

Research Article

# Maternal Postpartum Hospital Readmissions and Associated Factors Among Women Who Delivered at Bugando Medical Centre Mwanza Tanzania

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## Abstract

**Background:** Maternal postpartum hospital readmissions are of importance concern in the field of maternal health with most of maternal deaths occurred includes those women who were readmitted in the hospital after initial admission for delivery. There is no information on the reasons for maternal postpartum hospital readmissions and factors associated with their readmissions. The proposed study was set to examine maternal readmissions and associated factors so as to take specific preventive measures among women who delivered at Bugando Medical Centre. **Methodology:** This was a 4-years retrospective descriptive study. Patient files (case notes) of women who were readmitted within 42 days after discharge from initial delivery admission between 1<sup>st</sup> January 2014 to 31<sup>st</sup> December 2017 and meet the inclusion criteria were included. **Results:** There were 29664 deliveries in the four years of the study, 73.6% (n =21837) were by vagina deliveries and 26.4% (n=7827) by caesarean section. During this period 285 cases of maternal postpartum hospital readmission were identified, making a readmission rate of 9.6 cases per 1000 deliveries (1%). Two hundred and fifty two case files (88.4%) were available for analysis. The highest indication of maternal postpartum hospital readmissions was puerperal sepsis 50.8% (n=128). There was an identified association between type of labour and MPHR with puerperal sepsis. There were five maternal deaths among the cases, giving a case fatality rate (CFR) of 1.7%. **Conclusion:** The rate of maternal postpartum hospital readmission in this study was relatively low as compared to other studies. Majority of the study population were readmitted with puerperal sepsis and elective caesarean sections as type of labour were less associated with maternal readmission with puerperal sepsis.

## Keywords

Postpartum Care, Hospital Readmissions, Tanzania

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## 1. Introduction

Postpartum maternal morbidities usually poses the challenge in care of women after delivery to both the families and the communities because largely require hospital readmissions [1]. Readmissions to the hospital shows an unexpected maternal outcomes and signifies abnormal trends from normal postnatal course of recovery [2]. First 42 days after newborn delivery is the most important period for both the mother and her newborn because most of physiological changes which occurred during pregnancy are resolving towards pre-pregnant state, and also care of the mother to her infant is believed to be of the highest concern [3]. Unfortunately most women seem to be forgotten and denied much deserved quality maternal and infant health care services during this period when compared to antenatal and intrapartum care. Surprisingly most of maternal and infant deaths occur in this period [3, 4]. A study done in Dhaka Bangladesh showed that more than 60% of maternal deaths occur in postpartum period [5].MPHR is used as one of the measures of performance in the hospital and also regarded among the maternal listed core outcome measures in order to rectify and improve the quality of services in hospital settings [6].Worldwide the incidence of maternal postpartum hospital readmissions is still high and poses a challenge despite the improvement of maternal health care services. Studies done in Canada, United states and Australiabetween2000 and 2010 showed MPHR rates of3.2%,1.8% and 1.2%respectively although the quality of maternal health care services in these high income countries are high when compared low-middle income countries [7-9]. A study in Ireland showed rates of MPHR of 4.3% following caesarean section compared to 2.3%following SVD [10]. In Sub-Saharan Africa in which Tanzania is included, most reports shows high rates of maternal mortality ranging between 882 to 42 in Central African Republic and Cape Verde respectively, and in Tanzania maternal mortality ratio had increased from 432 in 2010 to 556 in 2016 and these death most of them arise from maternal complications which occurred after delivery, and yet there is limited studies on MPHR [4, 11, 12]. At Bugand Medical Centre(BMC) unpublished data shows that there were 219 MPHR out of 4,432 deliveries, 246 out of 6,314 deliveries and 204 out of 8,163 deliveries in the year 2015, 2016 and 2017 respectively.

However, there is no available information on the reasons for maternal postpartum hospital readmissions and associated factors at BMC. Thus the aim of this study was to determine the readmission rate and factors associated with maternal postpartum hospital readmissions among women who delivered at BMC, Mwanza Tanzania.

## 2. Material and Methods

### 2.1. Study Design

This was a 4 years period retrospective descriptive hospital

based study of all women who delivered at BMC and readmitted within 42 days after initial discharge after delivery from 1st January 2014 to 31st December 2017.

### 2.2. Study Area and Setting

The study was conducted at BMC, a tertiary referral, consultant and teaching Hospital in the Lake and Western zones of the United Republic of Tanzania. It is located along the shores of Lake Victoria in the City of Mwanza.BMC has 950 beds and 1500 employees. It is a referral hospital with various specializations

### 2.3. Sampling Strategy and Sample Size

Purposive sampling technique was used; the sample size was obtained from women who delivered at BMC and were readmitted within 42days in postnatal ward from 1<sup>st</sup> January, 2014 to 31<sup>st</sup> December, 2017.Patients' files notes with adequate information among those women readmitted were included as per inclusion criteria.

### 2.4. Data Collection

A semi structured data collection tool was used to extract data from patients files (case notes) of those women who were readmitted after initial discharge after delivery. Data collected were verified at the end of each day by a principal investigator and entered in a computer using unique study number for each patient. All the data were stored in a database which was protected by password ready for analysis. All data collected from this study were entered to the Microsoft excel 2007 and then be transferred into STATA version 13 for analysis.

### 2.5. Data Analysis

Categorical variables will be summarized into proportions and percentage while numerical variables in mean, median and standard deviation. All independent variables were subjected to univariate logistic regression model and those with p value of 0.1 or less were subjected to multivariate ordinal logistic regression model. Independent variables with p value of less than 0.05 were considered significant.

### 2.6. Ethical Consideration

The study clearance was sought from joint CUHAS/BMC Research Ethics and Review Committee, with ethical clearance number CREC/334/2019. Permission to access files was sought from BMC Director General before commencement of the study. Name and other identity of the client were deidentified to keep confidentiality. The benefits that were obtained from the study for using secondary data outweigh their risks.

### 3. Results

#### 3.1. The Readmission Rate and Social Demographic Characteristics

During the four –year period of study from 1<sup>st</sup> January, 2014 to 31<sup>st</sup> December, 2017, there was a total of 29664 deliveries at BMC, of which 73.6% (n=21837) were by vaginal deliveries and 26.4% (n=7827) by caesarean sections. There were 285 cases identified to be readmitted during the study period, of which 252(88.4%) case files were available for analysis while 33(11.6%) were excluded due to inadequate information, partograph absence of which carries most of information pertaining antenatal care, labour and deliveries. The rate of maternal postpartum hospital readmission in our study was 9.6 cases per 1000 deliveries. Majority of the study population were aged less than 35 years 82.1% (n=207) (Table 1). The median age was 26[IQR 23-32] years (not shown in the table). Most of the study population reside in urban 86.5% (n=218), married 79% (n=199) and multipara (2-4) 45.2% (n=114) (Table 1). Majority of the study population had primary education 79.0% (n=199), were housewives 52% (n=131) and majority had no health insurance 89.3% (n=225) (Table 1).

**Table 1.** Socio demographic characteristics of the study population (N=252).

Variable	Frequency(n)	Percentage (%)
<b>Age(years)</b>		
<35	207	82.1
>= 35	45	17.9
<b>Parity</b>		
Primepara (1)	105	41.7
Multipara (2-4)	114	45.2
Grandmultipara (>=5)	33	13.1
<b>Residence</b>		
Urban	218	86.5
Rural	34	13.5
<b>Education</b>		
Primary	199	79.0
Secondary/College	53	21.0
<b>Marital status</b>		
Single	53	21.0
Married	199	79.0
<b>Occupation</b>		
Housewife	135	53.6

Variable	Frequency(n)	Percentage (%)
Employed/Business	93	36.9
Peasant	24	9.5
<b>Mode of cost sharing</b>		
No health insurance	225	89.3
Health insurance	27	10.7

#### 3.2. Basic Characteristics of the Study Population

Of all cases that were evaluated in the study 86.5% (n=218) were admitted to BMC for delivery direct from home while 13.5% (n=34) were referral cases from other health facilities. Majority of readmitted women had their delivery at GA of 37 weeks and above 92.5% (n=233) (Table 2). Majority of the study population had spontaneous onset of labour 84.9% (n=214) and 52.4% (n=132) delivered by emergency caesarean section (Table 2).

Significant number of women in this study delivered during weekdays 79.4% (n=200) and 20.6% (n=52) delivered during weekends. Most of them 59.9% (n=151) their deliveries were conducted by general practitioner. Also significant number had normal blood loss after delivery of 200-500mls 40.8% (n=103) (Table 2). Majority of participants 95.2% (n=240) delivered live babies, 4.4% (n=11) had fresh stillbirths and 0.4% (n=1) had macerated stillbirth. Also in this study we found five (5) maternal deaths, making a case fatality rate of 1.8% (Table 2).

In this study population 61.9% (n=156) had no complications during pregnancy and delivery. While 38.1% (n=96) had complications in their index pregnancy (Table 3). Preeclampsia/eclampsia was the leading complication 46.9% (n=45), followed by hemorrhages (APH/PPH) and premature rupture of membranes both had 19.8% (n=19) (Table 3)

Other complications and their frequency are shown in table 3.

**Table 2.** Clinical-delivery characteristics of the study population (N=252).

Variable	Frequency(n)	Percentage (%)
<b>Patients' admission</b>		
From home	218	86.5
From lower health facility	34	13.5
<b>Gestation age during delivery(weeks)</b>		
<37	19	7.5
>=37	233	92.5

Variable	Frequency(n)	Percentage (%)
<i>Type of labour</i>		
Spontaneous	214	84.9
Induced	11	4.4
Elective caesarean section	27	10.7
<i>Mode of delivery</i>		
Spontaneous vagina	91	36.1
Emergency caesarean section	132	52.4
Elective caesarean section	27	10.7
Assisted vagina	2	0.8
<i>Blood loss after delivery (mls)</i>		
<200	70	27.8
200-500	103	40.8
>500	79	31.4
<i>When delivery was conducted</i>		
Normal weekdays	200	79.4
Weekends	52	20.6
<i>Who performed the delivery</i>		
Nurse midwife	91	36.1
Medical officer	151	59.9
Medical specialist	10	4
<i>Fetal outcomes during delivery</i>		
Alive	240	95.2
Fresh stillbirth	11	4.4
Macerated stillbirth	1	0.4
<i>Maternal outcome after readmissions</i>		
Alive	247	98
Died	5	2

**Table 3.** Complications in the index pregnancy among the study population (N=252).

Variable	Frequency(n)	Percentage (%)
Complications in the index pregnancy		
Yes	96	38.1

Variable	Frequency(n)	Percentage (%)
No	156	61.9
<i>Common complications in the index pregnancy(N=96)</i>		
Pre-eclampsia /eclampsia	45	46.9
Hemorrhages(APH/PPH)	19	19.8
Premature rupture of membranes(PROM/PPROM)	19	19.8
Obstructed labour	3	3.1
Ruptured uterus	2	2.1
Heart disease	2	2.1
Others	6	6.2

### 3.3. Indications (Diagnosis) of Maternal Postpartum Hospital Readmissions

In our study, we found majority of the study population were readmitted due to puerperal sepsis 50.8% (n=128) hence was the leading cause of maternal postpartum hospital readmission (Table 4). The second most indication of readmission in this study was preeclampsia/eclampsia 14.3% (n=36) followed by anaemia 12.3% (n=31) and peripartum cardiomyopathy/heart disease 8.3% (n=21) (Table 4). Other indications are shown in table 4 below.

**Table 4.** Indications of maternal postpartum hospital readmissions among the study population (N=252).

Indications of maternal postpartum readmissions	Frequency(n)	Percentage (%)
Puerperal sepsis	128	50.8
Pre-eclampsia/eclampsia	36	14.3
Anemia	31	12.3
Peripartum cardiomyopathy /heart diseases	21	8.3
Puerperal psychosis	10	4
Malaria	6	2.4
Musculoskeletal complaints	20	7.9

### 3.4. Factors Associated with Maternal Postpartum Hospital Readmissions for Women Readmitted with Puerperal Sepsis

In this study we found puerperal sepsis was the highest indication of MPHR, so we had to look on factors associated with puerperal sepsis against other indications. On univariate

logistic regression analysis (table 5) women who were peasants (OR 0.3; 95% CI [0.1-0.7]; p value=0.010) were less likely to be readmitted with puerperal sepsis compared to those who were housewives. Women who delivered by elective caesarean section (OR 0.3; 95% CI [0.1-0.7]; p value=0.006) were less likely to be readmitted with puerperal sepsis compared to those who had spontaneous onset of labour. Emergence caesarean section as mode of delivery (OR 11.2; 95% CI [5.9-21.2]; p value=<0.001) was strongly associated with maternal postpartum hospital readmission with puerperal

sepsis.

When these factors were subjected to multivariate logistic regression analysis (table 5), only one factor was significant. Those women whom had elective caesarean as a type of labour (OR 0.1; 95% CI [0.0-0.3]; p value=0.000) strongly had less chance of being readmitted with puerperal sepsis when compared with those who had spontaneous onset of labour. Table 5 summarizes factors associated with maternal postpartum hospital readmission with puerperal sepsis.

**Table 5.** Factors associated with maternal postpartum hospital readmissions for women readmitted with puerperal sepsis.

Variable	Category	Puerperal sepsis		Univariate		Multivariate	
		Yes n (%)	No n (%)	OR[95%CI]	P-value	OR[95%CI]	P-value
Age(years)	<35	108(52.2)	99(47.8)	1.0			
	>=35	20(44.4)	25(55.6)	0.7(0.4-1.4)	0.384		
Parity	Primepara(1)	59(56.2)	46(43.8)	1.0			
	Multipara(2-4)	57(50)	57(50)	0.8(0.4-1.3)	0.359		
	Grand multipara(>=5)	12(36.4)	21(63.6)	0.4(0.2-1.0)	0.050		
Occupation	Housewife	74(54.8)	61(45.2)	1.0			
	Peasant	06(25.0)	18(75.0)	0.27(0.1-1.7)	0.010		
	Employed/Business	48(51.6)	45(48.4)	0.9(0.5-1.5)	0.634		
Type of labour	Spontaneous	118(55.1)	96(44.9)	1.0		1.0	
	Induced	3(27.3)	8(72.7)	0.3(0.1-1.2)	0.086	0.4(0.0-0.6)	0.002
	Elective c/s	7(26.0)	20(74)	0.3(0.1-0.7)	0.006	0.1(0.0-0.3)	0.000
	Spontaneous vaginal	20(22.0)	71(78.0)	1.0			
Mode of delivery	Emergency c/s	101(76.0)	32(24)	11(5.9-21.2)	0.000		
	Elective c/s	6(23.1)	20(76.9)	1.1(0.4-3.0)	0.905		
	Assisted vaginal	1(50.0)	1(50.1)	3.5(0.2-59.3)	0.378		

## 4. Discussion

To the best of our knowledge we believe this was the first study of its kind to be done in this institution. The aim of the study was to evaluate the experience in the quality of obstetric care we are providing to clients and determine the readmission rates, indications of maternal postpartum hospital readmissions and factors associated with higher indication of readmission among these maternal postpartum hospital readmissions.

### 4.1. Readmission Rate and Characteristics of the Study Population

In this study the rate of maternal postpartum hospital readmission was found to be 9.6 cases per 1000 deliveries (1%) which are almost similar to the study done in Ireland which was 1.5% [13]. This rate is lower than that reported in other studies which were between 2.16% - 3.2% [14-16]. The observed differences in rates of maternal postpartum hospital readmissions could be due to differences in sample size and other studies included readmissions of up to 60days after

initial admission for delivery. Also another plausible difference could be due to other women deciding to seek care from nearby health facilities since postnatal care has a waiver in all public facilities. In this study majority of the women who were readmitted were less than 35 years, self-referred from home and had no health insurance. This observation is in contrast in the first two observations with other studies observed in other parts of the world but the same with the other study in the later observation [17, 18]. The possible explanations for these differences could be, most of our women in sub-Saharan Africa like in several LMICs start their reproductive carrier in young age. Also since BMC is a tertiary hospital and faith-based hospital, there are assurances and sustainability of good and quality obstetric care observed over the years when compared to the surrounding primary health care facilities. Due to this reason most women are attracted to come direct in this hospital. Lastly since most women were of low economic status, lower education level and most of them are housewives who are likely to have less opportunity to have health insurance. Furthermore majority of readmitted women had no complication either during pregnancy or immediately after delivery. BMC receive both high risk women, and low risk women for delivery seeking quality and good obstetrics care during labour and delivery.

#### 4.2. Indications of Maternal Postpartum Hospital Readmissions

In this study we found that the leading indication of maternal postpartum readmission was puerperal sepsis in half of the case files followed by pre-eclampsia/eclampsia. These findings are similar to the study done in Massachusetts-USA [14]. This could be in our study population there were majority who delivered by emergency c/s, also had pre-eclampsia/eclampsia, premature rupture of membranes and obstetric haemorrhages as complications in the index pregnancy that may increase risks of puerperal sepsis.

#### 4.3. Factors Associated with Maternal Postpartum Hospital Readmission with Puerperal Sepsis

In this study the leading cause of readmission was observed to be puerperal sepsis, hence several factors were seen to be associated with maternal postpartum hospital readmission for women readmitted with puerperal sepsis. In this study we found that most of the women readmitted with puerperal sepsis had complications in their index pregnancy like premature rupture of membranes, anaemia and pre-eclampsia/eclampsia which are associated with puerperal sepsis. Also in this study we found that women who delivered by emergency caesarean sections were having more risk of getting puerperal sepsis compared to those who delivered by spontaneous vagina in univariate analysis. The reason could be because most of them had prolonged labour and multiple vagina examinations. On

multivariate logistic regression analysis, it was observed that women who delivered by elective c-section as type of labour strongly had less chance of maternal postpartum hospital readmission with puerperal sepsis compared to those who had spontaneous onset of labour. The possible explanations for the observed association results could be those women who had spontaneous onset of labour may have early spontaneous rupture of membranes and long duration of labour, which may predispose them to ascending infections. All these could not be observed in those who had elective caesarean sections, hence good outcome after delivery in this group and less chance of being readmitted with puerperal sepsis.

## 5. Conclusion

The rate of maternal postpartum hospital readmissions in the study was relatively low as compared to other study. Majority of the study population were readmitted with puerperal sepsis. Elective caesarean sections were observed to be less associated with maternal postpartum hospital readmission with puerperal sepsis.

## Abbreviations

APH	Antepartum Hemorrhages
BMC	Bugando Medical Centre
CUHAS	Catholic University of Health and Allied Sciences
GA	Gestational Age
MLS	Milliliters
MPHR	Maternal Postpartum Hospital Readmissions
PPH	Postpartum Hemorrhages
SVD	Spontaneous Vagina Delivery

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## Author Contributions

**Innocent Kaiza:** Conceptualization, designed, proposal writing, data collection, analysis and manuscript writing

**Fridoline Mujuni:** Proposal writing, data collection, analysis and manuscript writing

**Dismas Matovelo:** Proposal writing, data collection, analysis and manuscript writing

**Richard Kirita:** Data collection, analysis and manuscript writing

**Simon Kamuli:** Data collection, analysis and manuscript writing

**Ndikabae Mabega:** Data analysis and Manuscript writing

## Declaration

Ethics Approval and Consent to Participate All methods were carried out in accordance with relevant guidelines and regulations. This study clearance was approved by joint CUHAS/BMC Research Ethics and Review Committee, research clearance certificate number, CREC/334/2019. Permission for conduct this study was granted by Director of Bugando Medical Centre.

## Consent for Publication

All authors read the manuscript and approved it for publication.

## Availability of Data and Material

The database used and analyzed during the current study is available from the corresponding author and will be available on request.

## Conflicts of Interest

The authors declare no conflicts of interest.

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