KNOWLEDGE, ATTITUDES AND BARRIERS TO MATERNAL ORAL HEALTH AMONG PREGNANT WOMEN AND NURSE-MIDWIVES AT MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA.

BY

PAULINA KABBAH

A Thesis Submitted to the College of Health Sciences, School of Nursing and Midwifery, Department of Midwifery and Gender in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science in Nursing (Maternal and Neonatal Health)

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DECLARATION

Declaration by Candidate

This thesis is my original work and has not been presented for any degree award at any other University. No part of the thesis should be reproduced without the prior permission of the author and/or Moi University.

Signature:_____ Date:_____.

Paulina Kabbah

SN/PGMNH/02/19

Declaration by the Supervisors

This thesis has been submitted for examination with our approval as the university supervisors.

Signature:_____ Date:_____.

Dr Dinah Chelagat

Department of Midwifery and Gender

School of Nursing

College of Health Sciences

Moi University

Signature:_____ Date:_____.

Dr Ochiba Lukandu

Department of Maxillofacial Surgery and Oral Pathology

School of Dentistry

College of Health Sciences

Moi University

DEDICATION

I dedicate this thesis to my sisters: Victoria Kaba, Gladys Kaba and Elizabeth Kaba, who have been my support system and inspiration throughout the writing of this thesis. To my dear friend, Prince Ezekiel Yensombre Allan, for all the support and encouragement throughout this program. God richly bless you for your positive impact.

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ABSTRACT

Introduction: Pregnant women are more prone to oral health problems like periodontitis due to hormonal changes, frequent vomiting, changes in diet coupled with lowered immunity. The mother and child health handbook used in the care of these women at Moi Teaching and Referral Hospital and Kenya includes scanty information on oral care during pregnancy. Failure to mention oral health during pregnancy or other healthcare visits may contribute to poor oral health seeking behaviour. There is little attention given to oral care by routine antenatal care nurses and midwives in a majority of health facilities in Kenya.

Objectives: To assess the knowledge, attitude and associated barriers to maternal oral healthcare among pregnant women and nurse-midwives at Moi Teaching and Referral Hospital.

Methods: A cross-sectional descriptive study was conducted with 379 participants. A total of 309 pregnant women were selected using systematic sampling technique. A census approach was used to recruit 70 nurse-midwives working at the maternal and child health units. The functionalist theory and health belief model were used to generate the conceptual framework for this study. Interviewer administered structured questionnaire were employed for pregnant women and self-administered questionnaires were used in the case of nurse-midwives. Descriptive results were presented in frequency tables, bar charts and pie charts as appropriate. Ordered logistic regressions were conducted to respectively ascertain the predictors of and differences in pregnant mothers' and nurse-midwives' knowledge and perceived barriers to maternal oral health. A p value <.05 at 95% confidence level was considered significant.

Results: Majority 266 (86%) had a low level of oral health knowledge by agreeing to the statement that it is normal to have a bleeding gum during pregnancy and that dental extraction is unsafe during pregnancy. The nurse-midwives in the antenatal ward were more knowledgeable on maternal oral health than those in the antenatal clinic (Coef. = 3.082, $p<0.005$). Women who had basic or secondary education demonstrated poorer knowledge (Coef. =-0.736, $p=0.016$) and attitude (Coef. =-0.453, $p=0.54$). Barriers to oral healthcare included and not limited to not being informed about the need to visit the dentist 256(83%) and high cost of dental treatments 232(75%). Barriers cited by nurse-midwives were among others, lack of guidelines on oral healthcare during pregnancy 43(61%) and lack of in-service training on maternal oral healthcare 39(56%).

Conclusion: Pregnant women have low knowledge and attitudes on the importance of oral health care during pregnancy. Nurse-midwives knowledge and attitudes on oral health care during pregnancy is sub optimal. Nurse-midwives and pregnant women indicated lack of guidelines and lack of information as major barriers to maternal oral health.

Recommendations: There is the need for targeted in-service training programmes for nurse-midwives on maternal oral healthcare and development of customised guidelines for oral health assessment to improve the knowledge and attitude of antenatal care providers. Dental health care should be incorporated into the Kenya free maternity care policy to reduce barriers such as cost of dental treatment.

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ABBREVIATIONS

ACOCG	American College of Obstetricians and Gynaecologist
ANC	Antenatal Care
LBW	Low Birth Weight
LMICs	Low and Middle-Income Countries
MOH	Maternal Oral Health
MTRH	Moi Teaching and Referral Hospital
MTRH/MU-IREC	Moi Teaching and Referral Hospital and Moi University Institution Research and Ethics Committee
PD	Periodontal Disease
WHO	World Health Organization

CHAPTER ONE

1.1 Background

Diseases that affect the teeth, lips and tongue are known as oral diseases (Nouaman et al., 2015). The most common global oral health burdens are dental caries and periodontal diseases (Nouaman et al., 2015). Internationally, oral health has been given minimal attention in terms of research. However, poor oral health has a significant impact on the quality of life of affected individuals. It is evident that most people are affected worldwide, but the majority of the people affected are in Low and middle-income countries (LMICs). This high prevalence is because LMICs have limited access to dental services (Iseselo et al., 2017).

Pregnant women are more at risk for oral health problems like periodontitis and gum diseases due to hormonal changes, frequent vomiting, changes in diet coupled with lowered immunity (Toker et al., 2020). Progesterone levels rise during conception, and this promotes dilation of gingival capillaries. As a result, gingival capillaries are dilated. The increased hormonal levels put the mother at risk of being affected by an oral condition like bleeding gums. This condition may result in adverse health effects on mother and infant if not treated.(Africa & Turton, 2019; Govindaraju et al., 2015; McNeil et al., 2016; Vamos et al., 2015). New mothers with dental caries can quickly transfer decay-causing bacteria to the infant through kissing, cleaning toys with saliva and blowing air on food. These practices can lead to early childhood caries(Bahramian et al., 2018; George, Dahlen, Blinkhorn, et al., 2016; Heilbrunn-Lang et al., 2015). Furthermore, periodontitis has also been linked to preterm birth, but this association has not been fully established in some countries (Govindaraju et al., 2015).

Good maternal oral health can only be achieved if antenatal health care providers, especially nurse-midwives, have good knowledge and attitude regarding maternal oral health while caring for pregnant women.

A systematic review examined the range, scope, and impact of existing oral health promotion interventions during prenatal care and found that oral health promotion interventions during pregnancy are mostly directed towards preventing childhood carries and not the pregnant mother(Vamos et al., 2015). Attitude acts as a predisposition variable to the ability to provide oral health care to pregnant women. Eventually, it can influence the nurse-midwives performance of oral health assessment for pregnant women.

A study conducted in Australia by George et al. (2016) revealed that midwives being the key providers of antenatal care (ANC), demonstrated good attitudes towards oral health promotion activities for pregnant women(George, Dahlen, Reath, et al., 2016). They also accepted that oral health is vital to the health of the mother and child. In addition, they have a major role to play in promoting maternal oral health.

Some barriers were identified concerning the low uptake of dental services by pregnant women, including workload, unawareness and inadequate skills of the nurse-midwife(George et al., 2018; Villarosa et al., 2018). Moreover, lack of collaboration among nurse-midwives and dentists and midwives not being sure if oral health is within their scope of practice were also identified as barriers to promoting maternal oral health during prenatal follow up visits (Bahramian et al., 2018).

1.2 Problem Statement

It is estimated that about 40% of pregnant women have oral health issues, and about 10% might experience oral tumours globally(Abou El Fadl et al., 2016; Vamos et al., 2015). In a nationwide survey among 7,500 midwives in Germany, it was established that there was a misunderstanding among midwives on what to recommend to pregnant women on oral health(Wagner & Heinrich-Weltzien, 2016). Furthermore, a cross-sectional survey conducted among 33 directors of midwifery programmes in the United States of America showed that maternal oral health courses were included into the training of midwives; however, their graduates were not competent to perform oral health assessments. This study identified that running the oral health program for midwives was difficult due to a lack of experts in this field (Haber et al., 2019). In Mali, Hess et al. (2017) reported a very high prevalence of periodontal diseases among expectant mothers. Studies have shown a positive correlation between low birth weight and periodontitis(Gichuki et al., 2021). Again, in Kenya 100% prevalence of periodontitis was reported by Wanjohi (2020) in Kiambu County among pregnant women. The study also, highlighted that these women were not treated even after the delivery of their infants.

At Moi Teaching and Referral Hospital, antenatal care is carried out by nurse-midwives who are mostly interested in another aspect of care like abdominal examination and most often, oral health is neglected. The mother and child health handbook used in the care of these women at Moi Teaching and Referral Hospital and Kenya includes only scanty information on the care of the teeth during pregnancy. Furthermore, the book only advises pregnant women on brushing twice a day. Still, it does not give information on the impact of poor oral health on pregnancy outcomes and referral pathways(MOH, 2016). Pregnant women also fail to seek care mainly because their nurse-midwife did

not mention oral health during antenatal care or due to other factors. The area of maternal oral health has been given the least attention, especially in Africa. There is inadequate research on the knowledge, attitude and barriers among expectant mothers and nurse-midwives in promoting oral health care during pregnancy, especially in East Africa, where Kenya is no exception. Therefore, the purpose of this study is to assess the knowledge, attitudes and barriers to maternal oral health among pregnant women and nurse-midwives at Moi Teaching and Referral Hospital (MTRH),Eldoret , Kenya.

1.3 Justification of the Study

There is inadequate literature on the knowledge, attitudes and barriers of maternal oral health among pregnant women and nurse-midwives. The majority of research in this field of study is focused on gynaecologists and obstetricians who, in most cases, only provide care for pregnant women who are considered high risks. Nurse-midwives are the key care providers for pregnant women in LMICs, including Kenya. In Kenya, nurse-midwives are the first professionals' women seek care from when they are pregnant. Also, nurse-midwives spend the most time with women throughout pregnancy and postnatal care. Therefore nurse-midwives are in the right place to educate women about their oral health. It is also well established that most pregnant women are willing to adopt a healthy lifestyle during pregnancy to avoid poor birth outcome and mostly rely on ANC education conducted by nurse-midwives.

When maternal oral problems of expectant mothers are addressed during prenatal follow up visit it will : save pregnant women the time and money in visiting the hospital solely for dental treatments, reduce the transfer of tooth decay bacteria to the infants when is born, help the mother maintain a good nutritional status, make new mothers confident in caring for the gums and teeth of their new-borns and most importantly,

there will be reduction in poor maternal outcomes like preterm birth, low birth weight ,preeclampsia and stillbirth that has been associated with poor maternal oral health.

Again, Nurse-midwives clear understanding of the impact of poor maternal oral health during pregnancy will make integrating maternal oral health screening tool in routine practice easy to implement which will enable nurse-midwives to identify and refer pregnant women who are at risk of oral health diseases.

Furthermore, it is well established that women will consider oral health in pregnancy important if their nurse-midwives continually talk about it while caring for them throughout pregnancy and postnatal period. In Kenya, no study has assessed the knowledge, attitudes and barriers among pregnant women and nurse-midwives on maternal oral health. Therefore, the aim of our study is to fill the gap in the literature on maternal oral health by assessing the knowledge, attitudes and barriers of pregnant women and nurse-midwives at Moi Teaching and Referral Hospital (MTRH) on maternal oral health.

1.4 Main Objective of the Study

To assess the level of knowledge and attitude of pregnant women and nurse-midwives on maternal oral health and the associated barriers to maternal oral health services at Moi Teaching and Referral Hospital.

1.4.1 Specific Objectives

1. To assess the knowledge of pregnant women and nurse-midwives on maternal oral health at Moi Teaching and Referral Hospital.
2. To determine the attitude of pregnant women and nurse-midwives on maternal oral health at Moi Teaching and Referral Hospital.

3. To identify the barrier to oral health among pregnant women receiving care and nurse-midwives at Moi Teaching and Referral Hospital.
4. To compare the attitudes and barriers to maternal oral health among pregnant women and nurse-midwives at Moi Teaching and Referral Hospital

1.4.2 Research Questions

1. What is the knowledge of pregnant women and nurse-midwives on maternal oral health at Moi Teaching and Referral Hospital?
2. What is the attitude of pregnant women and nurse-midwives on maternal oral health at Moi Teaching and Referral Hospital?
3. What are the barriers to maternal oral health among pregnant women and nurse-midwives at Moi Teaching and Referral Hospital?
4. What are differences in the attitudes and perceived barriers to maternal oral health among pregnant women and nurse-midwives at the Moi Teaching and Referral Hospital?

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section of the thesis reviews the relevant empirical literature on maternal oral health among pregnant women and nurse-midwives. The review adopted the "funnel shape" approach. Literature from the global, continental and national levels were systematically reviewed, analysed, and synthesised guided by the research objectives and thematic areas. The theoretical framework underpinning this study is also briefly explained in this section. Databases used during literature search include Google Scholar, PubMed, Jstor, BioMed Central, African Journals Online and ScienceDirect. Also, the keywords used in the literature search includes oral health, maternal oral health, midwives, nurse-midwives, pregnant women, knowledge, attitudes, barriers

Most countries worldwide have directed their attention towards improving and scaling up maternal and new-born services to achieve sustainable development goal three (3) by 2030 (Symon et al., 2016).

Countries in Africa contribute 66% of all maternal deaths worldwide, with the leading cause of death being post-partum haemorrhage, hypertension in pregnancy and sepsis (Kumakech et al., 2020). It is well established that midwifery-led care can improve maternal and infant outcomes in marginalized communities by providing low-cost antenatal, intrapartum and postnatal education and care, especially to pregnant women with low-risk pregnancies (Donnellan-Fernandez et al., 2018).

Midwifery care is based on the natural capability of the woman to go through pregnancy and birth with little or no intervention. The care midwives provide is associated with reduced risk of small-for-gestational-age, preterm deliveries and low birth weight for

pregnant women of low socioeconomic status (Darling et al., 2019). The philosophy underpinning midwifery practice provides individualised, holistic, women-centred, collaborative, and evidence-based care (Yanti et al., 2015).

Introducing the continuity of care model in midwifery-led care has shown high women satisfaction internationally(Mattison et al., 2020).In most countries, midwives are the first to interact with women when they are pregnant and hence are in a good position to deliver health education to these expectant mothers (George et al., 2018).

In 2013, Lira University in Uganda started a midwifery programme to train advanced midwifery practitioners to provide cost-effective but quality maternal and child health services in rural areas where maternal and newborn outcomes were poor. The program has trained midwives who are well equipped and skilled in managing birth complications and performing minor obstetric surgeries such as caesarean sections(Kumakech et al., 2020).

Also, in 2018 Bangladesh absorbed the first batch of diploma midwives into the healthcare system as part of the government attempt to scale up access to skilled birth attendants (Zaman et al., 2020). Besides midwives being more acceptable to women, they also spend much time with women providing a continuum of care throughout pregnancy and postnatal care. This group of professionals are in the right position to educate women about their oral health(Nguyen et al., 2020; Wagner & Heinrich-Weltzien, 2016).

In Nigeria, a new cadre of professionals known as community midwives has been introduced to work in rural areas because of the high mortality rate in rural communities. As a result, the training is restricted to young women who reside in rural

communities because they are being trained to deliver care in the rural communities, which has yielded positive results(Okereke et al., 2019).

It is estimated that about 40% of pregnant women are affected by periodontal diseases. However, a greater number (59%) of expectant mothers are not taken through oral health education during their entire pregnancy(Hoerler et al., 2019).

Oral health education is important during prenatal care because research has shown that poor maternal oral health can lead to adverse pregnancy outcomes like preterm birth, low birth weight(Khanna et al., 2018; Riggs et al., 2016) and preeclampsia(Jaiman et al., 2018; McNeil et al., 2016).

In most instances, pregnant women with dental issues fail to seek care because their nurse-midwife never included any information on maternal oral health during antenatal education. Moreover, most pregnant women have the misconception that dental treatment may negatively impact their unborn child (Nguyen et al., 2020).

Another study conducted in Tanzania to determine the prevalence of periodontal disease and associated adverse pregnancy outcomes among 1117 post-partum mothers shows a high incidence of periodontitis among participants. However, there was no association between periodontitis, eclampsia, preterm premature rupture of membrane (PPROM), and eclampsia(Gesase et al., 2018).

In Kenya, a cross-sectional study involving 384 post-partum mothers conducted in Kiambu County of Kenya examined the link between low birth weight and periodontitis showed that there was a positive correlation between low birth weight and periodontitis. The study also highlighted that majority of the participants (86.5%) never received any form of education on maternal oral health throughout pregnancy(Gichuki et al., 2021).

Again, in Kenya, Wanjohi, 2020 conducted a study to determine whether there was an link between maternal periodontal disease and preterm birth in an institutional case-control study among 235 postnatal mothers. This study's findings did not show a positive correlation between maternal periodontitis and PTLBW(Wanjohi, 2020). Again, the study highlighted that all the postnatal mothers who participated in the study were affected by periodontitis which was not treated even after delivery.

2.2 Theoretical Framework

The entire research centred on the functionalist theory and the health belief model.

2.2.1 Health belief model

The health belief model was applied in the case of pregnant women. This model guide health promotion and disease prevention programs. The model is mostly utilized in the explanation and prediction of individual change behaviours. It has two key elements: the belief of the condition that intends to predict a person’s health-related behaviours. This model also highlights the key factors that may influence an individual's health-related behaviours: the perceived threat to sickness, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.

The health belief model posits that health education will change behaviour if health-related messages are directed towards perceived barriers, threats, severity, benefits, and self-efficacy. Suppose pregnant women can perceive that they are at risk of dental problems. In that case, they will seek information about the consequence of the problem; they will take steps to improve on her health-related behaviour; this will enable them to identify and reduce the barriers involved and consequently, they will be able to develop skills in the new behaviour change(Hochbaum et al., 1952).

2.2.2 Functionalist theory

The functionalist theory was used in the case of nurse-midwives. The theory posits that an institution exists because of its vital role in the stability of society as a whole (Merton, 1968).

Any institution that fails to serve its role dies off, and new institutions will evolve to meet society's changing needs. Merton (1968) divided human functions into two types: manifest functions and latent functions. The manifest functions are intentional, obvious and easily apparent.

However, a latent function demands a sociological approach to be revealed. Merton (1968) believes that every structure has many parts, some more obvious than others. He identified three main limitations to functionality which are; functional unity, universal functionalism and indispensability. In this study, nurse-midwives can be seen as institutions in the health care system whose manifest and latent functions work together to ensure a healthy mother and baby at the end of pregnancy (stability).

However, dysfunction in this duty indicates a change in either manifest function or latent function to bring back the stability. This dysfunction may manifest in the inability of the nurse-midwives to educate pregnant women about oral hygiene, which may be due to limited knowledge on the part of nurse-midwives, among other factors(Merton, 1968).

2.3 Knowledge, Attitude and Barriers of Pregnant Women on Maternal Oral Health

2.3.1 Knowledge of Pregnant Women on Maternal Oral Health

A study conducted in London to determine pregnant women’s oral health knowledge and plans to provide dental care for their expected child revealed that pregnant women

were less knowledgeable on the oral health of the infant and maternal oral health. The majority of the participant in this study did not know that excessive juice intake could result in early childhood caries. Moreover, most pregnant women were not given information by prenatal providers on oral health during pregnancy(Correia et al., 2017).

Further, a study conducted in Spain assessed oral health awareness among 139 pregnant women also found out that a minority of pregnant women were less knowledgeable on oral health preventive measures. In this study, oral health awareness was directly correlated with having undergone an oral health program. However, only 10% of the women in this study were taken through an oral health program during their pregnancy(Llena et al., 2019).

In Italy, Aiuto et al. (2020) assessed the habit and awareness of 763 pregnant women on the importance of oral health for the mother and their growing fetus. They highlighted that the awareness level was poor. The majority of the respondents were unaware that caries causing bacteria could be transferred from the mother to the infant through saliva(Aiuto et al., 2020).

In Indonesia, a study analysed the effectiveness and contributing factors of oral health knowledge improvement among 47 pregnant mothers using mobile application highlighted that mobile application effectively enhanced the knowledge of pregnant women in this study. Participants' knowledge in this study increased by 31% after education using the mobile application(Setijanto et al., 2021).

Furthermore, a study in China examined the correlations among oral health knowledge, attitude, practices and oral diseases among 82 pregnant women in China reported that the knowledge level of women was inadequate. Participants in this study could not correctly identify the signs and symptoms of dental caries; they were unsure about the

safety of dental treatments and were unaware of the care for bleeding gums(Balan et al., 2018).

In India, Chawla et al. (2017) conducted a longitudinal study among 112 pregnant women to observe the effect of oral health education on knowledge, attitude, practice, oral health status, and treatment needs on pregnant women belonging to different socioeconomic groups found out that the knowledge level of pregnant women was limited before the intervention. However, the knowledge level increased among all socioeconomic groups after the intervention; but women with high socioeconomic status had the highest score in knowledge(Chawla et al., 2017).

Similarly, another study assessed the oral health knowledge level of 606 pregnant women visiting a government maternity hospital in India, indicated that pregnant women's knowledge level was below average. This inadequate knowledge is because the participants in this study were not aware that fluoridated toothpaste prevented dental caries. Most of them did not know the signs of gum disease and were ignorant that pregnancy could increase their chances of getting a gum disease. This group of women were also unaware that poor oral health could impact the growing foetus (Lakshmi et al., 2020).

Furthermore, in India, Ramamurthy & Irfana. (2017) assessed the awareness of 100 pregnant women in a cross-sectional study established those pregnant women were more knowledgeable in other aspects of health. However, the women were deficient in oral health knowledge and the impact of pregnancy on their oral health(Ramamurthy & Irfana, 2017).

Again, in India, one study assessed the oral health status and knowledge gain after an educational program on oral health among 159 pregnant women receiving antenatal

care reported that the oral health knowledge of women was below average at baseline. Moreover, the knowledge of women increased significantly after a one on one educational session in respective of social class, educational level and age(Bansal et al., 2019).

A cross-sectional study in Pakistan conducted among 350 pregnant women assessed the knowledge and awareness about the bidirectional relationship between gingival inflammation and adverse pregnancy outcomes established that the knowledge level was inadequate. About 66% of the participants were not aware of the relationship between pregnancy gingivitis and pregnancy outcome(Khan et al., 2020).

Lubon et al. (2018), in Nepal, aimed at understanding dental care-seeking patterns, oral hygiene practices, attitudes and knowledge on the oral health of pregnant and recently delivered women, found that most of the women were not knowledgeable about the impact of poor oral health on their pregnancy and were not able to identify oral health problems correctly.

Furthermore, in Nepal, Sherpa et al. (2020) also reported that pregnant women knowledge of oral health was average. The majority of the participants were unaware that fluoridated toothpaste was important for preventing dental caries(Sherpa et al., 2020).

Furthermore, a qualitative study conducted among 50 pregnant women explored the knowledge and practices on oral health in Nepal reported that the knowledge levels of women regarding oral health were low as the majority of the women did not know that decay-causing bacteria could be transferred from the mother to the baby if maternal tooth decay was left untreated. Also, the women in this study were not aware of the link

between poor maternal oral health and adverse pregnancy outcome(Gupta & Chhetry, 2019).

In Saudi Arabia, a study conducted among 360 pregnant women explored women's knowledge on the oral health of infants, maternal oral health, and the possible relationship between oral health and adverse pregnancy outcomes found out that almost all the women had good knowledge on infant oral health. However, participants knowledge was poor on maternal oral health and the impact of oral health on pregnancy outcomes. This deficiency in awareness is because oral health education during prenatal care was mostly focused on infant oral health. In addition, majority of the women in this study had a misconception that dental check-up during pregnancy was harmful (Abu-Hammad et al., 2018).

Again, in Saudi Arabia, Togoo et al. (2019) conducted a study that assessed the level of knowledge on pregnancy gingivitis and children's oral health among 251 pregnant women, highlighting that most of the participants were unaware of the fact that pregnancy gingivitis may result in adverse pregnancy outcomes. The pregnant women in this study were also less knowledgeable about the causes, prevention and treatment of pregnancy gingivitis. In addition, participants who were educated were knowledgeable as compared to those who were not educated (Togoo et al., 2019)

Literature in Africa revealed similar findings on the knowledge of maternal oral health among pregnant women. In Egypt, Khalaf et al. (2018) assessed the knowledge, attitudes and reported practices among 365 pregnant women reported that women knowledge on oral health was below average because less than half of the pregnant women did not know the causes of tooth problems like gum diseases. The respondents in this study were unaware of the best time to visit the dentist during pregnancy. The

majority of the participants indicated that their source of information on oral health was the media (Khalaf et al., 2018).

Another study in Egypt aimed to enhance pregnant women's knowledge of dental care and periodontitis outcomes highlighted that women's knowledge on oral health at baseline was below average, with the majority of the women stating friends and relatives as the main source of oral health information. Moreover, the knowledge of women on dental care, periodontitis and infant oral care increased significantly after educational intervention on oral health(Mohamed & Hassan, 2019).

In contrast, in Zambia, Kabali et al. (2018) determined the level of knowledge of the periodontal disease, practices regarding oral health, and self-perceived periodontal problems among 410 pregnant and postnatal women reported that knowledge on the periodontal disease was above average with expectant mothers being more knowledgeable. The women in this study were deficient in knowledge on the causes of periodontitis and dental plague (Kabali & Mumghamba, 2018).

Furthermore, Omisakin et al. (2021) assessed the level of knowledge, attitude and practice of oral health among 320 pregnant women attending antenatal clinics at a teaching hospital in Nigeria reported that the knowledge level of women on oral health was moderate. More than half of the participants pointed out that they had never heard of dental caries(Omisakin et al., 2021). Similarly, a cross-sectional study conducted among 274 antenatal attendees in Benin city in Nigeria also reported that the knowledge level of participants on oral hygiene was not satisfactory, with the majority of the women indicating school and mass media as their main source of oral hygiene information (Adams et al., 2017).

Again, in Nigeria, Hannah & Howells. (2020) assessed 225 pregnant women attending antenatal clinics at three selected hospitals in River State reported that the knowledge level of pregnant women was above average, with the main source of oral health information being the mass media. The majority of expectant mothers in this study were deficient in knowledge of the possible link between dental problems and poor pregnancy outcomes(Hannah & Howells, 2020). No studies were found in Kenya in regards to knowledge of pregnant women on maternal oral health.

2.3.2 Attitude of pregnant women on maternal oral health

A study conducted in Indonesia reported that pregnant women's attitudes on oral health were good, as 55% of the participants stated that they visited the dentist routinely for preventive services(Setijanto et al., 2021).

In China, Balan et al. (2018) reported that pregnant women had a negative attitude toward oral health in pregnancy. Most of the participants who had oral health problems did not seek dental care.

A study in India observed the effect of oral health education on knowledge, attitude, practice, oral health status, and treatment needs of pregnant women belonging to different socioeconomic groups, highlighted those pregnant women in all socioeconomic groups had good attitudes towards oral health during pregnancy before intervention. Moreover, the attitude level after the intervention was more enhanced (Chawla et al., 2017).

In Nepal, Lubon et al. (2018) explored the dental care seeking pattern, practices of oral health hygiene attitude and knowledge on the oral health of pregnant and recently delivered women. They also found out that majority of the women had a negative

attitude towards oral hygiene. The respondents in this study stated that they brush their teeth once with either a toothbrush or toothpaste (Lubon et al., 2018).

Furthermore, in Nepal, a cross-sectional study among 120 pregnant women revealed that women had a negative attitude regarding oral health. In this study, only 15% of the pregnant women indicated that it was necessary to see a dentist at least once during pregnancy(Sherpa et al., 2020).

Again, Napel reported that pregnant women had poor attitudes towards oral health as the majority of the pregnant women indicated that they brush their teeth only once a day and had never visited the dentist for dental check-up throughout their pregnancy(Gupta & Chhetry, 2019).

In a study conducted in Saudi Arabia majority of the expectant mothers had a negative attitude on maternal oral health care because the women in this study believed that any form of dental treatment was harmful during pregnancy(Abu-Hammad et al., 2018).

In Egypt, Khalaf et al. (2018) assessed oral health knowledge and attitudes of pregnant women. The study reported that practices among pregnant women established that more than half of the women believed that it was unsafe for pregnant women to visit the dentist for routine care.

Furthermore, in Nigeria, Osmisakin et al. (2021) reported that pregnant women had a positive attitude toward oral health. A good number of the participants in this study did not know the causes of tooth decay and gum diseases.

Similarly, in Nigeria, Adam et al. (2017) established that women's attitudes on oral hygiene were positive in a cross-sectional study among 274 antenatal attendees in the

Benin City of Nigeria. The pregnant women in this study stated that there was a need for a dental check-up during pregnancy.

Again, Hannah & Howells. (2020) assessed the knowledge, attitude and practices among 225 pregnant women attending antenatal clinics at three selected hospitals in River State reported that the attitude towards oral health was poor among respondents. The majority of the participants indicated that dental visits during pregnancy were safe; however, most never visited the dentist for consultations and professional teeth cleaning. No studies were found in Kenya in regards to pregnant women attitudes on maternal oral health.

2.3.3 Barriers of pregnant women to maternal oral health

In the United States, Dragan et al. (2018) identified lack of insurance cover as a barrier to the utilization of oral health by pregnant women(Dragan et al., 2018). Similarly, in China, Balan et al. (2018) identified that the cost of dental treatment and not having dental insurance was the cause of the underutilization of dental services by pregnant women (Balan et al., 2018). A cross-sectional study in Jerusalem also identified cost, time and provider's advice as a barrier to utilization of dental services by pregnant women (Kateeb & Momany, 2018).

Furthermore, Kumar et al . (2021) in India assessed the oral health awareness and practices among 158 pregnant women identified limited time due to busy schedule, lack of knowledge on the importance of oral health and peer influence as a major barrier to the uptake of dental services by pregnant women (Kumar et al., 2021).

Furthermore, Ramamurthy & Irfana. (2017) in India also reported that the high cost of dental treatment was a major barrier to using dental services by pregnant women.

A study in Nepal conducted to understand the care-seeking patterns, practices of oral hygiene, attitudes and knowledge on the oral health of pregnant and recently delivered women established that women were not willing to seek care at the early stages of dental problems due to the limited number of dental professionals, distance from home to health facility, lack of finance and transportation were identified as barriers to maternal uptake of dental services(Lubon et al., 2018).

Again, in Napel, Gupta & Chhetry. (2020) reported that lack of awareness about the importance of oral health in the prenatal period, cost, and concerns regarding the safety of dental treatment during pregnancy was a major barrier to maternal oral health. Similarly, another study in Nepal among 1452 pregnant participants identified time, cost and not being taken through lessons on how to properly clean teeth as a barrier to oral health during pregnant women (Erchick et al., 2019).

Bahramian et al., 2018 in Iran explored the barriers and facilitators influencing pregnant women's dental utilization found out pregnant women fail to seek oral health care due to limited knowledge, misconception about dental treatment, the expensive nature of the dental treatment, fear of the dentist, cultural taboos and time limitations.

Lnjewile-Marealle explored the factors influencing oral health services utilization in Lesotho; South Africa highlighted high cost, fear, anxiety and ignorance as major barriers to the uptake of oral health(Linjewile-Marealle, 2017).

In Nigeria, Osmisakin et al. (2021) also indicated that the main barrier to oral health was low-socioeconomic status. Another study in Nigeria evaluated the knowledge level of mothers on oral health and oral hygiene practices established that the expensive nature of dental services, inadequate knowledge, lack of dental insurance and

misconception about the safety of dental treatment were major barriers to dental health care utilization(Olatosi et al., 2020). No publication was found in Kenya.

2.4 Knowledge, Attitude and Barriers of Nurse-Midwives on Maternal Oral Health

2.4.1 Knowledge of nurse-midwives on maternal oral health

A nationwide survey in Germany assessed the oral health knowledge and preventive recommendations for pregnant women, infants, and young children reported that a greater number of midwives gave out information about oral health to their clients. Still, most (78.6%) did not know about the association between periodontal diseases and poor pregnancy outcomes (Wagner & Heinrich-Weltzien, 2016).

A web-based survey in the city of Midwestern United States reported that most prenatal care professionals were knowledgeable on oral health during pregnancy, with midwives and nurses being more knowledgeable than the other prenatal care providers (general physicians and residents) on oral health during pregnancy(Hoerler et al., 2019).

Again, Mayberry et al. in 2020 in the U.S.A conducted a pilot project called “the Oral Health Pregnancy Day Initiative” aimed at increasing dental utilization among expectant mothers and improving dental students’ awareness, comfort and knowledge of the impact of poor oral health on birth outcomes reported that dental students’ level of knowledge increased significantly at the end of the project. After the program, the majority of the dental students stated that they were now fully aware of the impact of poor maternal oral health on pregnancy outcomes. These young professionals indicated that they were more confident in maternal oral health and were most likely to treat pregnant women in the future(Mayberry et al., 2020).

Similarly, in Virginia, Naavala & Claiborne (2021) explored prenatal care provider's practice in the area of oral health assessments and highlighted the reasons for the gap in maternal oral health inclusion in prenatal care also brought to light that midwives were knowledgeable on maternal oral health(Naavaal & Claiborne, 2021).

Studies have reported that most antenatal care providers do not have the required skills to provide oral health care to pregnant women. This is because caregivers did not have adequate information on the referral pathways and were not sure of the safety of dental treatment during pregnancy even though it is well established that dental treatment is safe during all trimesters(George, Dahlen, Reath, et al., 2016; Kong et al., 2020).

A study aiming at determining the awareness of midwives and nurses working in 34 (thirty-four) family health centres on oral and dental health in pregnancy among 106 midwives and nurses in the city Mediterranean Region of Turkey reported that the awareness level concerning oral and dental health knowledge was inadequate among the participants (Toker et al., 2020).

Similarly, another study in Turkey evaluated the knowledge levels of gynaecologists, obstetricians, dentists, family physicians, and midwives also reported that midwives and family physicians were less knowledgeable on maternal oral health and hence did not refer and examined the oral cavity during prenatal care (Koca, 2020).

A study conducted in Turkey reported that the knowledge level of nursing and midwifery students was inadequate, and this was due to the exclusion of dental and oral health programs in their training curriculum, with very few of the participants indicating that they would like oral and dental health programs included in their curriculum(Ayık et al., 2017).

Likewise, a study in India by Sudhakar et al. (2019) evaluated the knowledge, attitude, and prevention of periodontal diseases among health care professionals, including nurses, reported that the professionals' knowledge levels on oral health were below average. This prevented them from speaking to their client about oral health. The study also highlighted that professionals who had had dental examinations or lost a tooth before were more likely to talk to expectant mothers about oral health(Sudhakar et al., 2019).

In contrast, another study in India evaluated the knowledge and awareness of gynaecologists regarding the association between periodontitis and adverse pregnancy outcomes among 50 practising gynaecologists concluded that gynaecologists were fully aware of the association between maternal periodontitis and poor pregnancy outcomes(Sinha et al., 2020).

Further, in India, Ganganna & Devishree. (2017) evaluated the knowledge, attitudes and practices of dentists and gynaecologists on the link between oral health and PLBW found that dentists are more knowledgeable in oral health knowledge but were less aware of the link between periodontitis preterm low birth weight(Ganganna & Devishree, 2017).

A study conducted in Birjand (Iranian) involving two (2) obstetricians and 88 midwives reported a high level of knowledge among participants, with the source of current information being continuous professional educations courses(Alizadeh et al., 2019). Again, in Iranian, Bakhshi et al. (2019) evaluated the knowledge and practice of gynaecologists regarding oral and dental health during pregnancy. They concluded that the knowledge on maternal oral health was average(Bakhshi et al., 2019).

Rayyani et al. (2021) evaluated the knowledge and practice of dentists in Bandar Abba (Iran) regarding the required measures during pregnancy among 93 dentists found out that most of the dentists had average knowledge on maternal oral health, with only 33% reported to have high knowledge(Rayyani et al., 2021).

In Australia, Nguyen et al. (2020) conducted an online survey to evaluate midwives' awareness, attitude and practice regarding periodontal health of expectant mothers reported that midwives had good knowledge(Nguyen et al., 2020). Again, another study in Australia that explored ANC providers' knowledge, attitude, and practice on maternal oral health reported that ANC providers' knowledge on oral health was below average(George, Dahlen, Reath, et al., 2016). Further, a study in Australia explored the perspective of midwives in integrating oral health after undergoing online training on maternal oral health reported a very high increase in knowledge after training(Heilbrunn-Lang et al., 2015).

Lim et al. (2018) highlighted that midwives in this study were seen to be less knowledgeable on maternal oral health and referral pathway despite partaking in various in-service training in this area in a qualitative study to identify the barrier and facilitators of midwives to facilitate pregnant women's access to dental care during pregnancy (Lim et al., 2018).

Furthermore, it was reported by Riggs et al. (2016) that even though maternity facilities had clear guidelines and policies for assisting pregnant women who had oral conditions, midwives were not aware of the policies and guidelines and hence did not refer their patients to the dentist (Riggs et al., 2016).

In Saudi Arabia, a study that assessed gynaecologists' knowledge of the association between female sex hormones and women's periodontal health established that

gynaecologists were knowledgeable on the association between changes in sex hormones during pregnancy. The professionals in this study were not aware of the association between poor maternal periodontal health and poor pregnancy outcomes(Al-Qahtani et al., 2019).

In Pakistan, Ayaz et al. (2019) assessed the knowledge, attitude and practices of prenatal care providers on maternal oral health in pregnancy reported that the majority of the ANC providers were knowledgeable on oral health(Ayaz et al., 2019).

Reviewed literature on Africa revealed similar findings on the knowledge of maternal oral health among nurse-midwives.

In Nigeria, one study which assessed and correlated the oral health knowledge, attitudes and behaviour of medical students, pharmacy students and nursing students reported inadequate knowledge among the young professionals(Bashiru & Omotola, 2016). This study also highlighted that medical student had higher knowledge in oral health than pharmacy and nursing students. This was attributed to the inclusion of community oral health in the training of the medical students, which was not included in the training of nurses and pharmacists (Bashiru & Omotola, 2016).

Likewise, a study in Rwanda which assessed the knowledge, attitude and practice of periodontal diseases among midwives and nurses working in 12 selected facilities in Southern Province reported that knowledge levels were below average(Uwambaye et al., 2020). No study in Kenya was found on the knowledge of nurse-midwives on oral health.

2.4.2 Attitude of nurse-midwives on maternal oral health

In France, a study by Boutigny et al. (2016) reported that prenatal care providers did not routinely provide oral examinations unless the patient complained about an oral condition(Boutigny et al., 2016). A web-based survey in the city of Midwestern United States reported that only a few of the professionals integrated oral health history taking and dental screening in their practices(Hoerler et al., 2019).

Similarly, in Virginia, Naavaal & Claiborne. (2021) explored prenatal care provider's practice in regards to maternal oral health assessments and perceived causes for the gap in oral health incorporation in antenatal care also brought to light that few midwives made referrals to the dentist in their practice(Naavaal & Claiborne, 2021).

In India, Sudhakar et al. (2019) evaluated the knowledge, attitude and prevention of periodontal diseases among health care professionals, including nurses found out that majority of the participants in this study had a good attitude towards oral health(Sudhakar et al., 2019).

Moreover, in India, another study evaluated the knowledge and awareness of gynaecologists regarding the association between periodontitis and adverse pregnancy outcomes among 50 practising gynaecologists highlighted that the knowledge was not in cooperated in their practice in most cases. In this study, only 14 gynaecologists out of 50 stated that they make referrals to the dentist(Sinha et al., 2020).

Further, in India, Ganganna & Devishree. (2017) evaluated the knowledge, attitudes and practice of dentists and gynaecologists on the link between oral health and PLBW identified that majority of gynaecologists in this study did not make referrals to the dentist for further treatment despite knowing that there was an association between maternal periodontitis and poor pregnancy outcomes(Ganganna & Devishree, 2017).

A study conducted in Birjand (Iranian) among two (2) obstetricians and 88 midwives reported a high level of attitude and practice, with the source of current information being continuous professional education courses. In this study majority, 96% of the participants had already been examining and screening for oral health during prenatal care(Alizadeh et al., 2019). Again, in Iranian, Bakhshi et al. (2019) evaluated the knowledge and practice of gynaecologists with regards to oral and dental health during pregnancy concluded that the practice levels were above average. However, the majority of the gynaecologist did not routinely perform an oral assessment of their clients. Furthermore, Rayyani et al. (2021) evaluated the knowledge and practice of dentists in Bandar Abba (Iran) regarding the required measures during pregnancy among 93 dentists established that the practices of the participants were average(Rayyani et al., 2021).

In Australia, Nguyen et al. (2020) conducted an online survey to evaluate midwives' knowledge, attitude, and practice regarding periodontal health of pregnant women reported that the midwives could not translate their knowledge into their practice. Most midwives did not communicate oral health information to expectant mothers, but a few of the midwives referred their clients to see a dentist(Nguyen et al., 2020). Another study in Australia explored ANC providers' knowledge, attitude, and practice on maternal oral health reported that even providers who had some theoretical knowledge on maternal oral health could not integrate oral health assessment into their practice(George, Dahlen, Reath, et al., 2016).

In Pakistan, Ayaz et al. (2019) assessed the knowledge, attitude, practices of ANC providers about oral health in pregnancy reported that providers had a poor attitude towards oral conditions during pregnancy(Ayaz et al., 2019). A nationwide survey in Germany assessed oral health knowledge and preventive recommendations for pregnant

women, infants, and young children. The study reported that more midwives gave out information about oral health to their clients (Wagner & Heinrich-Weltzien, 2016).

Andargie & Kassahum. (2019) assessed the knowledge and attitude of nurses towards patient oral health in a cross-sectional study among 422 nurses in Ethiopia reported that the oral health attitudes of nurses were poor .In this study 49 nurses in this study stated wrongly that oral health care was not part of their normal nursing routine(Andargie & Kassahun, 2019).

In Eritrea, a cross-sectional study evaluated the knowledge, attitudes and practices of 73 ICU (Intensive Care Unit) nurses found out that nurses' attitudes were above average (68.89%). Most of the nurses in this study were aware that oral health was one of their responsibilities in caring for patients (Dagnew et al., 2020).

A study in Rwanda which assessed the knowledge, attitude and practice of periodontal diseases among midwives and nurses working in 12 selected facilities in Southern Province reported that attitudes towards oral health were satisfactory(Uwambaye et al., 2020). No studies were found in Kenya.

2.4.3 Barriers of nurse-midwives to maternal oral health

A web-based survey in the city of Midwestern United States reported that time and workload were major reasons for not including maternal oral health in their practice(Hoerler et al., 2019). Similarly, in Virginia, Naavaal & Claiborne. (2020) explored prenatal care provider’s practice in relation to maternal oral health assessments and highlighted perceived reasons for the gap in oral health inclusion in the care during pregnancy. Also brought to light that maternal oral health was excluded from the training of midwives; hence they did not have the required skills to provide oral health assessment(Naavaal & Claiborne, 2021). Also, a good number of the

midwives had not received any in-service training on maternal oral health. A nationwide survey in Germany assessed the oral health knowledge and preventive recommendations for pregnant women, infants, and young children reported that preventive recommendations were not similar across professionals. This was associated with a lack of a uniform guideline(Wagner & Heinrich-Weltzien, 2016).

A study in Nepal reported that inadequate time and misconception about the safety of oral treatment during pregnancy were major barriers to promoting maternal oral health(Thapa & Acharya, n.d.).

In 2018, Bahramian et al. explored the barriers and facilitators influencing pregnant women dental service utilization in Tehran (Iran). This study was conducted among midwives, dentists, and pregnant women revealed that the majority of the midwives (85%) did not take continuous education courses regarding maternal oral health(Bahramian et al., 2018).

A study in Australia explored the knowledge, attitude and practice of ANC providers on maternal oral health reported that midwives were inadequate in skills needed for screening and counselling pregnant women on maternal oral health(George, Dahlen, Reath, et al., 2016). Again, a study in Australia explored the perspective of midwives in integrating oral health after undergoing online training on maternal oral health reported that provider's time was still a barrier to promoting maternal oral health. However, in the study, the majority of the midwives were confident to provide screening and counselling to women(Heilbrunn-Lang et al., 2015).

Lim et al. (2018) reported that the fear of not being able to answer women's questions on maternal oral health, time and language differences prevented midwives from talking to women about oral health during pregnancy (Lim et al., 2018) in a qualitative

study to identify the barrier and facilitators of midwives to facilitate pregnant women's access to dental care during pregnancy.

In addition to the above barriers, certain cultures also prohibit women from assessing dental care rendered by males. This also results in low uptake of dental services by pregnant women since most dentists were males(Abou El Fadl et al., 2016; Hess et al., 2017).

Iseselo et al. (2016) reported that the training curriculum for nurses and midwives in Tanzania included very little oral health training. Hence, graduates did not have adequate knowledge and skills to provide oral health examinations for their patients(Iseselo et al., 2017).

In 2019, Africa & Turton assessed the oral health status and treatment need in women attending ANC clinic in KwaZulu-Natal, South Africa and concluded that there was a need for strong collaboration between ANC care providers, pregnant women and dentists coupled with a clear referral pathway in other to reduce poor pregnancy outcomes due to poor maternal oral health(Africa & Turton, 2019). Another study was conducted in South Africa by Kolisa. (2016) also reported that maternal and child health providers incorporated some form of oral health education in their practice; however, barriers such as lack of educational materials, time on the part of the providers, and inadequate training of staff to confidently provide oral health services still exist(Kolisa, 2016). To conclude, no studies were found in Kenya.

2.5 Summary of Literature Review

Most of the studies reviewed internationally and locally reveal that nurse-midwives knowledge levels on maternal oral health were insufficient. Almost all studies conducted among gynaecologists and obstetricians have highlighted a high level of

knowledge among this group of prenatal care providers on maternal oral health; however, most of the knowledge was not integrated into the routine practice.

It was noted that most of the studies reporting better knowledge levels among pregnant women and nurse-midwives were studies conducted in developed countries. Regarding attitude towards maternal oral health, almost all the global and local studies reported that nurse-midwives had a good attitude towards maternal oral health.

Finally, lack of time on the part of the nurse-midwives due to workload, lack of practice guidelines on maternal oral health, cost, and culture, lack of professional collaboration between nurse-midwives and dentists and misconceptions about the safety of dental treatment and lack of in-service training were identified as barriers to maternal oral health both globally and internationally.

2.6 Conclusion

In African, very little has been done on the knowledge, attitudes and barriers of pregnant women and nurse-midwives on maternal oral health. No study in Kenya has assessed the knowledge, attitudes, and barriers regarding maternal oral health among pregnant women and nurse-midwives. The only studies concerning maternal oral health in Kenya are Gichuki et al. (2021) and Wanjohi. (2020) were conducted to examine the relationship between low birth weight and periodontitis among post-partum mothers. Therefore, this study seeks to assess pregnant women and nurse-midwives knowledge, attitude, and barriers to maternal oral health at Moi Teaching and Referral Hospital.

CHAPTER THREE

METHODOLOGY

3.1 Study Design

An institutional cross-sectional descriptive study was conducted among pregnant women and nurse-midwives at Moi Teaching and Referral Hospital, Eldoret, Kenya, East Africa.

3.2 Study Site

MTRH started in 1917 as a district hospital with a bed capacity of 60. MTRH became a teaching hospital and gained its current status on 12th June 1998. At any time, MTRH has an estimated number of 1300 inpatients and 1500 outpatients daily. MTRH is the second biggest hospital in Kenya, with a bed capacity of 1020. It is located in Eldoret (Uasin Gishu County). The hospital serves western Kenya regions (22 counties out of the 47 counties in Kenya), part of eastern Uganda and southern Sudan. MTRH is a Centre for training for the Kenya Medical Training College and University of Baraton East Africa's School of Nursing. MTRH also serve as a teaching hospital for Moi University College of Health Sciences that trains undergraduates and postgraduates health care providers. The maternity unit of MTRH consists of the antenatal clinic, antenatal ward, labour ward, postnatal ward and newborn unit. The estimated number of pregnant women receiving care at MTRH monthly is approximately 600, and on daily basis is 65.

3.2.1 Target Population

All pregnant women receiving care at the antenatal clinic at MTRH and nurse-midwives providing care to women at the maternity unit at MTRH.

3.3 Study Population

In terms of the clients, the study population were pregnant women coming for their subsequent prenatal visit at MTRH. The antenatal clinic provides care for about 950 pregnant women every month.

Regarding the health professionals, the study population were nurse-midwives involved in antenatal, postnatal and intrapartum units at MTRH, Eldoret, Kenya. The total number of nurse-midwives at MTRH as at April 2021 was 99. The distribution in the antenatal clinic, antenatal ward, postnatal ward and labour ward was 13, 16, 26 and 44, respectively.

3.3.1 Inclusion for nurse-midwives

Eligibility included all nurse-midwives with six months or more working experience in the prenatal unit, antenatal clinic, antenatal ward and labour ward. This group of nurse-midwives are experienced and have interacted with many pregnant women hence their inclusion in the study.

3.3.2 Exclusion for nurse-midwives

Nurse-midwives who were on leave.

3.3.3 Inclusion for pregnant women

Pregnant women visiting the unit for their second or more antenatal appointments at MTRH because these women might have interacted with at least one nurse-midwife and will be able to give an account of the care that is being rendered. These women might have been in contact with at least two or more nurse-midwives and hence will be able to give an account of their experiences.

3.3.4 Exclusion for pregnant women

Pregnant women younger than 18 years old were also excluded from the study because they were below consenting age. Again, the scope of this study focused on adult pregnant women.

3.4 Sampling/Sampling Size Determination

3.4.1 Sampling/Sampling Size Determination for pregnant women

Sampling: This study used a systematic sampling technique to reduce bias and create an equal distribution during data collection. In this study, every 3rd (950/309=3.07) pregnant woman was recruited until the required sample size was obtained.

3.4.2 Sampling size determination for pregnant women

The sample size for this study was determined by Yaro Yamane (1967) formula to calculate the sample size $n = \frac{N}{1+N(e)^2}$

N=population size =950

n=sample size

1=constant

e=margin of error which is 5% (0.05)

n=$\frac{950}{1+950(0.05)\text{^}2}$=281 sample size (n) =281

Adjusting for 10% non-respondents give as a sample size of 281+28=309

3.4.3 Sampling/Sampling Size Determination for nurse-midwives

There was no sample size required among nurse-midwives. This component of the study employed a census approach, where the entire population of nurse-midwives were invited to participate.

3.5 Data Collection Tool

The researcher administered structured questionnaire which was developed based on the study objectives. The questions were designed taking into consideration previous literature available on the subject area. The following concepts were investigated: 1. Socio-demographic characteristics of pregnant women and nurse-midwives 2. Knowledge of pregnant women and nurse-midwives on maternal oral health; 3. Attitudes of pregnant women and nurse-midwives in promoting maternal oral health; 4. Barriers to maternal oral health among pregnant women and nurse-midwives. The questionnaires were ranked on a five-point Likert scale with appropriate descriptions as 1= "Strongly disagree", 2= "Disagree", 3= "Undecided", 4= "Agree", and 5= "Strongly agree". Questionnaires were serially numbered to allow easy identification and accuracy of input into the data entry sheet for easy analysis. The study utilized two separate questionnaires for pregnant women and nurse-midwives. Also, a simple two-item validated midwifery screening oral health tool was included in the questionnaire of pregnant women.

3.6 Data Collection Procedure

Three Research assistants were trained on how to collect data using the research tool. The training of research assistants included detailed presentation of the study design and purpose, obtaining informed consent, and demonstrating among peers using the data collection instruments. The data collection for this study commenced at MTRH from 7th June 2021 to 30th July 2021 by the principal researcher and three research

assistants after training and completing a pilot study at Kapsabet Referral Hospital. The purpose of the study was explained to the participants, and informed consent was obtained. Respondents were given a copy of the signed consent forms. The researcher and research assistants administered the questionnaire to the participant in an interview. Individual respondents spent approximately 30 minutes completing a questionnaire. Measures were put in place to prevent the spread of COVID-19 throughout the data collection process. Facial masks were provided for research assistants and study respondents. Participants and research assistants maintained a distance of one meter during interviews, and hand sanitisers were provided for research assistants and participants to enable them to maintain hand hygiene before and after administering the questionnaire.

3.7 Data Analysis

Data were entered into an excel sheet. The data was then transferred into STATA version 15, cleaned and analysed. The results were organised in frequencies tables and bar charts. The chi-square test was utilized to compare the knowledge and attitudes of nurse-midwives and expectant mothers. Variables on knowledge and attitude were estimated/measured using five-point Likert Scale items ranging from 1= “Strongly disagree”, 2= “Disagree”, 3= “Neutral”, 4= “Agree”, and 5= “Strongly agree”. To set a proxy marker for high knowledge and desired attitude on the key constructs of interest, the Likert Scale responses were later dichotomised into binary outcomes were responses from 1-2 was coded or considered as “Low knowledge” or “Undesired attitude” while responses from 4-5 will be coded or considered as “High knowledge” or “desired attitude”. In the case of questions posed in the negative, reverse coding was done. The total number of knowledge items for nurse-midwives was 14, while those for pregnant women were 12. Questions on attitude for nurse-midwives were nine (9) and

seven (7) questions for pregnant women. Ordered Logistic Regression analysis was used to identify determinants of oral health knowledge and attitude at a 95% confidence level.

Table 3.1: Variable definition

Independent variables	Dependent variables
Nurse-midwives	Knowledge
Age	Attitude
Years of experience	Barriers
Educational level	
Department	
Pregnant women	
Age	
Marital status	
Educational level	
Occupation	
Trimester	
Number of pregnancies	

3.8 Pilot Study

The feasibility of the research instruments was determined through a pilot study conducted from 2nd June 2021 to 4th June 2021 among thirty-one (31) pregnant women and ten (10) nurse-midwives at Kapsabet County Referral Hospital. After the pilot study, questionnaire items were rearranged to flow; questions that were not clear were explained using signs and symptoms for clarity. Kapsabet County Referral Hospital was selected because it is a major referral hospital in Kapsabet County that provides care for pregnant women similar to our study site. In addition, Nandi County shares a border with Uasin Gishu county; therefore, pregnant women from both counties share identical characteristics.

3.9 Reliability and Validation

In this study, the tool for collecting data on pregnant women subjects was developed based on an adaptation from Chawla et al. (2017), who reported that the face and content validity of the questionnaire was done among 15 subject matter experts before starting the study. According to Chawla et al. (2017), the reliability of the questionnaire item was checked using WINPEPI software, and the Kappa value for the average scale reliability was found to be 0.81, which is acceptable. In the case of the tool for the nurse-midwives adapted from Nguyen et al. (2020), the Cronbach's alpha measuring the mean scale reliability of the questionnaire items was also reported to be above 0.80. The validity of the tools was tested in Chawla et al. (2017) and Nguyen et al. (2020), which justify their usage in this current study.

In this study, validity was further ensured by testing the data collection tools among a section of the study population for content validity; experts in oral health reviewed the instruments to ensure face validity and construct validity. Additionally, to enhance the test-retest reliability of the test instruments, questionnaire items were completed without ambiguity; duration and length of the test instruments are also checked for brevity (correlation coefficient=0.7). Finally, piloting was done to promote objectivity in the scoring of the questionnaire items.

3.10 Limitation of Study

This study was conducted only in one out of the several hospitals in Kenya, which posed generalizability problems. The study was conducted in a Referral Hospital and the context might be different from lower-level facilities because of the cadre of nurse-midwives working in these various facilities and perhaps the calibre of pregnant mothers accessing care. However, these limitations were mitigated by conducting a

pilot study outside the county. In addition, the cadre of nurse-midwives in Kenya have similar training and hence have similar characteristics across the 47 counties.

3.11 Dissemination of Findings

The result from this study will be published in both national and international journals. Findings will also be presented at conferences and professional association gatherings, progress reports for funders, stakeholders, and the community. The study results will be shared at the study site through continuous nursing education, publication on the official website of MTRH, flyers and pamphlets containing study findings will be distributed at the maternity department of MTRH.

3.12 Ethical Consideration

Ethical approval was obtained from the Moi University and Moi Teaching and Referral Hospital Institutional Research and Ethics committee (IREC) (reference number: IREC/2021/38). In addition, permission from the hospital (MTRH) administration was sought before the commencement of this study. In this study, participants were given a full description of the nature of the study, including risk and benefits. Again, Participation was voluntary. Respondents were requested to sign a written informed consent before participating in the study. To ensure confidentiality, the actual names of participants and contact information were not indicated on the questionnaire. Data collected from participants were kept in folders and kept under lock by the principal investigator. According to national guidelines, these data will be kept at a secured place under lock for three (3) years before disposal.

CHAPTER FOUR

FINDINGS

4.1 Introduction

The researcher collected two levels of data sets, namely: nurse-midwives and pregnant mothers' data. Each of the data sets was analysed independently guided by the research objectives. The results are thus presented based on sub-headings of demographic characteristics of respondents, knowledge of oral health, attitude towards oral health and perceived barriers to practising optimal oral health.

In this chapter of the project work, the pregnant womens' data findings are first presented based on 309 valid responses. Afterwards, nurse-midwives analysis results are presented along with the sub-headings: demographic characteristics of respondents, knowledge of oral health, attitude towards oral health, and perceived barriers to practising optimal oral health based on 70 valid responses.

4.2 Pregnant Women Data

4.2.1 Demographic characteristics

A total of 309 questionnaires were administered to the respondents, and all of them responded, representing a response rate of 100%. The majority of the participants, 252(82%), were married; 158 (51%) had tertiary education; 159(53%) were informally employed. Less than half of the participants, 139(45%), were in the third trimester. The average age of participants was 28 years, and the mean number of pregnancies per woman was two (2). The average number of children per woman was one (1). Refer to Table 4.1 for details.

Table 4.1: Descriptive statistics

Marital status				**Freq. (f)**	**Percent (%)**
Single				55	17.80
Married				252	81.55
Co-habitation				2	0.65
Total				**309**	**100.00**
Educational level					
Tertiary				158	51.13
Secondary education				97	31.39
Basic education				54	17.48
Total				**309**	**100.00**
Occupation					
Formal employment				66	21.93
Informal employment				159	52.82
Student				37	12.29
Unemployed				39	12.96
Total				**301**	**100.00**
Trimester					
First trimester				55	17.80
Second trimester				115	37.22
Third trimester				139	44.98
Total				**309**	**100.00**
	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
Age	309	28.091	5.433	18	45
Number of pregnancies	309	2.32	1.393	1	7
Number of children	309	1.188	1.345	0	6

Source: Field Data (2021)

4.2.2 Maternal oral health screening

Almost half 132 (42.7%) of the respondents indicated that they were affected by an oral health problem (figure 1). However, only 30 (9.7%) had visited the dentist in the last 12 months (*figure 2*). More than 90% of the respondents had not seen the dentist for dental treatment in the last 12 months (*figure 1*).

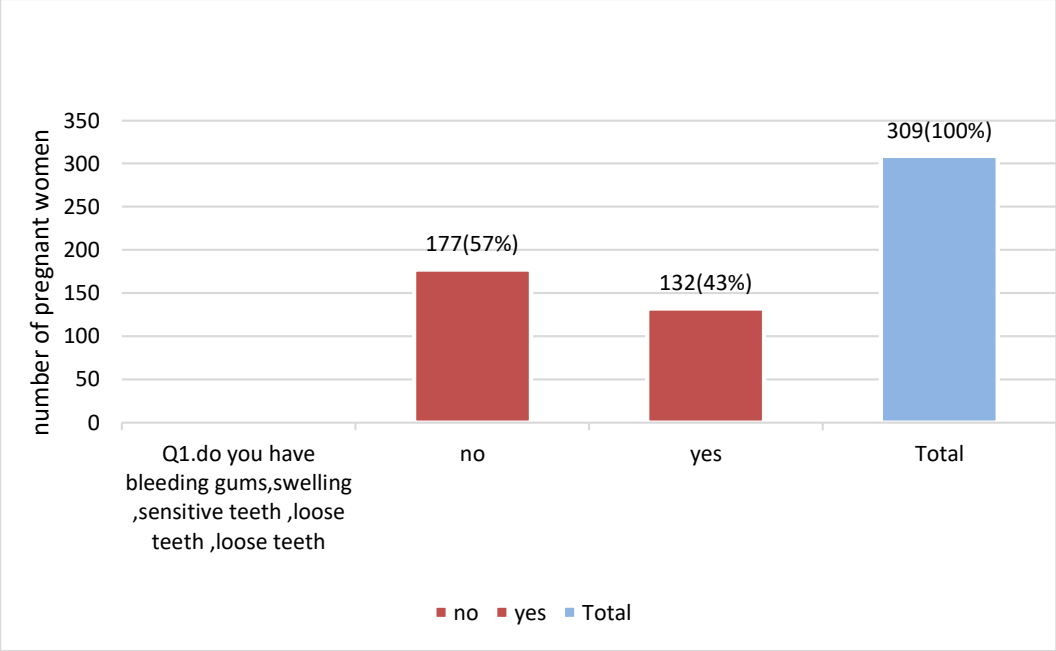


Figure 4.1: Maternal oral health screening responses

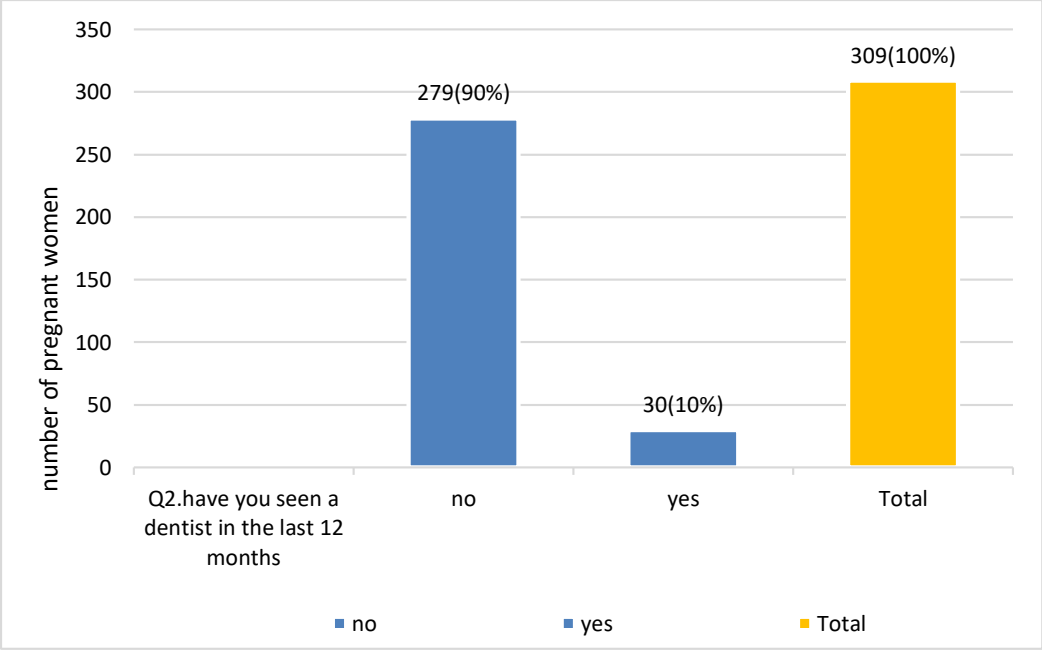


Figure 4.2: Maternal oral health screening responses

4.2.3 Knowledge of pregnant women on maternal oral health

Knowledge of pregnant women on oral health was assessed based on a five-point Likert scale from 1= “Strongly disagree to 5= “Strong agree”. To set a proxy marker for high knowledge and desired attitude on the key constructs of interest, the Likert Scale responses were later dichotomised into binary outcomes were responses from 1-2 was coded or considered as “Low knowledge” while responses from 4-5 will be coded or considered as “High knowledge” Percentages of the Likert scale were computed for all the knowledge indicators.

The responses revealed that knowledge of pregnant women was high in the area of the safety of scaling of teeth during pregnancy 142(46%) and dental visits during pregnancy 244(79%).

The majority, 264(86%) of women, exhibited a low level of knowledge by agreeing that it is normal to have bleeding gum during pregnancy. Also, 289(94%) respondents agreed that losing a tooth because of pregnancy is normal. Most 264 (86%) pregnant women indicated that dental extraction is unsafe during pregnancy. See table 4.2 for the details.

Table 4.2: Knowledge indicators on oral health among pregnant women

Indicators	Obs.	agree	disagree
		Frequency/ percentage	Frequency/ percentage
Pregnant women are more susceptible to dental caries than other women	309	79(26)	230(74)
Pregnant women are more susceptible to gum diseases than other women	309	53(17)	255(83)
Scaling (having teeth cleaned by a dentist) during pregnancy is safe	307	142(46)	165(54)
Pregnant women can have dental extraction (having decay tooth removed)**	308	44(14)	264(86)
Having a dental X-ray during pregnancy is not harmful to my baby	307	81(26)	227(74)
Pregnant women can lose a tooth only because of pregnancy*	308	289(94)	18(6)
Visiting the dentist during pregnancy for a check-up is safe	308	244(79)	63(21)
Periodontal disease in pregnant women could lead to pre-eclampsia	307	66(21)	243(79)
Periodontal disease in pregnant women could lead to a low-birth-weight baby	309	67(22)	242(78)
Periodontal disease in pregnant women could lead to preterm labour	305	59(19)	246(81)
It is normal to have bleeding gums during pregnancy*	307	264(86)	43(14)
Oral and teeth problems in the mother can affect the baby's health	308	127(41)	181(58)

Data Source: Field Data (2021); Legend: NOTE: *Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depicts better oral care knowledge among pregnant women, while lower summated scores show lower knowledge.

4.2.4 Attitude of pregnant women towards maternal oral health

Study participants were also asked questions to determine their attitude towards oral health. The data shows that participants attitude towards oral health was generally poor. For instance, it was found that the majority, 274(89%), of the participants agree with the negative statement that brushing once a day was sufficient during pregnancy. However, a better attitude was observed on the attitude indicator that dental treatments are stressful 90 (29%). See Table 4.3 for details

Table 4.3: Attitude indicators

Indicators	Obs.	agree	disagree
		Frequency/percentage	Frequency/ percentage
Pregnant women should not visit the dentist for dental treatments**	309	173(56)	136(44)
Brushing once a day is sufficient during pregnancy**	308	274(89)	34(11)
Poor oral health can contribute to complications during pregnancy	307	113(37)	194(63)
Dental treatment during pregnancy is harmful to my baby	306	159(52)	147(48)
Pregnancy causes tooth loss**	306	264(86)	44(14)
Dental treatments are stressful	307	90(29)	217(79)
Poor oral health can contribute to complications during pregnancy	307	113(37)	194(63)

Data Source: Field data (2021); Legend: NOTE: **Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score depicts better attitude towards oral care among pregnant women while lower summated scores show undesirable attitude; Obs. (observations)

4.2.5 Correlates of maternal knowledge on oral health

Principal Factor analysis (varimax unrotated) was done to isolate principal factors on knowledge of pregnant women on oral health, and six (6) factors were retained (see Figure 4.1). Subsequently, the Wilcoxon Mann-Whitney test was conducted in a bivariate analysis to determine the correlations between maternal knowledge of oral health and respondent's demographic and background characteristics.

The bivariate analysis results revealed that pregnant women with tertiary education were more knowledgeable on the association between periodontal diseases and preeclampsia than women with other levels of education (mean=2.57). The data from the field shows that women in the other level of education were less knowledgeable on the association between periodontal diseases and low-birth-weight compared to women who had tertiary education ($p<0.05$). Finally, women in the tertiary group had better knowledge of the abnormality of bleeding gums during pregnancy (mean=2.38) than other women. Refer to figure 3 for details.

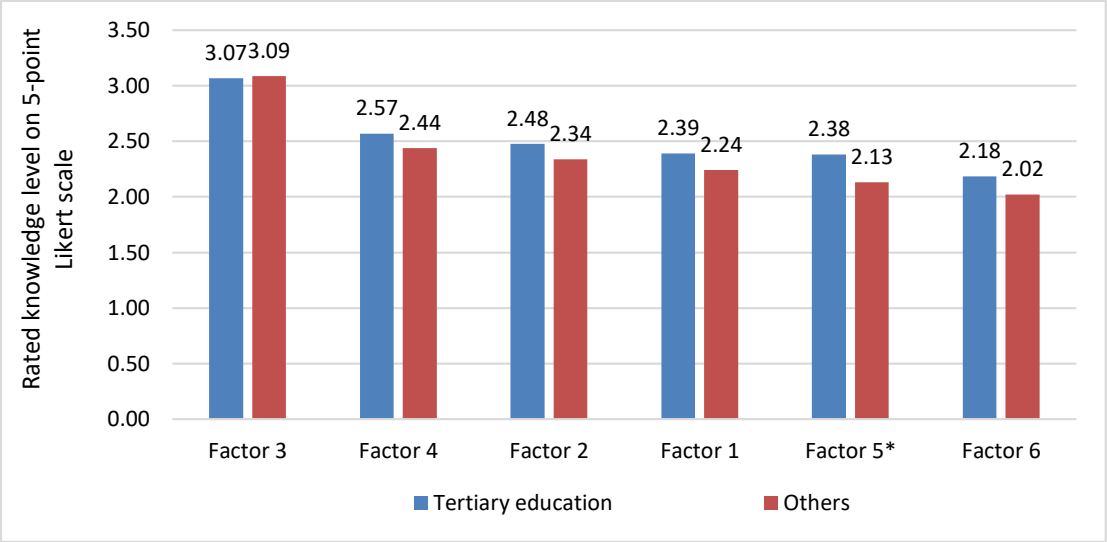


Figure 4.3: Level of education compared with knowledge levels on oral health among pregnant women

Legend: *Wilcoxon Mann-Whitney Sign Rank test statistical significant, p=0.0342; Factor 1 (Pregnant women are more susceptible to gum diseases than other women); Factor 2 (Scaling during pregnancy is safe); Factor 3 (Pregnant women can lose a tooth only because of pregnancy (reverse coded)); Factor 4 (Periodontal disease in pregnant women could lead to pre-eclampsia); Factor 5 (Periodontal disease in pregnant women could lead to low-birth-weight baby); Factor 6 (It is normal to have bleeding gums during pregnancy (reverse coded)

NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, higher summated Likert scale score (i.e. longer bars) depict better knowledge on oral care among pregnant women, while lower summated scores depict lower knowledge

Another Wilcoxon Mann-Whitney test compared marital level with knowledge of pregnant women shows that married women demonstrated better knowledge on the fact that pregnancy does not cause tooth loss (mean=3.09) compared to women who were not married (mean=3.04). Women who were not married had better knowledge on the possible link between periodontal diseases and low birth weight (mean=2.29) compared to married women ($p<0.05$). However, married women were better aware that bleeding gums were abnormal during pregnancy (mean=2.11) than unmarried women (mean=2.07). Refer to Figure 4.4 for details.

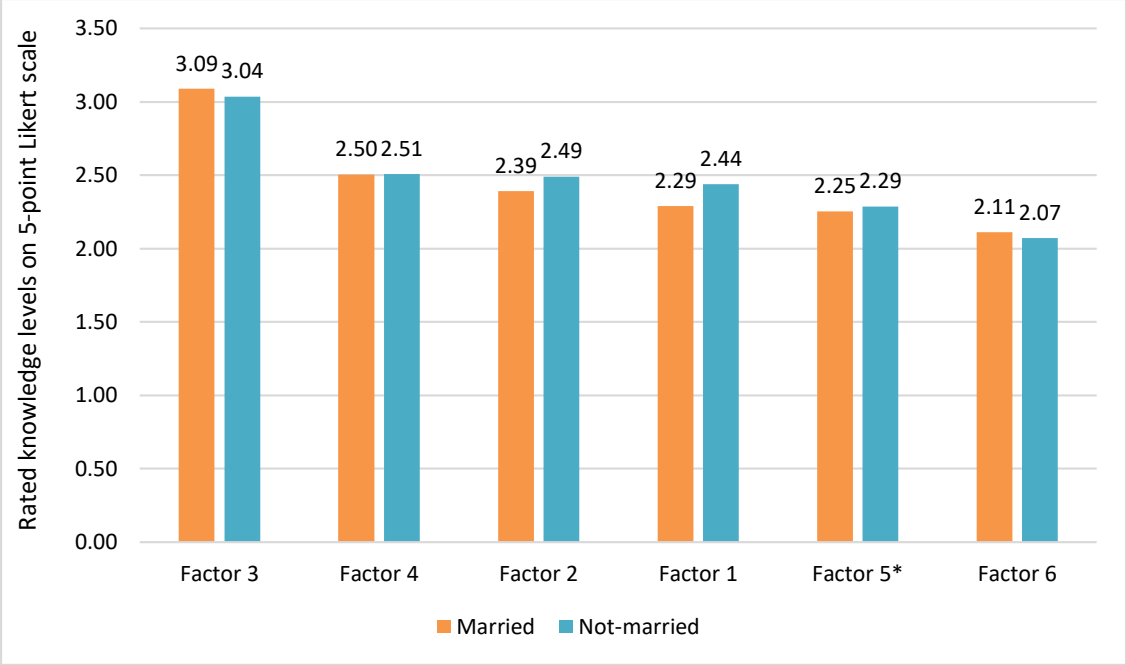


Figure 4.4: Marital status compared with knowledge levels on oral health among pregnant women

Legend: *Wilcoxon Mann-Whitney Sign Rank test statistical significant, p=0.0342; Factor 1 (Pregnant women are
more susceptible to gum diseases than other women); Factor 2 (Scaling during pregnancy is safe); Factor 3 (Pregnant women can lose a tooth only because of pregnancy (reverse coded)); Factor 4 (Periodontal disease in pregnant women could lead to pre-eclampsia); Factor 5 (Periodontal disease in pregnant women could lead to low-birth-weight baby); Factor 6 (It is normal to have bleeding gums during pregnancy (reverse coded)

NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, higher summated Likert scale score (i.e. longer bars) depict better knowledge on oral care among pregnant women, while lower summated scores depict lower knowledge

Results from the bivariate analysis further show that most women in the first trimester were aware of the susceptibility of pregnant women to develop gum diseases (mean=3.16) than women in the other trimesters (mean=3.06). Women in the first trimester demonstrated better awareness of the association between periodontal diseases and pre-eclampsia (mean=2.65) than women in the other trimesters (mean=2.47). Additionally, it was observed that women in the first trimester had better knowledge that the scaling of teeth during pregnancy is safe (mean=2.75) compared to women in the other trimesters ($p<0.05$).Likewise, women in the first trimester were aware that periodontal diseases in pregnancy might result in low birth weight

(mean=2.56) compared to other women in the other trimesters (mean=2.26). However, most of the women in the first trimester had poor knowledge of the normality of bleeding gums during pregnancy (mean=2.29) than women in other trimesters (mean=2.25). See Figure 4.5 for details.

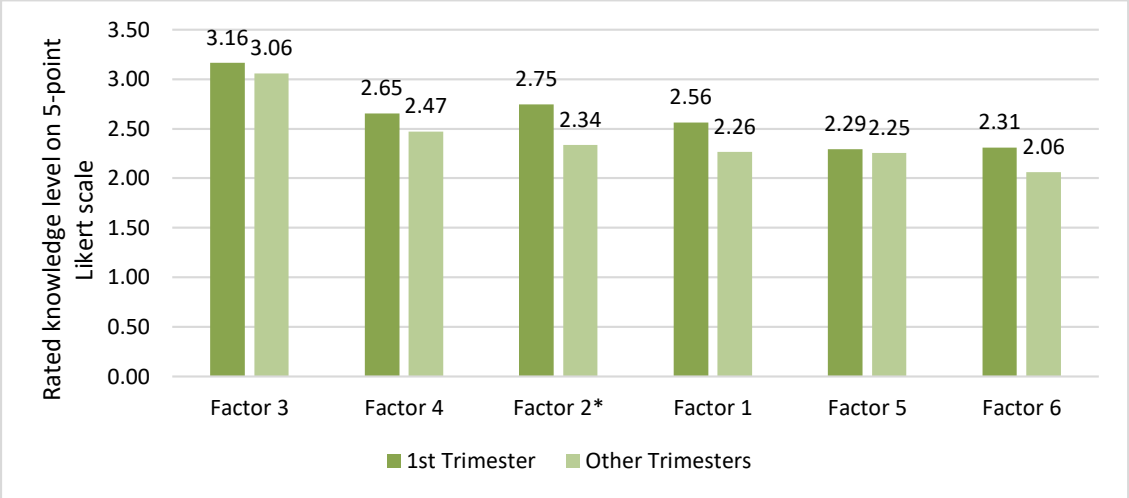


Figure 4.5: Trimester compared with knowledge levels on oral health among pregnant women

Legend: *Wilcoxon Mann-Whitney Sign Rank test statistical significant, p=0.0107; Factor 1 (Pregnant women are more susceptible to gum diseases than other women); Factor 2 (Scaling during pregnancy is safe); Factor 3 (Pregnant women can lose a tooth only because of pregnancy (reverse coded)); Factor 4 (Periodontal disease in pregnant women could lead to pre-eclampsia); Factor 5 (Periodontal disease in pregnant women could lead to low-birth-weight baby); Factor 6 (It is normal to have bleeding gums during pregnancy (reverse coded)

NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depicts better oral care knowledge among pregnant women, while lower summated scores show lower knowledge.

4.2.6 Factors associated with attitude towards maternal oral health

Bivariate cross-tabulations on factors associated with women's attitude towards maternal oral health shows that women in the other educational level demonstrated better attitude in terms of pregnancy causing tooth loss than women having tertiary education. Women with different educational qualifications other than tertiary qualifications had a bad attitude towards maternal oral health by disagreeing those dental treatments are stressful. Women in both the tertiary and other levels of education group have a poor attitude towards maternal oral health by agreeing that brushing once

a day is sufficient during pregnancy. Similarly, pregnant women who were married demonstrated a poorer attitude towards maternal oral health by agreeing that pregnancy causes tooth loss compared to women who were not married.

Most women in other trimesters had a poor attitude towards maternal oral health by agreeing that pregnancy causes tooth loss compared to women in the first trimester. Refer to Figure 4.6 for details.

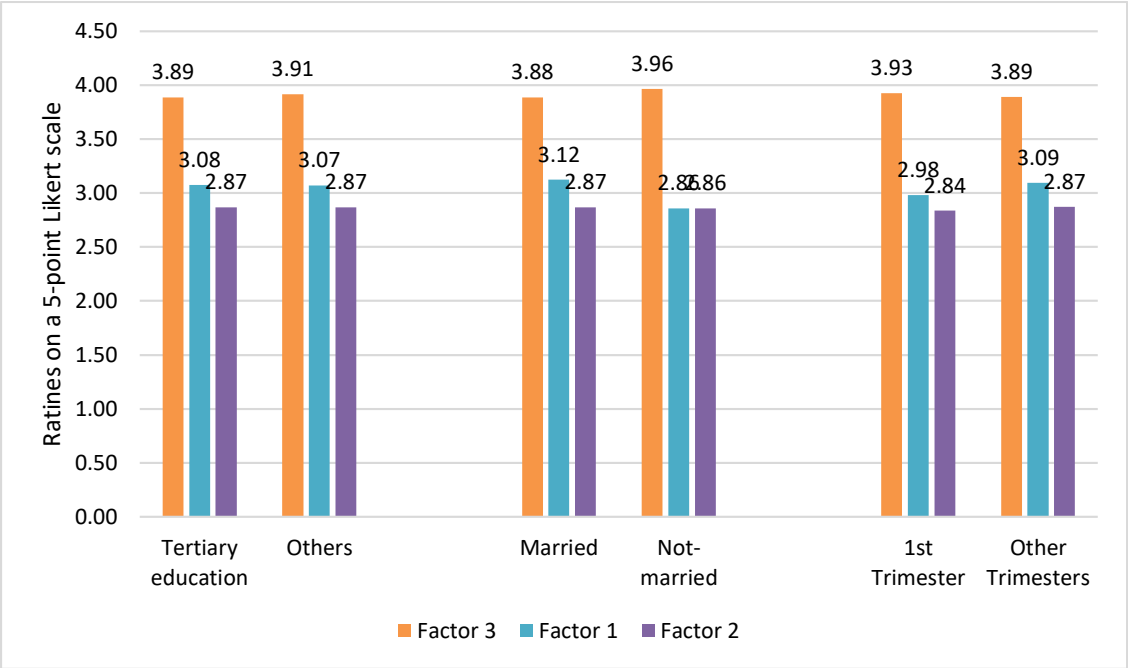


Figure 4.6: Attitude indicators on oral health among pregnant women (disaggregated by educational level, marital status and trimester of pregnancy

Legend: Factor 1 (Dental treatments are stressful); Factor 2 (Brushing once a day is sufficient during pregnancy (reverse coded); Factor 3 (Pregnancy causes tooth loss (reverse coded); NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depict a better attitude towards oral care among pregnant women, while lower summated scores depict an undesirable attitude

NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depict a better attitude towards oral care among pregnant women, while lower summated scores depict an undesirable attitude

Besides the bivariate analysis, an ordered logistic regression was done to ascertain the predictors of knowledge and attitude of pregnant women towards maternal oral health

while controlling for the potential effect of confounding variables. The results show that women who had basic education or were in the second or third trimester had a lower likelihood of demonstrating sufficient oral health knowledge than women with tertiary education or first trimester, respectively ($p<0.05$). Also, pregnant women who had more children were more likely to demonstrate better maternal oral health knowledge than participants who had fewer children. See table 4.4.

Table 4.4: Ordered logistic regression on determinants of pregnant women knowledge of oral health

Overall knowledge	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	-.01	.027	-0.37	.709	-.064	.044	
Single	0	.	.	.	.	.	
Married	-.067	.284	-0.23	.814	-.624	.49	
Co-habitation	1.313	1.458	0.90	.368	-1.545	4.171	
Tertiary	0	.	.	.	.	.	
Secondary	-.302	.242	-1.25	.211	-.776	.171	
Basic	-.736	.306	-2.41	.016	-1.336	-.137	**
First trimester	0	.	.	.	.	.	
Second trimester	-.696	.3	-2.32	.02	-1.285	-.108	**
Third trimester	-.761	.289	-2.63	.008	-1.326	-.195	***
Number of pregnancies	-.14	.196	-0.71	.476	-.524	.244	
Number of children	.36	.207	1.74	.082	-.046	.766	*
Mean dependent var		2.607	SD dependent var			0.482	
Pseudo r-squared		0.010	Number of obs			294.000	
Chi-square		18.054	Prob > chi2			0.035	
Akaike crit. (AIC)		1880.014	Bayesian crit. (BIC)			2027.358	

*** *p<.01, ** p<.05, * p<.1*

Table 4.5: Ordered logistic regression on correlates of pregnant women attitude towards oral care

Overall attitude	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	-.005	.029	-0.17	.866	-.062	.052	
Single	0	.	.	.	.	.	
Married	-.162	.281	-0.58	.565	-.713	.389	
Co-habitation	.04	1.09	0.04	.971	-2.096	2.176	
Tertiary	0	.	.	.	.	.	
Secondary	-.453	.236	-1.92	.054	-.915	.009	*
Basic	-.145	.325	-0.45	.655	-.781	.491	
First trimester	0	.	.	.	.	.	
Second trimester	-.228	.299	-0.76	.446	-.814	.358	
Third trimester	-.385	.286	-1.35	.178	-.944	.175	
Number of pregnancies	.335	.213	1.57	.115	-.082	.752	
Number of children	.047	.217	0.22	.829	-.378	.472	
Mean dependent var		2.834	SD dependent var			0.596	
Pseudo r-squared		0.015	Number of obs			301.000	
Chi-square		24.142	Prob > chi2			0.004	
Akaike crit. (AIC)		1622.005	Bayesian crit. (BIC)			1725.804	

**** p<.01, ** p<.05, * p<.1*

In terms of the predictors of women's attitude towards oral health, it was found that women with at most basic education had a lower likelihood of demonstrating a positive attitude relative to their counterparts with at least tertiary educational qualifications. Other explanatory variables were not significant determinants of respondents' attitudes. See Table 4.5 for details.

4.2.7 Barriers to maintaining desire oral care

The data shows that several barriers confront pregnant women regarding strict adherence to good oral care practices. Among the barriers, not being informed about the need to visit the dentist (n=256, 83%) was the greatest perceived barrier, followed by the cost of dental treatments (n=230, 75%) and lack of money for transportation (n=223, 72%). The least perceived barrier was time constraints (n=90, 30%).

Table 4.6 shows details of the responses.

Table 4.6: Perceived barriers to maintaining desired oral care among pregnant women

Indicators+	Obs	agree	disagree
		Frequency/ percentage	Frequency/ percentage
Nurse-midwives do not inform as about the need to visit a dentist	309	256 (83)	44 (14)
Time constraint is a barrier to accessing oral health services	308	91 (30)	217 (70)
My insurance does not cover dental treatments	308	128 (42)	180 (58)
The distance to the health facility is a barrier to access preventive dental services	309	147 (48)	162 (52)
Lack of money for transportation to the hospital for dental treatment is a barrier	309	223 (72)	86 (28)
The cost of dental treatment prevents me from seeking dental health preventive services	308	230 (75)	78 (25)

Data source: Field Data (2021)

Legend: NOTE: +Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a lower summated Likert scale score depicts a perceived lesser barrier towards maintaining desired oral care among pregnant women. In contrast, higher summated scores show a perceived greater barrier towards maintaining desired oral care among pregnant women.

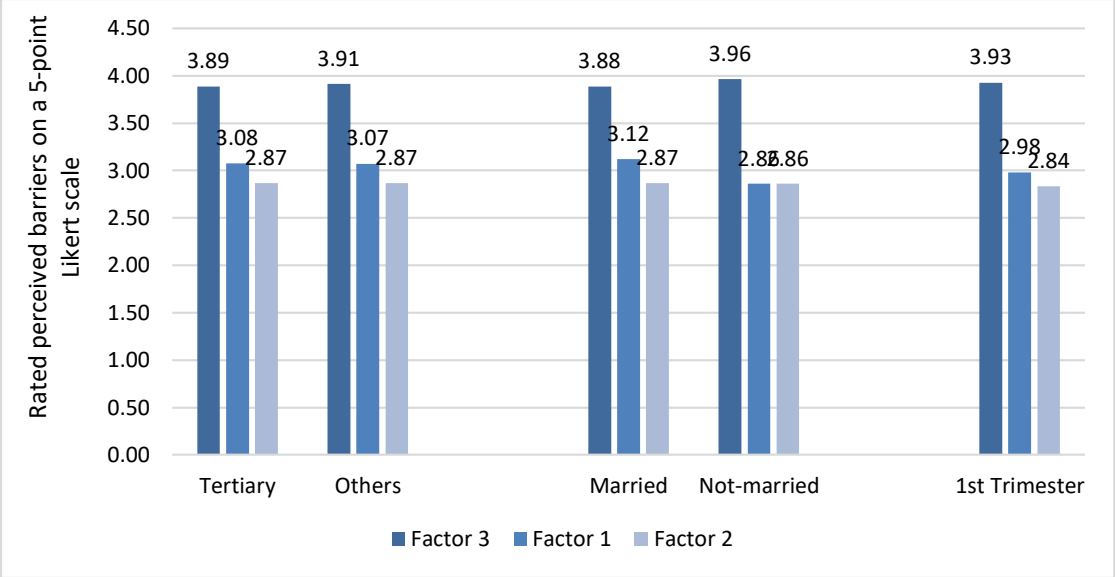


Figure 4.7: Barriers indicators on oral health among pregnant women (disaggregated by level of education, marital status and trimester)

Legend: Factor 1 (The distance to the health facility is a barrier to access dental preventive services (reverse coded)); Factor 2 (Time constraint is a barrier to accessing oral health services (reverse coded)); Factor 3 (Nurse-midwives do not inform as about the need to visit a dentist (reverse coded))

NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depict a perceived lesser barrier towards maintaining desired oral care among pregnant women, while lower summated scores depict a perceived greater barrier towards maintaining desired oral care among pregnant women

Bivariate analysis results show differences in the perceived barriers by pregnant mothers based on marital status, level of education and trimester of the pregnancy (see Figure 8). After controlling for confounding variables, an ordered logistic regression analysis was further conducted to isolate predictors of perceived barriers to practicing good oral health. The results show that none of the independent variables (i.e. age, marital status, trimester, level of education and number of children) significantly predict overall perception on barriers to observing oral health (See Table 4.7).

Table 4.7: Ordered logistic regression on predictors of perceived barriers to maintaining desired oral care among pregnant women

Overall barriers	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Age	.02	.028	0.72	.471	-.034	.075	
Single	0	.	.	.	.	.	
Married	.206	.276	0.75	.454	-.334	.746	
Co-habitation	.802	1.101	0.73	.466	-1.356	2.96	
Tertiary	0	.	.	.	.	.	
Secondary	-.353	.24	-1.47	.141	-.823	.117	
Basic	-.495	.304	-1.63	.103	-1.09	.101	
First trimester	0	.	.	.	.	.	
Second trimester	.267	.296	0.90	.368	-.314	.848	
Third trimester	.428	.287	1.49	.136	-.134	.991	
Number of pregnancies	-.069	.185	-0.38	.707	-.431	.293	
Number of children	.205	.188	1.09	.276	-.164	.574	
Mean dependent var		3.377	SD dependent var			0.721	
Pseudo r-squared		0.008	Number of obs			306.000	
Chi-square		12.854	Prob > chi2			0.169	
Akaike crit. (AIC)		1724.310	Bayesian crit. (BIC)			1832.294	

**** p<.01, ** p<.05, * p<.1*

4.3 Nurse-Midwives Data

4.3.1 Demographic characteristics

A census of the total number of nurse-midwives at MTRH was done, and out of the 99 target population, 70 of them participated in our study, representing a response rate of 71%.

Participation was highest in the labour ward, with 33 respondents representing 47%. The antenatal clinic had the lowest participation, with 7 participants representing 10% of respondents. The highest level of education was a master's degree, and the lowest level was a diploma. Respondents in the diploma level of education were the majority, representing 53% (n=70). The majority of the participants were females representing 84% of participants. The average years of work experience was 13±6 years and the mean age of participant was 39 years. See table 4.8 for details.

Table 4.8: Descriptive statistics

Gender				**Freq. (f)**	**Percent (%)**
Male				11	15.71
female				59	84.29
Total				**70**	**100.00**
Highest level education					
Master's degree				4	5.71
Bachelor's degree				29	41.43
Diploma				37	52.86
Total				**70**	**100.00**
Department					
Antenatal clinic				7	10.00
Antenatal ward				12	17.14
Postnatal ward				18	25.71
Labour ward				33	47.14
Total				**70**	**100.00**
Age of respondents					
28-35				25	35.71
36-45				35	50.00
46-52				10	14.29
Total				**70**	**100.00**
Years of working					
2-5				5	7.14
6-10				25	35.72
11-20				34	48.57
21-30				6	8.57
total				**70**	**100.00**
	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
Age	70	38.67	5.82	28	52
Years of working	70	13.04	5.99	2	30

Source: Field Data (2021)

4.3.2 Knowledge of nurse-midwives on maternal oral health

The findings from the field show that 66(94%) of participants were aware that gingivitis and periodontitis were infections of the tooth and supporting structures; similarly,66(94%) of participants were aware that gingivitis is a reversible gum infection; 59(88%) were aware that preventive dental services were necessary during pregnancy. The majority, 56(82%) of participants, were aware that basic dental treatments are safe during pregnancy. See table 4.9 for details

Table 4.9: Knowledge indicators on oral health among nurse-midwives

Indicators	Obs.	agree	disagree
		Frequency/ percentage	Frequency/ percentage
Gingivitis and periodontitis are conditions that affect the supporting structures of the teeth	70	66(94)	4(6)
Pregnancy exacerbates the existing dental condition	70	54(77)	16(23)
Gingivitis is more serious than periodontitis**	68	49(72)	19(28)
Calcium can be drawn out of the mother's teeth by the developing baby	70	31(44)	39(56)
Gingivitis is a potentially reversible infection of the gum	70	66(94)	4(6)
Poor maternal oral health contributes to early childhood tooth decay	69	24(35)	45(65)
Poor maternal oral health may contribute to preterm delivery	70	24(34)	46(66)
Poor maternal oral health can lead to miscarriages	68	20(29)	48(71)
Periodontitis has been associated with preeclampsia	68	10(15)	58(85)
Periodontitis has been associated with low birth weight	69	20(29)	49(71)
Periodontal disease has been associated with Stillbirth	70	13(19)	57(81)
Preventive dental services are necessary during pregnancy	67	59(88)	8(12)
Basic dental treatments are safe during pregnancy	68	56(82)	12(18)
It is unsafe to obtain dental radiographs during pregnancy**	68	49(72)	19(28)
Having a dental X-ray during pregnancy is safe	66	44(67)	22(33)

Data Source: Field Data (2021); Legend: NOTE: *Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depicts better oral care knowledge among pregnant women, while lower summated scores show lower knowledge.

4.3.3 Attitudes of nurse-midwives towards maternal oral health

Attitude indicators show that majority of the participants felt confident about performing oral health assessments 51 (74%). Respondents also indicated poor attitude with regards to pregnancy causing tooth loss. The majority, 58(83%) of the participants, believed that asking women about oral health is part of the routine practice of nurse-midwives. However, 67(96%) thought that pregnancy causes tooth loss, and 54(78%) were unaware that poor maternal oral health could predispose pregnant women to poor pregnancy outcomes. See table 4.10 for more details

Table 4.10: attitude indicators on oral health among nurse-midwives

Indicators	Obs.	agree	disagree
		Frequency/percentage	Frequency/ percentage
Pregnant women should not visit the dentist for dental treatment	70	4(6)	66(94)
Brushing once a day is sufficient for pregnant women**	70	16(23)	54(77)
Poor oral health can contribute to complications during pregnancy	69	15(22)	54(78)
Dental treatment during pregnancy is harmful to the baby**	70	26(37)	44(63)
Pregnancy causes tooth loss, and so it is normal for pregnant women to lose a tooth during pregnancy	70	67(96)	3(4)
Dental treatments are stressful for pregnant women**	70	48(69)	22(31)
I feel confident about performing an oral health assessment	69	51(74)	18(26)
Asking pregnant women about oral health is outside my routine practice**	70	12(17)	58(83)

Data Source: Field Data (2021); Legend: NOTE: *Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depicts better oral care knowledge among pregnant women, while lower summated scores show lower knowledge.

4.3.4 Perceived barriers to the promotion of maternal oral health among nurse-midwives

Perceived barriers to promoting maternal oral health among nurse-midwives were: lack of guidelines on maternal oral health 42 (61%), lack of in-service training on maternal oral health 39(56%) and exclusion of maternal oral health courses during professional training 30(43%). See table 4.11 for more details

Table 4.11: Perceived barriers on oral health among nurse-midwives

Indicators	Obs.	agree	disagree
		Frequency/ percentage	Frequency/ percentage
I do inform my clients about the need to visit the dentist	70	48(69)	22(31)
The fear of the onset of labour during dental treatment is a barrier to referring pregnant women to the dentist	70	21(30)	41(70)
Time constraint is a barrier to discussing maternal oral health during ANC visit/admission/discharge	70	20(29)	50(71)
The national health insurance does not cover dental treatment**	70	14(20)	56(80)
Dental professionals are reluctant to treat pregnant women**	70	12(17)	58(83)
Lack of guidelines on oral health during pregnancy is a barrier to promoting oral health among pregnant women	69	42(61)	27(39)
Lack of in-service training on maternal oral health is a barrier to promoting oral health during pregnancy	70	39(56)	31(44)
Exclusion of maternal oral health courses during my professional training is a barrier	70	30(43)	40(57)

Data source: Field Data (2021)

Legend: NOTE: +Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a lower summated Likert scale score depicts a perceived greater barrier towards maintaining desired oral care among pregnant women. In contrast, higher summated scores show a perceived lesser barrier towards maintaining desired oral care among pregnant women.

An ordered logistic regression was done to ascertain the predictors of knowledge of nurse-midwives towards maternal oral health while controlling for the potential effect of confounding variables. The results show that nurse-midwives in the antenatal ward, labour ward and postnatal ward had better knowledge compared to those nurse-midwives at the antenatal clinic and these were statistically significant ($p<0.05$). Also, older nurse-midwives had better knowledge compared to younger ones (coef=0.206, $p=0.039$). See table 4.12 for details.

Table 4.12: Ordered logistic regression on determinants of nurse-midwives knowledge of maternal oral health

Ordered logistic regression

Overall knowledge	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Antenatal clinic	0	.	.	.	.	.	
Antenatal ward	3.082	1.092	2.82	.005	.941	5.222	***
Postnatal ward	2.81	1.071	2.62	.009	.71	4.909	***
Labour ward	3.267	1.038	3.15	.002	1.233	5.301	***
age	.206	.1	2.07	.039	.011	.401	**
male	0	.	.	.	.	.	
female	1.328	.688	1.93	.053	-.02	2.676	*
Master's degree	0	.	.	.	.	.	
Bachelor's degree	.552	1.013	0.54	.586	-1.434	2.537	
diploma	-.262	.981	-0.27	.789	-2.186	1.661	
Years of working experience	-.06	.088	-0.68	.499	-.232	.113	

Mean dependent var	3.267	SD dependent var	0.526
Pseudo r-squared	0.048	Number of obs	56.000
Chi-square	17.573	Prob > chi2	0.025
Akaike crit. (AIC)	419.397	Bayesian crit. (BIC)	494.335

*** $p<.01$, ** $p<.05$, * $p<.1$

Furthermore, an ordered logistic regression was run on the determinants of nurse-midwives attitudes towards maternal oral health and the results show that none of the independent variables has a significant association with the main outcome variable of interest (i.e. overall attitudes). See table 4.13 for details.

Table 4.13: Ordered logistic regression on determinants of nurse-midwives attitude on maternal oral health

Ordered logistic regression

ova	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Antenatal clinic	0	.	.	.	.	.	
Antenatal ward	.138	1.146	0.12	.904	-2.107	2.383	
Postnatal ward	-.546	.959	-0.57	.569	-2.426	1.334	
Labour ward	.093	.981	0.10	.924	-1.829	2.015	
age	.113	.096	1.18	.24	-.075	.3	
male	0	.	.	.	.	.	
female	.083	.748	0.11	.912	-1.383	1.549	
Master's degree	0	.	.	.	.	.	
Bachelor's degree	-.477	1.018	-0.47	.64	-2.472	1.519	
diploma	.354	.965	0.37	.714	-1.537	2.244	
Years of working experience	-.122	.087	-1.40	.16	-.292	.048	
Overall knowledge	.601	.576	1.04	.296	-.527	1.73	

Mean dependent var	2.541	SD dependent var	0.405
Pseudo r-squared	0.029	Number of obs	54.000
Chi-square	7.806	Prob > chi2	0.554
Akaike crit. (AIC)	309.844	Bayesian crit. (BIC)	355.590

**** p<.01, ** p<.05, * p<.1*

Barriers to maternal oral health care were perceived more among nurse-midwives in the postnatal ward relative to those in the antenatal clinic (coef=2.24, p=0.04). Nurse-midwives who have overall high knowledge on maternal oral health are more likely to identify barriers to providing mothers with oral health care (coef=1.86, p=0.001). See figure 15 for details.

Table 4.14: Ordered logistic regression on determinants of nurse-midwives perceived barriers on maternal oral health

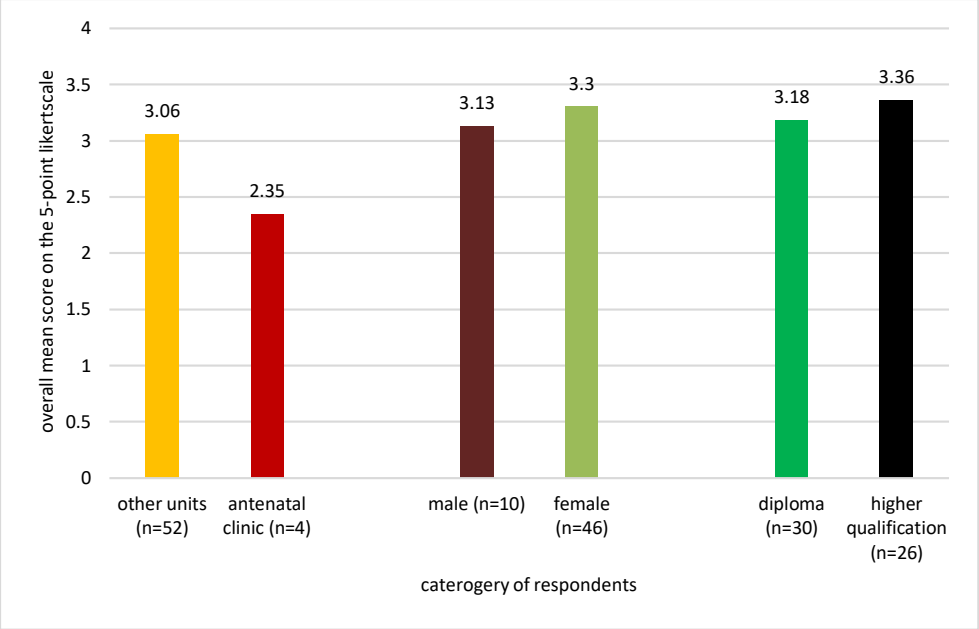
Ordered logistic regression

Overall perceived barriers	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Antenatal clinic	0	.	.	.	.	.	
Antenatal ward	1.989	1.18	1.69	.092	-.323	4.301	*
Postnatal ward	2.235	1.088	2.05	.04	.102	4.367	**
Labour ward	1.625	1.1	1.48	.14	-.531	3.781	
Age	.049	.09	0.54	.59	-.128	.225	
Male	0	.	.	.	.	.	
female	-.692	.7	-0.99	.323	-2.064	.679	
Master's degree	0	.	.	.	.	.	
Bachelor's degree	1.257	1	1.26	.209	-.703	3.218	
diploma	.989	.975	1.01	.31	-.922	2.901	
Years of work experience	.005	.08	0.06	.948	-.152	.162	
Overall knowledge on maternal oral health	1.864	.557	3.35	.001	.772	2.957	***

Mean dependent var	3.033	SD dependent var	0.575
Pseudo r-squared	0.087	Number of obs	56.000
Chi-square	25.922	Prob > chi2	0.002
Akaike crit. (AIC)	324.368	Bayesian crit. (BIC)	379.053

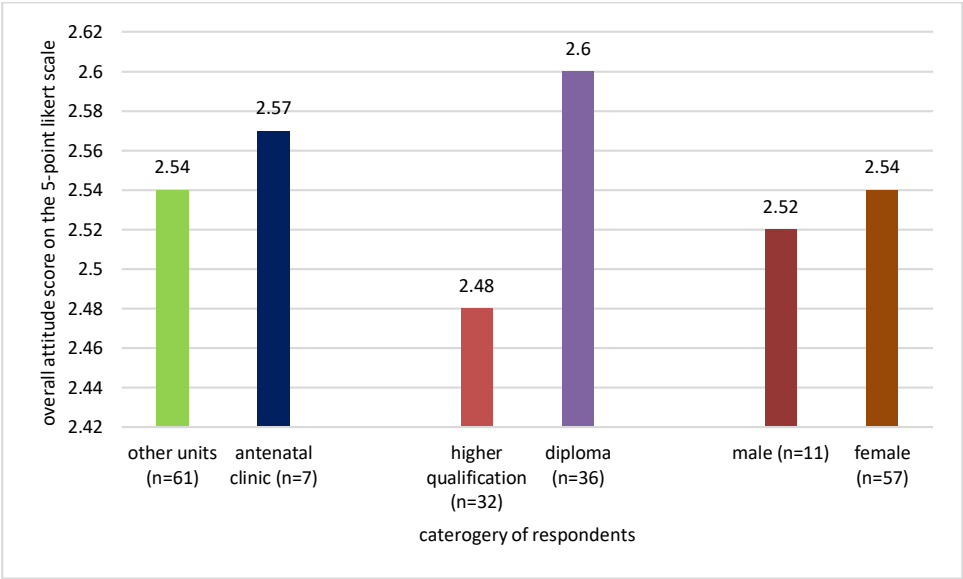
**** p<.01, ** p<.05, * p<.1*

A two-sample t-test was done to compare the mean scores of the five-point Likert scale on knowledge and attitude of respondents on maternal oral health. A comparison of overall knowledge and attitude was further done according to department, gender and level of education using the Wilcoxon Mnan-Whitney test for differences. The results show none was statistically significant. See figures 4.8 and 4.9 for details.



NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e. longer bars) depict higher knowledge on oral care among nurse-midwives, while lower summated scores depict a perceived lesser barrier towards maintaining desired oral care among nurse-midwives

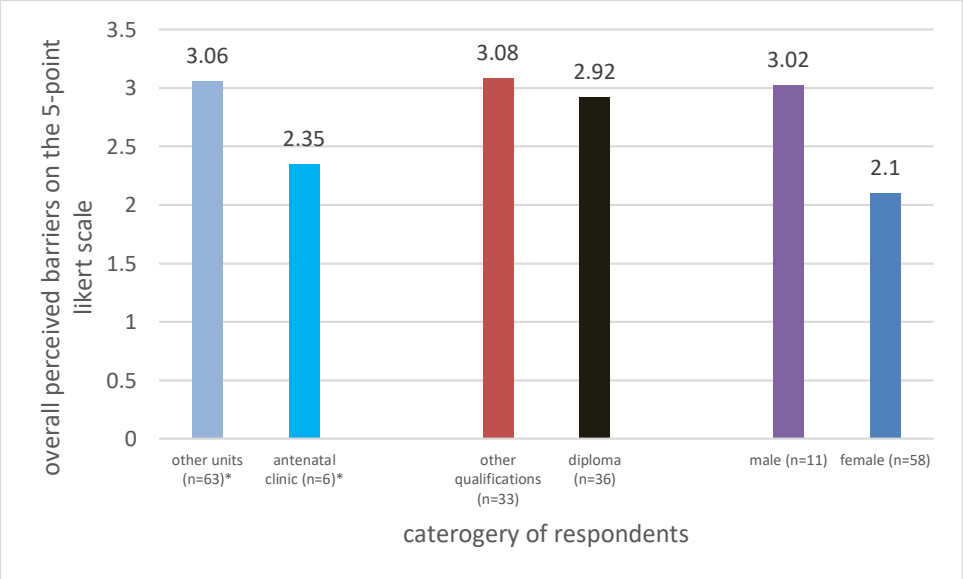
Figure 4.8: Overall knowledge of nurse-midwives on maternal oral health disaggregated by department, gender and educational level



NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e., longer bars) depict positive attitude towards oral care among nurse-midwives, while lower summated scores depict a towards oral care among nurse-midwives

Figure 4.9: Overall attitude of nurse-midwives on maternal oral health desegregated by department, gender and educational level

Similarly, a two-sample t-test was done to compare the mean scores of the five-point Likert scale on the perceived barriers of respondents on maternal oral health. A comparison of overall perceived barriers was further done according to department, gender and level of education using Wilcoxon Mnan-Whitney test for differences. Perception of barriers to maternal oral health care was high among nurse-midwives in other departments (mean=3.06) compared to their counterparts in the antenatal clinic (mean=2.35) (p=0.017). See figure 4.10.



NOTE: Reverse coded questions are done for uniformity in the coding for easy interpretation. Thus, a higher summated Likert scale score (i.e., longer bars) depict a perceived greater barrier towards oral care among nurse-midwives, while lower summated scores depict a perceived lesser barrier towards oral care among nurse-midwives; * $p<0.05$

Figure 4.10: Overall barriers of nurse-midwives on maternal oral health desegregated by department, gender and educational level

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Discussion Pregnant Women

This quantitative study concentrated on the knowledge, attitude and perceived barriers to maternal oral health among pregnant women and nurse-midwives at MTRH, Eldoret, Kenya. The average age of pregnant respondents in this survey was 28, with most participants expecting their second child. A study by Gupta & Chhetry. (2019) in Nepal, among 50 pregnant women, the mean age was 25.12, and most of the participants were expecting their first baby. Similarly, Africa & Turton. (2019) in South Africa reported an average age of 24.1 in a study among 443 pregnant women. Our study's fertility rate is lower than the 3.9 birth per woman reported by the Kenya Demographic and Health survey in 2014. The mean age may be higher in our study because the present study was conducted in a major referral hospital and Eldoret, the Capital of Usain Gishu County. Therefore, most pregnant women might be well exposed. In the present study, most of the participants were educated to the tertiary level, which may be a reason for the low fertility rate among our participants because it is well established that the level of education is inversely proportional to the number of children.

In this study, 81.55% of respondents were married, similar to previous studies (Hannah & Howells, 2020; Kabali & Mumghamba, 2018) among 224 pregnant women and 410 pregnant and postnatal mothers in Nigeria and Zambia, respectively.

In this study, 90.7% of pregnant women indicated that they had not visited the dentist in the last 12 months. This finding is similar to that of Gupta & Chhetry. (2019) study conducted in Nepal indicated that 90% of pregnant women had no dental visit in the last 12 months. Less than half (43.7%) of pregnant women in this study had a dental problem. However, only 9.7% of respondents had visited the dentist in the last 12

months. This is lower than studies conducted in India by Nagi et al. (2016) among 446 pregnant women who reported that 73% of participants had oral health problems and 52.4% visited the dentist twice annually(Nagi et al., 2016). Again, in Indonesia, Soegyanto et al.(2020) reported that 31.7% of the participants had visited the dentist in the last 12 months in a study among mothers with infants between 0-59 months old. In Spain, Llena et al. (2019) reported that 42.2% of participants visited the dentist in a study among 139 pregnant women. This number of dental visits may be higher in the previous studies because of the high percentage of pregnant women who experienced dental health problems. Most of the women in the earlier studies were gainfully employed compared to the pregnant women in our study and hence may be able to afford dental treatments.

5.1.1 The knowledge of pregnant women on maternal oral health at Moi Teaching and Referral Hospital

In the present study, only 21.67% of participants were aware of the association between periodontal diseases and low birth weight. This was higher compared to previous studies by Gupta and Chhetry. (2019) among 50 pregnant women in Nepal and Abu-Hammad et al. (2018) study conducted in Saudi Arabia among 360 pregnant women reported that 12% and 11.4% of women were fully aware of this association between periodontal diseases and low birth weight. Further, another study in Portugal reported that only 16.7% of pregnant women were aware of the association between low birth weight and periodontitis (Esteves et al.,2021). This may be because more than half of the pregnant women in our study had a tertiary level of education compared to participants in the previous studies. In another study by Chinenye-Julius et al. (2021), among 385 pregnant women in Nigeria, the percentage of participants aware of the

association between periodontal diseases and low-birth-weight was 33.5%(Chinenye-Julius et al., 2021).

Furthermore, it was found that 26.3% of participants in the current study were aware that having a dental x-ray was not harmful during pregnancy. This was far better compared to a previous study in Spain by Llena et al. (2019), who reported that only 11.5% of 139 pregnant participants were aware of the safety of dental x-rays. These findings may be because the majority (57.6%) of participants in the previous study were in the secondary level of education compared to our study, which had only 31.39% in the secondary level of education. Additionally, the result from our study was found to be lower than a study conducted in Saudi Arabia by Abu-Hammad et al. (2018) among 360 pregnant women who reported that 69.4% of participants were aware that dental x-ray is safe during pregnancy.

In the present study, 41.23% were aware that dental problems in the mother might affect the baby's health. This percentage is better compared to a previous study in Spain which reported 38.8% of pregnant women were aware of the impact of poor maternal oral health on the health of the baby (Llena et al., 2019) and lower compared to 55% reported by Azizah et al.(2021) in Indonesia among 65 pregnant women. This high level of knowledge on this indicator maybe because most of the women in our study were educated to the tertiary level and hence had better knowledge than women in the previous studies.

In our study, 17.2% of pregnant women were aware of an association between pregnancy and gum disease. This was similar to a survey conducted by (Khan et al.,2020; Lakshmi et al.,2020), who reported that 16% among 350 pregnant women in Pakistan and 8.9% of 606 pregnant women in India were aware of the association

between pregnancy and gum diseases. The findings may be similar because both the current and previous studies were conducted in a tertiary institution which is similar to our study site. Our results were in contrast with the findings of a survey by Abu-Hammah et al. (2018) conducted in Saudi Arabia among 360 pregnant women, which reported that 64.2% were knowledgeable of the susceptibility of pregnant women to gum diseases. This may be so because most of the previous study participants were younger and maybe well exposed to information on the internet and other sources than the women in our study.

Again, in our study, 36.8% of participants indicated that poor maternal oral health could contribute to poor pregnancy outcomes. The level of awareness was similar to the 39.7% and 32.9% reported in previous studies by (Hannah & Howells, 2020; Soegyanto et al., 2020) in Nigeria and Indonesia, respectively. This may be so because most of the respondents in the previous study were within the tertiary and secondary levels of the education group. This was similar to the participants in our research.

5.1.2 The attitude of pregnant women on maternal oral health at Moi Teaching and Referral Hospital.

In the present study, 79.48% of pregnant women had the perception that dental treatment was safe during pregnancy and this depicts better attitude towards maternal oral health compared to previous studies (Aiuto et al., 2020; Hannah & Howells, 2020), which reported 52% among women of childbearing age in Italy and 52.7% of 224 pregnant women in Nigeria were also on the view that oral treatment during pregnancy is safe. This may be because of the large sample size in the previous study compared to the sample size used in our research and the calibre of women attending antenatal clinics at MTRH.

Further, only 6% of pregnant women in our study knew that pregnancy is not a cause for tooth loss. Our findings were low compared to a survey by Abu-Hammad et al.(2018) that reported that 26.4% of pregnant participants disagreed that pregnancy causes tooth loss, indicating better awareness than the participants of our study.

In our study,88.6% were on the view that brushing once per day was sufficient and this shows poor attitudes among our study participants in regards to the number of times they brush their teeth during the day. This was poor compared to previous studies conducted in India, Spain and Indonesia by (Nagi et al.2016; Llena et al.2019; Azizah et al., 2021), which reported that 99.8%,79.9% and 55% of pregnant participants were on the view that tooth brushing should be twice respectively. However, our findings were similar to a Nigerian study by Chinenye-Julius et al. (2021) report that 70.9% of 385 pregnant respondents indicated that they brush once a day.

In the present quantitative study, 30% of respondents indicated time as a barrier for assessing oral health care during prenatal days . This finding is similar to the 25.32% reported by Kumar et al. (2021) in India among 158 pregnant women. This may be so because most of the participants in the previous study were pregnant with their first child compared to the participants in our study who were mostly expecting their second child and hence were ready to allocate time for prenatal follow ups compared to the women in our study.

5.1.3 The barrier to oral health among pregnant women receiving care and nurse-midwives at Moi Teaching and Referral Hospital.

In the present study, 83% of pregnant women indicated that they were not given information on maternal oral health during antenatal visits. Similarly, a study among 384 post-partum mothers in Kiambu county of Kenya reported that 86.5% of women

did not receive oral health information during prenatal follow ups However, this study only examined the relationship between low birth weight and periodontitis (Gichuki et al.,2021). The findings of the present study are similar to the studies conducted by (Petit et al., 2021; RIAZ et al., n.d.; Soegyanto et al., 2020), who reported that 81.8%,85.4% and 73.6% of pregnant women in France, Pakistan and Indonesia also indicated that oral health was never mentioned by their provider during pregnancy follow up visits respectively.

This may because previous study and the current study was conducted in Kenya and hence midwifery training and practices might be the same in both Uasin Gishu County (where our study was conducted) and Kiambu County.). Further, an Ivorian study also reported that 96.6% of pregnant participants never received any information on maternal oral health during prenatal checkups (Guinan et al.,2021). The findings of previous studies outside Kenya had similar findings and this confirms the fact that oral health during pregnancy has been given less attention both locally and internationally.

5.2 Discussion

The present quantitative study assessed the knowledge, attitudes and perceived barriers on maternal oral health among pregnant women and nurse-midwives at MTRH, Eldoret, Kenya. The response rate in the present study was 70.70%, while in a study by Naavaal & Claiborne conducted among 30 midwives in the United States, the response rate was 13.6%. This may be because the previous study was an online survey with a low response rate compared to other survey methods.

In the present study, 52.9% of nurse-midwives held a bachelor's degree. This is lower than a study by Alizadeh et al. (2019) in Iran among 90 obstetricians and midwives, which reported that 91.1% of midwives were educated to the bachelor's degree level.

This may be because the previous study was conducted in Birjand (Iran), better developed than Kenya which may result on the differences on entry levels in nursing education.

In the current study,84.3% of the nurse-midwives were females, which is low compared to 100% females midwives reported in previous studies (George, Dahlen, Reath, et al., 2016; Naavaal & Claiborne, 2021) in Australia and the United States, respectively, are similar to the 81% female reported by Touriño et al. (2021) in Spain among 96 professional midwives and 32 midwifery students. Half (50%) of the nurse-midwives in our were within the age group of 36-45 years hence were younger than that reported by George et al. (2016) in Australia among 393 general providers, obstetricians, and midwives where the majority of midwives were in the age range of 41-50 year.

5.2.1 The knowledge of nurse-midwives on maternal oral health at Moi Teaching and Referral Hospital.

In the current study, only 28.9% of nurse-midwives were aware of the association between periodontitis and low birth weight, and this is low compared to 44.86% reported in a previous study in Spain by Touriño et al . (2021) among 128 midwives and midwifery students and 60.8% reported by Hoerler et al. (2019) among 76 prenatal providers in the United States. This may be because the previous study was conducted among professional midwives who might have undergone some courses in maternal oral health and therefore were more knowledgeable than the professionals in our study.

Further, 18.6% of the nurse-midwives in our study knew of the association between stillbirth and periodontal diseases during pregnancy. This is higher than 12.77% reported by Touriño et al.(2021) in Spain among 128 midwives and midwifery students. This may be because some of the participants in the previous study were not

fully license as midwives and might not have much exposure in clinical care compared to the participants in our study who were fully licensed nurse-midwives.

In the present study, 72.1% agreed that dental radiography was unsafe, indicating a lack of knowledge. This was high than the previous research by (Touriño et al., 2021) in Span, which reported that only 76.6% of respondents were unaware of the safety of dental radiography. This may be because the previous study was conducted in Spain, a more developed country than Kenya, where our study was conducted. Hence, the training of nurse-midwives in Spain may be different from that of Kenya.

In our study, only 34% of nurse-midwives were aware of the possible link between poor maternal oral health and preterm delivery. This was inconsistent with previous studies of Alizadeh et al. (2019) in Birjand (Iran) among 90 obstetricians and midwives report that 93.3% of participants were fully aware of this association. This high level of awareness in the previous study may be because participants in the earlier studies had in-service training on oral health during pregnancy.

5.2.2 The attitude of nurse-midwives on maternal oral health at Moi Teaching and Referral Hospital.

In our study, only 24.3% of nurse-midwives were of the view that there is a good understanding between nurse-midwives and dentists concerning dental care during pregnancy and this indicate poor attitudes in our study. This finding was poor compared to a previous study in Spain by Touriño et al. (2021), which reported that 55.33% of 128 midwives and student midwives believed there was a good understanding between them and the dentists. This may be because the previous was conducted in a more advanced setting than our study, and therefore they might be differences in the mode of training of nurse-midwives.

Further,83% of nurse-midwives in our study were of the view that asking pregnant women about oral health as part of the routine practice of nurse-midwives indicating better attitudes among the nurse-midwives in our study compared to the previous Australian study by Nguyen et al.(2020), which reported only 31% of nurse-midwives consider oral health as being part of the routine practice. The findings of Uwambaye et al.(2020) in Rwanda shows that 75.9% of ANC providers felt that looking into the patient's mouth was not part of their routine practice. In Spain and the United States, Touriño et al.(2021) and Hoerler et al.(2019) reported that 29.7% and 24.6%, respectively, of midwives, believed oral health was not part of the job description as prenatal care providers.

Again, 96% of respondents in our study indicated that pregnancy is a major cause of tooth loss and is depicts that the nurse-midwives in our study had poor attitude compared to the previous study of Alizadeh et al. (2019) report that only 38.9% believed the statement gain a "child lose a tooth'. This low level of awareness in our study may be because the participants in our study were not given any training in regards to maternal oral health compared to participants in the previous study.

Furthermore,26% of the nurse-midwives in our study indicated they were not confident enough to perform oral health assessments for their pregnant client meaning a majority of our participant felt they were confidence however they did not provide oral health information to the pregnant women under their care and this was highlighted by the pregnant participants in our study. Our finding is better than the previous study of Touriño et al.(2021), which reported that 85.11% of respondents believed they do not have the necessary skills to perform oral health assessments for pregnant women.

In our study, only 12.9% of respondents agreed that they advise their pregnant clients to visit the dentist during follow-ups. This is similar to the previous survey of Hoerler et al. (2019), which reported that only 12% of prenatal professionals always give dental visit advice to pregnant women. This low referrals to the dentist maybe because most of the nurse-midwives in our study and in the previous study might have not considered maternal oral health as an important component of prenatal care. The above indicator depicts a poor attitude toward maternal oral health among nurse-midwives.

5.2.3 The barrier to oral health among nurse-midwives at Moi Teaching and Referral Hospital

In the current study, 29% of nurse-midwives indicated that time was a barrier to providing oral health information to pregnant clients. This finding is better than a previous study by (Nguyen et al., 2020) which reported that 60% of midwives felt there was insufficient time to talk about oral health during pregnancy follow up visits.

In our study,60.9% of respondents indicated that dental professionals are reluctant to treat pregnant women as a barrier to making dental referrals. similar to 56.31% reported by a previous study (Touriño et al., 2021) in Span. Further,30% of nurse-midwives in our research said that the fear of the onset of preterm labour is a barrier to making the dental referral, and this was poor compared to 3.13% reported by Touriño et al.(2021).this maybe the reason why the nurse-midwives in our study this not consider maternal oral health as a key area in their practice.

5.2.4 Comparison of the attitudes and barriers to maternal oral health among pregnant women and nurse-midwives at Moi Teaching and Referral Hospital

In our study, 69% of the nurse-midwives indicated that they gave out oral health information to pregnant women about the need to make a dental visit during pregnancy.

However, the majority (83%) of the pregnant women indicated that their nurse-midwives never informed them about the need to make a dental visit during their pregnancy as a barrier to accessing oral health services. This study identified that oral health information is a barrier to maternal oral health for both nurse-midwives participants and pregnant participants.

In this study,96% of the nurse-midwives and 86% of pregnant women agreed that pregnancy causes tooth loss, showing that both pregnant women and nurse-midwives have a negative attitude regarding oral health during pregnancy. Further,77% of nurse-midwives believed that brushing once a day was insufficient during pregnancy. In comparison, 89% of the pregnant respondents in our study believed that brushing once a day was sufficient during pregnancy. Indicating that pregnant women had a negative attitude compared to nurse-midwives on the number of teeth brushing per day.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study highlights that both pregnant women and nurse-midwives knowledge concerning the link between poor maternal oral health and poor pregnancy outcomes were inadequate. The majority of our participants were not aware that poor maternal oral health has an association with pre-eclampsia, still birth, preterm delivery and low-birth- weight. Also, both pregnant women and nurse-midwives had poor attitudes toward maternal oral health with majority of participants having a wrong notion that tooth lost is normal during pregnancy. However, the attitudes of nurse-midwives were far better than that of the pregnant women in this study. The major barriers to accessing oral health services indicated by pregnant women were: not being informed by their nurse-midwife to make a dental visit, lack of transportation and the cost of dental treatments . The barriers identified in regards to nurse-midwives were: lack of guidelines and lack of in-service training as a major barrier to oral health during pregnancy.

6.2 Recommendation

6.2.1 Kenya Ministry of Health

- Integrating a simple oral health screening tool during prenatal care should be considered to enable nurse-midwives to identify and refer pregnant women at risk of dental problems to overcome barrier of lack of guidelines.
- There is the need to include an aspect of maternal oral health into the training curriculum of nurse-midwives. This will enable trained professionals with the skills and knowledge to provide maternal oral health information and assessment to pregnant women

6.2.2 Kenya Health Service

- Nurse-midwives should be taken through in-services training on oral health assessments to make them confident enough to assess pregnant women and increase the awareness of pregnant women and nurse-midwives on maternal oral health and its impact on pregnancy outcomes. This will go a long way to improve upon the attitudes of nurse-midwives during the prenatal period

6.2.3 Recommendation for future research

- There is the need for a qualitative study to be conducted among pregnant women and nurse-midwives to understand their

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APPENDICES

Appendix I: Data collection tool (for nurse-midwives)

INSTRUCTIONS

Kindly read the following instructions before filling out this questionnaire. This questionnaire has been divided into sections A, section B, section C, and section D. Section A seeks demographic information. Kindly indicate your responses in section A in the response column provided. Section B, C, D aims to assess your knowledge, attitude and barriers to maternal oral health. For each of the questions in sections B, C and D below, circle the response that best characterizes how you feel about the statement, where 1= Strongly disagree 2= Disagree 3= Neutral 4= Agree 5= strongly disagree

SECTION A: DEMOGRAPHIC INFORMATION		
		RESPONSE
1	Age	
2	Gender	
3	Highest level of education Certificate Diploma bachelor degree master's degree fellowship PhD	
4	Years of work experience	

SECTION B: KNOWLEDGE						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Q1	Gingivitis and periodontitis are conditions that affect the supporting structures of the teeth	1	2	3	4	5
Q2	Pregnancy exacerbate existing dental condition	1	2	3	4	5
Q3	Gingivitis is more serious than periodontitis	1	2	3	4	5
Q4	Calcium be drawn out of the mother's teeth by the developing baby	1	2	3	4	5
Q5	Gingivitis is a potentially reversible infection of the gum	1	2	3	4	5
Q6	Poor maternal oral health contributes to early childhood decay	1	2	3	4	5
Q7	Poor maternal oral health can contribute to preterm delivery	1	2	3	4	5
Q8	Poor maternal oral health can lead to miscarriages	1	2	3	4	5
Q9	Periodontitis has been associated to preeclampsia	1	2	3	4	5
Q10	Periodontitis has been associated with low birth weight	1	2	3	4	5
Q11	Periodontal disease has been associated with Stillbirth	1	2	3	4	5
Q12	Preventive dental services are necessary during pregnancy	1	2	3	4	5

Q13	Basic dental treatment safe during pregnancy	1	2	3	4	5
Q14	It is unsafe to obtain dental radiographs during pregnancy	1	2	3	4	5
Q15	Having a dental x-ray during pregnancy is safe	1	2	3	4	5
SECTION C: ATTITUDES						
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Q16	Pregnant women should not visit the dentist for dental treatment	1	2	3	4	5
Q17	Brushing once a day is sufficient for pregnant women	1	2	3	4	5
Q18	Poor oral health can contribute to complications during pregnancy	1	2	3	4	5
Q19	Dental treatment during pregnancy is harmful to the baby	1	2	3	4	5
Q20	Pregnancy causes tooth loss, and so it is normal for pregnant women to lose a tooth during pregnancy	1	2	3	4	5
Q21	Dental treatments are stressful for pregnant women	1	2	3	4	5
Q22	I feel confident about performing oral health assessment	1	2	3	4	5
Q23	Asking pregnant women about oral health is outside my routine practice	1	2	3	4	5
Q24	Currently, there is a good understanding between dentists and nurse-midwives regarding dental care during pregnancy	1	2	3	4	5

SECTION D:BARRIERS						
Q25	I do not inform my clients about the need to visit the dentist	1	2	3	4	5
Q26	The fear of the onset of labour during dental treatment is a barrier to referring pregnant women to the dentist	1	2	3	4	5
Q27	Time constraint is a barrier to discussing maternal oral health during ANC visit/admission/discharge	1	2	3	4	5
Q28	The national health Insurance does not cover dental treatment	1	2	3	4	5
Q29	Dental professionals are reluctant to treat pregnant women	1	2	3	4	5
Q30	Lack of guidelines on oral health during pregnancy is a barrier to promoting oral health during pregnancy	1	2	3	4	5
Q31	Lack of in-service training on maternal oral health is a barrier to promoting oral health during pregnancy	1	2	3	4	5
32	Exclusion of maternal oral health courses during my professional training is a barrier	1	2	3	4	5

Appendix II: Data collection tool (for pregnant women)

INSTRUCTIONS

Kindly read the following instructions before filling out this questionnaire. This questionnaire has been divided into sections A, section B, section C, section D, and E. Section A seeks demographic information. Kindly indicate your responses in section A in the response column provided and tick the appropriate reactions in section B. Sections C, D. E aims to assess your knowledge, attitude and barriers to maternal oral health. For each of the questions in areas B, C and D below, circle the response that best characterizes how you feel about the statement, where 1= Strongly disagree 2= Disagree 3= Neutral 4= Agree 5= strongly disagree

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS		
		responses
1	Age	Please specify_____
2	Marital status	Married_____1 Single_____2 Widow_____3 Co-habitation_____4 Other
3	Educational status	No formal education Basic education Secondary education Tertiary
4	Occupation	Please specify_____
	SECTION B: PARITY AND PREGNANCY HISTORY OF MOTHERS	
1	Trimester	

2	Number of pregnancies	
3	Number of children	

SECTION C: MATERNAL ORAL HEALTH SCREENING TOOL	
Q1	Do you have bleeding gums, swelling, sensitive teeth, loose teeth, holes in your teeth, broken teeth, toothache or any problems in your mouth? Yes ☐ No ☐
Q2	Have you seen a dentist in the last 12 months? Yes ☐ No ☐

SECTION D: KNOWLEDGE						
		Strongly disagree	disagree	neutral	agree	Strongly agree
Q3	Pregnant women are more susceptible to dental caries than other women	1	2	3	4	5
Q4	Pregnant women are more susceptible to gum diseases than other women	1	2	3	4	5
Q5	Scaling (having teeth cleaned by a dentist) during pregnancy is safe	1	2	3	4	5
Q6	Dental extraction during pregnancy is safe(having decay tooth removed)	1	2	3	4	5
Q7	Having a dental X-ray during pregnancy is not harmful to my baby	1	2	3	4	5
Q8	Pregnant women can lose teeth only because of pregnancy	1	2	3	4	5

Q9	Visiting the dentist during pregnancy for check-ups and scaling is safe	1	2	3	4	5
Q10	Periodontal disease in pregnant women could lead to pre-eclampsia(swelling of the whole body, ankles and legs, high blood pressure, protein in urine)	1	2	3	4	5
Q11	Periodontal disease in pregnant women could lead to low- birth- weight baby	1	2	3	4	5
Q12	Periodontal disease in pregnant women could lead to preterm labour	1	2	3	4	5
Q13	It is normal to have bleeding gum during pregnancy	1	2	3	4	5
Q14	Oral and teeth problems in the mother can affect the baby's health	1	2	3	4	5
SECTION E: ATTITUDE						
		Strongly disagree	disagree	neutral	agree	Strongly agree
Q15	Pregnant women should not visit the dentist for dental treatment	1	2	3	4	5
Q16	Brushing once a day is sufficient during pregnancy	1	2	3	4	5
Q17	Poor oral health can contribute to complications during pregnancy	1	2	3	4	5
Q18	Dental treatment during pregnancy is harmful to my baby	1	2	3	4	5
Q19	Pregnancy causes tooth loss	1	2	3	4	5
Q20	Dental treatments are stressful	1	2	3	4	5

SECTION F: BARRIERS						
Q21	Nurse-midwives do not inform as about the need to visit a dentist	1	2	3	4	5
Q22	Time constraint is a barrier to accessing oral health services	1	2	3	4	5
Q23	My insurance does not cover dental treatments	1	2	3	4	5
Q24	The distance to the health facility is a barrier to access dental preventive services	1	2	3	4	5
Q25	Lack of money for transportation to the hospital for dental treatment is a barrier	1	2	3	4	5
Q26	The cost of dental treatment prevents me from seeking dental health preventive services					

THANK YOU FOR YOUR TIME

Appendix III: Informed consent

MOI TEACHING & REFERRAL HOSPITAL / MOI UNIVERSITY COLLEGE OF HEALTH SCIENCES -INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (MTRH/MU-IREC)

INFORMED CONSENT FORM

Study Title: KNOWLEDGE, ATTITUDES AND BARRIERS ON MATERNAL ORAL HEALTH AMONG PREGNANT WOMEN AND NURSE-MIDWIVES AT MOI TEACHING AND REFERRAL HOSPITAL

Name of Principal Investigator(s): Paulina Kabbah
Co-investigator(s): DrChelagat Dinah, Dr. OchidaLukandu
Name of Organization: MOI UNIVERSITY
Address: P.O BOX 4606 (30100)**Telephone Number:** 0732947748
Name of Sponsor/Funding Agency: Queen Elizabeth Commonwealth Scholarship
Informed Consent Form for: Pregnant women and Nurse-midwives
This Informed Consent Form has two parts:

- Part I: Information Sheet [to share information about the study with you]
- Part II: Certificate of Consent [for signatures if you choose to participate]

PART I: INFORMATION SHEET

Introduction: You are being asked to take part in a research study. This information is provided to tell you about the study. Please read this form carefully. You will be given a chance to ask questions. Taking part in this research study is voluntary. Saying no will not affect your rights to health care or any other services. Your treatment/payment or enrolment in any health plans or eligibility for benefits will not be affected if you decide not to take part. You are also free to withdraw from this study at any time. If after data collection you choose to quit, you can request that information provided by you be destroyed under supervision. This would be before data is de-identified and aggregated.**Purpose of the study:** to assess the knowledge, attitudes and barriers of pregnant women and nurse-midwives on maternal oral health at Moi Teaching and Referral Hospital.**Study site:** Moi Teaching and Referral Hospital. **Study population:** pregnant women receiving care at the antenatal clinic of MTRH and nurse-midwives working at the maternity unit of MTRH.**If you agree you will do the following**:Sign the consent form. The participant will then be given one copy of the consent form to keep. **Benefits:** The study will contribute to the existing body of knowledge and also service as a guide to curriculum developers of midwifery programs.

Risks/Discomforts: This study will take a maximum of 30 minutes of participant's time**Payments and Reimbursements:**Participant will not receive any payments nor reimbursement

Confidentiality: All reasonable efforts will be made to keep your protected information (private and confidential). Using or sharing ("disclosure") of such information will follow National privacy guidelines. By signing the consent document for this study, you are giving permission ("authorization") for the use and disclosure of your study information. We may need to share your protected information with the community advisory board, MTRH//MU-IREC, NACOSTI or the healthcare team. We will retain your research records for at least six years after the study is completed. At that time, the research information is destroyed.

PART II: CONSENT OF PATICIPANT:

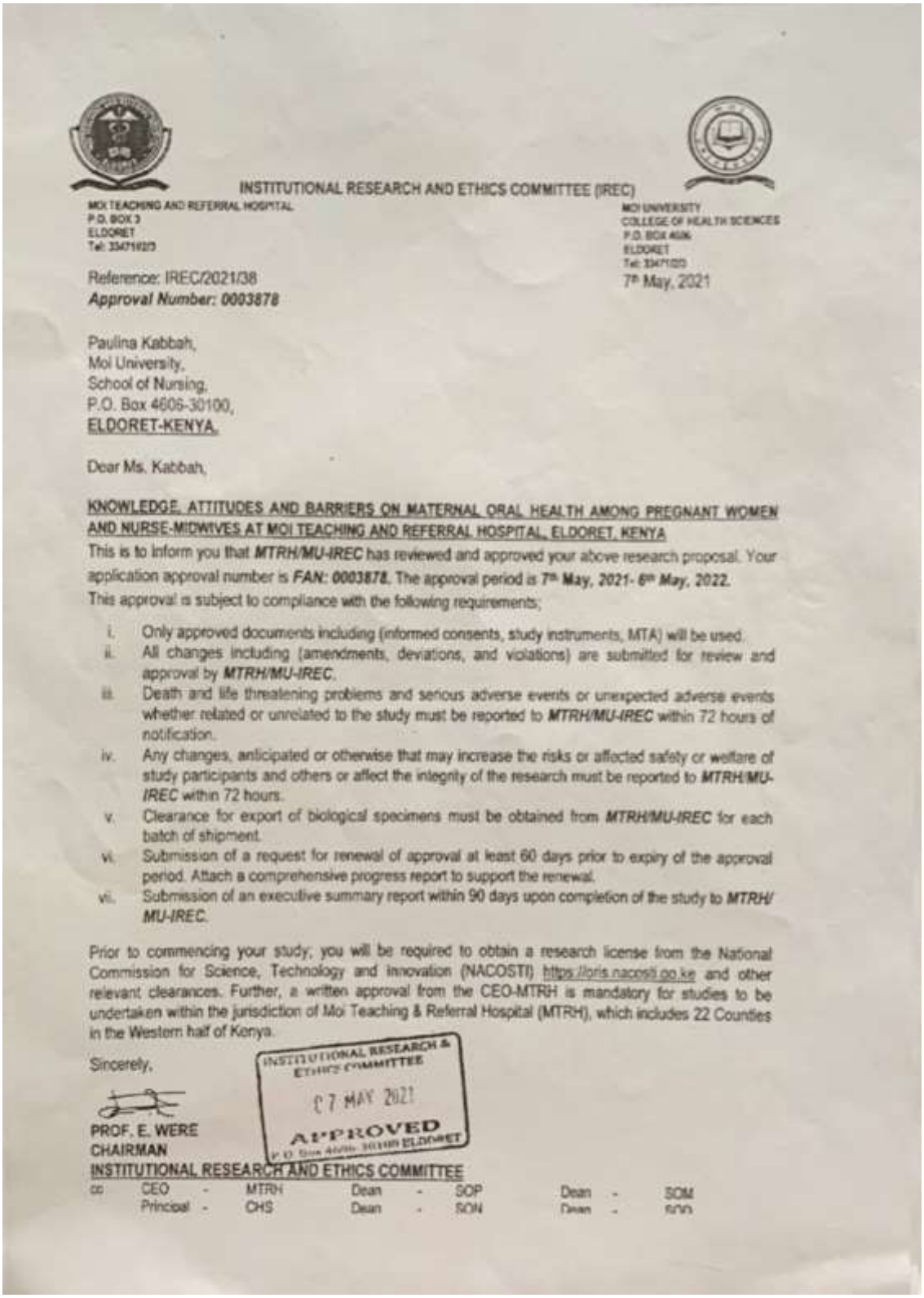
I have read or have had someone read to me the description of the research study. The investigator or his/her representative has explained the study to me and has answered all the questions I have at this time. I have been told of the potential risks, discomfort, and possible benefits (if any) of the study. I freely volunteer to take part in this study.

Name of Participant	Signature of participant/Thumbprint	Date & Time
Name of the person obtaining consent	Signature of person Obtaining consent	Date & Time
Paulina Kabbah(PI)	Signature.....	Date

Contacts for questions about the study;Questions about the study: Paulina Kabbah (Principal Investigator), Phone number: 0732947748, Email: paulina.kaba@yahoo.com

Questions about your rights as a participant: You may contact the Institutional Ethics and Research Committee (MTRH//MU-IREC) 0787723677 or email irec@mtrh.go.ke or irecoffice@gmail.com. The MTRH//MU-IREC is a group of people that review studies for safety and to protect the rights of participants.

Appendix IV: IREC approval



INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471020

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471020

Reference: IREC/2021/38
Approval Number: 0003878

7th May, 2021

Paulina Kabbah,
Moi University,
School of Nursing,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Ms. Kabbah,

KNOWLEDGE, ATTITUDES AND BARRIERS ON MATERNAL ORAL HEALTH AMONG PREGNANT WOMEN AND NURSE-MIDWIVES AT MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA

This is to inform you that ***MTRH/MU-IREC*** has reviewed and approved your above research proposal. Your application approval number is ***FAN: 0003878***. The approval period is ***7th May, 2021- 6th May, 2022.***
This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MTRH/MU-IREC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MTRH/MU-IREC*** within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MTRH/MU-IREC*** within 72 hours.
v. Clearance for export of biological specimens must be obtained from ***MTRH/MU-IREC*** for each batch of shipment.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MTRH/MU-IREC***.

Prior to commencing your study, you will be required to obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and other relevant clearances. Further, a written approval from the CEO-MTRH is mandatory for studies to be undertaken within the jurisdiction of Moi Teaching & Referral Hospital (MTRH), which includes 22 Counties in the Western half of Kenya.

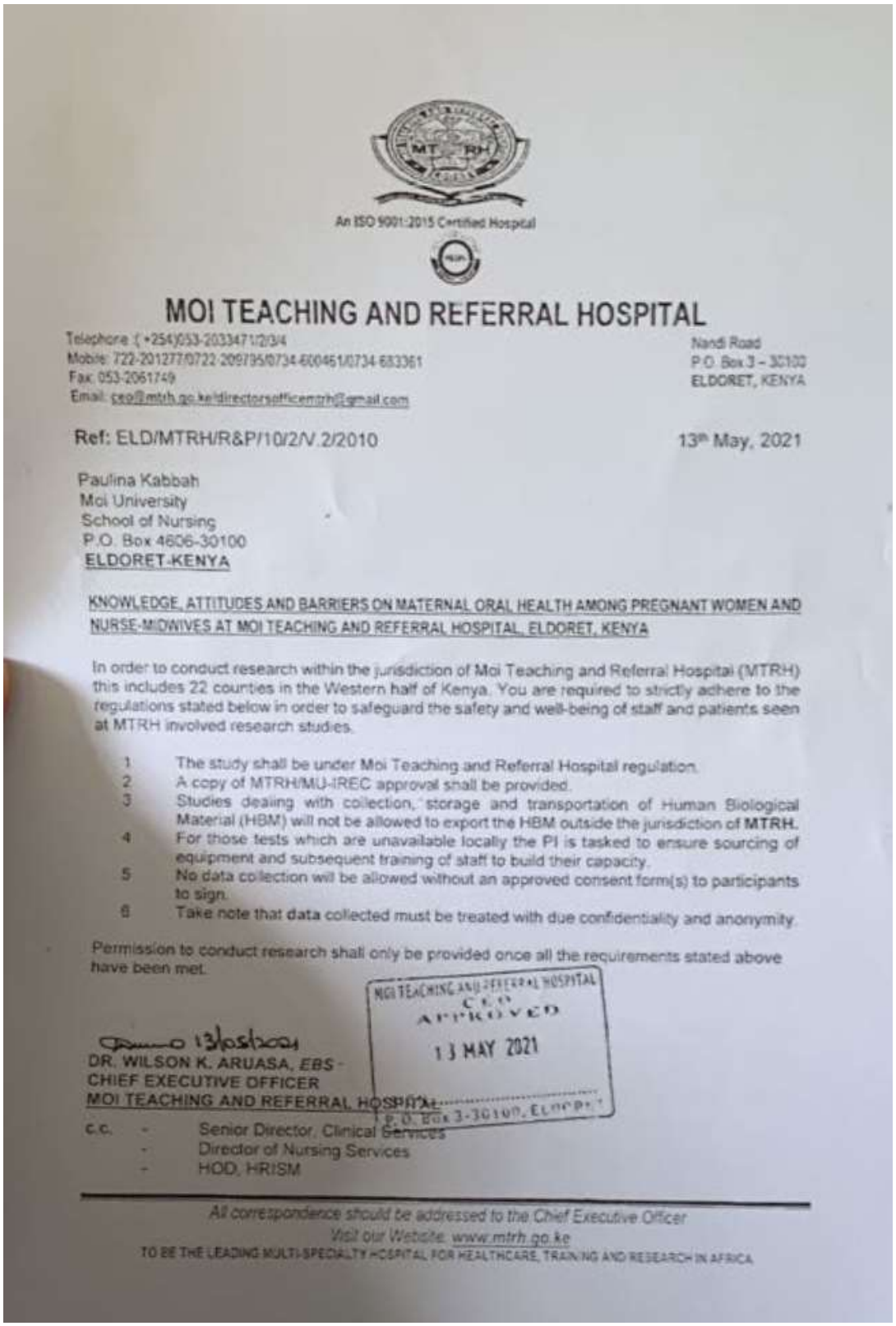
Sincerely,

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
07 MAY 2021
APPROVED
P.O. Box 4606, 30100 ELDORET

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH Dean - SOP Dean - SOM
Principal - CHS Dean - SON Dean - SON

Appendix V: Hospital approval (MTRH)



An ISO 9001:2015 Certified Hospital

MOI TEACHING AND REFERRAL HOSPITAL

Telephone: (+254)053-2033471/2/3/4
Mobile: 722-201277/0722-209795/0734-600461/0734-683361
Fax: 053-2061749
Email: ceo@mtrh.go.ke/directorsofficemtrh@gmail.com

Nandi Road
P.O. Box 3 – 30100
ELDORET, KENYA

Ref: ELD/MTRH/R&P/10/2/V.2/2010

13th May, 2021

Paulina Kabbah
Moi University
School of Nursing
P.O. Box 4606-30100
ELDORET-KENYA

KNOWLEDGE, ATTITUDES AND BARRIERS ON MATERNAL ORAL HEALTH AMONG PREGNANT WOMEN AND NURSE-MIDWIVES AT MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA

In order to conduct research within the jurisdiction of Moi Teaching and Referral Hospital (MTRH) this includes 22 counties in the Western half of Kenya. You are required to strictly adhere to the regulations stated below in order to safeguard the safety and well-being of staff and patients seen at MTRH involved research studies.

1. The study shall be under Moi Teaching and Referral Hospital regulation.
2. A copy of MTRH/MU-IREC approval shall be provided.
3. Studies dealing with collection, storage and transportation of Human Biological Material (HBM) will not be allowed to export the HBM outside the jurisdiction of **MTRH.**
4. For those tests which are unavailable locally the PI is tasked to ensure sourcing of equipment and subsequent training of staff to build their capacity.
5. No data collection will be allowed without an approved consent form(s) to participants to sign.
6. Take note that **data** collected must be treated with due confidentiality and anonymity.

Permission to conduct research shall only be provided once all the requirements stated above have been met.

MOI TEACHING AND REFERRAL HOSPITAL
C.E.O.
APPROVED
13 MAY 2021
P.O. Box 3-30100, ELDORET

13/05/2021
DR. WILSON K. ARUASA, *EBS*
CHIEF EXECUTIVE OFFICER
MOI TEACHING AND REFERRAL HOSPITAL

c.c. - Senior Director, Clinical Services
- Director of Nursing Services
- HOD, HRISM

Appendix VI: Approval from county (Kapsabet County Referral Hospital)

COUNTY GOVERNMENT OF NANDI

DEPARTMENT OF HEALTH

The Medical Superintendent office
Kapsabet County Referral Hospital
P.O Box 5 - 30300
KAPSABET.
24/5/2021

Telegrams; MEDICAL;
Telephone; 52081, 52623
When replying please quote
REF:R.I/VOL.I/18/252

TO:

Paulina Kabbah

RE: RESEARCH AUTHORIZATION REG.NO SN/PGMNH/02/19

Following your request to conduct a research, the management of Kapsabet County Referral Hospital has granted you a permission to conduct your study on ***"KNOWLEDGE, ATTITUTES AND BARRIERES ON MATERNAL ORAL HEALTH AMONG PREGNANT WOMEN AND NURSE-MIDWIVES:"*** for a period of one week w.e.f 2nd June 2021.

It is expected that you observe the ethics of this organization.

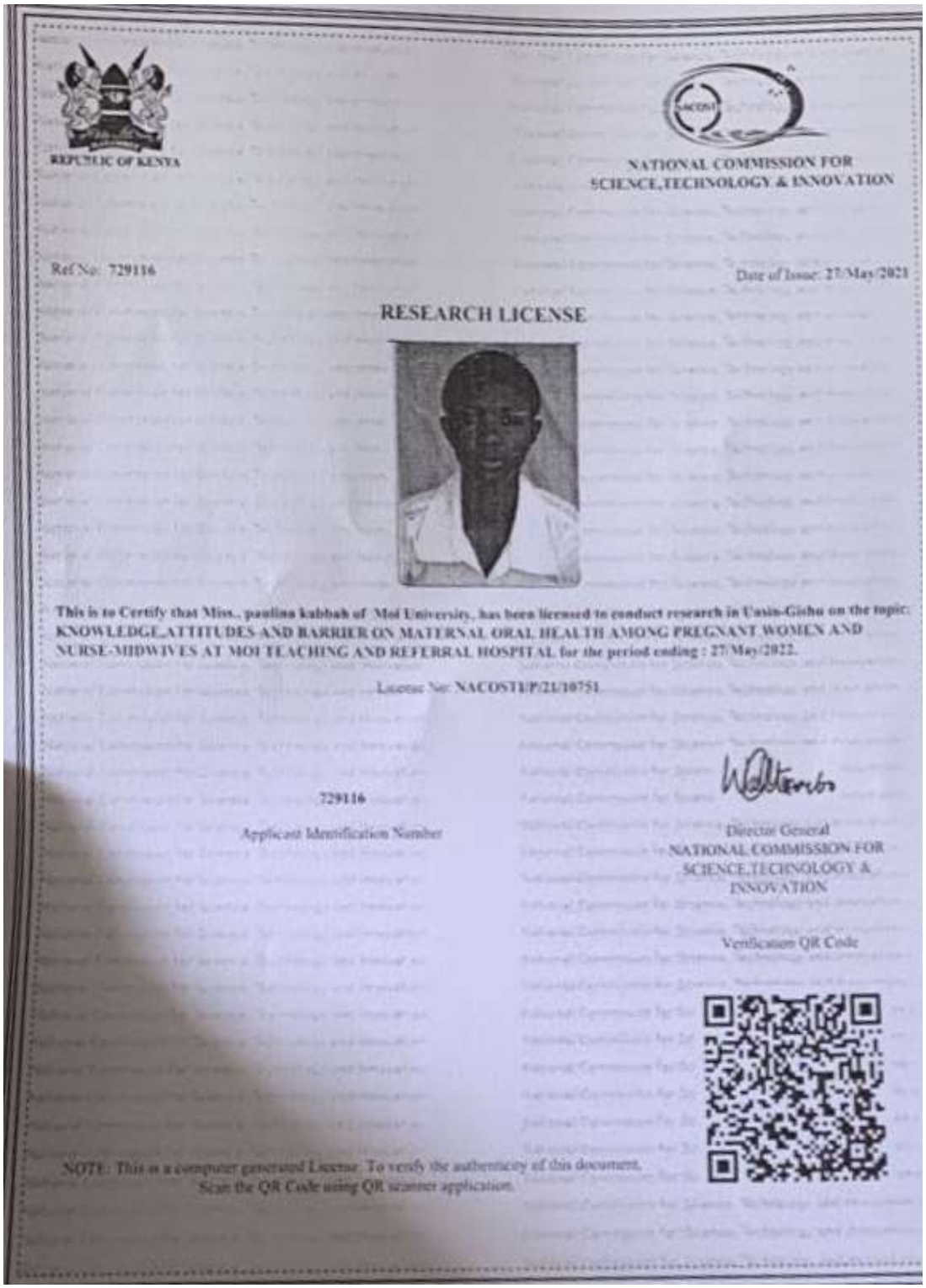
Yours,

MEDICAL SUPERINTENDENT * KAPSABET COUNTY REFERRAL HOSPITAL *

24 MAY 2021

DR. DAVID BUNGEI
COUNTY DIRECTOR OF HEALTH
NANDI COUNTY

Appendix VII: Approval from NACOSTI



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 729116

Date of Issue: 27/May/2021

RESEARCH LICENSE

This is to Certify that Miss., paulina kabbah of Moi University, has been licensed to conduct research in Uasin-Gishu on the topic: KNOWLEDGE,ATTITUDES AND BARRIER ON MATERNAL ORAL HEALTH AMONG PREGNANT WOMEN AND NURSE-MIDWIVES AT MOI TEACHING AND REFERRAL HOSPITAL for the period ending : 27/May/2022.

License No: NACOSTI/P/21/10751

729116

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix VIII: Plagiarism Certificate

SR024

EDU 999 THESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

PAULINA KABBAH

SN/PGMNH/02/19

In recognition for passing the University's plagiarism awareness test with a similarity index of 1% and striving to maintain academic integrity

Awarded by:

Prof. John Changách, CERM-ESA Project Leader

Date: 30/11/2021