

Analysis of Maternal Mortality in Obstetrics and Anesthesia Resuscitation in 15 Years at Chu Point “G” about 389 Cases Bamako/Mali

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Abstract

Objective: Analyze the maternal mortality in the two departments of CHU Point “G” in Bamako, because of high maternal mortality rate in our country.

Material and Methods: This was an analytical cross-sectional study on maternal deaths from February 19, 2005 to November 19, 2019 for patients admitted in both departments and who died during the pregnancy-puerperal period at CHU Point “G”. All the patients who died outside this pregnancy-puerperal period were not retained. The data were entered and analyzed using SPSS 12.0 software. The statistical test used was that of Chi², the statistical significance threshold was fixed at 5%. **Results:** During our study, we recorded 389 maternal deaths out of 16,033 admissions in 15 years and 18,060 live births during the same period making a maternal mortality ratio of 2153.931 and a frequency of 2.426. At the end of our study, we noted that the frequency of maternal deaths was higher in 2014: 12.9% (50/389). The maternal death predominantly affected women aged of 20 - 24 with a frequency of 22.4% (87/389). The multiparity (166/389 making 42.7%), illiteracy (341/389 making 87.7%), the poor evacuation conditions (non-medicalized transport): 263/389 making 67.6%; the evacuation without any evacuation sheet: 259/389 making 66.6%), poor CPN (Prenatal consultation) quality (undone CPN: 191/389 making 49.1%) and the poor monitoring of delivery works (no use of partograph in 343/389 making 88.2%) were the factors favoring maternal deaths. The main causes of maternal deaths were direct in 231/389 making 59.4% with hemorrhage in first line: 21.1% (82/389), infec-

tion (61/389 cases making 15.68%), dystocia: 50 cases making 12.85% and high blood pressure and complications (38/389 making 9.76%); indirect in 158/389 cases making 40.6% (**Figures 1-3**). The majority of women 65.8% (256/389) of our patients died in the gynecology and obstetrics department; in the Resuscitation department 73/389 making 18.8%; in the operating room 43/389 making 11.1% and the deaths that were observed on arrivals represented 17/389 making 4.4%. In our study, 10.3% (40/389) of our patients died in the antepartum, 57.1% (222/389) in perpartum, and 32.6% (127/389) in the postpartum (**Figure 4**). The need not covered in blood transfusion represented 91.5% the cases either 356/389. **Conclusion:** The frequency of maternal deaths is very high in our country. Reducing the rate of maternal deaths requires improving the SONU (cares obstetrical and neonatal emergency).

Keywords

Hemorrhage, High Blood Pressure, Maternal Death, *Partographe*, Prenatal Consultation

1. Introduction

The death of a woman in the pregnancy-puerperal period is still experienced as a tragedy. Expecting a child, giving him birth and hugging him are the wishes of every woman. Pregnancy if it is well carried out, leads to a live birth, and constitutes for women a criterion of social valorization. However, for thousands of women, giving birth is not the cause of exhilaration as it should be, but rather a suffering whose outcome can be fatal. The death of a woman is a terrible loss, despite the silence, not only for the family but also for the community and the whole nation [1].

The level of maternal mortality has become an indicator of the performance of the health care system because the visible part of the interventions that prevent maternal death is completely managed by the health services. However, we must look beyond and consider that the maternal death is the result of a chain of dysfunctions and lack of resources, which depend on the factors situated outside the health care system [2]. At the dawn of the new millennium, in the world which is experiencing an unprecedented economic growth and technological progress, there is still an alarming number of women who die during the pregnancy, deliveries and its outcomes [3]. In 2015, 303,000 women died during the pregnancy-puerperal period, approximately 830 women died every day from preventable causes related to pregnancy and deliveries. The maternal mortality ratio in developing countries in 2015 was 239 per 100,000 births, compared to 12 per 100,000 in developed countries; 99% of all the maternal deaths occur in developing countries, more than half of them in South Sahara Africa. It is the region in which the maternal mortality ratio is the highest representing 542 per 100,000. [4] In Mali, several efforts have been made in the fight against the maternal

mortality: The report of mortality linked to pregnancies has decreased between 2001 and 2018 from 582 per 100,000 live births to 373 per 100,000 live births in 2018 [5] [6] [7] [8].

The Sustainable Development Goal (SDG) 5 between 2016 and 2030 is to bring the global maternal mortality rate below 70 per 100,000 live births [3] [4]. Despite that some progresses have been made, the maternal mortality rate remains high in our country, hence this work is to contribute to a decline in the rate of maternal mortality with the objective of analyzing the contributing factors and the causes of maternal mortality in the two departments at CHU Point “G”.

2. Patients and Methods

This was a cross-sectional analytical study on maternal deaths from February 19, 2005 to November 19, 2019 in the gynecology, obstetrics and anesthesia-resuscitation departments of CHU Point “G”. The population we studied consisted of all the pregnant women we received and cared for during the study period. Were retained in our study, all the patients admitted in the gynecology and obstetrics department and who died either in the gynecology and obstetrics department or in the anesthesia and resuscitation department during the pregnancy-puerperal period. We excluded all the living women and those who died outside the pregnancy-puerperal period. The variables we studied were the frequency, age, marital status, occupation, antecedents, prenatal consultation (CPN), the parameters of evacuation, the factors favoring maternal death, the causes of maternal death with as of information collecting sources: an individual survey form, obstetrics admission registers, operation reports, obstetric records/files. The data were entered and analyzed using SPSS 12.0 software. The statistical test used was that of Chi-square, the threshold of statistical significance was set at 5%.

3. Results

From February 19, 2005 to November 19, 2019, we recorded 389 maternal deaths out of 16,033 admissions and 18,060 live births making a maternal mortality ratio of 2153.931 and a frequency of 2.426. The ratio of the maternal mortality in these 15 years was higher in 2007 with 5413.105 (38 maternal deaths and 702 live births). The highest frequency of maternal deaths was recorded in 2014 presenting 12.9%.

The 20 - 24 age group was the most frequent in our sample: 22.4% (87/389) and there was a relationship between the age group and the period of death and the duration of stay in the service with Khi^2 respectively: 11.32; $P < 0.05$ and Khi^2 : 25; $P < 0.05$ [9] (**Table 1**). The housewives represented 87.4% (340/389) of our sample. They were uneducated in 87.7% (341/389) and were married in 93.3% (363/389) (**Table 2**). We found a relationship between marital status and the period of death with Chi-square: 10.16 and $P < 0.05$. The spouses were mainly farmers with 28.3% (110/389) and uneducated in 64.8% (252/389). In our study,

Table 1. Cross between age group and period of death.

Age group	Period of death			Total
	Antepartum	Per partum	Postpartum	
14 to 19	14	38	22	74
20 to 24	10	51	26	87
25 to 29	5	49	24	78
30 to 34	6	39	25	70
35 to 39	3	24	25	52
40 and more	2	21	5	28
Total	40	222	127	389

Khi-deux de Pearson: 18.076; P: 0.04.

Table 2. Statut matrimonial de nos patientes.

Marital status	Effective	Percentage	Percentage valid	Pourcentage cumulative
Married	363	93.3	93.3	93.3
Single	25	6.4	6.4	99.7
Widow	1	0.3	0.3	100
Total	389	100	100	

61.7% (240/389) of the patients were evacuated, 20.1% (78/389) of the patients came by themselves and 18.3% (71/389) of the patients were referred, there was a strong relationship between the mode of admission and the death service with Khi^2 : 24.90; $P < 0.001$. In 20.6% (80/389) of the cases, the patients came from outside Bamako. Our patients were evacuated in 66.6% (259/389) of the cases without any evacuation sheets and in 67.7% (263/389) of the cases without any medicalized means of evacuation (Ambulances). We found a relation between the means of transport and the period, the service of death with respectively Khi^2 : 11.98, P : 0.01 and Khi^2 : 6; P : 0.01 (**Table 3**).

The itinerary from home to CHU-Point G without passing by the CHU GT (Gabriel TOURE) constituted the majority with 27.5% (107/389) of the cases in our sample and we found a strong relationship between distance and period and death service with Chi-square: 31.052; $P < 0.001$. The time of evacuation was less than or equal to 8 hours representing 96.9% (377/389) of our sample. Deaths were observed on arrivals in 4.4% (17/389) of the cases in our study. The inter-reproductive interval was less than 1 year (short) presented 83.3% (324/389) of our sample and there was a relationship between the inter-reproductive interval and the causes and period of maternal death with respectively Chi-square: 28.52; P : 0.01 and Chi^2 : 10.19; $P < 0.00$. The pauciparous represented 33.4% (130/389), the multiparous: 22.1% (86/389) and the large multiparous: 20.6% (80/389) of our sample. The prenatal consultation was not done in 49.1% (191/389), 89.89% (178/198) of the cases were within the standards of WHO

Table 3. Means of transport crossing and period of death.

Means of Transport	Period of death			Total
	ante partum	per partum	post partum	
Ambulance	16	58	52	126
Public Transport	14	117	47	178
Personal car	10	47	28	85
Total	40	222	127	389

Khi-deux de Pearson: 11.98; P: 0.01.

(World Health Organization) and the midwives were the authors in 32.4% (127/389) of the cases.

In our study, we have found a relationship between the prenatal consultation and the death service with Chi-square: 13.27; $P < 0.00$. There was also a relationship between the quality of prenatal consultation and the causes of maternal death with Chi-square: 16.64; $P < 0.05$. The partographs were used for monitoring delivery only in 11.8% (46/389) of the cases, and there was a relationship between the use of partographs during the delivery works and the period, causes, and service of maternal death with Chi-square respectively: 49.97; $P < 0.001$; Chi-square: 42.41; $P < 0.001$ and Chi-square: 8.59 and $P < 0.05$. The use of oxytocics during the delivery works represented 51.7% (201/389) of the cases and the protocol for the use of oxytocics was correct only in 13.4% (27/201) of the cases. We noted a relationship between the use of oxytocics and the period, causes, and service of maternal death with respectively Chi-square: 33.65; $P < 0.001$; Chi-square: 29.23; $P: 0.01$; Chi-square: 35.78; $P < 0.001$. The active management of the third period of delivery was done in 18% (70/389) of our sample and there was a relationship between the non-practice of GATPA (Active management of the third stage of childbirth) and the causes of maternal death and postpartum blood loss with Chi-square: 29.65; $P < 0.001$; Chi-square: 50.61; $P < 0.001$. The causes of maternal deaths were direct causes in 59.4% (231/389) (**Figure 1**) with hemorrhage in first line: 21.1% (82/389) (**Figure 2, Figure 3**), infection (61/389 cases making 15.68%), dystocia: 50 cases making 12.85% and high blood pressure and complications (38/389 making 9.76%); indirect in 158/389 cases making 40.6% (**Figures 1-3**). In 65.6% (255/389) of the cases the patients were cared for within 24 hours and there is a relationship between the care times and the maternal death service with Chi-square: 10.08; $P: 0.03$. The blood transfusion needs were not satisfied in 91.5% (356/389) of the cases. In our study, 10.3% (40/389) of our patients died in the antepartum, 57.1% (222/389) perpartum, and 32.6% (127/389) in the postpartum (**Figure 4**). The majority of women (65.8% (256/389) of our patients died in the gynecology department and obstetrics. The patients died within 2 hours after admission in 99.5% (387/389).

4. Discussion

During our study we were confronted with many difficulties between other incomplete files, badly informed, badly archived, registers and lost files.

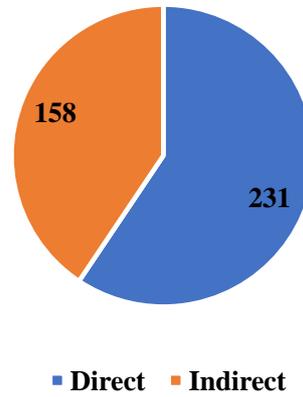


Figure 1. Causes of maternal deaths.

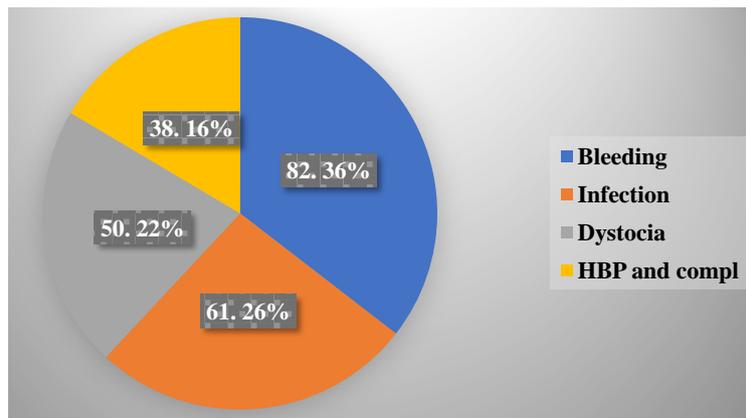


Figure 2. Direct Causes of maternal deaths.

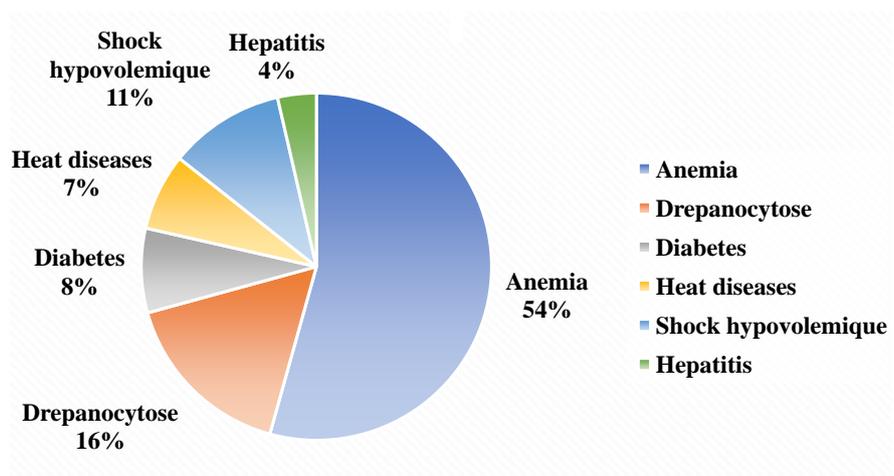


Figure 3. Indirect causes of maternal deaths.

1) The frequency:

From February 19, 2005 to November 19, 2019, we recorded 389 maternal deaths out of 16,033 admissions and 18,060 live births, making a maternal mortality ratio of 2153.931 and a frequency of 2.426. The ratio of maternal mortality during these 15 years was higher in 2007 with 5,413,105 (38 maternal deaths and

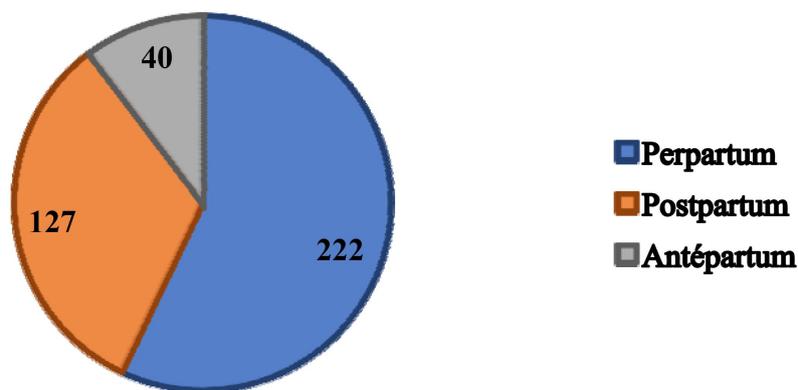


Figure 4. Period of maternal death.

702 live births). In developing regions, the maternal mortality rate is 450 maternal deaths per 100,000 live births, compared to 9 in developed regions [10] [11]. The highest frequency of maternal deaths was recorded in 2014, 12.9% in our study.

2) The sociodemographic factors:

In our study, the 20 - 24 age group was the most frequent in our sample: 22.4% making 87/389 patients, but all the age groups were represented. There was a relationship between the age group and the period of death and the duration of stay in the service with Khi^2 respectively: 11.32; $P < 0.05$ and Khi^2 : 25; $P < 0.05$ (Table 1). Koudjou T. and coll found that the age group 20 - 24 was the majority presenting 41.09% [12]. Boubacar B. and all in Senegal found that the age group 16 - 20 years was the most represented. These figures show that young and very old women are at greater risk of maternal death, so early and late childbearing negatively influences maternal mortality [13]. A study conducted in Nigeria showed that the maternal mortality rate was 7 times higher among women aged of 15 years old than those aged from 20 to 24 [14]. A study carried out in hospitals in Tunisia found that the maternal mortality rate was 33.72 per 100,000 live births and that primiparity, multiparity, unfavorable socio-economic conditions, risky pregnancies and poor follow-up of pregnancy are the risk factors for maternal mortality [15]. In our study, the ethnic group which constituted the majority was Bambara with a frequency of 48.8% which is the majority ethnic in Mali (Table 4). Housewives represented 87.4% of our sample; they were uneducated in 87.7% and were married in 93.3%. We found a relationship between marital status and the period of death with Khi^2 : 10.16 and $P < 0.05$. The spouses were farmers in 28.3% and uneducated in 64.8%. Koudjou T. and all found the same trends compared to the following data: housewives in 95.89%; not in school in 93.15%; 95.89% are married [12] Boubacar B. and all found that 85% of their sample were illiterate and 99% were married. (11); In RCI Bohousou and coll [16] and Burkina Faso [17] also found similar figures that is 83% and 81.60% respectively [18]. According to Caldwell [19] educated mothers, more than those who are not, tend to use modern health services for both prevention and curative cares in case of illness.

Table 4. Ethnic of our patients.

Ethnic	Effective	Percentage	Percentage valid	Percentage cumulative
Bambara	190	48/8	48.8	48.8
Soninke	25	6.4	6.4	55.3
Malinke	50	12.9	12.9	68.1
Senoufo	10	2.6	2.6	70.7
Minianka	8	2.1	2.1	72.8
Bobo	8	2.1	2.1	74.8
Bozo	3	0.8	0.8	75.6
Sonrhäi	12	3.1	3.1	78.7
Peulh	61	15.7	15.7	94.3
Autres	9	2.3	2.3	96.7
Dogon	9	2.3	2.3	99.0
Khassonke	4	1.0	1.0	100.0
Total	389	100.0	100.0	

3) Clinical studies:

In our study, 61.1% of patients were evacuated, 20.1% came by their own and 18.3% were referred and there was a strong relationship between the mode of admission and the service of death with Khi^2 : 24, 90; $P < 0.001$. In our study, 79.4% of our patients came from Bamako and 20.6% outside Bamako. Koudjou T and all found that 89.04% of the patients were evacuated [12]. Boubacar B. and all found that 60% of the women came from rural areas and 40% from urban areas. This also shows that in rural areas the problem was very important because the factors linked to customs, traditions and delays are more serious [13]. The patients were evacuated in 66.6% of the cases without any evacuation sheets and 67.7% of the cases without any medicalized means of evacuation (Ambulances) in our study. We found a relationship between the means of transport and the period, the service of death with respectively Khi^2 : 11.98, P : 0.01 and Khi^2 : 06, P : 0.01 (Table 3). The itinerary from home to CHU-Point G without passing by CHU GT (Gabriel TOURE) constituted the majority making 27.5% of the cases in our sample and we found a strong correlation between the distance and the period of death and the death service with Khi^2 : 31.052; $P < 0.001$. The evacuation time was less than or equal to 8 hours representing 96.9% of our sample. Maternal Deaths were observed on arrivals in 4.4% in our study. Koudjou T. and al found that 54.79% of the women were evacuated by ambulance, 43.21% without means of transport [12] [20]. The delays were very significant in the fight against maternal mortality. The inter-reproductive interval was less than 1 year (short) represented 83.3% of the cases in our sample and there was a relationship between the inter-reproductive interval, the causes of maternal death and the periods of maternal death with respectively Chi-square: 28, 52; P :

0,01 and Chi-square: 10.19; $P < 0.001$. The pauciparous represented 33.4%; multiparous: 22.1% and large multiparous: 20.6% of our sample. The prenatal consultation was not done in 49.1% of the cases, only 20% of the cases were within the standards of WHO (World Health Organization) and the midwives were the authors in 32.4% of the cases. In our study, we found a relationship between the prenatal consultation and the death service with Chi-square: 13.27; $P < 0.001$. There was a relationship between the quality of the prenatal consultation and the causes of maternal death with Chi-square: 16.64; $P < 0.05$. Koudjou T. and all found that the pauciparous constituted the majority (41.09%).

The prenatal consultation was not done in 61.64% and only 17.79% was of a good quality [12]. According to our study, the partographs were used for delivery monitoring only in 11.8% of the cases and there was a relationship between the use of the partograph during the delivery works and the period, the causes, and the service of maternal death with Chi-square: 49.97, respectively; $P < 0.001$; Chi-square: 42.41; $P < 0.001$ and Chi-square: 8.59 and $P < 0.05$. The use of oxytocics during deliveries represented 51.7% of the cases in our sample and the protocol for the use of oxytocics was correct only in 6.9% of the cases. We found a relationship between the use of oxytocics and the period, causes, and service of maternal death with respectively Chi-square: 33.65; $P < 0.001$; Chi-square: 29.23; $P < 0.01$; Chi-square: 35.78; $P < 0.001$. The active management of the third period of deliveries was done in 18% of our sample and there was a relationship between GATPA and the causes of maternal death and postpartum blood loss with χ^2 : 29.65; $P < 0.001$; Chi-square: 50.61; $P < 0.001$. The causes of maternal deaths were direct causes 59.4% in our study with bleeding in front line: 21.1% (Figures 1-3). Moussa A. and all found the direct causes of maternal death representing 69.1% [21]. Koudjou T. and all showed that direct causes represented 68.49% of the cases and indirect causes: 31.50%; among the direct causes, the hemorrhage constituted the majority with 36.98% followed by infections (16.46%) and eclampsia (12.32%) [12]. The causes of maternal death were dominated by direct causes (80%): hemorrhage: 40%, pregnancy toxemia: 20% and infections: 10%. The indirect causes represented 20% [22]. In worldwide, around 80% of deaths are due to direct causes. The four main causes are: severe hemorrhages (mostly postpartum hemorrhages), infections (especially sepsis), hypertensive disorders during the pregnancy (usually eclampsia) and dystocia. The complications from unsafe abortions represent 13% of deaths. Among the indirect causes of maternal death (20%), we must retain diseases that complicate the pregnancy or are worsened during this period of life such as malaria, anemia, HIV/AIDS, or cardiovascular diseases [23].

4) Support

In 65.6% of the cases in our study, the patients were care for within 24 hours and there is a relationship between the care times and the maternal death service with Chi-square: 10.08; $P < 0.03$. Moussa A. and all showed that 71.1% of the patients were cared for/treated before 24 hours [21]. The majority, 65.8% (256/389)

of our patients died in the gynecology and obstetrics department; In the study led by Moussa A. and all 76.7% of patients died in the gynecology department [21]. The patients died within 2 hours after admission in 99.5% of the cases according to our study. In our study, 10.3% of our patients died in the antepartum, 57.1% in perpartum, and 32.6% in the postpartum. Moussa A. and all found 27.3% of deaths in the antepartum, 8% in the perpartum and 64.7% in the postpartum [21]. The study in Tunisia has shown that all deaths have occurred after delivery, 60% in the immediate postpartum [22]. The blood transfusion needs were not met in 91.5% of the cases.

5. Conclusion

The maternal mortality remains high in our services and constitutes a major public health problem. It reflects the dysfunction of our health system, namely the problem of qualified personnel, the technical platform of health structures, and the dysfunction of our referral/evacuation system. Reducing the maternal death rate requires improving the SONU.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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