



## Proportion, Characteristics and Maternal Outcome of women referred for childbirth to a tertiary hospital in northern Tanzania – A descriptive retrospective study based on a hospital birth registry

Carolyn A. Lissu<sup>a,b</sup>, Helena Volgsten<sup>c,d,\*</sup>, Festo Mazuguni<sup>b</sup>, Eusebious Maro<sup>b,e</sup>

<sup>a</sup> Faculty of Nursing, Kilimanjaro Christian Medical University College, Moshi, Tanzania

<sup>b</sup> Kilimanjaro Christian Medical University College, Moshi, Tanzania

<sup>c</sup> Department of Women's and Children's Health, Uppsala University, Uppsala, Sweden

<sup>d</sup> Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden

<sup>e</sup> Department of Obstetrics and Gynaecology, Kilimanjaro Christian Medical Centre, Moshi Tanzania

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### ABSTRACT

**Objective:** Timely identification of danger signs and prompt referral to higher level may prevent complication associated with childbirth. With a high MMR in Tanzania, there is need to highlight the information on the proportion of women referred to tertiary healthcare, their basic characteristics and outcomes. This study aimed to determine the proportion, basic characteristics and outcomes among women referred while in labour, from lower health facilities to a tertiary hospital in northern Tanzania.

**Methods:** A descriptive retrospective study based on a hospital birth registry was conducted using consecutive stored data on pregnant women referred while in labour and managed at a tertiary hospital in northern Tanzania, between the years 2000 and 2015.

**Results:** During the study period, a total of 53,662 deliveries were managed. Among these, 6066 women were referred from lower health facilities, with 4193 (69.2%) of them being referred while in labour. The main reason for referral was poor progress of labour (31.0%), followed by prolonged labour (27.1%) and obstructed labour (19.5%). The rate of caesarean section was 44.6%. A total of 292 maternal deaths occurred between 2000 and 2015. Of these, almost a quarter (22.6%) occurred in women referred from other health facilities while in labour.

**Conclusion:** Majority of referred women while in labour from lower health facilities are linked to maternal complications associated with childbirth. This underscores the need to further explore the competence of lower health facilities to quickly detect complications and provide effective emergency obstetric care, as well as timely referral to higher-level facility.

### Introduction

Maternal morbidity and mortality remains a great challenge in many low-income African countries like Tanzania, despite global and national efforts to improve women's reproductive health. Tanzania has the fourth highest number of maternal deaths in Sub-Saharan Africa and the sixth highest in the world [1], with a maternal mortality ratio (MMR) of 556/100,000 live births in 2015 [2]. Obstetric emergencies are the leading cause of maternal mortality, particularly in low-income countries [3]. This high number of maternal deaths is even threatening the new target of Sustainable Development Goal (SDG) 3.1, to be achieved by 2030 [4].

Tanzania's healthcare system is a pyramid structure, providing its referral services from primary-level healthcare to secondary (district &

regional) and tertiary (central/consultant) hospitals or specialized hospitals [5]. A woman reporting labour pain at a primary healthcare facility is usually admitted for observation of labour progress. In the case of complications or any risk factors, a doctor is informed and the matter is discussed by the doctors and midwives. If the facility lacks the ability to handle complications, the woman is transferred to a higher-level facility (secondary or tertiary hospital) [6].

The timely identification of danger signs in pregnant women before developing complications, as well as the identification of these patients and their prompt referral to a center that is well equipped to tackle such cases, may improve the maternal outcome [7]. In the absence of interventions and a proper referral system, there is usually high maternal morbidity and mortality. Referral due to obstetric complications offers

\* Corresponding author.

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women some degree of care at every level of the healthcare system [8].

Most of the women referred for childbirth in tertiary hospitals are in labour, and hence need to be admitted. Cross-sectional studies of referred obstetric emergencies show that 42–68% of these were admitted with labour pain [8–9]. Direct causes of maternal death, such as hemorrhage, infection, high blood pressure, unsafe abortion, and obstructed labour, are the major reasons for the majority of these referrals and admissions, and are associated with poor obstetric outcomes including obstetrics hemorrhage, instrumental delivery such as caesarean section and vacuum extraction, and maternal deaths. [5]. Other poor maternal outcomes among women referred for childbirth include increased episiotomy and perineal tears [10].

A number of interventions have been put in place by the government of Tanzania, such as training healthcare providers in Basic Emergency Obstetric Care and Comprehensive Emergency Obstetric Care, and ensuring a constant supply of essential equipment, aiming to reduce maternal and neonatal morbidity and mortality. These efforts are aimed at giving healthcare providers at each level the ability to handle and reduce the obstetric complications that cause increased obstetric referrals, as well as decreasing maternal and fetal morbidity and mortality [11–13]. However, skilled birth attendants still struggle to provide quality care because of inadequate resources [14].

Despite the efforts described, there are still instances of suboptimal care in health facilities, especially in rural Tanzania [15]. The timeliness and appropriateness of referral form an important factor in the fate of pregnant women and their obstetric outcomes. However, this still faces practical challenges due to many circumstances. The three-delay model identifies three groups of factors that contribute to difficulties in women accessing care and poor obstetric outcomes: Delay in the decision to seek care, delay in reaching care; and delay in receiving adequate healthcare. Together, these expose laboring women to unnecessary medical and surgical interventions [16].

Being a country with a high MMR, Tanzania needs to update its information on the proportion of women referred to tertiary healthcare, their demographic and obstetric characteristics and outcomes. Hence, this study aimed to determine the proportion of referral and to describe socio-demographic and obstetric characteristics; and maternal outcomes, such as birth complications including instrumental delivery, obstetric hemorrhage, prolonged labour and maternal deaths, among women referred during childbirth to a tertiary hospital in northern Tanzania.

## Methods

### Study design

A descriptive retrospective study was conducted based on a hospital birth registry, including pregnant women in labour referred to and managed at Kilimanjaro Christian Medical Centre (KCMC), a tertiary hospital in northern Tanzania between the years 2000 and 2015.

### Study setting

The study was conducted at the KCMC hospital, located in Moshi Municipality in the Kilimanjaro region in northern Tanzania. KCMC is a zonal consultant hospital that provides tertiary (Level 3) medical services for the regions within Tanzania's Northern Zone, as well as from neighboring districts in Kenya close to the border. The hospital serves a population of >15 million and has a bed capacity of 450; however, its daily patient census ranges from 500 to 550 [17]. The average annual birth rate at KCMC is about 4000 births. The labour ward receives women coming for normal births, as well as high-risk women with obstetric complications at various stages of pregnancy, labour or childbirth, referred from health facilities in the Northern Zone. The labour ward has four beds as well as a clean corridor, which sometimes serves as additional patient space. The obstetrics and gynecology department

has seven full-time obstetricians, who are always available to attend to these referrals.

### Data collection

The Medical Birth Registry is a tool that contains information on all births at KCMC and is intended to serve clinical, administrative, and research purposes. The rationale for this registry is to collect data in order to develop and organize maternity care, obstetrical services, and neonatal care. The registry begun in July 2000, with each birth recorded in the separate database. The information in the Medical Birth Registry is obtained through daily personal interviews with each mother within 24 h after birth. The data was obtained from these interviews and patient records and not from physical examination.

A standardized data extraction sheet was used to collect all relevant information in the Medical Birth Registry pertaining to the study variables [18]. All referred pregnant women noted to be missing information in the registry upon admission regarding their labour status were excluded. Outcome variables of interest in the study were socio-demographic and obstetric characteristics, including maternal variables such as mode of delivery (such as; spontaneous vertex delivery, caesarean section and assisted vaginal delivery), complications (postpartum hemorrhage, eclampsia), trauma (episiotomy, perineal tear), prolonged labour (including poor progress of labour) and maternal death.

### Data processing and analysis

Data were checked for completeness and accuracy prior to analysis. All data processing and analysis was performed using the Statistical Package for Social Sciences (SPSS) version 23. Descriptive analysis was completed to explore the outcome variables such as; socio-demographic and obstetrics characteristics; and maternal variables of women referred during labour. Data on categorical variables were summarized using frequencies and percentages, and using mean and standard deviation (SD) for continuous variables.

### Ethical consideration

Ethical approval was obtained from the Kilimanjaro Christian Medical University College Research and Ethics Committee, registration No. 1008. Permission to access the database was received from the KCMC hospital administration.

## Results

During the study period, a total of 53,662 births were managed at KCMC. A total of 6066 (43.4%) women were referred from lower health facilities with admission status, of whom 4193 (69.1%) were referred during labour and included in the study. The proportion of referral is presented in Fig. 1.

The mean age was  $25.7 \pm 6.4$ , and most (73.4%) of the women had a primary education. The majority of the women in labour (75.4%) were from rural areas, although they were equally referred from district and regional hospitals; socio-demographic characteristics of women referred during labour are presented in Table 1.

More than half (54.9%) of the women were referred as primigravida, and the majority (71.9%) were at term gestation. Moreover, the leading reason for referral was prolonged labour (58.3%), followed by obstructed labour (19.5%); obstetric characteristics of women referred during labour are presented in Table 2.

A total of 1859 (44.6%) women referred had given birth by caesarean section (CS). Of the referred women, 277 (10.6%) encountered postpartum hemorrhage, while 67 (1.6%) women experienced bleeding late in their pregnancy. A total of 25 of these women had placenta previa and 42 abruptio placenta. About 244 (5.8%) of the

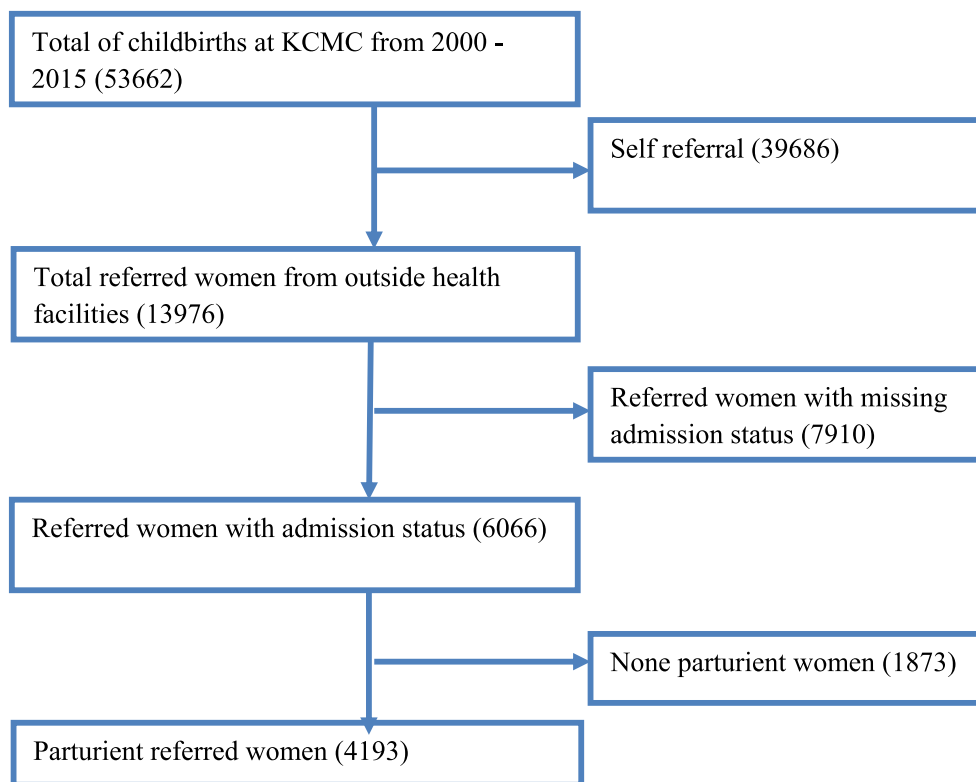


Fig. 1. Flow chart of pregnant women who gave birth at KCMC and those excluded and included in the final analysis.

**Table 1**

Socio-demographic characteristics of women referred for childbirth to KCMC from 2000 to 2015 (n = 4193).

Characteristics	n (%)
<b>Age (years) *</b>	25.74(6.49)
<b>Maternal age</b>	
<20	757 (18.06)
20–35	2939 (70.13)
>35	495 (11.81)
<b>Marital status</b>	
Married	3532 (84.46)
Not Married	650 (15.54)
<b>Educational Status</b>	
None	183 (4.37)
Primary	3072 (73.42)
Secondary	442 (10.56)
Higher	487 (11.64)
<b>Religion</b>	
Catholic	1163 (27.86)
Protestants	1881 (45.06)
Muslim	1113 (26.67)
Others	17 (0.41)
<b>Mothers tribe</b>	
Chagga	1758 (42.05)
Pare	687 (16.43)
Masai	124 (2.97)
Others	1612 (38.56)
<b>Residence</b>	
Rural	3161 (75.39)
Urban	1032 (24.61)
<b>Referred from</b>	
Regional	2079 (49.67)
District	2090 (49.93)
Unknown	17 (0.41)

\* Mean (SD).

**Table 2**

Obstetric characteristics of women referred for childbirth to KCMC from 2000 to 2015 (n = 4193).

Characteristics	n (%)
<b>Parity</b>	
Primipara	2302 (54.90)
Multipara	1512 (36.06)
Grand multipara	379 (9.04)
<b>Gestational age* (weeks)</b>	
Extreme Preterm (<28)	24 (0.64)
Very Preterm (>28–32)	100 (2.66)
Moderate Preterm(>32–37)	485 (12.91)
Term (>37–42)	2704 (71.99)
Post term > 42	443 (11.79)
<b>Labour induction*</b>	
Yes	865 (20.80)
No	3294 (79.20)
<b>BMI*</b>	
Normal	384 (25.18)
Underweight	551 (36.13)
Overweight	408 (26.75)
Obese	182 (11.93)
<b>Reasons for referral*</b>	
Prolonged labour	854 (27.15)
Abruption	115 (3.66)
Prematurity	184 (5.85)
Big baby	324 (10.30)
Early Rapture of membrane	77 (2.45)
Poor progress of labour	978 (31.10)
Obstructed labour	613 (19.49)

\* Missing values.

referred women had an episiotomy. Outcomes among women being referred during labour are presented in [Table 3](#).

During the study time, between 2000 and 2015, a total of 292 (0.5%) maternal deaths occurred out of 53,662 deliveries. Among women referred during labour (n = 4193), 66 (1.6%) maternal deaths were recorded; that is 22.6 % of the total maternal deaths occurred in women

**Table 3**  
Outcomes among women referred for childbirth to KCMC from 2000 to 2015 (n = 4193).

Outcomes	n (%)
<b>Mode of delivery*</b>	
Spontaneous vertex delivery	2176 (52.19)
Caesarean section	1859 (44.59)
Assisted vaginal delivery	134 (3.21)
<b>PPH*</b>	
Yes	277 (10.60)
No	2337 (89.40)
<b>Eclampsia</b>	
Yes	116 (2.77)
No	4077 (97.23)
<b>Episiotomy</b>	
Yes	244 (5.82)
No	3949 (94.18)
<b>Placenta Previa</b>	
Yes	25 (0.59)
No	4168 (99.41)
<b>Abruption placenta</b>	
Yes	42 (1.00)
No	4151 (99.0)
<b>3–4 degree perineal tear</b>	
Yes	13 (0.31)
No	4180 (99.69)
<b>Ruptured Uterus</b>	
Yes	10 (0.23)
No	4183 (99.76)
<b>Cord prolapsed</b>	
Yes	7 (0.16)
No	4186 (99.84)
<b>Retained 2nd Twin</b>	
Yes	11 (0.26)
No	4182 (99.74)
<b>Maternal deaths</b>	
Yes	66 (1.57)
No	4127 (98.43)

\* Missing values.

referred from other health clinics. Maternal deaths among women being referred during labour are presented in [Table 3](#).

## Discussion

This study found the proportion of pregnant women referred with admission status to tertiary healthcare while in labour to be 69%, and the majority of them were primigravida. The main reason for referral was prolonged labour, and among these women almost a half gave birth by caesarean section. A total of 292 maternal deaths occurred between the years 2000 and 2015. Of these maternal deaths, almost a quarter occurred in women referred from other health facilities while in labour.

The proportion of referred women found in this study is comparable to findings in other studies, which reported a higher rate (87%) of referred patients in labour [9,19–21]. However, the proportion is higher than in other studies, reporting 60.3% and 42.2%, respectively [8,21]. The possible reasons for these differences in proportion might include the study design as well as study duration and sample size. Another possible explanation could be the difference in size between the health facilities. The present study was conducted at a zonal tertiary hospital serving a large population of >15 million.

Women referred during labour to the tertiary hospital, were referred from both district and regional hospitals (secondary-level health facilities). This could be due to the local referral system within the region that allows patients and their relatives to influence the referring channel. Thus, indicating that the regional hospitals could be improved to handle more complications and to reduce referrals to tertiary level. Furthermore, secondary level hospitals need to have enough number of specialized personnel and adequate equipment to handle complicated cases to avoid a delay in receiving adequate healthcare [16]. Other explanations could be the severity of the condition of the referred patient

or the nearness of the referring health facility to KCMC. Further, more than half of women in labour in northern Tanzania have their birth at the hospital by a skilled attendant and can access referral to secondary- and tertiary-level of healthcare in the event of a complication [5].

The caesarean section (CS) rate of almost 45.0% observed among women referred during labour is higher than the WHO recommendations, which stress that CS rates above 10% are not associated with a decrease in maternal mortality rates [5]. Similar studies have also reported higher rates of CS among obstetric referrals [9,20]. Notably, the most common indications for referral during labour was due to prolonged labour. This high rate may be due to late referral at the previous health facility, leading to a compromised maternal outcome. According to the three delay models, the higher rate of CS seen in this study might be attributed to the second delay (delay in reaching care) [16]. This delay was previously reported in another study in the same setting as the most common delay attributing to other serious maternal complications such as maternal deaths [22]. This calls for more joint efforts to improve referral system in the northern zone of Tanzania, to improve outcome of those women who need further care in a higher health facility. Furthermore, the complications experienced by women during labour at any hospital depends upon a number of factors, such as type of obstetric complications, competency of the midwives/doctors, and distance from the health facility in the catchment area to the referred hospital. Other general contributing factors include the socio-economic status and literacy of the parturient, the frequency and quality of prenatal care, and timely referral by the facility [9].

Among the obstetric complications in the referred women, postpartum hemorrhage (PPH) was the most common, reported in 10.6% of cases. Similar findings have been reported in studies from Uganda and Tanzania, which reported PPH in 9.0% and 11.9%, respectively [23–24]. However, this is lower than reported in another study [9], which found PPH in 40.0% of cases. The relatively lower prevalence of PPH in this study could be associated with an early anticipation of PPH in these complicated referred cases and preparation in order to prevent it. This result is in contrast to the present study, could be associated with an early anticipation of PPH in these complicated referred cases and preparation in order to prevent it. The use of uterotonic agents and the availability of experienced staff in the application of active management of the third stage of labour is recommended for preventing PPH. Thus, birth by skilled attendants in hospital should be highly promoted [25]. Even though there have been improvements in management, PPH remains a significant contributor to maternal morbidity and mortality in both developed and developing countries, although the exact frequency of PPH is difficult to determine [26].

An episiotomy rate of 5.8% of the referred women is lower than the 39.3% reported in Nigeria [10]. The lower rate found in this study might be explained by the successful efforts of the obstetrics and gynecology department at KCMC that led to the attainment of the recommended WHO target of reducing the episiotomy rate to 10% [24]. It is likely that midwives are overly supportive when conducting deliveries for the referred women, in the sense that their threshold for performing an episiotomy is higher despite the complicated nature of the referred cases. Constant attendance by a midwife offering continuous care at all stages of labor could be an alternative explanation for the lower rate of episiotomy [27].

A total of 292 maternal deaths occurred in this study, following 15 years of review. This MMR (292/53662) equals 544/100,000 live births in a year, also equivalent with the MMR in Tanzania in 2015 [2]. Furthermore, almost a quarter (22.6%) of the maternal deaths between 2000 and 2015 occurred in women referred to the tertiary hospital from other health clinics while already in labour. Thus, the MMR among the referred women during labour is higher than reported in Tanzania [2]. The proportion of maternal deaths among referred women was also reflected in a previous study at KCMC by Maro et al. [22], who reported an even higher rate of maternal deaths among women referred from other health facilities. A delay in the decision to refer women with

complications to an appropriate level of care is one possible explanation for these maternal deaths among parturient. However, a weakened healthcare system at all levels of facilities could be the reason for preventable maternal deaths in low-resource settings, where there is poor reproductive healthcare, including a lack of access to attentive antenatal care, effective referrals, and supervised childbirth [28]. Efforts should be made to improve the management of obstetric emergencies at different levels of health facilities, as well as in the communities where most of the women experiencing these deaths came from. Empowering the family and community level by building capacity and clear systems is important for facilitating the referral of pregnant women in need of advanced care.

A limitation of this study is that missing information on study participants from the Medical Birth Registry may have led to their exclusion from analysis. However, as the registry is filled in on a daily basis and within 24 h after birth, most of the information needed was captured accurately and completely, which reduces the risk of recall and misclassification bias. Nevertheless, the exclusion of women admitted without labour or unknown status might be a selection bias as women referred during labour are more likely to have complications and poorer outcomes. Another limitation, is that this being a single-centred study, thus lack generalizability.

However, being one of the four zonal referral centers, KCMC provided a better study area for understanding the functionality of the referral system in Tanzania, as it receives cases from all levels of healthcare. A strength is that this study is one among few conducted in Tanzania to report the obstetric outcomes of women referred to a tertiary hospital during labour. Moreover, the study was based on authorized birth registry data covering a period of over 15 years, which provided a long enough period to study the outcomes and referral system in the region and the country at large.

In conclusion, the majority of referred women during labour from lower health facilities are linked to maternal complications, such as prolonged labour. This underscores the need to further explore the competence of lower health facilities to quickly detect complications and provide effective emergency obstetric care, as well as timely referral to higher-level facility. However, community empowerment to avoid initial delays cannot be overemphasized in the efforts towards accelerating the attainment of the third SDG to ensure healthy lives and promoting well-being at all ages in a low-income country like Tanzania.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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