

**ASSESSMENT OF FACTORS ASSOCIATED WITH TETANUS TOXOID
VACCINATION UPTAKE BY PREGNANT WOMEN RECEIVING CARE AT
KAKAMEGA COUNTY REFERRAL HOSPITAL, KENYA**

BY

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**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF PUBLIC HEALTH IN HEALTH PROMOTION AND
INTERNATIONAL HEALTH**

**SCHOOL OF PUBLIC HEALTH AND COMMUNITY
DEVELOPMENT**

MASENO UNIVERSITY

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DECLARATION

I declare that this thesis is my original work and has not been duplicated or done in any other university for an award of a degree.

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ACKNOWLEDGEMENTS

This thesis was prepared with the active participation of health experts from several institutions and organizations. The development of the thesis was carried out under the supervision of Prof. Rosebellah Onyango and Prof. James H. Ombaka both of them from Maseno University School of Public Health. In this regard their support is greatly acknowledged. Special appreciation goes to research assistants who provided significant support and contribution in the review of materials and data collection. Staff from Kakamega County Referral Hospital is appreciated for their consistent support during data collection and granting permission for the same. I also appreciate the cooperation offered by all the respondents who took their time to answer questions during the interview with research assistants.

DEDICATION

I dedicate this work to my family with all the passion and love.

ABSTRACT

According to the 2013 World Health Organization estimates, maternal tetanus toxoid (TT2) immunization coverage was 65% globally, and 66% in Africa. In Kenya, the vaccination was 48.7% in 2013 while 27.4% in Kakamega County. Since non-uptake of TT vaccination means a mother would not be able to develop immunity against tetanus, the mother would not pass anti-tetanus immunity to her neonate. In this case, Neonates born of 72.6% anti-tetanus naive mothers in Kakamega County are susceptible to infection and death from tetanus. Across the literature, no study has been undertaken for this Hospital to analyze the causes of low TT vaccination uptake in relation to health seeking behavior, examine the magnitude of vaccination attritions and identify the determinants of TT vaccination among pregnant women. This cross-sectional study was conducted at this Hospital to: examine the health seeking behavior; tetanus toxoid uptake and magnitude of tetanus toxoid vaccination attritions as well as to identify the determinants of tetanus toxoid vaccination uptake by pregnant women attending the Hospital. A total of 231 mothers of children aged between 1 day - 11 months sampled from a study population of 462 women, were proportionately stratified and systematically randomly sampled at a sampling interval of 2 in this hospital. Data was collected using questionnaires. Chi-square test was used to establish proportion of women for health seeking behavior as well as uptake and attrition of tetanus toxoid vaccination and the reasons for non-TT vaccination. Multivariate logistic regression was used to establish the association between socio-demographic; economic and health seeking behaviors influencing TT vaccination. Mothers who had <4 ANC visits were 116(50.2%) and 109(47.2%) had 4+ ANC visits. Mothers who delivered at the health facility were 186(80.5%) whereas 44(19.0%) delivered at home. Only 67(29.0%) mothers received 1+ TT injections; 95(41.1%) never received TT vaccination and 69(29.9%) were attrition cases. Approximately 140(85.4%) mothers were unaware of: need for TT vaccination; 8(4.9%) need to return for 2nd or 3rd TT dose. Mothers who had at least one ANC visit were 39 times [OR = 38.9 (95% CI = 5.620 – 269.44) P value <0.001]; more likely to receive TT vaccination. Mothers who delivered at the hospital were three times more likely to receive TT vaccination than those who delivered elsewhere [OR= 3.419; 95% CI = (1.578 – 7.403); p<0.001]. Mothers aged 15 - 19 were 2 times more likely to be vaccinated [OR = 1.944; 95% CI = 0.502 – 7.528), P = 0.336. Mothers with primary education were 1.27 times; [OR = 1.27; 95% CI = (1.079 – 1.080); P value <0.001] more likely to be vaccinated than illiterate mothers. Mothers from urban were two times more likely to be vaccinated [OR = 2.474; 95% CI = (1.205 – 5.076); p = 0.014] than those of rural residence [OR = 0.404; 95% CI = (0.197 – 0.830); p = 0.014]. TT2+ vaccination in Kakamega County Referral Hospital is below the WHO recommendations. The lack of awareness is the major reason for it. The public health awareness programs should be launched to increase the awareness and acceptance rate for TT vaccination.

Table of Contents

DECLARATION.....	i
ACKNOWLEDGEMENTS.....	ii
DEDICATION.....	iii
ABSTRACT.....	iv
TABLE OF CONTENTS.....	v
ABBREVIATIONS.....	viii
OPERATIONAL DEFINITIONS.....	ix
LIST OF TABLES.....	x
LIST OF FIGURES.....	xi
CHAPTER 1: INTRODUCTION.....	1
1.1 Background.....	1
1.2 Statement of the Problem.....	5
1.3 Justification of the Study.....	6
1.4 Objectives.....	7
1.4.1 Main Objective.....	7
1.4.2 Specific objectives.....	7
1.5. Research Questions.....	8
1.6 Significance of the Study.....	8
1.7 Study limitation.....	8
CHAPTER 2: LITERATURE REVIEW.....	10
2.1 Health seeking behavior and TT vaccination uptake.....	10
2.2 Tetanus Toxoid Vaccination Attritions.....	11
2.2.1 Reason for low uptake or tetanus toxoid vaccination attritions.....	12
2.3 Determinants of Tetanus Toxoid Vaccination Uptake.....	13

2.3.1 Socio-demographic factors and Tetanus Toxoid Vaccination Uptake.....	13
2.3.2 Socio-economic factors and tetanus toxoid vaccination uptake.....	15
2.3.3 Behavioral Factors.....	16
2.4 Tetanus Toxoid Vaccination program	18
2.5 Maternal recall of tetanus toxoidvaccination.....	20
2.6 Use of maternal TT Vaccination coverage as a strategy to eliminate neonatal tetanus.....	20
2.7 Conceptual frame work	22
CHAPTER 3: METHODOLOGY.....	23
3.1 Introduction.....	23
3.2 The Study Area.....	23
3.3 The Study Design.....	24
3.4 The Study Population.....	24
3.4.1 Criteria for inclusion.....	25
3.4.2 Criteria for exclusion.....	25
3.5 The Sample Size Determination.....	25
3.6 Sampling Technique.....	26
3.7 Data Collection Technique.....	27
3.8 Data Management and Analysis,,.....	27
3.9 Ethical Consideration and Authorization.....	28
CHAPTER 4: RESULTS.....	29
4.1 Introduction.....	29
4.2 Socio-Demographic Profile of the study Participants.....	29
4.3 Health Seeking Behavior of Pregonant Women Attending Kakamega County Referral Hospital.....	30
4.4 Tetanus Toxoid Vaccination and Attrition among Pregnant Women Attending Kakamega County Referral Hospital.....	32

4.5 Reasons given for not getting TT Vaccination.....	34
4.6 Determinants of Tetanus Toxoid Immunization Uptake.....	34
4.6.1 Association between Health Seeking Behavior and TT vaccination up take by Pregnant Women Attending Kakamega County Referral Hospital.....	34
4.6.2 Association between Socio- Demography and TT vaccination (Pregnant Women Attending Kakamega County Referral Hospital).....	36
CHAPTER 5: DISCUSSIONS	38
5.1 Introduction.....	38
5.2 Health Seeking Behavior and TT Vaccination uptake	38
5.3 Tetanus Toxoid Vaccination and Attrition (Pregnant Women).....	39
5.3.1 Reasons given for missing TT Vaccination.....	41
5.4 Associations between Socio-Demographic Characteristics of Pregnant women and TT Vaccination.....	42
CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS	44
6.1. Conclusions.....	44
6.2 Recommendations.....	44
6.3 Recommendation for Further Research.....	45
REFERENCE	46
APPENDICES	53

ABBREVIATIONS

DHIS	District Health Information System
EPI	Expanded Programme on Immunization
FANC	Focused Antenatal Care
H/C	Health Centre
HOS	Hospital
KCRH	Kakamega County Referral Hospital
KDHS	Kenya Demographic and Health Survey
MCH	Maternal and Child Health
MNT	Maternal Neonatal Tetanus
NT	Neonatal Tetanus
OUT	Outreach
PRIV	Private
TBA	Traditional Birth Attendant
TT 2	2 Doses of Tetanus Toxoid vaccine
UNFPA	United Nations Population Fund
UNICEF	United Nations Children Fund
WHO	World Health Organizations

OPERATIONAL DEFINITIONS

Infant mortality rate: The number of deaths of young babies per 1000 live births

Infant mortality: The death of a young baby in the first year of life.

Maternal tetanus toxoid immunization: The process whereby a pregnant woman is made immune or resistant to tetanus disease.

Maternal tetanus: Tetanus that strikes women during pregnancy or within 6 weeks of the termination of pregnancy.

Morbidity: Sickness/illness.

Mortality: Death

Random number: A number selected by chance.

Study population: Women with children less than one year who are seeking services in Kakamega County Referral Hospital Kenya.

Target population: All women within the child bearing age bracket (14 to 49 years)

Tetanus Toxoid Vaccine: A vaccine that produces immunity to tetanus disease by stimulating the production of antibodies.

TT Vaccination coverage target: A number of pregnant women estimated by a health facility that states what number of these in the study population will be vaccinated with TT vaccine in a given time period.

TT Vaccination coverage: Population of women in the study who are immunized with at least 2 doses of tetanus toxoid vaccination

LIST OF TABLES

Table 3.1: Population Proportionate Sample Size.....	26
Table 4.1 Socio-Demographic Profile of the study Participants.....	30
Table 4.2: Health seeking behavior and TT vaccination.....	32
Table 4.3: Reasons given for non - TT Vaccination.....	34
Table 4.4: Association between Health Seeking Behavior and TT vaccination uptake of Pregnant Women Attending Kakamega County Referral Hospital.....	35
Table 4.5: Association between Socio-Demography and TT vaccination of Pregnant Women..	37

LIST OF FIGURES

Figure 2.1: Operational Framework.....	22
Figure 4.1: Tetanus Toxoid Vaccination and Attrition among Pregnant Women Attending Kakamega County Referral Hospital.....	33

CHAPTER 1: INTRODUCTION

1.1 Background

Tetanus toxoid injections are given during pregnancy to prevent neonatal tetanus, a frequent cause of infant deaths that killed 58,000 newborns in 2010 world-wide (WHO/Vandelaer, 2012). According to WHO estimates of the year 2013, some 5476 cases of Neonatal Tetanus were reported globally. However, deaths attributable to tetanus infections has reduced significantly especially in developed countries. For instance in 2009 only 19 cases of tetanus, including two deaths, were reported to the national tetanus surveillance system of Alaska, USA (CDC, 2011).

The low number of cases and deaths due to tetanus could be due to improved utilization of tetanus vaccination services by the people. Nevertheless, tetanus vaccination uptake in developing and least developed countries is still wanting. For example a study by Singh *et al.* (2012) that investigated maternal tetanus toxoid vaccination and neonatal mortality in Rural North India established that a total of 68% of the interviewed mothers reported receiving two or more doses of tetanus toxoid (TT) vaccination and that the odds of reduced all-cause of neonatal deaths following one or more antenatal dose of TT was 0.46 (95% CI 0.26 to 0.78) after one dose and 0.45 (95% CI 0.31 to 0.66) after two or more doses, which shows a positive relationship between tetanus toxoid immunization and reduced neonatal mortality.

In Africa, just like other developing continents; tetanus toxoid vaccination TT1 - TT5 uptake has depicted a declining trend. A good example is a report from UNICEF where tetanus toxoid uptake among Somali women was recorded. In this report, information on (TT) uptake obtained from 282 mothers with children aged 0 - 11 months indicated that only 39%, 30% 19%, 11% and 7% had received TT1-TT5 doses, respectively (UNICEF 2008).

Reportedly in 2002, Busoga region of Uganda had the highest cases (195) of neonatal tetanus incidences (UNICEF, 2005); however, by July 2011, Uganda announced that it had eliminated maternal and neonatal tetanus (MNT) (WHO/Vandelaer, 2012). Unfortunately, Kenya is still fighting to eliminate maternal and neonatal tetanus. In 2013, Kenya reported a total of 71 cases of neonatal tetanus (DHIS, 2013). In 2011, Kakamega County Referral Hospital reported 3 neonatal tetanus deaths and entire district reported 6 NT deaths the same year (District Health Records). These deaths occur when a woman delivers under unhygienic condition. Kakamega County reported the highest number of unskilled deliveries (79.2%) compared to other counties in the former western province such as Bungoma (58.6%), Vihiga (49.7%) and Busia (41.5%) KNBS & ICF Macro, (2014).

Antenatal care (ANC) attendance during pregnancy has been reported to be associated with being protected at delivery from tetanus (Deming, 2002). It gives an opportunity for a woman to be reviewed and given her due dose of TT. A minimum of 4FANC visits are recommended for a pregnant woman who has no complications (WHO, 2007). In the year 2014, only 57.6% of mothers completed 4 ANC visits in Kenya and 45% in Kakamega County the same year. Other counties recorded high numbers of 4th ANC visits for example, Bungoma (50%), Vihiga (61.3%) and Busia (50%) KNBS & ICF macro, (2014), compared to Kakamega County.

Provision of at least 2 doses of Tetanus toxoid vaccine to all pregnant women is one of the three strategies of achieving maternal neonatal tetanus elimination recommended by WHO, UNICEF, UNFPA and adopted by Kenya (WHO, UNICEF, UNFPA 2002). Despite the fact that this vaccine is available and considerable resources are invested in the routine EPI programme by WHO, UNICEF, UNFPA and Kenya Government, only 65% of pregnant women globally and

66% in Africa were reported to be immunized with at least 2 doses of TT vaccine in the year 2013 according to WHO estimates.

In Kenya, the percentage of women receiving at least two doses of TT vaccination was 55% in 2009 (KNBS & ICF Macro, 2010), 38% in 2011, and 47.1% in 2013. In the former Western province TT vaccination was at 48% in 2009 and 41.5% in 2011(DHIS 2011). In Kakamega County TT vaccination was only at 27.4% in 2013 (Appendix II). These figures indicate that there is no or very slow improvement in TT vaccination coverage among the pregnant women in Kenya and Kakamega County in particular.

It is because of the high level of unskilled deliveries and low level of 4th ANC attendance coupled with low TT2 vaccination coverage 27.4% together with 6 neonatal deaths that motivated the researcher to choose Kakamega County Referral Hospital as a study area.

There was no study done for this Hospital to examine the health seeking behavior and itemized uptake of TT vaccination of these women. Previous studies done, (Maina *et al.*, 2014; Mwaniki *et al.*, 2002) and the most recent KNBS & IFC Macro (2010) survey are community based studies conducted regionally and they do not reflect the situations at individual institutions such as Kakamega County Referral Hospital whose situation remain unknown. To highlight the causes of the low uptake of TT vaccination among women of reproductive age attending Kakamega County Referral Hospital it is important that the health seeking behavior and itemized uptake of TT vaccination of these women is investigated as currently it is not known.

According to previous studies there are an array of socio-demographic, economic factors and health seeking behaviors that often influence TT vaccination uptake by the targeted population. By use of multivariate logistic regression analysis Kidane (2004) was able to demonstrate that maternal vaccination awareness score and residence were the predictors of TT3+ while

vaccination status of the mother and maternal vaccination awareness, residence and maternal education were the main predictors of a child's protection at birth against tetanus.

Afridi *et al.* (2005) reported a significant association between TT vaccination and marital status (OR= 8.5, 95% CI (4.7, 15.6), source of information regarding tetanus toxoid (TT) vaccination, knowledge regarding TT vaccination, visits of lady health worker (LHW) to a household (OR = 2.3, 95% CI (1.4, 3.9) and restriction on TT vaccination (OR = 28.7, 95% CI (3.5, 237.9). For the married females, the same study established that source of information; visits of LHW to a household (OR = 2.8, 95% CI (1.5 to 5.2) and an interaction between knowledge regarding TT vaccination and antenatal care visits were significantly associated with TT vaccination status.

A study conducted in Lahore District of Pakistan that investigated causes of low tetanus toxoid vaccination coverage in pregnant women was able to report that poor knowledge about the importance of TT (32%) or the place or time to get vaccinated (18%) were the main reasons for non-TT vaccination (Hasnain & Sheikh, 2007). The study also reported that according to the health care medical officers there was lack of awareness about the importance of TT vaccination among the public as well as a misconception that TT vaccination was a contraceptive. While these studies show that there is an array of socio-demographic, economic factors and health seeking behaviors that often influence health service uptake by the targeted population, they do not give the magnitude of TT vaccination attrition and how it affects the coverage of TT vaccination. Lack of documented evidence on the magnitude of TT vaccination attritions for this particular hospital, motivated the undertaking of the current study to establish the magnitude of TT vaccination attrition in this Hospital.

In a survey done in Somaliland by UNICEF (2008), it emerged that low uptake of TT vaccination was closely linked to ANC attendance by the mothers as well as place of delivery.

A study carried out at Peshawar, Pakistan reported that lack of awareness (38.4%), being busy (18.1%), centre too far (18.1%), misconceptions (10.86%), and fear of reactions (4.3%) were the main reasons for low uptake of TT vaccination among married women of reproductive age (Naeem *et al.*2010). In the same study, husband education, females' knowledge and views on vaccination, income, distance, frequency of health visits were the main factors associated with vaccination status. Despite all the above highlighted factors showing significant influence on TT vaccination in other countries, it is not certain how such similar factors would influence TT vaccination among women of reproductive age at Kakamega County Referral Hospital when documented literature on the determinants of TT vaccination uptake in this Hospital is lacking. In the light of this the current study identified the determinants of tetanus toxoid vaccination uptake by women of reproductive age attending Kakamega County Referral Hospital.

1.2 Statement of the Problem

Neonatal tetanus is a leading cause of neonatal deaths in developing countries where a high proportion of deliveries are conducted at home or in places where hygienic conditions do not exist. Tetanus toxoid (TT) vaccination is given to pregnant women to prevent neonatal tetanus. Two doses of Tetanus toxoid vaccine provide protection against tetanus for three years. A mother protected against tetanus will pass her immunity on to her newborn child for the first two or three months, who will be considered protected as long as the delivery takes place two or more weeks after the second injection. Non-uptake or non-completion of schedules of TT vaccination would mean that the mother would not be able to develop immunity against tetanus and consequently the mother would not be in a position to pass anti-tetanus immunity on to her newborn. This in essence implies that children born of TT naive mothers would not be protected

from tetanus infections and so would be susceptible to potential infection and death from tetanus. 78.2% of women in Kakamega County deliver their babies at home, where the standards of hygiene could be compromised exacerbating the chances of neonates acquiring tetanus infections. Kakamega is the leading County with home deliveries compared to other counties in the former western province such as Bungoma (58.6%), Vihiga (49.7%) and Busia (41.5%). The problem is that TT vaccination coverage reported for this County is low at 27.4% implying that neonates of 73% of mothers in Kakamega County are at risk of contracting tetanus infection. Again, the few women who are initiated on TT vaccination do not complete the schedule provided by the Ministry of Health. Across the literature, no hospital based study has been done in this region and Kakamega County Referral Hospital to analyze the causes of low T.T vaccination uptake in relation to health seeking behavior of pregnant women, the magnitude of vaccination attritions as well as to identify the determinants of TT vaccination uptake. The current study therefore was conducted at kakamega county referral hospital to analyze the causes of low T.T vaccination uptake among pregnant women attending services at this hospital.

1.3 Justification of the Study

The importance of TT vaccination to a mother of reproductive age and neonates can never be over emphasized. Uptake of TT vaccination protects both the mother and the neonate as the immunity developed by a vaccinated mother is usually passed to the neonate for subsequent protection of the neonate. The absence of such immunity is lethal to both the mother and the unborn child and can lead to increased maternal and neonate morbidity and mortality. Studies suggest that maternal and neonatal deaths from tetanus have been reduced with increased uptake of TT vaccination by mothers of reproductive age (CDC, 2011; Singh *et al*, 2012).

Due to the low uptake of TT vaccination; 27.4% in 2013 (DHIS); by mothers of reproductive age from Kakamega County it is important to study their health seeking behavior and determinants of TT vaccination uptake. A study that focuses on health seeking behavior would enhance ones understanding on health indicators of expectant mothers such as ANC visits and services received during ANC visits; place of delivery and post delivery care for both the mother and the newborn. Knowledge of health seeking behavior and factors that influence TT vaccination uptake is crucial in putting in place interventions that can reverse the current scenario. Improved uptake of TT vaccination will reduce deaths that could occur as a result of maternal and neonatal tetanus. This study was therefore set out to determine current vaccination status of pregnant women in Kakamega County Referral Hospital Kenya, which is the main referral Hospital for former western province and also identify various factors that influence tetanus vaccination uptake in these women.

1.4 Objectives

1.4.1 Main objective

To assess tetanus toxoid vaccination uptake by pregnant women attending Kakamega County Referral Hospital, Kenya.

1.4.2 Specific objectives

1. To examine the health seeking behavior of pregnant women attending Kakamega County Referral Hospital, Kenya.
2. To establish the magnitude of tetanus toxoid vaccination attritions among pregnant women attending Kakamega County Referral Hospital, Kenya.

3. To identify the determinants of tetanus toxoid vaccination uptake among pregnant women attending Kakamega County Referral Hospital, Kenya.

1.5 Research Questions

1. What are the health seeking behaviors of pregnant women attending Kakamega County Referral Hospital, Kenya?

2. What is the magnitude of tetanus toxoid vaccination attritions among pregnant women attending Kakamega County Referral Hospital, Kenya?

3. What are the determinants of tetanus toxoid vaccination uptake among pregnant Women Attending Kakamega County Referral Hospital, Kenya?

1.6 Significance of the Study

The significance of this study was to understand health seeking behavior and factors that influence the uptake of TT vaccination of women of reproductive age attending Kakamega County Referral hospital in order to provide information that can be used in addressing the gaps that has led to low uptake of TT vaccination. Unless such gaps causing low uptake of TT vaccination are identified and addressed, there is very little hope for increased uptake of TT vaccination and this could finally lead to continual maternal and neonatal morbidity and mortality due to tetanus.

1.7 Study limitation

Lack of prior research studies on the topic in comparable hospital based settings in Kenya. Studies similar to this have been done elsewhere though in different socio-cultural environment

(Nusrat *et al.*, 2010 ; Naeem *et al.*, 2010).Kenyan studies were community based (Maina *et al.*, 2014; KNBS & ICF Macro, 2010).

The independent variables were limited to the respondent's age, parity, level of education and place of residence. One key socio-economic factor (household income of the mother) was not included in the study but has been found in other studies to influence TT vaccination uptake (Perry *et al.*,1998) The questionnaire did not have a question to determine that key socio-economic factor.

CHAPTER 2: LITERATURE REVIEW

2.1 Health seeking behavior and TT vaccination uptake

Several studies have reported on a number of factors that seem to influence tetanus toxoid vaccination uptake among women of reproductive age (Kidane, 2004; Afridi *et al.*, 2006). These factors include health seeking behavior such as Antenatal care (ANC) attendance during pregnancy and place of delivery.

Antenatal care (ANC) attendance during pregnancy has been reported to be associated with being protected at delivery from tetanus (Deming *et al.*, 2002). In a survey done in Somaliland by UNICEF (2008) it emerged that low uptake of TT vaccination was closely linked to ANC attendance by the mothers as well as place of delivery. Access to maternal health care services gives an opportunity for a woman to be reviewed and given her due dose of TT. The WHO recommends that a woman without complications should have at least 4 ANC visits to provide sufficient ANC services (WHO, 2007). In the year 2013, only 30% of mothers completed 4 ANC in Kenya and 45.1% in Kakamega County the same year (DHIS, 2013). This is very low yet it is a strong predictor for maternal TT immunization coverage of any country as observed in many studies (Dahal, 2013). According to Nusrat and colleagues (2010) the utilization of health care facility for antenatal care has positive impact on the TT vaccination coverage. The visit of women to the health care provider for the antenatal care not only increases the knowledge of women regarding TT vaccination but also helps in change of behavior regarding vaccination. The results of Nusrat *et al.*, (2010) study carried out at Tertiary Care Hospital in Pakistan were also consistent with other studies conducted in the central Africa and India. These studies demonstrated that antenatal care visits and knowledge about vaccination were important factors for an increase in coverage of maternal TT vaccination. In keeping with previous studies, it is

evident that health seeking behavior of target population plays significant role in TT vaccination uptake. However most of these studies focused more on the community and the few hospital based studies (Nusrat *et al.*, 2010) were conducted elsewhere but not for Kakamega County Referral Hospital.

Place of Delivery - Place of delivery can positively or negatively influence tetanus immunization uptake by women of reproductive age. However, no studies have associated place of delivery and tetanus toxoid vaccination uptake most probably because the expectation is that TT vaccination is suppose to precede delivery of a newborn.

2.2 Tetanus Toxoid vaccination Attritions

In developing countries, low adherence to maternal TT vaccination schedule has been found associated with women socio-demographic characteristics (such as parity, lower education) and provider-based characteristics (such as longer distance of EPI Centre from home) (Thind, 2005; Rooshermatie *et al.*, 2000; Guthmann *et al.*, 2010). Behavioral factors (such as women's lack of information and poor motivation) have also predicted both poor adherence to vaccination recommendations and high risk of dropouts (Dey *et al.*, 2011). Availability of Kenya's literature on barriers of maternal TT vaccination is minimal while the available literature from other African studies on maternal TT immunization status was primarily assessed by women's' recall because of the unavailability of immunization cards at the time of interview. According to Anandhi and colleagues (2000) such assessment of a woman's immunization status is liable to misclassification and thus the internal validity of these studies is questionable. On the other hand, review of maternal TT immunization records at EPI centers can provide estimates of TT1–TT3 dropout using accurate immunization status of women. However, absence of socio-demographic information in those records prohibits any analysis of determinants of

immunization completion. This then implies that no study has been done with keen interest of establishing vaccination attritions in order to bring out the magnitude of this problem and make such recommendations to the policy makers. Kenya National Bureau of Statistics (KNBS) and ICF macro, (2014) assessed the TT vaccination attritions of each county however the study recruited all the women in the community. Some who even had older children and therefore could not clearly recall the number of TT doses they received during the pregnancy.

2.2.1 Reason for low uptake or tetanus toxoid vaccination attritions

Women of reproductive age have often mentioned varied reasons for non-TT vaccination. According to Hasnain & Sheikh (2007) the most common reason (32%) was that the women did not know the importance of the TT vaccination, followed by 18% who did not know the correct place or time to get the vaccination. Findings of the focused group discussion in (Zeba *et al.*, 2006) study, some women confessed that they did not know about TT and its dangerous outcome. A few women had only heard about its signs and symptoms from other women and believed that these signs were due to evil look of devils, jinn and other evil creatures. Majority of women (90%) in the same study mentioned that vaccinators and other workers had not visited their houses and never asked for or given any information about TT, nor had they offered any services and that Lady Health Workers (LHWs) discussed vaccinations against tetanus for the children but not for the women. It is therefore emerging from the literature that mothers only know that TT vaccination is for children and not for adult women.

Naeem and colleagues (2010) reported that lack of awareness (38.4%), being busy (18.1%), centre too far (18.1%), misconceptions (10.86%), and fear of reactions (4.3%) were the main reasons for low uptake of TT vaccination among married women of reproductive age in Peshawar, Pakistan. Little information of this kind is available for Kakamega County Referral

Hospital. Basing on the findings of these studies, reasons for non completion of T.T Vaccination schedule are varied and they differ from place to place even if in the same region, and since no study has been done for Kakamega County Referral Hospital, the reasons for T.T vaccination attrition among women of this location is unknown.

2.3 Determinants of Tetanus Toxoid vaccination Uptake

Several studies have reported on a number of factors that seem to influence tetanus toxoid vaccination uptake among women of reproductive age (Acharya and Cleland 2000; Maral *et al.*, 2001; Hasnain *et al.*, 2007; Singh *et al.*, 2012). This section attempts to review literature on the influence of socio-demographic, economic and health seeking practices that have reportedly influenced tetanus toxoid vaccination uptake by women of reproductive age.

2.3.1 Socio-demographic factors and Tetanus Toxoid vaccination Uptake

Age - Utilization of maternal tetanus toxoid immunization services is highly influenced by women's health care seeking behavior, which is affected by socio-demographic factors of women such as age (Hasnain & Sheikh 2007). The significant association between women age and frequency of antenatal care visits and the TT vaccination status were found in some studies (Maral *et al.*, 2001). There is however, some debate on women's age regarding use of maternal Health care services. Many researchers argued that older women are most likely to be immunized with 2 or more doses of TT vaccine than their younger counterparts (Rahman *et al.*, 1982). In contrast a negative relationship between TT immunization status and age of women was found in a study in central Nepali (Acharya and Cleland 2000). The young women were more likely to utilize TT immunization services than older ones (Singh *et al.*, 2012). Since the younger and older women differ in their experience and influence the health seeking behavior is likely to vary between older and younger women. Older, on the other hand would have

accumulated knowledge on maternal healthcare and therefore are likely to have more confidence about pregnancy and child birth and thus may give less importance to obtaining institutional care (Usman *et al.*, 2010) .

Some studies demonstrated that the age of a woman has no impact on utilization of maternal TT immunization (Mwaniki *et al.*, 2002). If a relationship does exist, the association between utilization of maternal TT immunization services and age of women is very weak. In short some studies imply that women's age is not an important factor in influencing the use of maternal healthcare services. However numerous researches have documented that socio demographic characteristics of pregnant woman such as age, is impact associated with utilization of prenatal care services and in addition relates to choosing the place of delivery. Inconsistence in these studies on whether the influence of maternal age on TT vaccination uptake is positive or negative demands further investigation to establish the truth about the same at Kakamega County Referral Hospital since it is not known.

Marital status - According to Afridi and colleagues (2005) established that for married women source of information; visits of LHW to a household (OR = 2.8, 95% CI (1.5 to 5.2) and an interaction between knowledge regarding TT vaccination and antenatal care visits were significantly associated with TT vaccination status. However, Afridi and colleagues were not able to state what type of marriage that is to say how monogamy or polygamy influenced uptake of TT vaccination by the married women that they studied.

Parity - There are many studies that have investigated the relationship between parity and the utilization of maternal TT immunization services. For instance Parity and frequency of antenatal care visits were reported as positive association in a study about care seeking behavior in Bangladesh (Rahman *et al.*, 1982). In this study, Rahman and colleagues (1982) argued that

women with higher parity understand the high risk of maternal and neonatal tetanus (MNT) and are more likely to go for TT immunization. The more children women have the more they pay attention to taking care of their health and the health of their newborns during pregnancy (Usman *et al.*, 2010).

2.3.2 Socio-economic factors and tetanus toxoid vaccination uptake

Level of Education - Maternal education is considered as the most important factor in determining women's antenatal and delivery care seeking behavior in order to utilize maternal TT immunization services (Gitta *et al.*, 2006). Education may have a modest effect on health knowledge and beliefs, but a pronounced effect on the propensity to use modern medical facilities and adopt modern health practices, because of a closer social identification with the modern world, greater confidence at handling bureaucracies or a more innovative attitude to life among women who have some experience of school (Gokhale *et al.*, 2002). Many studies show the influences of education on maternal TT immunization status (Perry *et al.*, 1998; Gitta *et al.*, 2006; Hasnain & Sheikh, 2007;). A women's education has a positive relationship, and a statistical significant influence in utilization of maternal TT immunization services as reported in the findings of a study by (Naeem *et al.*, 2010). In Naeem *et al.*, (2010) study that was conducted in Peshawar, Pakistan, from 9 June to 19 June 2010. Cross-tabulation between uneducated and educated females showed a clear pattern of low immunization among uneducated and high immunization among educated ones ($p < 0.05$). Women who had attended school for a few years are more likely to be immunized using TT vaccine than women without any schooling. Naeem and colleagues reported a positive relationship and a statistical significant influence of maternal education on T.T utilization in Peshawar Pakistan but nothing has been done for Kakamega County Referral Hospital Kenya

Residence - A study by Kidane (2004) in Ethiopia revealed a difference in TT vaccination uptake by area of residence. TT5 coverage by urban resident mothers was 13.6% and 66.7% for rural resident mothers. TT3+ coverage was 63.8% in urban areas versus 81.2% in rural areas ($p=0.002$). Similar findings were reported in the study of Khan and Raza (2013) that investigated maternal health care in India: the case of tetanus toxoid vaccination. The same study established that rural women were more likely to have TT vaccination than their urban counterparts. These are indeed surprising findings and against the common belief that urban women are more informed than rural women to seek health care services. The fronted argument is in line with the findings of Kalule-Sabiti and colleagues (2014) which established that urban women were more likely than their rural counterparts to use antenatal care services receive tetanus toxoid injection and deliver their babies in public health facilities. Nevertheless, the higher percentage of rural women receiving TT vaccination in Kidane (2004) and Khan and Raza, (2013) could be explained by accelerated health campaigns that usually focus on rural women and forgetting about the urban women.

2.3.3 Behavioral factors;

Behavioral factors such as ANC attendance and place of delivery have been reported to influence TT vaccination uptake. Antenatal care (ANC) attendance during pregnancy has been reported to be associated with being protected at delivery from tetanus (Deming *et al.*, 2002). In a survey done in Somaliland by UNICEF (2008) it emerged that low uptake of TT vaccination was closely linked to ANC attendance by the mothers as well as place of delivery. Access to maternal health care services gives an opportunity for a woman to be reviewed and given her due dose of TT. The WHO recommends that a woman without complications should have at least 4 FANC visits to provide sufficient FANC services (WHO, 2007). In the year 2013, only 30% of mothers

completed 4 ANC in Kenya and 45.1% in Kakamega County the same year (DHIS, 2013). This is very low yet it is a strong predictor for maternal TT immunization coverage of any country as observed in many studies (Dahal, 2013). According to Nusrat and colleagues (Nusrat *et al.*, 2010) the utilization of health care facility for antenatal care has positive impact on the TT vaccination coverage. The visit of women to the health care provider for the antenatal care not only increases the knowledge of women regarding TT vaccination but also helps in change of behavior regarding vaccination. The results of Nusrat *et al.*, (2010) study carried out at Tertiary Care Hospital Pakistan were also consistent with other studies conducted in the central Africa and India. These studies demonstrated that antenatal care visits and knowledge about vaccination were important factors for an increase in coverage of maternal TT vaccination.

Place of Delivery - Place of delivery can positively or negatively influence tetanus immunization uptake by women of reproductive age. However, no studies have associated place of delivery and tetanus toxoid vaccination most probably because the expectation is that TT vaccination is suppose to precede delivery of a newborn.

Although studies (Acharya and Cleland 2000; Maral *et al.*, 2001; Hasnain *et al.*, 2007; Singh *et al.*, 2012) have found that there is a positive relationship and a statistical significant influence of maternal socio-demographic, economic and behavioral factors on maternal TT vaccination uptake, these factors have not been firmly established in Kakamega County. The main reason is that the routine reporting system of EPI in Kenya (DHIS) is supplemented by the coverage evaluation survey (KNBS-KDHS), which focus basically only on coverage. Therefore little or no research has been done to analyze the determinants of TT vaccination coverage of pregnant women in Kakamega County. The present study therefore focused on assessing the determinants of vaccination coverage of TT2 in pregnant women in Kakamega County Referral Hospital in

order to suggest ways of improving routine vaccination coverage towards helping to eliminate neonatal tetanus.

2.4 Tetanus Toxoid Vaccination program.

Tetanus toxoid immunization of pregnant women is currently recommended by WHO and is included in the immunization policy of most Member States (Gall *et al.*, 2011). The schedule originally recommended by the Expanded Programme on Immunization was 2 doses of TT vaccine during the first pregnancy, followed by a booster dose during each subsequent pregnancy. Since 1987, a revised schedule of a lifetime total of 5 doses of TT vaccine to women of childbearing age has been recommended as the “high risk approach”(WHO., 2002). This approach implies that, in addition to routine immunization of pregnant women, all women of child bearing age living in high risk areas are targeted for immunization with three doses of a tetanus toxoid containing vaccine (TT or Td), implemented as “supplemental immunization activities” (SIAs).

In Kenya, Tetanus toxoid immunization of women is routinely given to pregnant women, usually during focused antenatal care (FANC) contacts. For women who have never received TT vaccine, or have no documentation of such immunization, a total of five doses is recommended, 2 doses given one month apart in the first pregnancy, then 1 dose in each subsequent pregnancy (or intervals of at least 1 year), to a total of five doses. In areas where immunization fails to reach a substantial proportion of pregnant women, TT SIAs may be required. This is known as the "high-risk approach"(Lambo *et al.*, 2012). All child-bearing aged women living in high risk districts (HRDs) are targeted with 3 properly spaced doses of tetanus toxoid (TT) through specially organized supplementary immunization activities (SIAs). This approach focuses on providing TT vaccination in districts where women have limited or no access to routine

vaccination. HRDs are identified by systematic analysis of routinely reported district data and local knowledge. The most surprising thing is that the last SIA in Kenya was conducted in the year 2006 (UNICEF, 2006). Since that time there has been a decline in maternal TT2 immunization coverage as shown by DHIS estimates (Appendix III). According to WHO the aim of this TT vaccination policy is to maintain the high coverage of primary immunizations and ensure protection throughout life with adequate booster doses. If the current programme cannot achieve the expected coverage, then it should be revised because WHO recommends that the exact timing of the booster doses should be flexible to take account of the most appropriate health service contacts in different countries (UNICEF, 2005). Ideally, a booster dose should be offered at age 4–7 years followed by another booster in adolescence, e.g. at age 12–15 years. In addition to the childhood vaccination programme, an extra dose to adults will further assure long-lasting, possibly lifelong protection. A sixth dose is therefore recommended for adults, for example at the time of the first pregnancy or during military service (Roper *et al*, 2007). With an increasing percentage of children worldwide, including girls, attending school, school-based immunization programmes will become increasingly important and should be implemented where feasible. Female enrolment rates in various grades should be considered when deciding which age groups should be offered immunization against tetanus at school. A school-based immunization approach may be linked to other important health services, including health education. In the future, new vaccines, such as the vaccine against human papilloma virus, could also benefit from a school-based delivery system, but efforts to reach school non-attenders will be important for all these interventions

2.5 Maternal recall of tetanus toxoid vaccination

Difficulties of vaccination documentation in developing countries lead to a dependence on maternal recollection of vaccination to evaluate tetanus toxoid (TT) vaccination (De Francisco, 1996). To date, the validity of this approach has not been assessed but the study that was done in Matlab, rural Bangladesh (De Francisco, 1996) on the recollection of TT immunization among women of reproductive age, found out that; Maternal recollection of the second TT dose was good, but considerably reduced if a woman had received more than two doses. Recollection was also reduced if the doses were administered more than a year prior to questioning. Again younger women, with fewer children and with a good vaccination status, tend to have a better recollection of the number of doses received than older women with more children, but maternal education had no effect on the accuracy of recall. These results suggest that maternal recall may underestimate TT doses received a year before the date of questioning. Current methods to determine TT status by asking mothers at infant vaccination contacts may result in underestimating coverage.

2.6 Use of maternal TT vaccination coverage as a strategy to eliminate neonatal tetanus

UNICEF, WHO and the United Nations Population Fund, had set the year 2005 as the target date for worldwide elimination of the disease but it was missed (WHO,UNICEF,UNFPA, 2002). (WHO/Vandelaer, 2012). The next set date was 2015 (Global elimination of neonatal tetanus is defined as the reduction of cases to fewer than 1 per 1000 live births in every district in every country) (Lambo *et al*, 2012). The recommended strategy for eliminating neonatal tetanus by WHO and UNICEF is the "high-risk approach"(Gall *et al.*, 2011). This approach focuses on providing three properly spaced doses of tetanus toxoid vaccine for all women of childbearing age in order to increase the coverage in districts, or in areas within districts, where women have

no access or only limited access to routine tetanus toxoid vaccination services, where there is limited or no antenatal care; and where births occur without assistance from skilled personnel such as Kenya where skilled delivery is at 29% (KNBS and ICF macro, 2010). These three doses are provided through supplemental immunization activities, where by the tetanus toxoid vaccine is given through a campaign-style approach that is organized specifically to increase coverage of tetanus toxoid vaccination among the targeted groups and areas. Following the implementation of supplementary immunization activities, the elimination of neonatal tetanus should be maintained by routinely vaccinating pregnant women through fixed post services, outreach strategies or other methods, as well as by improving antenatal and birth services. Using this approach, by February 2007, 40 countries had implemented tetanus campaigns in high-risk areas, targeting more than 94 million women, and protecting more than 70 million with at least two doses of tetanus toxoid (UNICEF., 2008). Through this strategy, three of the East African Countries Burundi, Uganda & Tanzania showed elimination of maternal and neonatal tetanus the very year. With available and pledged funding in Kenya, routine immunization of tetanus toxoid has been stagnant over the past five years, with only close to 48 –52% of pregnant women receiving adequate immunization nationally, a situation largely unchanged since 2011 for Kakamega County (Appendix II & III). Although data for vaccine coverage underestimate the true proportion of protected women because of unregistered doses of tetanus toxoid, and the increasing number of women who received a primary series of tetanus toxoid-containing vaccine in infancy, the continued need to increase the routine vaccination of women of childbearing age is indisputable. Take for instance a case of Burundi country within the same geographical region as Kenya. Routine TT2+ coverage among pregnant women in Burundi varies from province to province, ranging from 51% to 212%, with a coverage rate of >80% in 9 out of 17 provinces. In

addition to tetanus immunization during prenatal visits in the context of fixed strategies and outreach, catch-up campaigns have been organized twice a year during mother and child weeks. In 2007, Burundi organized 3 rounds, including in 2009 additional corrective round of TT immunization in 8 of the 17 provinces considered at risk from NT, `this made it possible to administer 2 doses of TT vaccine to 93% of WRA (UNICEF., 2008). Coverage at prenatal consultations 1 and 2 (PNC1 and PNC2) was >95% and >70% respectively in all provinces. National clean delivery coverage was 56%, varying between 33% and 79% in different provinces.

2.7 Conceptual frame work

Based on preceding literature review, determinants of TT2 vaccination uptake have been summarized and put in conceptual frame work (figure 2.1). The frame work illustrates theoretical relationship between independent and dependent determinants which influence TT2 vaccination

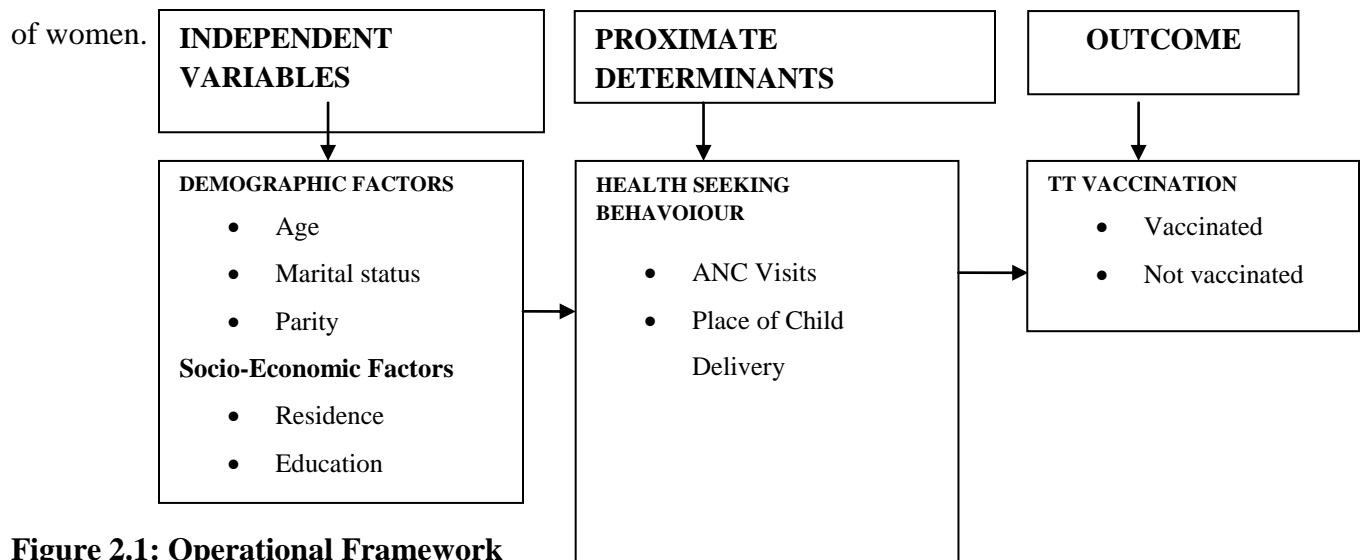


Figure 2.1: Operational Framework

This study acknowledges that TT vaccination uptake of women is influenced by underlying factors which are both socio-economic and demographic ones. These factors operate through proximate determinants that directly persuade TT completion or non completion among women of reproductive age.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter describes the methods that were used to conduct this study. The chapter describes the study site, study design, target population, inclusion and exclusion criteria; sample size and sampling techniques, data collection tools and procedures, data management and analysis and ethical consideration.

3.2 The Study Area

This study was conducted in Kakamega County Referral Hospital (KCRH), Kenya. The hospital functions as a referral facility for the country's western region. KCRH treats people from a wide range of social- economic backgrounds that live in urban centers and other parts of the region. This hospital is located in Kakamega municipality near the town center within Kakamega Central Sub-County. Majority of the patients are low- and middle-income earners, and most reside in sub-urban and rural areas relatively close to the town. Individuals of high socioeconomic status very rarely, if ever, visit this hospital. Kakamega is a town in western Kenya lying about 30 km north of the Equator. It is the headquarters of Kakamega County Kenya (Appendix V).

The District population: _____ 297394 (2009 censuses).

Average house hold size: _____ 4.5.

Area in square kilometre: _____ 419.66

Population Density: _____ 708.66

Gender Index women: men; _____ 1.04425.

GPS Location: _____ 0° 17' 0" North, 34° 45' 0" East.

3.3 The Study Design

A cross-sectional study was carried out at the Outpatient, Obstetrics and Gynecology departments in Kakamega County Referral Hospital Kenya. The study adopted quantitative approach of data collection using closed ended structured questionnaire to collect data.

3.4 The Study Population

In the former Western province, 4th ANC attendance was; 45.0% Kakamega County, 61.3% Vihiga County, 50.0% Bungoma County and 59.9% Busia County (KNBS & ICF Macro, 2014). Health facility deliveries were; 47.0%, 50.2%, 40.8% and 58.4% respectively (KNBS & ICF Macro, 2014). The Out-patient department of Kakamega County Referral Hospital recorded 5544 1st ANC visits in 2014. This gave an average of 462 1st ANC visits in a month. Therefore the study population consisted of 462 mothers of children below one year old and who were seeking health care service at Kakamega County Referral Hospital at the time of the study. Documented evidence (KNBS & ICF Macro, 2010) indicate that 92 percent of women in Kenya receive antenatal care from a medical professional, either from doctors (29 percent), or nurses and midwives (63 percent). A very small fraction (less than one percent) receives antenatal care from traditional birth attendants, and 7 percent do not receive any antenatal care at all (KNBS & ICF Macro, 2010). Therefore the vast majority of women who obtain antenatal care go to government sources (83 percent). The most common sources of antenatal care are government hospitals and government dispensaries, only five percent of women in Western province reported having received antenatal care at home (KNBS & ICF Macro, 2010).

3.4.1 Criteria for inclusion

All mothers with one day to eleven months old children seeking health care service at Kakamega County Referral Hospital Kenya during the study period that took one month (September 2013), and gave consent were included in the study.

3.4.2 Criteria for exclusion

Very sick mothers seeking service at Kakamega County Referral Hospital Kenya were excluded from the study.

3.5 The Sample Size Determination

Fisher's method revised by Mugenda and Mugenda (1999) was used in sample size determination.

$n = Z^2 Pq \div d^2$ Where; n= desired sample size (if the study population is greater than 10,000)

z = the standard normal deviation at the required confidence level (standard error at 95% confidence, in this case 1.96).

p = estimate percentage of the population having the existing variable being measured and where such data is lacking, 50% estimate is applied. Since there was no such data for this hospital, 50% was used).

$$q = 1 - p \quad (1 - 50\%) = 1 - 50/100 = 1 - 0.5 = 0.5$$

d = the level of statistical significance set (i.e. the maximum tolerable error for the study) which is 0.05. When the sample size for a population is more than 10000,

$$n = (1.96)^2 (0.5) (0.5) \div (0.05)^2 = 384$$

Since the study population was below 10000, the final sample size (nf) was calculated as follows: $nf = n \div \{1 + (n/N)\}$

Where: nf= desired sample size (when study population is less than 10,000)

n = desired sample size (when study population is greater than 10,000)

N= the desired sample size (462 monthly 1st ANC attendance)

$nf = 384 \div \{1 + (384/462)\} = 209.7$, this was rounded to 210. Therefore a minimum of 210 mothers was sufficient for this study. However in order to overcome the problem of non - response, 10% (21) was included (210+21=231). The sample size of 231 mothers with children less than 11 months old was considered for this study.

3.6 Sampling Technique

A total of 231 mothers of children aged between 1 day - 11 months who visited Kakamega County Referral Hospital were proportionately stratified and systematically randomly sampled at a sampling interval of 2 from the Out Patient, Obstetrics and Gynecology Departments of the hospital.

Table 3.1: Population Proportionate Sampling

DEPARTMENT	POPULATION	SAMPLE SIZE
Out Patient	439	$(439 \times 231) \div 462 = 219.5$
Obstetrics	16	$(16 \times 231) \div 462 = 8$
Gynecology	7	$(7 \times 231) \div 462 = 3.5$
TOTAL	462	231

3.7 Data Collection Technique

A researcher-administered questionnaire adopted from WHO was used as a data collecting tool (Appendix IV&V). Data was collected for a period of one month. Interviewers visited the mothers at least 24 hours after delivery in the maternity ward. Some mothers were contacted at the Outpatient department. After taking verbal informed consent, the mothers were interviewed and socio-demographic information such as their age, residence, education (None, primary and secondary,) and reproductive parameter like number of pregnancies was collected. The number of prenatal care visits, the type of prenatal care facilities used, and the number TT doses received was also recorded. Those mothers who had not received at least 2 doses of TT were asked to give reasons for failing to be vaccinated with the 2nd dose of TT. Record of vaccination was collected through immunization cards but in the absence of cards, memory recall was used. In this study, fully immunized referred to protection at birth. Any mother who had received at least 2 doses of TT and had only one pregnancy was considered fully immunized.

3.8 Data Management and Analysis

All the filled-in questionnaires were verified by the researcher for completeness, consistencies and other errors while still in the field. All the copies were filed sequentially according to numbers for secure storage awaiting entry into the computer. Pearson Chi-square test was used to establish the proportions of women for the variables in health seeking behavior as well as uptake and attrition of tetanus toxoid vaccination; the reasons given for non-vaccination uptake. Whereas multivariate logistic regression was used to establish the association between socio-demographic; economic and health seeking behaviors influencing TT vaccination uptake. Results with a p - value ≤ 0.05 at 95% CI were considered statistically significant.

3.9 Ethical Consideration and Authorization

This study commenced after approval had been received from Maseno University School of School of Graduate Studies. The research permit was sought from the Ethics and Research Committee of Kakamega County Referral Hospital. Study participants made verbal informed consent prior to inclusion in the study (Appendixes 6 &7).

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the study findings objective by objective. First, the socio-demographic profile of the study participants is described, followed by results on tetanus toxoid uptake and attritions at Kakamega County Referral Hospital; reasons for not being fully vaccinated against tetanus. And the last one was the findings on the associations between health seeking behavior and socio-demographic characteristics of the mothers and TT vaccination.

4.2 Socio-Demographic Profile of the study Participants

A total of 231 women of reproductive age (15 – 49 years) participated in the study and data generated were included in the analysis. A total of 32 (13.9%) of the women were aged between 15 – 19 years while those aged 35 – 39 years were 14 (6.1%). Those aged 20-24 years were 86 (37.2%) while about a third 69 (29.9%) of the women were aged between 25 – 29 years, Majority of the women 149 (64.5%) had attained primary education while 79 (34.2%) had secondary education and 3 (1.3%) never went to school. On parity, mothers who had between 1 and 2 children were 151(65.4%); 3 and 4 children 64 (27.7%) and the women who had ≥ 5 children were 16(6.9%). Slightly above half 128 (55.4%) of these women were urban residents whereas 103 (44.6%) were rural residents (Table 4.1).

Table 4.1 Socio-Demographic Profile of the study Participants

Variable	Frequency n(%)	Variable	Frequency n(%)
Age		Education	
15 – 19	32(13.9)	None	3(1.3)
20 – 24	86(37.2)	Primary	149(65.4)
25 – 29	69(29.9)	Secondary	79(34.2)
30 – 34	30(13.0)		
35 – 39	14(6.1)		
Parity		Residence	
1 – 2	151(65.4)	Urban	128(55.4)
3 – 4	64(27.7)	Rural	103(44.6)
≥ 5	16(6.9)		

4.3 Health Seeking Behavior of Pregnant Women Attending Kakamega County Referral Hospital

Health seeking behavior analyzed revealed that those mothers who had <4 ANC visits were 116(50.2%) and those who had ≥ 4 ANC visits were 109(47.2%) whereas 6(2.6%) did not attend any ANC session. The 225(97.4%) women who attended at least one ANC visit were confirmed to possess a clinic card. TT vaccination record in the clinic cards indicated that 138(61.3%) had TT in the last pregnancy while 87(38.7%) had no TT vaccination. The place where the last TT vaccination was given was also checked. The clinic cards showed that 211(93.8%) received TT

vaccination from a health centre; 6(2.7%) during health service community outreach and another 6(2.7%) from private clinics while 2(0.8%) had TT vaccination from other unclear sources.

Other health seeking behavior investigated included place of delivery of the last child; who assisted the delivery and child was protected against tetanus. The results revealed that 186(80.5%) of the deliveries were conducted at health facility and assisted by trained health care workers; whereas 44(19.0%) of the deliveries occurred at home and 1(0.5%) parent did not volunteer this information. Traditional Birth Attendants assisted in 26(11.3%) of the deliveries whereas 10(4.3%) were assisted by mothers-in-law and 9(3.9%) of the deliveries occurred without assistance (Table 4.2).

Table 4.2: Health seeking behavior and TT vaccination

Variable	Frequency n(%)	Variable	Frequency n(%)
ANC visits		Clinic card	
0	6(2.6)	Present	225(97.4)
<4	116(50.2)	Absent	6(2.6)
≥ 4	109(47.2)		
TT vaccination record		Place TT was given	
Present	138(61.3)	HC	211(93.8)
Absent	87(38.7)	Outreach	6(2.7)
		Private Clinic	6(2.7)
		Others	2(0.8)
Place of Last Delivery		Delivery assistance	
Hospital/HC	186(80.5)	Health Staff	186(80.5)
Home	44(19.0)	TBA	26(11.3)
Others	1(0.5)	Mother-in-law	10(4.3)
		Not assisted	9(3.9)

4.4 Tetanus Toxoid Vaccination and Attrition by Pregnant Women Attending Kakamega County Referral Hospital

Tetanus toxoid attrition was measured in terms of mothers who received at least 1 TT immunization and never went back for the second vaccination injection. According to the

Kenyan Ministry of Health Recommendation and guidelines (2001); a woman is considered protected against tetanus when she receives at least two doses of TT. The results of the current study showed that 67(29.0%) of the women interviewed received ≥ 2 TT injections i.e. they were the ones who were protected; 95 (41.1%) never received any TT vaccination and 69 (29.9%) only received one injection for TT vaccination (Figure 4.3 below).

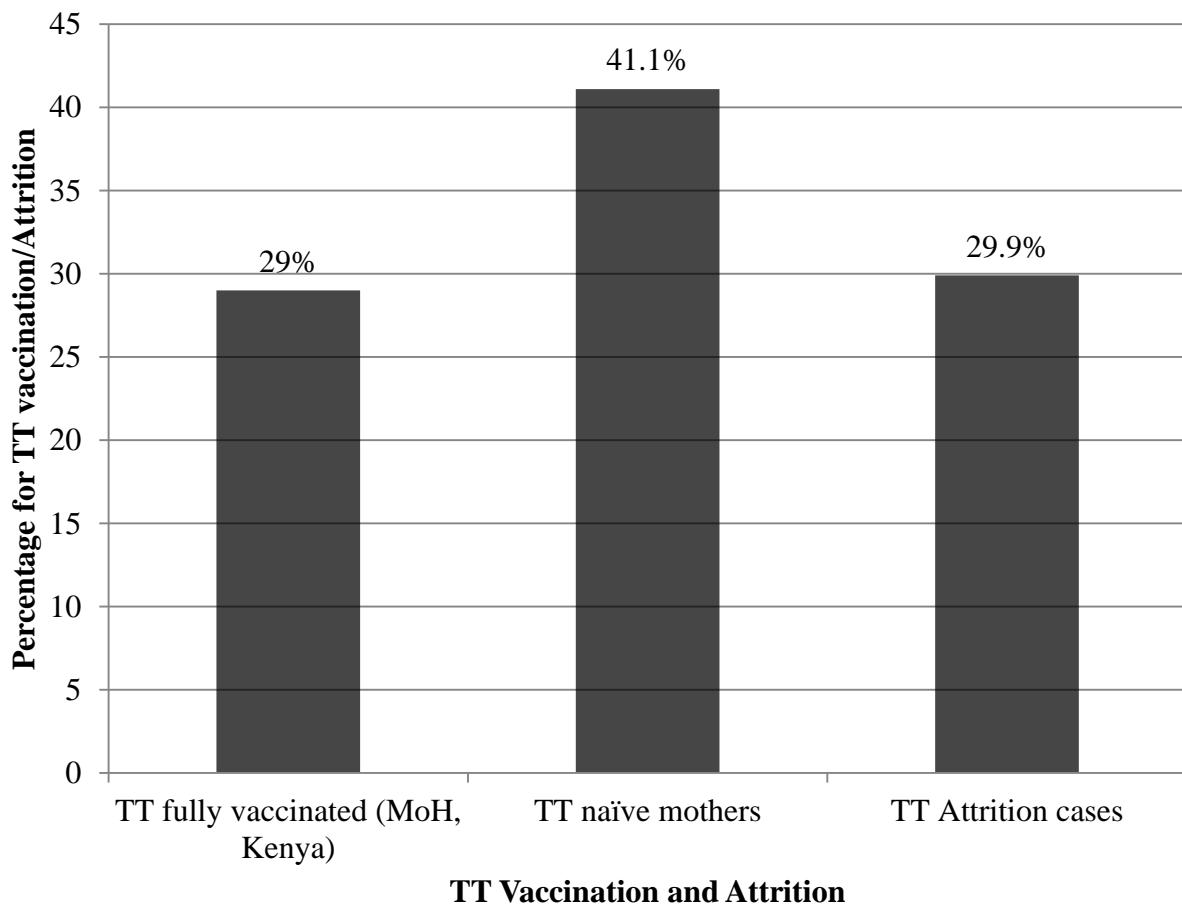


Figure 4.1: Tetanus Toxoid Vaccination and Attrition (Pregnant women Attending Kakamega County Referral Hospital Kenya).

4.5 Reasons given for not getting TT Vaccination

The study explored 164 mothers who were either TT naïve 95 (41.1%) or those who were TT defaulters (attrition cases) 69 (29.9%) according to Kenyan Ministry of Health recommendation on TT vaccination which states that at least a mother should receive ≥ 2 TT injection. It emerged that 140(85.4%) of the women were unaware of the need for TT vaccination; 8(4.9%) were unaware of the need to return for 2nd or 3rd TT dose; 8 (4.9%) had wrong ideas about contraindications and another 8(4.9%) said that TT vaccines were unavailable at the health facilities (Table 4.3 below).

Table 4.3: Reasons given for not Getting TT Vaccination

Reason for Non Vaccination (N = 164)	Frequency	n (%)
<i>Unaware of need for TT vaccination</i>	140	(85.4)
<i>Unaware of need to return for 2nd or 3rd TT dose</i>	8	(4.9)
<i>Wrong ideas about contraindications</i>	8	(4.9)
<i>TT vaccine not available at facilities</i>	8	(4.9)

4.6 Determinants of Tetanus Toxoid vaccination Uptake

4.6.1 Association between Health Seeking Behavior and TT vaccination uptake by Pregnant Women Attending Kakamega County Referral Hospital.

The women who had at least one ANC visit were 39 times [OR = 38.9 (95% CI = 5.620 – 269.44) P value <0.001]; more likely to receive TT vaccination than those who did not visit the

health facility for ANC services. The women who delivered at the hospitals were three times more likely to receive TT vaccination than those who delivered elsewhere [OR= 3.419; 95% CI = (1.578 – 7.403); p<0.001].

Table 4.4: Association between Health Seeking Behavior and TT vaccination by Pregnant Women Attending Kakamega County Referral Hospital

Variable	OR; (95% CI); P- value
ANC visits	
<i>None (Ref)</i>	
<i>At least one visit</i>	38.9; (5.620 – 269.449); <0.001
<i>4+ times visits</i>	6.966; (2.584 – 18.7780); <0.001
Place of last delivery	
<i>Others (Ref)</i>	
<i>Hospital</i>	3.419; (1.578 – 7.403); <0.001
<i>Home</i>	1.266; (1.265 – 1.275); <0.001

Legend

(Ref); - These are mothers who are unlikely to go for TT vaccination

4.6.2 Association between Socio- Demography and TT vaccination (Pregnant Women Attending Kakamega County Referral Hospital).

The study further analyzed using multivariate logistic regression to establish the association between socio demography and TT vaccination uptake by pregnant women attending Kakamega County Referral Hospital. It was found that mothers aged between 15 and 19 years were 2 times more likely to get TT vaccination [OR = 1.944; 95% CI = 0.502 – 7.528), however, this age did not significantly influence TT toxoid vaccination uptake $P = 0.336$. With regard to education the analysis revealed that mothers who at least attained primary education were 1.27 times; [OR = 1.27; 95% CI = (1.079 – 1.080); P value <0.001]. With reference to residence women of urban residence were two times more likely to receive TT vaccination [OR = 2.474; 95% CI = (1.205 – 5.076); $p = 0.014$] than those of rural residence [OR = 0.404; 95% CI = (0.197 – 0.830); $p = 0.014$] (Table 4.5).

Table 4.5: Association between Socio-Economic and Demographic factors and TT vaccination uptake by Pregnant Women Attending Kakamega County Referral Hospital

Variable	OR; (95% CI); P- value
Age	
<i>15 – 19</i>	<i>1.944; (0.502 – 7.528); 0.336</i>
<i>20 – 24</i>	<i>0.188; (0.045 – 0.780); 0.021</i>
<i>25 – 29</i>	<i>0.428; (0.111 – 1.617); 0.209</i>
<i>30 – 34</i>	<i>0.385; (0.080 – 1.841); 0.232</i>
<i>35 – 39 (Ref)</i>	
Education	
<i>None (Ref)</i>	
<i>Primary</i>	<i>1.27; (6.030 – 26.850); <0.001</i>
<i>Secondary</i>	<i>1.07; (1.079 – 1.080); <0.001</i>
Residence	
<i>Urban</i>	<i>2.474; (1.205 – 5.076); 0.014</i>
<i>Rural</i>	<i>0.404; (0.197 – 0.830); 0.014</i>

Legend

(Ref); - These are mothers who are unlikely to go for TT vaccination

CHAPTER 5: DISCUSSION

5.1 Introduction

This chapter presents a discussion of the study findings objective by objective. First, the result on health seeking behavior and TT vaccination, then tetanus toxoid uptake and attritions at Kakamega County Referral Hospital is discussed followed by a discussion on reasons given by the mothers for not being fully vaccinated against tetanus. Lastly the chapter presents a discussion on the associations between Socio-Demographic Characteristics of the Mothers and TT vaccination.

5.2 Health Seeking Behavior and TT Vaccination

ANC services provide an opportunity to vaccinate pregnant women with the recommended two doses of tetanus toxoid vaccination. Where ANC coverage is low, or misses certain populations, mass immunization of women of childbearing age is an alternative option (Lincetto, unpublished data). In the current study it emerged that mothers who attended at least one and ≥ 4 ANC visits were 39 and 7 times, respectively more likely to receive TT vaccination as opposed to their counterparts who never attended ANC. Similar observation was made for place of delivery whereby those who delivered from the hospital were three times more likely to receive tetanus toxoid vaccination than those who delivered their children elsewhere. Place of delivery could be influenced by other factors such as proximity to the place of delivery, availability of personnel and availability of tetanus toxoid vaccine (Maina *et al.*, 2014).

Maral *et al.* (2001) also evaluated TT vaccination status in Ankara (Turkey) and its determining factors using primary data from 493 mothers. Multivariate logistic regression models revealed that number of prenatal visits, rural-urban residence and type of prenatal-care facility, such as hospital/private practice or primary health service had significant effect on TT

vaccination. The higher number of prenatal visits raises the likelihood of TT vaccination. Women who received prenatal-care from primary health service had a 12.67 fold higher chances of being vaccinated than those who received this care from hospital/private clinics.

5.3 Tetanus Toxoid Vaccination and Attrition (Pregnant Women)

Studies have proven that maternal tetanus toxoid (TT) vaccination is effective in protecting newborns against tetanus infection (Ropper *et al.*, 2007; Blencowe *et al.*, 2010), however, in Kenya maternal uptake of the recommended TT vaccination is low (Maina *et al.*, 2014) as has also been confirmed in the current study in which barely a third of the interviewed received at least two jabs of TT vaccination as recommended by the Ministry of Health. The current finding is contrary to KNBS & ICF macro, (2010) report in which at least 55% of the interviewed mothers received at least two doses of tetanus toxoid vaccination. However the KNBS & ICF macro survey recruited all the women in the community. Some who even had older children and therefore could not clearly recall the number of TT doses they received during the pregnancy. This current study was carried out at the hospital including only mothers whose children were less than one year old and can clearly recall all the doses they received during the pregnancy of that particular baby. Again this study used documented evidence (97.4% of immunization cards available) to determine the magnitude of TT vaccination attrition from TT1 -TT5 completion among women who have received their TT1 at rural EPI centres and in Kakamega County Referral Hospital in Kenya.

Kakamega County is far much less; only 1 in 3 mothers are protected against tetanus. In view of this the county government of Kakamega needs to come up with interventions to improve TT vaccination coverage. The low tetanus coverage in this study is not unique as other studies in Kenya and other developing countries have reported lower tetanus toxoid coverage (Maral *et al.*,

2001; Adeiga *et al.*, 2006; UNICEF, 2008; Maina *et al.*, 2014). Many studies in sub-Saharan African countries, including Kenya have reported TT coverage of 55% and below, which is far much less than the WHO recommended coverage of 80% (WHO/UNICEF, 2001)

According to Immunization Coverage Survey (UNICEF, 2008) for Somaliland 16.8% of the interviewed mothers had received at least 1+ tetanus toxoid vaccination, which is far much less than TT vaccination recorded in the current study. Even though the TT vaccination coverage for Somaliland was low, most of the mothers delivered at home as opposed to findings of the current study where most of the mothers attended four ANC+ but failed to get at least 1+ TT vaccination. Another study in Turkey (Maral *et al.*, 2001) also established low coverage of TT vaccination by pregnant women. Adeiga and colleagues (2006) that investigated Tetanus Toxoid immunization coverage among mothers of children aged below one year of age in difficult-to-reach areas of Lagos Metropolis recorded 55.6% TT coverage. A separate study that investigated maternal tetanus toxoid vaccination and neonatal mortality in rural North India about two-thirds of mothers received two or more than two doses of tetanus toxoid. The difference in tetanus toxoid coverage in North and India and that of Kakamega could be due to socio-economic differences between the two study populations. The study by Adeiga and colleagues (2006) reported a reducing percentage of TT vaccination with subsequent doses. In the current study there was TT attrition of 29.9%, which is equal to the attrition rate that was reported in a study that investigated utilization of antenatal tetanus toxoid immunization services among women in Bahati Division in Nakuru Kenya (Maina *et al.*, 2014). Adeiga *et al.*, (2006) also noted a dropout rate of 26.6% when comparing those who received TT1 and TT2. The similarity between the Kakamega TT attrition rate and that of Bahati in Nakuru could be a pointer that TT uptake among Kenyan women is low. Low tetanus immunization uptake among women of reproductive

age could mean that their children are not protected against neonatal tetanus. Health service providers should therefore concentrate resources towards tetanus toxoid immunization and there is need for accelerated health education on the importance of TT uptake. This argument is supported by the current findings in which the mothers did not know that it was important to have TT vaccination.

5.3.1 Reasons given for missing TT Vaccination

In the somaliland Immunization survey (UNICEF, 2008) most women mentioned that they could not get TT doses because of lack of vaccines at the health facilities. This is contrary to the current study where a small number of the interviewed mothers said vaccines were not available at the health facilities. Naeem *et al.*, (2010) also revealed that one of the reasons for low tetanus coverage among married women of reproductive age was lack of awareness; being busy, centre too far, misconceptions, and fear of reactions. Similar reason of little information, was also reported by women in the Adeiga and colleagues (2006) study. In the current study, the reason given by most of the mothers for failing to get TT vaccination was that they were unaware of the need for TT vaccination. This implies that there is need to create awareness on the importance of TT vaccination amongst Kenyan women of reproductive age. Women of reproductive age in Kakamega County need to know that a single TT vaccination does not amount adequate protection against tetanus infection. Therefore information needs to be passed over these mothers that they should return for TT vaccination in order to receive at least two doses. According to Government of Kenya/Ministry of Health (2001) a person is protected from tetanus when they receive at least two doses.

5.4 Associations between Socio- Economic and Demographic Characteristics of the Mothers and TT Vaccination uptake

From the current study, age had a significant association with tetanus toxoid coverage. Those aged 15 – 19 were twice more likely to receive TT vaccination than those who were aged 35 - 39 years. This observation could be true as previous studies have reported a positive association between younger mothers and their health seeking behavior as opposed to older mothers (Maina *et al.*, 2014). Most young mothers have better health seeking behavior as opposed to older mothers (Chadrashekar *et al.*, 1998) and so their chances of getting TT vaccination is higher with high number of ANC visits.

Previous studies have established that a woman's education is an important determinant of health seeking behavior (Thind 2005; Khan and Raza, 2013). A study in Nigeria that investigated awareness and status of tetanus toxoid vaccination among female undergraduate students revealed that correct knowledge of the target population and the correct number of doses of tetanus toxoid to be administered was positively associated with higher academic levels (Alex-Hart and Okoh, 2015). In the current study women with primary and secondary education had 12% and 10%, chance respectively of having TT vaccination than those without education. Studies in Pakistan also reported positive correlation between TT vaccination and woman's education (Siddiqi *et al.*, 2007; Rahman, 2009). Lack of education can additionally potentially lead to misconceptions and rumours about vaccines as is commonly seen in areas of resistance during TT vaccination campaigns in some parts of Kenya. Printed and English IEC materials unfortunately reach mostly the educated in society. Frequent printed IEC focused campaigns therefore inadvertently end up only targeting these groups. The end result is further

marginalization of the less educated that form majority of Kenyan society and condemnation by the educated in society when they refuse to embrace vaccination.

Previous studies have highlighted residence as a significant determinant in TT vaccination coverage with women from urban areas more likely to receive tetanus toxoid vaccination than women from rural areas (Naeem *et al.*, 2010; Khan and Raza, 2013). The current study revealed that women from urban areas had 25% chance of receiving tetanus toxoid vaccination compared to women from rural areas that had 4% chance. Nevertheless this finding contradicts the results of Maral *et al.*, (2001) for Turkey where rural women were more likely to have TT vaccination as opposed to their urban counterparts but is in support of the findings by Khan and Raza, (2013). The finding on residence and its association with tetanus toxoid vaccination is very important for Kakamega County and other counties of Kenyan as most Kenyan women of reproductive age live in the rural areas and could be less protected from tetanus infection and so a vaccination campaign in the rural areas with mass TT vaccination is necessary.

CHAPTER 6: CONCLUSIOS AND RECOMMENDATIONS

6.1 Conclusions

1. Health seeking behaviors evaluated in this study showed that women prefer health facility as a place of delivery however they don't utilize the recommended ANC services provided at these health facilities and therefore miss an opportunity to be vaccinated with TT vaccine.
2. High number of attrition cases was contributed by inadequate information among women on the need for tetanus toxoid vaccination leading to low coverage.
3. Education, residence and age are main predictors in the utilization of TT vaccination services among women from Kakamega County Referral Hosspital.

6.2. Recommendations

1. Since health seeking behaviors such as ANC attendance and hospital as a place of delivery played a significant role in TT vaccination uptake, the County Government of Kakamega should direct its efforts towards ensuring that pregnant mothers receive ANC services.
2. It is essential to uplift the awareness of the mothers about the need for tetanus toxoid vaccination with an aim of reducing attrition cases. This can be done through mass media campaigns to create awareness among women, their husbands and families about the importance of TT vaccination and the consequences of not being vaccinated.
3. In order to reduce the effect of low levels of maternal education, residence and age on TT vaccination uptake, this study recommends for the following;
 - Identification and training of community volunteers who will be conducting home visits to health educate illiterate women by providing accurate information about TT vaccination.

- At all interactions between health workers and women of reproductive age irrespective of the pregnancy, the women's TT vaccination status should be checked and those who need to be immunized should be referred to vaccination centers.
- Coverage could also be increased if health workers promoted vaccination when they visit the homes of women of reproductive age in the rural areas and subsequently used targeted follow-up of these.

6.3 Recommendation for Further Research

Further research is required to describe the association between the household income of the mother and TT vaccination uptake.

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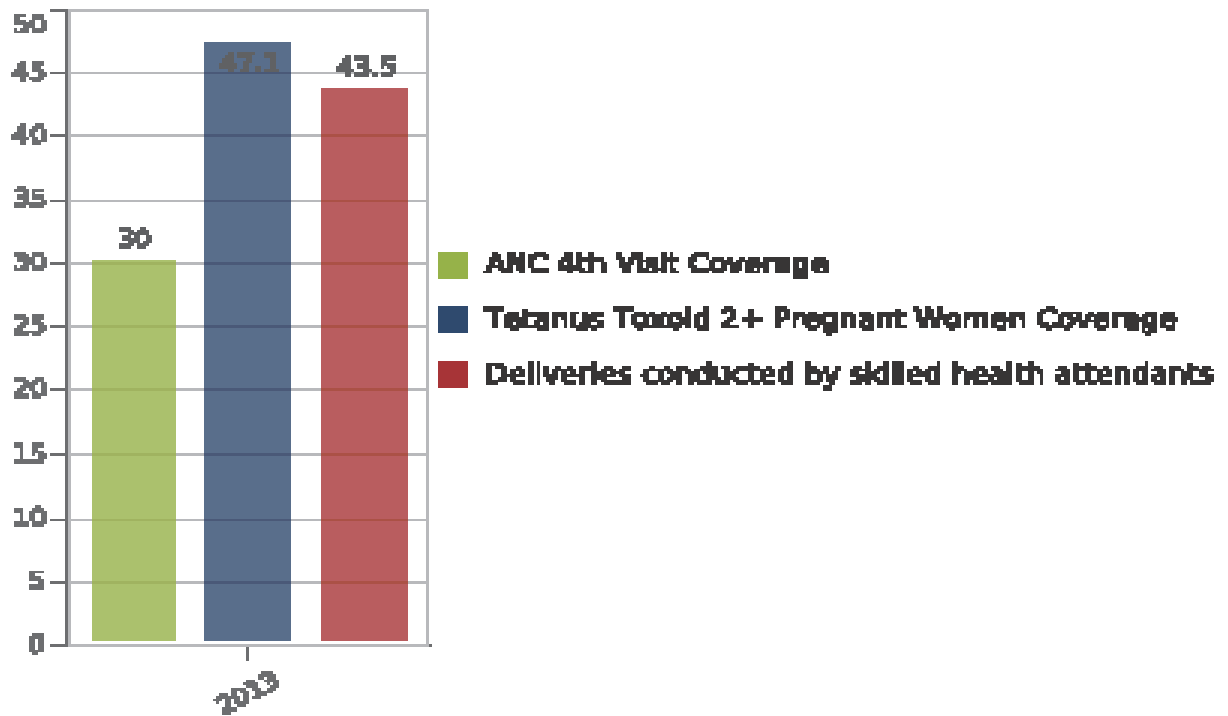
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APPENDICES

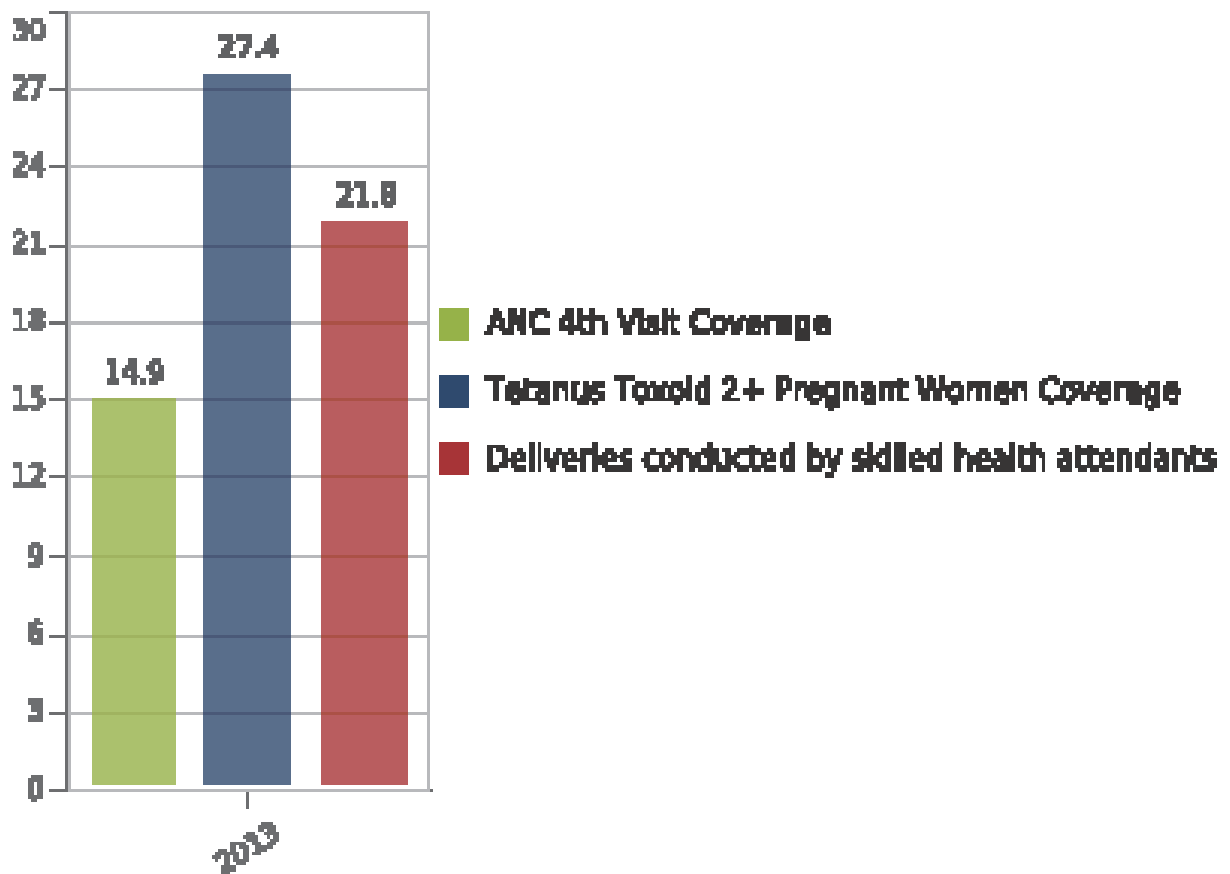
APPENDIX I: DHIS REPORT ON ANC, SKILLED DELIVERIES AND TT2+ IMMUNIZATION COVERAGE FOR 2013

Kenya



APPENDIX II: DHIS REPORT ON ANC, SKILLED DELIVERIES AND TT2+ IMMUNIZATION COVERAGE FOR 2013 KAKAMEGA COUNTY

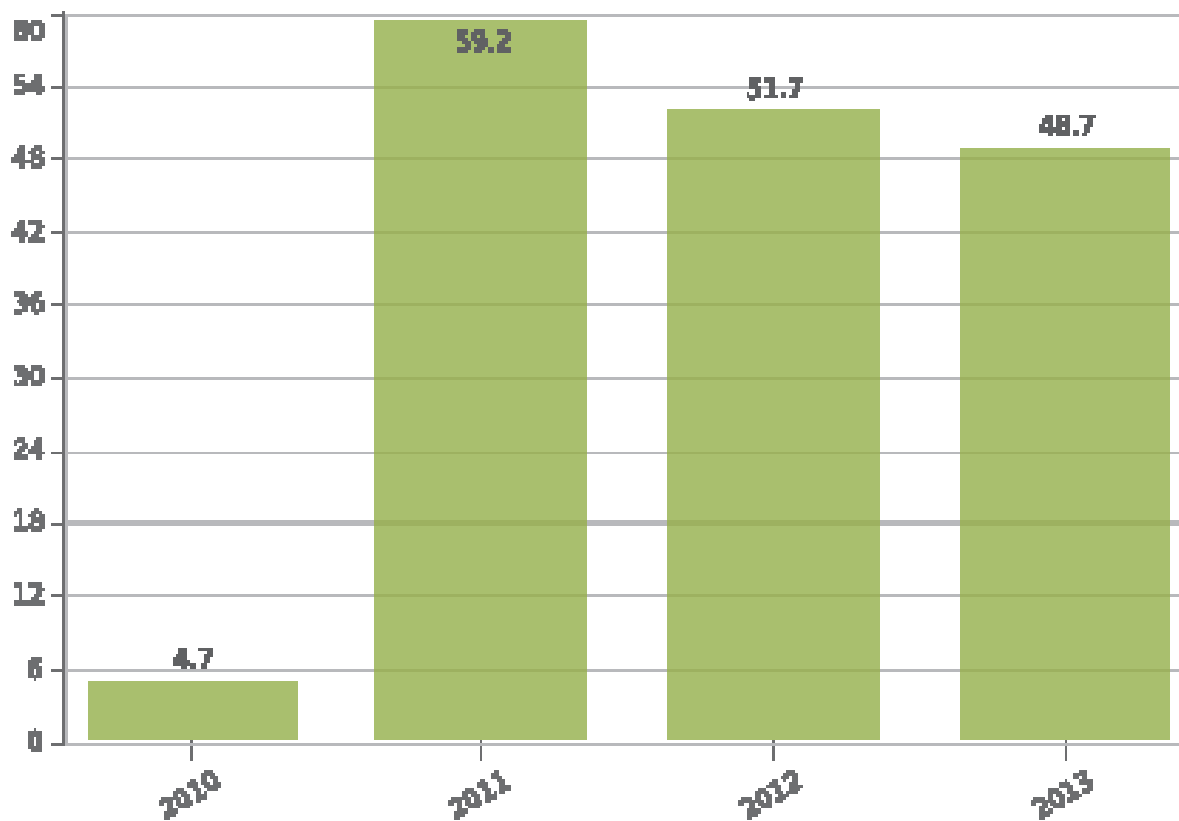
Kakamega County



APPENDIX III: DHIS REPORT ON TT2+ IMMUNIZATION COVERAGE FOR 2010-2013

Kenya

■ Tetanus Toxoid 2+ Pregnant Women Coverage



APPENDIX IV: QUESTIONNAIRE

Cluster form for Tetanus Toxoid Immunization of Women

Cluster Number		Name of mother									Totals (to be completed by supervisor)	
Date												
Area												
Birthdates : From : Until :												
Woman cluster number			1	2	3	4	5	6	7			
Age of the woman;												
Woman education level;(P)(S)(PS)												
Birth date of child												
Total number of pregnancies												
History of Td (or TT) Immunization during last pregnancy	Number of Td (or TT)doses received during last pregnancy ?										Dose last pregnancy	Cumulative doses
	Number of Td (or TT) doses received prior to last pregnancy?										TT0= TT1= TT2= TT3= TT4= TT5=	TT0= TT1= TT2= TT3= TT4= TT5=
	Card available showing Td (or TT) received during last pregnancy										Yes =	No=
	Whether or not card is available, was a card ever received on which the Td (or TT) received during the last pregnancy was marked? Y/N										Yes =	No =
	If card is available, mark the date of the last Td (or TT) doses received during the last pregnancy.											
	Where was the last Td (or TT) dose in the last pregnancy received?										Out = HC= NGO= SCH= OTH=	HOS= PRV= SIA= WCV=
Antenatal care	Number of visits in last pregnancy										One visit =	Two or more visits =
Other visits to Health facility	Number of visits in last pregnancy										One visit =	Two or more visits =
Delivery of baby	where	Home									Home =	
		Hospital/ HC									HC/Hospital =	
		Other									Other =	
	Reporter	Health staff									Health Staff=	
		TBA									TBA =	
		Other									Other =	
	Nobody									Nobody =		
Child protected against neonatal tetanus	Yes (based on history)									Yes (history)=		
Name of interviewers:		Name of supervisor:										

Adopted from WHO

Key: P- Primary, S- Secondary, PS- Post secondary

APPENDIX V
Cluster form; reasons for immunization Failure

1	Cluster Number		4.Birth dates	From										
2	Date			Until										
3	Area													
Note: Ask only one question. 'Why were you not fully immunized?' Mark (x) the single most important reason given.														
Woman cluster number				1	2	3	4	5	6	7	8	Total		
Woman education: (P)(S)(PS)														
Woman residence: urban(U) rural®														
5	Age of the mother													
6	Immunization status	Not immunized												
		Partially immunized												
		Fully immunized												
7	Information Source on immunization	• Unaware of need for immunization												
		• Unaware of need to return for 2 nd or 3 rd dose												
		• Place and/or time of immunization unknown												
		• Fear of side effects												
		• Wrong ideas about contra indications												
		• Other												
	Motivation state	• Postponed until another time												
		• No faith in immunization												
		• Rumours												
		• Other												
	Obstacles to immunization	• Place of immunization too far												
		• Time of immunization inconvenient												
		• Vaccinator absent												
		• Vaccine not available												
		• Mother too busy												
• Family problems, including illness of mother														
• Long waiting time														
• Other														
8	Name of interviewer													
9	Signature													

Adopted from WHO

Key: P- Primary, S- Secondary, PS- Post secondary

APPENDIX VI: RESEARCH PROPOSAL APPROVAL - KAKAMEGA HOSPITAL

Telegram: "PROVMED", Kakamega
Telephone: Kakamega 056-30050/1/2
When replying, please quote:

ERC REF: 0067//2013



PROVINCIAL GENERAL HOSPITAL
P. O. Box 15 - 50100
KAKAMEGA

17th SEPT, 2013

**PROVINCIAL GENERAL HOSPITAL, KAKAMEGA
ETHICS AND RESEARCH COMMITTEE**

GABRIEL MASINDE

Dear Madam,

REF: RESEARCH PROPOSAL APPROVAL (070/9/2013)

This is to inform you that the Ethics and Research Committee has reviewed and approved your work titled "ASSESEMENT OF MATERNAL TETANU IMMUNIZATION STATUS IN KAKAMEGA PROVINCIAL HOSPITAL"

The approval is valid for 1 year from the above date and any continuation thereafter will necessitate a request for renewal.

Note that this approval is only for the work that you have submitted to us. The committee must be notified of any changes or amendments and serious or unexpected outcomes related to the study. You will be expected to submit a final report at the end of the study and may be requested to do a presentation of the same to the hospital.

This information will form part of the database that will be consulted in future when processing related research studies so as to minimize chances of study duplication.

Thank you for your interest in research in our institution.

Yours Faithfully

for  

Dr. Dixon Mchana
CHAIRMAN

ETHICS AND RESEARCH COMMITTEE

CC. Medical Superintendent
PGH KAKAMEGA

APPENDIX VII:

RESEARCH PROPOSAL APPROVAL - MASENO UNIVERSITY SGS



MASENO UNIVERSITY
Office of the
DEAN, SCHOOL OF GRADUATE STUDIES

Our Ref: PG/MPH/0023/2011

Private Bag, MASENO, KENYA
Tel: (057) 351 622/351008/351011
FAX: 254-057-351153/351221
Email: sgs@maseno.ac.ke

Date: 6th September 2013

TO WHOM IT MAY CONCERN

**RE: PROPOSAL APPROVAL FOR MASINDE GABRIEL AJUMA—
PG/MPH/0023/2011**

The above named is registered in the Master of Public Health Programme of the School of Public Health and Community Development, Maseno University. This is to confirm that his research proposal titled “Assessment of Maternal Tetanus Immunization Status in Kakamega Provincial General Hospital” has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.


Prof. P.O. Owuor
DEAN, SCHOOL OF GRADUATE STUDIES

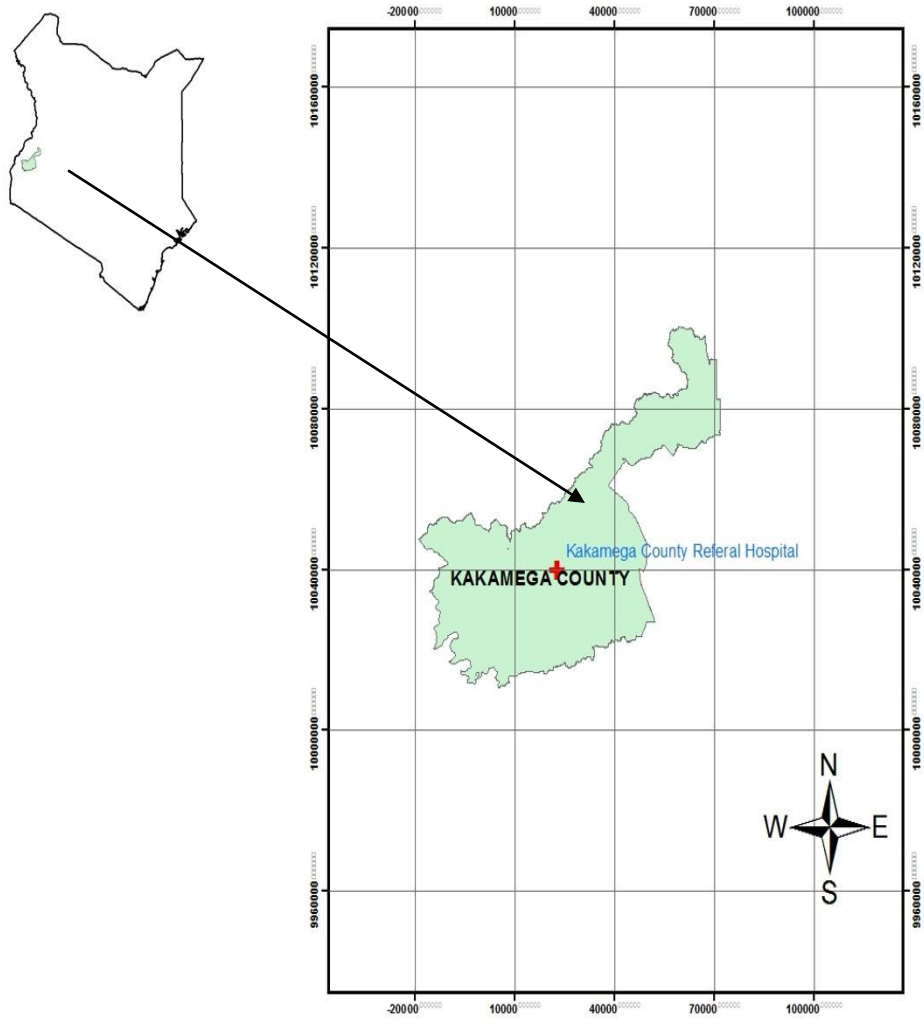


Maseno University

ISO 9001:2008 Certified



APPENDIX VIII: MAP OF KAKAMEGA COUNTY



APPENDIX IX: INFORMED CONSENT

My name is..... I am a research assistant for this study ‘**ASSESSMENT OF TETANUS TOXOID VACCINATION UPTAKE BY PREGNANT WOMEN RECEIVING CARE AT KAKAMEGA COUNTY REFERRAL HOSPITAL, KENYA**’. This study is strictly for the purpose of learning and shall not be used for any other purpose whatsoever. The information obtained from you shall be treated with ultimate confidentiality and shall not be diverged to anybody or any other use than the intended. I will not ask for your name. All your answers will be anonymous. No one will know who answered what questions. Your participation in this study is completely voluntary. If you want to be in the study, but do not want to answer any particular question, you do not have to. If the meaning of any of the questions is unclear, please ask me to explain it to you in different words. I expect that the interview will take no more than 20-30 minutes of your time. Thanks.