

# **Reactions to pictorial warning labels on tobacco packs among university students in Tshwane, South Africa**

**By**

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## DECLARATION

I, Thandekile Ntombikayise Moyo, hereby declare that the work which I hereby submit to the School of Health Systems and Public Health, health policy and management track, is part of the fulfilment for the degree Masters in Public Health. This work is original (except where acknowledgement indicated otherwise) and neither the whole work nor part of it has been submitted for another degree at this or any other University.

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**Thank you to all the participants and data collectors.**

## **DEDICATION**

**This work is dedicated to my son**

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**My 'Magnificent Light'**

**And to my parents**

**Two & Mish**

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## LIST OF ACRONYMS

COPD	Chronic Obstructive Pulmonary Disease
CTCA	Centre for Tobacco Control in Africa
FCTC	Framework Convention on Tobacco Control
FDA	Food and Drug Administration
LC	Lung Cancer
MPH	Master in Public Health
SIDS	Sudden Infant Death Syndrome
UK	United Kingdom
WHO	World Health Organization

## **ABSTRACT**

### **CONTEXT**

Smoking is one of the largest public health hazards. In 2000, smoking caused between 41 632 and 46 656 deaths in South Africa. Smoking accounted for 8 – 9% of the deaths in the same year. In South Africa studies on effects of smoking among students are limited. Communication of health risks has largely been done through media campaigns in most countries. Since 2005 South Africa is now legally obligated to protect non-smokers and educate both smokers and non-smokers on the health implications of smoking. Currently, no research has been done on pictorial warning labels among university students in the country

### **AIM OF STUDY**

The aim of this study was to determine the effectiveness of various pictorial health warnings on desire to quit smoking among students at the University of Pretoria.

### **METHOD**

A cross sectional observational study using a structured self-administered questionnaire examined a random sample of students (n=448) between 18-55 years old (mean 23.74). A total of eight pictorial health warnings were placed on cigarette packs. The pack design included pictorial warnings without (plain packs) and with brand design elements (branded packs). SAS version 9.1 was used for the data analysis. Pearson product-moment correlation coefficients (r) were used to identify correlates of desire to quit. P-value was set at 0.05.

### **RESULTS**

Exposure to pictorial health warnings enhanced the desire to quit smoking among both smokers 31.14% and non-smokers 68.86%. Females showed a significantly higher intention to quit smoking than males ( $t=-2.38$ :  $Pr> |t| = 0.0180$ ). The branded pack pictorial of oral disease was the most effective in being understandable

(20.21%); believable (21.71%); relevant (12.30%); and helping prevent youth from starting smoking (16.85%). Respondents (14.44%) said the branded picture of abortion was effective in making one stop and think, while the plain package with the abortion picture was the most frightening (16.85%). Females showed significantly higher intentions to quit smoking than their male counterparts ( $t=-2.38$ ;  $Pr > |t| = 0.0180$ ).

## CONCLUSION

Pictorial health warnings on cigarette packs had an effect on students at the University of Pretoria. The pictorial health warning on oral disease was the most effective among the participants. Further, the pictorial health warnings had a significant effect on desire to quit smoking especially among female students.

**KEY WORDS:** pictorial, warning labels, cigarette, university, students, South Africa.

# PART I

## CHAPTER 1

### INTRODUCTION AND LITERATURE REVIEW

#### 1.1 INTRODUCTION

Approximately 1 person dies every 6 seconds due to tobacco use which equates to 1 in every 10 adults dying of a tobacco related disease.<sup>1</sup> Tobacco kills up to half of its users, resulting in nearly 6 deaths each year. 5 million of those deaths are as a result of direct tobacco use while more than 600 000 are the result of non-smokers being exposed to second hand smoke.<sup>1</sup>

Smoking is estimated to cause about 71% of all lung cancer deaths, 42% of chronic respiratory diseases and nearly 10% of cardiovascular diseases and is also an important risk factor for communicable diseases such as tuberculosis and lower respiratory infections.<sup>2</sup> Tobacco smoking is the world's leading cause of avoidable premature mortality. The World Health Organization (WHO) projects that by 2020, annual tobacco-related deaths will increase to 7.5 million accounting for 10% of all deaths in that year<sup>2</sup>. The tobacco smoke from cigarettes and pipes comprises over 4000 chemicals, at least 50 of these chemicals initiates cancer or stimulates it.

In South Africa, tobacco use is also a leading cause of death.<sup>3</sup> South Africa has taken steps in ensuring a reduction in tobacco use, although it remains high in certain population groups.<sup>4</sup> Communicating the health risks of tobacco use is a major component of any successful tobacco control strategy.<sup>5</sup> The WHO Framework Convention on Tobacco Control (FCTC) through its packaging regulations in Article 11 sets standards for communicating health risks through tobacco package warning labels by requiring that countries “...*within a period of three years after entry into force of this Convention for that Party, adopt and implement, in accordance with its national law, effective measures to ensure that: ....Each unit packet and package of tobacco products and any outside packaging and labeling of such products also*

*carry health warnings describing the harmful effects of tobacco use, and may include other appropriate messages...*<sup>6</sup>.

In 2005 South Africa became part of FCTC joining a total of one hundred and forty six countries. This meant the country had a legal obligation to include health warning on cigarette packages.<sup>7</sup> According to the Tobacco Products Control Act, Act no. 83 OF 1993 as amended by Act no. 12 of 1999, no 23 of 2007 and no 63 of 2008 one of the purpose of the Act is to ensure that young people do not start smoking, keep people away from harm with regards to their health and to help smokers quit.<sup>8</sup>

Therefore this study will seek to understand the reactions to pictorial warning labels on tobacco packs among students, since there is limited knowledge on this subject.

## **1.2 LITERATURE REVIEW**

Tobacco is a green leafy plant that for centuries has been planted in warm climates around the world. It is dried and is cured and used in the form of cigarettes, snuff, cigars, and pipes and for chewing. Five million of those deaths are a result of tobacco use while more than 600 000 are the result of non-smokers being exposed to second hand smoke. Approximately 1 person dies every 6 seconds due to tobacco use, resulting in 1 out of 10 adult deaths. Most of these deaths (80%) are in low to middle income countries; by 2030 tobacco will be responsible for killing 8 million people.<sup>1</sup> Tobacco kills 44 000 South Africans per year,<sup>10</sup> attributing to most non communicable diseases such as cancer, heart diseases and stroke.

Mostly people only use tobacco containing products occasionally or on a recreational basis especially students. With continued use it becomes highly addictive. Use of tobacco is then seen as a medical disorder, this is because a majority of smokers are dependent on cigarettes and show withdrawal when they try to cease smoking. Withdrawal signs and symptoms of people who stop smoking include difficulty concentrating and doing mental tasks, disturbance of sleep, increased hunger,



irritability and a strong craving for cigarettes. These signs and symptoms usually appear within a day and can peak within a few days. The severity of these signs and difficulty to stop smoking is dependent on the amount of cigarettes a person smokes per day.<sup>11</sup>

Strong craving of cigarettes is caused by the numerous chemicals found in tobacco products. *“There are more than 4000 chemicals in tobacco smoke, 250 are known to be harmful and more than 50 are known to cause cancer.”<sup>1</sup>* Some of these chemicals include:

- a. Carcinogens – Cyanide, Benzene, Formaldehyde, Methanol (wood alcohol), Acetylene (the fuel used in welding torches), Ammonia.
- b. Nicotine – A psychoactive stimulant that triggers complex biochemical and neurotransmitter disruptions in the brain. Nicotine in tobacco can be addictive or habit forming, once it enters the blood stream the body wants more. Nicotine is able to reach the brain in ten seconds and is potentially as addictive as cocaine or heroine
- c. Carbon Monoxide
- d. Nitrogen Oxide
- e. Tar

### **1.2.1 Prevalence among youth**

*“Youth and Young Adults are very susceptible to all aspects and different circumstances in life which they face. Adolescence and young adulthood are the critical times when people are most susceptible to starting tobacco use. In addition, these young people are more vulnerable and greatly influenced by marketing than adults. When smoking is portrayed as a social norm among people who are seen as cool, sophisticated, rebellious, or fun-loving, teenagers often respond by copying the exact behavior and want to try cigarettes and experience it themselves. Furthermore,*

*if their friends smoke, or their siblings smoke, they are even more likely to smoke themselves”.*<sup>12</sup>

In United States of America it is reported that more than 3200 youths below the age of 18 smoke their first cigarette. 2100 young adults who have been occasional smokers become regular smokers at least a third of these replacement smokers will unfortunately die early from smoking.<sup>12</sup> In South Africa, equity of health has been awarded a high priority and health programs have been put in place to benefit those who have been disadvantaged in the apartheid years. This is due to South Africa previously being seen as one of the most unequal societies in the world.<sup>13</sup> In the early 1990's, it was found that 1 out of every 9 deaths in South Africa were proved to be tobacco related. Lung cancer death rates over the period of 1968-1988 increased by 300% among coloured women and 100% among coloured men. In spite of the fact that there is more and more evidence every day that smoking cigarettes is bad for an individual's health, it remains a very important preventable habit of mortality and morbidity in South Africa.<sup>13</sup>

A study done on young people in high school in Pietersburg, South Africa found that the use of cigarettes and other drugs were more prevalent in male adolescents than in females.<sup>14</sup> Most adolescents said that smoke cigarettes when they are stressed, bored, tired, stressed or at social gatherings. In South Africa it has been noted that there is a need to curb substance use and abuse among adolescents in order to improve the health status and economy of the country. The environment is ever changing and the only way to cope according to Madu and Matla<sup>14</sup> is to smoke and make use of drugs. It also helps them to reduce tension and frustration, stress, relieves boredom and fatigue.<sup>14</sup> In an adolescent's life, especially in high school, being alienated from the drug abusing and smoking world of an individual's friends can progress into suicidal behaviour of the individual.<sup>14</sup>

Among the participants of the study in Pietersburg, it was found that the prevalence for cigarette smoking was 10.6% and individually the prevalence was higher for males than females. In South Africa, the law prohibits cigarettes from being sold to

children (adolescents younger than 18 years old) though it was found that in spite of this law, they still succeed in buying cigarettes from retail outlets.<sup>8, 14</sup> “*The average age when adolescents start to smoke cigarettes is 14.54 years; the age for males is 14.88 and 13.79 for females.*”<sup>14</sup> Therefore, most people have their first cigarette smoking experience during early puberty. There is a dire need for adequate facilities in South Africa to provide recreational activities for adolescents to do. This will help in keeping them away from boredom, experimenting with cigarettes and drugs and help them to cope with stress and their changing environment.<sup>14</sup> Furthermore, there is an urgent need to introduce graphic warning labels on cigarette packs to assist with tobacco control among the youth.

### **1.2.2 Prevention of smoking**

In the world over it has been found that graphic warnings do have a greater impact in encouraging individuals to curb the habit of smoking.<sup>15</sup> However, few countries have implemented graphic warnings although the prevalence of youth smoking remains the same or even is increasing in some countries. Those who do not smoke seem to be far more responsive to the packaging, as it gives further validation to the decision already taken to not smoke.<sup>15</sup>

### **1.2.3 Cigarette package warning labels**

#### **1.2.3.1 Communicating health risks through warning labels**

Research shows that more smokers get information about the risks of smoking from cigarette packs than from any other source except television, with a significant proportion showing awareness of the health warnings. This makes health warning labels a cost effective public health intervention.<sup>16</sup>

Warning labels on cigarette packages are increasingly being used by countries to warn members of the public about the dangers of tobacco use. This is because they

have been found to inform smokers about the health hazards of smoking, encourage smokers to quit, and prevent nonsmokers from starting to smoke.<sup>17</sup>

Studies show that smokers' understanding of the magnitude of smoking related health risks influence their smoking behaviour and those smokers who perceive greater health risk from smoking are more likely to attempt to quit and to quit smoking successfully. Health risks of smoking have been reported to be the most common motivation to quit smoking by current and former smokers.<sup>18</sup>

Even though most smokers have some basic knowledge that smoking is harmful for their health, studies in developed countries such as Canada show that there still exist gaps in their understanding of the health risks involved and many tend to under- estimate the magnitude of these effects.<sup>18</sup>

#### **1.2.4 Text- only warning labels**

Research shows that large text-only labels increase health knowledge and perception of risk. Cross-sectional surveys conducted in Canada in the 1990s, before the introduction of graphic warnings, showed that majority of smokers found package warning labels to be an important source of health information<sup>19</sup>. Similarly a study carried out in Australia in the 1990's found that smokers demonstrated an increase in their knowledge of health risks as compared to non-smokers.<sup>19</sup> In relation to the size of the warning labels, a cohort study conducted in the United Kingdom (UK) showed that the level of knowledge and frequency of thoughts related to health effects of tobacco use increased with an increase in the size of the warning labels; indicating an increased perception of health risks as a result of more comprehensive text warnings.<sup>19</sup>

Sambrook<sup>20</sup>, however, in its evaluation of text only warnings found that they are less effective as most smokers don't read them and those who do, have found them to be impersonalized, not easy to understand and more often than not, not specifically

targeted to any group. Text only warning labels also pose a challenge in communicating to illiterate smokers.

Lack of knowledge or ignorance (or at times in terms of medical professionals who choose to disregard the knowledge they acquired about the dangers of smoking) may be attributed to the subliminal message about the dangers of smoking.<sup>21</sup> According to the economics of tobacco control in South Africa, the health hazard of smoking takes less than five percent of the space on the cigarette pack only in one sentence; and this is situated or placed at the back of the pack. Individuals who are illiterate will not be able to elaborate what it is written on the pack. Furthermore those who are literate will ignore it very easily because it is at the back. As a result smokers tend not to mind the hazard and continue to indulge in the deadly chemical. The economics of tobacco control in South Africa posit that if the health hazard was engraved in big visible images and writing, smokers would take cognizance and avoid it as much as possible.<sup>3</sup>

### 1.2.5 Importance in young people

A study done by the FDA to assess the response of youth to the graphic warning labels proved to have positive results. *"Of the 36 labels, 64% induced greater fear-related reactions and 58% discouraged respondents from wanting to smoke more than the corresponding text-only labels did".*<sup>15</sup>

In today's world that revolves around social media and veneration of a certain type of celebrity, the youth is more impressionable than ever.<sup>22</sup> There is also an undeniable degree of pressure to fit in and keep up appearances.<sup>22</sup> There is minimal literature in South Africa about smoking with regards to the youth. However, in the USA there is comprehensive work that has been done.<sup>22</sup> It's been found that young African Americans have and continue to smoke at lower rates than Whites and Hispanics.<sup>22</sup> However the prevalence of young black smokers is increasing.<sup>22</sup>

The number of university students that smoke is undesirably high.<sup>23</sup> This comes with the new found freedom of university life, an increased need for experimenting and also pressure to fit it with one's new peers.<sup>23</sup> Therefore campaigns for use of text and graphic warnings will be of great importance in possibly preventing smoking amongst the youth.<sup>23</sup>

### **1.2.6 Campaigns for use of text and graphic warnings**

In a publication released in 2014 at least seventy seven countries had finalized requirements for warning pictures.<sup>24</sup> Countries such as Australia have increased the size of the images 75% at the front and 90% at the back of the cigarette packs. This intervention is to educate smokers on the dangers of smoking and hopefully enticing them to quit smoking. It also is a way to prevent nonsmokers from attempting to have their first smoke.<sup>24</sup>

This study is part of a larger study that is a first to conduct research on pictorial warnings in South Africa. That being said, the implementation of pictorial warnings on cigarette packs would be one of the solutions to try and protect the public against health hazards.<sup>25</sup>

According to studies conducted in the USA and Germany on college students, the use of pictorial warnings showed to be more effective than text only warnings, in terms of enlightening ones knowledge and promoting cessation of smoking among the young adult smokers<sup>25, 26</sup> Furthermore, the more gruesome the pictorial warning and the more darkly colored the package of the cigarette, the more effect it had on the adult smokers, as the images evoked the strongest emotional response. This increased ones understanding of the health risks, motivation and confidence to quit smoking.<sup>23</sup> The effect had a large impact, particularly to those smokers who were at great risk for smoking and had the lowest motivation, including self-efficacy for quitting.<sup>26</sup> Countries such as Australia, UK, New Zealand and Canada are planning on implementing plain packaging with only a health warning and a brand name. This is as a way of reducing brand appeal, which amongst young people, plays a role in

the expectation of the type of taste the cigarette has and status accompanied with smoking that particular brand.<sup>27</sup>

However, this may be a downfall for the advertising industries. Judging from the effective response of pictorial warnings on cigarette packs in developed countries, its implementation in developing countries, including South Africa will have an effect among the youth, particularly those who are illiterate and with low education.

The use of pictorial health warnings will be of a great advantage in countries where multiple languages are spoken. As not only does image speak louder than words, but the emotional arousal conveyed through image depictions of health risks are more likely to be recalled by smokers and non-smokers.<sup>27</sup> As mentioned earlier, the conducting of this study will be for the first time in South Africa. Currently, the country uses a system where text warning labels are printed in front and at the back of the pack. In terms of size and emphasis, the front health warning is large and concise, whereas the back warning goes further in explaining the health warning in the front of the pack. Additionally, should there be individuals willing to stop smoking, and need guidance in doing so; a telephone number in small font size is printed on the sides of the pack.<sup>27</sup>

### **1.2.7 Health warnings and cessation behaviour**

Little research has been conducted on the impact of graphic warnings on smoking behavior among youth.

A recent, comprehensive review of the evidence on the impact of tobacco warning labels, found that warning labels with the large text and pictorial warnings are noticed more, are an important source of health information, increase knowledge about the dangers of tobacco use and perceptions of risk and promote smoking cessation.<sup>5, 28,</sup>

<sup>29</sup> In addition, comprehensive warning labels are effective amongst youth and there is evidence that they prevent smoking initiation.<sup>28</sup> In an article by the Campaign for

Tobacco free kids<sup>29</sup>, it was noted that pictorial warning labels that elicit a strong emotional response are especially;

- *Large warning labels are the most effective. Warning labels must be large enough to be easily noticed and read, and should be as large as possible. 46 countries now require health messages to comprise at least 50% of the overall package, and three countries (Australia, Sri Lanka, and Uruguay) require warnings to cover as much as 80% of the package.*<sup>29</sup>
- *Smokers report that they tend to remember warnings that shown on the front, compared to the side, of packages.*
- *Warning labels that contain a clear, direct and precise message about the dangers of tobacco use, including messages about specific health effects, are the most effective. Messages that are worded simply and speak directly to the reader have the greatest impact*<sup>29</sup>.
- *Warnings with pictorials are more effective than text-only warnings. Pictorials also increase the message's accessibility by people with low levels of literacy and can help smokers visualize tobacco-caused diseases. Pictorials with colour are more effective than black and white pictures.*
- *Warning labels that include graphic images that elicit an emotional response have been shown to be the most effective. Strong, emotional responses are associated with increases in the warning's effectiveness.*
- *Warning labels need to be changed regularly to avoid overexposure.*
- *Warning labels with information for smokers who want to quit and get help have been shown to increase the number of smokers who try to quit.*<sup>29</sup>



## **CHAPTER 2**

### **AIMS AND OBJECTIVES**

#### **2.1 AIM**

The aim of this study was to determine the effectiveness of various pictorial health warnings on desire to quit smoking among students at the University of Pretoria.

#### **2.2 OBJECTIVES**

- To determine the reactions of university students with regards to pictorial warnings on cigarette packs.
- To determine the extent of desire to quit smoking among university students after viewing the pictorial health warnings.
- To determine reactions of non-smokers with regards to smoking up-take after viewing the pictorial warnings.

## CHAPTER 3

### METHODS AND DATA COLLECTION

#### 3.1 RESEARCH METHODS

##### 3.1.1 STUDY DESIGN

An observational descriptive cross-sectional study was conducted where data examined the university students' reactions to pictorial warnings on cigarette packs, through the use of a questionnaire. (Appendix A)

##### **Study setting**

Tshwane, Gauteng Province

##### **Study population**

Students who were enrolled at University Pretoria in 2013:

- **Inclusion criteria**
  - Students of University of Pretoria
  - Males and females
  - Ages 18-55
  - Both smokers and non-smokers
- **Exclusion criteria**
  - Non-students of the University of Pretoria
  - Ages less than 18 and greater than 55

##### 3.1.2 SAMPLING METHOD

The participants were randomly sampled irrespective of their gender, race, whether they were smokers or non-smokers. Data collectors approached students randomly

at areas of reaction outside the campuses, to ascertain whether they were students. Data collectors would ask students to produce a student card of the University of Pretoria to identify that they were eligible to participate.

### **3.1.3 SAMPLING SIZE**

From previous studies there is an assumed 17% prevalence of tobacco use among university students. Therefore in order to have a 0.95 probability of being within 3% points of the actual proportion of those who use tobacco, it was determined a sample of 571 participants was representative of the study population and complied with the inclusion and exclusion criteria of the study population. A total sample of (448) was included in the study.

## **3.2 DATA MANAGEMENT AND ANALYSIS**

This study used data collected in May 2013 to respond to the research question. SAS version 9.1 was used for the data analysis. Descriptive statistics including mean, standard deviations, and percentages, was used to characterize the sample in terms of socio-demographic characteristics and theoretical variables. Pearson product-moment correlation coefficients ( $r$ ) were used to identify correlates of decisions in smoking habits. Chi-square tests were used to test for the hypotheses of interest.

## **3.3 ETHICAL AND LEGAL CONSIDERATIONS**

The study sought ethical approval from the University of Pretoria's Health Sciences Research and Ethics Committee. Participants were given an information leaflet and informed consent was obtained. Participant's identities were not revealed in the collection of data, analysis, reporting and dissemination of the study; and anonymity

was maintained by using an allocated unique identifier number. Additionally approval for the use of this data set was sought from the data management team at the University of Pretoria.

### **3.4 LIMITATIONS OF THE STUDY**

This study utilised secondary data and therefore, causal inferences cannot be made. The data though, was collected to answer the study question.

### **3.5 REPORTING AND DISSEMINATION OF RESULTS**

A report will be presented to the University of Pretoria as partial fulfillment of the requirements of the Master of Public Health (MPH) degree. An article will also be submitted to the South African Medical Journal (SAMJ).

### **3.6 CONCLUSION**

In chapter one, the researcher provided contextual information on the study, giving a detailed account of the impact tobacco has on society and the urgent need for introduction of pictorial warnings. Chapter two gives a summary of the aims and objectives while chapter three summarized the methods and data collection used. Planning of the research included seeking permission from respondents and use of a questionnaire as a data gathering instrument. In the next chapter analysis and interpretation of results will be presented.

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# PART II



## Effectiveness of pictorial warning labels on cigarette packs among university students in Tshwane, South Africa

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### Abstract

#### Background

South Africa's tobacco control policy has been strengthened to include pictorial health warnings on tobacco product packs. There is currently no evidence of the type of pictorial health warning that will be effective for the South African population. The aim of this study was to determine the effectiveness of various pictorial health warnings on desire to quit smoking among students at the University of Pretoria.

#### Method

A cross sectional observational study, using a structured self-administered questionnaire, examined a random sample of students (n=448) between 18-55 years old (mean 23.74). A total of eight pictorial health warnings were placed on cigarette packs. The pack design included pictorial warnings without (plain packs) and with brand design elements (branded packs). The SAS version 9.1 was used for data analysis. Pearson product-moment correlation coefficients (r) were used to identify correlates of desire to quit. All tests were carried at 5% significance level.

#### Results

Exposure to pictorial health warnings enhanced the desire to quit smoking among both smokers 31.14% and non-smokers 68.86%. Comparison over smoking status showed a significant effect revealing a higher impact that the pictorial warning signs had on intentions on one to quit on non-smokers than smokers ( $t=-6.22$ ;  $Pr > |t| = <.0001$ ). Females showed a significantly higher intention to quit smoking than males ( $t=-2.38$ ;  $Pr > |t| = 0.0180$ ). The branded pack pictorial of oral disease was the most effective in being understandable (20.21%); believable (21.71%); relevant (12.30%); and helping prevent youth from starting smoking (16.85%). Respondents (14.44%) said the branded picture of abortion was effective in making one stop and think, while the plain package with the abortion picture was the most frightening (16.85).

#### Conclusion

Pictorial health warnings on cigarette packs had an effect on students at the University of Pretoria. The pictorial health warning on oral disease was the most effective among the participants. Further, the pictorial health warnings had a significant effect on desire to quit smoking especially among females.

**Key words:** pictorial, warning labels, cigarette, university, students, South Africa

## Introduction

The prevalence of smoking among university students has increased in South Africa (SA), yet there is minimal information about the impact of pictorial warning labels. This study was part of a bigger study which seeks to assess the reactions to warning labels on tobacco packs among students at the University of Pretoria in SA. It is the fundamental right of persons to have accurate information about the risks of smoking, according to the World Health Organization (WHO).<sup>[1]</sup> Since 2005 SA was required by the Framework on Tobacco Control to implement health warning labels on cigarette packages that cover at least 30% of the surface.<sup>[2, 3, 4]</sup>

In SA, bold health warnings are placed on cigarette packaging and smoking is banned in many public places. The country plans on adopting standardised packaging.<sup>[5]</sup> The Minister of Health, Dr Aaron Motaalehi has said: *'I want it as soon as possible.'* The tobacco industry is expected to fight this suggestion, however Reuters quotes the Minister saying, *'They are going to be vocal and kick dust and we are prepared to fight.'*<sup>[5]</sup>

This is being done because tobacco kills 44 000 South Africans per year, contributing to non-communicable diseases such as cancer, heart disease and stroke which are a heavy burden on the health system.<sup>[2]</sup> A study on cigarette use done in Pietersburg amongst adolescents, found smoking was more prevalent among males.<sup>[6]</sup> This was attributed to boredom, stress, tiredness and social pressures.<sup>[6]</sup> According to studies conducted in Germany and the USA, pictorial warnings were more effective than text messages.<sup>[7]</sup> In a study done in Australia on effectiveness of pictorial warning, it was found that adolescents were significantly more likely to read, attend to, think and talk about pictorial warnings shortly after initiation of smoking.<sup>[8]</sup> Experimental and regular smokers were also significantly more likely to think about quitting and foregoing cigarettes.<sup>[8, 9]</sup> A review of the literature on the effect of pictorial warning labels found one other study conducted on adolescents and university students in Lebanon.<sup>[10]</sup> The research question was: what is the effectiveness of the current text warning compared to pictorial warnings on intentions to quit or not start smoking among school and university students in Lebanon?<sup>[10]</sup>









The aim of the current study was to investigate the effect of the type of pictorial warning labels on cigarette packs, among university students at the University of Pretoria, SA.

## Methods

Pictorial warnings were adapted from the international standards set by WHO. The study was a cross sectional observational study that was part of a larger National study on pictorial health warnings. Data was collected among students at the University of Pretoria in Tshwane, SA. A written questionnaire was administered randomly on campus to both smoking and non-smoking students between the ages of 18 – 55 years of age, irrespective of sex or race. Participants were randomly sampled. Students were shown pictures of branded and plain packs with pictorial warning label and then asked questions which would measure the effectiveness of the warning picture. The questionnaire covered demographics; smoking

habit; questions on the mock cigarette packs and pictorial health warnings. The eight pictorial health warnings that were tested among the participants are show in Table 1 below.

**Table 1: Pictorial health warnings**

NUMBER	Picture	NUMBER	Picture
<b>1</b>	 Impotence	<b>4</b>	 Death
<b>2</b>	 Abortion	<b>5</b>	 Oral disease
<b>3</b>	 Stroke	<b>6</b>	 Second Hand Smoke
<b>7</b>	 Poverty	<b>8</b>	 Addiction

The Chi-square test for equal proportions was used to test for differences in frequency distribution within each demographic variable. Intentions to quit smoking were assessed using standardised measures, which consisted of 8 items on a 5 point Likert scale. The perceived impact and effectiveness of the pictorial warning labels was then measured using the mean levels of the 8 items. Fisher's Exact test and associated odds ratios, were used to test for gender and smoking status differences in regard to perceptions of the effect of each

picture on intention to quit smoking. The Likert-scale was collapsed combining 1-strongly agree and 2-agree, as well as combining 5-strongly disagree and 4-disagree. Therefore the comparisons were to determine how the respondents differed in agreeing or disagreeing in respect to gender and smoking status. Females were compared to males and non-smokers were compared to smokers. A chi-square test for equal proportions was used to test for the null hypothesis that there is no association between exposure to cigarette package warning labels and the desire to quit smoking among university students against the alternative, there is association between exposure to cigarette package warning labels and the desire to quit smoking among university students. The effect of different types of pictures 1 to 8 (See Table 1) was compared.

Ethical approval was granted by the University of Pretoria's Health Sciences Research and Ethics Committee (92/2014). The limitation of the study is that secondary data was utilised. Therefore causal inferences cannot be made. The data collected though was gathered to answer the study question.

## Results

### Demographics

Table 2 summarises the demographic characteristics of the study sample. A chi-square test for equal proportions was used to test for differences in frequency distribution within each demographic variable.

**Table 2: Biographical Data – Frequencies, Percentages and Chi-Square test for equal proportions**

Variable	Levels	f	%	Chi-square	p-value
Gender	Female	241	53.91	2.7405	0.0978
	Male	206	46.09		
Age	< 25 years	333	74.33	343.9330	<.0001**
	25 - 34 years	77	17.19		
	> 35 years	38	8.48		
Years of Study	< 4 years	365	81.47	470.4152	<.0001**
	4 to 6 years	26	5.80		
	> 6 years	57	12.72		
Smoking Status	Smokers	141	31.47	61.5089	<.0001**
	Non-Smokers	307	68.53		

### Comparisons of Means on Age and Year of Study

The Duncan Waller groupings show those who are aged < 25 years and > 35 years had a statistically significant effect. This revealed a higher impact that the pictorial warning signs

had on their desires of quitting smoking as compared to those aged between 24 to 35 years of age.

### Effects of pictorial warnings

Most effective pictorial warning signs are summarised in Table 3 and 4

**Table 3: Comparison by percentage of total respondents of the most effective branded pictorial warning sign**

Most effective in	impotence	abortion	stroke	death	Oral disease	2 <sup>nd</sup> hand smoke	poverty	addiction
a grabbing my attention	8.42	14.74	3.16	2.81	21.40 <sup>a</sup>	4.21	3.16	1.05 <sup>b</sup>
b being easy to understand	6.38	4.96	2.13 <sup>b</sup>	6.74	20.21 <sup>a</sup>	2.84	10.99	3.90
c making me stop and think	7.58	14.44 <sup>a</sup>	7.22	6.14	9.75	5.42	5.05	1.08 <sup>b</sup>
d teaching me something new about harm of smoking	14.87 <sup>a</sup>	9.67	13.38	3.72	7.06	3.72	3.35 <sup>b</sup>	3.35 <sup>b</sup>
e being believable	2.14 <sup>b</sup>	5.69	5.69	4.98	21.71 <sup>a</sup>	2.85	11.39	4.63
f being relevant to me	5.16	3.57	3.17 <sup>b</sup>	4.37	12.30 <sup>a</sup>	7.54	11.90	3.17 <sup>b</sup>
g being frightening	3.94	16.49 <sup>a</sup>	6.81	7.89	12.54	3.58	1.79 <sup>b</sup>	2.15
h making me think about the health risks of smoking	7.89	6.45	13.98 <sup>a</sup>	6.09	13.26	3.23	1.79	0.72 <sup>b</sup>
i making me feel smoking is extremely dangerous to my health	3.94	4.66	15.77 <sup>a</sup>	11.47	14.34	5.02	1.43	0.36 <sup>b</sup>
j helping to prevent youth from starting smoking	6.30	4.44	5.56	5.93	15.93 <sup>a</sup>	3.33 <sup>b</sup>	7.78	6.30
<sup>a</sup> Most effective pictorial warning sign, <sup>b</sup> Least effective pictorial warning sign								

**Table 4: Comparison by percentage of total respondents of the most effective plain pictorial warning sign**

Most effective in...	impotence	abortion	stroke	death	Oral disease	2 <sup>nd</sup> hand smoke	Poverty	addiction
a grabbing my attention	1.75	15.09	1.40	0.70 <sup>b</sup>	15.79 <sup>a</sup>	0.70 <sup>b</sup>	1.40	1.75
b being easy to understand	4.26	7.09	4.96	3.55	10.99 <sup>a</sup>	0.35 <sup>b</sup>	3.55	3.55
c making me stop and think	2.17 <sup>b</sup>	12.64 <sup>a</sup>	5.05	3.61	5.78	3.97	3.97	3.97
d teaching me something new about harm of smoking	8.55 <sup>a</sup>	8.18	8.55 <sup>a</sup>	1.49	5.20	4.46	0.37 <sup>b</sup>	1.49
e being believable	2.49	6.05	3.20	2.85	12.46 <sup>a</sup>	1.42 <sup>b</sup>	4.98	3.20
f being relevant to me	5.56	7.14	2.78	2.38 <sup>b</sup>	9.52 <sup>a</sup>	5.56	8.33	2.78
g being frightening	1.43	16.85 <sup>a</sup>	4.66	5.38		2.87	0.72 <sup>b</sup>	1.43

h	making me think about the health risks of smoking	1.79	8.60	12.19 <sup>a</sup>	4.30	9.68	4.30	0.00 <sup>b</sup>	1.43
i	making me feel smoking is extremely dangerous to my health	2.51	5.73	10.39	5.73	11.47 <sup>a</sup>	1.43	0.00 <sup>b</sup>	1.79
j	helping to prevent youth from starting smoking	5.19	5.56	5.56	5.56	8.15 <sup>a</sup>	2.96 <sup>b</sup>	3.33	4.44

<sup>a</sup>Most effective pictorial warning sign, <sup>b</sup>Least effective pictorial warning sign

The oral disease pictorial was the most effective in grabbing ones attention with 21.4% indicating the branded package and 15.79% plain package. Pictorial warnings on plain packages with death and second hand smoking were viewed as having the least effect with 0.7% responses each. Of the 448 respondents, 20.21% selected the branded pictorial of oral disease as most effective, with regards to being easily understood. The branded pictorial of oral disease was considered the most effective pictorial warning sign on being believable (21.71%); being relevant to individuals (12.30%); and helping to prevent youths from starting smoking (15.93%). The plain package with a pictorial of an aborted foetus was seen as the most frightening (16.85%). With regards to health status, the pictorial that was viewed as having the most impact on making someone think about the health risks of smoking, as well as making someone feel smoking is extremely dangerous to health is of a man suffering from a stroke in a wheelchair (13.98%, 15.77% respectively). 14.44% of the respondents were of the view that the abortion pictorial which was on the branded package was more effective on making one to stop and think about smoking.

### Perceived desires to quit smoking

Desires to quit smoking were assessed using standardised measures, which consisted of eight items on a 5–point Likert scale. The desire to quit smoking was measured using the mean levels of the eight items. For the demographic variables gender and smoking status a t-test was used to test for the mean differences. As for the variable age and years of study an ANOVA test using the Duncan's Multiple Range Test was used for Comparisons of means. Table 5 below shows the summary of the t-tests.

**Table 5: T-Tests for Mean Differences Gender and Smoking Status**

VARIAB	LEVELS	COMPARISON BY	MEAN	t	Pr >  t
			Quit Smoking		
<b>Gender</b>	Female	Intentions to Quit Smoking	2.2244	-2.38	0.0180**
	Male		2.3699		
<b>Smoking Status</b>	Smokers	Intentions to Quit Smoking	2.5616	-6.22	<.0001**
	Non-Smokers		2.1681		

A pooled T-Test was used due to equality of variances.

Females showed significantly higher intentions to quit smoking than their male counterparts ( $t=-2.38$ ;  $Pr > |t| = 0.0180$ ). Thus the pictorial warning signs had more impact on females than males on desire to quit smoking. There was a statistically significant effect which revealed a



higher impact, that pictorial warning signs had on intentions of one to quit on non-smokers than smokers ( $t=-6.22$ ;  $Pr > |t| = <.0001$ ).

### Gender and Smoking Status comparisons

There were no significant differences (all  $p$ -values  $> 0.05$ ) on the way females and males responded to the measures of intentions/desire to quit smoking. Therefore both females and males had the same perception or view on how the pictorial warning signs affected the desire for one to quit smoking. Significant differences were noted between smokers and non-smokers. Non-smokers and smokers responded to the measures of intentions/desire to quit smoking differently. These differences include “These pictorial warnings make me think about quitting smoking” ( $p=<.0001$ ,  $OR=10.3043$ ), where non-smokers were 10.3043 times more likely to perceive the pictorial warning signs to make them think about quitting smoking than smokers. Non-smokers also viewed the pictorial warning signs as believable 17.17 times more than the smokers ( $p=0.0026$ ,  $OR=17.17$ ). There was a highly significant ( $p=<.0001$ ) evidence that unbranded pictorial warnings packs will make smokers think more about giving up smoking.

### Discussion

The perceived reactions to pictorial warnings were examined among a sample of 448 university students. Females showed higher intentions to quit smoking than their male counterparts. This could be attributed to their perceived reactions to the abortion pictorial. Where the abortion pictorial was regarded by 37.08% of respondents as one that would make one stop and think about smoking, and 33.35% considered this pictorial the most frightening. Studies conducted in Canada, France, Belgium, Spain, UK and some European Union countries deemed fear arousing pictorials like the abortion one were effective. <sup>[11]</sup>

Of the eight pictorial warnings the branded oral disease picture was the most effective in grabbing ones attention, being believable, being relevant and helping to prevent youth from smoking according to the students. This is similar to a study done on university students in Lebanon, ‘tooth decay pictures ranked among the top five across all gender and smoking categories.’ <sup>[10], [11]</sup> The poverty plain pictorial had no impact with 0% of the respondents stating that it neither made them think about the risks of smoking nor make them feel smoking is very dangerous to their health. This could be attributed to the fact that either respondent did not understand the pictorial or money was not an issue when it came to one smoking. With one respondent stating that smoking was a choice.

There was a statistically significant effect which revealed a higher impact that pictorial warning signs had on intentions of one to quit on non-smokers than smokers. This reveals that pictorial warnings had a larger effect on non-smokers. Non-smokers believed in the pictorial warnings which suggest that pictorial warnings do have effect on uptake. Non-smokers are less likely to smoke after seeing these pictorials. The desire to quit smoking was higher among participants below the age of 25 and among participants above the age of 35 years of age. This could be because respondents below the age of 25 are undergraduates and most of them are new smokers who have been exposed through peer pressure and societal pressures. Therefore, realisation of the impact of smoking learnt through the pictorial warning

may illicit fear of not wanting to uptake smoking after viewing pictorial warnings. For those above 35 years of age, they are post graduates and are highly aware of the long term consequences of smoking on health of an individual therefore would agree to the possible effectiveness of pictorials.

Introduction of pictorial warning will strengthen the tobacco control policy by improving information on consequences of smoking. In turn this will have an impact on intentions to quit and therefore contributing to non-communicable diseases as smoking is a significant risk factor.

### Conflict of Interest

Non

### Acknowledgments

We express our acknowledgement to all the participants who partook in this study.

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3. Introduction
4. Methods
5. Results
6. Discussion
7. References
8. Acknowledgements
9. Tables
10. Figures and legends

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Students' results are presented here with some discussion as to the statistical processes used. These may be presented in table or other graphical representations.

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See the section on references below

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These need to be brief and follow rules of general courtesy.

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Weinstein L, Swartz MN. Pathogenic properties of invading microorganisms. In:

Sodeman WA jun, Sodeman WA, eds. Pathologic Physiology: Mechanisms of Disease.

Philadelphia: WB Saunders, 1974: 457-472.

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# PART III

## CHAPTER 4

### RESULTS

The perceived impact and effectiveness of pictorial cigarette warning labels was examined among a sample of university students (n=447). Females (53.91%, n=241) and males (46.09%, n=206) between the ages of 17 to 55 years, with a mean age of 23.74 completed a survey that allowed participants to view graphic/pictorial warning labels. A bivariate and multivariate analysis revealed that both smokers (31.47%, n=141) and non-smokers (68.53%, n=307) had the view that the pictorial cigarette warning labels had a considerable effect on ones desire to quit smoking. There was a statistically significant effect which revealed a higher impact that the pictorial warning signs had on intentions on one to quit on non-smokers than smokers ( $t=-6.22$ ;  $Pr > |t| = <.0001$ ). There was also a significance difference on gender ( $t=-2.38$ ;  $Pr > |t| = 0.0180$ ) that the pictorial warning signs had more impact on females than males on desire to quit smoking. There were also significant gender differences for selection of the most effective pictorial warning label on the one that grabs ones attention ( $p=0.0017$ ), makes one stop and think ( $p=0.0390$ ), being relevant ( $p=0.0003$ ) and frightening ( $p=0.0045$ ).

#### 4.1 SOCIO DEMOGRAPHIC CHARACTERISTICS

The perceived impact of reactions of students towards pictorial cigarette warning labels were examined among a sample of university students (n=447). Females (53.91%, n=241) and males (46.09%, n=206) between the ages of 17 to 55 years, with a mean age of 23.74 completed a survey that allowed participants to view graphic/pictorial warning labels.

**Figure 1: Gender distributions of respondents**

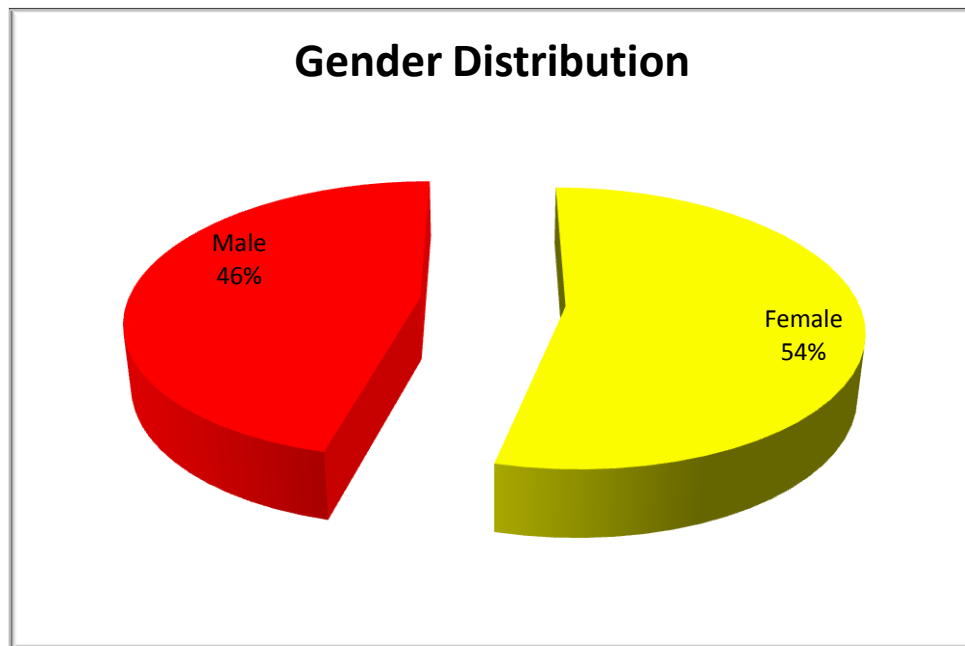


Figure 1 depicts the gender of respondents. The majority of the respondents (54%,  $n = 241$ ) were female respondents, while male respondents comprised of 46% of the study sample ( $n = 206$ ). The Chi-square tests for equal proportions failed to reject the null hypothesis ( $p=0.0978$ ) hence there is no significant difference between the distribution of males and females within the respondents.

**Figure 2: Age distribution of respondents**

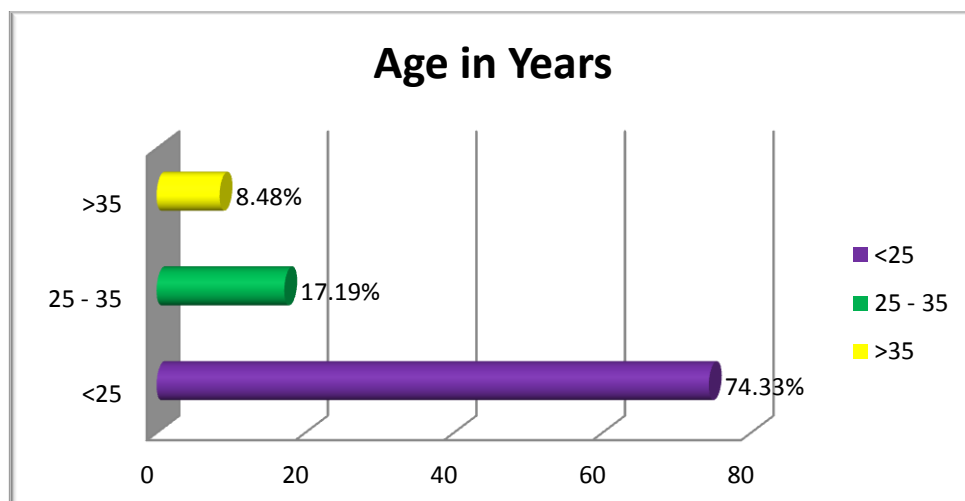


Figure 2 shows that the majority of the respondents (74.33%,  $n = 333$ ) were less than 25 years of age, while 17.19% ( $n=77$ ) were within the age group 25 to 35 years. Only 38 respondents (8.48%) fell in the age category of above 35 years old. The mean age is 23.74. The Chi-square tests for equal proportions showed that there is a significant difference ( $p<.0001$ ) within the different age groups.

**Figure 3 Years of Study of respondents**

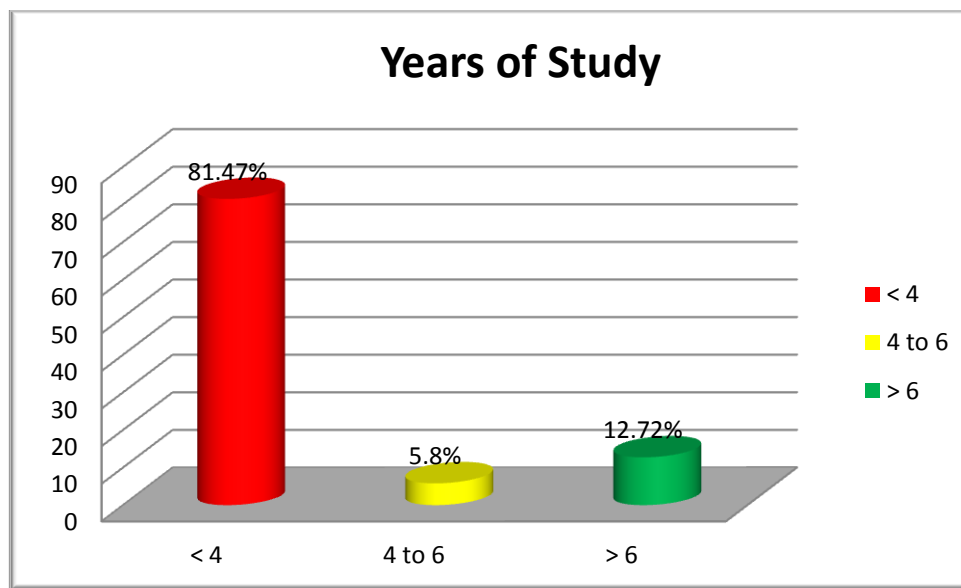
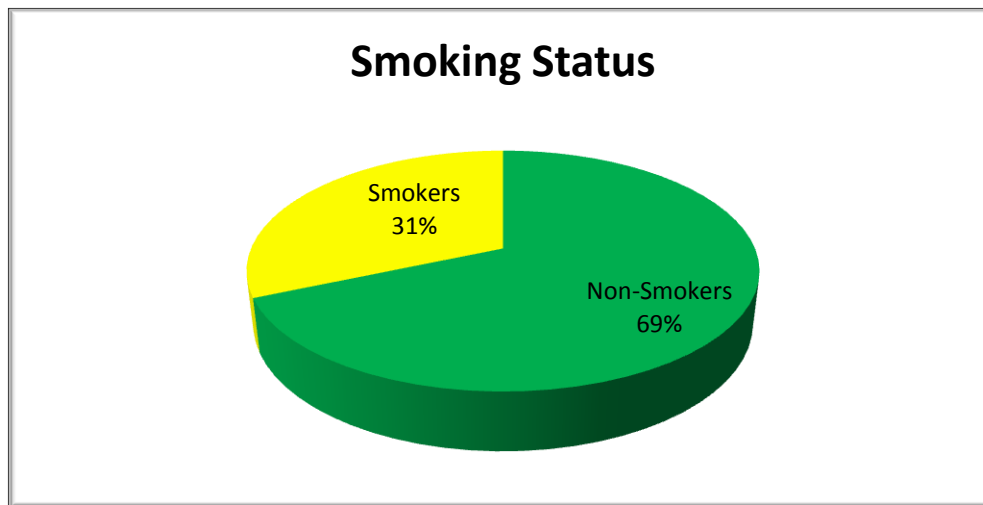


Figure 3 illustrates the study level of the sample. The graph depicts that the majority of the respondents, 81.47% ( $n = 365$ ) had less than 4 years of study whilst 12.72% ( $n = 57$ ) had more than 6 years of studying at the institution. Twenty-six respondents (5.8%) had 4 to 6 years of study. The Chi-square tests for equal proportions showed that there is a significant difference ( $p<.0001$ ) within the different study levels.



**Figure 4: Smoking Status**



The Chi-square tests for equal proportions showed that there was a significant difference ( $p < .0001$ ) in proportion for the distribution of smokers and non-smokers. Majority of the respondents (68.53%,  $n = 307$ ) were non-smokers while 31.47% ( $n = 141$ ) of the respondents were smokers in figure 4.

## 4.2 ANALYSIS OF MEANS

### Mean age of demographic features

**Table 1: Mean Age of Demographic Variables**

VARIABLE	LEVELS	N	MEAN	SD	DUNCAN'S GROUPING	t VALUE	Pr >  t
<b>Gender</b>	Female	241	23.60	6.7	A	0.28	0.5989
	Male	206	23.94	6.8	A		
<b>Smoking Status</b>	Smokers	141	22.73	5.3	B	4.62	0.0321**
	Non-Smokers	307	24.21	7.3	A		

Means with the same letter are not significantly different. \*\*Statistically Significant Difference within the means

Table 1 shows that there was no significant difference in mean age ( $F=0.28$ ;  $p=0.5989$ ) on the variable gender. Thus both males (mean age = 23.94,  $SD = 6.8$ )

and females (mean age = 23.60, SD = 6.7) had equally the same mean age. This was different to the distribution of mean age on smokers and non-smokers. Smokers (mean age = 22.73, SD = 5.3) had a significantly lower mean age ( $F=4.62$ ;  $p=0.0321$ ) than non-smokers (mean age = 24.21, SD = 7.3).

#### 4.3 PERCEIVED DESIRES FOR ONE TO QUIT SMOKING

Desires to quit smoking were assessed using standardized measures, which consisted of 8 items on a 5-point Likert scale (1-Strongly Agree to 5-Strongly Disagree). The perceived impact and effectiveness of the pictorial cigarette warning labels in making the respondents desire to quit smoking was then measured using the mean levels of the 8 items. For the demographic variables gender, and smoking status a t-test was used to test for the mean differences. As for the variable age and years of study an ANOVA test using the Duncan's Multiple Range Test was used for Comparisons of means. Table 2 below shows the summary of the t-tests.

**Table2: T-Tests for Mean Differences Gender and Smoking Status**

VARIABLE	LEVELS	COMPARISON BY	MEAN LEVELS	t VALUE	Pr >  t
			Quit Smoking		
<b>Gender</b>	Female	Intentions to Quit Smoking	2.2244	-2.38	0.0180**
	Male		2.3699		
<b>Smoking</b>	Smokers	Intentions to Quit Smoking	2.5616	-6.22	<.0001**
<b>Status</b>	Non-Smokers		2.1681		

A pooled T-Test was used due to equality of variances.

Females showed a significantly higher intentions to quit smoking than their male counterparts ( $t=-2.38$ ;  $Pr > |t| = 0.0180$ ). Therefore the pictorial warning signs had more impact on females than males on desire to quit smoking. There was a statistically significant effect which revealed a higher impact that the pictorial warning

signs had on desires of one to quit on non-smokers than smokers ( $t=-6.22$ ;  $Pr > |t| = <.0001$ ). Table 3 below shows the results of the ANOVA test for age and year of study.

**Table 3: Duncan's Multiple Range Test for Comparisons of Means for Desires to Quit Smoking on Age and Year of Study**

VARIABLE	LEVELS	N	MEAN	SD	GROUPINGS	F-VALUE	P-VALUE
AGE	< 25 years	324	2.22955247	0.58449	B	7.92	0.0004
	25 - 35 years	75	2.54833333	0.74912	A		
	> 35 years	33	2.32196970	0.72148	B		
Year Of Study	< 4 years	355	2.25387324	0.61692	A	3.73	0.0247
	4 to 6 years	25	2.41500000	0.64823	A		
	> 6 years	52	2.49278846	0.72693	A		

Means with the same letter on "Groupings" are not significantly different

For the variable age the means analysis showed that there is a significant difference on the levels of the desires to quit smoking ( $F=7.92$ ;  $p=0.0004$ ). The Duncan's Multiple Range ordering showed that the age group <25 (mean=2.23; SD = 0.58) and age group >35 (mean=2.32; SD = 0.72) were not statistically different. the Duncan Waller groupings showed those who are aged < 25 years and > 35 years had a statistically significant effect which revealed a higher impact that the pictorial warning signs had on their desires of quitting smoking as compared to those aged between 24 to 35 years of age.

#### 4.4 MOST EFFECTIVE PICTORIAL WARNING SIGN

After viewing all the pictorial warning signs, 21.4% indicated that oral disease in white packaging would be more effective with regards to grabbing ones attention. Pictorial warning signs plain packaging of death (0.70%) and plain 2<sup>nd</sup> hand smoke (0.70%) were viewed to be having the least effect on grabbing ones attention. Of the 448 respondents, 20.21% selected branded oral disease as most effective on being easy to understand. The branded oral disease was also seen to be the most

effective pictorial warning sign on being believable (21.71%), being relevant to me (12.30%), and helping to prevent youth from starting smoking (15.93%). The plain abortion was seen to be most effective on being frightening (16.85%).

**Table 4: Comparison by percentage of total respondents of the most effective white (branded) pictorial warning sign**

Most effective in		impotence	abortion	stroke	death	Oral disease	2 <sup>nd</sup> hand smoke	poverty	addiction
a	grabbing my attention	8.42	14.74	3.16	2.81	21.40 <sup>a</sup>	4.21	3.16	1.05 <sup>b</sup>
b	being easy to understand	6.38	4.96	2.13 <sup>b</sup>	6.74	20.21 <sup>a</sup>	2.84	10.99	3.90
c	making me stop and think	7.58	14.44 <sup>a</sup>	7.22	6.14	9.75	5.42	5.05	1.08 <sup>b</sup>
d	teaching me something new about harm of smoking	14.87 <sup>a</sup>	9.67	13.38	3.72	7.06	3.72	3.35 <sup>b</sup>	3.35 <sup>b</sup>
e	being believable	2.14 <sup>b</sup>	5.69	5.69	4.98	21.71 <sup>a</sup>	2.85	11.39	4.63
f	being relevant to me	5.16	3.57	3.17 <sup>b</sup>	4.37	12.30 <sup>a</sup>	7.54	11.90	3.17 <sup>b</sup>
g	being frightening	3.94	16.49	6.81	7.89	12.54 <sup>a</sup>	3.58	1.79 <sup>b</sup>	2.15
h	making me think about the health risks of smoking	7.89	6.45	13.98 <sup>a</sup>	6.09	13.26	3.23	1.79	0.72 <sup>b</sup>
i	making me feel smoking is extremely dangerous to my health	3.94	4.66	15.77 <sup>a</sup>	11.47	14.34	5.02	1.43	0.36 <sup>b</sup>
j	helping to prevent youth from starting smoking	6.30	4.44	5.56	5.93	15.93 <sup>a</sup>	3.33 <sup>b</sup>	7.78	6.30

<sup>a</sup>Most effective pictorial warning sign, <sup>b</sup>Least effective pictorial warning sign

In terms of health, the pictorial warning sign which was viewed to be more effective on making someone think about the health risks of smoking as well as making someone feel smoking is extremely dangerous health is branded stroke (13.98%, 15.77% respectively). Most respondents (14.44%) said that branded abortion pictorial warning sign would be more effective on making one to stop and think about smoking.

**Table 5: Comparison by percentage of total respondents of the most effective brown (plain) pictorial warning sign**

Most effective in...		impotence	abortion	stroke	death	disease	Oral stroke	2 <sup>nd</sup> hand	poverty	addiction
a	grabbing my attention	1.75	15.09	1.40	0.70 <sub>b</sub>	15.79 <sub>a</sub>	0.70 <sub>b</sub>	1.40	1.75	
b	being easy to understand	4.26	7.09	4.96	3.55	10.99 <sub>a</sub>	0.35 <sub>b</sub>	3.55	3.55	
c	making me stop and think	2.17 <sub>b</sub>	12.64 <sub>a</sub>	5.05	3.61	5.78	3.97	3.97	3.97	
d	teaching me something new about harm of smoking	8.55 <sub>a</sub>	8.18	8.55 <sup>a</sup>	1.49	5.20	4.46	0.37 <sub>b</sub>	1.49	
e	being believable	2.49	6.05	3.20	2.85	12.46 <sub>a</sub>	1.42 <sub>b</sub>	4.98	3.20	
f	being relevant to me	5.56	7.14	2.78	2.38 <sub>b</sub>	9.52 <sup>a</sup>	5.56	8.33	2.78	
g	being frightening	1.43	16.85 <sub>a</sub>	4.66	5.38	9.32	2.87	0.72 <sub>b</sub>	1.43	
h	making me think about the health risks of smoking	1.79	8.60	12.19 <sub>a</sub>	4.30	9.68	4.30	0.00 <sub>b</sub>	1.43	
i	making me feel smoking is extremely dangerous to my health	2.51	5.73	10.39	5.73	11.47 <sub>a</sub>	1.43	0.00 <sub>b</sub>	1.79	
j	helping to prevent youth from starting smoking	5.19	5.56	5.56	5.56	8.15 <sup>a</sup>	2.96 <sub>b</sub>	3.33	4.44	

<sup>a</sup>Most effective pictorial warning sign, <sup>b</sup>Least effective pictorial warning sign

## 4.5 GENDER AND SMOKING STATUS COMPARISONS ON MEASURES TO QUIT SMOKING

Fisher's Exact tests and its associated odds ratios were used to test for gender and smoking status differences in regards to perceptions of the effectiveness of the different pictorial warning signs in one's intention/desire to quit smoking. The likert-scale was collapsed combining 1-strongly agree and 2-agree, as well as combining 5-strongly disagree and 4-disagree. Therefore the comparisons were to determine how the respondents differed in agreeing or disagreeing in respect to gender and smoking status. Females were compared to males and non-smokers were compared to smokers. Table 6 shows the results of the comparisons. The odds ratio, displayed provides an estimate of the relative risk when an event is rare.

There were no significant differences (all p-values > 0.05) on the way females and males responded to the measures of intentions/desire to quit smoking. Hence both females and males had the same perception or view on how the pictorial warning signs affected the desire for one to quit smoking. As for non-smokers and smokers, significant differences were noted on several measures. In Table 6 all p-values marked with an \*, represent all measures that showed a significant difference in the way that non-smokers and smokers responded to the measures of intentions/desire to quit smoking. These include “These pictorial warnings make me think about quitting smoking” ( $p < .0001$ ,  $OR = 10.3043$ ), where non-smokers were 10.3043 times more likely to perceive the pictorial warning signs to make them think about quitting smoking than smokers. Non-smokers also viewed the pictorial warning signs as believable 17.17 times more than the smokers ( $p = 0.0026$ ,  $OR = 17.17$ ). There was a highly significant ( $p < .0001$ ) evidence that non-smokers were highly likely not to suggest that the pictorial warning signs are not going to stop them from smoking, as well as to suggest that the brown pack pictorial warnings will make smokers think more about giving up smoking.

**Table 6: Comparisons on gender and smoking status on measures for intentions/desire to quit smoking,**

Measure	Female Vs Males			Non Smokers Vs Smokers		
	P-Value	OR	CL	P-Value	OR	CL
A These pictorial warnings make me think about quitting smoking	0.2877	1.8367	0.5556 6.2697	<.0001*	10.3043	2.7216 46.9093
B These pictorial health warnings make me think about chemicals in cigarettes/smoke	0.4138	1.6213	0.4718 5.6636	0.1355	2.3750	0.6611 8.2318 40

C	These pictorial warnings are believable	0.6 972	0.5 143	0.04 73	0.00 26*	17.1 724	1.90 87
				3.32 31			799. 018
D	These pictorial warnings will make smokers think more about giving up smoking	0.8 130	1.1 667	0.40 73	0.02 01*	3.17 39	1.07 95
				3.27 41			9.20 04
E	These pictorial warnings are easier to understand than text only warnings	1.0 000	1.3 750	0.09 63	0.07 15	8.03 23	0.60 62
				19.5 345			426. 580
F	The white pack pictorial warnings will make smokers think more about giving up smoking	0.8 435	1.1 190	0.47 61	0.05 17	2.37 32	0.95 38
				2.60 71			5.83 71
g	When smokers want a cigarette the pictorial warnings are not going to stop them from smoking	1.0 000	1.0 000	0.43 82	<.00 01*	6.40 22	1.97 93
				2.30 21			26.8 012
H	The brown pack pictorial warnings will make smokers think more about giving up smoking	0.6 701	1.2 639	0.50 14	<.00 01*	5.46 15	2.02 99
				3.15 26			14.7 074

\*Significant difference

## 4.6 HYPOTHESIS TESTING

### Hypothesis

$H_0$ : There is no association between exposure to cigarette package warning labels and the desire to quit smoking among university students.

$H_1$  There is association between exposure to cigarette package warning labels and the desire to quit smoking among university students.

**Table 7: Measures for intentions/desire to quit smoking, Percentages and Chi-Square test for equal proportions.**

Variable	%	%	%	Chi-Square	P-Value
	Agree	Neither Nor	Disagree		
a These pictorial warnings make me think about quitting smoking	64.48	26.24	9.28	212.0407	<.0001*
b These pictorial health warnings make me think about chemicals in cigarettes/smoke	75.28	15.19	9.52	351.3605	<.0001*
c These pictorial warnings are believable	82.50	10.23	7.27	479.2136	<.0001*
d These pictorial warnings will make smokers think more about giving up smoking	63.64	21.14	15.23	184.1227	<.0001*
e These pictorial warnings are easier to understand than text only warnings	90.52	6.09	3.39	652.4063	<.0001*
f The white pack pictorial warnings will make smokers think more about giving up smoking	53.27	21.90	24.83	79.8330	<.0001*
g When smokers want a cigarette the pictorial warnings are not going to stop them from smoking	22.85	23.08	54.07	85.5520	<.0001*
h The brown pack pictorial warnings will make smokers think more about giving up smoking	56.33	23.98	19.68	106.4570	<.0001*
Variables with a significant difference in proportions are marked with *					



A chi-square test for equal proportions was used to test for the null hypothesis that there is no association between exposure to cigarette package warning labels and the desire to quit smoking among university students against the alternative, there is an association between exposure to cigarette package warning labels and the desire to quit smoking among university students. Percentages of frequencies were used to determine the perceived view of respondents on each particular measure. From table 7 above the chi-square values and the associated p-values (all  $< 0.05$ ,  $p=<.0001$ ) revealed that there is significant evidence that the proportions of those who agreed, disagreed or who neither agreed nor disagreed were not the same for all the 8 measures/variables. The percentages shows that most respondents agreed on all of these statements and since  $p=<.0001$  we reject the null hypothesis and conclude that there is an association between exposure to cigarette package warning labels and the desire to quit smoking among university students.

#### **4.7 CONCLUSION**

This chapter presented the findings from the study using both qualitative and quantitative analysis. The results were presented in both tabular and graphic form. Data was collected through the use of a questionnaire and analysed using a statistical programme to determine the reactions to pictorial warning labels on tobacco packs among university students in Tshwane, South Africa.

## CHAPTER 5

### DISCUSSION

The perceived reactions to pictorial warnings were examined among a sample of 448 students' at the University of Pretoria on Tshwane South Africa. Females (54%, n=242) and males (46%, n=206) between the ages of 17 to 55 years, with a mean age of 23.74. Figure 1-3 provide information on the socio demographics of the participants in the study. Notably females make up the majority of participants, with most participants being under year 4 (87%) as shown in Figure 2. Non-smokers make up the bulk of participants and further results show that pictorial warning are more likely to have an impact than on smokers.<sup>1, 2, 3, 4</sup>

A European Union (EU) survey found that younger respondents were more likely to perceive health warnings as effective.<sup>1, 2, 4</sup> In this study younger participants comprised of 74% of the total participants. Therefore by increasing the campaigns against smoking and pushing the instigation of pictorial warnings on cigarette packs would help curb tobacco abuse.<sup>5</sup> Table 3 with results of Duncan's Multiple Range Test for comparisons of means for desires to quit smoking on age and year of study also support finding in the EU that younger people are more likely to elicit a reaction of not wanting to smoke after seeing the pictorial warnings labels.<sup>2</sup>

Gender smoking comparisons in table 2 show that females had higher intentions to quit smoking than their male counterparts. A study on cigarette use done in Pietersburg amongst adolescents, found smoking was more prevalent among males.<sup>6</sup> This was attributed to boredom, stress, tiredness and social pressures.<sup>6</sup> This could be attributed to their perceived reactions to the abortion pictorial. Where the abortion pictorial was regarded by 37.08% of respondents as one that would make one stop and think about smoking, and 33.35% considered this pictorial the most frightening. Studies conducted in Canada, France, Belgium, Spain, UK and some European Union countries deemed fear arousing pictorials like the abortion one were effective.<sup>2</sup>

Table 5 and 6 give comparisons on the most effective pictorial. Of the eight pictorial warnings the branded oral disease picture was the most effective in grabbing ones

attention, being believable, being relevant and helping to prevent youth from smoking according to the students. Similar to a study done on university students in Lebanon, 'tooth decay pictures ranked among the top five across all gender and smoking categories'.<sup>3</sup> Therefore the pictorial on oral disease was regarded as the most effective pictorial warning among students. The poverty plain pictorial had no impact with 0% of the respondents stating that it neither made them think about the risks of smoking nor make them feel smoking is very dangerous to their health. This could be attested to the fact that either respondent did not understand the pictorial or money was not an issue when it came to one smoking. With one respondent stating that smoking was a choice.

Recommendations to improve on the effectiveness of warning labels would be to enlarge the font and add more striking words to the boxes. Red coloured words will have a stronger emphasis and replace the word "*Warning*" with "*Danger*" together with a danger sign. Making the pictures more realistic and ensuring they leave a feeling of disgust behind, but still are easily understood. By adding these pictorial warnings to cigarette packages will be effective because a picture speaks a thousand words.<sup>7</sup> Speaking to smokers or previous smokers may help give insight needed on how to make pictorials have a bigger impact.

Participants were of the opinion of improving some of the pictorial warning labels, specifically with regards to Box 8 and 4. Box number 8 which has addiction on it is not properly portrayed. It reminds a person of jail or prison rather than addiction. Box number 4 which revolves around death should have a coffin or the grave must be more clearly shown with a rest in peace sign because most were getting lost in translation. Suggestions from participants were to change images.

Table 6 gives results on a statistically significant effect which revealed a higher impact that pictorial warning signs had on intentions of one to quit on non-smokers than smokers. Non-smokers were 10 times more likely to quit smoking after seeing the pictures and 17, 7 times more likely to believe the pictorial warning labels than smokers. This reveals that pictorial warnings had a larger effect on non-smokers.

Non-smokers believed in the pictorial warnings which suggest that pictorial warnings do have effect on uptake. Non-smokers are less to smoke after seeing these pictorials.<sup>4,5</sup> In a Canadian study youth believed that pictorial warning did give them useful information that made smoking seem less attractive and making them more aware of dangers of smoking.<sup>2, 8</sup>

Recommendations are that there is need for further study in order to curb smoking among those who smoke because this study only proved that pictorials have greater impact on non-smokers than smokers with regards to uptake. A study conducted in Canada showed that there where more than 40% of smokers reported that the pictorial warnings have motivated them to quit smoking and in Australia, where 57% of smokers reported that the labels have made them consider quitting and 34% reported that the warnings have helped them to try to quit.<sup>9</sup>

The desire to quit smoking was higher among participants below the age of 25 and among participants above the age of 35 years of age. This could be because respondents below the age of 25 are undergraduates and most of them are new smokers who have been exposed through peer pressure and societal pressures. Therefore, realisation of the impact of smoking learnt through the pictorial warning may illicit fear of not wanting to uptake smoking after viewing pictorial warnings. In a study done in Australia on effectiveness of pictorial warning, it was found that adolescents were significantly more likely to read, attend to, think and talk about pictorial warnings shortly after initiation of smoking.<sup>10, 11</sup> Experimental and regular smokers were also significantly more likely to think about quitting and foregoing cigarettes.<sup>11</sup> For those above 35 years of age, they are post graduates and are highly aware of the long term consequences of smoking on health of an individual therefore would agree to the possible effectiveness of pictorials.

## **5.2 RECOMMENDATIONS FROM PARTICIPANTS**

1. Participants recommended that the writings are small and not very easy to read so smokers with poor eyesight might not bother reading on the packs. Enlarge

the font and add more striking words to the boxes. Red colored words will have a stronger emphasis and replace the word “warning” with “Danger” together with a Danger sign.

2. Participants suggested that smokers should be talked to, to help give insight needed from their personal point of view on what they think might work.
3. Suggestions were made that pictures should be more realistic and leave a feeling of disgust behind, but it must still be easily understood. By adding these pictorial warnings to cigarette packages participants were of the opinion that packs would definitely have an impact because they speak louder than words.
4. Participants were of the view that box number eight which had addiction on it is not properly portrayed. It reminds a person of jail or prison rather than addiction. Box number four which revolves around death should have a coffin or the grave must be more clearly shown with the rest in peace sign because the picture gets lost between the words.
5. Suggestions were also made to include pictures of the dangers of cancer, especially including the effect smoking has on the lungs and oral cancers that are malignant. Also to try and include real people and diseases in these pictures, which would almost be a type of testimony.
6. The impotence picture should be portrayed better, because it might be seen as a spelling error for importance and people outside the Health Care Society do not necessarily know what the word means recommended a participant. *“A better word choice would be erectile dysfunction.”*
7. Some participants viewed the brown packs with its darker colors making the pictorial warnings seem more frightening than those of the white packs. The white color almost disguises the bad aspects of smoking to make it less discouraging to smoke.
8. Suggestions were made that the unbranded packs coupled with more benefits of quitting smoking should be included rather than just effects and dangers thereof because most smokers are aware of the dangers associated with smoking.

Furthermore, including more than one picture on a box to give the true sense of Danger. Opinions by participants were that non-colored pictures are more effective.

9. Research has shown that there is a high correlation between smoking trends, ethnicity and socio-economic status. This study, excluded both. This may limit results as different ethnicities had very different and more negative reactions to the different graphic warnings based on societal values instilled in them. Studying ethnic trends would improve the implementation of graphic warnings in different societal groups.
10. It seems it was not clear to some participants with regards to image seven and four (W7/4 and B7/4), the suggestion was if a person burns money; it may be interpreted as that person has money; therefore in order to get a greater impact, this picture must be replaced with a person tearing money instead of burning money. The impact that smoking wastes money will then be greatly achieved. The grave image did not give a clear interpretation of tobacco use leading to death. A more direct picture would be more appropriate.
11. A detailed study needs to be conducted on reasons pictorial warnings have a lesser impact on students in sixth year and above.

### **5.3 RECOMMENDATIONS FROM FINDINGS.**

- The University of Pretoria should invest in an anti-tobacco campaign that includes pictorial warnings. A large study on adults and also on university students is recommended to further investigate the effects of pictorial warnings on smoking behavior among the general adult and youth population.

### **5.4 LIMITATIONS OF STUDY**

1. The study used secondary data therefore causal inferences cannot be made.
2. There is need for a nationwide study which will be inclusive of the whole population to gain more knowledge of effects of cigarette smoking and reactions of different age groups on pictorials.

## 5.5 REFERENCES

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## APPENDIX A

### QUESTIONNAIRE

Questionnaire ID number:


**Instruction: Please complete the questions below**

1. How old are you?

Years

2. What is your gender?

Female	1
Male	2

3. What is your year of study?

4. Have you ever tried or experimented with cigarette smoking, even one or two puffs?

Yes	1
No	2

5. 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

6. If you currently smoke, on the days you smoke, how soon after you wake up do 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
I have stopped smoking daily	5
I have never smoked daily	6
(Do not know/ Can't choose)	7

**7. Refer to the mock cigarette packs in front of you and respond to the following statements.**

		Strongly agree	Agree	Neither or nor	Disagree	Strongly disagree	(Do not know /NA)
<b>a</b>	These pictorial warnings make me think about quitting smoking	1	2	3	4	5	8
<b>b</b>	These pictorial health warnings make me think about chemicals in cigarettes/smoke	1	2	3	4	5	8
<b>c</b>	These pictorial warnings are believable	1	2	3	4	5	8
<b>d</b>	These pictorial warnings will make smokers think more about giving up smoking	1	2	3	4	5	8
<b>e</b>	These pictorial warnings are easier to understand than text only warnings	1	2	3	4	5	8
<b>f</b>	The white pack pictorial warnings will make smokers think more about giving up smoking	1	2	3	4	5	8
<b>g</b>	When smokers want a cigarette the pictorial warnings are not going to stop them from smoking	1	2	3	4	5	8

<b>h</b>	The brown pack pictorial warnings will make smokers think more about giving up smoking	1	2	3	4	5	8
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**1. Please complete the following questions with regards to the different pictorial warnings in front of you**

The following warning message was most effective with respect to.....		Insert pictorial warning number e.g. W1 or B8
1	grabbing my attention	
2	being easy to understand	
3	making me stop and think	
4	teaching me something new about harm of smoking	
5	being believable	
6	being relevant to me	
7	being frightening	
8	making me think about the health risks of smoking	
9	making me feel smoking is extremely dangerous to my health	
10	helping to prevent youth from starting smoking	
<b>THE FOLLOWING QUESTIONS ARE FOR SMOKERS ONLY</b>		
11	making me feel more concerned about my smoking	
12	making me think about quitting smoking	

**2. Any suggestions on how these packs can be made more effective in discouraging smoking?**

.....

.....

.....

.....

.....

**THANK YOU**

## LABELLING OF TOBACCO PACKS




### Instruction:

Please note that for the study you will have a total of 16 mock cigarette packs, 8 white packs and 8 brown packs with the same pictures as the white mock cigarette packs.

Please label your packs as follows **(W)** for white packs **(B)** for brown packs and the pictures with the corresponding number below.

### Example:

- W1- (Impotence white pack), B1- ( Impotence brown pack).
- W8 - (addiction white pack), B3- ( stroke brown pack)

NUMBER	Picture	NUMBER	Picture
1	 Impotence	4	 Death
2	 Abortion	5	 Oral disease
3	 Stroke	6	 Second Hand Smoke
7	 Poverty	8	 Addiction

## APPENDIX B: ETHICAL APPROVAL UNIVERSITY OF PRETORIA

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

27/03/2014

### Approval Certificate New Application

Ethics Reference No 92/2014

Title Reactions to pictorial warning labels on tobacco packs among students in Tshwane South Africa

Dear Thandekile Ntombikayise Moyo

The **New Application** as supported by documents specified in your cover letter for your research received on the 28/02/2014, was approved by the Faculty of Health Sciences Research Ethics Committee on the 26/03/2014.

Please note the following about your ethics approval:

- Ethics Approval is valid for 1 year
- Please remember to use your protocol number (92/2014) 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 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 2004 (Department of Health).*

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## APPENDIX C- INFORMED CONSENT



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

**Faculty of Health Sciences, School of Health Systems and Public Health,  
University of Pretoria**

**PARTICIPANT'S INFORMATION LEAFLET & INFORMED CONSENT FOR  
QUESTIONNAIRES**

**Researcher's name:**

**Thandekile Ntombikayise Moyo**

**School of Health Systems and Public Health University of Pretoria**

Dear Participant

**Reactions to pictorial warning labels on tobacco packs among university  
students in Tshwane, South Africa**

I am a masters student with the Faculty of Health Sciences, School of Health Systems and Public Health, University of Pretoria. You are invited to volunteer to participate in our research project on **Reactions to pictorial warning labels on tobacco packs among university students in Tshwane, South Africa**

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 determine the effectiveness of various pictorial health warnings on desire to quit smoking among students at the University of Pretoria.

I 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.

I 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.**

I sincerely appreciate your help.

Yours truly,

Thandekile Ntombikayise Moyo