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The Pattern and Spectrum of Severe Maternal Morbidities in Nigerian tertiary Hospitals

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Abstract

Maternal morbidities are precursors to maternal mortality as well as potential causes of life time disability and poor quality of life. This study aimed to determine the pattern and spectrum of life-threatening maternal morbidities seen in tertiary reproductive health facilities in Nigeria. All cases of severe maternal outcome (SMO), maternal near-misses (MNM), or maternal death (MD), attending 42 tertiary hospitals across all geopolitical zones of Nigeria were prospectively identified using the WHO criteria over a period of 14 months. The main outcome measures were the incidence and outcome of severe maternal outcome by geopolitical regions of Nigeria. The participating hospitals recorded a total of 4383 severe maternal outcomes out of which were 3285 maternal near-misses and 998 maternal deaths. The proportion of maternal near-miss was similar across all the geopolitical zones but the maternal mortality ratio was highest in the southwestern zone (1,552) and least in the northcentral zone (750) of the country. Haemorrhage was the leading cause of severe maternal morbidities followed by hypertensive disorders of pregnancy. The mortality index of about 41% using the organ dysfunction criterion was triple the figures from other parts of the world. The findings reflect poor obstetric care in the tertiary hospitals in Nigeria. The health facilities in the country urgently need to be revamped. *(Afr J Reprod Health 2020; 24[2]: 115-122).*

Keywords: Pattern and spectrum, severe maternal outcome, maternal near-miss, maternal death, WHO near-miss criteria

Résumé

Les morbidités maternelles sont des précurseurs de la mortalité maternelle ainsi que des causes potentielles d'invalidité à vie et d'une mauvaise qualité de vie. Cette étude visait à déterminer le modèle et le spectre des morbidités maternelles potentiellement mortelles observées dans les établissements de santé de la reproduction tertiaire au Nigéria. Tous les cas de résultats maternels graves (SMO), de quasi-accidents maternels (MNM) ou de décès maternels (MD), fréquentant 42 hôpitaux tertiaires dans toutes les zones géopolitiques du Nigéria ont été prospectivement identifiés en utilisant les critères de l'OMS sur une période de 14 mois. Les principales mesures de résultats étaient l'incidence et l'issue des issues maternelles graves dans les régions géopolitiques du Nigéria. Les hôpitaux participants ont enregistré un total de 4383 issues maternelles graves, dont 3285 quasi-accidents maternels et 998 décès maternels. La proportion de quasi-accidents maternels était similaire dans toutes les zones géopolitiques mais le taux de mortalité maternelle était le plus élevé dans la zone sud-ouest (1 552) et le moins dans la zone centre-nord (750) du pays. L'hémorragie était la principale cause de morbidités maternelles sévères, suivie de troubles hypertensifs de la grossesse. L'indice de mortalité d'environ 41% en utilisant les critères de dysfonctionnement des organes était le triple des chiffres des autres parties du monde. Les résultats reflètent la médiocrité des soins obstétricaux dans les hôpitaux tertiaires au Nigéria. Il est urgent de réorganiser les établissements de santé du pays. *(Afr J Reprod Health 2020; 24[2]: 11-122).*

Mots-clés: Schéma et spectre, issue maternelle grave, quasi-accident maternel, décès maternel, critères WHO de quasi-accident

Introduction

The year 2015 has come and gone and the reduction of maternal mortality by 75%, a goal set by the millennium development goals number five (MDG 5) in 1990 was only a mirage. Although there has been significant improvement in the reduction of maternal mortality globally, Nigeria is one of those developing countries that did not make significant progress in this direction[1].

A reduction in maternal mortality has traditionally been used as a critical measure of progress in improving maternal health. Yet the burden of maternal mortality is only a small fraction of the burden of maternal morbidity. For every pregnant woman who dies of pregnancy related causes, 20 or 30 others experience acute or chronic morbidity, often with permanent sequel that undermine their normal functioning[2,3] . Not surprisingly, the burden of maternal morbidity, like maternal death, is estimated to be highest in low- and middle-income countries like Nigeria[4].

Maternal morbidity can be conceptualized as a spectrum ranging, at its most severe, from a 'maternal near miss' – defined by world health organization (WHO) as the near death of a woman who has survived a complication during pregnancy, childbirth and 42 days of termination of pregnancy[5] – to non-life threatening morbidity, which is more common by far. In 2011, the WHO published guidelines for defining and identifying a maternal near miss on the basis of clinical criteria, laboratory markers and management proxies[6]. At present, varying definitions of non-severe or non-life threatening maternal morbidity continue to exist. This study is based on the WHO definition of maternal near miss only and did not take into account non-life threatening morbidities. This is due to the difficulty of obtaining a uniform definition of non-life threatening maternal morbidities.

Relying solely on maternal mortality to assess a country's status in the area of maternal health overlooks the importance of maternal morbidity, which is not only a precursor of maternal death but also a potential cause of lifetime disability and poor quality of life[7]. Thus, we must be able to define and measure maternal morbidity and asses its impact in the post 2015 era.

Objectives

a. To determine the pattern and spectrum of life-threatening maternal morbidities seen in tertiary reproductive health facilities in all geopolitical zones across Nigeria
b. To determine the outcome of life-threatening maternal morbidities seen in tertiary reproductive health facilities in Nigeria.

Methods

Study population

This is a secondary analysis of a national prospective cross sectional study of women who suffered maternal near miss (MNM) from pregnancy, labour and puerperium seen in tertiary reproductive health facilities across Nigeria[8]. All women admitted for delivery or within 42 days of delivery or termination of pregnancy over a period of 14 months in all participating hospitals made up the study population. Through a prospective surveillance of the study population, cases of MNM during the period that the women remained on admission were identified and enrolled into the study. The local research team analyzed and documented the health service events surrounding the care of every woman enrolled using a structured format.

Design

Data was collected continuously for a period of 14 months, starting 1st June 2012 to 14th August 2013, from all participating hospitals. Each facility had a team of four doctors; the facility coordinator, two resident obstetricians or medical officers in the maternity unit and a data collector. The resident doctor or medical officers working in the maternity units identified the cases of MNM while the data collector who works in a different unit comes daily to enter the information onto a simple individual-level data form for all enrolled women and their babies within 24 hours. The data collector also updates the information for the period the woman was on admission on the same form at discharge. All team members had a regional training before the commencement of the research.

Data was collected on the demographic and reproductive characteristics of the participants, markers of organ dysfunction underlying MNM as well as the primary complication leading to MNM. The time interval between diagnosis and definitive treatment and the cadre of the most senior participating physician were also captured. The WHO criteria for maternal near miss were used[6]. The hospital coordinator verified and electronically transferred the completed forms to

the central (national) coordinating office. A regional coordinator monitored and coordinated the data collection process in each geopolitical zone.

The data collection instruments were pretested over a period of one month in selected secondary reproductive health facilities before the commencement of the study. All data were centrally handled by the Data Management Unit of the Centre for Research in Reproductive Health (CRRH), Sagamu, Nigeria.

Main outcomes

a. To generate data on the pattern and spectrum of MNM in all the geopolitical zones of Nigeria
b. To assess the outcome of MNM; both maternal and perinatal

Data analysis

The primary aim of the research was to generate descriptive data on the magnitude of maternal near miss and maternal death in tertiary reproductive health facilities in Nigeria over a set time period. This paper examines the pattern and spectrum of MNM, based on the WHO criteria, as seen in these hospitals. In this analysis we generated descriptive frequencies of the demographic and reproductive characteristics as well as the frequencies of the primary complications underlying the occurrence of MNM. We assessed the overall care performance for MNM by estimating the cause-specific mortality index.

Statistical analyses were performed using Epi Info7.1.4 (CDC; USA) and Medcalc for windows version 13.3.1 (Medicalc software, Ostend, Belgium). Routine obstetric data from all hospitals and health facility structural variables were analyzed using Microsoft excel software.

Results

The majority of our patients were aged 20-35 years (77.7%) but a significant number of teenagers were involved in the northern part of the country (16-22%). Similarly, most of the patients were married multigravidas but with a significant amount of primigravidas (36-39%) in the northern part of the country (Table 1). Most of the women had formal education (62.1%) but this is not so in the north where 60-65% of the women were illiterates and unemployed. Although substantial amount of the mothers had antenatal care (51.5%), about 90% of them were admitted as emergencies.

Out of a total of 94,835 deliveries, there were 5,910 stillbirths, giving a stillbirth rate of 60.5 per 1000 (Table 2). There was a total of 3285 maternal near-miss cases and 998 maternal deaths, giving a severe maternal outcome of 4283. The proportion of maternal near-miss seen across the country was nearly the same but, the maternal mortality ratio and the mortality index varied across regions, with the best outcome in the north central region and the worst outcome in the south western region of the country.

Table 3 shows that obstetric haemorrhage was the commonest primary complication resulting in severe morbidities (11,402/94,835) with abortion-related haemorrhage being the commonest across all regions of the country. However, the burden of obstetric haemorrhage was higher in the northeastern and northwestern regions of Nigeria. Postpartum haemorrhage was the second commonest obstetric haemorrhage followed by placenta praevia.

Hypertensive disorders of pregnancy were the next common primary complication resulting in severe maternal morbidities. Although chronic hypertension and pre-eclampsia presented a relatively uniform burden across the country, eclampsia, a complication of pre-eclampsia occurred about three times more common in the northeastern and northwestern Nigeria than other parts of the country.

Infections in pregnancy closely followed hypertensive disorders in pregnancy in magnitude with HIV/AIDS accounting for more than 50% of the infective morbidities. Infection in pregnancy was more common in the southeastern and southwestern parts of the country due to the higher burden of HIV/AIDS in these parts of the country.
Table 4 shows the spectrum of severe maternal complications and outcomes by maternal near-miss criteria with a total of 4283 cases of severe maternal outcome (SMO). Maternal near-miss (MNM) of 3285 was more than three times the number of maternal deaths (998). Mortality index

Table 1: Demographic characteristics of women with severe morbidity in Nigeria

Characteristics	NC 523	NE 615	NW 699	SE 344	SS 497	SW 607	Total 3285
Age (%)							
<20 years	22(4.21)	139(22.60)	113(16.17)	16(4.65)	52(10.46)	32(5.27)	374(11.39)
20-35	428(81.84)	434(70.57)	525(74.11)	290(84.30)	388(78.07)	488(80.40)	2553(77.72)
>35 years	72(13.77)	42(6.83)	60(8.58)	36(10.47)	57(11.47)	87(14.33)	354(10.78)
Data missing	1(0.19)	0(0.00)	1(0.14)	2(0.58)	0(0.00)	0(0.00)	4(0.12)
Marital status							
Married	479(91.59)	599(97.40)	681(97.42)	298(86.63)	399(80.28)	533(87.81)	2989(90.99)
Unmarried	43(8.22)	15(2.44)	16(2.29)	42(12.21)	91(18.31)	74(12.19)	281(8.55)
Data missing	1(0.19)	1(0.16)	2(0.29)	4(1.16)	7(1.41)	0(0.00)	15(0.46)
Number of pregnancy							
1	117(22.37)	242(39.35)	253(36.19)	107(31.10)	97(19.56)	156(25.70)	972(29.60)
2-5	310(59.27)	214(34.80)	221(31.62)	176(51.16)	323(65.12)	378(62.27)	1622(49.39)
>5	88(16.83)	157(25.53)	223(31.90)	49(14.24)	74(14.92)	70(11.53)	661(20.13)
Data missing	8(1.53)	2(0.33)	2(0.29)	12(3.49)	3(0.40)	3(0.49)	29(0.88)
Educational level							
No formal education	92(17.59)	401(65.31)	421(60.23)	10(2.91)	28(5.63)	33(5.44)	985(29.99)
Formal education	425(81.22)	169(27.53)	172(24.61)	289(84.01)	436(87.73)	548(90.28)	2039(62.1)
Data missing	6(1.15)	45(7.17)	106(15.16)	45(13.08)	33(6.64)	26(4.28)	260(7.92)
Occupation							
Unemployed	247(47.23)	505(82.11)	491(70.24)	101(29.36)	215(43.26)	128(21.09)	1687(51.35)
Employed	273(52.19)	73(11.87)	195(27.90)	216(62.8)	269(54.13)	467(76.93)	1493(45.45)
Data missing	3(0.57)	37(6.02)	13(1.86)	27(7.85)	13(2.62)	12(1.98)	105(3.20)
Antenatal care status							
None	184(35.18)	384(62.44)	364(52.15)	147(42.73)	151(30.38)	124(20.43)	1354(41.23)
Some form of ANC	177(33.84)	117(19.02)	134(19.20)	132(38.37)	218(43.86)	329(54.20)	1107(33.71)
ANC at study site	141(26.96)	63(10.24)	129(18.48)	50(14.53)	98(19.72)	105(17.30)	586(17.84)
Data missing	21(4.02)	51(8.29)	71(10.17)	15(4.36)	30(6.04)	49(8.07)	237(7.22)
Mode of admission							
Emergency	477(91.20)	587(95.45)	627(89.83)	312(90.70)	417(83.90)	552(90.94)	2972(90.50)
Regular	43(8.22)	24(3.90)	68(9.74)	31(9.01)	79(15.90)	52(8.57)	297(9.04)
Data missing	3(0.57)	4(0.65)	4(0.43)	1(0.29)	1(0.20)	3(0.49)	15(0.46)

for all MNM criteria was 23.3%. Organ-dysfunction criteria, capturing 57.2% of SMO cases had high MI of 40.8% on average (range31.7-64.3%). The clinical criteria captured most cases of SMO (95.4%) and carried the least MI of 22.4% on average (range 18.4 – 55.4%). The management criteria captured only 21.3% of cases of SMO with an average MI of 29.4% (range20.5-44.8%).

Discussion

This study shows an unacceptably high maternal near-miss and maternal deaths across all regions of the country, with the north central region, which houses the administrative capital of the country faring a little better than the rest of the country. The south-south region of the country with its difficult terrain and environmental degradation due to oil exploration showed the worst figures. The distribution of severe maternal outcome, maternal near-miss and mortality index followed the same pattern and were higher than reported from other large surveillance networks[9-11]. Haemorrhage remains the single most important contributor to severe maternal morbidities as previously reported in Africa and Asia[12,13]. Abortion related

Table 2: Vital statistics and near-miss indicators by region in Nigeria

Regions	NE	NW	NC	SE	SW	SS	Total
Number of hospitals	6	7	7	7	9	6	42
Total number of deliveries	18441	18925	16264	12318	15564	13323	94835
Total number of births	18928	19372	16861	12732	16065	13676	97634
Live births (LB)	17492	18049	16137	11885	15267	12894	91724
Stillbirths (SB)	1436	1323	724	847	798	782	5910
Stillbirth rate (/1000 total births)	75.9	68.3	42.9	66.5	49.7	57.2	60.5
Maternal near-miss - MNM (%)	615(3.33)	699(3.69)	523(3.21)	344(2.79)	607(3.9)	497(3.73)	3285(3.46)
Maternal deaths MD – total	178	250	123	137	292	154	1134
Intrahospital maternal deaths (/100,000 LB)	169(996)	237(1,313)	121(750)	94(791)	237(1,552)	140(1,086)	998(1,088)
Maternal deaths – Brought-In-Dead	9	13	2	43	55	14	136
Severe maternal outcome (SMO)*	784	936	644	438	844	637	4283
Frequency of MNM/1000LB*	35.2	38.7	32.4	28.9	39.8	38.5	35.8
SMO/1000LB*	44.8	51.9	39.9	36.9	55.3	49.4	46.7
Mortality index – MI (MD/SMOx100%)	21.6	25.3	18.8	21.5	28.1	22.0	23.3

*based on Intrahospital data

Table 3: The pattern of primary complications resulting in severe morbidities by region in Nigeria

REGIONS	NE	NW	NC	SE	SW	SS	TOTAL
Haemorrhage	**2309**	**2255**	**1583**	**1677**	**1899**	**1679**	**11,402**
Abortion-related haemorrhage	993	744	552	702	384	554	3929
Ectopic pregnancy	143	206	233	156	283	222	1343
Placenta praevia	251	328	208	203	322	343	1655
Abruption placenta	368	330	124	135	200	167	1324
Placenta accreta/increta/percreta	12	25	6	32	31	11	117
Ruptured uterus	114	203	73	126	81	116	713
Postpartum haemorrhage	391	409	320	281	470	216	2087
Other obstetric haemorrhage	37	10	67	42	28	50	234
Infections	**777**	**751**	**752**	**935**	**893**	**792**	**4900**
Abortion-related sepsis	94	63	63	59	135	93	507
Puerperal sepsis	123	130	93	63	141	75	625
Chorioamnionitis	17	29	28	45	47	75	241
Pyelonephritis	86	98	92	16	71	17	380
HIV/AIDS	418	370	440	601	459	492	2780
Other systemic infections	39	61	36	151	40	40	367
Malaria infestation	**507**	**657**	**227**	**591**	**699**	**297**	**2978**
Hypertensive disorders	**1694**	**1375**	**872**	**645**	**1111**	**1056**	**6753**
Chronic hypertension	222	133	190	103	203	175	1026
Pre-eclampsia	778	681	519	377	674	645	3674
Eclampsia	694	561	163	165	234	236	2053
Dystocic labour	**403**	**640**	**270**	**595**	**490**	**573**	**2971**
Prolonged labour	167	207	127	307	216	176	1200
Obstructed labour	236	433	143	288	274	397	1771
Other conditions	**527**	**715**	**279**	**458**	**433**	**425**	**2837**
Medical disorders in pregnancy	167	250	171	226	294	277	1385
Anaemia (unrelated to haemorrhage)	309	275	67	92	107	78	928
Cancers	51	190	41	140	32	70	524
Coincidental (violence, accident, poisoning etc)	9	23	10	58	12	23	135

Table 4: Spectrum of severe maternal complications and outcomes in Nigeria by maternal near-miss criteria

All maternal near-miss criteria	SMO N=4283	MNM N=3285	MD N=998	Mortality index (23.30%)
Organ-dysfunction criteria	**2449(57.18)**	**1451(44.17)**	**998(100.00)**	**40.8**
Cardiovascular dysfunction	1589(37.10)	949(28.89)	640(64.13)	40.3
Respiratory dysfunction	951(22.20)	349(10.62)	602(60.32)	63.3
Coagulation dysfunction	469(10.95)	318(9.68)	151(15.13)	32.2
Renal dysfunction	291(6.79)	104(3.17)	187(18.74)	64.3
Hepatic dysfunction	75(1.75)	36(1.10)	39(3.91)	52.0
Neurological dysfunction	435(10.16)	190(5.78)	245(24.55)	56.3
Uterine dysfunction	208(4.86)	142(4.33)	66(6.61)	31.7
Clinical criteria	**4075(95.14)**	**3162(96.26)**	**913(91.48)**	**22.4**
Severe haemorrhage	1587(37.06)	1305(39.74)	282(28.26)	17.8
Hypertensive disorders	1751(40.90)	1429(43.50)	322(32.33)	18.4
Dystocia	508(11.86)	406(12.36)	102(10.23)	20.1
Infection	608(14.20)	271(8.25)	337(33.80)	55.4
Anaemia unrelated to haemorrhage	497(11.62)	326(9.94)	171(17.19)	34.4
Management- based criteria	**914(21.34)**	**645(19.63)**	**269(26.95)**	**29.4**
Admission to ICU	433(10.11)	239(7.28)	194(19.46)	44.8
Interventional radiology	5(0.12)	3(0.09)	2(0.20)	40.0
Emergency laparotomy	596(13.93)	474(14.44)	122(12.24)	20.5
Transfusion of blood products	181(4.23)	128(3.90)	53(5.32)	29.3

haemorrhage accounted for 34.5% of severe maternal morbidities due to haemorrhage. Hypertensive disorders of pregnancy also pose substantial risk for severe maternal morbidity with 30% progressing to eclampsia, a preventable complication of hypertension.

The socio-demographic characteristics of the study population was consistent with the National Demographic and Health Survey (NDHS)of 2008 with low literacy level and high teenage pregnancy in the northern parts of the country compared to the southern parts where literacy level was relatively higher and teenage pregnancy lower[14]. This finding is largely due to the socio-cultural differences of the two parts of the country with a predominantly Moslem population in the north and a predominantly Christian population in the south. For the same reason, most mothers in the north (47-82%) were unemployed while 54-76% of mothers in the south were employed.

The patronage of tertiary health facilities for antenatal care was generally poor across the country but most women accessed some form of antenatal care somewhere among the southern population. In the northern parts of the country, 35-62% of the mothers did not access any form of antenatal care. Poverty and ignorance, both more prevalent in the north, may be responsible for this trend of events.

This study showed that maternal near-miss was three times commoner than maternal deaths with a mortality index (MD/SMOx100) that was fairly uniform across all regions, indicating poor emergency obstetric care in the country. In a similar study in Brazil, the maternal near-miss was 24 times more than maternal deaths indicating a better salvage rate of maternal near miss cases than in Nigeria[15]. It would appear from our findings that more women die at home in the southern part of the country (up to 18.8% brought-in dead) compared to the northern part (1.6% in north central). The truth is due to cultural reasons, more women are buried without coming to hospital for certification in the north.

The finding that haemorrhage was the leading primary complication leading to severe maternal morbidities is consistent with the findings on systematic review of maternal deaths in Africa and Asia but differs from findings in Latin America and the Western world where hypertension is the main complication responsible for severe maternal outcomes[12,13,15]. Due to the country's restrictive abortion law, an estimated 1.25 million induced abortions occurred in Nigeria in 2012, which was equivalent to 33 abortions per

1000 women of reproductive age[16]. In our study, abortion-related haemorrhage accounted for 34.5% of severe maternal morbidities due to haemorrhage. Hypertensive disorders of pregnancy still pose substantial risk for severe maternal outcome in our environment with eclampsia, a preventable condition, complicating 30% of hypertensive disorders of pregnancy. These findings reflect the urgent need for the revival of both antenatal and emergency obstetric care in Nigeria.

Despite the establishment of the prevention of mother-to-child transmission of HIV (PMTCT) project by the Federal Ministry of Health in 2001, HIV/AIDS still accounts for 50% of infective morbidities among maternal near-miss cases in Nigeria. The regional variation of the burden of this morbidity appears to parallel the regional seroprevalence rate of HIV among antenatal women in the country[17].

The prevalence of maternal near-miss identified was greater than expected when the clinical criteria were used. This is in contrast to the WHO systematic reviews which showed greater identification of MNM when the organ-dysfunction criteria was used[12,18]. The reason for this is because the organ-dysfunction criteria require sophisticated laboratory and other medical equipment which were lacking in the health facilities in Nigeria. The WHO maternal near-miss criteria can be used in all types of health facilities; from those with minimum level of care to sophisticated health centers [19.] The list of potential life threatening conditions proposed by WHO can be used as pragmatic criteria for identification of near-miss cases at large in the community and low level health facilities to obtain actionable information to improve the quality of maternal health.

This study reports the largest cohort of maternal near-miss and maternal deaths in Africa, from the most populous black African country with diverse ethnic and cultural composition. The study was based in tertiary hospitals across the country where the best facilities and manpower in the country were located. This gives credence to the data obtained. A standardized uniform criterion was used to obtain the data on maternal near miss and maternal deaths across the country. However, because these tertiary public health facilities were based in cities and towns, the findings may not reflect the true picture of events occurring in the rural areas where the majority of the people live.

Conclusion and Recommendations

The emergency obstetric care in Nigerian tertiary hospitals is grossly inadequate. With mortality index of up to 41%, about 4 out of every 10 mothers presenting with severe morbidity will die. The health system challenges in the country have been discussed in an earlier paper on this study[8]. The capacity of tertiary hospital in Nigeria to manage obstetric emergencies must be improved both in terms of infrastructure and equipment as well as trained manpower. The capacity of the primary and secondary health facilities to prevent pregnancy complications and handle basic obstetric emergencies needs to be evaluated and tackled accordingly.

Conflict of Interest

None declared

Contribution to Authorship

The primary study was conceived by OTO and SE was the regional coordinator for South-South Nigeria. CMC was the regional coordinator for the north-east group and prepared this manuscript.

Ethical Approval

The WHO research ethics review committee (WHO ERC) reviewed and approved the study on 10th May 2011 (protocol ID: A65745, version 4). The health research ethics committee (HREC) of each of the 42 participating hospitals reviewed and approved the study.

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