

**Knowledge, Attitudes and Perceptions of Pregnant Women
about Early Childhood Caries in Tshwane District,
Gauteng, South Africa**

By

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Master of Science (Community Dentistry)**

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DECLARATION

I, Tshepiso Mfolo, hereby declare that this dissertation, “*Knowledge, Attitudes and Perceptions of Pregnant Women about Early Childhood Caries in Tshwane District, Gauteng, South Africa*” is submitted in accordance with the requirements for the Masters of Science (Community Dentistry) degree at University of Pretoria. It is my own original work and has not previously been submitted to any other institution of higher learning. All sources cited in this dissertation have been duly acknowledged.

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DEDICATION

This dissertation is dedicated to my beloved mother, Bertha Mfolo. It is through her unceasing prayers, love, faith and encouragement; I have been able to complete my Master's degree.

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All praise and honour to our Heavenly Father, my redeemer and protector. He has been the source of my strength throughout this Master's degree.

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LIST OF ABBREVIATIONS

AAPD	American Academy of Paediatric Dentistry (AAPD)
ADA	American Dental Association
DMFT	Decayed, Missing, Filled Teeth
DoH	Department of Health
ECC	Early Childhood Caries
FDI	International Federation of Dentists
GA	General Anaesthesia
GHS	General Household Survey
KAP	Knowledge, Attitude and Perception
MCH	Maternal and Child Health
MS	Mutans Streptococci
OHE	Oral Health Education
PHC	Primary Health Care
SA	South Africa
SES	Socio-economic status
SiC	Significant Caries Index
US	United States
WHO	World Health Organization

ABSTRACT

Introduction: Early Childhood Caries (ECC) is a serious public health concern globally especially in developing countries like South Africa. The main source from which infants acquire the causative bacteria - Mutans Streptococci (MS) is their mothers. The mothers with high levels of MS have a greater chance of transmitting the bacteria, particularly if they are involved in practices such as tasting the infant's food and/or sharing eating utensils. Current research indicates that dental public health programmes fail to prevent ECC because of late intervention.

Objective: This study sought to determine the existing knowledge, attitudes and perceptions (KAP) of pregnant women about ECC in a population in Tshwane district, Gauteng province, South Africa and to compare these KAP across socio-economic groups (SES).

Methodology: A cross-sectional analytical study involving consenting pregnant women recruited from selected private and public antenatal healthcare facilities in the Tshwane District area was conducted. This study involved the use of a validated self-administered structured questionnaire and an oral epidemiological clinical examination (modified by WHO Oral Health Assessment 1997 Guidelines). One calibrated examiner using a dental explorer and a mouth mirror under natural light carried out the oral examination. Data analysis included descriptive statistics, principal component analysis to obtain a composite score for participant's attitude towards ECC; and chi-square and independent student's T-test to compare different groups. Significance level was set at $p < 0.05$.

Results: Response rate was 88.9% (n=353). Respondents' age ranged from 18-44 years (Mean age=31 years). Only 18.7% of the respondents had complete knowledge of the cause of dental caries i.e. both sugar (diet) and biologic agent (bacterial plaque) whilst over half of the respondents (55.5%) mentioned only one factor. The participants' knowledge of the cause of ECC was significantly associated with SES. A few mothers-to-be (13.9%) believed in the caries transmission from mother to child. Reported mean age for the child's first dental visit was 2 years and 8 months. Only a quarter of respondents received oral health education for their unborn child during the antenatal visits. The majority of the pregnant women (93.8%)

expressed the desire to receive information during the antenatal visit. The participants' attitudes towards ECC was significantly associated with SES.

The caries prevalence of the pregnant women was high at 64.3%, with mean DMFT of 2.97(SD 3.20). High participant DMFT was significantly associated with reports of 'rotten teeth' in their other children. Only 19.3% mothers-to-be had visited a dental care provider in the last 6-months.

Conclusion: The knowledge of the pregnant women studied on ECC is incomplete and limited, while their attitudes and perceptions towards ECC was satisfactory. Therefore there is a need for the integration of oral health education with maternal and child health activities in both antenatal and post-natal clinics. There is a need for the oral health professionals to collaborate with other health works to reduce the prevalence of ECC.

Keywords: Knowledge, Pregnant Women, Socio-Economic Status (SES), Early Childhood Caries (ECC), DMFT, Mutans Streptococci (MS), Maternal Caries,

CHAPTER 1: INTRODUCTION

1.1 Background

For several years, researchers have battled to clearly define Early Childhood Caries (ECC). Several terms referred to ECC as ‘baby bottle tooth decay’, ‘nursing bottle syndrome’ and ‘rampant caries’. ¹The American Dental Association (ADA) defines ECC as the presence of one or more decayed (non-cavitated or cavitated), missing (due to decay), or filled tooth surfaces in any primary tooth in a child under 71 months of age.² It is the most common childhood illness globally. The prevalence of ECC is high worldwide especially in developing countries¹. Children affected by ECC suffer from severe pain. ECC affects a child’s general health, eating and sleeping patterns, learning ability and quality of life and can have a life-long impact on oral health. ²

ECC is an infectious disease. Mutans Streptococci (MS) is considered to be the principal bacterial organisms responsible for caries. The source of MS infection in infants and toddlers has been meticulously studied in recent years. The key source from which infants obtain MS is their mothers. ³ Mothers with high levels of MS have a greater chance of transmitting the bacteria, particularly if they are involved in practices such as tasting the infant’s food and/or sharing eating tools.

ECC is a preventable disease. Prevention of ECC is dependent on having the correct knowledge of the disease and preventive practice by the child’s parents/caregiver. Good health and eating practices initiated early in pregnant women, may be carried into adulthood by the children, therefore preventative programmes for ECC that promote good parenting practices related to dental health of the child should begin in prenatal stages.

This study aims to assess the knowledge, attitudes and perceptions of pregnant women about early childhood caries in a population in Tshwane District of Gauteng Province, South Africa in order to make recommendations for timely preventive interventions before the child is born.

1.2 Relevance and Significance of the study (Rationale)

ECC is a serious public health concern globally especially in developing countries like South Africa (SA). It is the most common childhood illness yet it is preventable. Pregnancy is a time when women should adopt a healthy lifestyle for themselves and their unborn baby. Oral health is a vital part of the overall health. Oral health is defined by the World Health Organization (WHO) as a “state of being free from chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects such as cleft lip and palate, periodontal (gum) disease, tooth decay and tooth loss, and other diseases and disorders that affect the oral cavity.”⁴ ECC does not only have an individual impact but it also has a social impact. The low socio-economic group exhibit an increase in the prevalence of ECC. ECC has a negative effect on the economy and labour productivity of the country.⁴ The effect on the economy and productivity present in the form of income loss from time-spent taking the child to multiple dental visits, reduced workforce productivity for the caregiver, decrease in child educational performances due to school absenteeism, cost of transportation and increased government health care cost.

Current research indicates that dental public health programmes fail to prevent ECC because of late intervention.⁵ Good health and eating practices should be reiterated early in pregnant women and carried into parenthood, therefore preventative programs for ECC that promote parenting practices related to dental health of the child should begin in prenatal stages. Hence, the need to assess ECC knowledge, attitudes and perceptions of pregnant women so that evidence-based interventions can be initiated early in life. The interventions will assist in reducing the high prevalence of the disease.

1.3 Study outline

This introductory chapter (Chapter 1) presents the background to the study, the significance and the relevance of the study (as discussed above). The structure of this dissertation is as follows:

CHAPTER 1 introduces the study.

CHAPTER 2 reviews the published literature on ECC and its association to the knowledge, attitudes and perception of pregnant women.

CHAPTER 3 stipulates the aim and objectives of the study.

CHAPTER 4 discusses the method applied in this study in relation to the study site, study design, study population and sampling, the instrument and measures utilized for the study. Ethical consideration, data management and analysis are included in this chapter.

CHAPTER 5 presents the results obtained from this study

CHAPTER 6 discusses the results of the study.

CHAPTER 7 covers the conclusion and makes recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

For many years, a curative approach was adopted first before initiating a preventive program. Current guidelines highlight the importance of early professional intervention and primary preventive strategies for oral health, which are a crucial public health priority.⁶ The World Health Organization (WHO) and the International Federation of Dentists (FDI) support and advocate the promotion of good oral hygiene on a population level.⁷ The implementation of preventive strategies both at the individual and population level help decrease the adverse effect of oral diseases and in this manner improve the quality of life.⁸

In seeking to assess pregnant women's knowledge, attitudes and perceptions about early childhood caries (ECC), the effects of poor oral health is discussed in relation to dental caries under the following headings:

- Early Childhood Caries (ECC) definition, prevalence, socio-economic association,
- Link between pregnancy and ECC
- Factors influencing transmission of ECC
- Risk factors associated with ECC

A review of the existing literature on knowledge, attitude and perception is presented in this chapter. Furthermore, the current and possible preventive measures are also included.

2.2 Early Childhood Caries

Early Childhood Caries is defined as the presence of one or more decayed (non-cavitated or cavitated), missing (due to decay), or filled tooth surfaces in any primary tooth in a child under 71 months of age.² ECC is a pattern of dental caries occurring in children.

Dental caries is a biofilm (plaque)-induced acid demineralization of enamel or dentin, mediated by saliva.⁹ Dental caries is an infectious disease that is modified by diet.⁹ The biological mechanisms of dental caries are well recognised. It is a disease with a number of essential causative factors – each of which must be present at the same time for the disease to start and progress. These essential factors are:

- Fermentable carbohydrates (substrate)
- Cariogenic microorganisms
- Susceptible tooth surface/host
- Time

Dental caries is the most common chronic infectious disease of childhood. It is a result of the interaction of bacteria, mainly *Streptococcus mutans* (MS), and sugary foods on tooth surface. These microorganisms break down sugars for energy, resulting in an acidic environment in the mouth. This results in demineralization of the enamel on the tooth surface, leading to progression of dental caries. Transmission of the bacteria, MS, can occur from a mother's mouth to her infant and can inoculate even the mouths of pre-dentate infants.³

Early Childhood Caries is a bacterial infection characterised by severe decay in teeth of infants and young children. It is the most common disease amongst children globally, yet it is preventable. The United States Surgeon General has identified ECC as the most common chronic childhood disease as it is five times more prevalent than asthma in America.¹⁰ The prevalence of ECC is high in developing countries like South Africa.¹¹ ECC is considered a public oral health problem in South Africa (SA), which is demonstrated by fulfilling the criteria below:

1. High prevalence (the prevalence of ECC is high)
2. The impact of the problem on an individual. (The impact of ECC is significant on the child's quality of life)
3. The impact of the problem on the society. (ECC has a significant impact on the society)
4. The condition (ECC) is preventable and effective treatments are available i.e. there is potential for prevention and treatment of ECC

2.2.1 Prevalence of ECC in South Africa

The literature reports a high prevalence of ECC in SA indicating that one in three South African children have dental caries in their anterior primary teeth.¹¹ If left untreated, ECC can severely affect a child's general health, eating and sleeping patterns, learning ability and quality of life. Three separate national studies have been carried out to determine the oral health status in SA. These studies were carried out in 1984, 1988/89 and 1999/2002. These include firstly, a study by Williams who reported on the dental health status of 12-year-old children representing the whole country.¹² Secondly, the National Department of Health led a National Oral Health Survey (NOHS) in 1988/1989 to determine the oral health status of adults and children in the five major metropolitan areas in SA.¹³ Finally, the most recent National Oral Health Survey was conducted during the period July 1999 to June 2002¹⁴ and was restricted to 4- to 5- year-, 6-year-, 12-year and 15-year-old children in SA. The recent national oral health survey reported caries prevalence in children, the caries prevalence of 4-5-year-old children was 50% with a mean dmft of 2.4.¹⁴ A cross sectional study to determine the prevalence of dental caries among preschool children in the metropolitan area of Johannesburg reported a high prevalence of dental caries. The Significant Caries Index (SiC) score was almost twice the dmft score among four- to five-year-old children; the difference was statistically significant between the dmft and SiC scores.¹⁵ Another study conducted in a Cape Town population assessed the prevalence of oral and dental problems, specifically ECC, in children under six years of age. A caries prevalence of 71.6% was reported.¹⁶

The results that approximately 1 in 3 children was affected by dental caries on the anterior primary teeth, and with the population's SiC projected at 7.6, emphasizes the necessity to recognize ECC as a public health problem.¹¹

2.2.2 The impact of ECC on an individual

Frequent exposure to sugary drinks, milk in baby bottles and sippy cups as well as feeding during sleep are associated with the development of severe ECC. If left untreated, it can severely affect a child's general health, eating and sleeping patterns, learning ability, aesthetic appearance, quality of life and can have a life-long impact on oral health.¹⁷ Children are often not co-operative during dental treatment therefore

hospitalization for treatment under general anaesthesia (GA) is often necessary to treat severe ECC. Early invasive treatment could result in fear and anxiety of the child towards the dental team, which can become a serious barrier to delivery of dental care when the child grows.¹⁸

Dental fear and anxiety could lead to non-attendance to the dental clinic, failed dental appointments, poor co-operation and disruptive behaviour in the dental clinic during treatment that may result in a negative impact on the individual's oral health status.¹⁹

The negative influence on the growth of children affected by ECC has been reported.²⁰ Toddlers affected by ECC have a tendency to grow slower than caries-free toddlers. They may be underweight due to difficulty eating and are more likely to have dental problems as adults.²⁰

2.2.3 The impact of ECC on the society

The Surgeon General's annual report noted that each year, children miss 51 million hours of school due to dental related problems in Florida, United States (US).^{10, 21}

Furthermore, ECC has an overall negative influence on the oral health-related quality of life of preschool children. Untreated dental caries can lead to loss of school time, learning difficulties, impaired nutrition and health, and in severe cases can result in life-threatening infection.²²

ECC has a negative effect on the economy and productivity of the country. This can be recognized by income loss from the time spent taking the child to multiple dental visits, reduced workforce productivity, decrease in the child's education performances due to school absenteeism, cost of transportation and an increase in government health care expenditure.²³

The management of ECC devours an uneven share of dental budget because of the typical scope of the disease and the associated cost of treatment under general anaesthesia (GA).²⁴ Considering the overloaded health care system, emphasizing prevention to reduce the prevalence of ECC would aid in minimizing the demand for dental services under GA, thereby reducing the costs associated with ECC. The disease puts more strain on an already intricate health service situation.

2.2.4 Prevention and treatment of ECC

Although ECC is prevalent among young children, it is highly preventable with early intervention. Early identification of ECC can reduce the risk, arrest or even reverse the disease. There are several established methods to prevent ECC such as good oral hygiene practices, fissure sealants and the use of topical and systemic fluorides. An early dental visit by a child's first birthday is ideal in the prevention and intervention of ECC.²

Recently added preventive measures include the prevention of maternal bacterial transmission to the child by reducing the bacteria in the mouth of the mother or primary caregiver.²⁵

To minimize the transmission of bacteria that cause tooth decay, saliva-sharing activities between children and parents/caregivers should be avoided. Examples include avoiding the sharing of utensils, food, and drinks, discouraging a child from putting his/her hand in the caregiver's mouth, not licking a pacifier before giving it to the child, and not sharing toothbrushes.²⁵

Treatment of ECC can be accomplished through different types of intervention, depending on the progression of the disease at the time the child presents, the child's age, as well as the social, behavioral, and medical history of the child.²⁵

Children at low risk may not need any restorative treatment. Children at moderate risk may require restoration of progressing and cavitated lesions, while white spot and enamel proximal lesions should be treated by preventive techniques and monitored for progression. Children at high risk, however, may require earlier restorative intervention of enamel proximal lesions, as well as intervention of progressing and cavitated lesions to minimize continual caries development.

Postma and co-workers¹¹ indicated that preventive intervention during pregnancy such as providing prenatal oral health education has proven to be beneficial in improving the mothers' oral health and instilling positive attitudes towards infant oral health. Postma et al¹¹ also indicated that ECC may not be wholly understood by the general South African public, and that ECC is not fully explored or well defined in many

developing countries. This deems it necessary to identify the gaps in the understanding of ECC by the population of SA in order to provide appropriate prenatal oral health education.

2.3 Link between pregnancy and ECC

Oral health is a significant component of general health. Upholding the optimal oral health during pregnancy is acknowledged as an important factor in the immediate and long-term health of women and their children.^{26, 27, 28} Pregnant women are at a higher risk of poor oral health due to hormonal changes, dietary changes, increased nausea and vomiting associated with pregnancy.^{26,28} The bacteria responsible for initiating dental caries can be transmitted to the baby from the mother through close physical contact such as sharing utensils and when mothers 'clean' the baby's dummies with their mouths. Promotion of good oral health in women during pregnancy is an ideal early intervention and good public health policy on ECC.^{28, 29}

2.3.1 Link between maternal caries and ECC

The relationship between the parents and children's oral health has been studied as far back as 1946.^{30,31} Klein studied about 3000 offspring from 1150 families of Japanese ancestry, and demonstrated that the DMFT category (low, middle, and high) of 15- to 19-year-olds from families with both parents having high caries levels was about double that of children from families where both parents had low caries levels. This is also corroborated by a historic US study carried out in Maryland, USA,^{31,32} whereby the parent's DMFS (decayed, missing, filled teeth and surfaces) stratified into 3 disease levels, was significantly related to his/her 6- to 32-year old children's caries status, after adjusting for age. This relationship was stronger for the mothers' caries status than for the fathers'. The AAPD reported that infants and toddlers whose mothers have high levels of MS are at elevated risk for acquiring the organism than children whose mothers have low MS levels.³¹

2.3.2 The mode of transmission for caries from mother to child

Evidence suggests that the initial phase in the progression of ECC in children is through the acquisition of cariogenic microorganisms and these pathogens can colonize the tooth surface. The main cariogenic microorganisms are streptococci e.g. *Streptococcus mutans* (MS), *sobrinus* and *lactobacillus*. A study using phenotyping and/or genotyping methods suggested that the mother is the major primary source of infection for children who carry MS and/or *S. Sobrinus* strains 1, 9, 17, and 26.³³ The study further suggested that saliva is the main vehicle by which transfer of MS may occur.³³ It specified that if the mother shares the same utensils with her child during feeding, in due course, she might introduce numerous colony-forming units into the child's mouth.

2.3.3 Factors influencing mother to child transmission of cariogenic microorganisms

The natural origin of cariogenic bacteria in young children is through direct salivary transmission from their mothers. Several factors encourage the transmission of cariogenic bacteria from a mother to her offspring. These factors include:

1. the bacterial levels in maternal salivary reservoirs,
2. the frequency and efficiency of transmission, and
3. the child's receptivity to implantation, which is largely diet dependent.

This is substantiated through a study done by Sakai et al.³³ which affirms that the rate and degree of transmission are determined by the degree of infection of the mother, caretaker or playmate; the frequency of contact with the infant, the infant's diet and immune status. Additional factors take account of timing of transmission, which is affected by the window of infectivity and the age of the child, and the composition and flow of the child's saliva.³⁴

Early transmission and high cariogenicity of the diet are associated with earlier and more extensive transfer of pathogens. Subsequently, mothers who have experienced widespread tooth decay are likely to harbour high levels of MS in their saliva. Therefore, they will consequently transmit this infection vertically, in that way, placing their young children at a high risk for ECC. These pathogens are recognized in the dental plaque on the tooth surface only after the eruption of the first tooth at about six

months of age even though maternal cariogenic bacteria can be isolated in the pre-dentate infant's mouth. As oral flora tends to remain stable over time, a woman's cariogenic flora before and during pregnancy predicts her flora during the child's first years of life as well as the likelihood of transmitting infection early to her offspring.³⁵ Although the transmissible nature of dental caries is well documented in the literature, little is known whether this information is correctly provided to the South African population.

The literature has authenticated the association between parental dental status and offspring caries, even into adulthood.^{36, 37} Multiple mechanisms are likely to trigger intergenerational oral health endurance. These consist of genetic predisposition,³⁸ shared social environments,³⁹ parental oral health knowledge and attitudes.^{35, 40} It is not astonishing that disparities in dental caries among adults are mirrored in their children. Fortunately, despite the high prevalence of caries in women and children, this disease is readily preventable or manageable.^{31, 35, 41, 42}

2.4 Knowledge, attitude and perception about ECC – what the current literature states

Oral health literacy is defined as the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions.^{21, 43, 44} Information seeking is recognized as one tool by which literacy influences knowledge. According to Shieh and colleagues, tackling health literacy has the ability to influence information seeking and consequently, health knowledge and behaviours in pregnant women.⁴⁵ It is well-known that mothers play an important part in a child's life.⁴⁵ As a result, their knowledge, attitudes and perceptions about infant oral health will have a great impact on the child's oral health status. Mounting evidence indicates that good oral health of the mother from pregnancy could be the key to establishing good infant oral health.^{27, 43} Therefore, ECC can be prevented to a large extent if parents are properly educated and motivated. This implies that oral health literacy is one of the important factors affecting oral health status.⁴³ The parents' educational level is associated with the occurrence and severity of ECC in their children,⁴⁶ suggesting that lower prevalence of dental caries and lower mean DMFT (decayed, missing, filled, teeth) scores are

associated with higher levels of parental education.⁴⁶ A higher education and employment status of parents is associated with better oral health knowledge.⁴⁷ Furthermore, higher educational level of women seemed to be an important key predictor of better oral health knowledge compared to the less educated women.⁴⁸

In terms of attitudes and beliefs, parents of children who were caries-free had more positive beliefs and attitudes about dental health than the parents whose children had caries when studied over a period.⁴⁹ In a study carried out by Sedky⁵⁰, the pregnant and lactating mothers were found to have negative attitude, poor knowledge, perception and practices towards their own oral health; during pregnancy and post-delivery as well as their children's oral health. The poor perception related to causes of dental diseases, methods of tooth cleaning, types and benefits of using toothpaste regarding oral hygiene status. A high level of education of mothers was associated with improved awareness of oral health related issues. Another study suggested that although mothers were familiar with factors causing dental caries, the transmissibility of caries and effect of recurrent fermentable carbohydrates were not apparent.⁵¹

In assessing knowledge and practice of oral health care, knowledge about frequency of brushing, flossing and brushing after meals is considerably associated with good dental practice.⁴⁷ This suggests that proper education on oral healthcare knowledge among the pregnant women will possibly lead to correct dental healthcare practice. On the other hand, Mani et al.⁵² observed that parents showed relatively good knowledge, but poor attitude and practice towards the oral health of their children. The poor attitude and practice were attributed to lack of information received by parents on the causes of oral disease. Hoeft et al.⁵³ suggested that an in-depth education about caries aetiology will most likely bring about positive behaviour change in parents.

In Contrast, a Tanzanian study conveyed that although most of the sampled parents/guardians had positive attitude on the need to preserve natural teeth for themselves and for their children, they lacked adequate preventive oral health knowledge.⁵⁴ Furthermore, George and co-workers⁵⁵ found that despite having good maternal and infant oral health knowledge, pregnant women had insufficient knowledge about the possible consequences of poor maternal oral health and the fact that dental decay could spread from the mother to the baby's mouth. Caregivers of

children with ECC were more likely to believe that caries could not affect a child's health while those who believed primary teeth are important had children with significantly less decay.⁵⁶ Some mothers with good oral hygiene practices actually lacked knowledge about the timing of the first dental visit for their infant.^{51, 57} Tooth brushing activity fell far short of professional expectations in parents and toddlers when observed using home-based videotaped sessions, although parents thought the sessions were effective in achieving clean teeth.^{52, 58} This suggests that there are gaps in the parents' knowledge on effective tooth brushing. Therefore, interventions to improve oral hygiene in early childhood informs mothers' own tooth brushing habits while their infant oral cleaning skills are also improved.⁵⁹ Many studies have concluded that parents are in definite need of advice on children's feeding and oral hygiene practices.^{52, 60, 61} Rwakatema & Ng'ang'a⁵⁴ suggested the importance for programmes involving preventive oral health activities to be strengthened amongst parents and caregivers.

Hence, research on the assessment of knowledge, attitudes and perceptions among pregnant women may possibly point out knowledge areas that are deficient, as well as attitudes and practices that need to be rectified to ultimately improve the oral health status of children.

2.5 Risk Factors Associated With ECC

There are various factors affecting knowledge, attitudes and perceptions of mothers and primary caregivers of children on ECC. The risk factors associated with ECC, can generally be categorized into biological and social risk factors.¹ Biological risk factors include dietary variables, feeding habits and early colonization of cariogenic bacteria.¹ Social risk factors comprise of low parental educational-levels⁶², low socio-economic status⁶³, ethnicity and/or immigrant status⁵², lack of awareness about dental disease and its' prevention and lack of access to dental services. Other factors are high caries status in the children⁶², difficult past dental experience⁶⁴, cultural influences, competing pressures and perceptions of hereditary influences.⁵⁷

Most of these factors have been discussed in earlier sections of this chapter. A review of the literature on access to oral health information, dental service utilization, access

and barriers to dental service utilization, the common myths and misconceptions are included below.

2.5.1 Access to oral health information

Flaws in the delivery of oral health information can be attributed to the fact that before and during pregnancy, majority of pregnant women do not receive information about oral health and the significance of dental care.⁶⁵ This can be due to the lack of oral health advice from prenatal care providers, as many prenatal care providers do not regard oral health care as an essential part of prenatal care.⁶⁵ Therefore, most of them do not routinely advise their prenatal patients to seek dental care. This is evident from the study by Saddki et al.⁶⁶ in which only five mothers (13.9%) were referred by their doctors or nurses for a dental visit. This situation of lack of oral health advice from non-oral health professionals is compounded by disciplinary restrictions and the historic compartmentalization of dental practice and medical care.

Saskatchewan Prevention Institute⁶⁵ pointed out that the medical doctors and nurses are the front liners in antenatal care. Their responsibilities in oral health care delivery are primarily to recommend dental referral to all pregnant women and to highlight the significance of good oral health care practices. Therefore, it is vital that they are also cognisant of the current evidence linking maternal oral health status and pregnancy outcomes. As a result, on-going education to the medical providers on the current issue is necessary. In addition, there should be ways that can efficiently enable communication and encourage cross-referral between dental and medical health care providers. A South African study reported evidence of minimal integration of oral health education services at the Maternal and Child Health (MCH) sites in Tshwane Health District.⁶⁷ Kolisa⁶⁷ recommended that integration of oral health education at MCH services needs to be strengthened and supported by the dental sectors to maximize benefits. Appeals for improved awareness of oral health in pregnancy may have a minute effect, if they exclusively target oral health practitioners and the reasonably lesser amount of women who already use the oral healthcare services in pregnancy. Greater influence is possible if prenatal care providers are aware and trained to address the oral health topics during prenatal visits, pre-pregnancy counselling, and

prenatal education.⁶⁸ Disciplinary boundaries and the historic compartmentalization of dental practice and medical care may limit sharing of information among professionals.⁶⁹ Interdisciplinary learning and cross-training opportunities should be used to promote oral screening and guidance training for obstetricians, nurse practitioners, midwives, and family practitioners. Similarly, starting regular anticipatory guidance during routine dental check-ups to women of childbearing age about the importance of maintaining good oral health and oral health service attendance during pregnancy may be a valuable opportunity for oral health education, particularly for women who seem to place a low priority on dental care.⁶⁵

It is noticeable that pregnant women experience confusion regarding the appropriateness of accessing dental care in their pre- and post-natal periods. George et al.⁷⁰ noted that approximately a third of pregnant women (32.5%) studied were unsure about the best time for a baby to have their first dental visit. The researchers reported that a quarter of participating pregnant women (26.1%) felt that dental treatment should be avoided during pregnancy unless it is an emergency. This is because several women do not receive timely oral health information to take the correct action before and during their pregnancies, or with their infants.⁷¹ Frequently, women did not get information on how to promote oral health until they were on the lookout for treatment of dental problems or pain. It was clear that information was not received early enough irrespective of the women's eagerness to implement the oral health advice they receive.⁶⁵ Pregnant women who made a dental visit were more likely to be those who had received oral health education before their current pregnancy and knew of the association between poor maternal oral health and adverse pregnancy outcomes.⁶⁶ This finding highlights the significance of oral health education to provide knowledge and increase awareness, which could ultimately improve the mothers' dental care-seeking behaviour.⁶⁶ Therefore, the delivery of oral health education to all pregnant women should be made obligatory in an effort to increase taking up of oral health services.

Another way that literacy may affect provision of knowledge is the lack of suitable oral health education and/or communication methods available for practitioners to use with patients with low oral health literacy levels. Correia et al.⁷² demonstrated the need for

better patient dental education and communication especially during pregnancy.⁷² Buerlein and co-workers⁷¹ reported, “Plain language, as a cornerstone for increasing oral health literacy, must be used to explain concepts.” For pregnant women, having the correct knowledge to prevent and control oral disease during pregnancy and early childhood is of great importance because it affects both the mother and the child. However, dentists recognize that there are some barriers to communicating with pregnant women, which include cultural and/or linguistic differences, and having incorrect professional knowledge, these add to the complexity of providing timely and literacy level–appropriate oral health information to pregnant women.⁴³

2.5.2 Access to dental health care services in pregnancy

Access to dental health services during pregnancy is varied. Majority of women do not attend dental facilities during pregnancy.^{66, 73-80} Barriers to access dental health care during pregnancy across different socio-economic levels exist. These barriers are discussed below:

2.5.2.1 Utilization of dental services during pregnancy

Dental health service attendance is low during pregnancy even in the presence of dental problem as was noted in a US study, where 65% of women did not make a dental visit during pregnancy despite the fact that about half of these women reported a dental problem prenatally, of which 62% received no care.⁸⁰ This suggests that even in the presence of pain due to dental reasons, utilization of dental services by pregnant women is poor.^{80, 81}

Even though safety of dental care during pregnancy is well established, many women do not access dental care during the perinatal period. In the US, approximately one in five women do not access dental care during the year prior to their pregnancy.⁸²

A South African study carried out to determine the dental service utilization rates among pregnant women in the Chris Hani District of the Eastern Cape Province, reported that majority of pregnant women studied did not seek dental care during their pregnancy.⁸³ Poor attendance for dental treatment by pregnant women is a worldwide phenomenon as reported in other studies.^{68,76}

2.5.2.2 Factors affecting the utilization of dental services

Factors associated with utilization of dental services during pregnancy include past utilization of dental services (prior to pregnancy), healthier lifestyle behaviours (such as frequent brushing of teeth, not drinking alcohol while pregnant, non-smoker), greater income, higher educational attainment (such as college-educated), older women, and having a private health insurance.^{65, 84}

Overall, among mothers who reported having made a dental visit, the more knowledgeable women were those more likely to have visited the dental office.⁶⁵

On the other hand, the main reasons for non-receipt of dental care were lack of perceived need, followed by financial reasons.^{80, 85} Pregnant women did not see preventive dental care as a priority or as important. Even among those with insurance, the utilization rates were low, particularly in public insurance programmes.⁸⁶ In the United Kingdom, oral health care forms an essential component of antenatal care. In spite of the fact that dental services are exempted from the National Health Services fee to all pregnant women up to 12 months post-partum, only 32% of immigrant women in North London revealed making an antenatal dental visit.⁷⁵ Unfortunately, those at highest risk are also those who face the greatest barriers to access early and continuous dental care. Other factors linked to non-receipt of dental care include race/ethnicity matters, lack of education, lack of insurance (private prenatal insurance or first-trimester prenatal insurance coverage), lower income, and no usual source of pre-pregnancy medical care.⁸⁰ Detman et al.⁶⁹ reported further barriers to the use of dental services during pregnancy. These barriers include pregnancy stressors, perceived dental experience, attitudes toward dental practitioners, importance and value placed on of oral health, perceived ability to pay for dental care, time constraints, and dental practitioners' and office staff attitudes toward clients.⁶⁹ In US, women covered by Medicaid were 24%–53% less likely to obtain a dental visit during pregnancy than women who were privately insured.³⁴ Another factor of importance is past negative experience in accessing dental care both as children and as adults.⁷¹ Women expressed negative personal experiences with dental treatment that involved pain and fear. Personal experiences appeared to be an important restraint, along with cost, to obtaining consistent, if any dental care pattern between childhood and

adulthood. A study revealed that majority of women, who visited the dentist as children, had not been to a dental office since their childhood.⁶⁵ Most participants in a study of low-income women described a large gap in their inclination and ability to access care between childhood and adulthood.⁷¹ Thus, oral health education clearly plays an important role in imparting knowledge and increasing awareness to improve mothers' dental care-seeking behaviour.⁶⁸

A vital consideration is that dentists are maybe unwilling to deliver care to pregnant women because of concern about the possible risks. Contemporary practice usually restricts non-urgent dental treatment of pregnant women to the second trimester, as there is fear of possible teratogenic consequences during the first trimester and for the pregnant woman's ease and comfort in the dental chair during the third trimester.⁵²

A chance exists for dentists to affect a woman's oral health behaviours and use of dental care during and after pregnancy. It is suggested that dental and prenatal care workers should cultivate policies that address access to oral healthcare to improve routine dental care utilization before and during pregnancy, address distortion of information about dental care being unsafe during pregnancy.⁶⁵

2.5.3 Myths and misconceptions

Pregnant women frequently have misconceptions about oral health that impedes them from pursuing dental care. Some misconceptions include the belief that poor oral health is normal and accepted during pregnancy, and that dental treatment can harm the foetus.⁷⁰ Traditional beliefs have interconnected dental health in pregnancy with the ancient saying - "A tooth for a child". It insinuates that the strains of pregnancy include the loss of a tooth. Although the concept that dental minerals are recycled to benefit foetal bone formation was put to rest long ago, many women apparently still believe this.⁷⁹ Likewise, misunderstanding over the safety of accessing dental care during pregnancy have led to some women avoiding treatment during the prenatal period. It is well recognized that undertaking important dental treatment during pregnancy, such as treating acute infections and dental caries, is extremely safe and will not result in adverse pregnancy outcomes. Additionally, the second trimester is considered the best time to carry out dental treatment.⁶⁵ However many oral health

care and prenatal care workers are still confused about when it is safe to treat women during pregnancy. Other studies identified mistaken beliefs about dental treatment being harmful to the foetus as a barrier to seeking dental care. This misconception is the most important factor limiting access to dental care among pregnant women in Greece.^{66, 76}

Many women have questions about the need for radiographs (x-rays), the types of procedures allowed during pregnancy, lack of pain relief or worry about its effects on the baby, beliefs among friends and family that dentists would not see pregnant women; and information from practitioners about seeking dental care.^{65, 69}

The misconceptions about the safety of dental treatment may add to the low rate of dental service utilization. Oral health care and prenatal care providers can correct this through oral health education of pregnant women.⁶⁶

2.6 Conclusion of literature review

It is imperative to understand pregnant women's oral health knowledge, attitudes, and perceptions about ECC to initiate early preventive interventions.

ECC is a multifactorial disease with biological and social risk factors. The biological risk factors include the dietary variables, feeding habits and early colonization of cariogenic bacteria, MS and vertical transmission of MS. Social risk factors comprise of low parental education, low socio-economic status, lack of awareness about ECC and access to dental services. Other factors include high caries status in siblings, negative past dental experience, cultural influences in terms of myths and misconceptions.

ECC is recognized as a public health problem in SA characterized by its high prevalence, the negative impact on the child and society. The importance of preventive measures should not be underestimated. Oral health education of pregnant women is significant, as it has proven to be a factor in preventing ECC. It is imperative to understand pregnant women's oral health knowledge, attitudes to detect their barriers in accessing care and maintaining good oral hygiene practices.

From the literature, it is evident that confusion exists pertaining to the appropriateness of accessing dental care both during pregnancy and in early childhood. Pregnant women reported deficiencies in receiving oral health information and the importance of dental care prior to and during pregnancy. One of the causes of poor oral health knowledge among pregnant women identified is the absence of advice from prenatal care providers on oral health. There is evidence of minimal integration of Oral Health Education services at the Maternal and Child Health sites in Tshwane Health District.

It is evident that the socio-economic status, educational experience and past negative dental experience, have an impact on the utilization of dental healthcare services during pregnancy. Pregnant women frequently have misconceptions about oral health that impedes them from pursuing dental care. The need for dental healthcare prenatally and during pregnancy must be encouraged extensively for both the public and private providers, to address the barriers to dental healthcare.

The fact that there is limited literature concerning pregnant women's knowledge, attitudes and perceptions in South Africa highlights the need to carry out this research. Furthermore, before any oral health strategies are planned for South African pregnant women, the extent of their knowledge, attitudes and perceptions on ECC needs to be fully explored to inform the development of such strategies. Hence the need to investigate ECC knowledge, attitudes and perceptions of pregnant women so evidence-based intervention can be initiated early in life. This will hopefully reduce the high prevalence of ECC in South Africa.

The next chapter will provide the aim and objectives of this study

CHAPTER 3: AIM AND OBJECTIVES

3.1 Aim of the study

The aim of the study was to assess the knowledge, attitudes and perceptions of pregnant women in relation to early childhood caries in Tshwane District, Gauteng South Africa

3.2 Objectives

- 1) To determine the existing level of knowledge of pregnant women regarding ECC
- 2) To determine the attitudes and perceptions of pregnant women regarding ECC
- 3) To identify source and content of the information about ECC available to pregnant women
- 4) To provide comparison of knowledge, attitudes and perception of pregnant women about ECC across different socio-economic groups
- 5) To determine the access to oral health services by pregnant women

CHAPTER 4: METHODS

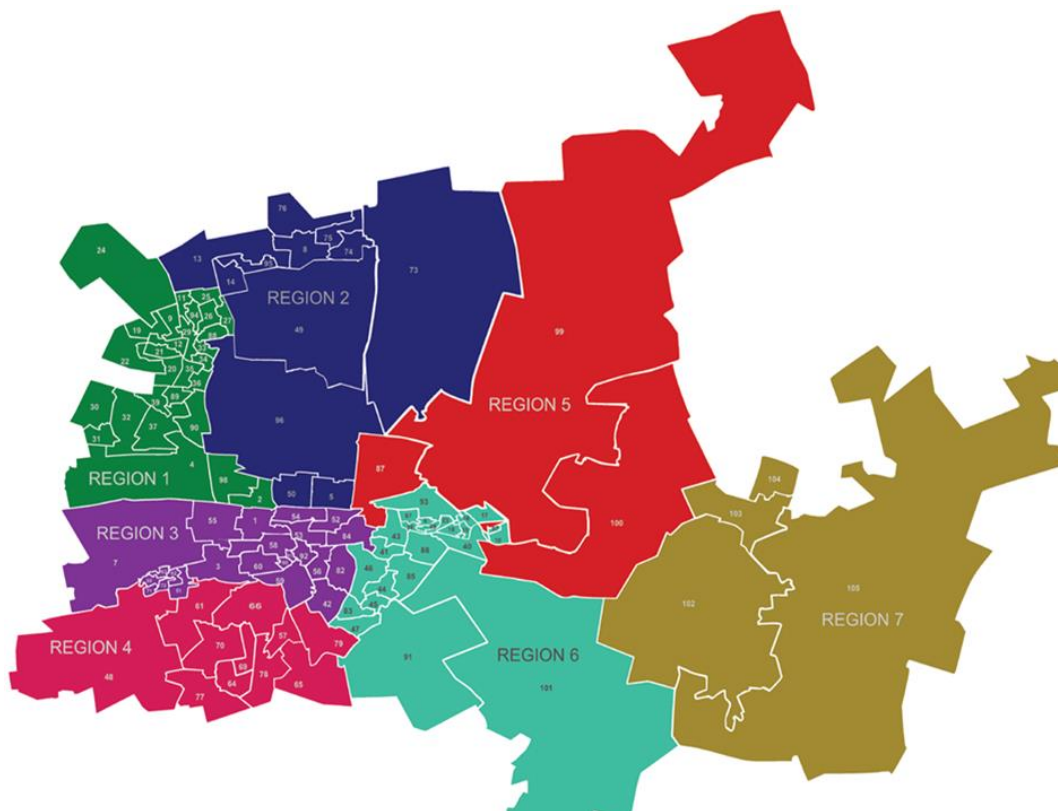
4.1 Introduction

This chapter addresses the methods used to achieve the aims and the objectives of this study. This chapter covers the methodology applied in this study in relation to the study site, study design, study population, sampling, and measures utilized for the study. It demonstrates the research instrument, the ethical consideration for the study, and the data management and analysis employed.

4.2 Study Site

Gauteng, Tshwane District Profile

The Tshwane Health District is geographically in the northern part of Gauteng Province. The District comprises of seven Health Sub- Districts (Tshwane 1 Sub-district to Tshwane 7 Sub-district) in line with the seven administrative demarcation of the Metro.



Health Sub-districts of the City of Tshwane⁸⁷

Source: <http://www.tshwane.gov.za/sites/regions/Pages/Region-7.aspx>

The total population in Tshwane was 2 921 488 in 2011⁸⁸ and has since increased to 3 275 152 in 2016.⁸⁹ The geographic area of Tshwane is 6,298 km² with a population density of 460/km².⁸⁸

The General Household Survey (GHS)⁹⁰ reported almost a quarter (23.3 %) of South African households had at least one member who belonged to a medical aid scheme. One of the areas with the highest medical aid membership (29.1%) noted was in the City of Tshwane.⁹⁰

Study setting

The participants for this study were recruited from selected healthcare facilities providing pre-natal care to pregnant women in the Tshwane area. These include both the private and public (government) healthcare facilities.

4.3 Study design

This is a cross-sectional analytical study to assess the knowledge, attitudes, and perceptions of pregnant women in relation to ECC in Tshwane District of Gauteng Province.

This study involved the use of a self-administered structured questionnaire (Appendix 1) and an oral examination of the participating pregnant women's mouth, which was carried out on the participants by only one calibrated examiner on the day of the survey – TM (Appendix 2). The data capture sheet for a Clinical oral examination used the modified WHO Oral Health Assessment 1997 Guidelines (Appendix 2). The data recorded included the demographic variables and DMFT. The examiner was blinded to the contents of the completed questionnaire.

The administered structured questionnaire obtained data including the participants' age, level of education, occupation, number of children, history of pregnancy, oral habits etc. (Appendix 1).

The questionnaire comprised questions that cover four broad parts. These include:

- (1) Socio-demographic data of the participant consisting of age, race, educational level and employment status
- (2) Knowledge of the participant about Early Childhood Caries
- (3) Attitude of the participant towards Early Childhood Caries.
- (4) Perception of the participant on dental health.

The questionnaire assessed the pregnant women's knowledge, attitudes and perceptions towards ECC and it covered information on the perceived importance of primary teeth. The other information obtained included the sources of oral health information during pregnancy, frequency of the participants' dental visits, barriers (if any) to seeking dental care, oral hygiene habits, and the participants' socio-demographic data (including participants' age, race, educational level, employment status and household income). The questions utilized were adapted from other oral health questionnaires used for similar studies. The self-administered questionnaire used was pre-tested and validated prior to the commencement of the study.

Each participant who consented and completed a questionnaire was examined to obtain the participant's' DMFT index.

4.4 Instrument – Clinical component

Oral epidemiological data was collected from the study participants by means of a clinical examination. The results of the examination were recorded on a data-capturing sheet modified by WHO Oral Health Assessment 1997 Guidelines (Appendix 2). Variables that were not applicable to the current study were not included. One calibrated examiner using a dental explorer and a mouth mirror under natural light while the pregnant women were sitting carried out the oral examination. All teeth were evaluated according to the criteria recommended by the World Health Organization (WHO) using the DMFT index for permanent teeth by a calibrated examiner to ensure that the results obtained were valid and reliable.

4.4.1 Dentition status and treatment need-DMFT

The dentition status and treatment needs were assessed using the WHO standard DMFT. ⁹¹

Codes and criteria

0 Sound crowns

A crown was recorded as sound if it showed no evidence of treated or untreated clinical caries. In addition, a crown with the following defects was also coded as sound - white or chalky spots, discoloured or rough spots that were not soft to touch with the metal CPI probe, stained pits or fissures in the enamel that did not have visual signs of undermined enamel, or softening of the floor or walls detectable with CPI probe, dark, shiny, hard, pitted areas of enamel in a tooth showing signs of moderate to severe fluorosis, lesions that, on the basis of distribution or history, appeared to be due to abrasion.

1 Decayed crown

Caries was recorded as present when a lesion in a pit or fissure, or on a smooth tooth surface, had an unmistakable cavity, undermined enamel, or a detectable softened floor or wall. A tooth with a temporary filling, or a tooth, which is sealed (code 6) but also decayed was also included in this category. The CPI probe was used to confirm visual evidence of caries on the occlusal, buccal and lingual surfaces. Where any doubt existed, caries was not recorded as being present.

2 Filled crown, with decay

A crown was considered filled, with decay, if it had one or more permanent restorations and one or more areas on the tooth that were decayed.

3 Filled crown, with no decay

A crown was considered filled, without decay, when one or more permanent restorations were present and there was no caries anywhere on the crown of the tooth. A tooth that has been 'crowned' because of previous decay was recorded in this

category. A tooth that had been 'crowned' for other reasons (e.g. a bridge abutment), not recorded in this category but rather it was coded as category (7).

4 Missing tooth, as a result of caries

This code was used for teeth that had been extracted because of caries and was recorded under coronal status.

5 Tooth missing, for any other reason

This code was used for teeth judged to be absent congenitally, or extracted for orthodontic reasons, periodontal disease, trauma, etc.

6 Fissure sealant

This code was used for teeth in which a fissure sealant had been placed on the occlusal surface. If a tooth with sealant had decay, it was not recorded in this category but rather coded as '1'.

7 Bridge abutment, crown, and veneer

This code was used under coronal status to indicate that a tooth formed part of a fixed bridge i.e. if it is a bridge abutment. This code was also used for crowns placed for reasons other than for caries and for veneers or laminate covering the labial surface of a tooth on which there was no evidence of caries or a restoration. Missing teeth replaced by bridge pontics were coded '4' or '5' under coronal status as appropriate.

8 Unerupted crown

This code was used for a tooth space with an unerupted permanent tooth. Teeth scored as unerupted were excluded from all calculation concerning dental caries. This category does not include congenitally missing teeth, or teeth lost as a result of trauma, etc.

9 Not recorded: This code was used for any tooth that could not be examined for any reason

4.5 Study population and sampling

All consenting pregnant women from the first trimester to the last trimester attending antenatal classes in identified clinics within the Tshwane health district on the days of the study were selected to participate in the study. Two selected government clinics and five selected private clinics which offer antenatal care; were contacted regarding the use of their facilities for recruiting potential participants to the study. Convenient sampling was used for selection of all clinics. The sample size was calculated based on the following assumption - of an unknown distribution of knowledge of early childhood caries among an infinite population of pregnant women. An expected moderate effect size of the difference of a 0.3 standard deviation in mean knowledge scores between two groups of pregnant women, was determined to give a statistical power of 80% with a 5% margin of error overall, a total of 377 pregnant women needed to be recruited. A further 10% of sample was added to account for potential incomplete or missing data, making a target sample size of participants' to be about 414 pregnant women.

The final sample size obtained for this study was 397 pregnant women, with a distribution of 264 attending the public healthcare clinics and 133 attending private practice.

Inclusion Criteria- Pregnant women attending an antenatal facility from the first to the last trimester (1st to the 3rd trimester)

Exclusion Criteria- Pregnant women below 18 years of age

4.6 Measures

The questionnaire (Appendix 1) obtained the following information on the pregnant women:

1. Demographic data
2. Knowledge
3. Attitude about ECC
4. Perceptions about ECC
5. Source of the information about ECC
6. Access to services

4.6.1. Demographic data:

The socio-demographics variables were recorded and coded as follows:

- Age

The age was recorded as age as at the last birthday in years of respondents

- Marital status

The options for marital status were Married, Single, Separated, Divorced and widow. The code “1” was used for the options ‘single’, ‘separated’, ‘divorced’ and ‘widow’ while the code “2” was used for the option ‘married’.

- Employment status

The options for employment status were Full time-paid employment, Part time-paid employment, Unemployed, Housewife and Student. The code “1” was used for the option unemployed, which included the unemployed, housewife and student while the code “2” was used for the option employed which included both full- and part-time employment

- Education

The options for education were Post-matric qualification, Matric (Grade 12), Below Matric (Grade 1 - 11), No formal education. The code “1” was used for the options ‘below matric’ and ‘no formal education’; the code “2” was used for matric; while the code “3” was used for ‘post matric’.

- Race

The options for race were Asian / Indian (coded 1), Black (coded 2), Coloured (coded 3), White (coded 4) and Other (Specify) was coded 5

- Household income.

The options for household income included:

R 25 001 and more	Coded as 1
R15001 - R 25 000	Coded as 2
R 5001 - R 15 000	Coded as 3
R1501 - R 5000	Coded as 4
R1 – R 1500	Coded as 5
No income	Coded as 6

- Number children

The number of other children the participant had excluding the current pregnancy was recorded and coded according to the number specified from one to five, those with more than five children were coded as '5'.

4.6.2. Knowledge

To determine the existing level of knowledge of pregnant women regarding ECC, questions/statements relating to knowledge included:

- causes of dental caries
- transmission of caries
- prevention of caries

A Likert-like scale was used. The coding was done with the most undesirable response as 1 and most desirable response as 5 such that for most of the questions 1 represented 'strongly agree', 2 represented 'agree', 3 represented 'not sure', 4 as 'disagree' and 5 as 'strongly disagree'. These were further recoded into three categories, which included 'Yes' for the categories 'Strongly agree' and 'agree'; 'Not sure' for not sure, and 'No' for the categories 'disagree' and 'strongly disagree'.

However, some of the statements with a Likert scale were coded in the reverse direction based on the desirability of the response i.e. '1' as 'strongly disagree', '2' as

‘disagree’, ‘3’ as ‘not sure’, ‘4’ as ‘agree’ and ‘5’ as ‘strongly agree’. These statements included the following questions/statements:

- ‘Primary teeth are not important because they will fall out any way’
- ‘It is a good idea to give babies a bottle with milk to comfort them while their teeth are still developing or growing’
- ‘Frequently giving a child juice in the bottle is okay for the child’s teeth’
- ‘Frequently feeding a child with expressed / formula milk in a bottle is okay for the child’s teeth’
- ‘Babies who do not get a bottle with milk when they go to sleep will cry more than those babies who do get one’
- ‘Letting a baby use a sweetened pacifier (dummy) is okay’

4.6.2.1 Knowledge of the causes of dental caries:

Knowledge in terms of dietary/feeding practices were assessed on a Likert scale with the statements below:

- It is a good idea to give babies a bottle with milk to comfort them while their teeth are still developing or growing.
- Frequently giving a child juice in the bottle is okay for the child’s teeth
- Frequently feeding a child with expressed / formula milk in a bottle is okay for the child’s teeth
- Babies who do not get a bottle with milk when they go to sleep will cry more than those babies who do get one
- Letting a baby use a sweetened pacifier (dummy) is okay
- It is ok to put a baby to bed with a bottle containing milk or tea

Two open-ended questions were included in the questionnaire which were

1. In your opinion, what causes rotten teeth? – The responses to this question were categorised according to the themes that emerged.
2. What is the best age for a child’s first visit to the dentist? The response was recorded according to the indicated age in years and months.

4.6.2.2 Knowledge of the transmission of dental caries

The questions asked on transmission of caries included:

- 'If a baby has rotten teeth, the rotten baby teeth can affect the permanent teeth'
- 'If a mother has rotten teeth, her rotten teeth can affect her baby's teeth'
- 'A child inherits his/her likelihood to have rotten teeth from his/her parents'

Further questions were asked on the attitude towards the transmission of dental caries: 'Do/did you and your child share the same spoons and forks, or cups and bottles, during feeding time?'

4.6.2.3 Knowledge on prevention of dental caries

Questions/statements on prevention of caries included:

- 'Using a toothpaste with fluoride helps to prevent rotten teeth'
- 'Babies without teeth need their mouths cleaned'
- 'Children should be helped with brushing their teeth up to the age of 10 years'

4.6.3. Attitudes and perceptions of pregnant women regarding ECC

To determine the attitudes and perceptions of pregnant women regarding ECC, respondents' were asked to rate their own oral health. Other questions pertaining to their attitudes and perceptions towards oral health were asked such as their last dental visit and self-oral health practices.

Self-rated oral health

The available options for self-rated oral health were – excellent, good, average, fair and poor. The options were coded with the most desirable response 'excellent' as '1' to the least desirable answer 'poor' coded as '5'.

Last dental visit

Respondents' last visit to the dentist was sought. Responses included – 'Last 6-months' – coded as '1', 'One year ago' coded as '2', '2 years and more' coded as '3' and 'never' coded as '4'.

Personal oral health practices

In terms of their own oral health practices like brushing frequency (answers ranged from a few times a month, once a week, a few times per week, once a day, two or more times per day and never).

Questions on the use of oral hygiene aids was asked with the given options of toothbrush, toothpaste, dental floss, mouthwash, none of the above.

The statements concerning pregnant women's' attitudes and perceptions towards primary teeth were asked with Likert-like scale response options. These statements include:

- 'Baby teeth are important'
- 'Baby teeth do not need to be taken care of because they will fall out any way'
- 'Most children eventually develop rotten teeth, it does not matter what you do'
- 'Regular dental check-ups are not necessary for children'

To identify source and content of the information about ECC available to pregnant women, the participants were given the several options to select as many as applicable. The options included: Dentist, magazines, educational books, television, General Practitioner (GP), Nurse, Radio, Friend, Mother, Crèche-teacher, Other sources (e.g. internet) and I have never received any information.

- Pregnant women were asked whether they received dental health education for their baby during their antenatal visits. The options were 'Yes', 'No' and 'I do not remember'. The code "1" was used for the 'yes' option, code 2 was used for the 'no' options, while the code "3" was used for the option 'I do not remember'.
- Participants were also asked if they would like to receive more information about children's dental health during antenatal visits. The options were 'yes' and 'no' and coded as '1' and '2' respectively

4.6.4 Access to services

To determine if there were any barriers pertaining to access to dental services, the following questions/statements were asked:

- “It is a problem to access dental services” - Likert scale (1-5) strongly agree (1), agree (2), not sure (3), disagree(4) and strongly disagree (5), recoded as yes ‘1’ for ‘strongly agree’ and ‘agree’, not sure ‘2’ and no as ‘3’ for ‘disagree’ and ‘strongly disagree’
- The question “Have you ever experienced a problem in finding or getting to a dental health care provider when you needed any dental treatment? “ was asked to assess dental service access barriers. The code ‘1’ was used for the options ‘yes’, code ‘2’ was used for ‘no’ while code ‘3’ was used for sometimes

If the participants responded with a yes option, provision was made to elaborate on the problems encountered. These responses were categorized according to the theme that emerged.

Dental caries experience

Pregnant women who completed the questionnaire received a systematic oral examination at the health facility premises using natural light, by a trained and calibrated dentist blinded to the completed questionnaire, to eliminate potential examiner bias. The dental caries experience was measured using the WHO survey method, the status of each tooth was recorded as decayed (D), missing (M) or filled (F) teeth.

Validity and reliability

The dental examiner was trained and calibrated by a clinician experienced in epidemiological survey examinations. This was carried out by using a series of standardized procedures and one-on-one tutorials in recognition of dental decay. The study examiner was calibrated against the experienced/specialist examiner and level of agreement with this examiner was determined using kappa statistics. The inter examiner kappa score was good with a value of 0.76.

In order to limit the problem of inter-examiner variation, only one examiner was used to examine all the participants in this study. A repeat examination was carried out on 10% of the study population, who were randomly selected and blinded to the examiner to determine the intra-examiner reliability.

Ethical consideration

Each questionnaire received a personal identification number to allow inspection to match the questionnaire with the dental examination form completed. A completed and signed informed consent form (Appendix 3) was received from each participant before enrolment in this study. Only those who consented completed the questionnaire and had a dental examination. Participation in this study was voluntary and the participants were aware that they were allowed to withdraw from the study at any time if they wished to do so. Strict participant confidentiality was exercised and the information was used anonymously to insure tracing of patients did not occur. This is evident by the use of a questionnaire with personal identification numbers, without any participant names. The study received ethics clearance from the Faculty of Health Sciences Research Ethics Committee. The Ethics clearance number is 262/2015 (Appendix 5).

The process for the study followed involved the introduction of the researcher to the pregnant women by a staff member of the clinic (often the antenatal care nurse). Subsequently informed consent was obtained from the pregnant women. The consented pregnant women completed the self-administered questionnaire in the waiting room while waiting for routine gynaecologist consultation / the commencement of antenatal classes by the nursing sister in charge of the ANC centre. Thereafter an oral examination was carried out in a private room allocated by the health facility. The completed questionnaire together with a completed oral examination sheet for each participant was then paired and left in a 'drop box' in the private room. After the oral examination, the study participants who needed of dental treatment were referred to a dental clinic / dentist for treatment.

4.7 Data management and analysis

All data was captured on paper-based data capture form (for clinical examination) and questionnaire before being transferred to the computer. The electronic data captured in Microsoft Excel and imported to social package of statistical analyses (SPSS). Analysis of data was carried out using IBM SPSS statistics version 25 software

package. Descriptive and inferential statistical analysis were done. Descriptive statistics such as mean and frequencies were used, and inferential statistics such as Chi-squared statistics and independent student's t-tests were used to compare group differences for categorical and continuous variables respectively. The significance level was set at p-value < 0.05. In particular, a composite score for attitude was derived to determine the attitude of the participants. This was with the use of principal component analysis. The possible variables were factor analysed using an eigenvalue cut-off of 1, with a varimax rotation. An extraction factor loading of 0.40 was the cut-off for inclusion in the final construct, as recommended by Costello and Osborne (2005)⁸⁹. Of the questions included, six 'question' variables (The questions from the questionnaire included were Questions 20, 23, 25, 28, 30 & 31 (Appendix 1) which loaded as one component. The internal consistency of the model gave a good result of 0.76 (Cronbach's $\alpha = 0.76$). This component measures the locus of control of the mothers-to-be. (The higher the mean score the greater the locus of control). The composite score and frequency distribution of other measures were compared across socio-economic groups and by the type of healthcare facility (private or public), the participants attended. Associations were analysed using the Pearson's correlation

CHAPTER 5: RESULTS

5.1 Introduction

This chapter presents the findings of the study. The findings will be presented in eight sections as follows:

- 5.2 Socio-demographic data
- 5.3 Knowledge of pregnant women regarding ECC
- 5.4 Attitudes of pregnant women regarding ECC
- 5.5 Perceptions of pregnant women regarding ECC
- 5.6 Comparison of knowledge, attitudes and perception of pregnant women about ECC across different socio-economic groupings
- 5.7 Source and content of the information about ECC available to pregnant women
- 5.8 Access to services
- 5.9 Dentition status and treatment needs

5.2 Socio-demographic data

Three hundred and fifty three pregnant women were included in this study (response rate 88.9%). The study population comprised of pregnant women attending private clinics (n=106) and public / government clinics (n=247). The age of the mothers-to-be ranged from 18 - 44 years with a mean age of 31 years. (SD 5.95) and majority (82.1%) of the participants were of the black Africans. Only 35.1% were first time mothers-to-be and 51% were unmarried. Just about half (51%) of the respondents were employed and contributed to their household income. Of the respondents 41.1% reported post-matric qualification as the highest level of education they have obtained (Table 1).

Table 1: Socio-demographic characteristics

DEMOGRAPHIC VARIABLES		FREQUENCY (n)	%
Marital Status	Married	173	49
	Single	173	49
	Separated	1	0.3
	Divorced	4	1.1
	Widow	2	0.6
Employment status			
Employment status	Full time - paid employment	160	45.3
	Part time - paid employment	38	10.8
	Unemployed	87	24.6
	House wife	43	12.2
	Student	24	6.8
Education level			
Education level	Post-matric qualification	145	41.1
	Matric (Grade 12)	117	33.1
	Below Matric (Grade 1- 11)	83	23.5
	No formal education	8	2.3
Race			
Race	Asian / Indian	2	0.6
	Black	291	82.4
	Coloured	6	1.7
	White	54	15.3
Household monthly income (in South African Rands)			
Household monthly income (in South African Rands)	R 25 100 and more	87	24.6
	R15 001- R 25 000	19	5.4
	R 5 001- R 15 000	44	12.5
	R1 501- R 5 000	54	15.3
	R1 – R 1 500	62	17.6
	No income	73	20.7
Other children			
Other children	Pregnant with other children	229	64.9
	Pregnant with no children	124	35.1

5.3 Knowledge of pregnant women regarding ECC

To determine the existing level of knowledge of pregnant women regarding ECC; knowledge on the causes, transmission, prevention and management of ECC were assessed

Causes of ECC

The respondents gave various answers when asked about the causes of dental caries. Only 18.7% of the respondents mentioned both sugar (diet) and biologic agent (poor oral hygiene / bacterial plaque) as the cause of caries whilst over half of the respondents (55.5%) mentioned only either sugary diet (substrate) or biologic agent (poor oral hygiene / bacterial plaque). About a quarter (25.8%) did not mention either diet or bacterial plaque as the cause of dental caries.

Knowledge on prevention

Majority (71.9%) of the pregnant women agreed that children without teeth need their mouths cleaned, that the children need assistance with brushing their teeth up to the age of 10 years (75%) and that toothpaste-containing fluoride helps to prevent rotten teeth (65.2%) - Table 2. The respondents also agreed that regular check-ups are necessary for children and the response to the time of first visit to the dentist ranged from 0 to 12 years with the mean age as 2.69 years of age (SD 2,65), which is about 2 years and 8 months of age.

Knowledge on transmission

The majority (46.5%) of participants were not sure the mother's diet during pregnancy affects her unborn child's teeth and only a fifth (20.4%) agreed that children inherit the likelihood to have caries from the parents. A few (13.9%) believed in the transmission of maternal caries to the child. (Table 2).

Table 2: Knowledge of pregnant women regarding prevention and transmission of ECC

Variable	Yes % (n=)	Not sure % (n=)	No % (n=)
Babies without teeth need their mouths cleaned	71.9 (254)	19.8 (70)	7.6 (27)
Children should be helped with brushing their teeth up to the age of 10 years	75.0 (265)	10.2 (36)	14.7 (52)
Using a toothpaste with fluoride helps to prevent rotten teeth	65.2 (230)	27.8 (98)	6.8 (24)
The mother's diet during pregnancy can affect her baby's teeth	33.7 (119)	46.5 (164)	19.8 (70)
Children inherit the likelihood to have caries from parents	20.4 (73)	39.4 (139)	40 (141)
Caries in mother can be transmitted to the child	13.9 (49)	45.3 (160)	40.5 (143)

Knowledge on management

Of those who had other children (64.9%), about 17.8% of the mothers reported their other children having rotten teeth.

5.4 Attitudes of pregnant women regarding ECC

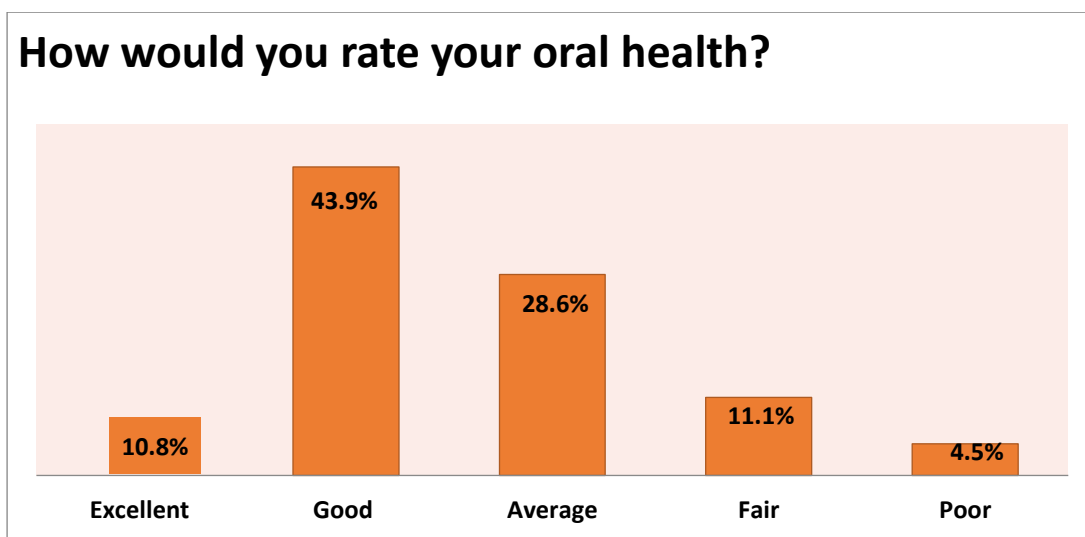
To determine attitudes of pregnant women about ECC, a principal component analysis was used. The possible variables were factor analysed using an eigenvalue cut-off of 1, with a varimax rotation. An extraction factor loading of 0.40 was the cut-off for inclusion in the final construct, as recommended by Costello and Osborne (2005)⁹² Of the questions included, six 'question' variables (The questions from the questionnaire included were Questions 20, 23, 25, 28, 30 & 31 - Appendix A which loaded as one component. The internal consistency of the model gave a good result of 0.76 (Cronbach's $\alpha = 0.76$). This component measures the internal locus of control of the mothers-to-be. (The higher the mean, the greater the internal locus of control)

Table 3: Attitudes of pregnant women regarding ECC

Variable	Yes % (n=)	Not sure % (n=)	No % (n=)
Frequently giving a child juice in the bottle is okay for the child's teeth	13.3 (47)	39.4 (139)	47.0 (166)
Letting a baby use a sweetened pacifier (dummy) is okay	11.3 (40)	31.2 (110)	57.5 (203)
Baby teeth do not need to be taken care of because they will fall out anyway	15.3 (54)	9.6 (34)	75.1 (265)
Regular dental check-ups are not necessary for children	14.4 (51)	16.4 (58)	68.9 (243)
Most children eventually develop rotten teeth, it does not matter what you do	10.7 (38)	30.3 (107)	58.6 (207)
There is not much I can do to stop my child from developing rotten teeth	10.4 (37)	20.7 (73)	68.8 (243)

5.5 Perceptions of pregnant women regarding ECC

To determine perceptions of pregnant women about ECC, self-rated oral health status of the mothers-to-be was recorded. The majority (43.9%) rated their oral health as good (Figure 1).


Figure 1: Self-rated oral health

On the contrary, only 19.3% had visited a dental care provider in the last 6-months and an alarming quarter of the study population claimed to have never visited a dental care provider (Figure 2).

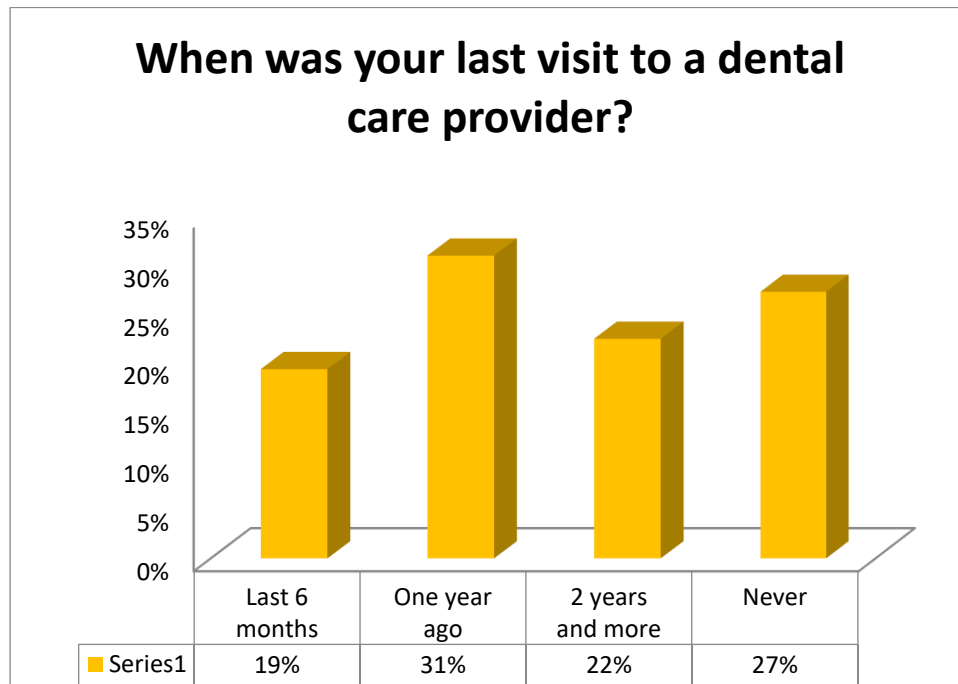


Figure 2: Last visit to dental care provider

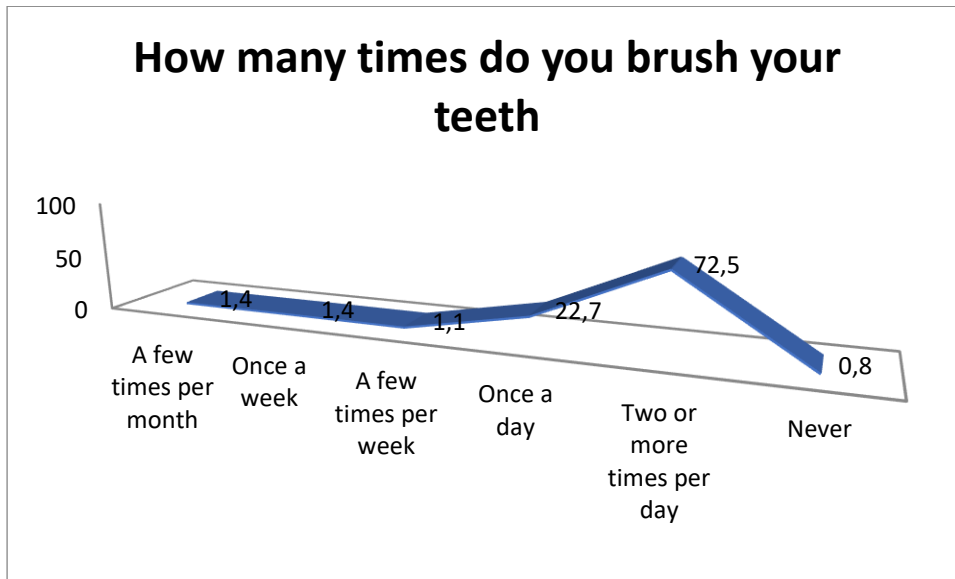


Figure 3: Frequency of brushing teeth

Most of the participants (72.5%) reported that they brush their teeth twice a day (Figure 3). Majority of the participants reported using a toothbrush (93.5%) and toothpaste (77.9%) - Figure 4.

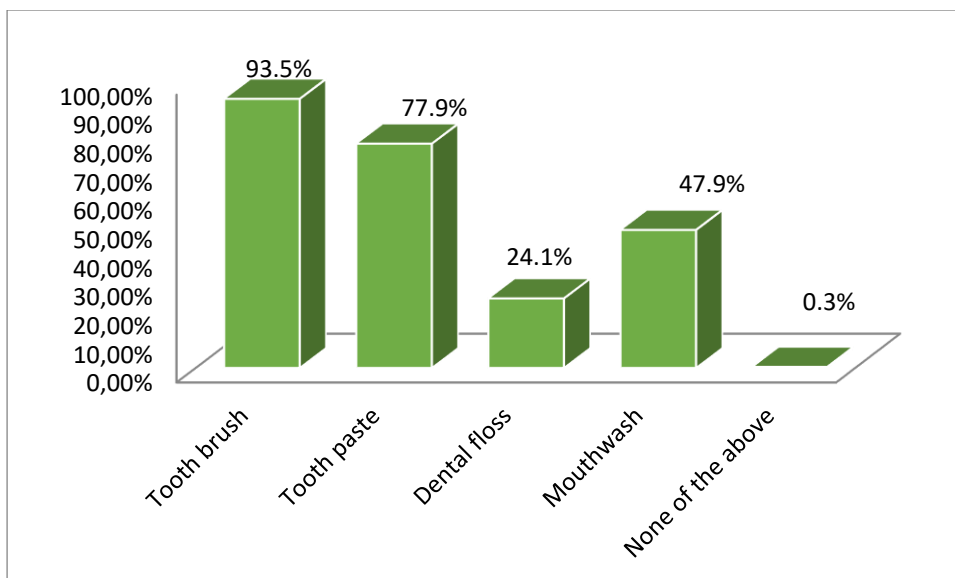


Figure 4: Oral health cleaning aids used by the participants

5.6 Knowledge, attitudes and perceptions of pregnant women about ECC across socio-economic groups

Comparison of knowledge, attitudes and perceptions of pregnant women about ECC across different socio-economic groups was done based on employment status, highest educational levels, household income and type of health sector attended.

Table 4: Knowledge on the cause of dental caries by socio-economic status

Variable		Incorrect % (n)	Sugar or plaque % (n)	Both Sugar and plaque % (n)	p-value
Employment*	No (n=155)	25.8% (n=40)	61.3% (n=95)	12.9 (n=20)	0.037
	Yes (n=198)	25.8 % (n=51)	51% (n=101)	23.2% (n=46)	
Education*	<Matric (n=91)	26.4% (n=24)	65.9% (n= 60)	7.7% (n=7)	0.030
	Matric (n=117)	27.4% (n=32)	50.4% (n=59)	22.2% (n=26)	
	Post Matric (n=145)	24.1% (n=35)	53.1% (n=77)	22.8% (n=33)	
Income**	< R5000 (n=189)	24.9% (n=47)	64.0% (n=121)	11.1% (n=21)	0.000
	> R5000 (n=150)	26.7% (n=40)	46.0% (n=69)	27.3% (n=41)	
Health Sector attended	Public (n= 247)	25.1% (n=62)	58.7% (n=145)	16.2% (n=40)	0.111
	Private (n= 106)	27.4% (n=29)	48.1% (n=51)	24.5% (n=26)	

*Significant value at p-value <0.05; ** p-value<0.000

Table 4 demonstrates the distribution according to the different measures of socio-economic status (SES) of the participants' knowledge of the cause of dental caries i.e. both the sugar (substrate) and bacterial plaque.

The age of the child for the first visit to a dentist varied significantly (p -value <0.000) based on the type of health sector the participant attended (private vs public). The average age for the first dental visit within the public / government health sector attendees was 3 years of age (range between 0 -12 years of age; SD 2.904) compared to the attendees of the private health sector which was 1.83 years of age – i.e. 1 year and 10 months - (range 0 – 7 years; SD 1.636)

Table 5: Attitude measured by locus of control across socio-economic status

Measure of socio-economic status		n	Mean	SD	p-value
Income	< R5000	189	20,99	4.17	<0.000
	>R5000	150	24.1	3.8	
Employment	No	155	21.08	4.23	<0.000
	Yes	198	23.54	4.07	

The attitude of the study participants towards ECC measured by an index reflecting the locus of control was significantly associated with higher SES in terms of higher income and being employed (Table 5).

5.7 The source of information about ECC available to pregnant women

Throughout the antenatal visits, only 26.3% of the pregnant women reported that they received dental health education for their unborn baby. However, the majority of respondents (93.8%) expressed the desire to learn more about their child’s dental health during antenatal visits. The participants indicated that they received their current knowledge about children oral health from various sources. These sources include dentists, magazines, educational books, television, general practitioners (GP), nurses, radio, friends, mother, crèche-teacher and the internet.

5.8 Barriers in access to services

Most of the study participants (80.5%) had not visited a dental practitioner in the last 6-months at the time of data collection (Figure 2). However, it is important to note that

the majority of the respondents (79.6%) did not report experiencing any problem to access a dental care provider. Of those who reported difficulty in accessing a dental care provider, the barriers mentioned were - cost, distance, no transport and fear. Cost was cited as the main barrier in access to services

Table 6: Healthcare facility attended by socio-economic status

Socio-economic status Variable		Health Facility attended		p-value
		Private % (n)	Public % (n)	
Income	<R 5 000	0 (n=0)	78 (189)	< 0.000
	>R 5 000	100 (n=97)	22 (53)	
Employment	No	7.5 (n=8)	59.5 (147)	< 0.000
	Yes	92.5 (n=98)	40.5 (100)	

Table 6 demonstrates the socio-economic status variables in terms of income and employment according to the health facility attended whether private or public sector. Those who earned more, mostly attended a private health care facility compared to those who earned less. Most pregnant women who were in employment attended a private health facility, while the unemployed mostly attended the public health facility.

5.9 Dentition status and treatment needs

The dentition status and treatment needs were assessed using the WHO standard DMFT.

Clinical examination (DMFT) of pregnant women on ECC

The caries prevalence of the study population was high, with a caries prevalence of 64.3% of the respondents at the time of examination for this study.

The mean DMFT for the study population was 2.97 (SD 3.20)

Table 7: DMFT summary of the pregnant women by Health sector attendance

Variable	Health Sector type attended	DMFT Mean (SD)	p-value
Missing Teeth	Public/Government (n=244)	0.86 (1.77)	0.035
	Private (n=106)	0.47 (1.46)	
Filled Teeth	Public/Government (n=244)	0.02 (0.16)	0.000
	Private (n=106)	0.64 (1.16)	
Decay Teeth	Public/Government (n=244)	2.45 (2.48)	0.000
	Private (n=106)	1.06 (1.48)	
DMFT	Public/Government (n=244)	3.32 (3.47)	0.000
	Private (n=106)	2.17 (2.39)	
	Total population	2.97 (3.20)	

The mean DMFT of the sampled population was 2.97; the participants who attended the public healthcare sector had significantly higher DMFT than those who attended the private healthcare sector (Table 7). Those who attended the public healthcare sector had significantly more decayed teeth and missing teeth compared to those who attended the private healthcare sector. On the other hand, the private healthcare sector attendees had significantly more filled teeth.

Table 8: Factors associated with DMFT

Variables		DMFT Mean (SD)	p-value
Knowledge of cause of caries	Incorrect (n=284)	3.17 (3.60)	0.003
	Correct – both sugar and bacterial plaque (n=66)	2.14 (2.20)	
Self-rated OH	Poor (n=153)	3.39 (3.32)	0.03
	Good (n=193)	2.63 (3.07)	
Income	<R5000 (n=189)	3.51 (3.57)	0.000
	> R5000 (n=150)	2.32 (2.53)	
Employment	No (n=155)	3.40 (3.27)	0.026
	Yes (n=195)	2.63 (3.10)	
Have any of your children had 'rotten' teeth	Yes (n=60)	4.48 (3.86)	0.002
	No (n=170)	2.69 (3.01)	

The participants who indicated that the other children they have apart from the child they are pregnant with have 'rotten teeth' had significantly greater DMFT compare to those whose other children do not have 'rotten teeth' (DMFT 4.48 Versus 2.69). This finding suggests that mothers with caries experience are associated with their children having caries (Table 8). The factors associated with the mother's DMFT are perhaps likely to be also associated with the child's DMFT including the possibility of vertical transmission of caries from mother to child.

Tables 9, 10 and 11 display the correlations between DMFT and other variables using Pearson's correlation.

Table 9: Correlations between variables and DMFT of pregnant women

Variable	DMFT (r)*	p-value
Attitude - Locus of control	-0.149	0.005
A mother's rotten teeth can affect her baby's teeth	0.126	0.19
It is a problem to access the dental clinic	-0.089	0.097
Best age for a child's first dental visit	0.168	0.002
Educational level	0.164	0.002
Age of the mother-to-be	0.037	0.489

*r = correlation coefficient

Table 9 demonstrates that most mothers-to-be did not know the best age or a child's first dental visit. The lower the education level the significantly higher the DMFT was observed.

Table 10: Correlation between Components of DMFT and participants' age

	Age (r)*	p-value
D - Decay Teeth	-0.122	0.023
M - Missing Teeth	0.194	0.000
F - Filled Teeth	0.102	0.057
DMFT	0.037	0.489

*r = correlation coefficient

The increasing age of the participants was positively correlated with missing teeth and filled teeth, while the younger the participant age correlated with significantly untreated dental caries – Table 10.

Table 11: Correlation between DMFT and difficulty to access to dental healthcare services

	Difficulty to access dental healthcare service (r)*	p-value
D - Decay Teeth	-0.095	0.075
M - Missing Teeth	-0.125	0.019
F - Filled Teeth	0.209	0.000
DMFT	-0.089	0.097

*r = correlation coefficient

The participants, who reported having problems to access the dental healthcare services, tend to have significantly more teeth extracted rather than filled teeth in their mouths – Table 11.

Chapter 6: DISCUSSION

6.1 Introduction

The primary objective of this study was to determine the existing level of knowledge, attitudes and perceptions of pregnant women regarding ECC. In addition, the study sought to determine the knowledge, attitudes and perception of pregnant women regarding ECC across different socio-economic groups.

The current study, to the best of the researcher's ability is the first one to examine the knowledge, attitudes and perceptions of pregnant women about ECC in Tshwane District, South Africa. Of the study population 70% attended public healthcare facilities and 30% attended private healthcare facilities. The pregnant women who participated in this study were aged between 18 years and 44 years of age. The distribution of the participants between the public and private healthcare facilities was made to represent the target population distribution in the Tshwane region in South Africa.

The results of this study suggest that parental socio-economic status is a significant risk factor for ECC development and this is in line with documented literature.⁹³

6.2 Knowledge on ECC cause, prevention and transmission

The mothers' accurate knowledge about ECC is one of the key predictors for children's caries experience. This study elicited the cause of dental caries from the participants in an open-ended question. Only 18.7% of the participants were able to correctly indicate that both sugary diet and bacterial plaque were responsible for caries. However, a further 55% of participants indicated either sugary diet or bacterial plaque as the cause of caries. This finding is in contrast to that of Bondarik and Leous⁹⁴, who found 47% of the mothers' in their study, had the correct knowledge of the cause of dental caries (the complex of "bacteria + sugar"). This finding of incomplete knowledge

in majority of the study participants suggests that more information needs to be given to pregnant women in this population on the correct cause of dental caries.

It is pertinent to note that the DMFT of the pregnant women studied who had the correct knowledge of the cause of dental caries (both sugary diet and bacterial plaque) was significantly less compared to those who had incomplete knowledge (DMFT of 2.14 vs 3.17 – Table 8). This confirms that comprehensive knowledge of the cause of dental caries is important for adequate prevention of dental caries in the participating mothers-to-be, which will likely also filter down to their children. Thus, the need to provide pregnant women with the correct knowledge on the causes of caries as a means to prevent ECC and reduce the burden of ECC in children is crucial.

George and co-workers⁵⁵ reported that despite having good maternal and infant oral health knowledge, pregnant women had insufficient knowledge about the possible consequences of poor maternal oral health and the fact that caries could spread from the mother to the baby's mouth. Although the literature on vertical transmission of MS from the mother to infant is well documented, in this current study, knowledge of both the cause and transmissibility of caries was scanty. This is an area of concern as only 13.9% of the participants believe in the transmission of maternal caries to child (Table 2). This study reveals that only half of the participants who are not first time mothers indicated that they do not share feeding utensils with their children. Early transmission of MS and high cariogenicity of the diet are associated with earlier and more extensive transfer of pathogens. Consequently, mothers experiencing extensive tooth decay are likely to harbour high levels of MS in their saliva. Therefore, they will consequently transmit this infection vertically by sharing utensils, placing their young children at a high risk for ECC.

This vertical transmission could be argued by the finding in this study that demonstrates the mothers' DMFT was significantly associated with self-report of caries in their other children. Those who reported 'rotten teeth' in their children had a higher DMFT score of 4.48 compared to those who reported that their children did not have 'rotten teeth' having a DMFT score of 2.69 (Table 8). This finding is in agreement

with the literature that claims an association between parental dental status (caries) and caries in their offspring, even into adulthood.^{36, 37}

Knowledge on prevention of ECC cannot be overemphasized. Pregnant women in this study had the right knowledge on brushing/cleaning children's mouth/teeth. They indicated that children without teeth need their mouths cleaned and the tooth brushing of children need supervision. It is important to note another study, which reported on mothers being aware of brushing/cleaning of their children's mouth but inadequately practiced it.⁹⁵ This is a classic example of knowledge not being translated to practice. Therefore, health education and motivation of the mothers is mandatory in this regard as suggested by Reang et al.⁹⁶ Furthermore, it is reassuring that most of the participants (65.2%) in this study knew that toothpaste-containing fluoride helps to prevent rotten teeth (Table 2).

The reported age of the child's first dental visit in this study ranged from newborn (0) to 12 years of age with the mean age of 2 years and 8 months of age. This is much older than recommended by the AAPD, which states that all children have their first dental visit during the first year of life.⁹⁷ However, another study by Slayton and colleagues⁹⁸ revealed that only 2% of parents had taken their children for dental visit by one year of age, 11% by two years of age and 31% by three years of age. The lack of knowledge about the timing of the initial dental visit for children is of particular concern, as the right knowledge would possibly encourage the mothers to bring their children to the dental healthcare professional as early as possible, which in turn will aid in the prevention of ECC.

6.3 Pregnant women's attitudes and perceptions about their own dental health and ECC

It would be important to note how the pregnant women perceived their own dental health. In this study, the majority (55%) rated their dental health as good. An interesting outcome is that those who rated their oral hygiene as poor, had a higher DMFT 3.39 (SD3.32) compared to those who rated their oral health as good 2.63 (SD3.07).

Most participants (86%) believed that the baby teeth are important and it is important to take care of the baby's teeth even if the baby teeth will still fall out. It is encouraging to report that despite the majority of women not receiving information during their antenatal visits, a staggering 94% were willing to learn more, which highlights a positive attitude to seek knowledge in this regard. This finding is contrary to that of Sedky ⁵⁰, who disclosed that pregnant and lactating mothers had poor knowledge, negative attitude, perception and practices, toward their own oral health during pregnancy and post-delivery as well as their children's oral health.

It is encouraging that most pregnant mothers (72.5%) brushed twice daily and used toothbrush (94%) and toothpaste (78%) (Figure 3 and 4), however, this can still be improved upon. In this current study, sources of information about dental care comprised of dentists, magazines, educational books, television, general practitioners, nurses, radio, friends, mothers, crèche teachers, and the internet. The fact that only a quarter of the study participants received dental health education at antenatal clinics is disturbing. This highlights a challenge experienced with the integration of health services and supports the need for adequate cross-referral amongst dental and medical healthcare providers as indicated by Kolisa. ⁶⁷ It was advocated that integration needs to be strengthened and supported by the dental sectors to maximize benefits which is supported by the finding of this study. ⁶⁷

6.4 Parental factors associated with ECC

The caries prevalence of 64.3% in this study population is considerably high. The mean DMFT for the pregnant women studied in the Tshwane district was 2.97 (SD 3.20). This result is similar to that of developing countries like India with a caries prevalence of 62.7% and DMFT of 2.13 (SD 2.54). ⁹⁹

The characteristics of those attending the different types of healthcare facilities (private versus public) mirrored their socio-economic status. Those who attend the private healthcare facilities were more likely to be employed, have a higher household income and higher educational attainment (Table 6). Those participants who attended the private healthcare facility also had significantly lower caries levels compared to those in the public healthcare facility (DMFT of 2.45 versus 3.32 – Table 7). This

finding supports the fact that higher levels of caries is associated with lower socio-economic status.

A discrepancy was observed in this study between the perceived need for regular dental check-up in the child and the mothers' own practice of regular dental attendance. Despite the fact that the pregnant women considered regular check-ups to be necessary for children, their own report of dental attendance was not impressive. A mere 19.3 % visited the dentist in the last 6 months and 31% in the past 12 months in this study. This finding is corroborated by a study done in the Eastern Cape Province, SA, which reported a dental visit of only 14.7% by pregnant women.⁸³ In a similar study conducted in Tanzania, only 31.8% of pregnant women visited a dental clinic for a consultation, with only 11.1% stating that they had visited a dentist in the past 12 months⁹⁷ while in another study only 35% had made no dental visit in at least two years prior.⁷⁹ Saddki et al.⁶⁶ reported that the prevalence of dental visit was lower in mothers with tertiary education, who were working, and had higher household income. A sensible rationalization for this was that higher education might lead to careers with higher salaries that keep the mothers very busy and unable to attend the dental clinics.⁶⁶ Similarly, another study noted that preventive dental care was not a priority or seen as important by pregnant women, even among those with insurance the service utilization rates were low, particularly in public insurance programmes.⁸⁶

Although most participants in the study (80%) did not experience problems in accessing a dental care provider, It was interesting to also note that those with a problem to access dental clinic had higher DMFT and also had significantly more of the M-component, missing teeth (i.e. extracted teeth) - Table 11. This finding can be attributed to the fact that by the time they are able to access a dental service, the caries level could be extensive therefore extraction might be the only option available. Another possible explanation could be that they have a low dental IQ and do not place much importance on preserving the teeth, or perhaps extraction may be the only available option for them at the dental healthcare facilities they end up attending.

6.5 Limitations of the study

There are some limitations to this study therefore the findings should be construed with caution. The nature of the study design was that of a cross-sectional analytical study, as a result causality cannot be inferred. The two-stage data collection process (i.e. completion of the questionnaire and the clinical examination component) seemed to be too lengthy for some of the pregnant study participants, so some participants withdrew. Obtaining a room to conduct oral examination in the data collection phase proved to be challenging especially in public facilities where they did not have adequate resources. However, prior arrangements were made with the nursing manager to utilize the medical room whilst the medical doctor was busy undertaking hospital ward rounds.

Regardless of these limitations, the study has created data that can be used to inform preventive programmes for ECC that promote good parenting practices related to dental health of the child in prenatal stages.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

- Mostly partial or incomplete knowledge on the cause of dental caries was reported with reference to the complex of “bacteria and sugar”.
- Most pregnant women exhibited lack of knowledge about the timing of the child’s initial dental visit.
- A significant proportion of pregnant mothers did not have adequate knowledge relating to the transmission of maternal caries to child thereby posing an increased risk of vertical transmission of caries to their children. Furthermore, for those with the correct knowledge, their knowledge did not translate to positive attitude towards vertical transmission of caries.
- Satisfactory attitudes and perceptions of pregnant women about their own dental health was observed, however, this did not translate to their oral health practices. An interesting outcome is that those who self-rated their oral health as poor, correctly had a higher DMFT on clinical examination.
- Most pregnant women did not receive oral health information at antenatal visits. In this current study, sources of information about dental care varied.
- The caries prevalence of the study population was considerably high at 64.3% of pregnant women studied. The mean DMFT for the pregnant women studied in the Tshwane district was 2.97 which is high.
- Socio-economic status is a risk factor for caries. The characteristics of those attending the different types of healthcare facilities (private versus public) reflected their SES. Those who attend the private healthcare facilities were more likely to be employed, have a higher household income and higher

educational attainment. Those with low socio-economic status had higher DMFT scores.

- Pregnant women reported low dental service utilization. Those with a problem to access dental clinic had higher DMFT and also had significantly more missing teeth (i.e. extracted teeth)

7.2 Recommendations

- The findings of this study emphasizes the need for oral health professionals, policy experts, public health authorities and societies to formulate early intervention strategies for the prevention of ECC by targeting pregnant women during antenatal visits.
- The Department of Health should design and implement programmes, which promote anticipatory guidance pertaining to preventive oral health activities like dental screening, oral health education with particular emphasis on the prevention, cause of caries - ECC, transmission and treatment of ECC. These programmes should be incorporated and strengthened in the MCH (maternal and child health) activities in both antenatal and postnatal clinics. Advice on feeding practices (bottle and breastfeeding), best age for the child's first dental visit, and oral hygiene practices of both the mother and child should be provided.
- Academic oral health professionals with special interest in paediatric dentistry, should create a set of manuals/pamphlets and guidelines regarding oral health care of pregnant women and children to combat the scanty and incomplete knowledge of ECC exhibited by pregnant women. This will also address the lack / distortion of public information regarding oral health care in prenatal stages and its link to ECC. These oral health educational guidelines should be created and made available to the pregnant women in various MHC sites and

could be distributed along with additional health related educational material regularly given to them.

- The Department of Health should encourage usage of the PHC (primary health care) model, by fostering multi-disciplinary collaborations and referrals between oral health professionals and other allied maternal health workers like gynaecologists, paediatricians, doctors, nurses, baby-wellness clinic providers. This integration will increase awareness of prenatal oral health and might maximize the usage of the dental component of the current 'road to health' booklet.
- There is a need to foster communication between public / government and private sectors to address the perceived barriers of access to dental care by pregnant women in order to improve utilization of dental services in the pre- and postnatal period. This channel of communication will also tackle the low priority placed on oral health facility visit by pregnant women.

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APPENDIX 1- Data Collection Sheet

Questionnaire to elicit Knowledge, Attitude and Perception of Pregnant women about Early Childhood Caries

For Official use			
Institution		Record Number	

Instructions:

If the question requires you to select an answer, please tick (✓) the appropriate box e.g.: Brushing your teeth is important

Strongly Agree	✓	Agree	Disagree	Strongly disagree	Don't know
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If the question requires you to write your answer out, please do so in the box provided.

1. Age (as at your last birthday)

	Years
--	-------

2. Marital status

Married	
Single	
Separated	
Divorced	
Widow	

3. Current employment status

Full time - paid employment	
Part time - paid employment	
Unemployed	
House wife	
Student	

4. What is the highest level of education you have obtained

Post-matric qualification	
Matric (Grade 12)	
Below Matric (Grade 1-11)	
No formal education	

5. Race

Asian / Indian	
Black	
Coloured	
White	
Other (Specify)	

6. What is your household total monthly income (e.g. last month)?

R 25 100 and more	
R15001-R 25 000	
R 5001-R 15 000	
R1501- R 5000	
R1 – R 1500	
No income	

7. Do you have any children?

Yes	
No	

8. If yes to question 7, how many children do you have?

One	
Two	
Three	
Four	

Five or more	
--------------	--

9. Have any of your children had 'rotten' teeth?

Yes	
No	

10. If yes to question 9, what did you do about the rotten teeth?

--

11. In your opinion, what causes rotten teeth?

--

12. What is the best age for a child's first visit to the dentist?
..... yearsmonths

--

Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
13. If a baby has rotten teeth, the rotten baby teeth can affect the permanent teeth.					
14. If a mother has rotten teeth, her rotten teeth can affect her baby's teeth					
15. Rotten teeth can affect a child's general health.					
16. Babies without teeth need their mouths cleaned.					
17. Using a toothpaste with fluoride helps to prevent rotten teeth					
18. The mother's diet during pregnancy can affect her baby's teeth					

19. It is a good idea to give babies a bottle with milk to comfort them while their teeth are still developing or growing.					
20. Frequently giving a child juice in the bottle is okay for the child's teeth					
21. Frequently feeding a child with expressed / formula milk in a bottle is okay for the child's teeth					
22. Babies who do not get a bottle with milk when they go to sleep will cry more than those babies who do get one					
23. Letting a baby use a sweetened pacifier (dummy) is okay					
24. A child inherits his/her likelihood to have rotten teeth from his/her parents					
Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
25. Baby teeth do not need to be taken care of because they will fall out anyway					
26. Baby teeth are important					
27. Children should be helped with brushing their teeth up to the age of 10 years					
28. Regular dental check-ups are not necessary for children					
29. It is ok to put a baby to bed with a bottle containing milk or tea					
30. Most children eventually develop rotten teeth, it does not matter what you do					
31. There is not much I can do to stop my child from developing rotten teeth					
32. It is a problem to access dental services					

33. Do/did you and your child share the same spoons and forks, or cups and bottles, during feeding time?

Yes	
No	
Sometimes	

34. Which of the following do you use to clean your teeth? (You can tick more than one if necessary)

Tooth brush	
Tooth paste	
Dental floss	
Mouthwash	
None of the above	

35. How would you rate your oral (dental) health?

Excellent	
Good	
Average	
Fair	
Poor	

36. When was your last visit to a dental health care provider?

Last 6 months	
One year ago	
2 years and more	
Never	

37. Have you ever experienced a problem in finding or getting to a dental health care provider when you needed any dental treatment?

Yes	
No	
Sometimes	

38. If yes to question 37, what problems did you experience regarding finding or getting to a dental health care provider.

39. How many times do you brush your teeth?

A few times per month	
Once a week	
A few times per week	
Once a day	
Two or more times per day	
Never	
A few times per month	

40. Where did you receive your current knowledge about children's dental health? (**you can tick more than one box**)

Dentist	
Magazines	
Educational books	
Television	
General Practitioner (GP)	
Nurse	
Radio	
Friend	
Mother	
Crèche-teacher	
Other sources: e.g. internet	
I have never received any information	

41. During your antenatal visits, did you receive dental health education for your baby?

Yes	
No	
I do not remember	

42. Would you like to learn more about children's dental health during antenatal visits?

Yes	
No	

THANK YOU FOR YOUR TIME

APPENDIX 2: Clinical examination form



World Health Organization Oral Health Assessment Form for Adults (by tooth surface), 2013

Leave blank (1) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Year (4) (5) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Month (10) <input type="text"/> <input type="text"/>	Day (11) <input type="text"/> <input type="text"/>	Identification No. (14) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Orig/Dupl (15) <input type="text"/>	Examiner (16) <input type="text"/> <input type="text"/> (17)																																																																																																																																																																																																																								
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Pocket (241)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	(256)																																																																																																																																																																																																													
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APPENDIX 3: Informed Consent document

PATIENT OR PARTICIPANT'S INFORMATION & INFORMED CONSENT DOCUMENT

Researcher's name: Dr Tshepiso Mfolo Student Number : 29670013

Department of : Community Dentistry

University of Pretoria

Dear Participant

Knowledge, attitude and perception of pregnant women about Early Childhood Caries

I am a Masters Student in the Department of Community Dentistry, University of Pretoria. You are invited to volunteer to participate in our research project on knowledge, attitude and perception of pregnant women about Early Childhood Caries.

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 assess the knowledge, attitude and perception of pregnant women about Early Childhood Caries. The information found regarding the knowledge, attitude, and perception of pregnant women about tooth decay will be useful in determining the existing knowledge, which will help to develop possible ways to reduce this disease in children.

We would like you to complete a questionnaire. This may take about 10 minutes. I, Tshepiso Mfolo, will collect the questionnaire from you before you leave the clinic. It will be kept in a safe place to ensure confidentiality. Please do not write your name on the questionnaire. This will ensure confidentiality. I will be available to help you with the questionnaire or to fill it in on your behalf.

Page 1 of 2

The Research Ethics Committee of the University of Pretoria, Faculty of Health Sciences, telephone numbers 012 3541677 / 012 3541330 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.

In the event of questions asked, which will cause emotional distress, then the researcher is able to refer you to a competent counselling.

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,

TSHEPISO MFOLO

APPENDIX 4: Permission to conduct study at the Hospital Antenatal Centre

Permission to access Records / Files / Data base at _____

To:

From: The Investigator: Dr Tshepiso Mfolo
Pretoria Oral and Dental Hospital

Re: **Permission to do research at** _____

I am a lecturer and a Masters Student working at the Department of Community Dentistry at Pretoria Oral and Dental Hospital. I am requesting permission to conduct a study on _____ grounds that involves access to patient records at the Hospital.

The request is lodged with you in terms of the requirements of the Promotion of Access to Information Act. No. 2 of 2000.

The title of the study is:

Knowledge, attitude and perception of pregnant women about Early Childhood Caries

The researcher request access to the following information:

Access to the clinical files, record book and the data base.

I intend to publish the findings of the study in a professional journal and/ or at professional meeting like symposia, congresses, or other meetings of such a nature.

I intend to protect the personal identity of the patients by assigning each patient a random code number.

I undertake not to proceed with the study until I have received approval from the Faculty of Health Sciences Research Ethics Committee, University of Pretoria.

Yours sincerely

Signature of the Principle Investigator

Permission to do the research study at this hospital and to access the information as requested is hereby approved.

Clinical Manager

Signature of the **Clinical Manager**

**Hospital Official
Stamp**

APPENDIX 5- Ethics Clearance



Faculty of Health Sciences

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.

10 April 2019

Approval Certificate Annual Renewal

Ethics Reference No.: 262/2015

Title: Knowledge, attitude and perception of pregnant women about Early Childhood Caries.

Dear Dr TB Mfolo

The **Annual Renewal** as supported by documents received between 2019-03-29 and 2019-04-10 for your research, was approved by the Faculty of Health Sciences Research Ethics Committee on its quorate meeting of 2019-04-10.

Please note the following about your ethics approval:

- Renewal of ethics approval is valid for 1 year, subsequent annual renewal will become due on 2020-04-10.
- Please remember to use your protocol number (262/2015) 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, monitor the conduct of your research, or suspend or withdraw ethics approval.

Ethics approval is subject to the following:

- 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) MPharmMed 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)