

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20193541>

Original Research Article

## Epidemiology of maternal mortality in Befelatanana maternity during 2016-2017

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**Received:** 31 May 2019

**Accepted:** 02 July 2019

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### ABSTRACT

**Background:** Maternal mortality remains a permanent obsession for the pregnant woman and her entourage, and is still one of the topical issues faced by a developing country, such as Madagascar. Our study aims to determine the epidemiological and etiological profile.

**Methods:** We conducted a descriptive retrospective study over a 2-year period from January 1<sup>st</sup>, 2016 to December 31<sup>st</sup>, 2017 at the Befelatanana Gynecology-Obstetrics Hospital on maternal deaths.

**Results:** We had 76 maternal deaths out of 5430 births, or 1.39%. The average age was 31.18±8.38 years with extremes of 14 and 49 years. The average parity was 2.67±1.85. The majority of pregnancies were poorly followed with a mean ANC of 2.18±1.85. The referred patients predominated at 68.42%. Women living in the urban area had a 57.89% majority. Among the etiology, hypertensive complications predominated at 42.11% followed by hemorrhagic (38.16%) and infectious (19.14%) complications. The patients who underwent surgery predominated at 78.94% and 59.21% were transfused.

**Conclusions:** Maternal mortality remains a major concern at the Befelatanana Obstetrics Gynecology Hospital. During our study, hypertensive complications were found to be the most common causes requiring adequate management. For this, an awareness of pregnant women for the standardization of ANC, as well as regular training of health actor are necessary.

**Keywords:** Epidemiology, Maternal death, Mortality related to pregnancy, Preclampsia

### INTRODUCTION

Maternal and perinatal mortality continues to be a major public health problem. According to the WHO, maternal

mortality is the death of a woman during pregnancy or for 42 days after the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but

not from accidental or incidental causes.<sup>1</sup> Information for maternal mortality serves many different purposes globally and locally, ranging from, for example, improving awareness in local communities, to global monitoring of progress towards Millennium Development Goal-5. Worldwide, more than half a million women die in peripartum period in developing countries. Maternal deaths are not uniformly distributed throughout the world, and obstetric risk is highest by far in sub-Saharan Africa. In Africa, it ranges from 228 per 100,000 live births (Abidjan) to 559 per 100,000 in Conakry.<sup>2,3</sup> This rate does not exceed 31 per 100,000 births in developed countries.<sup>4</sup> Proper management of the main etiology of maternal death will reduce the risk of maternal deaths. However, this will mean health workers and communities must develop the necessary capacity to respond appropriately to the management of emergency obstetric complications.

The objectives of this study were to determine the epidemiological and etiological profile of maternal mortality. Consequently, the obtained data would enable us to find potential preventive solutions by presenting these data to the healthcare officials.

## METHODS

This is a retrospective and descriptive study of cases of maternal death seen at the gynecology and obstetrics hospital of Befelatanana. Cases of maternal death throughout the pregnancy or within 42 days of delivery were retained. The period studied was two years from January 1, 2016 to December 31, 2017.

We excluded accidental maternal death. The collection of the data was done on the Excel Stat 2007 Software. The statistical analysis was done by the R version 3.5.2 software.

### *The parameters studied were*

- Sociodemographic characteristic of patients: maternal age, gestity, parity, marital status, profession, ethnic group
- Obstetrical parameters: number antenatal care, gestational age, antecedent of scarred uterus
- Characteristic of maternal death: time to death of maternal death after admission, period of maternal death, site of maternal death
- Etiology of maternal death divided into three groups (death by maternal hypertension, pregnancy-related hemorrhage, infectious)
- Treatment done during hospitalization.

## RESULTS

There were 76 maternal deaths out of 5430 births during the study period, or 1399 per 100,000 live births. The mean age of our patients was 31.18 years with extremes of 14 and 49 years (Table 1). The mean parity was

2.67±1.85, with multiparous prevalence at 51.31%, followed by 15% primiparous (Table 1). The majority of the deceased women were married (50%) of whom 35.53% were unemployed and 39.47% were in the primary sector (Table 1).

**Table 1: Sociodemographic characteristics of patients.**

Variables	
<b>Maternal age (years)</b>	
mean	31.18±8.38
Min-max	14-49
<b>Gestivity</b>	
mean	3.12±1.86
Min-max	1-8
<b>Parity</b>	
mean	2.67±1.87
Min-max	0-8
<b>Marital status n (%)</b>	
Single	12 (15.79)
Concubine	23 (30.26)
Married	38 (50.00)
Divorced	3 (3.95)
Widow	0 (0)
<b>Profession n (%)</b>	
Housewife	27 (35.53)
Primary sector	30 (39.47)
Secondary sector	17 (22.37)
Tertiary sector	2 (2.63)
<b>Residence n (%)</b>	
Urban	44 (57.89)
Rural	32 (42.11)
<b>Ethnic group n (%)</b>	
Merina	65 (86.67)
Betsileo	9 (12.00)
Sakalava	1 (1.33)

**Table 2: Obstetrical parameters.**

Variables	n=76
<b>Scarred uterus n (%)</b>	8 (10.67)
<b>Antenatal care (ANC)</b>	
Mean±SD	2.18±1.87
Min-max	0-7
<b>Gestational age</b>	
Mean±SD	29.72±10.83
Min-max	9-40

The majority of pregnancies were poorly followed with a mean ANC of 2.18±1.85. Mean gestational age was 29.72±10.83 weeks of amenorrhea and ranged from 9 to 40 weeks of amenorrhea (Table 2).

The referred patients predominated at 68.42%, of whom 28.95% were shocked at admission. Sixteen patients attempted a delivery outside the hospital (21.05%) (Table 3).

**Table 3: Clinical parameters.**

Variables	n=76
Referred n (%)	52 (68.42)
Vaginal birth attempt n (%)	16 (21.05)
Shock at admission	22 (28.95)

**Table 4: Maternal death characteristics.**

Variables	n=76
<b>Duration after admission</b>	
Mean±SD (hours)	31.75±31.20
Min-max	1-120
<b>Period of maternal death n (%)</b>	
1 <sup>st</sup> trimester	14 (18.42)
Antepartum	4 (5.26)
Intrapartum	3 (3.95)
Postpartum	55 (72.37)
<b>Site of maternal death n (%)</b>	
Emergency unit	4 (5.26)
Delivery room	2 (2.63)
Operating theatre	10 (13.16)
Intensive care Unit	60 (78.95)

With regard to death characteristics, the mean time to death compared with admission was 31.75±31.20 hours, with extremes of 1 to 120 hours, the majority of our patients die in postpartum period (72.37%) in intensive care unit (78.95%) (Table 4).

**Table 5: Etiology of maternal death.**

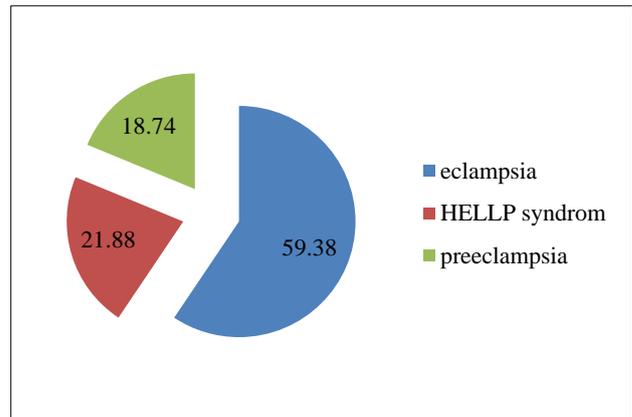
Etiologies	n=76
Hypertensive disorder and complication n (%)	32 (42.11)
Hemorrhage during pregnancy n (%)	29 (38.16)
Infectious n (%)	15 (19.74)

During this period, maternal mortality secondary to hypertensive disorders and its complications predominated. Thirty-two cases of death were related to this pathology, i.e. 42.11%. Haemorrhage was the second leading cause of death (38.16%). Infectious causes were found in 19.74% of cases (Table 5).

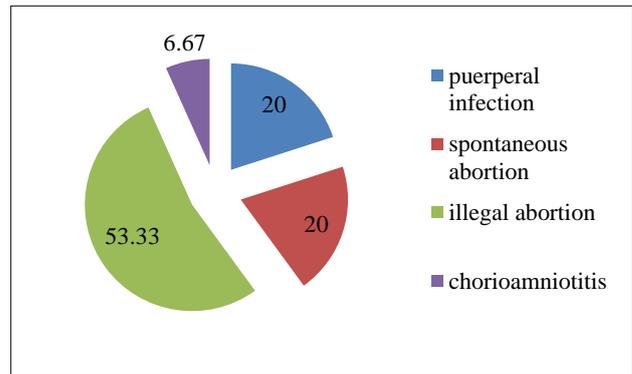
Eclampsia was the leading cause of maternal death secondary to high blood pressure during pregnancy. More than half died following the complication of eclampsia. HELLP syndrom was responsible for 21.88% of deaths (Figure 1).

Regarding maternal deaths secondary to haemorrhage, uterine atony constituted half of the causes (51.72%). uterine rupture was the second cause. Hemorrhagic complications of abortion accounted for 10.34% of cases (Figure 2).

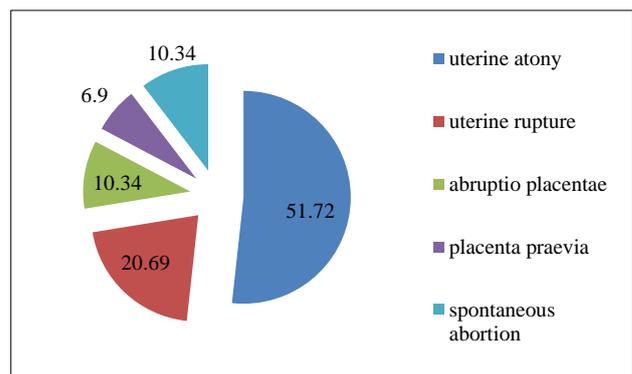
In infectious complications, complications for illegal abortion accounted for 53.33% of cases. Puerperal infections and complications of spontaneous abortion each accounted for 20% of infectious causes (Figure 3).



**Figure 1: Cause of maternal death due to hypertensive disorder.**



**Figure 3: Cause of maternal death due to infection.**



**Figure 2: Cause of maternal death due to hemorrhage.**

The majority of our patients had surgery including 47.37% caesarean section and 31.58% of laparotomy and emergency peripartum hysterectomy, 59.21% of the deceased patients were transfused (Table 6).

**Table 6: Therapeutic intervention during hospitalization.**

Paramètres	n=76
Intrauterine aspiration	7 (9.21)
No surgical intervention	4 (5.26)
Vaginal delivery	5 (6.58)
Caesarean section	36 (47.37)
Laparotomy and/or hysterectomy	24 (31.58)
Blood transfusion n (%)	45 (59.21)

## DISCUSSION

The maternal mortality during pregnancy or within 42 days of birth is a medical, social, economic and political issue, as well as a human rights issue.<sup>5</sup>

In our study, we had 76 maternal deaths out of 5430 births, which is a prevalence of 1399 per 100,000 live births over a 2-year period. This frequency is very high compared to that generally recorded in African countries.<sup>6-8</sup> A study conducted by Andriamady CL et al at the same hospital in 2000 found a mortality rate of 1250 per 100,000 live births, which is almost similar to our results.<sup>9</sup> Ousmane T et al, in a study conducted at the King Baudouin Health Center (Mali) in 2005 had shown a mortality rate of 615 per 100,000 live births, comparable to that of M'baye Iat the health center Youssou M'bargane in Rufisque which reported a rate of 592 per 100,000 live births over a period of 7 months.<sup>10</sup>

However, it is far superior to those reported in developed countries where the maternal mortality rate is between 9 and 43 per 100,000 live births.<sup>11</sup> The mortality rate in France was 9.1 per 100,000 live births, compared with 13.8 in North Carolina, 6.1 in Finland and 6.2 in Massachusetts.<sup>12</sup> We found that the maternal mortality rate is low in developed countries compared to developing countries, especially in Madagascar. Indeed, a reference delay following an unsatisfied means of transport, which led to the seriousness of the condition when the patients arrived in our center, could explain this situation.

The average age of our patients was 31.18±8.38 years with extremes of 14 and 49 years, results superimposable to that reported by Moma (30 years) in a study conducted in Kaolack and Saint Louis.<sup>13</sup> However, the study by Ousmani and his co-workers conducted in Senegal found younger women (28.4 years).<sup>10</sup> Similarly for the study conducted by Andriamady CL et al, who had found an average age of 29 years with extremes of 15 and 48 years.<sup>9</sup> Maternal age is a major risk factor for maternal mortality, with patients under the age of 20 and those aged 35 being the most affected.<sup>14,15</sup>

The average parity was 2.67±1.87 with extremes of 0 and 8, of which the multiparas were in the majority at 51.31% followed by the primiparous at 19.73%. According to the

Andriamady et al study, the average parity was 4, with extremes ranging from 0 to 14.<sup>9</sup> According to Ousmane et al, the analysis showed that the number of deaths increased with parity.<sup>10</sup> Thus, multiparous women accounted for 48.3% of deaths (149 cases) compared with 20% pauciparous (62 cases), 15.9% primiparous (49 cases), and 15.5% nulliparous (48 cases), almost similar to our results. This excess mortality of multiparas reported in our study was similar to data from African 6, 8 and Western literature.<sup>15-17</sup> Multiparity is known as a risk factor of uterine atony and preeclampsia which are the main etiology of maternal death in our study.

An important component in the fight against maternal mortality is prenatal surveillance, the main objective of which is to detect and manage all pathologies in order to ensure safe motherhood. Well-attended antenatal care significantly reduces the risk of death during pregnancy-sepsis.<sup>9,18,19</sup>

The results of our study showed that the majority of pregnancies were poorly followed with a mean ANC of 2.18±1.85. These results were similar to data from Iloki et al 20, which found in its series in Congo that more than half of women were poorly or not followed during pregnancy. Similarly for Ousmane et al, one in four women had more than 3 prenatal consultations.

WHO recommends at least eight ANC during pregnancy.<sup>21</sup> This lack of ANC is unique to developing countries, where adverse socio-economic conditions have an influence on the monitoring of pregnancy.<sup>22</sup>

In our study, we found that 68.42% were evacuated, and Ousmane and his collaborators found that more than 50% of the women were evacuated. At the CHUs of Niamey and Ouagadougou the results were identical.<sup>23,24</sup> This large proportion of evacuees among the cases of death could be explained by the fact that one is a center of reference and that the patients are admitted under bad conditions.

The study of maternal mortality has a particular connotation in the gynecology-obstetric services, because after a methodical analysis, it allows to establish the bases of a rational and effective prevention. The study of etiology in maternal mortality during the gravid-puerperium is difficult and complex.

The results of our study found, in order of decreasing frequency, hypertensive complications (42.11%) dominated by eclampsia, which was 59.38%, followed by haemorrhagic (38.16%) and infectious complications (19.14%). A study conducted by Rakotomahenina, in the same center, maternity Befelatanana Antananarivo (Madagascar) in the year 2005-2006 found that eclampsia is the leading cause of maternal mortality at 32%, similar to our results but with a decreased rate.<sup>25</sup> On the other hand, the study of Andriamady and his collaborators in the same center, in 1988-1997 over a period of 10 years

had shown a predominance of infectious causes.<sup>9</sup> The work of Ousmane et al, in a health center of King Boudouin (Dakar-Senegal) had found that hemorrhagic causes were majority, followed by hypertensive causes and indirect causes, this triad is found in the African literature.<sup>6,10-24,26</sup>

In developed countries, a study conducted in France from 1996-2002 over a period of six years found that hypertensive complications were in second position (12 to 14% of deaths, of which eclampsia was only 6%). Hemorrhagic causes accounted for the majority of cases.<sup>27</sup> Similarly, in the Netherlands, fewer maternal deaths are reported by complication of hypertension.<sup>28</sup>

Through our study, we have found that eclampsia is still ranked first among the causes of maternal deaths in our service compared to developed countries and other African countries. Eclampsia is just one of the complications of preeclampsia. Preeclampsia is a pathology associating a gravidic arterial hypertension and a proteinuria  $\geq 0,3g/24H$  occurring after 20WA, these are signs that one could detect easily during a CPN and that an adequate care during its discovery could avoid the occurrence of eclampsia and other complications. However, we have a deficiency problem in antenatal care that only patients consult at the stage of complications. In our study, the majority of pregnancies were poorly followed with an average ANCOF of  $2.18 \pm 1.85$ , this could be explained by the lack of awareness to come in prenatal consultation. In addition, this situation is probably due to a lack of health education, and some beliefs against the use of drugs and health actor.<sup>26</sup>

For the study in Bangladesh, the authors report that the very high rate of eclampsia is due to the fact that only 2.3% of pregnant women have been medically supervised, and the rest do not have access to obstetric care.<sup>29</sup>

## CONCLUSION

Maternal mortality remains a major problem in Madagascar as well as in developing countries. Hypertensive causes dominated by eclampsia are the leading cause of maternal deaths at the Obstetrics and Gynecology Teaching Hospital Befelatanana (Antananarivo). Awareness of all pregnant women to come to prenatal consultation is necessary to detect early pathologies of pregnancy including preeclampsia to be able to lead adequate care. Political leaders are urged to ensure that mother-child health is privileged, while making a supply of the necessary drugs within the hospital, and to ensure that its medicines are accessible by everyone, in short, an improvement of the health system is desirable. Progress will ultimately be dependent on strong health systems ensuring high coverage of midwifery services supported by timely and competent hospital care.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Ratsiatosika TA, Randriamahavonjy R, Rakotonirainy T, Rajaonarivony MV, Rainibarijaona AL, Randrianambinina T, et al. Epidemiology of maternal mortality in Befelatanana maternity during 2016-2017. *Int J Reprod Contracept Obstet Gynecol* 2019;8:3234-9.