

Maternal mortality in Niger: a retrospective study in a high risk maternity

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Abstract

Objective: This study analyzes maternal deaths in a tertiary maternity in Niamey, Niger.

Methods: This is a retrospective study covering the period of one year, from January 1 to December 31 2007. The setting for this study was the Maternity Issaka Gazobi, a tertiary maternity referral centre in the city of Niamey, Niger. Data encompasses all hospital maternal deaths attributable to obstetric causes. The data were abstracted from emergency room, delivery rooms and hospitalization units' patient files.

Results: During the study period a total of 4,582 live births were registered with a total count of 121 maternal deaths, yielding a maternal mortality ratio of 2,640/100,000 live births. The mean age of deceased mothers was 26 years with a range of 15 to 43 years, and 46% of them were 15-24 years old. The most common risk factors for maternal death were primiparity (33%), haemorrhage (30%) and anaemia (22%). Most of the maternal deaths occurred post-partum (70%), 24 died peripartum, 6 died from miscarriage or abortion in association with excessive bleeding or septic complications, and one died from ectopic pregnancy. Among most deaths, the burden of morbidity was important, with 57.9% of patients admitted in a state of shock from eclampsia or acute cerebral malaria.

Conclusions: The high rate of mortality in this hospital testifies to the high morbidity of the patients, with anemia as an important risk factor. Maternal mortality in Niger remains high due to socio-economic factors, lack of access to quality care, and insufficient number of qualified health personnel.

Keywords: *Maternal mortality, Niger, Sub-saharan Africa*

Résumé

Cette étude avait pour objectif d'analyser les mortalités maternelles dans la maternité du centre de santé tertiaire à Niamey, Niger. Dans cette étude rétrospective durant une période d'un an du 1^{er} Janvier au 31 Décembre 2007. La maternité

d'Issaka Gazobi est un centre tertiaire de référence dans la cité de Niamey au Niger, les cas considérés étaient constitués de tous les décès dus à des causes obstétricales. Des fichiers des patients des unités d'urgences, d'accouchements et d'hospitalisation. Les résultats montraient qu'un total de 4,582 naissances ont été enregistrés avec un total de 121 cas de décès maternel, donc une proportion de mortalité maternelle de 2,640/100,000 naissances.

La moyenne d'âge des mères mortes était de 26 ans, variant entre 15 à 43 ans, et 46% de 15-24 ans. Les facteurs à risques de la mortalité maternelle les plus communs étaient la primiparité (33%), hémorragie (30%) et anémie (22%). La majorité des cas de décès maternel survenait après l'accouchement (70%), 24 mourraient en peripartum, 6 mourraient des avortements associés à un excès de perte de sang ou des complications septiques et un mourrait d'une grossesse ectopique. Parmi les décès, le problème de mortalité était important, ayant 57.9% des admissions en état de chocs après une éclampsie ou du paludisme cérébral aigu. En conclusion, le taux élevé de mortalité dans cet hôpital témoigne le taux de souffrance élevé des malades, avec l'anémie représentant le facteur à risque le plus important. La mortalité maternelle au Niger demeure élevée due à des facteurs socio-économiques, un manque d'accès aux soins de qualité et un nombre très insuffisant du personnel qualifié.

Introduction

Maternal mortality is a major public health problem that has a greater occurrence within developing countries. According to the World Health Organization (WHO), the worldwide Maternal Mortality Ratio (MMR) is 260/100,000 live births, with an estimated 358,000 maternal deaths globally; and 99% of these deaths occur in developing countries, with obstetric risk being the highest by far in sub-Saharan Africa [1]. Within sub-Saharan Africa the maternal mortality ratio is 640/100,000 live births. The official estimated MMR in Niger is 648/100 000 live births, while the World Health Organization estimates the MMR for Niger at 820/100,000 live

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births, placing Niger among the 10 highest MMR countries in Sub-Saharan Africa [1]. The global estimate for lifetime risk for a woman dying from maternal causes is one in 140, and the risk for Niger is 1 in 16 [2,3]. Maternal deaths usually occur around labour, delivery, and the immediate postpartum period, with obstetric haemorrhage being the main medical cause of death [2,3].

Maternal mortality is considered a marker of global inequity indicating larger problems such as poverty, lack of education and gender inequalities. In sub-Saharan Africa, the primary risk factors for maternal mortality are often poverty, poor access to quality healthcare, and socio-cultural factors such as traditional practices which may prevent or delay the decision to seek care [2,3,4]. The low-status of women in many societies in developing countries place these women at a disadvantage as they are victims of inequality in education, employment, property ownership, allocation of resources, and decision making [5]. This lower status also places them at greater risk for gender-based violence, which is correlated with high rates of maternal mortality. In addition to the physical disadvantages associated with poverty (e.g., malnutrition), many harmful traditional practices and beliefs (from female genital cutting to feeding and nutritional practices) also adversely affect maternal health. These beliefs and practices also influence pregnancy and childbirth health-seeking behaviours and have been found to be associated with pregnancy outcomes [6].

The consequences arising from the death of a woman in the African setting could be far-reaching with negative effects to her children, family and her community in a variety of ways that encompasses physical (e.g., poorer nutrition for children), social (e.g., children no longer attending school), psychological (e.g., insecurity of orphaned children) and economic (e.g., loss of family income earner) domains [5-8]. Hence, the significance of studying the causes of maternal mortality as well as risk factors contributing to it so that prevention avenues should be identified.

Research on the issues surrounding maternal mortality in Niger is scarce, a fact that may impede the development and formulation of effective prevention strategies based on research findings. To fill this gap, we undertook this study that provided case studies of instances of maternal deaths within a referral maternity institution in Niger. We also examined the relative contribution of the main risk factors/causes of death among the deceased women.

Methods

The setting for this study was the Maternity Issaka Gazobi (MIG), a tertiary maternity referral centre in the city of Niamey, Niger, with an average of 5,000 deliveries per year. Referrals come primarily from around the capital city of Niamey and surrounding region of Tillabéri, an area covering approximately 9,117 square metres, with a population estimated at about 3 million in 2010. Access to the MIG can prove challenging in cases of emergencies, as roads and emergency vehicles are not adequate for a country as vast as Niger, the 4th largest African country in surface area south of the Sahara [9]. The MIG serves as a teaching maternity for faculty and medical students from the University Abdou Moumouni (UAM) division of health sciences, also located in Niamey.

This was a cross-sectional and retrospective study covering a period of 12 months, from January 1 to December 31 2007. Due to the time investment associated with examining paper records, one year was selected for this descriptive study. Researchers from the UAM division of science faculty also serving as MIG physicians gathered data from admission files of patients from the emergency delivery and hospitalization units of the MIG. The analysis included all pregnant women admitted for delivery at the MIG. The data were subsequently entered into Epi Info and analyzed. We calculated means, frequencies and proportions to describe characteristics of deceased mothers. We assessed the degree of precision and significance of point estimates by computing confidence intervals ($\alpha = .05$) around these values using Cornfield's formula [10]. Post partum haemorrhage was defined as blood loss of ≥ 500 mL after vaginal birth or ≥ 1000 mL after cesarean delivery. Spontaneous abortion was categorized at 20 weeks gestation. We used the World Health Organization (WHO) classification of anaemia at a haemoglobin concentration below 11 g/dL.

We computed maternal mortality ratio by dividing the numerator (total maternal deaths) by the denominator (total live births) and multiplying the ratio by 100,000. We were unable to obtain information on prenatal care visits because the vast majority of the patients were unbooked and were referred to the centre in dire emergency.

Results

A total of 4,582 live births were recorded during the period of the study with 121 maternal deaths, yielding a maternal mortality ratio of 2,640/100,000 live births. The results provided in this paper are

descriptions of these 121 cases using medical records. The mean age of deceased mothers was 26 years (standard deviation=6.9) with a range of 15 to 43 years, and close to half of them were 15-24 years old (46.3%). The overwhelming majority of these women were unemployed and more than half of them were multiparous. It is noteworthy that slightly more than 10% of the deceased were grand multiparae (Table 1).

There was almost an equal distribution of cases between rural and urban areas (47% versus 42%, respectively). From their location of origin to the MIG, the travel distance covered by the deceased patients ranged from 5 to 305 kilometres. The patient from the farthest distance of 305 kilometres was admitted for uterine rupture with the retention of the

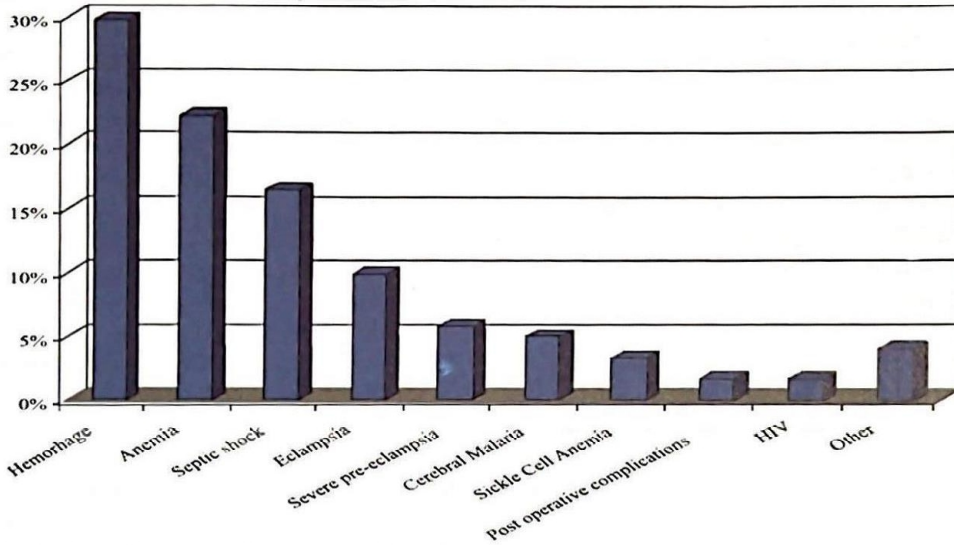


Fig. 1: Obstetric causes of maternal death

Table 1: Characteristics of Deceased Mothers

Characteristics	N (%)
Age (years)	
Mean= 26.0; SD=6.9	
Range: 15-43 years	
15-19	19 (15.7%)
20-24	37 (30.6%)
25-29	27 (22.3%)
30-34	14 (11.5%)
35-39	11 (9.1%)
≥ 40	7 (5.8%)
Unknown	6 (5%)
Employment	
None	108 (89.2%)
Private	4 (3.3%)
Civil	3 (2.5%)
Not Specified	6 (5.0%)
Parity	
1	40 (33%)
2-3	25 (20.7%)
4-5	26 (21.5%)
6-7	11 (9.1%)
≥ 8	4 (3.3%)
Not Specified	15 (12.4%)

second twin. In the majority of the referrals, transport was provided by non-medical vehicles.

Primiparity and associated complications were the most important risk factor/cause of maternal death (33%), often in young mothers (Figure 1). Anaemia was the second leading cause of death in our study and occurred in 22.3% of cases. However, when purely medical causes were considered, the ranking was as follows (Figure 1): 1) Hemorrhage, 2) Anaemia, and 3) Pre-eclampsia/eclampsia. Table 2 provides a summary of the main causes of haemorrhage among the deceased cases.

Table 2: Distribution of maternal mortality cases by cause of hemorrhage

Causes	N (%)	Confidence Interval (in %)
Placental abruption	13 (36%)	20.42 – 51.8
Post partum hemorrhage	6 (16.7%)	4.49 – 28.85
Uterine Rupture	6 (16.7%)	4.49 – 28.85
Spontaneous abortion	5 (13.9%)	2.59 – 25.19
Induced abortion	4 (11.1%)	0.84 – 21.38
Ectopic pregnancy	1 (2.8%)	-2.59 – 8.15*
Placenta previa	1 (2.8%)	-2.59 – 8.15*
Total	36 (100%)	

*P-value >0.05

It is notable that placental abruption accounted for more than a third of cases of bleeding episodes. Other obstetric causes of death included cerebral malaria, sickle cell anaemia (a condition which increases pregnant women's vulnerability to infection and anaemia), post-operative conditions and HIV.

Most of the maternal deaths occurred postpartum (N=85 or 70%), 24 died peripartum, 6 died from miscarriage or abortion in association with excessive bleeding or septic complications, and one died from ectopic pregnancy (Table 3). About a third of the women (35%) had been in labour for between 6 to 12 hours, 10.8% for less than one hour, while another 30.2% were in labour for more than 48 hours. Further analysis of the patient files showed that among the vast majority of deaths, the burden of morbidity was important, with 57.9% of patients admitted in a state of shock (hypovolemic, septic) from eclampsia or acute cerebral malaria.

Table 3: Distribution of cases by period of occurrence of maternal death.

Period of Occurrence of Maternal Death	N (%)	Confidence Interval (in %)
Antepartum	25 (20.6%)	13.69 – 28.33
Postpartum	85 (70.3%)	63.31 – 79.55
Complications from miscarriage	6 (5%)	1.11 – 8.97
Unknown	5 (4.1%)	0.6 – 7.8

Discussion

The maternal mortality ratio of 2,600/100,000 live births observed in this study is among the highest reported in the world. It is by far greater than the national average of 1,600/100,000 live births estimated for Niger [3]. One plausible explanation is that while the national MMR represents both high and low MMRs from various parts of the country, that being reported in this paper is from a referral facility to which very high-risk obstetric cases are referred. In addition, it is pertinent to mention that referred patients in this study had to cover enormous distances to seek care at our centre, and by the time of arrival, exhaustion and shock (from persistent bleeding) would have worsened their underlying condition significantly leading to their demise. This fittingly describes the single patient in the study that had to travel 305 kilometres with a diagnosis of uterine rupture. Hence, geographical barrier is a major non-medical risk factor for maternal mortality in Niger.

Young women represent an important demographic risk group in our study, a finding that is similar to observations in other sub-Saharan settings [11 - 15]. This relatively young age at death

of African mothers is of particular concern since it contributes directly to the low life expectancy in sub-Saharan Africa. In the case of Niger where this study was conducted a discussion of low maternal age and maternal mortality will be incomplete without expanding on the special roles played by socio-cultural norms vis-à-vis early marriage. Many women in Niger (a predominantly Muslim population) are married and pregnant quite early before full biologic maturity [16]. The consequences of this include obstructed labour and its various complications during the birth process making this young group of women more vulnerable to death than their mature counterparts [16]. It is therefore, not surprising that a third of cases of maternal death in this study were primiparous. In other cultural settings it has also been cited that younger women are special victims of socio-cultural taboos with certain nutritional habits that are harmful [11]. "Kunun kanwa" which consists of administering high-salt drink to the young mother has been incriminated as an important cause of peripartum cardiac failure and maternal death in neighbouring Nigeria [17]. However, the extent to which this potentially preventable cultural practice impacts young maternal death in Niger remains unexplored.

Among medical/obstetric causes of maternal mortality, haemorrhage represents the most important cause accounting for almost one-third of the cases of maternal death. This is similar to the findings from several other investigators from the African continent [18]. It is intriguing that despite decades of observation regarding the role of haemorrhage as an important cause of maternal mortality in Africa; it still remains the most significant cause of maternal demise in the African setting. In the case of Niger, the lack of resources (e.g., blood products and insufficient equipment for blood transfusion) is a major barrier to saving the lives of these women. Even in cases of massive haemorrhage, it is exceptional to have access to more than 2 units of blood to offer needy patients. Until these logistic problems are resolved it is hard to imagine how the lives of these young women could be saved.

Study limitations include the inability to provide extracted data from all live births and deliveries within the maternity for additional analyses. However, in light of the lack of availability of data on the country of Niger, this study provides crucial information on maternal mortality that may prove useful for physicians and public health professionals. Another limitation is that the data cover only one year and one maternity, therefore findings cannot be generalized.

In conclusion we found one of the highest maternal mortality ratios in the world in Niger, a country reputed to be among the world's most economically challenged nations. The burden of mortality from haemorrhage and anaemia highlights the need for

additional health resources and enhancement of access to skilled birth attendants as well as prenatal care facilities. Economic and socio-cultural issues cannot be ignored in a society such as Niger, where poverty, cultural traditions and lack of knowledge of health issues increase the risk of maternal death.

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