

# Coverage and Factors Influencing Uptake of Maternal Health Care Services in Kondoa District, Tanzania

Zacharia S. Masanyiwa<sup>1\*</sup>, Simon Meigaro<sup>2</sup>, Domitila R. Bashemera<sup>1</sup>

<sup>1</sup>Institute of Rural Development Planning, P.O. Box 138, Dodoma–Tanzania

<sup>2</sup>Aga Khan Foundation Tanzania, P.O. Box 1105, Mtwara-Tanzania

\*Corresponding author: Email: zmasanyiwa@irdp.ac.tz

## ABSTRACT

*Maternal health services play a vital role in achieving improved reproductive health outcomes. However, levels of uptake and utilisation of available services in most developing countries, including Tanzania remain substantially low. This study assessed coverage and factors influencing uptake of maternal health services in Kondoa District in central Tanzania. Data were collected from a cross-sectional survey of 434 women of reproductive age who had given birth three years prior to the survey in ten selected villages, and analysed for descriptive statistics, chi-square tests and binary logistic regression. The study found that most of the respondents (84%) lived within five kilometers from a health facility where basic maternal health care services were provided, although health facilities were not sufficiently staffed and equipped to provide basic maternal health services. Whereas antenatal care attendance for at least one attendance was generally high (99.8%), uptake of four or more antenatal care services was low (61%). Uptake of delivery services was also unsatisfactorily low as a substantial proportion of women (35%) preferred home delivery to health facilities. The factors influencing uptake of antenatal care services were ethnic background and household wealth whereas maternal education, mode of travel to the nearest health facility and number of antenatal care visits influenced choice of facility delivery. Postnatal care attendance was mainly attributed to the desire to ensure safety and survival of infants. It is recommended that the government and households should put more emphasis to post-secondary education for women, improvement of transport infrastructure and equipping the current health facilities with qualified medical personnel and medical supplies.*

**Keywords:** Maternal health services, access, coverage, uptake, health-seeking behaviour.

## 1.0 INTRODUCTION

Maternal health services play a vital role in achieving improved reproductive health outcomes. Over the last two decades, significant progress has been made in reducing the global maternal mortality ratio (MMR) by 44% from 385 deaths to 216 deaths per 100,000 live births between 1990 and 2015 (WHO, 2015). Despite this achievement, levels of maternal mortality remain unacceptably high in sub-Saharan Africa, which suffers from the highest maternal mortality ratio: 546 maternal deaths per 100,000 live births, or 201,000 maternal deaths a year (WHO, 2012; 2015). In Sub-Saharan Africa, one in every 26 pregnant women dies from maternal complications. Most maternal deaths are a result of direct obstetric causes such as hemorrhage, unsafe abortions, eclampsia, obstructed labour and infections. Over 80% of these deaths can be prevented if all pregnant women have access to essential antenatal care during pregnancy,

professional assistance during childbirth as well as emergency obstetric care (WHO *et al.*, 2012). Increasing utilisation of good quality maternal services is, therefore, necessary to reduce maternal and new born deaths and disability (Penfold *et al.*, 2013).

While various initiatives established by the international community, national governments, and civil society to galvanize efforts towards achieving the Millennium Development Goals (MDGs), and more recently the Sustainable Development Goals (SDGs) contributed to increased coverage and accessibility of maternity services (WHO, 2015), levels of uptake and utilisation of available services still remain substantially low, especially in sub-Saharan African countries (Magoma *et al.*, 2010; Abor *et al.*, 2011; Shija *et al.*, 2011; Penfold *et al.*, 2013). In Tanzania, recent estimates show that MMR is 556 deaths per 100,000 live births (URT, 2016). Low uptake, in addition to unsatisfactory coverage, have been blamed for failure to achieve MDG 5, which aimed at reducing maternal deaths by three quarters and achieve universal access to reproductive health, in most developing countries, including Tanzania (Magoma *et al.*, 2010; Shija *et al.*, 2011; Mujinja and Kida, 2014).

Globally, three core health sector strategies are considered as critical for reducing maternal and early neonatal deaths. These include comprehensive reproductive health care; skilled care for all pregnant women, especially during delivery; and emergency obstetric care (EmOC) for all women and infants with life threatening complications (Magoma *et al.*, 2010; WHO, 2015). Based on the WHO Focused Antenatal Care (FANC) model, it is strongly recommended that women attend antenatal care (ANC) at least four times during pregnancy (WHO, 2002). Attending ANC services allows a woman the opportunity to learn more about the conditions of her pregnancy and be screened and treated for infections and other medical conditions to reduce risk factors (WHO, 2015). However, since most fatal complications occur during or immediately after childbirth, it is important that professional assistance and EmOC services are available during delivery. Further, after delivery it is recommended that neonate mothers receive postnatal care (PNC) within 42 days after delivery, which allows for screening and treatment of post-delivery infections, which may compromise her good health (WHO, 2013; 2015).

Recent studies in Tanzania estimate that while nearly 98% of pregnant women attend ANC at least once and approximately 51% four times or more; hardly 63% deliver at available health facilities and 64% are assisted by a skilled provider (URT, 2016). Factors associated with the utilisation of maternal health care services in various parts of the country vary significantly with place of residence, culture, demographic and socio-economic characteristics, and so are the effects brought about by their interaction. Despite the vast scholarship on maternal mortality and morbidity in Tanzania (e.g. Magoma *et al.*, 2010; Shija *et al.*, 2011; Penfold *et al.*, 2013; Hanson, 2013; Ueno *et al.*, 2015), most studies tend to use hospital data and/or are urban based. Thus, less attention has been paid to the context specific availability and factors influencing uptake of maternal health services at the local level, especially in rural areas. Consequently, rural women's perspectives have been neglected in the existing reproductive health discourse. This paper, aims at contributing to the existing empirical literature on maternal health services by assessing the coverage and uptake of maternity services in Kondoa District in rural central Tanzania. The specific objectives of the paper are threefold: (i) to examine availability of maternal health care

services in the rural areas, (ii) to establish levels of uptake of available maternal health care services and, (iii) to determine factors influencing uptake of the available maternal health care services.

Theoretically, the study draws on the health-seeking behaviour model, which proposes three hypotheses as the basis for health care use. According to Abor *et al.* (2011), the first hypothesis posits that socio-demographic characteristics of individuals influence the underlying penchant of the individual to seek medical care. The second, accessibility hypothesis, argues that access to health care services and personnel is an important determinant of maternal health care utilisation. The third hypothesis is based on the premise that use of maternal health services can be influenced by mother's perception of the importance of modern health care services. Proponents of this theory like Currie and Wienserberg (2003) argue that health seeking behaviour is framed not only by the personal facilitators of health seeking, but also by the broader women's socio-cultural context. The model is viewed relevant to the context of this study because amongst other things, it focuses on coverage and utilisation of maternal health services in a specific socio-cultural context, which are likely to be influenced by the factors articulated in the model.

## **2.0 METHODOLOGY**

The data used in this paper derive from a field work conducted in ten selected villages of Kondoa district in Dodoma Region in 2016. The district is administratively divided in 28 wards and 116 villages, with a population of 269,704 (133,186 females and 136,518 males), distributed across 56,434 households (URT, 2013). In terms of health facilities, the district has one district hospital, five health centers and 67 dispensaries of which 14 are privately owned. In 2016, maternal mortality ratio in the district was one of the highest in the region: 400 deaths per 100,000 live births (Kondoa District Council, 2016).

The study employed cross-sectional design, which examines the relationship between variables of interest as they are in a defined population at a given point in time (Kothari and Garg, 2014). The design was appropriate for the study as it attempted to determine levels of uptake of maternal health care services and factors associated with uptake, among women of reproductive age. Primary data were collected from women of reproductive age (15 to 49 years), through semi-structured interviews using a structured questionnaire. The questionnaire aimed at collecting social, demographic and economic characteristics of respondents, and information about availability and uptake of maternal health care services. Relevant secondary data were obtained from the district socio-economic profile and the comprehensive council health plans.

The study used multi-stage random sampling technique. The first stage involved random selection of five wards from a list of 23 rural wards in the district. In the second stage, two villages were randomly selected from each of the five wards, adding up to a total of ten villages. Some of these villages were easily accessible from their district headquarters while others could be accessed with difficulties. None of them had a private health facility, thus, the public dispensary or health centre in the village or nearby village was the only health facility option available. In the third stage, 50 households were randomly selected from each of the selected village, which is a reasonable sample for statistical analysis and comparison across the villages (Grinnell, 2001). In

each household, a woman of reproductive age, who had given birth within three years prior to the study constituted the sampling unit.

Assuming a normal population distribution, a sample size of 434 women was used, estimated using a Z-score of 1.96 (based on 95% confidence interval), a standard p-value of 0.5 and a 5% margin of error. Thus, our survey data come from a sufficiently large sample to provide reasonable control over sampling error, enable statistical analysis and enhance validity and reliability of the findings (Grinnell, 2001). Data analysis techniques included descriptive statistics mainly frequencies, chi-square tests and binary logistic regression. Given k numbers of independent variables, the binary logistic model was specified as:

$$\ln\left(\frac{p}{1-p}\right) = \alpha + \sum_{m=1}^k x_i \beta_m$$

Whereas  $\alpha$  and  $\beta_i$  are parameters  
 $p$  = Probability that a women utilize maternity services  
 $x_i$  = Vector of explanatory variables  
 $\beta_m$  = Vector of regression coefficients

For ANC uptake, the explanatory variables specified were:  $x_1$ =age,  $x_2$ =marital status,  $x_3$  =number of children,  $x_4$ =education level,  $x_5$ =religion,  $x_6$ =tribe,  $x_7$  =employment type,  $x_8$ =household wealth,  $x_9$ =distance from the nearest health facility,  $x_{10}$ =travel mode to the nearest health facility,  $x_{11}$ =pregnancy risk awareness and  $x_{12}$ =perceived quality of antenatal care services at the nearest health facility. Explanatory variables for both facility delivery and skilled delivery attendance were:  $x_1$ =age,  $x_2$ =marital status,  $x_3$  =number of children,  $x_4$ =education level,  $x_5$ =religion,  $x_6$ =tribe,  $x_7$  =employment type,  $x_8$ =household wealth,  $x_9$ =distance from the nearest health facility,  $x_{10}$ =travel mode to the nearest health facility,  $x_{11}$ =pregnancy risk awareness,  $x_{12}$ =number of ANC visits,  $x_{13}$ =perceived quality of delivery services at the nearest health facility and  $x_{14}$ =place of delivery. For postnatal care, the explanatory variables specified were:  $x_1$ =age,  $x_2$ =marital status,  $x_3$  =number of children,  $x_4$ = education level,  $x_5$ =religion,  $x_6$ =tribe,  $x_7$  =employment status,  $x_8$ = household wealth,  $x_9$ =distance from the nearest health facility,  $x_{10}$ =travel mode to the nearest health facility,  $x_{11}$ =pregnancy risk awareness,  $x_{12}$ =number of ANC visits,  $x_{13}$ =place of delivery and  $x_{14}$ =perceived quality of postnatal care services at the nearest health facility.

### 3.0 RESULTS AND DISCUSSION

#### 3.1 Socio-demographic Characteristics of Women

The socio-demographic characteristics of women examined in this study included maternal age, marital status, education level, religious and ethnic background and employment status. The findings show that a significant majority (81%) of the women were aged 30 years or below, and the mean age was 28 years. The youngest respondent was aged 16 while the oldest was 49 years (Table 1). The observed age distribution tallies well with 2012 national census data, depicting a pyramidal structure of a young and expanding population (URT, 2013). This implies that actual

demand for maternal health care services is expected to continue rising and increasingly exert more pressure on the currently available services. Studies show that a woman's current age is an important determinant for utilisation of medical services, and can be used as a proxy for the woman's accumulated knowledge of health care services, which may have a positive influence on the use of health services (Abor *et al.*, 2011).

Whereas an overwhelming majority (81%) of the women were married, all women aged below 18 years were not married, suggesting that the lowest age for marriage was 18 years. URT (2016) shows that women in Tanzania marry at a median age of 19.2 years. The dominant religion in the study area was Islam (80%) and about 77% of the women were of either Rangi or Mwasi ethnic backgrounds, which were the indigenous tribes in the area. Religion strongly shaped the culture of the indigenous Rangi and Mwasi tribes, who were dominantly Islam by 90% and 93%, respectively. This allowed for a generally homogenous cultural society with no significant variations in traditional values, beliefs and practices across the district. Other studies have shown that religion is an important determinant of maternal health care utilisation. Similarly, different ethnic groups may exhibit different culture, values and belief systems, which invariably may affect behaviour and perceptions as well as use of health care services (Abor *et al.*, 2011).

Over three quarters (78%) of the respondents had primary school education. Mother's level of education has an important impact on the use of maternal health services. Education is argued to enhance women's autonomy, which enables them to develop greater confidence and capabilities to make decisions regarding their own health. Educated women tend to be aware of health problems, know more about the availability of health care services, and use this information to seek better quality services to produce better care. (Magoma *et al.*, 2010; Abor *et al.*, 2011). The majority (79%) of the women were peasants. Indeed, the size and reliability of household income sources provides a necessary social security that is highly needed during pregnancy and childbirth.

**Table 1: Socio-demographic characteristics of respondents (n=434)**

Characteristics	Frequency	Percent (%)
<b>Maternal age of respondents (years)</b>		
16-19	32	7.4
20-24	115	26.5
25-29	113	26.0
30-34	92	21.2
35-39	40	9.2
40-44	32	7.4
45-49	10	2.3
<b>Marital status</b>		
Not married	68	15.7
Married	350	80.7
Widowed	10	2.3
Divorced	6	1.4

Characteristics	Frequency	Percent (%)
<b>Religion</b>		
Traditional	12	2.8
Christian	71	16.4
Muslim	345	79.5
Others	6	1.9
<b>Tribe</b>		
Rangi	290	66.8
Mwasi	46	10.6
Others	98	22.9
<b>Education level</b>		
No formal education	37	8.5
Primary school	337	77.7
Secondary school	50	11.5
College or higher	10	2.3
<b>Occupation</b>		
Housewife	37	8.5
Peasant	342	78.8
Small business	32	7.4
Casual labor	1	0.2
Employed	17	3.9
Others	5	1.2

### 3.2 Availability of Maternal Health Care Services

In this study, availability of maternal health services was operationalized in terms of number of health facilities (dispensaries, health centres and hospitals) providing maternal health services in the area, availability of skilled personnel and essential drugs in such facilities. District data showed that Kondoa had one hospital, five health centres and 56 dispensaries spread out in 28 wards and 108 villages in the district (Kondoa District Council, 2016). This shows that the target for having a dispensary in every village and a health center in every ward by 2017 (URT, 2007), was still far from being achieved since this would mean constructing 23 health centres and 52 dispensaries without necessarily affecting the provision of maternal health services in the existing health facilities, some of which were already in poor conditions.

In the study villages, there were six health facilities: four dispensaries and two health centres, meaning that four of the study villages did not have any health facilities. About 84% of respondents lived within five kilometers from the nearest health facility. The average distance to the nearest facility was 2 kilometres (Table 2). An earlier study in the same district found that over three quarters (76%) of the population lived within five kilometres from the nearest health facility, with dispensaries being the main health facility for the majority of users in rural areas (Masanyiwa *et al.*, 2015). Indeed, the national health policy recognizes the dispensary as the backbone of

rural healthcare services, providing reproductive and child health services, diagnostic health services and essential drugs (URT, 2003).

**Table 2: Distribution of respondents by distance to health facilities (n=434)**

Distance	Frequency	Percent (%)
Less than 1	103	23.7
Between 1 and 3	169	38.9
Between 3 and 5	91	21.0
More than 5	71	16.4

Data from the six health facilities surveyed show that there were only three clinical officers/assistant medical officers, one in each health centre and one in a dispensary. Overall, one doctor in Kondoa district served between 15,000 and 20,000 people, which is well above the national threshold of 1,000 to 1,500 (Kondoa District Council, 2016). This implies an extremely heavy workload on health staff, which when combined with other factors could compromise their morale and the quality of service delivery. The limited number of clinical officers/assistant medical officers in rural health facilities could also mean that their work was shifted to nurses and medical attendants, who were not skilled enough to carry out some basic emergency obstetric care services. Nurses and midwives were responsible for 86% of assisted deliveries in health facilities in the last three years prior to the study. The number of nurses and midwives was also limited.

In the six health facilities surveyed, there were only two midwives and twelve nurses. Midwives were present only in health centres and not in dispensaries. On average, there was one midwife in each health centre and two nurses in each dispensary (Table 3). These observations are similar to what was reported by Yakong *et al.* (2010) in rural Ghana where women thought that their choices in seeking reproductive health care were limited to nurses only. In Tanzania, a cross-sectional study of eight hospitals in Moshi district found persistent lack of knowledge and skills to perform functions as one of the major obstacles for achieving better maternal health outcomes (Ueno *et al.* 2015).

**Table 3: Availability of skilled personnel in health facilities**

Health facility	Number of Facilities	% deficit of doctors	% deficit of nurses/midwives
Dispensary	4	75.0	12.5
Health center	2	50.0	12.5
Total	6	62.5	12.5

In this study, three out of four dispensaries had equipment and facilities to carry out simple diagnostic tests such as malaria rapid diagnostic test and blood pressure for pregnant women. None of the dispensaries had a designated laboratory room. The two health centres had designated laboratories, but the status of supplies could not be established. All dispensaries and health centres had rooms designated for delivery. In some dispensaries, delivery rooms were also used as waiting or resting rooms during the administration of intravenous drugs. It was also found that the two health centers had one ambulance vehicle, each, to facilitate transport for

referrals to the district hospital, but none of the dispensaries had ambulance services. Absence of ambulance services at village dispensaries limits transportation for referral cases to health centres should an emergency occur. In general, the mode of transport rather than distance to the health facility in the study areas was found to significantly decrease the likelihood of a pregnant woman delivering in a health facility as discussed further in the subsequent sections.

This study also attempted to establish the availability of essential drugs for maternal health care in health facilities. Three types of medicines were chosen for this purpose: intravenous antibiotics, oxytocin and anticonvulsants. Intravenous antibiotics are essential in the treatment/prevention of serious bacterial infections (such as pneumonia, acute urinary tract infections and sexually transmitted diseases) or prevent infection after delivery. Oxytocin is used in inducing labor in women with Rh problems, diabetes, pre-eclampsia, abort fetus in cases of incomplete abortion or miscarriage, produce contractions during the third stage of labor, and control bleeding after childbirth. Anticonvulsants (also commonly known as anti-epileptic drugs or as anti-seizure drugs) are used in the treatment of epileptic seizures. Intravenous antibiotics were available in five out of six health facilities. Oxytocin was found in all facilities except in one dispensary. However, anti-seizure drugs were missing in all dispensaries and available in all health facilities (Table 4). Most respondents were of the view that health facilities in the area were insufficiently stocked with essential drugs. This reflects earlier observations that shortage of essential drugs and medical supplies is a chronic problem in most rural health facilities, affecting quality of care (Penfold *et al.*, 2013; Uenoet *et al.*, 2015; Mkoka *et al.*, 2014; Masanyiwa *et al.*, 2015).

**Table 4: Availability of medicine for basic EmOC**

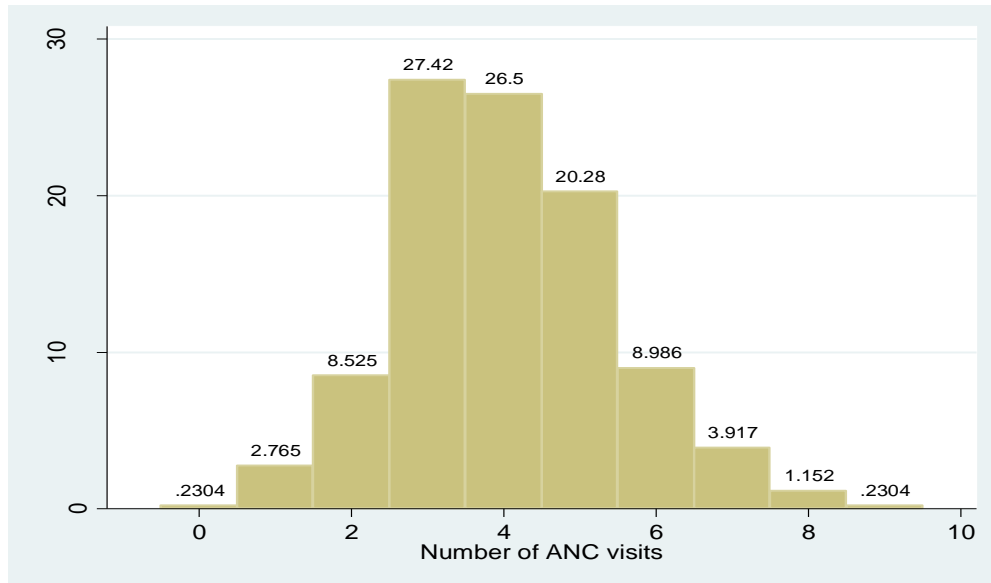
<b>Facilities</b>	<b>% deficit of IV Antibiotics</b>	<b>% deficit of oxytocin</b>	<b>% deficit of anticonvulsants</b>
Dispensary	25.0	25.0	100.0
Health Center	0.0	0.0	0.0
Total	16.7	16.7	66.7

### **3.3 Levels of Uptake of Maternal Health Care Services**

#### **3.3.1 Antenatal care attendance**

Almost all women reported to have had attended ANC at least once during their last pregnancy (99.8%) as shown in Fig. 1. However, only 61% of them attended at least four times as minimally required by WHO standards (WHO, 2002). Similar trends in uptake of ANC services have been reported in other studies in many developing countries such as Ghana and Malawi (Magoma *et al.*, 2010; Penfold *et al.*, 2013). In Tanzania, the 2015-2016 Demographic and Health Survey and Malaria Indicator Survey found that ANC coverage was 98% for one and 51% for four or more visits(URT,2016).





**Fig.1: Distribution of respondents by number of antenatal care visits**

### 3.3.2 Facility based and skilled assisted delivery

Overall, about two thirds (65%) of women reported to have had delivered in health facilities, slightly higher than the national average of 63% (URT, 2016). Specifically, over one quarter (28%) delivered in a dispensary, about one fifth (21%) in a hospital and 15% in a health centre (Fig. 2). Home based deliveries accounted for one third (33%) of all deliveries, slightly lower than the national average of 36% (URT, 2016). Respondents associated home delivery with ignorance and the perceived quality of delivery care in health facilities. Other studies establish that women's preference for home delivery results from unpleasant experiences during childbirth in health facilities, presence of traditional birth attendants (TBAs), distance from health facility, transportation problems, sudden onset of labour and cultural practices (Mrisho *et al.*, 2007; Magoma *et al.*, 2010; Masanyiwa *et al.*, 2015). In Ghana, Yakonget *al.* (2010) found that women's strong preferences for obtaining birthing support from TBAs rather than health facilities was attributed to nurses' poor relations with women when seeking health care. Viewed from the health-seeking behaviour model discussed earlier, these findings subscribe to the third hypothesis since health seeking was found to be determined not only by the presence of physical diseases or conditions, but also the perceptions about illness (Abor *et al.*, 2011).



**Fig.2: Distribution of respondents by place of delivery**

The findings in Table 5 show that 62% of respondents reported to have had skilled delivery assistance during childbirth, slightly lower than the national estimates of 64% (URT, 2016). Skilled assistance during childbirth was significantly ( $p=0.000$ ) associated with facility delivery as 91% of facility-based deliveries received skilled assistance whereas 91% of non-facility-based deliveries were at home. This implies that delivering at a health facility increases the chances of being attended by the skilled personnel. Further, non-facility deliveries accounted for about 36% of all deliveries. In 63% of the non-facility deliveries, there was no health facility of any kind in the village. The chi-square test between facility delivery and presence of health facility at village level affirms a statistically significant association ( $p=0.000$ ) at 5% level of significance. Again, this implies that presence of a health facility at village level increases the chances of facility-based deliveries than when it is absent.

**Table 5: Health facility delivery by skilled delivery assistance and presence of health facility (n=434)**

Place of delivery	Received Skilled Delivery Assistance			Presence of health facility at village		
	Yes	No	Total	Yes	No	Total
Health facility	255(91.1)	25(8.9)	280(64.5)	161(57.5)	119(42.5)	280(64.5)
Other places	14(9.0)	140(90.9)	154(35.5)	57(37.0)	97(63.0)	154(35.5)
Total	269 (62.0)	165 (38.0)	434(100.0)	218(50.2)	216(49.8)	434(100.0)

Pearson  $\chi^2(1) = 283.3698, p = 0.000.$       Pearson  $\chi^2(1) = 16.6807, p=0.000.$

### 3.3.3 Postnatal care attendance

The postnatal period is defined as the period beginning one hour after delivery of the placenta and continuing until six weeks (42 days) after birth of an infant (WHO, 2006). Care during this period is critical for the health and survival of both the mother and the newborn. Most maternal

deaths occur during labor, delivery or within one day postpartum. The findings show that, almost all respondents (97%) reported to have attended postnatal care at least once within one month after delivery (Table 6). The recent demographic and health survey and malaria survey results in Tanzania show that just over one third of women (34%) received a postnatal checkup within two days after delivery while 63% did not receive a postnatal checkup within 42 days of delivery (URT, 2016). The reasons for attending postnatal care revolved around ensuring the safety of infants except in pregnancy complications situations, supporting the health-seeking behaviour model argument about individual's perception as a key determinant in seeking health care (Abor *et al.*, 2011). Overemphasis on the child safety has also been reported in other studies. Mrisho *et al* (2007), for example, found that unless there is a serious issue related to maternal complications, postnatal services in rural Southern Tanzania target the child, and little attention is paid to the mother.

**Table 6: Distribution of respondents by PNC attendance (n=434)**

Received at least one PNC visit	Frequency	Percent
Yes	422	97.2
No	12	2.8

### 3.4 Factors Influencing Utilisation of Maternal Health Services

#### 3.4.1 Factors influencing antenatal care attendance

Binary logistic regression results in Table 7 indicate that ethnic background of a woman and the household wealth level were significantly ( $p>0.05$ ) associated with four or more ANC visits at 5% percent level of significance. Respondents with Mwasi backgrounds were more than three times likely to make at least four ANC visits than those with Rangì backgrounds ( $p=0.005$ ). Similarly, respondents from households whose wealth was perceived to be average were about two times more likely to make four or more ANC visits than those from households whose wealth was perceived as very low ( $p=0.041$ ). Previous studies on factors affecting utilisation of antenatal care in developing countries show that education, marital status, household income, employment, media exposure, cultural belief and a history of obstetric complications are significantly associated with antenatal care uptake (Simkhada *et al.*, 2007). This also supports the 'predisposing factors' proposition of the health-seeking behaviour model (Abor *et al.*, 2011). On contrast, Hanson (2013) found no evidence that low uptake of maternal health care services was explained by distance or socio-demographic factors in Southern Tanzania. This could mean that the effects of each of these factors are likely to be context specific, also as reflected in this study by the factors that did not show significant influence on ANC uptake.

**Table 5: Factors associated with antenatal care attendance (n=434)**

Explanatory variables	Coefficients	Odds Ratio	Std. Err.	z	P> z
Maternal age	0.039	1.040	0.024	1.65	0.099
Marital Status (1=single)					
2=Married	0.197	1.218	0.350	0.56	0.573
3=Widowed	-0.070	0.933	0.769	-0.09	0.928
4=Divorced	2.060	7.846	1.325	1.55	0.120
Number of Children	-0.063	0.939	0.088	-0.71	0.476

Explanatory variables	Coefficients	Odds Ratio	Std. Err.	z	P> z
Education (1=None)					
2=Primary	0.419	1.521	0.431	0.97	0.331
3=Secondary	1.016	2.763	0.566	1.79	0.073
4=College or higher	2.795	16.359	1.548	1.80	0.071
Religion (1=Traditional)					
2=Christian	0.421	1.524	0.768	0.55	0.583
3=Islam	0.161	1.175	0.732	0.22	0.826
4=others	-2.701	0.067	1.581	-1.71	0.087
Tribe (1=Rangi)					
2= Mwasi	1.250	3.489	0.443	2.82	0.005**
3=Others	-0.040	0.961	0.339	-0.12	0.906
Employment type (1=Housewife)					
2=peasant	-0.152	0.859	0.453	-0.34	0.737
3=business	-1.012	0.363	0.582	-1.74	0.082
4=formal	-0.500	0.607	1.036	-0.48	0.630
5=others	-0.607	0.545	1.145	-0.53	0.596
HH Wealth (1=very low)					
2=low	0.339	1.403	0.304	1.11	0.265
3=average	0.650	1.915	0.3179	2.04	0.041**
Distance in km (1=-1)					
2=1-3	-0.135	0.874	0.311	-0.43	0.665
3=3-5	0.557	1.746	0.351	1.59	0.112
4=5+	0.559	1.749	0.436	1.28	0.200
Travel mode (1=foot)					
2=bicycle	-0.114	0.892	0.526	-0.22	0.828
3=motorcycle	-0.183	0.832	0.462	-0.40	0.692
Risk awareness (1=not aware)					
2=less aware	1.425	4.160	1.305	1.09	0.275
3=aware	0.600	1.821	1.266	0.47	0.636
4=more aware	1.480	4.392	1.273	1.16	0.245
5=very aware	0.601	1.825	1.280	0.47	0.638
Perceived quality of ANC (1=very bad)					
2=bad	-0.261	0.770	1.363	-0.19	0.848
3=not so bad	-0.747	0.474	1.317	-0.57	0.571
4=good	-0.220	0.802	1.317	-0.17	0.867
5=very good	-0.464	0.629	1.362	-0.34	0.734
Constant	-2.164	0.115	2.216	-0.98	0.329

\*\*Significant at 5%

### 3.4.2 Factors influencing facility delivery and skilled delivery assistance

Education level, mode of travel to the nearest facility and the number of antenatal care services were associated with facility delivery at 5% level of significance (Table 8). Respondents with primary education ( $p=0.003$ ) and those with secondary education ( $p=0.006$ ) were 2.6 and 5.4 times, respectively, more likely to deliver in a health facility than those without any formal education. Respondents who used motorcycles were 3.1 times more likely to deliver in a health facility than those who walked ( $p=0.033$ ). Further, a unit change in the number of antenatal care visits increased the possibility of facility delivery by at least 1.4 times. In the context of the health-seeking behaviour model, education level falls within the predisposing factors whereas mode of transport and number of ANC visits could be viewed as 'access' related factors (Abor *et al.*, 2011).

**Table 8: Factors associated with facility delivery (n=434)**

<b>Explanatory variables</b>	<b>Coef.</b>	<b>Odds Ratio</b>	<b>Std. Err.</b>	<b>Z</b>	<b>P&gt; z </b>
Maternal Age	0.023	1.023	0.026	0.92	0.360
Marital Status (1=single)					
2=Married	-0.234	0.792	0.298	-0.62	0.535
3=widowed	-0.462	0.630	0.491	-0.59	0.553
4=divorced	-1.370	0.254	0.265	-1.31	0.189
Number of children	-0.063	0.940	0.085	-0.69	0.489
Education level (1=None)					
2=primary school	0.961	2.613	1.158	2.17	0.030**
3=secondary school	1.692	5.428	3.351	2.74	0.006**
4=college or higher	1.115	3.048	4.900	0.69	0.488
Religion (1=Traditional)					
2=Christian	0.321	1.379	1.113	0.40	0.691
3=Islam	0.266	1.305	0.996	0.35	0.728
4=Others	-0.778	0.459	0.605	-0.59	0.555
Tribe (1=Rangi)					
2=Mwasi	0.626	1.871	0.791	1.48	0.139
3=others	-0.081	0.922	0.342	-0.22	0.828
Employment type (1=housewife)					
2=peasant	-0.733	0.480	0.246	-1.43	0.152
3=business	-0.025	0.976	0.676	-0.04	0.972
4=formal	0.335	1.398	1.742	0.27	0.788
5=others	-1.353	0.258	0.300	-1.17	0.244
HH wealth (1=very low)					
1=low	-0.269	0.764	0.249	-0.82	0.411
2=average	-0.441	0.644	0.217	-1.31	0.191
Distance in km (1=0-1)					
2=1-3	-0.395	0.674	0.225	-1.18	0.238
3= 3-5	-0.281	0.755	0.284	-0.75	0.456
4=5+	-0.467	0.627	0.291	-1.00	0.315
Travel mode (1=foot)					
2=bicycle	-0.175	0.839	0.451	-0.33	0.744
3=motorcycle	1.144	3.140	1.688	2.13	0.033**
Risk awareness (1=not aware)					
2=Less aware	-0.402	0.669	0.312	-0.86	0.388
3= aware	-0.370	0.691	0.240	-1.06	0.287
4=More aware	0.190	1.210	0.439	0.52	0.600
Number of ANC visits	0.387	1.473	0.135	4.22	0.000**
Perceived quality of delivery care (1=very bad)					
2=bad	-0.279	0.756	0.816	-0.26	0.796
3=not so bad	-1.229	0.292	0.272	-1.32	0.186
4=good	-0.203	0.817	0.741	-0.22	0.823
5=Very good	1.343	3.826	4.055	1.27	0.205
Constant	-0.770	0.463	0.674	-0.53	0.597

\*\*Significant at 5%

Further, skilled delivery assistance was found to be highly and only associated with the place of delivery. Respondents who delivered in a dispensary were 255 times more likely to be attended by a skilled person than those who delivered at home ( $p=0.000$ ). Likewise, those who delivered in a health center ( $p=0.000$ ) and those who delivered in a hospital ( $p=0.000$ ) were 122 and 365 times, respectively, more likely to be attended by skilled person (Table 9). These findings support the argument that access is an important determinant of seeking maternal health care (Currie and Wienserberg, 2003; Abor *et al.*, 2011).

**Table 9: Factors associated with skilled delivery assistance**

<b>Explanatory Variables</b>	<b>Coef.</b>	<b>Odds Ratio</b>	<b>Std. Err.</b>	<b>z</b>	<b>P&gt; z </b>
Maternal age	0.029	1.029	0.045	0.64	0.525
Marital Status (1=single)					
2=Married	0.136	1.145	0.572	0.24	0.813
3=Widowed	-0.063	0.939	1.707	-0.04	0.971
4=divorced	0.455	1.576	1.305	0.35	0.727
Number of children	0.129	1.138	0.160	0.81	0.419
Education (1=None)					
2=Primary school	0.518	1.679	0.912	0.57	0.570
3=Secondary school	0.752	2.122	1.097	0.69	0.493
4=College or higher	0.939	2.557	1.698	0.55	0.580
Religion (1=traditional)					
2=Christian	0.692	1.998	1.630	0.42	0.671
3=Islam	0.459	1.582	1.558	0.29	0.768
4=others	-1.881	0.152	2.442	-0.77	0.441
Tribe (1=Rangi)					
2=Mwasi	-0.899	0.407	0.584	-1.54	0.124
3=Others	0.028	1.029	0.608	0.05	0.963
Employment type (1=housewife)					
2=peasant	-0.415	0.660	0.898	-0.46	0.644
3=business	-1.565	0.209	1.064	-1.47	0.142
4= formal	-1.839	0.159	1.346	-1.37	0.172
5=others	-0.724	0.485	2.273	-0.32	0.750
HH wealth (1=very low)					
2=low	-1.011	0.364	0.552	-1.83	0.067
3=average	-0.045	0.960	0.548	-0.08	0.934
Distance in km (1=-1)					
2=1-3	0.670	1.953	0.541	1.24	0.216
3=3-5	-0.356	0.700	0.629	-0.57	0.571
4=5+	0.387	1.472	0.766	0.51	0.613
Travel mode (1=foot)					
2=bicycle	-0.954	0.385	0.847	-1.13	0.260
3=motorcycle	1.346	3.841	0.821	1.64	0.101
4=public	0.092	1.096	1.428	0.06	0.949
Risk Awareness (1=not aware)					
2=Less aware	0.010	1.010	0.773	0.01	0.990
3=aware	-0.119	0.888	0.579	-0.21	0.837
4=More aware	0.191	1.211	0.556	0.34	0.731
Number of ANC visits	-0.077	0.926	0.149	-0.52	0.604
Perceived Quality of delivery care (1=very bad)					
2=bad	-0.455	0.634	1.582	-0.29	0.774
3=Not so bad	0.544	1.724	1.227	0.44	0.657
4=good	0.751	2.118	1.173	0.64	0.522
5=Very good	-0.159	0.853	1.317	-0.12	0.904
Place of delivery (1=home)					
2=dispensary	5.543	255.431	0.582	9.52	0.000**
3=Health center	4.811	122.872	0.656	7.34	0.000**
4=hospital	5.902	365.771	0.687	8.60	0.000**
5=others	0.358	1.430	0.920	0.39	0.697
Constant	-4.627093	0.010	2.533	-1.83	0.068

\*\*Significant at 5%

### 3.4.2 Factors influencing postnatal care attendance

Ethnic background (tribe) was found to be the only significant factor associated with postnatal care attendance. Respondents who were not from Mwasi tribe were found to be 0.06 times less likely to attend postnatal care at least once after delivery compared to their Rangi counterparts ( $p=0.023$ ). It is interesting to note that neither socio-economic nor demographic factors were significantly associated with at least one PNC attendance (Table 10). A possible explanation could be that in the study area, attendance to postnatal care was strongly influenced by a desire to ensure the safety and survival of their infants. Other studies in Southern Tanzania found that, during postpartum period the survival and safety of the infants have been given more emphasis resulting into less attention on services provided to mothers (Mrisho *et al.*, 2007).

**Table 10: Factors associated with postnatal care attendance**

Explanatory Variables	Coef.	Odds Ratio	Std. Err.	z	P> z
Maternal age	0.043	1.044	0.097	0.44	0.657
Marital Status (1=single)					
2=married	-0.832	0.435	1.500	-0.55	0.579
Number of children	-0.193	0.825	0.363	-0.53	0.595
Education level (1=None)					
2=Primary school	0.036	1.037	1.166	0.03	0.975
Religion (1=Traditional)					
2=Christian	-0.783	0.459	1.115	-0.70	0.482
Tribe (1=Rangi)					
2=mwasi	-1.168	0.311	1.453	-0.80	0.422
3=others	-2.828	0.059	1.242	-2.28	0.023**
Employment type (1=housewife)					
2=peasant	-2.548	0.078	1.742	-1.46	0.144
3=business	0.142	1.152	1.836	0.08	0.939
HH Wealth (1=very low)					
2=low	-1.294	0.274	1.377	-0.94	0.347
3=average	-0.074	0.926	1.489	-0.05	0.960
Distance in Km (1=-1)					
2=1-3	1.339	3.814	1.221	1.10	0.273
3=5+	0.348	1.416	1.769	0.20	0.844
Travel mode (1=foot)					
2=bicycle	2.189	8.929	2.222	0.99	0.324
3=motorcycle	-1.378	0.252	1.366	-1.01	0.313
Risk awareness (1=not aware)					
2=less aware	0.723	2.061	1.298	0.56	0.577
3=aware	3.363	28.885	1.775	1.90	0.058
More aware	2.337	10.353	1.451	1.61	0.107
Number of ANC visits	-0.069	0.933	0.379	-0.18	0.856
Place of delivery (1=home)					
2=dispensary	2.469	11.805	1.424	1.73	0.083
3=Health center	2.139	8.493	1.336	1.60	0.109
4=Hospital	0.028	1.029	1.438	0.02	0.984
Perceived Quality of PNC (1=very bad)					
2=Not so bad	1.332	3.788	1.279	1.04	0.298
Constant	4.654	104.983	3.703	1.26	0.209

\*\*Significant at 5%

#### 4.0 CONCLUSION AND RECOMMENDATIONS

This study has investigated coverage and factors influencing uptake of maternal health services in a rural district in Tanzania. The study found that availability of maternal health services in the study area was generally inadequate. Whereas most of the population lived within five kilometers from the nearest health facility providing maternal health services, important services like emergency obstetric care for pregnant women were very limited. Further, most of the health facilities experienced shortage of qualified personnel, medical equipments and drugs. Although ANC attendance was generally high as almost all women had attended at least once during their last pregnancy, uptake of four or more antenatal care services was low. Uptake of delivery services available in health facilities was also unsatisfactorily low as a substantial proportion of preferred home delivery to dispensaries or health centers. Factors influencing uptake of ANC services were ethnic background and household wealth, whereas maternal education, mode of travel to the nearest health facility and number of antenatal care visits were the main factors associated with choice of facility delivery. PNC attendance was mainly attributed to the desire to ensure safety and survival of infants.

Overall, the findings of this study are relevant to the current SGDs agenda. Reducing maternal mortality and morbidity in Tanzania requires a renewal of efforts and strategies that specifically target to achieve higher results. Thus, in order to improve uptake of maternal health care services in rural central Tanzania, efforts should be directed towards improving socio-economic conditions of the people and the quality of maternity services provided in health facilities. Special emphasis should be given to post-secondary educational achievement of women, improvement of transport infrastructure and equipping the current health facilities with qualified medical personnel and medical supplies.

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