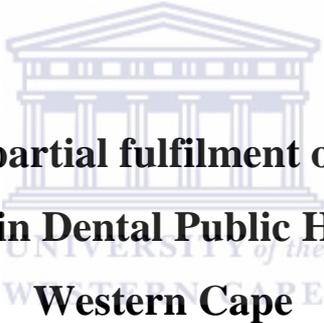# Oral Health Status, Knowledge, Attitudes and Practice among Pregnant Women attending Omdurman Maternity Hospital, Khartoum, Sudan

**Abdelseed Ibrahim Abdelseed**

**A thesis submitted in partial fulfilment of the requirements for the degree MSc (Dent) in Dental Public Health, University of the Western Cape**

**Supervisor: Prof Sudeshni Naidoo PhD**

**September 2012**

# Abstract

## Introduction

The critical role which mothers play in shaping the oral hygiene habits adopted by their children made pregnant women a very important target group for oral health interventions. In Sudan there are currently no oral health programmes targeting pregnant women with a view to improving their own oral health and that of their children. In addition, hormonal changes during pregnancy together with other determinants of health affect their oral health.

## Aim

The aim of the research was to determine oral health status, knowledge, attitude and practices regarding oral hygiene among pregnant women attending Omdurman Maternity Hospital in Khartoum, Sudan.

## Methodology

A convenience sampling was used. For the clinical examination, a modified WHO assessment form (1997) was used and for periodontal health and treatment need CPITN index was used. Oral hygiene knowledge, attitude and practice data were collected through an administered interview with a structured questionnaire translated into Arabic language. The data was captured in Excel and analysis was carried out using SPSS

## Results

About one third of the respondents were expecting their first child and nearly a third had more than three children. The most reported oral hygiene practice was use of tooth brush with tooth paste together with the misswak chewing stick for cleaning teeth. Two thirds of the women reported that they brushed their teeth twice a day and almost all brush in the morning. Half of the women did not know what causes gum disease. About 57.7% of the women visited a dentist, mostly for dental pain. Most of the women had received no instructions concerning either their own oral health nor for their children.

The overall periodontal health of the pregnant women was good, with three quarter of the examined sextants healthy, absence of deep pockets and less than a percent of shallow pockets. The mean DMFT of the sample was 3.35 and it was lower in the older age group, illiterate respondents and higher in those who brushed their teeth more frequently. The prevalence of oral mucosal lesions was 10.4% and the most common oral mucosal lesion was candidiasis.

**Conclusion and recommendations**

The oral health status of the pregnant women in this study was good despite the fact that they had hardly received any education on how to take care of their mouth and teeth. An integrated oral health education programme within the primary health care approach for pregnant women is recommended. An oral health screening and treatment package for pregnant women attending antenatal care in Sudan should be developed.

# Declaration

I, the undersigned, hereby declare that the work contained in this dissertation is my original work and that it has not been previously in its entirety or in part submitted at any university for a degree.

…………………………………          …………………………
Abdelseed Ibrahim Abdelseed                              Date

# Dedication

This thesis is dedicated to the soul and memory of my beloved mother.
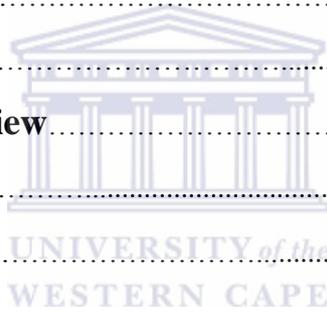
My father, to whom I am deeply and forever indebted for his love, support and encouragement throughout my entire life

My brothers and sisters, for their continuous encouragement and everlasting support given to me during the entire duration of my study period
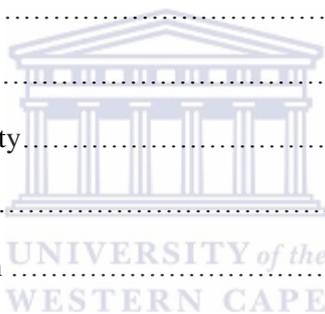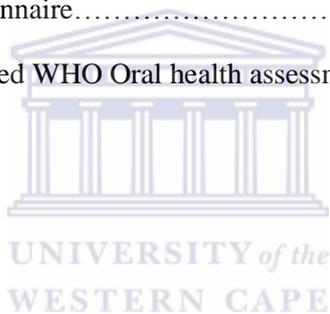
## TABLE OF CONTENTS

UNIVERSITY *of the*

WESTERN CAPE

# LIST OF TABLES

UNIVERSITY *of the*

WESTERN CAPE

## LIST OF FIGURES

UNIVERSITY *of the*

WESTERN CAPE

# LIST OF ABBREVIATIONS

| | |
|---|---|
| CPI | Community periodontal index |
| CPITN | Community periodontal index of treatment need |
| CBS | Central Bureau of Statistic |
| DHS | District health system |
| DMFT | Decayed, missing, filled and treatment need |
| FMH | Federal ministry of health |
| GDP | Gross domestic product |
| IL-1β | Interleukin 1 alpha |
| IL-6 | Interleukin 6 |
| IL-8 | Interleukin 8 |
| KS | Khartoum state |
| LPS | Lipopolysacchride |
| MCH | Mother child health |
| MHKS | Ministry of health Khartoum state |
| OHD | Oral health department |
| OHP | Oral health programme |
| OMH | Omdurman maternity hospital |
| PGE2 | Prostaglandin E2 |
| PHC | Primary health care |
| PTLBW | Preterm low birth weight |
| SES | Socioeconomic status |
| SMH | State ministry of health |
| SPSS | Social package of statistical analyses |
| TFNα | Tumour necrosis factor–alpha |
| TV | Television |
| WHA | World health assembly |
| WHO | World health organization |

# ACKNOWLEDGEMENTS

# CHAPTER 1: INTRODUCTION

In most developing countries little attention is given to the mouth and oral health. In Sudan there are no clear national guidelines and strategies regarding oral health. In Khartoum State, the Oral Health Directorate (OHD) has developed successful oral health programmes (OHP) that are being currently implemented. However, there are no specific oral health programmes focused on the oral health of pregnant women.

The Republic of Sudan is made up of 16 states situated in the eastern part of the African continent. Sudan is the largest country in Africa and its capital is Khartoum situated at the confluence of the Blue Nile and White Nile. In terms of total area, Sudan was the largest African and Arab country, covering 1.861.484 million square km. The total population is 33,419,625 according to the 2008 census (CBS, 2008). The official language is Arabic, and the ethnic groupings are as follows: 52% black African, Arabs 39%, Beja 6% and foreigners 3%. Sudan gained its independence from the United Kingdom in 1956 and is characterized by a strategic geographical location that has common borders with seven African countries - Egypt and Libya in the north, Chad and the Central African Republic in the west, the Republic of South Sudan in the south and Ethiopia and Eritrea in the east. It also neighbours Saudi Arabia across the Red Sea from the east, where the Sudanese population and those of the neighboring countries move freely across the borders.

The government adopted a federal system in 1994 and the country was divided into 16 states. Sudan has a Federal Ministry of Health (FMH) and 16 State Ministries of Health (SMH). The FMH is responsible for the development of national health policies, strategic planning, and the monitoring and evaluation of health system activities. The State Ministries of Health (SMH) are mainly responsible for policy implementation and health programming. The FMH adopted a district health system (DHS) to promote health services for PHC activities, in particular. A DHS is the first level of health services, at the level of locality and province, with a well-defined population, living within a clearly administrative and geographical area. Federal and state ministries of health, universities, armed forces, private sector and governmental and non-governmental organizations all provide health services.
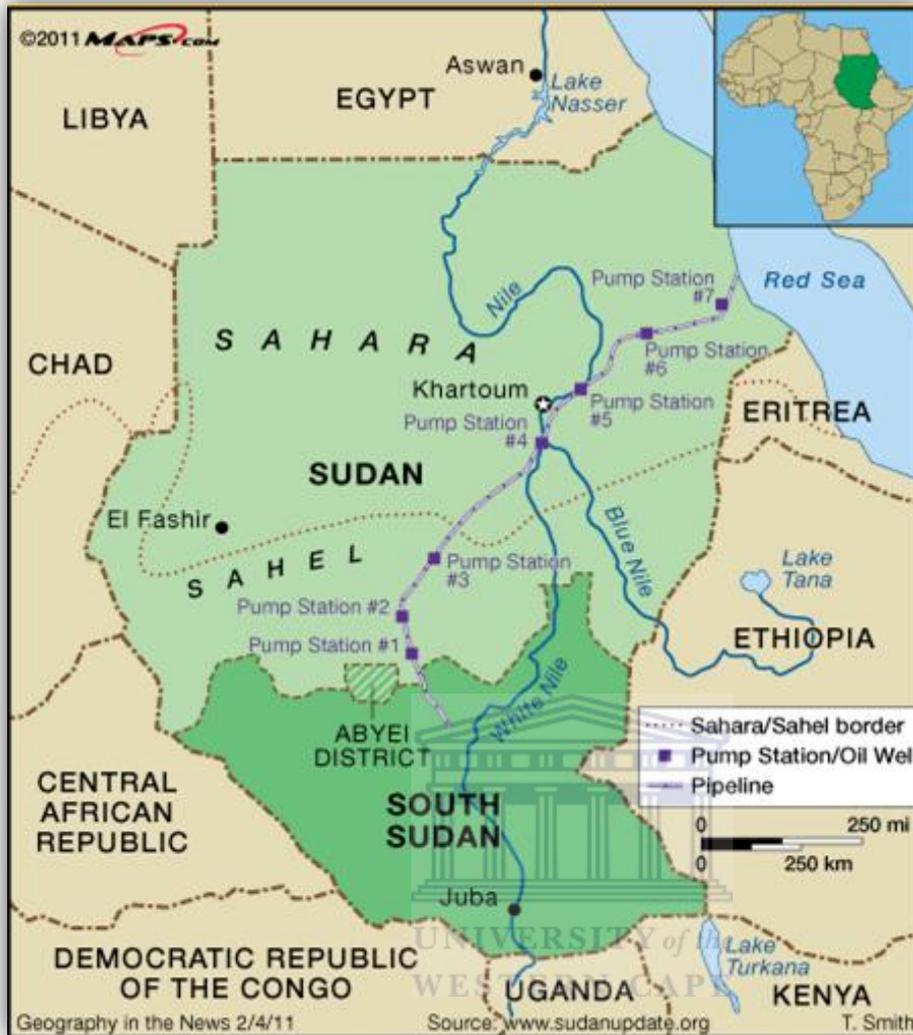
**Map of the Republic of Sudan**

**The rationale for this study is as follows:**

1. Pregnancy is characterized by complex physiological changes, which can adversely affect oral health.

2. It is an opportune time to educate women about preventing dental caries in young children and other common childhood problems.

3. Many studies have shown an association between periodontal disease and adverse pregnancy outcomes, such as pre-term birth, low birth weight or both.

4. There have been no studies on oral health and pregnancy in Sudan.

5. There are currently no oral health programmes focused on pregnant women.

# CHAPTER 2: LITERATURE REVIEW

## 2.1 Introduction

Pregnancy is a unique time in a woman's life and is characterized by complex physiological changes. These changes can adversely affect oral health. Pregnancy is also an opportune time to educate women about preventing dental caries in young children, a common childhood problem. Multiple studies have shown an association between periodontal infection and adverse pregnancy outcomes, such as premature delivery and low birth weight (Kumar and Samelson, 2009). Studies have confirmed the safety and effectiveness of providing oral health care during pregnancy. Pregnancy by itself is not a reason to defer routine dental care and necessary treatment for oral health problems. Diagnosis and treatment, including dental X-rays, can be undertaken safely during the first trimester of pregnancy. Treatment can be provided throughout pregnancy; however, the time period between the 14th and 20th week is considered ideal (Kumar and Samelson, 2009).

The most common oral manifestations during pregnancy have been studied, and the conclusion is that, although pregnancy itself is not responsible for such manifestations in the mouth, e.g. dental decay and periodontal diseases, follow-up and oral examinations during prenatal care is necessary, in view of the fact that hormonal alterations in pregnancy may aggravate the diseases. During pregnancy hormones alter immune-responsiveness and inflammatory mediators and this has been reported to cause oral problems primarily gingivitis and periodontal infections (Russell and Mayberry, 2008; Thomas, Middleton and Crowther, 2008). Pregnancy gingivitis ranges from asymptomatic erythema to severe cases with pain and bleeding of the gingival tissue affecting 30%-100% of pregnant women in industrialized countries (Rakchanok et al. 2010; Garfield et al. 2001; Christensen, Jeppe-Jensen and Petersen, 2003). The severity of gingival inflammation has been found to be higher *during* pregnancy than *after delivery* although no significant changes occur in the amount of the plaque (Loe and Silness, 1963).

Periodontal diseases produce wide range of clinical signs and symptoms such as tooth loss, altered appearance, pain, bleeding, bad breadth and impaired quality of life (Laine, 2002; Locker, 1988). Loss of posterior occluding supports has been associated with impaired

chewing efficiency and inadequate nutrition (Kida et al. 2007) which may result in the loss of important nutrients due to over preparation of food in order it easier to eat. Inadequate nutrition during pregnancy may lead to poor foetal growth and possibly interfere with kidney development which in turn leads to raised blood pressure in adulthood. Other changes associated with pregnancy include chlosama, facial telangiectasia, sialorrhea, tooth surface loss usually related to vomiting when severe (hyperemesis gravidarum), increased mobility of teeth and oral aphthate (Scully and, Cawson, 1999; Chiodo and Rosentein, 1985)

There have been numerous studies that have reported on the health and oral health of pregnant women and the following provides a summary of some of the common oral manifestations that have been reported.

## 2.2 Gingivitis

Gingivitis is the most common oral disease in pregnancy with variable prevalence ranging from 35 to 100% (Loe and Silness, 1963; Silness and Loe, 1964; Lindhe and Branemark, 1968; Cohen et al. 1969; O'Neil, 1979; Kornman and Loesche, 1980; Sooriamoorthy and Gower, 1989; Steinberg, 1991; Lapp, Thomas and Lewis, 1995; Machuca et al. 1999). Pregnancy gingivitis is a non-specific, vascularizing, and proliferative inflammation with large amounts of infiltrated inflammatory cells.

Increased levels of female sex hormones during pregnancy may play a central role in the aetiology of gingivitis (Lindhe and Branemark, 1968; Hugoson, 1971; Sooriamoorthy and Gower, 1989). The increase in oestrogen levels especially progesterone results in changes in vascular permeability causing gingival swelling and increased crevicular fluid levels (Amar and Chung, 1994). In addition, the production of prostaglandins is stimulated, possibly increasing gingival inflammation and loss of keratinisation of gingival epithelium, proliferation of fibroblasts, chemotaxis and phagocytic capacity of the neutrophils (Zachariasenm 1993; Maariotti 1994; Raber–Durlacher et al. 1994). Furthermore, high levels of progesterone during pregnancy affect the development of localized inflammation by down regulation of IL-6 production rendering the gingival tissues less efficient in resisting the inflammatory challenges produced by bacteria (Lapp et al. 1995). Repeated episodes of gingivitis during pregnancy might result in chronic periodontal disease (Offenbacher et al., 2006).

## 2.3 Periodontitis

Periodontitis is a destructive inflammation of the periodontium affecting approximately around 30% of child bearing age women (American Dental Association, 2006). The process involves infiltration of the periodontium with toxin producing bacteria, inducing chronic inflammatory process which results in a breakdown of the periodontium creating infected pockets resulting in teeth becoming mobile. This process can induce recurrent bactereamia, which indirectly triggers the hepatic acute phase response, resulting in production of cytokines, prostaglandins (i.e.PGE2), and interleukins (i.e. IL-6, IL-8), all of which can affect pregnancy (Boggess and Edelstein, 2006). Elevated levels of these inflammatory markers have been found in the amniotic fluid of women with periodontitis and preterm birth compared with healthy controlled patients (Dortburak et al. 2005).

## 2.4 Periodontitis and poor pregnancy outcomes

Many studies have found that periodontitis has been associated with several poor pregnancy outcomes. In a recent systematic review of mainly cross-sectional, case-control, and cohort studies conducted between 1996 and 2006 in 12 countries, investigators identified 24 studies demonstrating a positive relationship between periodontal and preterm birth, low birth weight or both (Clothier, Stringer and Jeffcoat, 2007). About 15,000 mothers were involved in these studies. Three studies were randomized controlled trails. A recent meta-analysis concluded that women with periodontitis are approximately two to three times more likely than periodontally healthy women to deliver a preterm, low birth weight infant (Vettore et al., 2006). Recently many epidemiological studies have been found to support a strong association between oral health and adverse pregnancy outcomes, but some controversy still remains (Han, 2011).

A significant association was found between preterm birth and initial localized chronic periodontitis, in a case control study consisting of 161 systematically healthy Caucasian women in Hungary (Radani et al., 2006). Consistent findings were reported in two case control studies involving Indian and Jordanian pregnant women (Kushtagi et al., 2008; Khader et al., 2009). Shub and his colleagues in 2009 reported that periodontal disease was significantly related to perinatal death in a separate study performed in Australia.

In cohort studies, researchers follow women over time to see whether those with periodontal disease demonstrate a higher incidence of adverse pregnancy outcomes than pregnant women without periodontal disease. Association between periodontal disease and pregnancy complications was established in six out of 10 published studies in this group (Jeffcoat et al., 2001), one suggested that this association may be present (Romero et al., 2002) and three found no association (Moore et al., 2004). As with the case-control studies, the cohort studies also varied in sample size, diversity of populations, definition criteria for periodontal disease and pregnancy outcomes.

Davenport et al. (2002) conducted a case control study in London, in which they examined 236 infants born at <37 weeks' gestation or <2500 g and compared them to a random sample of 507 control infants born at ≥38 weeks' gestation and weighing ≥2500 g. The authors found no evidence for an association between delivery of a preterm, low birth weight infant and periodontal disease and most interestingly that deeper mean tooth pocket depths at delivery was associated with a reduction in the risk of delivery of a preterm, low birth weight infant. When Moore and his colleague examined 3738 women in a follow-up longitudinal study no associations were found between maternal periodontal disease and preterm birth. However, there was an increase in second trimester fetal loss rates among women with periodontal disease. The diversity in results among these studies could be due to differences in the sample sizes studied or racial and socioeconomic differences among the populations.

The mechanism proposed for the relationship between periodontal disease (PD) and preterm low birth weight (PTLBW) infant delivery was that periodontal infection serves as reservoir of lipopolysacchride (LPS) which are responsible for the production of interleukin 1 beta (IL-1$\beta$), prostaglandin E2 (PGE2) and tumor necrosis factor–alpha (TFN$\alpha$) that is in turn associated with preterm parturition and fetotoxicity.

The international definition of low birth weight adopted by the 29th World Health Assembly (WHA) in 1976 is a birth weight < 2500g. Birth weight <2500g results in a rapid increase of infant mortality (World Health Organization, 1984). These low birth weight infants compared with normal weight new borns are more likely to develop neuro-developmental problems (Byrne et al., 1993), respiratory problems (Hack et al., 1983) and congenital problems (Cristianson, 1981).

## 2.5 Caries

Dental caries is considered as the second oral disease important to women of child-bearing age because of it is maternal-child health associations. One fourth of women of reproductive age have dental caries - a disease in which dietary carbohydrate is fermented by bacteria into acid that demineralises enamel (Surgeon General Report, 2000). Pregnant women are at higher risk of tooth decay for several reasons including increased acidity in the oral cavity, sugary dietary cravings and limited attention to oral health (Hey-Hadavi, 2002). Children of mothers who have high caries levels are more likely to get caries (Berkovitz, 2003).

In a cross-section study, carried out in South-East Hungary, to assess the caries and periodontal status of women soon after delivery, the mean DMFT score was found to be 12.57 (Randi et al.,2007). In a similar survey carried out in Brisbane, Australia, on a population of 314 pregnant women the DMFT was 15.8 DMFT (Jago et al., 1984) and in Finland, Soldering et al. (2000) reported a mean DMFT of 18 among pregnant mothers. .

## 2.6 Maternal oral health and children's experience with tooth decay

Woman's cariogenic flora before and during pregnancy anticipates her flora during the child's first years of life as well as the likelihood of transmitting infection early to her offspring since oral flora tends to remain stable over time. Young children acquire cariogenic bacteria through direct salivary transmission from their mothers (Caufield, Cutter and Dasanyake, 1993). Factors influencing transmission are the levels of bacteria in maternal salivary reservoirs, frequency and efficiency of transmission, and the child's receptivity to implantation, which is largely diet-dependent. Additional factors include timing of transmission, which is affected by the window of infectivity, the age of the child and the composition and flow of the child's saliva. The earlier the transmission and the more caries-supportive the diet, the earlier and more substantial the transfer will be.

## 2.7 Pregnancy oral tumours

Pregnancy oral tumour (also known as pregnancy epulis, epulis gravidarum, pregnancy granuloma) occurs in approximately 0.2% to 9.6% of pregnancies and is most often seen in the gingiva (Torgerson, Marnach, Bruce, and Rogers, 2006). It is clinically and histologically indistinguishable from the pyogenic granuloma occurring in men and women who are not pregnant (Mealey and Moritz, 2003) and it presents most commonly towards the end of the first trimester of pregnancy and typically recedes after delivery.

Lesions are typically erythematous, smooth and lobulated and located primarily on the gingiva. The lesion usually occurs labially on the upper anterior teeth. The tongue and palate may also be involved. It enlarges rapidly, bleeds easily and may range in colour from purplish red to deep blue, most commonly red in colour with small fibrin spots (Amar, 1994; Mealey and Moritz, 2003; Kostantinides, 2003). It is usually painless, if not traumatized by the opposing teeth. It rarely reaches more than 2 cm in size and has tendency to recur if not completely removed after pregnancy (Kostantinides, 2003). This vascular lesion is caused by increased progesterone in combination with local irritants and bacteria.

## 2.8 Loose (mobile) teeth

Teeth can loosen during pregnancy even in the absence of gum disease because of increased levels of progesterone and estrogen affecting the periodontium (Scheutz et al. 2002). There is a positive correlation between gingivitis and tooth mobility. In a cross-sectional study of 330 pregnant women, Ringsdorf et al. (1961), found that the tooth mobility during pregnancy increased with increase in the severity of gingivitis. Rateitschak (1967) showed that the upper incisors of periodontally healthy pregnant women are most mobile during the last month of pregnancy. The horizontal mobility of the teeth was thought to be a consequence of oedema.

## 2.9 Oral mucosal lesions

In case control study carried out in Turkey, in which there were 100 pregnant patients and 100 controls, Sarif Akioglu and his colleagues (2006) found that, the frequency of oral mucosal lesions was greater among pregnant women than in the control group (71% versus 29%). In this study 50% of the pregnant women presented with 1 oral mucosal lesion compared to 25(25%) in the controls, and this finding was statistically significant (p<0.001). In addition 2 or more mucosal lesions were found in 21% pregnant women was 21(21%) and only 4.4% in controls, which was also statistically significant (p<0.001). A study in Ghana with a 100 pregnant and 100 non-pregnant women reported that the incidence of pregnancy epulis was higher in the pregnant (3%) than non-pregnant women patients (0%). However, minor and major aphthae was found in only 1% of pregnant women, but 4% in non-pregnant women (Annan and Nuamah, 2005).

## 2.10 Treatment needs

Gingivitis and periodontitis that occurs during pregnancy responds positively to routine oral hygiene measures. Controlling plaque by brushing, flossing and professional prophylaxis, including scaling and root planning, all assist in achieving good dental health in pregnancy (Mills and Moses, 2002).

## 2.11 Oral hygiene practices

It has been suggested that 'pregnancy gingivitis' is an accentuated inflammatory response to dental plaque (Hugoson, 1971). In a Jordanian study on the oral health status of pregnant women and it is relation with socio-demographic and clinical variables concluded that gingival inflammatory symptoms were aggravated during pregnancy and were related to lower level of education and non-employment (Tany et al, 2003). In Africa the use of tooth brush and chewing stick (Misswak) are the main methods of mechanical plaque control.

## 2.12 Oral health education

Educating and motivating women to maintain good oral hygiene and providing affordable dental health care is fundamental in reducing dental disease. Improving dental education may need to become a priority in antenatal care to educate women at risk of the importance of maintaining oral health (Hirsh and Clarke, 1977). It has been shown that the mother is not only the reservoir of cariogenic bacteria, but also her dental knowledge, behaviour , as well as the general care of her child are also factors that contribute to caries risk (Milgrom,1998).

# CHAPTER 3: AIM AND OBJECTIVES

## 3.1    AIM

To determine oral health status, knowledge, attitude and practices of oral hygiene among pregnant women attending Omdurman Maternity Hospital (OMH) in Khartoum, Sudan.

## 3.2    OBJECTIVES

1. To determine the prevalence of dental caries, periodontal disease and oral mucosal lesions among a cohort of pregnant women attending Omdurman Maternity Hospital (OMH) in Khartoum, Sudan.
2. To determine treatment needs &  oral hygiene practices of these women
3. To evaluate socio-demographic and other variables relative to oral health status.
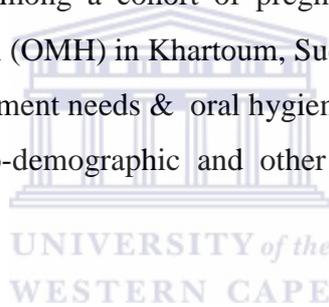
# CHAPTER 4: METHODOLOGY

## 4.1    Introduction

This chapter presents the research design and methodology adopted in the study. It describes the development of the research instrument and the methods used for data collection. The research method chosen was related to the aims and the objectives of study.

## 4.2    Study design

This study was a descriptive, cross-sectional study.

## 4.3    Study site

Omdurman maternity hospital which lies in Omdurman locality was selected for this study because it is the largest maternity hospital in Sudan, with large numbers of pregnant women coming from all Khartoum localities and occasionally even from other states. Omdurman maternity hospital has 12 wards for pregnant/ delivering woman (248 beds) and 5 delivery rooms (25 beds) with about 65 deliveries /day. In addition, the hospital has an outpatient clinic and prenatal care and approximately 350 pregnant woman visit/day.

This study covered all 7 geopolitically defined Khartoum State (KS) localities: Khartoum, Jabal Awlia, Om Dorman, Umbada, Karari, Khartoum North and Sharq Elnil localities. These 7 localities comprise of 19 health areas. Khartoum State is the national capital of Sudan and 7 other intermediate states include Gezira and White Nile from south, Kassala and Gadarif from east, River Nile and Northern state from north and North Kordofan from the west.

**Table 1: Demographic features of Khartoum State**

| | | Projected from census 2008 |
|---|---|---|
| **Total Population** | **By criteria** | 5,274,321 |
| Population with age groups | < one year 140,942 | 2.5% |
| | Children < 5 years 565,067 | 9.9% |
| | Population 5 – 15 years 1,358,888 | 23.8% |
| | % of females (15 -49)  1,467,057 | 25.7% |
| Population Density | 306 people / square kilometer | |
| % of urban to rural population | % of urban population 86.9% | |
| | % of rural population 13.1% | |
| % of urban to rural area | % of urban population 86.9% | |
| | % of rural population 13.1% | |
| Population movement | Internal migration (coming to the state) 1535 | |
| | External migration (leaving the state) 111 | |
| | Net of migration 1424 | |

**Table 2: KS Population Coverage Indicators by Health Services**

| No. | Population Coverage Indicators by health Services | Ratio |
|---|---|---|
| 1 | Population Coverage by certified health facilities | 11 facilities / 100 000 |
| 2 | Population Coverage by governmental health facilities | 6 facilities /  100 000 |
| 3 | % of non-working health facilities | 4.6% |
| 4 | Contribution of other sector (non-governmental) in provision of health services | 47% |

## 4.4    Study population

Pregnant women attending Omdurman maternity hospital comprised the population from which the study sample was selected.

**4.5     Sample size**

The daily attendance of pregnant women at Omdurman maternity hospital was estimated to be 350 pregnant women per day.

The sample size was collected according to the following formula:

$$n = \frac{z^2\,(QP)}{d^2}$$

Where:          n = sample size

z = standard deviation = 1.96

P = probability = 50% = 0.5

Q = 1-P = 1-0.5 =0.5

d = margin error of 95% = 5%

$$n = \frac{1.96^2 \times (0.5 \times 0.5)}{(5\%)^2}$$

400 Pregnant women were randomly selected from the prenatal clinic during the clinic day working hours from 8 am to 1 pm.

**4.6     Inclusion criteria**

1. Healthy women who had no mental and physical disability that would prevent them from accessing dental services. Women at the 3rd trimester of pregnancy.

**4.7     Instrument**

For the clinical examination, a modified WHO assessment form (1997) was used. Variables that were not relevant to the present study were excluded A structured questionnaire translated into Arabic language was administered s to the pregnant women. The questionnaire consisted of  (1) socio-demographic factors (age, education, and occupation/profession); ( 2) perceived oral health (dental  caries, periodontal disease); ( 3) oral health habits (tooth brushing, other oral hygiene aids, and dental visits); (4) knowledge concerning tooth brushing, and oral diseases; and (5) instructions relating to oral health care. Data was collected in two ways using:

1. A structured, administered questionnaire: The participants were interviewed about their age, level of education, occupation, number of children, history of pregnancy, oral habits etc. (Appendix 1).

2. A data capture sheet for a Clinical oral examination using modified WHO Oral Health Assessment 1997 Guidelines (Appendix 2). Demographic variables, DMFT, periodontal disease and oral mucosal lesions were recorded.

The questionnaires were designed to:

- Suite the study aims and objectives
- Be clearly understood and interpreted
- Minimize respondents errors
- Allow an honest reply from respondents
- Interpret data efficiently
- Evaluate oral health knowledge
- Enquire about brushing habits
- Enquire about eating habits

The questionnaire was designed in English language, but translated to Arabic language.

**Preparation of the final draft**

After the pilot, a few problematic questions were identified and restructured. A final draft of the questionnaire was then printed and used for the major study.

## 4.8    Data collection

*Cross Infection Control Measures:* Two plastic boxes with different colors for instruments were provided. One box was for transporting sterile instruments only and was sterilized if contaminated. A new set of sterile instruments was used for each subject. Gloves were changed before the examination on every subject and facemasks were changed every hour. Used probes, mirrors, and other instruments were collected in a separate container and, cleaned, washed and autoclaved at the end of the working day. A clinical waste bag was utilised for the disposal of used gloves, facemask, wipes and clinical sheets.

**4.9　Clinical Examination and documentation**

*Intra-oral: hard and soft tissues examination*

The WHO Oral health survey guidelines and criteria (dmft/DMFT, CPITN) were used. The oral examination was carried out without prior cleaning or drying of the teeth, using a plane mirror and dental curved probe, no radiographic examination were performed. The oral examinations were carried out in two different places, the referral clinics and ultrasound clinics. The pregnant women were seated in chairs the oral examination was carried out under the natural light. .

*4.9.1　Dentition status and treatment need-DMFT/dmft*

**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 one 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 that were decayed.

**3   Filled crown, 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. 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), was coded as (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 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. is a bridge abutment. It 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.

**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.

### 4.9.2   *Periodontal status*

The methods recommended by the World Health Organization (WHO) for recording of periodontal diseases has varied from Russell's periodontal index to the Community Periodontal Index of Treatment Need, CPITN/CPI (Page and Eke, 2007).

The WHO introduced the CPI to provide profiles of the periodontal status of populations and to enable countries to plan prevention programs (Benigeri et al., 2000). The surveillance of oral health at country level depends mainly on the CPI data (Petersen and Ogawa, 2005). Periodontal status was assessed using a specially designed lightweight CPITN probe with a 0.5 mm ball tip with periodontal pockets were measured from the edge of the free gingival to the bottom of the pocket. Using the epidemiological part of the CPITN, the community periodontal index (CPI), (W.H.O: Oral Health Surveys, 1997) with the following ten index teeth were examined (17,16,11,26,27,47,46,31,36,37) and six sextant per individual ,three indicator (gingival bleeding, calculus and periodontal pockets) of the periodontal status were used.The two molars in each sextant were paired for recording and, if one was missing, no replacement was used. Sextants with fewer than two teeth which were not indicated for extraction were excluded. If no index teeth or tooth was present in the sextant qualifying for the examination, all the remaining teeth in the sextant were examined and the highest score was recorded for the sextant.

**Codes and criteria**

**0  Healthy**

**1  Bleeding: o**bserved, directly or by using a mouth mirror, after probing.

**2  Calculus:** detected during probing, but the entire black band on the probe visible.

**3  Pocket 4-5mm:** gingival margin within the black band on the probe.

**4  Pocket 6mm or more:** black band on the probe not visible.

**X  Excluded sextant**: less than two teeth present.

*4.9.3   Oral mucosa*

**Examination procedure**

The oral mucosa and soft tissues in an around the mouth of all subjects were systematically examined. Any abnormalities in the oral mucosa or the gingival or any oral lesion were recorded on the data capture sheet.

The examination was thorough and systematic and was performed in the following sequence:

      a)  Labial mucosa and labial sulci (upper and lower).

      b)  Labial part of the commisures and buccal mucosa(right and left)

      c)  Tongue ( dorsal and ventral surfaces , margins)

d) Floor of the mouth

e) Hard and soft palate

f) Alveolar ridges/gingival (upper and lower)

Two mouth mirrors were used to retract the tissues. The following procedure was used and the following codes were used to record the absence, presence or suspected presence of the condition: The lips were examined with the mouth closed and open. The colour, texture and any surface abnormalities of the vermilion border were noted. The mandible vestibule was examined visually with the mouth partially opened. The colour and any swelling of the vestibular mucosa were observed. The maxillary vestibule and fraenulum with mouth partially opened was examined. Using the plane mouth mirrors as retractors and the mouth wide open, the entire buccal mucosa extending from the commisures and back to the anterior tonsillar pillar was examined. Any changes in pigmentation, colour, texture and mobility of the mucosa were noted. Alveolar ridges were examined from all sides (buccaly, palatally, lingually).

With tongue at rest and the mouth partially opened the dorsum of the tongue was inspected for any swelling, ulceration, coating or variation in colour or texture. The patient was then asked to protrude the tongue and the examiner noted any abnormality of mobility. The margins of the tongue were inspected with aid of mouth mirrors and then the ventral surface was observed. While the tongue was elevated, the floor of the mouth was inspected for swellings or any other abnormalities. With the mouth wide open and the subject's head tilted backwards, the base of the tongue was gently depressed. The hard palate was inspected first followed by the soft palate. Any mucosal or facial tissues that seemed to be abnormal, as well as the submandibular and cervical lymph nodes, were palpated.

## 4.10    Validity and reliability

The researcher was the only one who was involved in data collection and interviews, thereby ensuring standardization in the way the questions were asked and recorded.

## 4.11    Data analysis

Data was gathered categorized and coded then entered into the computer. The data was captured in Excel. Basic descriptive statistic will be done using the Excel environment. The database was imported into social package of statistical analyses (SPSS) for windows to perform complex statistical analyses. Descriptive statistics will be used to describe the demographic factors. Chi- square test and odds ratio and the independent t-test were used to determine correlation between the scale variables of the sample.

## 4.12    Ethical considerations

The protocol was submitted to the Senate Research Ethics Committee of the University of Western Cape for ethical approval and permission to carry out the study was sought from the Ministry of Health Khartoum State (MHKS). Informed consent (Appendix 3) was obtained from each participant prior to any interviews or examinations being conducted. Participation in this study was entirely voluntary and the participants were allowed to withdraw from the study at any time should they wish to do so. It was emphasized that strict confidentiality would be maintained at all times and that no names or personal details would be mentioned in the write up of the study. Anonymity was achieved by not using the participant's names on the questionnaire and the questionnaire was identified using serial numbers. All data was reported in aggregate form.

# CHAPTER 5: RESULTS

## 5.1 Introduction

The findings of the present study are presented in 6 sections as follows: Description of the population under the study, oral hygiene habits, knowledge about oral health, dental visits, instructions regarding oral health of the mother and her baby, oral health status and treatment needs.

## 5.2 Demography

Four hundred and two women were included in the study. The age of participants varied from less than twenty to over forty years, with mean age of 30 years (range: 18-46 years). Just over half (52.5%) were between 20 and 29 years of age and one third (34.3%) between 30 and 39 years of age (Figure 1). About a third were expecting their first child, while 29% had more than three children (Figure 2). Figure 3 depicts the level of education of the study sample. The majority (39.3%) graduated from university and 27.1% completed high school. Three quarters (75.6%) were house wives (Figure 4).

**Figure 1: Age**
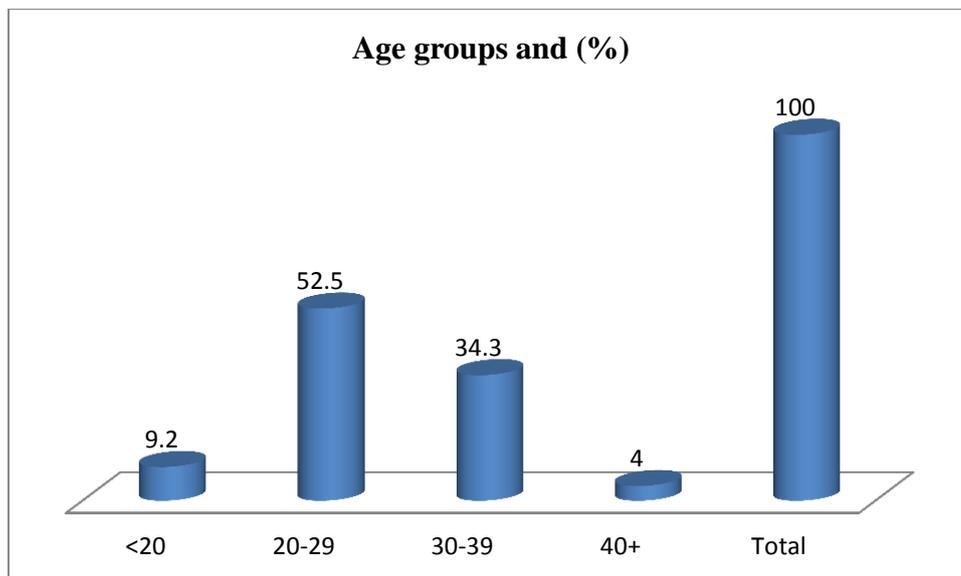


**Figure 2: Number of pregnancies**

No of pregnancies (%)

**Figure 3: Education**



Education and (%)

**Figure 4: Occupation**



Ocupation and (%)

| Occupation | % |
|---|---|
| Student | 6.5 |
| House wife | 75.6 |
| Labor | 2.5 |
| Teacher | 5.5 |
| Professional | 7.5 |
| Clark | 1.7 |
| Other | 0.7 |
| Total | 100 |
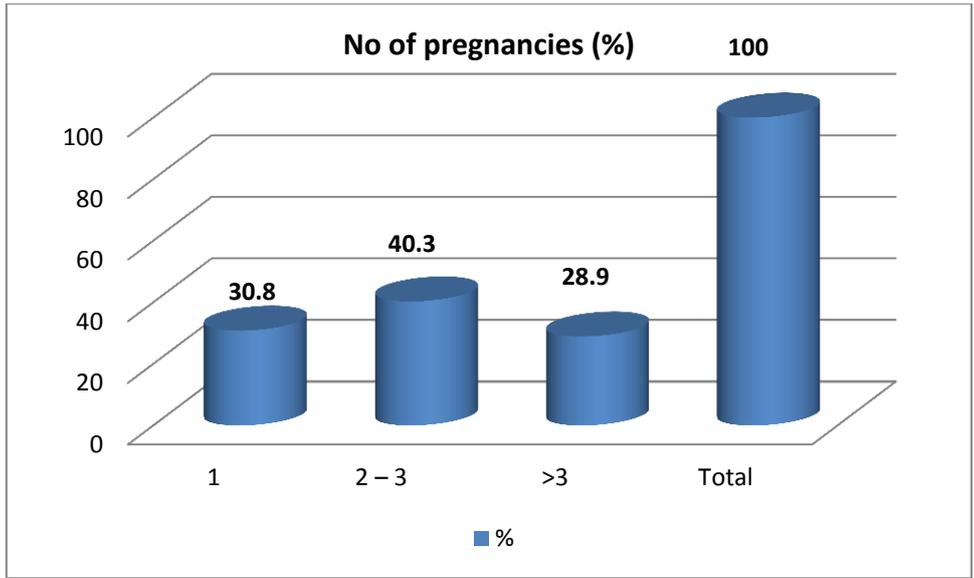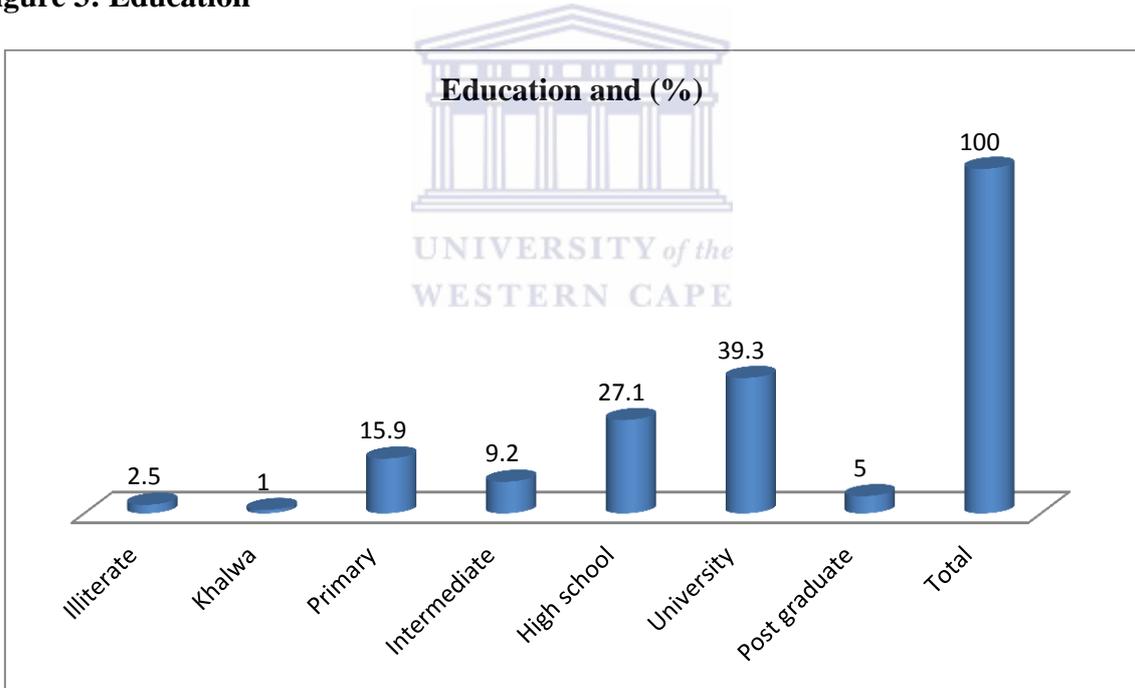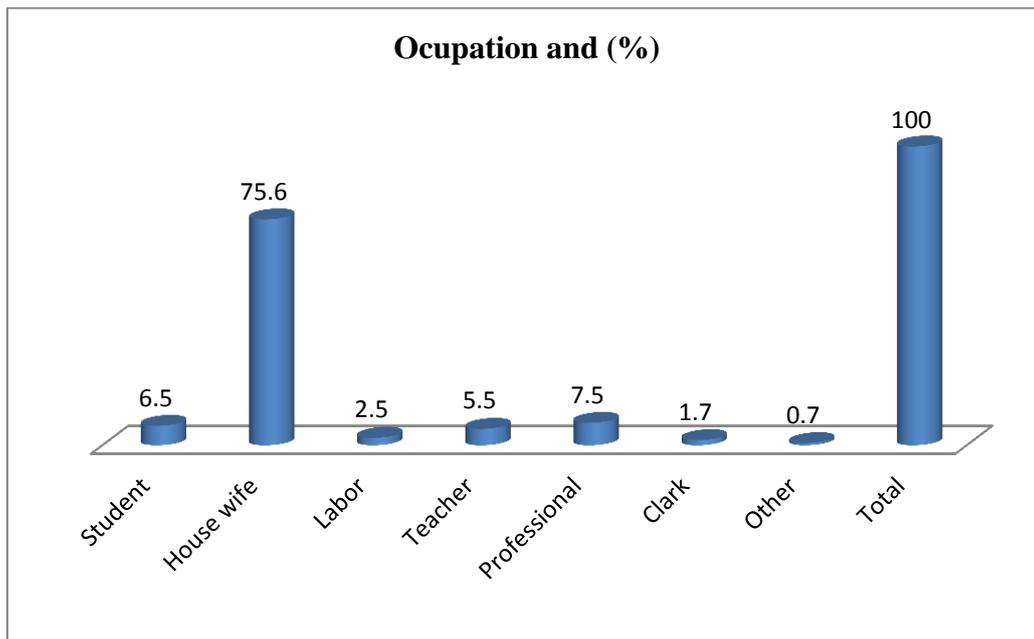
## 5.3 Oral hygiene habits

Table 3 shows that almost all use a tooth brush (99.3%) and misswak (92.8%) to clean their teeth. Almost two thirds (61.4%) brush their teeth twice a day. Almost all (99%) brush their teeth in the morning and 70.6% before bed time. 39.1% use tooth picks, 20.1% mouth washes and 6.7% dental floss as oral hygiene aids.

## 5.4 Knowledge about tooth decay and periodontal disease

More than two thirds (68.2%) reported that eating sweets is the one of the causes of the tooth decay, and just over half (51.2% that not cleaning the teeth may cause tooth decay. Just over a third (34.8%) reported that not cleaning their teeth may cause gum disease and half (50.2%) did not know what causes gum disease (Table 4).

## 5.5 Dental visits

All mothers were in the third trimester of their pregnancy. 42.3% had never visited a dentist, about two thirds (61.2%) believe that the dentist should be visited every six month. The reasons for visit vary, but the main reason for seeking dental treatment was due to pain (64.4%) (Table 5).

**Table 3: Oral Hygiene Habits**

| Brushing habits | Yes | No |
|---|---|---|
| Tooth brush | 99.3% | 0.7% |
| Misswak | 92.8% | 7.2% |
| Other | 00.0% | 100% |
| **Brushing frequency** | | |
| Once | 24.9% | |
| Twice | 61.4% | |
| More than twice | 13.7% | |
| Never | 00.0% | |
| **Time of brushing** | | |
| Morning | 99% | 1% |
| Before each meal | 4% | 96.00% |
| After each meal | 10.7% | 89.3% |
| Before bed time | 70.6% | 23.4% |
| **Other oral hygiene aids** | | |
| Dental floss | 6.7% | 93.3% |
| Tooth picks | 39.1% | 60.9% |
| Mouth wash | 20.1% | 79.9% |
| None of the above | 46.8% | 53.2% |

**Table 4: Causes of tooth decay and gum disease**

| Cause | Tooth decay | | Gum disease | |
|---|---|---|---|---|
| | Yes | % | Yes | % |
| Not cleaning your teeth | 206 | 51.2 | 140 | 34.8 |
| Eating sweets | 274 | 68.2 | 29 | 7.2 |
| Other | 19 | 4.7 | 67 | 16.7 |
| Don't know | 30 | 7.5 | 202 | 50.2 |

**Table 5: Dental visit history**

| Variable | Yes | No |
|---|---|---|
| **Have you ever visited a dentist** | 57.7% | 42.3% |
| **When do you think a person should visit the dentist** | | |
| Once every six month | 61.6% | |
| Once year | 8.0% | |
| When there is pain | 23.9% | |
| When there is need | 7.0% | |
| **How often do you visit the dentist** | | |
| Once every six month | 14.7% | |
| Once year | 6.0% | |
| When there is pain | 64.4% | |
| Never | 14.7% | |

## 5.6 Received instructions concerning oral health care

Almost all women reported not having received any instructions regarding oral health care from their doctor (98.8%), dental assistants (98.5%), dentists (83.1%) or their school teachers (83.6%). One fifth (21.9%) received oral health advice from TV (Table 6)

**Table 6: Who has given advice about how to care for your teeth and gums?**

| Variable | Yes | No |
|---|---|---|
| Family and relatives | 34.3% | 65.7% |
| School teachers | 16.4% | 83.6% |
| Dentist | 16.9% | 83.1% |
| Dental assistant | 1.5% | 98.5% |
| Doctor | 1.2% | 98.8% |
| TV, Radio, Magazine | 21.9% | 78.1% |
| Other | 25.1% | 74.9% |
| No one | 2.2% | 97.8% |

## 5.7 Baby's oral health

Most respondents (81.8%) did not receive any information on how to take care of their baby's teeth, while just over half of them (58%) reported that they knew how to look after their baby's teeth. Just under half (48.3%) prefer to have the information on how to look after their baby's teeth while they were pregnant and 31% before they have a baby (Table 7).

**Table 7: Looking after baby's teeth**

| Variable | Yes | No |
|---|---|---|
| Do you know how to look after your baby's teeth | 58.0% | 41.8% |
| Have you been given any information on how to look after your baby's teeth | 18.20% | 81.80% |
| **When would you like to have information about how to look after your baby's teeth** | **%** | |
| Before I have baby | 31.0% | |
| While I am pregnant | 48.3% | |
| After I have a baby | 14.3% | |
| No need | 0.6% | |
| Other | 5.2% | |

## 5.8 Oral health status indicators and treatment needs

### *5.8.1 Periodontal health*

Most sextants examined were healthy (76.5%). Calculus and bleeding were 10.1% and 6.3% respectively and no deep pockets were present (Figure 5).

**Figure 5: CPI**
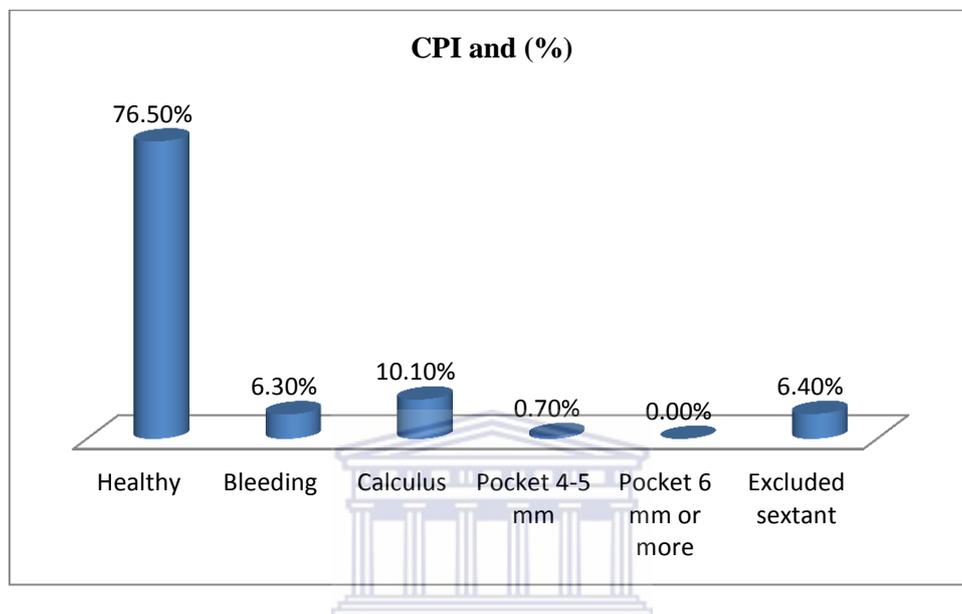


### *5.8.2 Dentition status*

The mean DMFT for the entire sample was 3.35 (±3.69) with the decayed component accounting for 55% of the DMFT and 32% were missing due to caries. A total of 136 filled teeth were recorded, 1.4% of which were decayed. .Forty six teeth were recorded as missing for reasons other than caries (Table 8). Treatment needs varied from filling, extraction, scaling and other prosthetic procedures.

**Table 8: DMFT**

| Variables | Frequency | % |
|---|---|---|
| Decayed | 767 | 55 |
| Filled with decay | 19 | 1.4 |
| Filled no decay | 117 | 8.4 |
| Missing as a result of caries | 446 | 32.0 |
| Missing for other reasons | 46 | 3.3 |
| **Total** | **1395** | **100.0** |

### 5.9 Oral health status and age

*Periodontal health*

The 20-29 year age group had the most number of health sextants (77.4%) followed by less than 20 year group (76.1%). Almost no deep pockets were recorded for any age groups. The highest sextants number in which bleeding occurred was 9.4% (40+ years) while the lowest was 4.1% and occurred in the youngest group (<20 years). The highest occurrence of calculus was 16.7% of the sextants in older age group (40+ years) and the least 8.9% in 20-29 year age group and this result was statistically significant (Table 9).

*Dentition status*

The lowest DMF 2.69 was found in the in older group of the participants 40+ years and the highest (3.67) in 30-39 year age group. This result was not statistically significant, possibly because of the habits (Table 9).

**Table 9: Oral health status and age**

| Variable | Age (years) | | | | Total |
|---|---|---|---|---|---|
| *CPI | <20 | 20-29 | 30-39 | 40+ | |
| **Healthy** | 76.1% | 77.4% | 75.7% | 71.9% | 76.5% |
| **Bleeding** | 4.1% | 7.0% | 5.4% | 9.4% | 6.3% |
| **Calculus** | 14.0% | 8.9% | 10.1% | 16.7% | 10.1% |
| **Pocket 4-5 mm** | 0.0% | 0.6% | 1.1% | 0.0% | 0.7% |
| **Pocket 6mm or >** | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% |
| **Excluded sextant** | 5.9% | 6.1% | 7.5% | 2.1% | 6.4% |
| **\*\*DMFT** | 3.05 | 3.26 | 3.67 | 2.69 | 3.36 |
| **Total** | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

*Chi-square test performed, p value = 0.038*
*\*\*One way ANOVA test performed, p value = 0.594*

### 5.10 Oral health status and number of pregnancies

*Periodontal health*

More than three quarter of the sextants 77.7%, 75.8 % and 75.6% respectively in those who were pregnant once, 2-3 and more than three times were healthy. Bleeding occurred in 7.6% of the sextants of those who get pregnancy more than three times followed by 6.5% and 4.8% in those who get pregnancy 2-3 times and once respectively. Calculus was found in

11.2% of the sextant in those who get pregnancy once then followed by 10.8% and 8.8% of the sextant in those who get pregnancy more than 3 times and 2-3 times respectively. In all categories almost no deep pockets were encountered (Table 10).

### *Dentition status*

The highest mean of DMFT was 3.53 found in those who were pregnant once, while the lowest (3.17)  who were pregnant 2-3 times.

**Table 10: Oral health status and number of pregnancies**

| Variable | Number of pregnancies | | | Total |
|---|---|---|---|---|
| | 1 | 2-3 | >3 | |
| *CPI | | | | |
| Healthy | 75.8% | 77.7% | 75.6% | 76.5% |
| Bleeding | 4.8% | 6.5% | 7.6% | 6.3% |
| Calculus | 11.2% | 8.8% | 10.8% | 10.1% |
| Pocket 4-5 mm | 0.5% | 0.7% | 0.7% | 0.7% |
| Pocket 6 mm or more | 0.1% | 0.0% | 0.0% | 0.0% |
| Excluded sextant | 7.5% | 6.3% | 5.3% | 6.4% |
| **DMFT | 3.53 | 3.17 | 3.42 | 3.36 |
| Total | 100.0% | 100.0% | 100.0% | 100.0% |

*Chi-square test performed, p value = 0.241
**One way ANOVA test performed, p value = 0.699

## 5.11 Oral health status and education

### *Periodontal status*

The highest number of health sextants were found in  80.2%  of women who studied Khalwa (type of religious schools in Sudan) and the  least number  in those who studied up to post-graduate level (67.5%).The highest number of sextants  in which bleeding occurred was in university educated  (9.2%) and the least   (3.6%) in primary school level respondents. Calculus occurred in 16.7% of sextants in illiterate women and the least (5.4%) in respondents who completed intermediate schools. No deep pockets were encountered. The result was statistically significant. The higher levels of education were significantly associated with the lowest number of the healthier sextants (Table 11).

*Dentition status*

The lowest mean DMFT was 2.10 found in illiterate women while the highest (4.00) were found in women who completed intermediate school studies. The result was not statistically significant.

**Table 11: Oral health status and education**

| Variable | Educational Level | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| *CPI | Illiterate | Khalwa | Primary | Inter mediate | High school | University | Post-graduate | |
| **Healthy** | 73.3% | 75.0% | 78.6% | 80.2% | 77.1% | 75.7% | 67.5% | 76.5% |
| **Bleeding** | 6.7% | 4.2% | 3.6% | 6.3% | 4.0% | 9.2% | 5.0% | 6.3% |
| **Calculus** | 13.3% | 16.7% | 11.2% | 5.4% | 13.1% | 7.9% | 13.3% | 10.1% |
| **Pocket 4-5 mm** | 0.0% | 0.0% | 0.3% | 0.9% | 0.3% | 0.9% | 1.7% | 0.7% |
| **Pocket 6 mm or more** | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.1% | 0.0% | 0.0% |
| **Excluded sextant** | 6.7% | 4.2% | 6.3% | 7.2% | 5.5% | 6.1% | 12.5% | 6.4% |
| **DMFT | 2.10 | 5.75 | 3.08 | 4.00 | 2.76 | 3.72 | 3.60 | 3.36 |
| **Total** | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

*Chi-square test performed, p value = 0.001*
**One way ANOVA test performed, p value = 0.188*

**5.12 Oral health status and occupation**

*Periodontal status*

The highest number of the healthy sextants among the respondent was 83.3% in those women who were categorized as working in "other" provision rather than the provision mentioned in the questionnaire and the least (72.7%) in teachers. The highest number of sextants in which bleeding was reported was 9.8% in the teachers and no bleeding was recorded for labourers and other categories. Calculus was found in 10.6% of house wives, teachers and professionals followed by 9.5% in Clerks and 7.1% in students (Table 12). No deep pockets were recorded. The result was statistically significant. (Increase periodontal health in lower socioeconomic class).

*Dentition status*

The highest mean DMFT was 6.00 found in other profession group, the lowest mean DMFT was 2.62found in the students. The result was statistically not significant.

**Table 12: Oral health status and occupation**

| Variable | Occupation | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| *CPI | Student | House wife | Worker | Teacher | Professional | Clerk | Other | |
| **Healthy** | 81.4% | 76.3% | 86.7% | 72.7% | 73.9% | 73.8% | 83.3% | 76.5% |
| **Bleeding** | 6.4% | 6.2% | 0.0% | 9.8% | 7.2% | 7.1% | 0.0% | 6.3% |
| **Calculus** | 7.1% | 10.6% | 3.3% | 10.6% | 10.6% | 9.5% | 0.0% | 10.1% |
| **Pocket 4-5 mm** | 0.0% | 0.6% | 0.0% | 2.3% | 1.1% | 0.0% | 0.0% | 0.7% |
| **Pocket 6 mm or more** | 0.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| **Excluded sextant** | 4.5% | 6.3% | 10.0% | 4.5% | 7.2% | 9.5% | 16.7% | 6.4% |
| **\*\*DMFT** | 2.62 | 3.33 | 3.80 | 4.00 | 3.27 | 3.71 | 6.00 | 3.36 |
| **Total** | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

*\*Chi-square test performed, p value = 0.038*
*\*\*One way ANOVA test performed, p value = 0.747*

**5.13 Oral Health Status and frequency of brushing**

*Periodontal health*

The highest number of the healthy sextants was 79.4% found in women who brush their teeth more than twice followed by 78.1% in those who brushes their teeth twice and 70.8% for those who brush their teeth once (Table 13).

Bleeding was recorded in 8.7% of the sextant in those who brush their teeth once and 3.9% in those who brushes their teeth more than twice. Calculus was found in 13.8% of the sextants of those who brush their teeth once, 9.7% in those who brush their teeth twice and 6.7% in those who brush more than twice. Shallow pockets were recorded 1.3% of those who brushes their teeth once, and no deep pockets were recorded .The result was statistically significant (Table 13). The periodontal health increased with increasing frequency of brushing.

41

*Dentition status*

The highest DMFT mean was 4.49 reported in those who brush their teeth more than twice, while the least one was 3.08 found in those who brush their teeth once.

**Table 13: Oral health Status and frequency of brushing**

| Variable | Brushing frequency | | | Total |
|---|---|---|---|---|
| | Once | Twice | More than twice | |
| *CPI | | | | |
| **Healthy** | 70.8% | 78.1% | 79.4% | 76.5% |
| **Bleeding** | 8.7% | 5.9% | 3.9% | 6.3% |
| **Calculus** | 13.0% | 9.7% | 6.7% | 10.1% |
| **Pocket 4-5 mm** | 1.3% | 0.3% | 0.9% | 0.7% |
| **Pocket 6 mm or more** | 0.0% | 0.0% | 0.3% | 0.0% |
| **Excluded sextant** | 6.2% | 5.9% | 8.8% | 6.4% |
| **\*\*DMFT** | 3.08 | 3.21 | 4.49 | 3.36 |
| **Total** | 70.8% | 78.1% | 79.4% | 76.5% |

*Chi-square test performed, p value = 0.0001*
*\*\*One way ANOVA test performed, p value = 0.046*

## 5.14 Oral mucosal lesions

Oral mucosal lesions were found in 10.4% of the study sample. The most common lesion was candidiasis. The tongue was the most common location, followed by the alveolar ridge and/or gingivae a single case of torus palatines was found on the hard palate.

**Table 14: Oral mucosal lesions**

| Oral mucosal conditions | Location | Frequency | % |
|---|---|---|---|
| **Candidiasis** | **Tongue** | 6 | 1.5% |
| **Other conditions** | **Tongue** | 22 | 5.5% |
| | **Hard and soft palate** | 1 | 0.2% |
| | **Alveolar ridge/Gingivae** | 13 | 3.2% |
| **Total** | | 42 | 10.4% |

# CHAPTER 6: DISCUSSION

The present study, to the best of the researcher's knowledge, is the first one to examine the oral health status, knowledge, attitudes and oral hygiene practices among pregnant women in Sudan. The sample comprised four hundred and two subjects aged between seventeen and forty five years, in their third trimester of pregnancy. Most pregnant women in Sudan attend antenatal clinics in government-sponsored facilities, and Omdurman Maternity hospital is the largest in the country. Women from different socio-economic backgrounds and from all parts of Sudan attend for routine checkups and the majority of deliveries occur in this hospital, hence the sample can be viewed as being representative of the target population.

The relationship between health and /or oral health and socioeconomic status (SES) is well established (Sabbah et al., 2007; Petersen et al.; 2005, Locker, 2000) and the gradient of improving health with improving SES, have been shown in several studies. The common SES indicators used have been income, education and occupation. In the present study education and occupation were chosen. In the present study just over half were between 20 and 29 years of age and the majority were pregnant two to three times. Nearly all the women had completed a university education and three quarter were housewives indicating that most stayed at home after getting married.

Plaque control procedures such as brushing, flossing and professional prophylaxis such as root planning will help to achieve good dental health in pregnancy (Sabstka et al., 2000). Tooth brushing with tooth paste together with the use of Misswak chewing sticks was the most common reported oral hygiene practice. This could be because of the affordability of tooth brushes and Misswak and to the fact that Sudanese clean their teeth as a part of their daily cleansing life activity. Furthermore, the use of a tooth brush does not require a high level of skill compared to other modern methods of oral hygiene such as a flossing.

It was gratifying to find that the study participants brushed their teeth on a daily basis and the recommended number of times per day (twice). Most of the respondents reported brushing twice daily, and this finding was higher than a similar study conducted among mothers in Zanzibar (Petersen and Mzee, 1998), but lower than a study conducted in Australia (Thomas et al., 2008). Nearly all reported brushing their teeth in the morning and three quarters brush their teeth before going to bed.

Preference for brushing teeth in the morning could be due to the fact that Sudanese consider brushing at this time of day as a part of general cleanliness of the body before going to work or school or doing any other daily life activity. Despite the fact that education has been shown to improve oral health awareness, in the present study, where the majority of respondents completed at least high school education, half did not know what causes gum disease and only half that not cleaning the teeth may cause tooth decay.

Almost half reported that they had never been to a dentist before. This finding concurs with a study carried out in the United States of America (Gaffield et al., 2001), but is lower than studies conducted in Germany (Gunay et al., 1991), UK (Rogers, 1991), and in Denmark (Christensen et al., 2003). The main reason for dental visit was for pain and this was despite the fact that the majority of them reported that there should be a six monthly visit to the dentist. The findings of the present study  is of concern regarding  dental care seeking behaviours  during the nine-month period especially since women may need extra periodontal care (Mills and Moses, 2002).

Educating and motivating women to maintain good oral hygiene and providing affordable dental health care is fundamental in reducing dental disease. Improving dental education may need to become a priority in antenatal care to educate women about the possible risks and importance of maintaining good oral health (Hirsh and Clarke, 1977).

The most alarming finding of this study was that the majority of the participants had received no oral health instructions or education from their neither dentist nor physicians during their pregnancy. Similar findings were found in studies from Germany (Gunay et al., 1991) and the United Kingdom (Rogers, 1991). The majority reported receiving their instruction regarding oral health from family members, TV, magazines and radio. This finding concurred with the findings of a study of Kuwaiti mothers of first-grade school children who reported that their oral health education was obtained mainly from TV and radio, and only one- third reported having received education from a dentist (Petersen et al., 1990).

Maternal support is essential for prevention of dental caries and gingivitis in children. Pregnant women should be included in all programmes targeting mothers of young children as they are at the beginning of this cycle of life. Previous studies have shown that in the children aged between 5 and 6 years, a more positive maternal attitude is linked to a lower incidence of caries in the child, better child oral hygiene, and more dental treatment received

by the child (Sarant, Kagan, Raviv, 1984). The majority of the participants in the present study reported that they did not have information on how to look after their baby's teeth and this is finding concurred with a study by Blinkhorn (1981) who that the majority of mothers with young children did not received advice during pregnancy on how to look after their children's teeth (Blinkhorn,1981).

Pregnant women may be more susceptible to periodontal disease, due to the increased levels of oestrogen and progesterone during pregnancy and this can induce hyperemia, oedema and bleeding of periodontal tissues (Offenbacher et al., 1996; Gajendra et al., 2004; Lyndon-Rochelle et al., 2004). Although hormonal changes in pregnancy are universal, not all pregnant women report dental diseases, therefore other factors such as pre- and antenatal oral health knowledge and habits may also play a part (Offenbacher et al., 1996; Lyndon-Rochelle et al., 2004). In the present study oral hygiene was good since most of the examined sextants were healthy with virtually no of shallow and deep pockets. These findings were much better than those reported from Tanzania (Mumghamba et al., 2006), Japan (Miyazaki et al., 1991) and UK (Davenport et al., 2002). Since poor periodontal health (as shown by bleeding gums and calculus deposits) among pregnant women has been found to be a potential risk factor for pre-term low birth weight babies (Dasanayake, 2008; Boggess and Edelstein, 2006), one can postulate that the pregnant women in this study were at low risk of giving birth to low birth weight babies as their oral hygiene was generally good.

The presence of healthier sextants were significantly related to age - increasing age showed decreasing healthy sextants and this finding concurred with a study conducted in Uganda (Wandera et al, 2009). Another significant finding of this study was that the number of healthy sextants increased with increased in brushing frequency.

The findings that labourers had the highest number of healthy sextants and participant who had the high qualification having the worst number of healthy sextants did not concur with most other studies such as a Hungarian study by Randi, et al.(2007) and a London study by Moore et al. (2001). In the present study this finding is different from that of Mark, Rajala and Pavinok (1983) who showed increasing severity of gingivitis with lower levels of education, this may require further research to investigate what are the possible causes of this finding. However in the present study, the highest prevalence of bleeding was in the older age group, in teachers and those who completed a university education.

There was an absence of severe periodontal disease (in terms of CPI code 4) and a very low prevalence of shallow pockets 4-5mm (corresponding to CPI score 3) and this was similar to study in Uganda (Wandera et al., 2009).

The main periodontal problem found in this study was the prevalence of calculus in one-tenth of the sextants in the surveyed women and the majority required scaling and oral hygiene instructions.

The mean DMFT was 3.35 and this finding is very low when compared to several studies - including from Hungary (Randi, et al., 2007 and Australia (Gago et al., 1984). Sudan is categorized in low category group (5-8.9 DMFT) according to WHO criteria for 35-44 years group (Petersen, 2005) and the finding from the present study is still lower than the WHO classification. However, a significant finding was that the mean DMFT was lower in the older age group and in illiterate respondent and higher in those who brush their teeth more frequently and this could be due to differing diets and life style.

Various forms of oral mucosal lesion were found in this study mainly located on the tongue. The prevalence was 10.4% and this was lower than that reported in study from Turkey (Sarifakioglu, 2006). Increased number of oral mucosal lesions during pregnancy could be due to stress and anxiety which in turn could lead to neglect of oral hygiene.
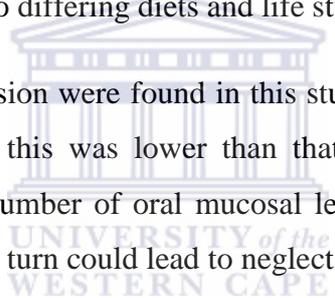
# 6.1 Conclusions

The prevailing oral health behaviour among the participants was that they cleaned their teeth twice per day using a tooth brush, tooth paste and Misswak and other oral hygiene aids such as tooth picks, dental floss and mouth wash.

The oral condition of the subjects were characterized by a high prevalence of healthy sextants, very low prevalence of shallow pockets, absence of severe periodontal problems, low prevalence of bleeding and calculus deposition. .

There was an increasing prevalence of bleeding and calculus with increasing age.  DMFT was low in illiterate women and the highest in teachers. Parity did not affect oral health.

A large number of pregnant women had not visited a dentist during their pregnancy and most had not received instructions concerning oral health care either for themselves or their children.

Oral hygiene instructions and scaling, filling, extraction of decayed teeth   and bridge and crown abutments were the most commonly treatment needs.

There is urgent need to institute early oral health education and encourage the use of dental services during pregnancy.

This should be aligned to the aims and objectives!
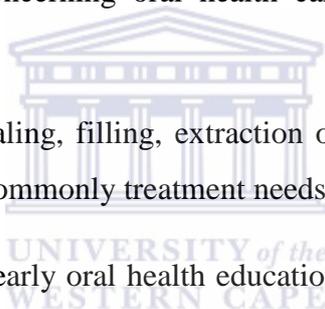
# 6.2 Recommendations

1. Oral health should be integrated into all preventive interventions related to pregnant women through a primary health care (PHC) approach in the Khartoum State.

2. An oral health programme for pregnant women should be developed and oral health personnel should collaborate with MCH staff carrying out oral health education including demonstrations of tooth brushing techniques.

3. An oral health education, screening and treatment package should be developed to be incorporated in the MCH activities, both in antenatal and postnatal clinics at Khartoum state.

4. Collaborative efforts between the ministry of Health and the private sector must be established so as to ensure delivery of more accessible oral health care programme for antenatal mothers in Khartoum state.

5. A similar oral health care survey should be carried out in the whole of Sudan with the collaboration with international organization and it should consider other determinants of oral health and factors which could affect utilization and delivery of oral health services to pregnant women.

6. Further research should be conducted to determine the reasons for low utilization of oral health care services during pregnancy.

# REFERENCES

Akioglu ES, Gunduz C, Gorpelioglu C (2006). Oral mucosal manifestations in 100 pregnant versus non-pregnant patients: an epidemiological observational study. European Dermatology 16(6):674-6.

Amar S, Chung K (1994). Influence of hormonal variation on the periodontium in women. Periodontology 2000 6: 79-87.

American Dental Association Council on Access, prevention and inter-professional relations, Women's Oral Health Issues (2006). American Dental Association.

Annan BDRT, Nuamah K (2005). Oral pathologies seen in pregnant and non-pregnant women. Ghana Medical Journal (39) 1:24-7.

Berkovitz RJ (2003). Acquisition and transmission of mutates streptococci. Calif Dental Association; 31(2):135-138.

Blinkhorn AS (1981). Dental preventive advice for pregnant and nursing mothers-social implications. International dental Journal 31(1):14-22.

Boggess KA, Edelstein BL (2006). Oral health in women during preconception and pregnancy: implications for birth outcomes and infant oral health. Maternal Child Health Journal 10(Suppl): s169-s174.

Byrne J, Ellsworth C, Bowering E, Vincer M (1993). Language development in low birth weight infants: the first two years of life. Journal Development Behaviour Pediatric 14:21-7.

Caufield PW, Cutter GR, Dasanayake AP (1993). Initial acquisition of mutant's streptococci by infants: evidence for a discrete window of infectivity. Journal of Dental Research 72:37–45.

Central Bureau of Statistics CBS. (2008). Sudan fifth census.

Chiodo GT, Rosenstein DI (1985). Dental treatment during pregnancy: a preventive approach. Journal American Dental Association 110: 365-68.

Christensen LB, Jeppe-Jensen D, Petersen PE (2003). Self-reported gingival conditions and self-care in the oral health of Danish women during pregnancy. Journal of Clinical Periodontology 30(11): 949-953.

Clothier B, Stringer M, Jeffcoat MK (2007). Periodontal disease and pregnancy outcomes, risk and intervention. Best Practice Research Clinical Obstetric Gynaecology 21(3):451-466.

Cristianson RE, van den Berg BJ, Milkovich L, Oechsli FW (1981). Incidence of congenital anomalies among white and black live births with long-term follow-up. American Journal Public Health 71:1333-41.

Dasanayake A, Gennaro S, Hendricks-Munoz K, Chhun N (2008). Maternal periodontal diseases, pregnancy, and neonatal outcomes. MCN American Journal of Maternal Child Nursing 33:45-9.

Davenport ES, Williams CE, Sterne JA, Murad S, Sivapathasundram V, Curtis MA (2002). Maternal periodontal disease and preterm low birth weight: case-control study. Journal Dental Research 81(5):313-8.

Dortbudak O, Eberhardt, Ulm M, Person GR (2005).Periodontitis, a marker of risk in pregnancy for pre term births.  Clinical Periodontology 32 (1):45-52.

Gaffield ML, Gilbert BJ, Malvitz DM, Romaguera R (2001). Oral health during pregnancy: an analysis of information collected by the pregnancy risk, assessment monitoring system. Journal American Dental Association 1342(7):1009-1016.

Gajendra S, Kumar JV (2004). Oral health and pregnancy: a review. New York State Dental Journal 70:40-44.

Gunay H, Goepel K, Schneller T (1991). Position of health education knowledge concerning pregnancy. Oralprophylaxe 13:4-7.

Hack M, Caron B, Rivers A, Fanaroff AA (1983). The very low birth weight infant: the border spectrum of morbidity during infancy and early childhood. Journal of Development Behaviour Pediatric 4:243-9.

Han WY (2011). Oral health and adverse pregnancy outcomes-what's next? .Journal of Dental Research 90(3):289-93.

Hey-Hadavi JH (2002). Women's oral Health issues: sex differences and clinical implications. Women's Health Prima Care 5(3):189-199.

Hirsh R, Clarke N (1977). Has small-scale audio-visual dental health education a viable future? Community Dentistry Oral Epidemiology 5:160-63.

Jago J, Chapman P, Aitken J, McEniery T (1984). Dental status of pregnant women attending Brisbane maternity hospital. Community Dentistry Oral Epidemiology 12:398-01.

Jeffcoat MK, Geurs NC, Reddy MS, Cliver SP, Goldenberg RL, Hauth JC (2001). Periodontal infection and preterm birth: results of a prospective study. Journal of American Dental Association 132(7):875-80.

Khader Y, Al-Shishani L, Obeidat B, Kassawneh M, Burgan S, Amarinl ZO (2009). Maternal periodontal status and preterm low birth weight delivery: a case control study. Archive Gynaecology Obstetric 279:165-69.

Kida IA, Astrom AN, Strand GV, Massalu JR (2007). Chewing problems and dissatisfaction with chewing ability: a survey of older Tanzanians. European Journal Oral Science 115(4):265-274.

Kostantinides A (2003). Periodontology Part 1. Kostantinides A., Thessaloniki Greece.

Kumar J, Samelson R (2006). Oral health care during pregnancy and early childhood: Practice Guidelines. New York, NY: New York State Department of Health.

51

Kumar J, Samelson R (2009). Oral health care during pregnancy recommendations for oral health professionals New York State Dental Journal 75(6):29-33.

Kushtagi P, Kaur G, Kukkamalla MA, Thomas B (2008).Periodontal infection in women with low birth weight neonates. International Journal of Gynaecology Obstetric 101:296-98.

Laine MA (2002). Effect of pregnancy on periodontal and dental health. Acta Odontalgia Scandinavica 60(5): 257-264.

Locker D (1988). Measuring oral health: conceptual frame work. Community Dental Health 5(1):3-18.

Locker D (2000). Deprivation and oral health: a review. Community Dent Oral Epidemiology 28:161-9.

Loe H, Sillness J (1963). Periodontal Disease in Pregnancy.1 .Prevalence and Severity. Acta Odontologica Scandiniavca 21:533-551q.

Lyndon-Rochelle MT, Karkowack P, Peters RM (2004). Dental care and self-reported dental problems in relation to pregnancy. American Journal of Public Health 94:765-71.

Mealey L, Moritz J (2003). Hormonal influences on periodontium. Periodontology 2000 32: 59-81.

Milgrom P, Riedy C,Weinstien P, Tanner A, Manibusan L, Bruss J (2000). Dental caries and it is relationship to bacterial infection, hypoplasia, diet and oral hygiene in 6 to 36 month old children. Community Dentistry Oral Epidemiology 28:295-6.

Milgrom P, Sutherland M, Shirtcliff RM, Ludwig S, Smole D (2010). Children's tooth decay in a public health program to encourage low income pregnant women to utilize dental care. BMC Public Health. 10:76.

Mills LW, Mosses DT (2002). Oral health during pregnancy. American Journal of Maternal Child Nursing 27 (5):275-280.

Miyazaki H, Yamashita Y, Shirahama R, Goto-Kimura K, ShimadaN et al. (1991). Periodontal condition of pregnant women assessed by CPITN. Journal of Clinical Periodontology 18:751-4.

Moore S, Ide M, Coward PY (2004). A prospective study to investigate the relationship between periodontal disease and adverse pregnancy outcome. British Dental Journal 197:251-8.

Moore S, Wilson R, Coward P, Borkowska E, Baylis R (2001). Periodontal health of London women during early pregnancy. BDJ 191:570-73.

Mumghamba E, Manj K, Michael J (2006). Oral hygiene practices, periodontal conditions dentition status and self –reported bad mouth breath among young mothers, Tanzania. International Journal of Dental Hygiene 4:166-73.

Offenbacher S, Bogess KA, Murtha AP, Jared HL, Lieff S, McKaig RG, Mauriello SM, Moss KL, Beck JD (2006). Progressive periodontal disease and risk of very preterm delivery. Obstetric Gynecology 107(1):29-36.

Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Manyor G (1996). Periodontal infection as a possible risk factor for preterm low birth weight. Journal of Periodontology 67: s1103-s1130.

Page RC, Eke P I (2007). Case definitions for use in population-based surveillance of periodontitis. Journal of Periodontology, 78: 1387-99.

Petersen PE, Ogawa H (2005). Strengthening the prevention of periodontal disease: the WHO approach. Journal of Periodontology 76: 2187-93.

Petersen PE, Bourgeois D, Ogawa H, Estupinan-Day S, Ndiaye C (2005).The global burden of oral diseases and risks to oral health. Bulletin of the World Health Organization 83:661-69.

Petersen PE, Hadi R, Al-Zaabi F, Hussein J, Behbehani J, Skougaard M, Vigild M (1990). Dental knowledge, attitudes and behavior among Kuwaiti mothers and school teachers. Journal of Paedontics 14:158-64.

Radani M, Gorzo I, Urban E, Eller J, Novak T, Pal A (2006). Possible association between mother's periodontal status and preterm delivery. Journal of Clinical Periodontology 33:791-96.

Rakchanok N, Amporn D, Yoshida Y, Harun-Or-Rashid M, Sakamoto J (2010). Dental caries and gingivitis among pregnant and non-pregnant women in Chiang Mai, Thailand. Nagoya Journal of Medical Science. 72(1-2):43-50.

Randi M, Gorzo I, Nagy Erzsebet, Urban E, Eller J, Novak T, and Pal Attila (2007). The oral health status of postpartum mothers in South-East Hungary. Community Dental Health 24:111-16.

Rateitschak KH (1967). Tooth mobility changes in pregnancy. Journal of Periodontal Research 2:199 –6.
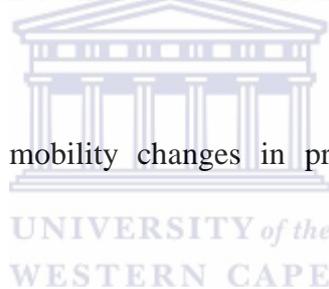
Ringsdorf WM, Flatland RF, Lindsey KG, Cheraskin E (1961). Clinical tooth mobility and pregnancy. Journal of Obstetric Gyaenecology 17:434–8.

Rogers SN (1991). Dental attendance in a sample of pregnant women in Birmingham, UK. Community Dental Health 8:361-68.

Romero BC, Chiquito CS, Elejalde LE, Bernardoni CB (2002). Relationship between periodontal disease in pregnant women and the nutritional condition of their newborns. Journal of Periodontology 73(10):1177-83.

Russell SL, Mayberry LJ (2008). Pregnancy and oral health: a review and recommendations to reduce gaps in practice and research. MCN 33(1):32-37.

Sabatka S, Bhattacharyga I, Cohen DM, Hunter J (2000). Oral health for the pregnant patients: a review. Access 14:41-44.

Saied-Moallemi Z, Virtanen JI, Ghofranipour F, Murtomaa H (2008). Influence of mothers' oral health knowledge and attitudes on their children's dental health. European Archive Paediatric Dentistry. 9(2): 79-83.

Sarifakioglu E, Gunduz C, Gorpelioglu C (2006). Oral mucosal manifestations in 100 pregnant versus non-pregnant patients: an epidemiological observational study. European Dermatology 16(6):674-6.

Sarnat H, Kagan A, Raviv A (1984). The relation between mothers' attitude toward dentistry and the oral status of their children. Pediatric Dentistry 6, 128-31.

Scheutz F, Baelum V, Matte MI, Mwangosi I (2002). Motherhood and dental disease. Community Dental Health 19(2):67-72.

Scully C, Cawson RA (1999). Medical problems in dentistry. 4th edition. (Ed Wright), Butter-worth Heinemann, Oxford, 291-293.

Shub A, Wong C, Jennings B, Swain JR, Newnhan JP (2009). Maternal periodontal disease and perinatal mortality. Aus NZ Obstetric Gaynaecology 49:130-36.

Sills ES, Zegarelli DJ, Hoschander MM, Strider WE (1996). Clinical diagnosis and management of hormonally responsive oral pregnancy tumor (pyogenic granuloma). J Reported Med.; 41(7): 467-470.

Soderling E, Isokangas P, Pienihäkkinen K, Tenovuo J (2000). Influence of maternal xylitol consumption on acquisition of Mutans streptococci by infants. Journal Dental Research 79:882-7.

Thomas N, Middleton P, Crowther C (2008). Oral and dental health care practices in pregnant women in Australia: a postnatal survey. Bio Medical Central, Pregnancy and Child birth 8:13.

Taani D, Habashneh R, Hammad N, Batieha A (2003). The periodontal status of pregnant women and it is relationship with socio-demographic and clinical variables. Journal of oral rehabilitation 30:440-45.

Torgerson RR, Marnach ML, Bruce AJ, Rogers RS (2006). Oral and vulvar changes in pregnancy. Clinics in Dermatology 24:122-32.

Vettore MV, Lamarca Gde A, Leao AT, Thomaz FB, Sheiham A, Leal Mdo C (2006). Periodontal infection and adverse pregnancy outcomes: a systematic review of epidemiological studies. Cardenos Da Saude Publica/Ministerio Da Saude, Fundacao Oswaldo Cruz, Escola National De Saude Publica 22:2041-2053.

Wandera M, Engebresten MS, Okullo I, Tumwine J, Astrom A (2009). Socio-demographic factors related to periodontal status and tooth loss of pregnant women in Mbale district, Uganda. Bio Med Cent Oral Health 9:18.

World Health Organization: Oral Health Surveys (1997). Basic Methods. 4th edition, Geneva.

World Health Organization (1984). The incidence of low birth weight: an update. Weekly Epidemiologic Record 59:205-11.
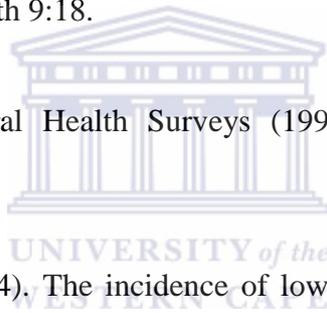
**Appendix 1**

**INFORMED CONSENT FOR ORAL EXAMINATION**


Dear ...............................……...............................

I am Dr Abdel seed Ibrahim Abdel seed working in the Ministry of Health, Khartoum State Oral Health Directorate, Sudan and is presently a post-graduate student studying for the MSc (Dent) in Dental Public Health at the Department of Community Faculty of Dentistry, University of the Western Cape (South Africa).

We would like to ask you a few questions about yourself, examine your mouth and teeth to look for any oral problems. We are doing this to see if there are ways in which we can prevent any problems or help with any problems you may have during your pregnancy.

The procedure will take about 10-15 minutes. You might feel some discomfort during the examination, but you will feel no pain. If we require photographs, we will only take photographs of your teeth and mouth and no-one will be able to see your face on the photographs or recognize you. All information obtained and all the information you give us about yourself will be strictly confidential.

You are completely free to take part or not to take part in the study. If you decide that you do not want to be part of the study, this will not be held against you and your management will not be changed in any way. If you would like to take part in the study, please sign the form below to allow us to proceed with the oral examination. If you would like to withdraw from the study at any point or for any reason, please feel free to do so and no questions will be asked.

If you have any questions or queries or would like more information about the study please contact Dr Abdel seed Ibrahim Abdel seed on telephone number (00249912207674) or e-mail drabdelseed@yahoo.com

Thank you for your cooperation

Yours sincerely

Dr. Abdel seed Ibrahim Abdel seed

----------------------------------------------------------------------------------------------------

I understand the information that has been provided to me and I agree to participate in the study.

Name: ..............................................                    ................................................

(In block letters)                                                          (Signature)

Date:

Witness 1: …………………………………………………………………..

Witness 2: …………………………………………………………………

## Appendix 2

**Oral health status, knowledge, attitude and practice of oral hygiene among pregnant women attending Omdurman Maternity Hospital, Khartoum-Sudan**

**Record No**
☐☐☐

**Data collector**
☐

1) Age: ☐
   a) <20
   b) 20-29
   c) 30-39
   d) 40+

2) Number of pregnancies ☐
   a) 1
   b) 2-3
   c) >3

3) Education level ☐
   a. Illiterate
   b. Khalwa
   c. Primary
   d. Intermediate
   e. High school
   f. University
   g. Postgraduate

4) Occupation ☐
   a) Student
   b) House wife
   c) Labor
   d) Teacher
   e) Professional
   f) Clark
   g) Others(specify)

5) What do you use to clean your teeth?
   a. Tooth brush ☐
   b. Misswak ☐
   c. Others (specify) ☐
   d. None ☐

6) How many times a day do you brush your teeth? ☐
   a. Once
   b. Twice
   c. More than twice
   d. Never

7) At what time of the day do you usually brush your teeth?
   a. Morning ☐
   b. Before each meal ☐
   c. After each meal ☐
   d. Before bed time ☐

8) Why do you brush your teeth?

   a. To Clean my teeth ☐
   b. To keep my mouth and breath fresh ☐
   c. To prevent tooth decay ☐
   d. To prevent gum disease ☐
   e. Do not know ☐

9) Do you use the following?
   a. Dental floss ☐
   b. Tooth picks ☐
   c. Mouth wash ☐
   d. None of the above ☐

10) How do you rate the condition of your teeth at the moment?

   a. Healthy, no visit to dentist is needed ☐
   b. Healthy, but you would like to have them checked ☐
   c. I have decayed tooth/teeth but no pain ☐
   d. I have toothache, pain ☐
   e. Don't know ☐

11) How do you rate the condition of your gums at the moment?

   a. Healthy ☐
   b. Unhealthy ☐
   c. Don't know ☐

12) Have you noticed any changes in your gums since you were pregnant?

   a. Yes ☐
   b. No ☐

13) If yes explain

   a. Swelling ☐
   b. Bleeding ☐
   c. Pain ☐
   d. Ulceration ☐
   e. Not applicable ☐

14) How many times a day do you take sweet foods and drinks?  ☐

       a.  Never
       b.  Once a day
       c.  Twice a day
       d.  More than twice a day
       e.  Every few days

15) Who has given advice about how to care for your teeth and gums?

       a.  Family and relatives         ☐
       b.  School teachers           ☐
       c.  Dentist                  ☐
       d.  Dental assistant           ☐
       e.  Doctor                  ☐
       f.  I learned about it on TV, radio, magazines  ☐
       g.  No-one                 ☐
       h.  Other                   ☐

16) Have you ever visited a dentist?

       a.  Yes    ☐
       b.  No     ☐

17) If yes, why

       a.  Routine visit   ☐
       b.  I have pain    ☐
       c.  I have tooth decay  ☐
       d.  I have gum problems  ☐
       e.  Others       ☐
       f.  Not applicable   ☐

18) If no, why not?             ☐

       a.  Very far to go to dentist
       b.   Treatment is expensive   ☐
       c.  Iam frightened, nervous, stressed  ☐
       d.  Lazy             ☐
       e.  No need          ☐
       f.  Not applicable     ☐

19) When do you think a person should visit the dentist?

       a.  Once  every six month   ☐
       b.  Once a year          ☐
       c.  When there is pain     ☐
       d.  When there is need     ☐

20) How often do you visit the dentist?

    a.  Once every six month  ☐
    b.  Once a year  ☐
    c.  Only when there is pain  ☐
    d.  Never  ☐

21) What causes tooth decay?

    a.  Not cleaning your teeth  ☐
    b.  Taking sweets more frequently  ☐
    c.  Other(specify)  ☐
    d.  Don't know  ☐

22) What causes gum disease?

    a.  Not cleaning your  teeth  ☐
    b.  Taking sweet more frequently  ☐
    c.  Other (specify)  ☐
    d.  Don't know  ☐

23) Do you know how to look after your baby's teeth?

    a.  Yes  ☐
    b.  No  ☐

24) If yes, how would you do it?

25) Have you been given any information on how to look after your baby's teeth?

    a.  Yes  ☐
    b.  No  ☐

26) If no, when would you like to have information about how to look after your baby's teeth and gums?

    a.  Before I have   baby  ☐
    b.  While I am  pregnant  ☐
    c.  After I  have a baby  ☐
    d.  No need  ☐
    e.  Other  ☐
    f.  Not applicable  ☐

# Appendix 3

## WHO ORAL HEALTH ASSESSMENT FORM (1997) MODIFIED

**Record number** [ ]        **Examiner number: …………………**

### Community Periodontal Index (CPI)

| | |
|---|---|
| **0** | Healthy |
| **1** | Bleeding |
| **2** | Calculus |
| **3** | Pocket 4 – 5mm (black band on probe partially visible) |
| **4** | Pocket 6 mm or more (black band on probe not visible) |
| **X** | Excluded sextant |

| 16 | 11 | 26 |
|----|----|----|
|    |    |    |
|    |    |    |
| 46 | 31 | 36 |

### Dentition Status and Treatments Need

| Status | Permanent teeth | Treatment need |
|---|---|---|
| Sound | 0 | 0 None |
| Decayed | 1 | 1 Preventive, caries arresting care |
| Filled with decay | 2 | 2 Filling |
| Filled no decay | 3 | 3 Crown or bridge abutment |
| Missing as a result of caries | 4 | 4 Extraction |
| Missing as a result of any other reasons | 5 | 5 Pulp care |
| Fissure Sealant | 6 | 6 Scaling |
| Bridge abutment, special crown | 7 | 7 Need for other care |
| Un erupted tooth | 8 | |
| Not recorded | 9 | |

| | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | Status |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------|
| (1) | | | | | | | | | | | | | | | | | (16) |
| (33) | | | | | | | | | | | | | | | | | (49) |

Treatment

| | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | Status |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------|
| (17) | | | | | | | | | | | | | | | | | (32) |
| (50) | | | | | | | | | | | | | | | | | (66) |

Treatment

## Oral Mucosal Lesions

**Normal** ☐

| Lesion | Fill here | Location | Code |
|---|---|---|---|
| Leukoplakia | | Vermilion border | **0** |
| Ulceration (apthous, herpetic, traumatic) | | Commissars | **1** |
| Lichen Planus | | Lips | **2** |
| Acute necrotizing gingivitis | | Sulci | **3** |
| Candidiasis | | Buccal mucosa | **4** |
| Abscess | | Floor of the mouth | **5** |
| Other condition | | Tongue | **6** |
| | | Hard or soft Palate | **7** |
| | | Alveolar ridge / Gingiva | **8** |

Other (please describe………………………………………………………………