all things together in your life, how would you say things are these days? Would you say you are <u>very happy</u>, <u>fairly happy</u>, <u>fairly unhappy</u> or <u>very unhappy</u>?'

Very happy	1
Fairly happy	2
Neither happy nor unhappy	3
Fairly unhappy	4
Very unhappy	5
(Don't know)	8

HOUSEHOLD CHARACTERISTICS

68. Indicate the type of main dwelling that the household occupies?

Dwelling/House or brick structure on a separate stand or yard or on farm	01
Traditional dwelling/ Hut/ Structure made of traditional materials	02
Flat or apartment in a block of flats	03
Town/cluster/semi-detached house (simplex, duplex or triplex)	04
Unit in retirement village	05
Dwelling/House/Flat/room in backyard	06
Informal dwelling/Shack in backyard	07
Informal dwelling/Shack not in backyard, e.g. in an informal/squatter settlement or on farm	08
Room/Flatlet	09
Caravan/Tent	10
Other, *specify*	11

PERSONAL AND HOUSEHOLD INCOME

69. Please consider the income of all household members and any income which may be received by the household as a whole. What is the main source of income in your household?

Salaries and/or wages	1
Remittances	2
Pensions and/or grants	3
Sale of farm products and services	4
Other non-farm income	5
No income	6
(Refused to answer)	7
(Don't know)	8

SHOWCARD G2

70. Please give me the letter that best describes the TOTAL MONTHLY HOUSEHOLD INCOME of all the people in your household before tax and other deductions. Please include all sources of income i.e. salaries, pensions, income from investment, etc.

71. Please give me the letter that best describes your PERSONAL TOTAL MONTHLY INCOME before tax and other deductions. Please include all sources of income i.e. salaries, pensions, income from investment, etc.

		70. Household	**71. Personal**
	No income	01	01
K	R1 – R500	02	02
L	R501 –R750	03	03
M	R751 – R1 000	04	04
N	R1 001-R1 500	05	05
O	R1 501 – R2 000	06	06
P	R2 001 – R3 000	07	07
Q	R3 001 – R5 000	08	08
R	R5 001 – R7 500	09	09
S	R7 501 – R10 000	10	10
T	R10 001 – R15 000	11	11
U	R15 001 – R20 000	12	12
V	R20 001 – R30 000	13	13
W	R30 001 – R50 000	14	14
X	R 50 001 +	15	15
	(Refuse to answer)	97	97
	(Uncertain/Don't know)	98	98

72. What monthly income level do you consider to be minimal for your household, i.e. your household could not make ends meet with less?

R _____

(Don't know = 98)

73. Is the total monthly income of your household higher, lower or more or less the same as this figure?

Much higher	1
Higher	2
More or less the same	3
Lower	4
Much lower	5
(Don't know)	8

THANK YOU FOR YOUR COOPERATION

9.18 APPENDIX 18: QUALITATIVE ANALYSIS

SMOKER 18-24 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=5)	*- The one with the baby in a bottle, it gets my attention because I have never seen this before (R1)* *-For me the other one, where the baby is smoking, that's wrong. It's the first one I noticed (R2)* *-I also think the baby in a bottle, it is bad (R4)* *-The money one! Who can afford to burn money in these days? (R5)*	*-It makes me think that all of this, this is a warning for everyone, not only for people who smoke, even those who don't won't start (R1)* *-Ya ne? even me, if I had seen these before starting, I don't think I would have started smoking (4)* *-For me I know that the one with money burning and the teeth, it shows me how I'm wasting money and hurting myself (R5)* *-Also the one in the wheelchair, I didn't know smoking can make you get like that, it's scary (R3)*	*-For me the brown one with the baby, it scares me because I still want to have a baby…and also I don't want to look at it, sorry please put a paper (R4)* *-The one burning money, it's SO TRUE! The money I spend. That box makes me feel bad (R5)*	*-All these things make me think maybe I should stop…the teeth, I don't want to look like that (R1)* *-YES! I'm also afraid to be looking like that! With ugly teeth. Yoh, I'm going to stop (R3)* *-I noticed this one with the money because I have dreams of making it big so I really did not know smoking will stop me from that.(R5)* *-I didn't know that when I smoke it damages the people next to me, it makes me worry about smoking next to my small sister (R2)*	*-I think the white box catches your attention, you see it faster than the brown, but the brown makes you not to buy it (R1)* *-The brown box with the baby, it's too much. No one can buy it. It will make everyone stop. Especially ladies, you know, when we see a baby like that, eish (R4)* *-I think if you use the brown boxes. I'm telling you people won't buy! Because it doesn't look cool !you know it's nice to take out your box and people see what you are smoking, but no, these brown boxes, those pictures? No (3)*

SMOKER 18-24 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
				-Na I don't want to be seen holding that ugly box, especially the brown one, I'll just buy and take the cigarettes out. It's hard to stop, but I'll try. (R5)	
Coloured (n=10)	*-The abortion baby is so bad, and it hurts because I have been smoking for so long and I did lose a baby before the one I have now, it makes me wonder if it was because of this (R6)* *-For me, the baby also is the first one that I see. Not the smoking one, the bottle one and also the teeth that one you can't not look at it (R10)* *-But what about the other one guys, the one with the oupa (*meaning*	*-I think this just tell someone that if you smoke a lot, your life will be bad, you will be sick, people around you will be sick, you won't have money. It is bad (R2)* *-I don't know, I smoke a lot, and this is frightening, but I don't know if it will make me stop. Maybe if something happens to me ill stop. (R4)* *-You will rather wait? I know I'm going to stop, I'm afraid (R6)*	*-If someone is having a baby, this one (..points at abortion picture on plain pack) will make them stop smoking (R1)* *-And a man, if a man wants to do that thing (giggles) it will make him stop. See this box (points at impotence), I think it will make a man stop smoking (R9)* *-I agree that the baby one (points at abortion on plain pack), it will make a person think (R4)* *-I feel like the addiction one can be me, because I could 'sommer'(* slang	*-I think all these pictures will make a person stop (R6)* *-Or at least make you think about stopping (R4)* *-I know I will TRY, I don't want to spoil my life, I didn't think smoking was a big deal, everyone I know smokes, so I didn't think it was a big deal, now I know (R2*)	*-I think the one that will make someone stop is the one with the baby, in the bottle, the baby in the bottle(R6)* *-The teeth and the stroke for me (R10)* *-Ya, the baby in the bottle and the teeth (R3)*

SMOKER 18-24 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	grandfather) in a wheelchair, that one you also see yourself looking at it hard (R8)	*-I'm just saying I might not stop, but I can see what the pictures are saying, I think most people will be afraid(R4)* *-This one with the cigarette burning money says yes if you smoke you have too much money and you can now burn it. It says I don't need this money I have it so why not burn it.(R9)*	*for just) stop smoking whenever I felt like it, but these days it's harder, so addiction can be real (R1)*		
Indian/Asian (n=10)	*-My grandfather is like in this wheelchair, so it catches my attention (R5)* *-The one with the baby in a bottle is also attention catching (R10)* *-And the graves! The graves and the baby (R7)*	*-The brown one says my teeth will be like this if I don't stop smoking (R1)* *-And the money, it says that I won't have money if I smoke I won't have money (R3)* *-And the addiction, I like it, it is like you have put yourself inside the jail (R9)*	*- I feel the one with the baby in the bottle, this brown one, because I want babies, lots of babies and if you marry and that happens, what will your husband say? What will you say, because I smoked, now this (R10)* *- For me I thought I just need to be careful of diabetes because people in my family have it, and*	*- I feel like I'm going to stop, any way I haven't been doing it long (R1)* *-me also, imagine not having money, not having a baby and looking ugly all because you smoke, that can be us (R10)* *-and a stroke, you can have that as well, so bad. I also want to stop (R6)*	*- The brown boxes make everything look uglier, I wouldn't buy them (R1)* *- Ya, the brown one with the baby (R4)* *- I think the white boxes stand out more, but because they look less ugly than the brown, people might still by them (R3)* *- The brown box with the teeth and the baby and the stroke, those, I am telling you NOW, no one will buy, you look stupid smoking and holding that box.* *-You know what I like a lot? Even if a person can't read, you will KNOW what*

SMOKER 18-24 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-The teeth, are they rotten? That's crazy, from smoking? ((R1)		*my grandpa is in a wheelchair because of it, now I can see that I can be like that because of smoking (R5)* *- I know it sounds shallow, but the teeth (giggles) I like to be pretty, I don't want to look that way, oh my word, no! I can't (R2)*	*-You know I thought that it is only the issues that affect your health but this smoking thing actually affects your whole life. This picture of the money really says to me that it is not just your health my dear but your pocket as well. No one wants to be poor I tell you no one(R1)*	*the boxes are trying to tell you, you will know, everyone will know, then it's your choice (R2)* *-But with these pictures, I tell you, it's not your choice anymore, it is already made, it is forcing you not to buy even if you want, can't, just can't (R6)*
White(n=12)	*-All the boxes, stand out to me, coz who ever can say they seen boxes with pictures on and all the pictures are soooo bad! (R4)* *-'Maar DIE een' (*meaning but this one)the one with the baby, that's the one that is so bad and the one with the teeth (R12)*	*- You know, this one with the money, how it says you are burning money, us here, we don't have much money, but even the small coins we get, we spend it in cigarettes (R11)* *- ai but the one with the baby, there was a friend I had, she left now, she doesn't live hereby anymore. She was going to have a baby and then the baby died she was*	*- Because of that girl whose baby died, I feel like if I choose a box I choose this one, with the baby in a bottle (R8)* *-you know, everyone is talking about the baby, but this with the graves place, I'm still young but I'm afraid to die, I don't want to die, that one is so…it makes me afraid, and sad (R2)* *-But you can die as an old person, but a dead*	*-What will make everyone stop, I'm telling you now it's the baby, (R6)* *-I think all of these can make a person stop (R12)* *-But if I think of Oom who has a stroke and STILL smokes, I thin k old people don't care anymore because they are old and can die any day, but for young*	*-I think I see the white boxes first, coz I can see the writing better. (R1)* *-Yes, but the brown boxes are the ones that will really make people not buy (R12)* *-I agree, those brown boxes, all the pictures, on the brown box, it just makes you not even want to touch it, the one with the baby and the teeth (R4)* *-Ya me too 'ek stem saam'(Afrikaans for 'I agree'), the brown boxes….wait , wait, I imagine seeing someone holding that brown box with a dead baby, you'll be*

SMOKER 18-24 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-I've never seen anything like this in my life before, this makes me feel so bad, like I knew some of it, but seeing it like this, the teeth, and my teeth are already changing colour (R10) *-I also saw the one with the teeth first because us two (points to friend) our teeth are already changing colour and we were like, it must be because of smoking, but we didn't know it could get that bad (R11)*	*so hurt and the whole time she was pregnant she was smoking coz it helped her be calm ,then the baby died, didn't even come out (R8)* *-It's like Oom (*meaning uncle) Christo, he is in a wheelchair and his hand is like that, it's a stroke? You call it a stroke? Yes that's what he has, but with his other hand he still smokes, that means he will never get better. (R5)*	*baby! That one I think I feel is the worst (R9)* *-I'm just saying again that if I chooses one that can make me stop, it's that one of the money. We are burning the small money we have. (R11)* *-This one with the fingers is funny, I think it means that a man can't do get to do his thing, but I don't know if everyone will understand, but it is funny, I like it. Am I right? (R2)*	*people,* this *will make you stop (R5)* *-I think the one with the teeth and the one with the baby, that will make people stop very quickly, people will stop smoking (R4)* *-But all the boxes, except maybe the one you were talking about, the one with the fingers, I don't understand it, but all of this can make a person stop(R3)* *-Ya, you can't see all this and not maybe just try to stop (R12)*	*like...you'll thin the person is not well in the head. (R10)*

SMOKER 18-24(Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=22)	*-Eish, this one this baby, what happened, it looks like it's burnt (R5)*	*-You spoke about the handcuffs (points to R12) brah, I think it means like smoking a lot can make you feel*	*- I think the one with the money gets me, as a guy, you know, coz I'm not going to have babies or anything, but*	*- I feel like when I am older ill stop, because these things take time, so for now I can continue for a bit (R5)*	*-The one with the baby in the bottle, I think that one will be the best one (R22)*

SMOKER 18-24(Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-It's the first one I noticed (R22) *-Ah, me I noticed the one with handcuffs, like why? Smoking will take you to jail? Or? It is not illegal mos(*slang for not so) (R12)* *-But this one with the teeth, that one got my attention first, imagine walking around looking like that (R20)*	*trapped, like you are in jail, when you are addicted and can't stop, it is deep (R14)* *-You know I always see the wording but I have never read it and had not realised that this was a warning message (R9)* *-Yho but I mean for chicks, sorry I mean girls, I think that burnt baby is bad, it will make a girl stop, because she can do that to her baby…if she is pregnant (R6)* *-But guys too, if you want to make the girl pregnant, you might not be able to, see this with the fingers, that's what it means! (laughs) (R9)* *-Wait, so like, me my teeth can to become like this just because I smoke? This is what this*	*this one with the cigarette on money, it is like smoking makes you rich (R12)* *-When I see this picture, I see me, I see my teeth because my teeth are yellow. I then think to myself well my lip could be like this too. I don't want that!(R9)* *- I don't think that's what it means bruh (laughs) I think it means that smoking can waste your money, maybe like if it had fire, or a poor person it would make more sense, and it is true you know, I waste A LOT of money smoking, I feel this one (R14)* *- me my girl is pregnant and we both smoke, so this one with the burnt baby in the bottle, this brown one, eish, ya…it is bad (R10)*	*- ya, but the thing is, when you look at the handcuff one, it shows that one day you might be so addicted you can't stop, that's what's scary (R19)* *-I'm going to stop, and I'm going to ask my girl to also stop, for our baby, this picture just messes you up (R10)* *- I don't know if I can because all my friends do, so it is tempting, but I'm going to try stop also (R17)* *-I think I am also going to try, because I don't want to die man, looking at the tombstone, it is like you are digging a grave for you.(9)*	*-I also think the brown boxes are better than the white ones. But maybe the words can be bigger (R12)* *-I agree, brown box, burnt baby, that will make someone stop(R6)* *-Yeah and the teeth brown box with rotten teeth(R9)* *-But I think the one of impotence needs to be more clear, like, it's like someone won't understand what it means, maybe people in bed or something (R16)* *-Eish ya that baby, it makes a person feel somehow (R4)*

SMOKER 18-24(Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
		says, I know lots of people who smoke and their teeth aren't like this (R16)	*- ah, the teeth! Mine are already changing, but I didn't think it can get bad like that! Yoh! (R1)*		
Coloured (n=12)	*-You know, when I look at all these pictures, it is 2 that get the attention FIRST, the baby in a bottle and the teeth! (R12)* *-Ei! What about the stroke, everyone is afraid of being like that (R10)* *-Ya, because, look at the graves, it doesn't matter, you are dead, but the stroke? It's like you almost died, you are half alive (R8)*	*-Yes, this one where the baby is smoking, it's a tough one, coz I smoke in front of my baby girl, I didn't know. So it is telling me that it is like I'm making my baby smoke (R4)* *-I dint understand the one with the fingers (R8)* *-I like the one with the graves, I know you said it isn't so bad, but to me it says if we keep doing what we are doing, we will die (R7)* *-To me all these pictures, just say we are messing up our lives by smoking. In our community smoking is accepted…I never imagined it was such a big problem (R10)*	*-The one I feel talks to me is the one with money…I never have money but I always have smokes… it is bad (R3)* *-I agree we lose so much money, we are unemployed, but the smoking makes it easier (R4)* *-No, guys, don't you see the baby that looks burnt? That one is worse than all the pictures, most of us have babies, or will have…anyone, a chick or a dude, can relate to the baby (R1)* *-I agree, the baby and the teeth! Which girl will look at you if you look like that? (R5)*	*-I think these pictures can make people stop smoking (R2)* *-Especially the one with the baby in a bottle (R6)* *-And the one with the teeth (R11)* *-I think then one with the stroke also, it makes a person afraid to can become like that (R9)* *-Yes the one with the stroke, because you think that only old people can be like that, but if we smoke, we can also (R10)* *-I don't want to lie, I only smoke a specific brand and will not be caught dead with some*	*-I think the ones that need to be fixed are the one with money and the one that says a man's pipi won't work. They don't make sense(R7)* *-Yes but I think all of them will make people want to stop smoking (R2)* *-I agree, but especially the one with the baby and teeth, on the brown boxes, except I think the white boxes stand out, but the boxes make you not want to hold it (R5)* *-Yes, the best boxes are the brown ones and also the best picture is the one with the baby (R10)* *-I think if you put the teeth and the baby and maybe the stroke, on the brown boxes, that will be the best. (R11)*

SMOKER 18-24(Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
				brands, people will laugh at me(R6)	
Indian/Asian (n=10)	*-It's hard to choose which one stands out the most, they are all so intense (R8)* *-I think the one with the graves is a problem, no one wants to die (R3)* *-I think the teeth and the stroke stand out, it catches your attention (R5)* *-I think the one with the baby is a problem, but I don't know how our community will respond to it, it can be a bit offensive, especially to the ladies, but it will capture your attention. (R3)*	*-You know, the one with the money says a lot, that you are wasting your money (R6)* *-I think that the one with the teeth will really bother people, it shows you what can happen to you and how you look if you don't stop smoking (R10)* *-You know, I know so many people who have had strokes, I never thought that it could be because of smoking, and yet most of them smoke (R2)* *-I find that these are all educating, except I don't really understand the one with the fingers (R6)*	*-So you are asking which one I identify with? I think it's the one with the stroke. I know people like that (R7)* *-For me it the graves, I don't want to die young (R3)* *-Noooo what about the baby in the bottle, that really make same think hard, we all want have children to carry on our name, If you or your wife smoke, you could kill your kids before they are born (R1)* *-I agree with you, the one with the baby communicates a lot to me too, it clearly shows that we need to stop smoking too protect our children, also the one with the baby smoking says that (R2)*	*-The teeth, that one will make me want to stop (R8)* *-I believe that these could make people want to stop smoking (R2)* *-I think so too, I want to stop smoking, I'll definitely try (R10* *-These pictures make you feel like you don't even want to hold a box of cigarettes. It is more impactful than just words (R7)*	*-I think the brown boxes are better than the white ones (R10)* *-Yes and the picture with the baby in a bottle, it offends people, so it is the one that will make them stop (R3)* *-The boxes that have the worst pictures, those ones can really affect a person. The brown ones, with the teeth and babies and stroke (R2)* *-I worry that there are some that don't make sense, that you don't know what they are trying to say, like impotence and the money (R1)*

SMOKER 18-24(Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-I think the one with the stroke is also standing out, because so many people we know are like that (R7)				
White (n=7)	*-It is hard to pic put which one is best when they all make a person feel bad for smoking, they are all so bad, if you know what I mean (R6)* *-I think that the one with the baby in the bottle is the one that makes a person feel bad, it's the first one I saw (R4)* *-Yes, the baby with the bottle and also the teeth, it is so bad, it makes a*	*-You know, I think all of them are telling us what can happen, but the ones that are really saying stop smoking, is the one with the brown teeth, like you can get sick like that, or the ones with the stroke and graves (R1)* *-But I think all of them show you how your life can be messed up just because of smoking, it's a problem (R5)* *-Yes but the one with the baby, we don't want to damage innocent people, and that's what smoking will do, to our children (R6)*	*-I think the one with the baby smoking says that if we smoke, our children will also smoke, my mother smoked and I also do (R4)* *-For me, I just see the teeth. I think ladies can take care of babies, but as a man, if you look like this or even if you have stroke, I don't know, I just find it hard it scary to believe that this is what smoking will do to you (R1)*	*-You know, for me all the men in my family smoke and they are all older, and they always tell me it is bad, so I ask why do they do it if they know it is bad and they just say they can't stop, they don't care. So I don't know if this will make them stop, but for me yes, I'll stop (R1)* *-I think a person is dumb if they don't stop after this, it is like we are killing ourselves (R3)* *-And also killing our families hey? Check the one with the babies (R2)*	*-I really like the one with the baby I think that's the best, I like the white boxes better because I think the pictures stand put more (R7)* *-No ways, the brown boxes are the ones that will make people stop, the picture on the white box is ugly but the box is still pretty, but the brown box? Ya, no! (R5)* *-I think the brown box also, and the picture? I go with the baby, the dead one or the teeth(R4)* *-Ya for me all of them I can't choose, it is all bad, but I also think the brown boxes will be the ones to be good (R6)*

SMOKER 18-24(Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	person not want to smoke (R6) *-I just wonder and worry if the teeth really get like that? That what worried me (R1)* *-Yes, the baby, actually both babies and the teeth, those are something that is typical to make you see the box first (R5)*				

SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=15)	*-Wow these pictures are hectic, the first one I saw is the baby in the bottle (R14)* *-Yes! Me too! The baby, is it*	*-I agree with this message here that you don't have to smoke in front of the children if you needs to smoke you must take it outside not inside cause it will sit in curtains and couches*	*-I think because we are all girls and some of us have children or want them, the baby pictures are what we understand (R12)* *-For me too, the dead baby is so bad guys, I*	*-Me I feel like I am going to try and stop very quickly, I'm afraid now because it is been a long time that I can be smoking (R7)* *-I don't know if I will stop, but I will try, I*	*-I know that the one with the grave will frighten people (R2)* *-Also the one with the baby, I think that will affect people in a big way (R1)* *-You know there are those that don't make sense, like this one with the bent cigarette,*

SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	because of smoking? That one is frightening, it's the first one I saw (R4) *-And the graves, that is scary (R10)*	*and they still going inhale (R1)* *-So to me, these messages are all bad, some I did (pause)… I knew and some I didn't know(R13)* *-Let me tell you, in this community of ours were everyone knows someone in jail this picture is powerful it says you have no self-control. You are stupid enough to handcuff yourself to cigarettes, the cigarettes own you. You see if you are in jail you are not in charge of yourself man, someone else is, so now your cigarette is in charge(R5)* *-But guys to be honest, we knew these things, but when you see the pictures, it makes it worse. Like the one about the stroke (R11)*	*didn't know that smoking can cause this (R6)* *-I think it is also the stroke one, I know someone who had a stroke and she is our age, but she didn't smoke, I don't think, but I don't want to be like that (R11)* *-No, honestly for me guys this one with the sleeping manhood, for my person to be like this and no tlof tlof * (*slang for sex), no I can't , sorry, better we stop smoking (R3)*	*think other people will also try to stop. (R14)* *-But old people, I wonder If they can stop, I doubt (R5)* *-I think they will stop, because they also don't want to die, or maybe to live in a difficult way in their old age, you know what I mean? (R13)*	*and this one with the money, they aren't clear (R10)* *-Yes, but the other ones, are very clear, especially the ones on the brown boxes, those are the best (R11)* *-All these pictures on the side of the box mean that I now know about more diseases because do you see here in the front there is only one picture of the mouth but..jis like..turn on the side and you see that there is more much more diseases. (R6)*

SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Coloured (n=15)	*-Ai no, this is too much, this is so bad (points to abortion picture) (R14)* *-Ya , you really want us to stop smoking! Look at this one with the wheelchair, no, this will really work(R2).* *-And the one with the handcuffs, it is like you will go to jail if you smoke. (R4)*	*-Ok, so I see now, the handcuffs means you can be addicted (R4)* *-I think the two babies mean that you can have a miscarriage, it is written on the boxes, but to see it the I really understand (R14)* *-The teeth also, so it's like saying smoking can make your teeth rotten and become brown just like that (R11)*	*-I think that the one that makes me feel like it could be me is the one with the baby that's dead, that makes me feel like it could be me or be a baby of mine, I can't stop looking, I don t want to look but I can't stop looking (R8)* *-For me it's the graves and the stroke, coz like I am even afraid to see a coffin, next thing here is this showing me that I can die just because I don't want to stop smoking (R13)* *-But the teeth! It is like it is rotten and it is got sores, you can't kiss anyone, I can't think what my boyfriend would say, I think if he sees this even him I am sure, he will stop (R2)*	*-I think these pictures will make people scared, because us we don't even bother to read the words on the boxes anymore, you know? It says 'smoking can harm your unborn baby' who cares, who reads that+ not me!, but with these pictures, it is in your face! (R5)* *-It is like I don't want to buy a box like this, I don't want to think about what I am doing to my body. I can maybe ask someone else to buy and then I take out the cigarettes, but to walk out and around with this boxes here, I can't (R10)* *-Ya most people won't want to, but maybe after sometime we will get used to the pictures, like drinking alcohol, it says on the bottle 'don't drink and drive' but we*	*-So for me, the box with the teeth, the brown one is the best, the one that doesn't make sense is the one with the fingers, not all of us understand it (R15)* *-I also think the brown box, but not the baby, it is too much, the teeth I think is good (R14)* *-But if it is going to make us stop smoking it must be too much neh? So I say yes! Put the baby, put the teeth and put the graves! (R13)*

SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
				don't care, we do it anyway, we know it is wrong, but we do it. (R12)	
Indian/Asian (n=9)	*-Yo! This is what happened to my uncle he used to smoke so hard and then he got a stroke and STILL continued smoking till he died! (laughs) so he is these 2 pictures, the stroke and the grave (R9)* *-You are laughing at your uncle but the first one I saw that caught my attention, was the baby in the bottle (R4)* *-The teeth and the money also stand out for me, but all of them are having*	*-Well like I said at the beginning, the one I identify with is the stroke and the grave, because that's what happened to my uncle (R9)* *-For me it is both babies, because I want to have a family some day (R8)* *-Yes I feel the same way, the babies to think that I have been smoking in front of my younger siblings, I didn't know this is what it meant when they talk about secondary smoke (R1)*	*-The best thing about the boxes with these pictures is that now you can see what the written words tell you, you can't ignore it, especially the brown box with the dead baby (R6)* *-Yes, because now, the first thing you look at, is the pictures and if you don't understand the pictures, like I didn't understand the one of the handcuffs, then you can read the words (R2)* *-Really at the end of the day all of these pictures just say that if we don't stop smoking, we will die and before we die, we will live very difficult and unhealthy lives before we die. (R1)*	*-I feel that I will definitely try stop smoking and even some of my friends and family, I think if they saw this, they would also stop smoking (R2)* *-I think the same way, but you know what? Even if you continue smoking after this, it won't be in the same way you were smoking before. Like you now have a clear understanding of what it is that you are doing (R4)*	*- Definitely the graves on the brown boxes are the most I impact (R5)* *- But also I think the baby and the teeth are good, but some of these, if the words were not on the box, I wouldn't understand, like the I impotence and addiction (R2)* *-I actually disagree, I think that the I impotence one is really good, I understood it, but the best one is still the baby in the bottle,, maybe the one with the burning money could me more clear, like maybe show a poor person smoking or something (R7)* *-The pictures all just have so much more I impact when you see them on the brown boxes, the brown boxes are the best (R4)*

SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	a major I impact (R2)				
White (n=13)	*-Why are the handcuffs on the cigarette, that's strange I've never seen it before. It makes me worry before I even know what it means or why I should worry (R1)* *-The baby in the bottle…sho, no one wants to see this? So this will be on the box? That's a problem* *-The teeth are the first one I saw, we all know people that have teeth like this in our community (R5)*	*-The one that makes me think it can happen to me is the one with the teeth, because it is like you said (points to R5) we all know people who look like that and I think mine are starting (R11)* *-Also the graves, because any of us can die, but if we smoke we die faster. (R2)* *-The baby in the bottle makes me feel strange, it is so sad, just because of smoking, I must quit, no.. no (R7)*	*-I like the one with the handcuffs, it shows you how addicted you can become, I think that's happened to me already, I can't finish a day without smoking (R13)* *-The rotten teeth, that picture just says it so badly, that your mouth can rot if you don't stop smoking (R4)* *-And the graves, they are showing us that we will die if we don't stop smoking (R3)*	*-I don't know if this will be enough to stop people from smoking (R1)* *-I feel like one way or the other this will really make people think twice about smoking, or even make children not start, like we started young, if we had boxes like this, I would never have started, it doesn't look cool (R8)* *-Yes I also think people will stop smoking very quickly with these new boxes (R12)*	*-The best boxes are the brown ones, that's what I see, who will want to hold a box like that and people see you (R3)* *-Yes the brown boxes, and the best picture, is the teeth and the baby (R10)* *-What about the stroke? That one also, I think is one of the best pictures (R2)* *-Yes, me if I choose top 3, it's the baby, the teeth and the stroke (R4)*

SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=20)	*-The one with the grave is the first thing that is see (R19)* *-Also the teeth are the bad, when I see the teeth that is bad (R11)* *-Ya and the one with the grave, it is such a hectic thing, it is so terrible (R7)*	*-This one, I like it the impotence one, I didn't know it can get so bad, that's all I needed to see to make me stop (R7)* *-Ya, I didn't know till you said that's what the finger and that bent cigarette mean, nna (*meaning I) I was looking at the teeth, eish! So smoking can give you diseases of the mouth, that's bad (R11)* *Ya you know, I think that's the thing, we read these things but it doesn't do anything, but to see, to actually see, like that dead baby, ah it is bad, so if my woman smokes while pregnant, this can happen to our child. That's why I don't like girls who smoke (R13)*	*-I identify with the stroke, and the money, many people I know have stroke, I don't know if it is because of smoking, and the money, any money I get I will always make sure I get smoke (R20)* *-Ya for me it's the baby, it doesn't matter what we do to ourselves but babies are innocent, this shows me the harm we can cause others because of smoking, even that one holding the cigarette, it is showing us that us smokers affect other people health, (R16)*	*-There is no way this won't stop you from smoking, or at least think about it (R20)* *-It can make a person TRY. It is not easy this thing, to stop, it is not easy (R19)* *-For me I know if I'm always having to buy with this pictures, I'll be able to can stop, I'm telling you (R17)*	*-The graves, that's the one, even if it's a brown box or a white one, the grave will be the best (R19)* *-no , no ways, the graves? You can't say graves, when there is a dead baby, live, like that, yoh! No, that baby is the one that will make people stop, even if it is just that picture and not others, it will make people stop (R14)* *-Ya the baby and also the rotten teeth with that thing on the mouth, no one wants to be like that, you just can't pretend like you didn't see. (R2)* *-Those brown boxes are so ugly (laughs) who can buy that? Me I won't (R12)*
Coloured (n=17)	*-You know, to pick just one of these pictures to*	*-I mean I think the baby will affect girls more than us guys, for me*	*-We are all learning , like some of these we knew right, cancer and*	*-It will be nice to see them in shops, I think people will be*	*-The best boxes are the brown ones, with the teeth and the baby (R17)*

SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	say ok this is the one, it is hard, these are all good and this is coming from someone who smokes all the time (R12) *-I think the one with the baby and the one with the teeth are the ones that will attract the most attention (R12)* *-Also the stroke, that one is frightening (R6)*	*what I identify with the most is the stroke and the money (R12)* *-Even if I am a guy that baby is a problem, we can see that if we continue smoking, if your girl is pregnant, it will affect her and the baby, so I think that's the one. (R11)*	*everything, but other we didn't know, so we are learning a lot from these boxes (R5)* *-This picture really broke my heart. I usually smoke when my small children are in the house and I did not know that this affects them. It says I am an evil father but now I know so I can now go outside and smoke without my kids. I also am thinking I must stop because my children always follow me so even if I go outside I will still smoke with them. Usually I smoke with my baby on the lap and now I see that my baby is smoking also. I did not know. This is too bad I am going to stop it. I do not want to kill my kids! (R11)* *-But for me, I don't like what I am learning, so if I smoke my mouth will look like that? I know*	*embarrassed buy them, I'll be embarrassed to be seen holding a box like that (R14)* *- I just look at the fancy pack and truthfully that is what attracts me to the pack, when my friends see that my pack is different from theirs then I receive a lot of attention (R6)* *-Me too, but I don't want to lie, I will buy but take them out and keep them in a different packet, it is late to stop now, I'm addicted (R 16)* *-Then you are like the box with the handcuffs! I am definitely going to quit, I know it won't be easy, but I am going to stop, these things are too much to ignore (R3)*	*-Yes the brown boxes are really better than the white ones, but you can't see the words as nicely as on the white boxes (R1)* *-Yes, the boxes are good, the ones that you can't see or understand nicely is the one with the money(R12)* *-Also the impotence, I think there can be another way of showing it, I don't know how, but to make it easier for people to understand (R15)*

SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
			many people who smoke and don't look like that, but what if it happens to me? (R16) *-Ya, but it is also good to see these pictures, because we are able to now see and not just read…the abortion one, I never thought much of it till I actually saw the picture. The pictures make sure we understand the message better (R4)* *-ya this is what I was also thinking, so if you can't read, you still know (R10)*		
Indian/Asian (n=15)	*-I'm not trying to be strange but so many of us here know that in our communities, many of our uncles are like this, and they still smoke, that's why it's*	*-My sister just had a baby girl, and I love her like she was my own, I smoke and so does her husband, so when I look at the baby holding the cigarette, it makes me worry about what we are doing to that little girl (R15)*	*-So to me, this one with the graves says, if we don't stop smoking we will die, and that is the truth (R7)* *-Yeah I like that the messages are so easy to interpret, the danger to unborn babies and new borns, because of us*	*-These pictures can definitely make someone stop smoking, me I don't know, but most people, yes, I think so (R4)* *-Yes, the thing is even if you don't stop today or tomorrow, we can cut down on how much we*	*-If you say which boxes are best, that's a tough one, the white ones are beautiful, almost like normal cigarette boxes, except that they have those pictures. But the brown ones are not as attractive at all. (R10)* *-You can't compare, the brown boxes are the best, if the words can just be a bit clearer, and the best picture is the one with the baby or the one with the teeth*

SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	the first one I always see (R12) *-It is true, I also saw that first and the teeth (R9)* *-Well, I think it is obvious that those three get the attention first, even if it is just for shock effect (R10)*	*-My story is almost the same, it is funny, my cousin is pregnant, she doesn't smoke, but we always smoke around her (R1)* *-Ya, it is funny how we can all identify with something or a picture on these boxes. I find I relate to the one with the money, I waste a lot of money buying smokes (R2)*	*smoking around them (R6)* *-And the stroke, you know we all think it only happens to grannies and grandpas, but this shows that if you don't live healthy, you can end up like that at a young age for the rest of your life. (R11)*	*smoke and have better habit is, like not smoking in front of children (R9)* *-I really believe that these new warnings will stop people from smoking (R12)*	
White (n=17)	*-Oh gosh, these pictures make me feel so guilty, the smoking baby…my girl and I smoke in front of our child (R11)* *-I saw that baby as well, but I also saw that one in the bottle, that's hectic! (R5)* *-The stroke as well and the*	*-I think the one of the stroke and the one of the money, they make me feel like they are talking directly to me (R1)* - I think the one with the money also, because I am struggling and unemployed, but if I do an odd job, and get some money, I spend it on cigarettes. (R5)	*-I think that these pictures just show us how dangerous it is to smoke (R5)* *-I think that they tell us what is dangerous about smoking, I don't think it means that what is on the boxes will definitely happen to everyone (R13)* *-I feel that the one with the baby says if we don't stop smoking, we*	-I *believe this can make people stop smoking (R2)* *-I also think this can make people stop, I know I will stop (R15)* *-I think that if you haven't started smoking it will make sure that you don't start, but I think that it might be difficult for people who smoke already to stop, many of us have tried before and can't stop, it*	*- I think the white boxes are best, you ca see the words better and the pictures, they stand out (R17)* *-No way, the brown boxes are better, do you see how ugly those boxes are, when tis on the brown box the picture just looks uglier (R1)* *-Both boxes are effective, I think that even if it's the brown or white, the only thing someone is looking at is the picture, you don't even look at the words, it just puts you off (R14)*

SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	teeth, that's bad, I am happy they wrote what they both are because it can be confusing. (R10)		*will destroy future generations (R12)* *-It's scary for me to know that if I don't stop smoking the children I have, might be like that, because my wife also smokes (R9)*	*is an addiction, but a person can try (R12)*	

SMOKER above 36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=12)	*-Oh my goodness, bathong! (' meaning my goodness'), the baby…you can't see anything except this one, oh! Was it burnt by cigarettes? Oh no, I see it is an abortion, oh I didn't know (R11)* *-Ya ne? that one and the one with the grave, it*	*-you know, these just show us everything that we know about smoking and that we tell our children, even though we smoke we don't want them to, because of this type of things (R1)* *-me I didn't know that it can cause stroke, this is saying you can get a stroke isn't it ? (R5)* *-The impotence one, it is true, it happened to my husband, but maybe*	*-It's what I was saying, that my husband became like this (points to impotence picture) so I identify with this one. (R9)* *-For me the stroke, ai! I don't want to end up like that, and it can happen (R4)* *-But look at the teeth, yoh, no, not me, imagine looking n like that, It makes me afraid to think I can end up that way (R8)*	*-Well, when you ask us what we think the effect it, I feel it will make us think, ya, definitely think about quitting. (R10)* *-When I saw this one with the baby in the bottle neh neh I just told myself enough yho enough(R11)* *-There really is no reason to have these sorts of things, I mean if you think about it who would want to talk or*	*-Even though for me the one with the stroke affects me most, I think the one that will stop people buying is the one with a baby in the bottle (R12)* *-Yes, the baby in the bottle and the teeth, those are the ones, that can stop a person form smoking (R11)* *-On the brown boxes, I think the message is clearer. The brown boxes with those pictures will stop people (R6)* *-You know what I like? That these pictures are frightening, they frighten a person, if we are going to quit smoking, we need to be frightened, and these pictures are*

SMOKER above 36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	really stands out, especially for those of us who smoke for many years, it is terrible. (R10) *-yes the stroke and the graves are the first ones I also saw (R5)*	*just because he is diabetic, I don't know, but he still smokes (R9)*		*look at someone with sores on their mouth and black teeth who?(R8)* *-For me it does more than just think about it, look at how it makes someone's life become for me I'm going to stop (R7)* *-I have tried many times to quit and failed, but if this boxes are on the shops, I will stop, I won't buy them, I am sure of that (R6)* *-You know I really did not know that smoking could cause stroke, I really did not know it just means you don't have to be old to get a stroke you just have to buy yourself this stroke when you buy cigarettes, you really buy this stroke. This picture has really*	*frightening, the baby, the teeth, the stroke, it is very good (R2)*

SMOKER above 36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
				touched me and I need to stop really(R5)	
Coloured (n=32)	*-You know in our community you see many things and a lot of us smoke, it is normal, but these things you are showing us…this baby (R22)* *-The first one I also did see is the baby, the baby that's dead it's so sad (R12)* *-It makes me feel like I should be grateful that my babies came out healthy, because I smoked when I was pregnant (R6)* *-For me the teeth are the first ones that I*	*-My teeth were starting to be like that, then I stopped smoking for a bit and the got better, now I've started smoking again, I hope it doesn't start again (R20)* *-It is hard for me to look at the baby because I had 2 miscarriages, the doctor told me to stop smoking, but I couldn't, I also didn't think it was a big deal, because I have friends who smoked when they were pregnant and their babies are fine (R15)* *-It's sad when you see these pictures, because you wonder if you had known before, if you would have done things differently. I had a stroke before but thank God I healed. I don't smoke as much as I used*	*-All these are just telling us everything that we know but we don't listen (R16)* *-Yes, but when you see it like this, it is in your face, you can't ignore it (R18)* *-I think the most important one is the one with the baby smoking, because a lot of us smoke in front of our children, I didn't know that it is so bad to do that, like it is like I'm making people around me smoke (R1)* *-You know I hear everyone talking about strokes, I didn't know that smoking can make you get a stroke, I know it sounds silly because it is written on the boxes, but until I saw this*	*-I think this can stop people from smoking, it can, this will stop people from smoking (R35)* *-For some of us, we are too old to stop, but I think the young ones will not start smoking (R28)* *-I think even older people will stop, no one wants to die and live a strange life before dying, no, these boxes will stop everyone from smoking (R19)* *-Yes, these pictures will stop people from smoking (R29)*	*- Ya the brown boxes are the best, for me all the pictures are good, except the one with the money and the one with the fingers (R4)* *-Yes all the pictures but the ones with the babies and the teeth are the best (R17)* *-Yes I think anyone who sees the baby in the bottle and the teeth, ok also the stroke I think, they will be affected, ya, those are the best. (R2)*

SMOKER above 36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	saw, it looks so bad (R17) *-For myself it's the baby yes, the dead one, but also the stroke, is the first one I saw (R18)*	*to, but I still haven't quit (R19)* *-Ya, sorry about the baby dear, even my daughter had the same thing happen, and she has stopped smoking since. (R25)* *-I think a lot of us have been affected by many of the things we see here, or we know someone who has been affected, even the grave, Sunei, remember auntie Romain, on the corner, who died of cancer? She smoked till the day she died (R32)*	*picture, I never really, really got it, you know what I mean? (R27)* *-Yes all these communicate the message very well, it helps us understand exactly what smoking can do to you and the people you love (R30)*		
Indian/Asian (n=11)	-So the *stroke, that's was caused by smoking? But I am sure it can be caused by many other things as well? It really stands out (R3)*	*-I identify with the teeth because it is happening to me already, but I don't have cancer, but my teeth are turning brown (laughs) (R10)* *-For me it's the baby, not the smoking one, but the other one, I*	*-It just shows me that I can die if I don't stop smoking, but either way, I will die isn't it? (R3)* *-I feel like the one with money says a lot, about how we are wasting money, it is just that I*	*-Look for me I won't stop smoking, I see the pictures, I know it may affect some people, but for me, this doesn't change anything, I won't stop smoking, I am fine the way I am (R3)*	*-The baby with the burn marks, in the bottle, no, that's the most impactful picture out of all of them, I am telling you (R1)* *-For me I feel like the one that has the teeth, that's the most effective one, also on the brown box, (4)*

SMOKER above 36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-Yes but smoking makes these things worse, for me the baby in the bottle is the one that stands out the most, it is so so so sad, denying someone a chance at life because you can't stop smoking (R5) *-Yes the 2 that catch my attention first are the baby in the bottle and the teeth (R11)*	*mean as ladies, we can't not be affected by that (R1)* *-I also feel I can identify with the baby that has those marks (R8)* *-The one which has the graves on it is the one that i identify with, the older you get the m ore death is something you think about. It is just that for me, smoking is one of the last comforts I have right now, I don't want to deny myself that (R10)*	*don't know if many people will understand it (R5)* *-I feel like the final message all these say is that if you smoke, so many bad things can happen to you as person, just being sick and not having money (R10)*	*-Personally I feel that I will stop smoking, I can't continue smoking very well seeing all this, although I knew, but now I feel like I know more (R7)* *-Yes, I will also try and stop, and you know, I think many people will stop, no one wants their lives to turn out like the things we see on these boxes (R2)*	*-I agree, the brown boxes are definitely the most effective. No one will want to buy them. (R6)* *-But those pictures, of the money and I impotence, if someone can't read, they can be misinterpreted, I think you can find a way to make them more understandable (R3)* *-You know this brown is a very dirty colour but it makes the pictures stand out. They just stand out really and you cannot see anything else(R8)*
White (n=25)	*-Wow, so this one with the handcuffs really got my attention, it is not something obvious that you would expect, it is brilliant, very clever (R6)*	*-Well I find it difficult to identify personally with any of them but I think of many people I know that would identify with like the baby or the teeth, you know what I mean? (R13)* *-I identify with the baby one, because I have*	*-I like the money one, it shows you that you are burning money, like you are wasting money when you spend it on smoking (R19)* *-The one with the baby, that is so loud, it just tells you straight, if you smoke while you are*	*-Look I know this won't stop many people from smoking, but it will stop A LOT of people, I am telling you now, many people will just be put off, it is like that feeling you get when you are eating meat maybe, then you see an operation on tv of*	*-I really like the brown boxes, I think they will have a massive effect on people (R25)* *-I feel the same way, the brown boxes are the ones that really make the pictures stand out, the whole box is just ugly, the picture of the box, the colour, everything (R16)* *-Yes and the best pictures are the one with the stroke, I think. Maybe also the baby and then the teeth. Those are my top 3. (R12)*

SMOKER above 36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-Yes, but the one that really hit is you is the abortion one, that's so sad (R2) *-I find that the abortion one is definitely the one that will grab your attention first (R20)*	*children, but I didn't smoke while I was pregnant, so they are fine, but I can really relate to that, and just empathy for people who may be going through things like that (R18)* *-I feel the one with the guy in the wheelchair, because I have a close friend who had a stroke and is in a wheelchair, and it is not an easy life to live, it makes a person think hey? (R20)*	*pregnant, you can lose your baby (R23)* *-I think that the one with the teeth as well, you know you read about these things, but to actually make sense of it, is difficult, but when you see the picture and then you also read, thi8s is deep (R19)*	*someone being cut up, you don't want to eat anymore, that's what this does, these pictures, that's what they do (R5)* *-I agree, I know I already feel put off, you know smoking is also fun because of the box that you are holding, the brand, the type, you know, but this? I don't want to be seen holding this box (R19)* *-Yes many people will stop just because they can't bring themselves to hold these boxes, imagine as a lady holding a box with a picture of a dead baby on it, what will people think (R4)*	*-I know that the frightening ones are going to catch attention, but I think the best ones are the clever ones that are not obvious, like impotence and second hand smoking, those make you think (R8)*

SMOKER above 36 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=19)	*-Eh! This baby, I think it is a bit too much, can you imagine a girl who has lost a baby seeing this? Ah, it is too much, it's the first thing you see (R3)* *-Ya but look at the teeth, that one is right up there with that baby, yoh! You just look and you want to put the box down (R1)* *-I just feel like nothing can beat that one with the baby, it's the first thing that anyone sees (R5)*	*-It is clear that if you smoke, this is how a person will end up, rotten teeth and wounds in your mouth (R16)* *-But I think it is also important to note that these things say "MAY"…so it doesn't mean these things will definitely happen to us, I've smoked for years and none of these things have ever happened to me. (R13)* *-Yes but even if it doesn't happen, we need to be warned, and these messages give a warning to all of us, especially I think to young people who have not started smoking (R14)* *-If I walked into a shop to buy these cigarettes with the pictures, I would not buy them*	*-This one with the bent cigarette (laughs) you know, I was wondering if it meant what I think it means, then I read the box, yes, I identify with this, which one of us wants that to happen (R19)* *-Ay the babies make me feel somehow, I have kids, I have younger siblings, it just makes a person feel somehow (R14)* *-For me the one with the money, a man and his money, ah, ya, I can't, so we are burning money 'magents' (*meaning., gentlemen)? (R3)*	*-These things these ones, can make a person to can stop (R2)* *-I really don't care about these word messages they really mean nothing to me, it is just words and in any case most people here cannot read, these are not good (R7)* *-Ya, me I will try stop, because this crazy! You know we don't even read these boxes, but here you are not being asked to read, it is FORCING you to know what you are doing to your body (R18)* *-ya me I will stop smoking, a person must stop smoking, before we die or get strokes (R15)* *-Let me tell you in our culture you do not walk around with pictures of graves, it is a taboo no*	*-ah number one is obvious!, I don't see how anyone can say anything, that dead baby is the one, it is top of the list (R6)* *-ya the baby is number one, we all agree, but 2 and 3 are the teeth and the stroke (R14)* *-no, I think before the stroke it's the tombstone, especially for us as black people, that's a serious thing (R12)* *-also the colours I think the brown boxes are better, like not better but they are the worst, like a person will not want to hold those boxes, you understand? (R5)* *-Let me tell you I would not but these cigarettes, this brown colour of the box makes me feel like the cigarettes inside are dirty or bad. No, I would not buy.(R16)*

SMOKER above 36 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
		with the same spirit that I usually buy them with. I would think, chief are you sure about what you are going to do? But because I need to satisfy that thing, I would buy, but in my mind I would think eish! But this is not good, I need to stop.(R6)		*one does that and I really would not buy such cigarettes they are just crazy, crazy no I would not buy them.(R12)*	
Coloured (n=19)	*-So, the first one I see is the baby, it is like it should be in it is mothers stomach, but it is outside, that picture is difficult to look at. (R1)* *-I saw the one with the teeth first, it stand out to me (R7)* *-I also saw the baby first, that box will grab your attention (R9)*	*-I want to keep focusing on the baby, so if a woman who is pregnant smokes this is what happens? that is so bad, you know, for all the things I know, I didn't know (R1)* *-So I always knew that your teeth can turn brown, but I didn't know that you can get cancer and open wounds in your mouth because of smoking (R10)* *-I like that it is easy to understand what is being said in the warnings, without having to read (R5)*	*-For a man I think most of us will identify with the one which has the fingers holding the cigarettes (R17)* *-But I think most people will not understand that one of holding the cigarette, I think we can identify with , well nto we, but me, with the guy in a wheelchair, that affects your whole life, you can't work, can't do anything (R2)*	*-I think this can really stop people from smoking (R12)* *-I know it will stop me from smoking you can be sure, I think it will be difficult but I will stop, I've never tried to stop before (R8)* *-I don't want to sound rude, but I don't see how you can have sense and ignore these pictures, it will do something to you, even if you fail to quit, you have to try (R10)*	*-The best picture is the stroke and the baby (R13)* *-I feel that the best one is the baby and the teeth on the brown boxes (R1)* *-I prefer the white boxes, only because they are brighter, you see better, the words and stuff (R12)* *-No, but we don't want them to be bright, they must be dull and unattractive, like the brown ones, so no one wants them, that's why I think the brown ones are better (R3)* *-Yes, the brown boxes, the teeth the baby and the stroke, those are the top ones (R9)*

SMOKER above 36 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Indian/Asian (n=26)	*-Thank you for these! Wow! I'm a smoker and these pictures are hitting me hard! This one with the stroke, that's really bad. (R4)* *-The stroke?! No man, the baby, that's what grabs attention very quickly (R22)* *-Yes, the baby is gruesome, but it is not the only one, I mean when you look at the teeth as well, that grabs a person's attention also, you see them very quickly (R12)*	*-I like that these boxes make it very easy for everyone to know what the message is, like look at this one with the baby smoking, you don't even have to start reading the box, you know what it means (R19)* *-Also the one with the baby, it is one thing when you read how smoking during pregnancy can harm the baby, but to see this, it makes it very clear. (R11)*	*-I think I identify with all of them, each one can make you feel something, or think of someone who can relate to that. (R1)* *-I relate to the one with the stroke, it hit is close to home, for personal reasons (R2)* *-I also feel I can identify with the stroke box, I know many people who are living like that, (R15)*	*-I feel like the boxes motivate me to quit smoking (R24)* *-I also think I will try to quit, I think a lot of people will when they see these boxes (R21)* *-I won't lie, I doubt I will quit, but even if I don't, I can't say that these boxes have no effect, I feel something, it is just not enough to give me the willpower to quit (R9)* *- Now how do you pack these in your shop, you really have no idea of what to do, but everything is the same and I must say I really buy my brand only not any other and I would not trust my brand if all brand were written this way. I would just ask myself no how do I know it's the one?(R2)*	*-I love the brown boxes, I mean they make me feel uncomfortable, but I really like them, I feel like they have a bigger effect than the white boxes (R12)* *-yes, I agree with you, the brown boxes, and the baby holding a cigarette and the abortion one (R22)* *-But the one that needs working on I think is the one with the money, and maybe the fingers holding the cigarette, I think those are open to interpretation. (R14)* *-Yes, the impotence picture isn't very clear, maybe put someone inside a bed, with a woman but the man is bent over in frustration, or something like that (R3)* *-This with graves should say smoking will kill you. That way it says to me not others. so when I buy my cigarette I know it will kill me not others(R1)*

SMOKER above 36 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
White (n=28)	*-I've never seen anything like this before, to think these are cigarette boxes? It is unbelievable. But if I choose one that I feel is the most attention grabbing, it's the baby in the bottle (R3)* *-I like the one with the teeth, not that I like it but it's the one I see first (R5)* *-The one that gets my attention is the one with the stroke, you can't ignore it, it just looks so painful and sad, hey? You see? It is sad, (R10)*	*-I feel that the best communication is the stroke one, it just shows you how you can ruin your life, you are alive, but life is difficult (R27)* *-Yes, you know the message from the boxes can be seen in the pictures, we don't need to read the words, to be honest. We were never reading them anyway (R21)* *-There are some that I don't understand, but otherwise I think that it is easy to understand what the message on the boxes is. (R11)*	*-The money, yes, if I choose one that I feel is just for me, it's the wasting money, I can't afford to do that, but I do (R2)* *-For me it is addiction, sometimes, I can't even sleep without a smoke, and I always make sure I have smokes with me (R16)* - *I agree, addiction is the one that makes me feel bad, I am like a prisoner of my addiction and it is been so many years I am not even trying to stop anymore (R18)*	*-I am going to try and stop smoking after this and if these boxes go to shops, I think many people won't want to buy (R5)* *-I also agree, I would be embarrassed to buy that box (laughs), but addiction is real, it is not easy to just wake up and say, oh I am going to stop smoking because I saw bad pictures(R11)* *-Yes but it does something to your head, like now, usually by now I would have walked out for a smoke break, but I keep thinking about these boxes (R17)*	*-I really like the brown boxes and the stroke picture and maybe the addiction as well (R28)* *-To me the teeth and the baby on the white boxes because I can't see the words nicely on the brown boxes (R18)* *-I feel like the brown boxes are better, but the pictures of the money and maybe addiction need some work, so that everyone can understand what they mean (R11)* *-I also like the white boxes, but only because I see the words better, maybe if the words on the brown box can be bigger, then the brown box will be better. (R4)* *-But do the words even matter when the pictures are so clear, I don't think so, brown boxes, clear pictures, it's a win (R6)*

NON SMOKER 18-24(Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=10)	*-Oh this is too much people, look at this small baby? So this is what happens when people smoke? I always knew it is bad. (R6)* *-the baby one is bad bad, yoh! But also the teeth! You can't even do anything after that and everyone will know it is because you smoke (R6)* *When I saw the one with the handcuffs it got my attention, because me I did thought that smoking can get you in jail, and it is*	*-Ai these pictures are good, they just say to you GIRL if you smoke, you will be a MESS! ya that's why I never even started smoking, look at the baby! I want to have babies one day, so if you smoke this can happen (R8)* *-I don't think that what the picture means, I think it is saying if you smoke when you are pregnant, this is what can happen to the baby. The money one is true, in our community, ma'am you don't know, these guys who like smoking, they NEVER have money, but they always have cigarettes (R4)* *-This one with the stroke is so sad, why would you smoke when you KNOW this can*	-Ya, me I am still *saying the one with handcuffs, because I know people who the police came to fetch them from their homes because they stole and they were stealing to get money for cigarettes, so when a person is addicted, it can make you do anything (R9).* *-I think the one with the teeth, I don't want to look like that one day, and so many people who smoke, I have seen, they already have like, a black mouth and brown teeth, have you seen? (R1)* *-The stroke one, it is something, because we as the youth, imagine if we start smoking now and we don't stop. We won't even get to be*	*-I don't know, these people who smoke? I've seen them hey? Today they say this, tomorrow they say that, oh I am going to stop, ill stop, then they get stressed then they are smoking again, I don't know if it can make people stop, but for me it just convinces me that I should never even start, I won't (R3)* *-I think it will make people stop smoking, can a person look at this (points to abortion picture) and say I don't care and just continue smoking? I don't think so, these boxes are good, they will make people stop, me I knew a lot of these things, that's why I never even bothered to start or even think of it. (R2)*	*-Definitely the one with the baby in the bottle it's the best (R6)* *-Yes but I think not only that one with the dead baby, the mouth with the wound and the stroke, those ones are good too (R8)* *-Yes, those teeth, iyoh (giggles) and I think the brown boxes are the ones that will work (R5)* *-And those brown boxes are ugly! think seeing a guy walking holding this brown box with the baby and he comes to ask for your number? I will say no! (R10)*

NON SMOKER 18-24(Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	true that thing! Because they want cigarettes so much, but they don't have the money, so they steal. Ya, but I see the words say it can make you to be addicted, that's also true, (R9)	*happen to you? Smoking can make this happen (R2)*	*old and healthy, because of things like this that can happen (R5)*	*-I have always been afraid to start smoking, because of things like this, even though all my friends smoke, it messes up your life. So this tells me I did the right thing, because people always want you to join them when they do bad things, now I can just point tto the box, like with the stroke, and say, I don't want to end up like this (R1)*	
Coloured (n=15)	*-When I look at this baby smoking and the baby that's is dead, it hurts me, because, I love children, you know this is why I don't smoke. Not to be racist, but I know when people see a coloured person, everyone just*	*-I like these so much because it is so clear, I mean we can tell people again and again not to smoke and they don't listen, now these pictures actually SHOW YOU, you know what I mean? (R12)* *-Yes, I mean just look at that baby, it is so sad, so smoking can do this to a pregnant woman. (R9)*	*-All of these you can think of someone who has been affected or could be (R15)* *-I feel like the one with the baby, this tiny baby in the bottle, we can all identify with, both men and women, young and all, that really gets to a person hey, it makes you scared (R5)*	*-Look for me I think this is a brilliant effort, but do you guys know people who smoke? NOTHING can stop them hey, nothing (R1)* *-But I used to smoke an di stopped, if I had seen boxes like this I would have stopped even sooner (R11)* *-I think so too, maybe not EVERYONE will stop smoking, but I am*	-These are all so good, it's hard to choose, but the baby in the bottle and the brown boxes (R13) *-But I think the I impotence one isn't clear, if you can't read, or you don't know what I impotence means, then someone won't understand it (R8)* *-Ya maybe if you put someone inside a bed, or the fingers must be trousers! (giggles) (R12)* *-I really like the brown boxes, I think they are very effective and the baby and the teeth and the stroke (R4)*

NON SMOKER 18-24(Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	thinks, you must be an addict, a smoker, a druggie, but because I have seen those things in my community, that's why I don't smoke or anything ((R3) *-I agree, the babies are the ones that get your attention first, and this is what I always tell my friends, if you smoke around your child it is dangerous (R6)*	*-I like that the messages are clear, smoke and your life is ruined, it is simple. You will be poor, I impotent, not have babies and be funny looking (R1)* *-I think the best part is that even people who aren't able to read will be able to understand what the message, is, most of the pictures are not too complicated. (R5)*	*-And the teeth, no man or woman would want to look like that (R6)*	*telling you, some will (R4)* *-People who haven't started won't even start and I think that's I important (R3)*	*-The graves also, everyone is afraid of dying, or losing someone, the graves on the brown boxes (R10)* *-yes, the brown boxes are the best, and the one with the mouth with the sores. Smokers need this type of shock effect, I think it will work (R2)*
Indian/Asian (n=10)	*-Wow, this baby. I actually have no words, this hurts (R9)* *-Yes that baby really grabs attention from*	*-This is why my family told me to never smoke, no one in our family smokes, it is not allowed, because of these things the pictures show. It's a dirty habit (R10)*	*-Well, like I said, for me it's the stroke and the grave because my parents smoke and I'm so afraid they can end up like this (R8)*	*-If I were a smoker, I would quit, I'm telling you, you can't see this and not quit (R1)* *-For me it just makes me more convinced that I should never start smoking (R8)*	*-These warnings are good, I just think some aren't as effective as the others, like the baby, the dead one, the teeth and the stroke, those are good. But the one with the money and the one with the bent cigarette and handcuffs, I think there might be a better way of showing them. (R5)*

NON SMOKER 18-24(Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	a person hey (R4) *-That sick mouth also, that wow, I knew smoking was bad, but I didn't know it could do that (R5)* *-The stroke and the grave grab my attention, they make me scared because my parents smoke (R8)*	*-You know what I like? Is that, even those of us how don't smoke, we are learning things we didn't know about the effects of smoking. Like I didn't know it could cause strokes (R1)* *-I find them very educational, frightening but educational (R6)*	*-I mean I find it hard to identify with any because I don't smoke and I don't know people who smoke, but this convinces me that I should never start (R10)* *-Well, no one at this group smokes but I think we can all identify with some of these, especially the two babies and the stroke, most of us know people who have had strokes and know people whom we wouldn't like to end up that way (R4)*	*-I feel like people will try stop smoking, I don't know if they can, because it is addictive, but I think they will definitely try (R7)*	*-I like the brown boxes best, maybe the words can be bigger, so that we can see them better, and the best picture is the baby in the bottle. (R2)* *-The brown boxes are definitely the best , I think they will have a strong impact on people who smoke, I think people will stop (R3)* *-Yes the brown boxes are best, but the picture with the fingers that look like they are walking, is not clear, that's the only one I think should change (R1)*
White (n=8)	*- The picture of a wheelchair, smoking can do that to you? (R2)* *- the one with the teeth caught my attention first, and the*	*-These tell you that smoking can harm your health, it is always written on the box, but now you can really see it. (R3)* *-But it is not just your health, this says it can harm your baby before it is born, it can harm*	*-The one with the teeth I can identify with, because I know my cousin smokes A LOT and looks just like that (R9)* *-I think the one with the gravestone, I wouldn't like to die or see someone I care*	*-I think that people might think about stopping smoking, but I doubt they will stop, smokers will need more than this (R5)* *-This will definitely stop people, or make them think twice, it makes me happy I never*	*-I think the brown boxes are best (R2)* *-I think the brown boxes are the best and the best picture is the one with the baby that's burnt (R1)* *-I also like the boxes that are brown, I think the best picture is the one with the stroke (R5)*

NON SMOKER 18-24(Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	wheelchair also (R6) *-I also think the abortion one, the dead baby, that grabs attention (R8)*	*your baby when it is alive and it can also make you poor (R10)* *-I feel that this shows how dangerous smoking is, actually all of them show us how dangerous smoking can be, it is frightening (R7)*	*about die from smoking. (R7)*	*started smoking, just think, knowing this, but being addicted (R4)* *-It will work, definitely, it will work very well, especially if people want to be healthy, and doesn't everyone want to be healthy? I think they do (R8)*	

NON SMOKER 18-24 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=17)	*-It is hard to choose just one, all these grab someone's attention (R4)* *-The one with the baby in a bottle is the one that I saw first, that's stood out to me (R6)* *-It is hard for me to choose but the one with the stroke and the*	*-To me this just shows what I always tell all my friends, smoking will destroy your life (R9)* *-Especially the money one, you see how it clearly shows you, you will waste money (R3)* *-Also the one in a wheelchair, you can end up getting a stroke (R13)*	*-For me I think the one with the teeth, I would never like to look like that, why would you still smoke if you know this can happen to you R16)* *-I think the one with the baby, the dead baby, that will affect anyone (R12)* *-For me it is the one with the stroke, that can happen to anyone (R14)*	*-I am sure this will stop young people from starting to smoke, even if you are thinking about it (R17)* *-I know it convinces me not to start smoking (R5)* *-I agree, that this will stop people from smoking (R10)*	*-The best boxes are the brown boxes, no doubt (R16)* *-Ya, the brown boxes are best and the best picture is the one with the teeth (R12)* *-I think the best picture is the one with the baby, but yes, the brown boxes are the best (R14)* *-I feel like the pictures that can be I improved, is the handcuff one and also the money one (R15)*

NON SMOKER 18-24 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	one with the teeth (R1)				
Coloured (n=8)	*-I can't choose one picture out of all, I think the attention grabbers are the baby that's dead, the teeth and the wheelchair (R1)* *-Ya definitely the baby that's dead, that grabs attention (R5)* *-Also the teeth, that looks bad, it is frightening (R6)*	*-But we all know these things, it's the smokers who need to see, that's why we don't, smoking is dangerous (R7)* *-It is true, we all know, but to see the pictures, really shows us just how dangerous smoking is, when you see that grave, you see that a person can actually die (R5)* *-Yes it is very true, these boxes just show, you, smoke, you can die (R3)*	*-For me it's the one with someone in a wheelchair, I know someone like that (R7)* *-I think the teeth and the baby, we are young, we want to look good and make babies (R7)* *-Definitely the baby, you are so right (5)*	*-This will make people stop smoking (R1)* *-But even if they don't stop, they will try to stop (R3)* *-I think they will stop for sure (R1)*	*-Best boxes are the brown ones, but on the white ones you can see the words better (R7)* *-I feel like the best boxes are the brown ones and the best picture is the ne with the teeth (R5)* *-Yeah, no one wants to buy these ugly brown boxes, this is what smokers need. They must stop (R3)*
Indian/Asian (n=12)	*-Guys can anyone argue that that that burnt baby is the one we all notice over and above all the others? (R12)* *-Yes the baby, I agree, you*	*-Yeah this just tells you that if you want to mess up your life, smoke (R11)* *-It does hey? imagine smoking and getting a stroke, people don't know these things because they don't*	*-I think that we can all identify with the baby (R12)* *-Not me, the one I could identify with is the mouth, I would never want to that way (R11)* *-For me it's the wheelchair, I wouldn't*	*-Well, I know I always think that maybe one day I will start smoking, because everyone around me does, but after this, I will never even start (R3)* *-Yes people won't smoke after this (R8)*	*-The boxes that I don't understand are the ones with the bent cigarette, if that one could be clearer it would help (R5)* *-But the brown boxes, you can't even compare, they are brilliant (R8)* *-Brown boxes are the most effective, I think (R11)*

NON SMOKER 18-24 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	wouldn't be human if that thing doesn't mess with your head (R5) *-Yes, that baby is hectic bruh (1)*	*bother to read the boxes (R11)* *-mouth cancer, can you imagine? Even I didn't know, smokers are also like that, they don't know, these boxes make it clear (R10)*	*want to like that, smokers are very strange if they know this and don't stop (R4)*	*-I think people will stop smoking because of these boxes (R5)*	
White (n=12)	*-It is difficult to look at these pictures, but the one with the baby stands out to me (R11)* *-The one with the baby but also the teeth (R8)* *-But also the one with the stroke, that's scary (R2)*	*-My understanding is that each one gives a different message of something that can happen to you, something bad that can happen if you smoke (R12)* *-They are teaching us that smoking is bad, you can get cancer and women can lose their babies (R1)* *-I like that the message is clear, a person can lose money and even die from smoking (R4)*	*-To me the one with the teeth is the one that I feel I can identify with (R10)* *-I know I'm a guy, but the one with the baby (R9)* *-I agree, the baby man, that's bad (R4)*	*-This will stop people smoking (points to oral cancer) it will stop someone I promise you (R1)* *-I am telling you, all of them can stop a person from smoking (R10)* *-I think people who smoke will not feel as confident smoking when holding this box (R7)*	*-I think the brown boxes are the ones you guys should use, because they are the ones that no one will want to buy (R10)* *-The best picture is the one with the baby, or the mouth, I can't decide (R3)* *-The brown box, and the teeth and the baby, and maybe the stroke, those are the best (R7)*

NON SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=21)	*-oooh the baby, this is so so frightening (R20)* *-I agree, especially as a woman, that baby is frightening (R18)* *-That one and the one with the teeth are the ones that are the most attention grabbing (R9)*	*-No, this is clear, I am telling you, these pictures are clear that smoking will mess up your life (R12)* *-That's why it is better not to smoke, cancer, strokes, imagine your man with impotence, yoh! (R1)* *-Yes, you don't even have to think about what is being communicated, it is obvious, you are putting poison into your body if you smoke (R3)*	*-I identify with the baby, because I want babies, healthy ones, that's why I take care of myself (R9)* *-I agree, no girl can look at that baby and feel like they can't relate, neh? (R7)* *-For me it's the stroke, I can't imagine going through life that way (R12)*	*-I am convinced that smokers will stop smoking after this (R21)* *-I also think this one with words will make people stop smoking (R19)* *-More than that this with baby it will make sure people like us never start (R11)* *-How do you expect people to look at these messages they are so boring, look at this pack and its colours its sophisticated and attractive and everyone can see the type of brand that you are smoking. It's cool actually I must say(R12)*	*-We all agree that the most effective picture is the one with the baby that is burnt (R10)* *-You know these pictures on the side tell me that all these things someone can get them when they smoke. You know it is great because now instead of showing one picture you can show them all. It's like saying this is what is in the series. It's great! (R13)* *-And that the bets boxes are the brown boxes, you can't even compare (R6)* *-Yes, the brown boxes are the best, without a doubt (R6)*
Coloured (n=11)	*-Look at that mouth (R5)* *-And the baby in the bottle (R11)*	*-I don't know what more people can do, all this is clear that smoking kills (R9)* *-I also agree with you, these boxes make it*	*-When I look at the mouth, that one frightens me (R10)* *-For me it's the baby (R4)*	*-If I was a smoker these would make me stop (R8)* *-I think they will definitely stop people from smoking (R1)*	*-I would change the impotence box and find a way to make it clearer, it's not easy to understand (R5)* *-The boxes I would use, would be the brown ones, they are more ugly than the white ones, you know what I am saying? (R2)*

NON SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-I see the baby, but the teeth, are crazy, the wounds inside the mouth (R7)	*obvious that a person shouldn't smoke (R11)* *-This one with the teeth, it shows that if you feel that you can't stop smoking, you can get oral cancer, that's what the box says, it is bad (R1)*	*-I agree, that the mouth one is a lot (R2)*	*-It is true though, if this doesn't stop people from smoking, then I don't know what will (R2)*	*-I feel that even if the only picture used was the baby, everyone would stop smoking, it's the best one (R9)*
Indian/Asian (n=16)	*-The grave grabbed my attention first (R15)* *-For me it was the babies, the baby with the ash and this one with the cigarette (R5)* *-I saw the teeth first (R7)*	*-So you mean to say when people smoke around their children it is like the child is smoking? I didn't know that. (R4)* *-I think it is good that the messages are so clear, because smokers don't even read those messages, the pictures communicate it clearly (R14)* *-That's the best part isn't it, that the message is so clear, you don't even have to apply your mind to understand (r12)*	*-The stroke one is the one I think would stop me from smoking If I was a smoker (R9)* *-The one I fear the most is the one where there is a sore in the mouth and teeth are brown (R8)* *-I also agree that the one with the wheelchair is so frightening (R15)*	*-People will stop smoking for sure with these boxes (R12)* *-Now this one with the baby really shows the selfishness of smokers. I like it, it will make somebody to say yes I am selfish(R5)* *-I don't know if people will stop, but it will stop young people and people which have never smoked, from starting (R8)* *-I think people will definitely stop smoking because of these images (R4)*	*-I like the white boxes best, I think the pictures stand out better and the words also (R14)* *-I actually think the brown ones are better because they are dull and the brown background makes the picture even uglier (R11)* *-The brown boxes are the best, the best picture is the teeth, if not the teeth the stroke (R13)*

NON SMOKER 25-35 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
White (n=8)	*-The ones that get my attention first are the baby and the stroke (R5)* *-I like the teeth, I saw that first also the stroke (R8)*	*-Smoking is bad for you it's simple (R2)* *-I think it is also deeper, it say smoking, it is bad for people around you also (R1)*	*-the baby is the one I identify with, I lost a baby before, not because of smoking, but still (R7)* *-I don't like this one (points to teeth) I have bad teeth, but I see if I smoke it could be worse (R6)* *-The stroke is the one that's relating to me, because I know someone like this (R4)*	*-Maybe people will want to stop smoking, even if they can't stop they will want to (R3)* *-I think it will force people to stop (R1)* *-I also think it will stop them (R5)*	*-The brown boxes are the best, all the pictures look so bad on the brown boxes (R8)* *-I also like the brown boxes and the best pictures are the teeth and the stroke (R5)* *-The brown boxes are better than the white ones, I can't imagine people buying them (R7)*

NON SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=11)	*-The teeth are the first ones I saw (9)* *-How can you see the teeth before the baby, that's the worst (R4)*	*-That smoking can give you cancer and a stroke or you can die (R1)* *- That if you are pregnant and you smoke you can lose your baby (R8)*	*-The stroke is bad (R6)* *-The impotence one is bad, imagine not being able to be with your girl (R3)* *- The teeth guy, that mouth, those blisters (R1)*	*-People will stop smoking (R4)* *-This one with the abortion think it will make them afraid, I don't know if it will make them stop, but it will make them afraid (R11)*	*-Best picture is the teeth and the best box is the brown one (R9)* *-Best picture is the baby and I agree, the brown box (R4)* *-I think the best box is the brown one and the best picture is the baby, that will make anyone stop (R1)*

NON SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	-Ya but that mouth is also bad, that's what I also saw first (R5)	*-If you smoke you can die (R11)*		*-I think it educates people a lot this one with the baby smoking(R8)*	
Coloured (n=12)	*-The teeth are very bad (R1)* *-Yeer the teeth, because it also has that wound inside the mouth (R6)* *-The baby for me is something else (R7)*	*-This just shows how bad smoking is (R12)* *-It also shows how dangerous it to smoke around children (R3)* *-And the fact that you can actually die from smoking (R10)*	*-The one with the grave, I wouldn't want to die because of cigarettes (R11)* *-The one with the stroke, I would rather die than live like that (R3)* *-The baby man. I have no words, but that baby that's lying in that bottle (R5)-*	*-People will stop smoking because of these pictures (R7)* *-Ja neh, you can't keep smoking after seeing this (R8)* *-They say seeing is believing, if they didn't want to stop before, when they see these pictures they will believe (R2)*	*-I like the brown (R12)* *-I like the brown but some pictures aren't good, like impotence (R4)* *-I also like the brown boxes and the picture that I think can be better is the one with money, it is not clear. (R5)*
Indian/Asian (19)	*-My attention went straight to the baby (R18)* *-I think the baby grabs the attention first (R7)* *-I think the baby and the teeth*	*-Smoking is dangerous (R1)* *-Smoking can destroy your life (R15)* *-Smoking can just mess you up and your life and your money and the people around you (R17)*	*-The baby is difficult to look at (R12)* *-I feel the baby picture is difficult but I identify with the money burning, who can afford that (R5)* *-The stroke for me is the one I identify with, even though I don't smoke (R14)*	*-Even if it is just an attitude change, you can't look at these pictures and walk away unchanged (R16)* *-I think people will stop smoking (R12)* *-I agree, people will stop smoking, out of fear (R9)*	*-I love the brown boxes a lot, they are more effective than the white ones (R11)* *-The brown boxes are in line with the message we want to put forward, they are not pretty or nice to look at (R14)* *-I think the brown boxes are best and the picture with the baby in the bottle (R19)*

NON SMOKER 25-35 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	grab the attention (R4)				
White (n=6)	*-The baby in the bottle (R4)* *-Only the stroke got my attention (R6)* *-For me it's the mouth that looks so dirty (R2)*	*-The pictures show us how bad smoking is for you (R3)* *-They show you that you can die from smoking (R2)* *-The pictures teach us not to smoke because it is bad (R5)*	*-The one with the baby I find talks to me (R4)* *-The one with the stroke makes me worry, it is sad (R6)* *-The one with the baby for me also (R2)*	*-I think this can make people to not want to smoke (R2)* *-People will stop buying if the boxes look like this (R1)* *-People will stop smoking (R6)* *-This one I don't know I thought it was just another way of holding a cigarette but now I see (laugh) yes, yes I see but I would put a bed or something with this finger!(R4)*	*-I like the brown boxes and the picture of the baby in the bottle. (R1)* *-I think the white boxes are better because the words , you can see better and the picture stands out (R4)* *-The brown boxes, no one will want to buy, especially with the baby and the teeth (R2)*

NON SMOKER ≥36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=53)	*-The baby in the bottle is the first one I saw (R4)* *-Yho after the baby you can't*	*-This just shows what is always written on the boxes, smoking is dangerous and it can even kill you (R23)*	*-The one with the baby, no one woman can look at it and not identify with that, especially as a mother (R27)*	*-People will stop smoking because of these pictures (R41)* *-Smokers can't be taught anything, they love that thing even*	*-Best boxes are the brown boxes with the picture of the stroke, or the teeth and the aby (R23)* *-I think the brown boxes will be the most effective (R34)*

NON SMOKER ≥36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	look at anything else (R29) *-Okay neh the impotence, sorry but me I don't want my man to be like that eish! This one his thing like this because of smoking no sorry. (R15)*	*-Smoking can cause you to lose your baby if you are smoking while pregnant (R45)* *-Smoking can make you lose money and harm people around you if you smoke in front of them (R12)*	*-I agree the baby, both of them, all women and mothers can identify with that (R30)* *-The stroke also, because some of us who are older, that is a reality to us (R51)*	*more than sense, they won't stop (R14)* *-I agree this one of the impotence it affects men and women not just men because if your man is like this. Yho it's a very big problem. This one it will make the men and women to can stop smoking, no! no! (R12)*	*-The impotence picture needs to be clearer, maybe a couple inside the bed (R44)* *-I think you should add some shacks or something with the burning money, that will be a shock and say you will be poor(R4)*
Coloured (n=30)	*-The baby in the bottle (R5)* *-The stroke picture got my attention (R6)* *I think the baby that is dead (R24)*	*-We always tell these young ones how bad smoking is for a person, now they can see (R30)* *-I think they show you how smoking can soil your life in many different ways (r22)* *-Smoking is dangerous, it is not complicated (R19)*	*-The baby inside of the bottle (R4)* *-The man in the wheelchair (R12)* *-I think the teeth are particularly bad (R26)*	*-I feel people will stop smoking because of this (21)* *-No I must say I don't smoke but I know many people who do and I will now tell them they can get a stroke, I did not know but I will tell them(R6)* *-I think that nothing can stop people who have smoked for long, but maybe it will stop these young ones from starting (R5)*	*-The brown boxes are the best and the frightening pictures are the best, the ones with the baby and the teeth and the stroke (R4)* *-I feel the brown boxes are the best and the best picture is that one with the dead baby (R20)* *-I like the brown boxes, but the words can maybe be a bit bigger (R1)*

NON SMOKER ≥36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
				-People will stop smoking because of this, definitely (R10)	
Indian/Asian (n=15)	*-The baby in the bottle got my attention first (R15)* *-For me the graves got my attention first (R12)* *-I think the teeth are the ones that grab the attention (R5)*	*-This shows the dangers of smoking I think, all the pictures show that. (R14)* *-The boxes show that you can get cancer and even a stroke (R10)* *-Smoking can make you waste money, no one ever thinks of that (R11)*	*- I identify with the baby, I am a mother (R8)* *-I identify with the stroke, that one can happen to anyone(R7)* *-The teeth and addiction are disturbing, because I know addicted people and how they struggle (R2)*	*-People will stop smoking (R4)* *-I think this can stop people from smoking, even if it is not a lot, but some (R1)* *-Young people will also not even start smoking because now they will be educated about the danger (R13)*	*-The brown boxes are better I think than the white ones. (R5)* *-I think the addiction picture could be better because it looks like you will go to jail if you smoke (R2)* *-The brown boxes are the ones people won't want to buy, who will want to hold that in public, no one, we will all judge you (R6)*
White (n=19)	*-The one with the man in the wheelchair (R12)* *-The one with the dead baby is the one I saw first (R10)* *-The one with the teeth got my attention (R4)*	*-I think that they show what people have been saying and that smokers ignore, smoking is poison (R2)* *-Smoking is dangerous and can kill you (R18)* *-If you don't stop smoking you can die (R4)*	*-The one with the dead baby, it is so sad (R1)* *-The one with money burning, that is a big truth (R12)* *-The stroke, because living in a wheelchair is difficult (R15)*	*-People will stop smoking and want to live a healthier life (R18)* *-I think especially pregnant women will be more careful (R3)* *-Smokers won't buy these boxes because they like to look cool*	*-The brown boxes are the best with all the pictures I can't choose one (R17)* *-The baby in the bottle on the brown background, that's the one to go with (R15)* *-The brown boxes are best and the baby and the teeth and the stroke, those are my top 3. (R12)*

NON SMOKER ≥36 (Female)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
				and these boxes are not cool (R10)	

NON SMOKER ≥36 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
Black (n=21)	*-The baby in the bottle, that is bad (R12)* *-the one with the man with the stroke (R5)* *-I think the one with the baby is the one that people will look at (R9)*	*-It is clear, smoking is bad (R11)* *-Smoking can make you very sick and even kill you (R5)* *-If a person smokes for a long time many bad things can happen to them (R1)*	*-The man in the wheelchair (R2)* *-The one with the brown teeth and the mouth sore (R17)* *-I think the one that has the man in the wheelchair (R9)*	*-If this doesn't stop people from smoking, I don't know what will, but you know how smokers are (r15)* *-People will stop smoking, especially the young ones because it is not too late for them (R10)* *-This will stop people from- smoking (R8)*	*-The brown boxes are the best ones I think they make the message clear (R20)* *-The box with the man in the wheelchair is the best picture, on a brown colour (R2)* *-The baby in the bottle and the brown box are the best ones (R7)*
Coloured (n=16)	*-The baby in the bottle is so sad, ai, these young people (R16)* *-I agree, it is the first thing you see (R4)* *-The baby in the bottle is very*	*-Young people are destroying their futures with this smoking business (R12)* *-Smoking is killing our children and the children they are supposed to have (R4)* *-Smoking is dangerous and can destroy lives.*	*-The man in the wheelchair (R5)* *-I think the one with the teeth, no one wants to walk around looking like that (R4)* *-The one with the baby in the bottle, our future generations, gone (R16)*	*-I think this will go a long way to stopping people form smoking (R11)* *-I also think it will make people want to quit (R5)* *-I don't know, but I think it can try help educate people*	*-I like the white boxes, because I can see the words better and the man with the stroke (R13)* *-I think the brown box with the baby in the bottle is best (R12)* *-I think the brown box with the dead baby or the mouth with wounds (R2)*

NON SMOKER ≥36 (Male)					
Race	**Attention**	**Communication**	**Identification**	**Effect**	**Top ranking & recommendations**
	attention grabbing (r10)				
Indian/Asian (n=19)	*-The one with the baby (R19)* *-The one with the baby got my attention (R4)* *-I saw the one with the teeth first (R6)*	*-Shows that smoking can kill you (R18)* *-It can give you cancer of the mouth (R2)* *-It can destroy your child health (R1)*	*-The baby in the bottle and the one smoking, I have grandchildren (r5)* *-The one with the man in the wheelchair, it can happen to us anytime (R18)* *-The one with the baby in the bottle, it is very sad (R1)*	*-People will stop smoking because of these pictures and the message they send (R16)* *-I think people will try to stop after seeing these (R5)* *-Our young people won't even start to smoke after this (R14)*	*-The brown boxes are the best ones (R12)* *-I think the brown boxes are the best and the best picture is the one with the stroke (R8)* *-I think the brown boxes are the best and the I impotence picture will stop men although it is not very clear, (r12)*
White (n=10)	*-I think the one with the stroke (R1)* *-I think the one that has the stroke (R10)* *-The one with the baby is sad (R4)*	*-Smoking can make you get a stroke (R3)* *-Smoking is dangerous and can kill you (R9)* *-If a person smoke for a long time, it can ruin their life (R2)*	*-The one with the man in the wheelchair, a stroke is a very bad and difficulty thing (r1)* *-The one with the mouth, it looks so painful and uncomfortable (R10)* *-The one which has the baby that is dead, that is very very bad (r7)*	*-I think people will stop smoking because of this, it is very good (R9)* *-Smoking people will be afraid to buy these boxes (r1)* *-I think they will try to stop smoking and maybe stop their friends from smoking (R4)*	*-The brown boxes are very ugly, no one will want to buy them (R2)* *-The brown boxes are the ones that really make everything look bad (R10)* *-The brown boxes and the picture of the baby (R4)*

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