The effect of socioeconomic factors on severe maternal morbidity among postnatal women at Kenyatta National Hospital: a cross-sectional study

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ABSTRACT
Background :Maternal mortality is an area of particular concern in public health especially in Africa where maternal deaths are the highest in the world. Despite the high maternal deaths, studies have been difficult since at the facilities maternal deaths are far between and proper vital registrations are still poor in Africa. This has led to a different perspective in addressing this issue hence the emphasis on maternal morbidity.The major objective of this study was to determine the effect of socioeconomic factors on severe maternal morbidity.

Materials and methods: This was a descriptive cross-sectional quantitative study carried out in the maternity wards at Kenyatta National Hospital using a structured questionnaire. 162 respondents were selected through systematic sampling with an additional 18 respondents also included in case there were missing records. Univariate, bivariate and multivariate analysis was carried out at 95% confidence interval and p value of less than 0.05.

Results: The respondents' husband's education level ($p<0.009$) and marital status ($p<0.004$) were statistically significantly associated with severe maternal morbidity while respondents' education, age and monthly income were not.

Conclusion: A woman's husband having at least a secondary school education is protective against experiencing a severe maternal morbidity.

KEY WORD: Maternal mortality; severe maternal morbidity (SMM); maternal near miss

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I.   INTRODUCTION

Maternal deaths are only a small bit of the magnitude of problems resulting from maternal morbidity, with maternal mortality being described as just a tiny part whereas the real issue is maternal morbidity (WHO, 2015). Maternal morbidity is defined as "any health condition attributed to and/or aggravated by pregnancy and childbirth that has a negative impact on the woman's wellbeing. The cases at the extreme end of the maternal morbidity spectrum are of particular interest as they occur more frequently than maternal deaths and have risk factors and characteristics that are similar to those of maternal deaths (Firoz et al., 2013).

Certain factors have been significantly associated with maternal morbidity. Socioeconomic and demographic factors such as income, education level and age have notably been associated with maternal morbidity with those from lower classes having a greater chance of experiencing SMM (Domingues et al 2016; Rosendo et al 2017). There exists a significant research gap on studies on severe maternal morbidities especially in low- and middle-income countries (Geller et al. 2018). This study aims to address this gap by adding to the body of knowledge on this subject especially in Kenya. This study used the WHO (2011) standard approach to pregnancy complications and maternal near misses, whose eligibility criteria for baseline assessment includes: the presence of a severe maternal complication such as severe postpartum haemorrhage, ruptured uterus. It also includes critical interventions e.g., hysterectomy and critical care admission; organ dysfunction such as cardiac arrest, dialysis and lastly maternal death (WHO, 2011).

II.   MATERIALS AND METHODS

This cross-sectional descriptive study was carried out at Kenyatta National Hospital in the maternity wards between March 2020 to May 2020. A total of 180 women were interviewed and some of the information was obtained from their medical records. The inclusion criteria were all postnatal women admitted in the maternity

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ward. The exclusion criteria were all antenatal women admitted in the maternity ward; those whose pregnancies terminated before 20 weeks and those who decline to give consent.

Study design: Cross-sectional descriptive study.

Study location: This was at Kenyatta National Hospital which is the leading referral hospital in East and Central Africa in the maternity wards.

Study duration: March 2020-May 2020

Sample size: 180 postnatal women

Sample size determination: The sample size was obtained using fischer's formula and adjusted for a population below 10,000. This came to 162 respondents. An additional 10% were included to cater for missing and incomplete records.

Sampling technique: The study employed the systematic sampling technique.

Data collection: Once informed consent was obtained, a research assistant interviewed the respondents using a structured questionnaire and obtained additional information from their antenatal care booklet and medical records. The questionnaire was accessed via the Kobo toolbox mobile data collection application.

Statistical analysis: Analysis was carried out using the STATA software. Descriptive statistics were carried out where discrete variables were summarized with frequencies and percentages while continuous variables were summarized using measures of central tendency and dispersion such as mean, median, mode and standard deviation. As the main variable of interest, socioeconomic factors associated with severe maternal morbidity were identified using Chi-squared tests. During multivariate analysis, adjustments were made for confounders and effect modifiers in the model to determine independent factors associated with severe maternal morbidity using binary stepwise backward logistic regression.

Ethical statement: Approval was sought to conduct the study from the Kenyatta National Hospital- University of Nairobi ethics and research committee and from the Department of Obstetrics and Gynaecology. Study participants signed an informed consent prior to taking part in the study. They were informed that participation was voluntary and that any information they gave would be handled with utmost confidentiality. They were informed of the benefits and risks and explained that they could withdraw from the study at any time. Questionnaires only had serial numbers on them. No identifiers such as names or initials were obtained to ensure participation remained anonymous.

III.   RESULTS

Socioeconomic and demographic characteristics of the respondents

AGE: The mean age of the respondents was 28 years with a standard deviation of 6. The youngest respondent was 16 years while the oldest was 42 years. Figure 1 shows the distribution of the respondents according to age. The majority of them (52%) were aged between 20-29 years followed by those aged between 30-39 years at 36%. Those above 40 years were at 5.6 % (10), while 16–19-year-olds were 6.7% (12).
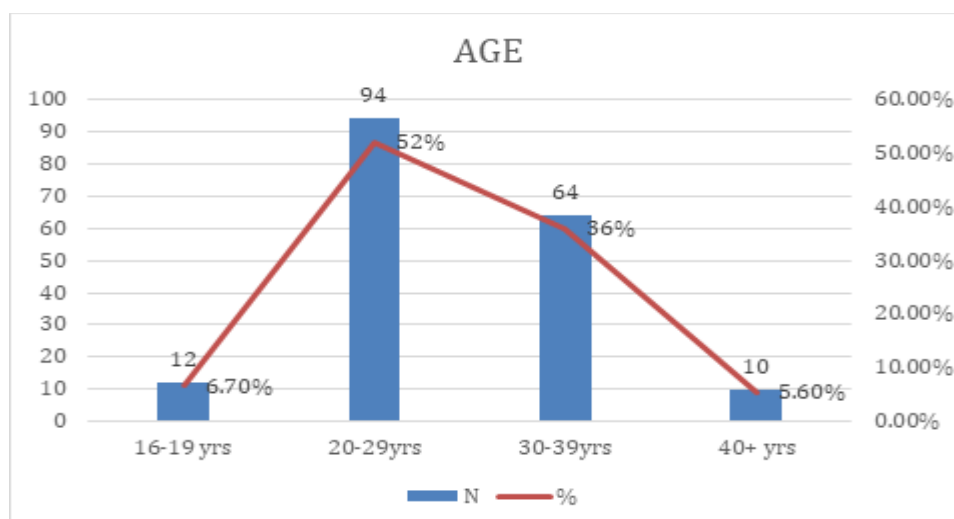

Figure 1: Age distribution

MARITAL STATUS: The majority of women were married at 81% (145) while 19% (35)) were single. (Table 1)

EDUCATION: Most of the women had a secondary school education 39.4% (71) followed closely by those with some form of tertiary education at 38.3% (69); while 22.2% (40) had only a primary school education.

Most of the husbands had a tertiary education at 42.6% (72), while 36.1% (61) had a secondary school education. 14% (26) had a primary school education while 12% (21) had none. (Table 1)

INCOME: 35% (63) of the respondents' main source of income was from informal employment, 33% (60) had no source of income and 32% (57) were formally employed. Most of the women 32% (57) reported a monthly income of less than Sh 3000. 20% (36) reported earning 3000-10,000, 21% (37) reported earning between 10,000 and 20,000, 14% (25) earning 20,000-30,000 while an equal number 14% (25) earned more than 30,000 in a month. (Table 1)

Severity of maternal morbidities

Those who experienced a severe maternal morbidity were 36.1% (65). 28.3% (51) experienced a moderately severe morbidity while 35.1% (64) did not experience a maternal morbidity (figure 2)

Figure 2: Severity of diagnosis
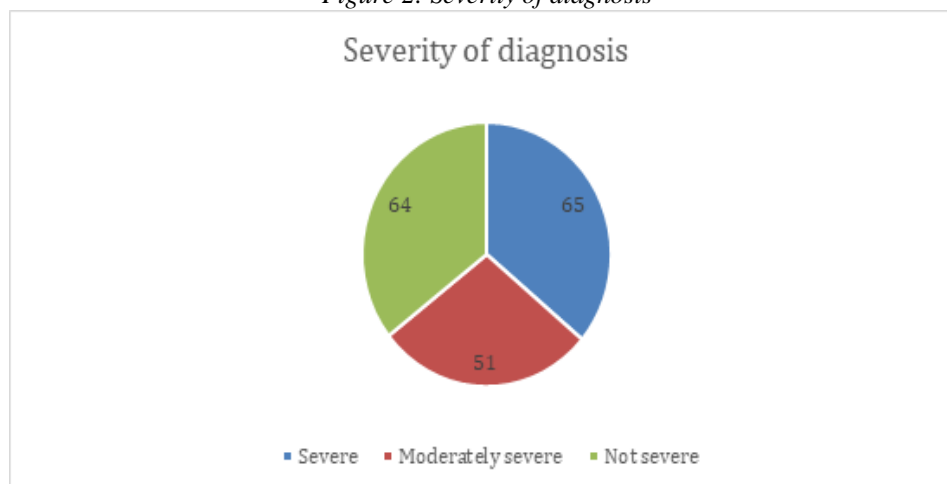
Table 1: Socioeconomic information of respondents

Characteristic of study participants in KNH, 2020		
Characteristics	N	N=180
Marital status	180	
Married		145(81%)
Single		35(19%)
Highest Education	180	
Primary		40(22%)
Secondary		71(39%)
Tertiary		69(38%)
Husband education	180	
Tertiary institution		72(40%)
Secondary		61(34%)
Primary		26(14%)
None		21(12%)
Individual age	180	
16-19 years		12(6%)
20-29 years		94(52%)
30-39 years		64(36%)
40+ years		10(6%)
Source of income	180	
Formal employment		57(32%)
Informal employment		63(35%)
None		60(33%)
Monthly income	180	
10000-20000		37(21%)
20000-30000		25(14%)

3000-10000	36(20%)
>30000	25(14%)
<3000	57(32%)

Data analysis

BIVARIATE ANALYSIS: Analysis was done using the chi square test of independence at a confidence level of 95%, significance level of p value<0.05. Age, marital status, education of both the respondents and their husbands, source of income was not found to be significant. Monthly income however was found to be significant at p value of 0.044.

MULTIVARIATE ANALYIS: This was done by proportional ordinal logistic regression. After adjustments monthly income was no longer significant while being single became significant at p value 0.004. A single mother was more likely to not have a severe maternal morbidity (P =0.004, β=1.33).

Husband's education became significant after adjustment. A woman whose husband had no education was at a higher probability of suffering a severe maternal morbidity (P=0.009, β = -1.5) than one whose husband had a secondary education. Age, respondents' education level remained not significant.

Table 2: Multivariate analysis from binary logistic regression

Characteristics	Unadjusted				Adjusted			
Severity diagnosis	Coef.	P-value	[95% CI]		Coef.	P-value	[95% CI]	
Marital status								
Single	2.033188	0.022	0.2982205	3.768155	1.327144	0.004	0.433333	2.220956
Source of income								
Informal employment	- 0.997742	0.052	-2.006114	0.010631				
None	- 1.162235	0.114	-2.603272	0.278802				
Individual age								
16-19 yrs.	1.602242	0.073	-0.1492931	3.353778				
30-39 yrs.	0.400801	0.38	-0.4936103	1.295211				
40+ yrs.	- 0.293443	0.716	-1.872778	1.285893				
Highest education.								
Primary	- 0.194257	0.722	-1.265173	0.876659	- 0.129574	0.648	- 0.686201	0.427052
Tertiary institution	- 1.109363	0.038	-2.154949	-0.063776	- 0.452518	0.104	- 0.997821	0.092785
Husband education								
Secondary	- 0.550674	0.324	-1.645645	0.544296	- 0.281143	0.351	- 0.872382	0.310097
Primary	- 1.799637	0.021	-3.331875	-0.267399	- 1.011521	0.019	- 1.859446	- 0.163595
None	-2.5723	0.015	-4.651675	-0.492926	- 1.507728	0.009	- 2.636558	- 0.378898
Monthly income								
10000-20000	-1.02127	0.179	-2.510179	0.46764	- 0.408926	0.174	- 0.998809	0.180956
20000-30000	0.007213	0.993	-1.559525	1.573951	0.074438	0.828	- 0.595697	0.744573
3000-10000	- 0.499419	0.48	-1.884702	0.885863	- 0.211609	0.451	- 0.761818	0.3386
>30000	- 1.174233	0.155	-2.793415	0.444949	- 0.593991	0.087	-1.27468	0.086698
Severe|Moderate severe	-2.83979				- 1.311364			
Moderate|Not severe	- 0.950332				- 0.270632			

IV. DISCUSSION

The prevalence of severe maternal morbidity at Kenyatta National Hospital during the study period was found to be at 36.1%. This was quite high compared to the prevalence in Africa determined from a systematic review of near miss studies which was at 14.98%. Moreover, this is even higher when compared to prevalence from Asia at 5.07% and North America at 1.38% (Tuncalp et al 2012). In addition to this a study carried out in Kenya on maternal near misses in 54 referral hospitals found the incidence of MNM to be at 7.2 per 1000 live births (Owolabi et al 2018). This high prevalence could be attributed to the fact that the majority of the patients

who experienced a maternal morbidity had been referred from another facility (62%) since this the leading referral facility in the region. Therefore, the cases were more than could be attributed to care provided at this facility.

Socioeconomic and demographic factors associated with severe maternal morbidity

According to the results from this study age was not found to be of significance in the occurrence of a severe maternal morbidity. This was contrary to studies carried out by Blanc et al (2013) and Linsokova et al (2017) which found that those who were very young and mothers older than 39 years had an increased risk for severe maternal morbidities. These differences could be because of a limited sample size which was not able to account for the other confounding factors.

Furthermore, from this study's findings a single mother had a less chance of suffering from a severe maternal morbidity as compared to a married mother (β=1.34). This result is contrary to that from a study carried out in Nigeria on the incidence and determinant of near miss morbidities which showed that unmarried women were three times more likely to experience a severe maternal morbidity as compared to their married counterparts (Adeoye et al., 2013). Moreover, another case control study on establishing the risk factors of life-threatening maternal outcomes found no statistical significance with marital status in determining their occurrence (Goffman, Madden, Harrison, Merkatz, & Chazotte 2007). This suggests that more research needs to be carried out to establish whether marital status plays a role in occurrence of severe maternal outcomes.

While the mother's education level was not found to be significant, the woman whose husband had less than a secondary school education had a high likelihood of experiencing a severe morbidity at (β=-1.5). This finding is in line with that from a previous study carried out in Ghana on understanding the impact of mothers' education on utilization of health services which found that husbands' education was strongly associated with their wives increased use of health services (Greenaway, Leon, & Baker 2012). This was correlated to education being a proxy to monetary resources which enable women access quality healthcare (Hobcraft, 1993).

V.   CONCLUSION AND RECOMMENDATION

The prevalence of severe maternal morbidity was substantially high at 36.1%. This is of concern and further investigation at the facility level is imperative to ensure the cause of this is understood and addressed. Moreover policymakers could use this results to inform their health education message in maternal health. Since a husband having at least a secondary education has been found to be protective against experiencing a maternal near miss, stakeholders can encourage husbands involvement in prenatal and postnatal visits .

A recommendation is made for analytical studies to be undertaken in order to establish whether a causal effect exists between husband's education and marital status on severe maternal morbidity. In addition a larger sample size is proposed so as to make the results generalizable to the population.

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