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Original Research Article

Maternal mortality by direct obstetric causes in an urban referral hospital: case of Boulmiougou District Hospital in Ouagadougou, Burkina Faso

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ABSTRACT

Background: Complications during pregnancy and childbirth are the leading causes of death and disability for women of childbearing age. Objective of this study was to study maternal mortality of direct obstetric origin at the Boulmiougou district hospital from 2010 to 2014.

Methods: This was a retrospective cross-sectional descriptive and analytical study of maternal deaths by direct obstetric cause at the maternity ward of Boulmiougou District Hospital during the period from January 1st 2010 to December 31st, 2014, i.e. 5 years.

Results: The maternal mortality rate by direct obstetric cause of 147.68 maternal deaths per 100,000 live births. The average age of the patients was 27.09 years old. The direct causes of maternal death were hemorrhage (47.06%), hypertensive disorders (20.59%), infections (14.71%) and unsafe abortion (11.76%). Contributing factors to maternal deaths were delay in evacuation (47.06%) and delay in care (38.23%).

Conclusions: Maternal mortality remains high in the Boulmiougou District Hospital. To effectively combat maternal mortality, it is important to focus on the continuous training of staff and the strengthening of the technical platform.

Keywords: Boulmiougou, Maternal mortality, Obstetric cause, Ouagadougou

INTRODUCTION

Maternal mortality remains a major challenge for health systems around the world.¹ According to WHO, about 830 women die every day in the world because of complications related to pregnancy or childbirth. In 2015, 303,000 women died during or after pregnancy or childbirth. Most of these deaths occurred in low-income countries and most could have been prevented.² Maternal

mortality is a social tragedy and constitutes a real public health problem. It is an indicator of the quality and supervision of obstetric care in a country.^{3,4} At the hospital level, it may be a witness to the quality of care supervision before, during and after delivery.³

Complications during pregnancy and childbirth are the leading causes of death and disability for women of childbearing age.⁵

In Burkina Faso, according to the 2010 Demographic and Health Survey (DHS), a woman dies as a result of a pregnancy-related complication every five hours. The maternal mortality ratio was 341 per 100,000 births in 2010, which is far from the Millennium Development Goals of 176.70 deaths per 100,000 live births for 2015; also, direct and preventable obstetric causes are responsible for about 80% of these deaths (haemorrhages, infections and dystocia etc.).⁷ In 2014, there was an overall obstetric case fatality rate of 2.01% at the national level, 4.65% at the hospital level and 1.69% at the district level. Specifically, this rate was 0.49% at Bogodogo District Hospital, 1.25% at Boulmiougou District Hospital and 5.09% at Yalgado OUEDRAGO University Hospital.⁸

These data are well above the WHO threshold of 1%. The high mortality in our context, could be explained by a low access of women to emergency obstetric care, an inadequacy of this care (for lack of qualified human and material resources, the 3 delays (delay in decision making, delay in evacuation, delay of care). Several strategies have been developed to improve maternal health in the world, in Africa and particularly in Burkina Faso. They were aimed at improving the performance of care through three mechanisms: strengthening the skills of providers, the establishment of an effective referral system and the availability of emergency kits.

Among the actions developed in Burkina Faso we can mention inter alia the implementation of National Health Development Plans (PNDS) 2001-2010 and 2011-2020, the implementation of the plan to accelerate the reduction of maternal mortality in 2006, the implementation of reproductive health plans and programs at regional and national levels, the adoption and implementation of Emergency Obstetric and Neonatal Care (SONU) in 2006, the implementation of programs to improve the quality and access to emergency obstetric care in developing countries.^{9,10}

Despite all these efforts, it is clear that women still lose their lives as a result of direct complications related to their pregnancy in different hospitals in Burkina Faso, including the Boulmiougou District Hospital. This sad reality challenges us. According to Margaret et al, information on maternal mortality ratios and trends is essential for resource mobilization, planning and assessment of progress 1.

That is why it seemed important to study the lethality of obstetric complications at the Boulmiougou district hospital, including epidemiological aspects, causes analysis and identification of contributing factors, in order to propose actions to help reduce its rate.

METHODS

It was a retrospective cross-sectional descriptive and analytical study on cases of maternal deaths of direct

obstetric cause at the maternity hospital of Boulmiougou District Hospital during the period of 2010-2014, ie 5 years. In the health system in Burkina Faso, the District hospital is the first reference level of patients. These hospitals may, in turn, refer patients to regional or university hospitals.

The study population was all maternal deaths by direct obstetric cause occurring at the maternity of Boulmiougou District Hospital. Our sample included patients who died by direct obstetric causes at the Boulmiougou District Hospital during the period from January 1st 2010 to December 31st, 2014 and whose records were exploitable. A pre-established form served as a data collection medium. Data sources included clinical records, birth records and operating room registers.

The overall lethality rate of obstetric complications was calculated as well as the specific lethality by type of complication.

The variables assessed were

- Sociodemographic data (marital status, geographical origin and the circumstances of admission)
- The clinical characteristics of the deceased women (gestational age, monitoring of pregnancy, general condition, the mode of termination of the pregnancy, the moment of death, causes of death)
- Therapeutic decisions (the mode of delivery, the treatment established) and the follow-up of the care
- The delay of taking care and the delay of death occurrence
- Assessment of three delays.

Statistical analysis

The data analysis was done using the software Epi info in version 7.1.1. The Chi-2 test and Student test were used to determine the factors contributing to maternal mortality. A value of p less than 0.05 for Chi-2 test was considered significant.

RESULTS

Epidemiological aspects

During the study period we collected 34 maternal deaths by direct obstetric causes for 23450 deliveries including 23023 live births. The ratio of maternal mortality by direct obstetric cause was 147.68 maternal deaths per 100,000 live births with an average of 6.8 maternal deaths per year. The maternal mortality ratio ranged from 85.4 to 226.18 per 100,000 live births from 2010 to 2014. The low rate was for the year 2010 and the high rate for the year 2011. The annual change in the maternal mortality ratio at Boulmiougou District Hospital from 2010 to 2014 was shown in Table 1.

Table 1: Evolution of maternal mortality ratio per year.

Year	Maternal deaths	Live births	Maternal mortality ratio per 100000 live births
2010	3	3513	85.4
2011	9	3979	226.2
2012	10	4542	220.2
2013	7	5185	135
2014	5	5804	86.1
Total	34	23023	147.7

Regarding the calculation of the case fatality rate, we did not take into account the medical records for the years 2010, 2011 and 2012. These records were incomplete. For 2013 and 2014, we counted 12 maternal deaths for 751 cases of direct obstetric complications. The overall case fatality rate for obstetric complications was 1.6%. Haemorrhage was the main cause of death with 7 cases on 10. The other causes represented one case each. Table 2 gives the lethality of the main direct obstetric complications. Lethality according delivery route was also calculated. Caesarean section had a higher fatality rate than vaginal delivery. It is presented in Table 3.

Regarding the women characteristics, age was not specified in one woman. The average age was 27.09 years with extremes of 16 and 42 years. Of 33 cases of maternal deaths, 21 (63.6%) were under 30 years old. More than three quarters (75.9%) of the patients lived in urban areas; 24.1% lived in rural areas. We have divided the patients according to whether they performed a gainful activity or not. Women who did not perform a gainful activity accounted for 97.1% (33 cases) of the women. The average parity was 2.22 deliveries, with extremes of 0 and 9. Table 4 presents the distribution of dead women by socio-demographic characteristics.

Table 2: lethality by direct obstetric complication from 2013 to 2014 (n=10).

Pathology	Number of cases	Number of deaths	Lethality
Pregnant- puerperal infections	35	1	2.9
Hemorrhage	206	7	3.4
Eclampsia	105	1	1
Abortion	21	1	4.8

Table 3: Lethality according to delivery route (n=25).

Delivery route	Women died	Living women alive	Lethality
C-section	6	2140	0.3 %
Vaginal delivery	19	21285	0.1%
Total	25	23425	0.1%

P < 0.05

Table 4: Distribution of dead women by socio-demographic characteristics (n=34).

Characteristics	Number	Percentage
Age		
< 20 years	6	17.6
20 - 24 years	7	20.6
25 - 29 years	9	26.5
30 - 34 years	7	20.6
>34 years	6	14.7
Place of residence		
Urban area	26	76.5
Rural area	8	23.5
Marital status		
Marital life	30	88.2
Single	4	11.8
Socio-professional status		
Non-remunerative activity	33	97.1
Remunerative activity	1	2.9
Parity		
Pauciparous	16	47.1
Nulliparous	7	20.6
Primiparous	5	14.7
Multiparous	5	17.6

Table 5: Distribution of dead women according to motif of admission (n=34).

Motif of admission	Number	Percentage
Childbirth	9	26.5
Hemorrhage	6	17.6%
Preeclampsia	6	17.6%
Abortion	3	8.8%
Anemia	2	5.9%
Others*	8	23.5%
Total	34	100%

*Chest pain (1), dyspnea (1), Excessive uterine height (1), Infection (1), Threat of premature labour (1), loss of Consciousness (1), vicious presentation (1), Pregnancy vomiting (1).

Clinical and therapeutic aspects

Patients were admitted by reference in 55.9% of cases (19/34). The others patients were self-referrals (44.1%).

Among the referred patients, 16 came from a first level health centre, 2 patients came from a medical centre and one patient came from a private facility.

Childbirth was the main reason for admission with 26.47% followed by haemorrhage and hypertensive disorders with 17.65% each. The motifs of admission are presented in Table 5.

The assessment of the general condition was noted in twenty-three (23) cases. Patients who died had a poor general condition in 10 cases (43.5%), a good general condition in 7 cases (30.4%), and a fairly good general condition in 6 cases (26.1%).

With regard to the consciousness status, 17 patients had a normal consciousness (73.9%), four (04) were obsessed or 17.4% and 02 patients were in coma or 8.7% of cases.

At admission, of the women who died, 8 were in the postpartum period, 15 women were in the third trimester of pregnancy and 4 were in the first trimester of pregnancy. In 7 women the gestational age was not specified.

Table 6: Distribution of dead women according to the diagnoses made at admission (n=26).

Diagnosis retained	Number	Percentage
Childbirth	9	34.6
Preeclampsia, eclampsia	5	23.1
Complications of abortion	4	15.4
Infections	3	11.5
Postpartum hemorrhage	2	7.7
Antepartum hemorrhage	1	3.9
Obstetric shock	1	3.9
Total	26	100%

After physical examination and paraclinical assessment, the diagnoses retained were labour, preeclampsia / eclampsia, abortion complications and infections with 34.6%, 23.1%, 15.4% and 11.5%, respectively. The different diagnoses are listed in the Table 6.

With regard to the therapeutic management, it should be noted that with regard to the therapeutic management, it should be noted that the time of first contact with the caregiver was ranged from 0 to 30 minutes with an average delay of 5.12 minutes for 25 patients. The time between admission and the moment of first contact was not specified for 9 women. Twenty-one (21) women (84% of the cases) had undergone a clinical examination within 15 minutes of their arrival in the emergency room, and 4 women (16%) had undergone clinical examination in 15 to 30 minutes.

The delay of care could not be specified in 13 women. Patients in whom this delay has been specified, care began within 0-45 minutes with an average delay of 10.6

minutes. In 90.5% of the cases (19/21), treatment was given within 30 minutes after the first contact with the nursing staff. In 9.5% of cases (2/21), women waited between 30 minutes to 1 hour.

Surgery was indicated in 7 patients. The time between the indication and the beginning of the surgery exceeded 1 hour in all patients (70 to 95 minutes).

Six (06) women needed a blood transfusion but only 04 actually benefited but the quantities were less than the actual needs.

Death data

Deaths occurred in the postpartum period 67.7% (23 cases), in the pregnancy period 20.6% (7 cases) and in the post-abortion suites 11.8% (4 cases). Table 7 shows the distribution of dead women according to the outcome of pregnancy.

Table 7: Distribution of dead women according to the outcome of pregnancy.

Pregnancy outcome	Number	Percentage
Vaginal delivery	16	47.06
Fetus no expelled	7	20.59
C-section	6	17.65
Abortion	4	11.76
Laparotomy (uterine rupture)	1	2.94
Total	34	100

The time between patient admission and death was also calculated. The average overall time was 22 hours 27 minutes. Relative to the admission time, the death occurred in less than one hour in 8 cases, between 1 hour and 24 hours in 13 cases and more than 24 hours in 9 cases.

Table 8: Distribution of dead women according to the obstetric causes (n=34).

Obstetric causes	Number	Percentage
Hemorrhage	16	47.1
Complications of preeclampsia	7	20.6
Obstetric infections	5	14.7
Complications of abortion	4	11.8
Dystocia	2	5.9
Total	34	100

The causes of maternal deaths were assessed. Haemorrhage was the first cause with 47.1%. The other causes were preeclampsia/eclampsia, infection with 20.6% and 14.7%. The distribution of dead women by obstetric cause is presented in Table 8.

Contributing factors of death were identified after univariate analysis. During the study, there were 6 post-caesarean deaths out of 2146 or 0.28%, compared to 16

deaths following vaginal delivery in 21304, ie. 0.08% ($p < 0.05$). The distribution of contributing factors to the occurrence of maternal deaths has been reported in Table 9.

Table 9: Factors associated to occurrence of maternal deaths.

Contributing factors	Number	Percentage
Delay to evacuation	16	47.06
Delay to support decision making	13	38.23
Delay in giving care	8	
Lack of blood	2	
Care served too later	1	
Blood transfusion trouble	1	
Delay in treatment prescription	1	
Delay to medical consultation	5	14.71
Pregnancy without follow up	3	
Lack of financial means	2	

DISCUSSION

The ratio of maternal mortality by direct obstetric cause was 147.7 maternal deaths per 100,000 live births. This rate is higher than that of Chelli et al in Tunisia.¹¹ However, it is lower than those of Foumsou in Chad, Fomulu in Cameroon and Igberase in Nigeria, which were respectively 968, 365 and 2232 per 100,000 live births.¹²⁻¹⁴ This ratio is comparable to the average estimated for the West Africa region according to Filippi et al, and those of other authors in the same region.^{9,10,16} This difference in ratio could be explained by the technical level of hospitals (level 2 versus level 3). In addition, the establishment of maternal death audit sessions could have contributed to improving the quality of care in this institution.

The average age in this series was 27.09 years. This result is superior to that of Foumsou et al, in N'Djamena.¹³ This average is lower than that of several other authors who varies between 28.2 and 33 years.^{5,11,12,15} The frequent early marriages in our area could explain this average age. Housewives who did not engage in gainful employment accounted for 95.45% of the women who died in our study. Poverty, ignorance, the very difficult living conditions of housewives could explain this very high proportion of housewives among the deceased.

The maternal mortality ratio has decreased from 2012 it has increased from 220.2 per 100,000 births to 135 in 2013 and to 86, 1 in 2014. Similarly, the case fatality rate of obstetric complications has increased from 2, 3% in 2013 to 1.1% in 2014. Effective implementation of emergency obstetric care after strengthening the operational capacity of the hospital could be the reason. During this period, in addition to the training of personnel

in emergency obstetric and neonatal care, the number of gynaecologists-obstetricians went from 3 to 6 and that of midwives / maieutic from 41 to 65.

The causes of mortality found are classic. Haemorrhage was the first cause and accounted for 47.1%. This result fits with those of several authors but the proportions are variable.^{4,5,11,12,15,16} Haemorrhage remains an important factor in maternal morbidity and mortality in developing countries due to lack of blood products and preventive measures in hospitals in these countries.

For Igberase and Ebeigbe, the most common causes of maternal mortality were puerperal sepsis, abortion complications, pre-eclampsia/eclampsia, prolonged obstructed labour, haemorrhage accounting for 33%, 22.6%, 17.4%, 13.0% and 7.8%, respectively.¹⁴

Hypertensive complications ranked 2nd with 20.59%. This same rank was found by Filippi, Chelli and Thiam.^{11,15,16} In Foumsou's study in Chad, this pathology was the leading cause of maternal death.¹³ The popularization of focused antenatal care and women's adherence to this care could make it possible to detect these pathologies early and take care of them in time.

Infections ranked 2nd in most studies in sub-Saharan Africa is in 3rd place in our series with 14.71% as in that of Foumsou in Chad.^{4,12,13} Compliance with the prevention of infection during delivery, screening and treatment of genital infections during pregnancy would have significantly reduced this condition.

In addition, the study identified factors that likely contributed to maternal mortality. Indeed, the mortality rate for women who had a caesarean section was 3.5 times that of women who gave birth vaginally ($p < 0.05$). This finding could be explained by the risk of haemorrhage and infectious diseases, which are often higher during caesareans carried out urgently on parturient who have been referred or who have been treated late.

The 3 delays are known for their contribution to maternal morbidity and mortality. In our series, the delay in evacuation was noted in 47.06% of the cases of death and the delay in the decision to take care in 38.23% of the cases. Foumsou had found the delay in consultation as a contributing factor to maternal mortality in 67.4% of cases.¹³ The delay in taking care could be explained by the deficiency of the technical platform, the lack of transfusion products and the lack of qualified personnel available at the opportune moment of taking care. Indeed, because of the workload, some patients had to wait a long time before receiving first care.

CONCLUSION

Maternal mortality by direct obstetric cause remains a major concern at the Boulmiougou District Hospital. The

main causes are haemorrhage, preeclampsia and its complications and finally infections. The majority of these deaths could be avoided with a strengthening of competent providers in obstetrics and a better organization of care. We believe that introducing free obstetric and neonatal care could help reduce this tragedy.

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