Determinants of Maternal Mortality at the Community University Hospital of Bangui: Central African Republic

Gertrude Rose De Lima Kogboma Wongo[1*], Thibaut Boris Clavaire Songo-Kette Gbekere[2], Rodrigue Herman Doyama-Woza[3], Siméon Matoulou-M'bala Wa-Ngogbe[1], Alida Koirokpi[1], Sabrina Ouapou[1], Georges Trésor Gamache[1], Norbert Richard Ngbale[1], Abdoulaye Sepou[1]

[1]Department of Gynaecology and Obstetrics, Centre Hospitalier Universitaire Communautaire, Bangui, Central African Republic
[2]Department of Gynaecology and Obstetrics, Centre Hospitalier Universitaire de l'Amitié Sino Centrafricaine, Bangui, Central African Republic
[3]Department of Public Health, Faculty of Health Sciences, University of Bangui, Bangui, Central African Republic
Email: *wgertruderose@yahoo.fr

Abstract

Introduction: Pregnancy is a physiological condition that can sometimes end in death. The death of a woman is a constant concern for the obstetrician and is considered a major public health problem in our developing countries. **Objective:** To identify the determinants that contribute to maternal morbidity and mortality in the Gynaecology and Obstetrics Department of the University Community Hospital. **Methodology:** We conducted a retrospective study from 1 January 2015 to 31 December 2019 (5 years) in the obstetrics and gynaecology department of the Centre Hospitalier Universitaire Communautaire (CHUC). It focused on the determinants of maternal mortality. Our study population consisted of all women who died during the period and met the World Health Organization (WHO) definition of maternal mortality (MOMA). We used non-probability sampling with the exhaustive choice technique. **Results:** The study revealed that the number of deaths recorded was 98, while 17,172 live births were registered during the same period. The maternal mortality ratio was 570 per 100,000 live births. The most common age group was 20 to 24, with an average age of 26. The frequency of death among primiparous women was 37.74%, pauciparous women 28.30% and multiparous women 26.42%. Direct causes were dominated by abortion complications (22.41%), followed by infections (9.30%) and haemorrhage (8.19%). Indirect causes were dominated by anaemia with a proportion of 45.16%. The majority of maternal deaths occurred in the post-partum period (34.71%). Most maternal deaths occurred after vaginal delivery, 19 cases (63.33%), while 11

deaths (36.66%) occurred after caesarean section. The occurrence of direct causes was associated with age less than or equal to 25 years, abortion complications and primiparity, with a statistically significant difference. **Conclusion:** At the end of this study, complications of unsafe abortion and poverty are all factors contributing to the rise in the maternal mortality rate. Emphasis should be placed on promoting family planning, as this would make a major contribution to reducing maternal mortality.

Keywords

Maternal Mortality, Determinants, Community Hospital

1. Introduction

The death of a woman during pregnancy, childbirth and the postnatal period is a major public health problem. Worldwide, an estimated 1500 women die every day from complications related to pregnancy or childbirth [1]. Most (99%) of these deaths occur in low-income countries, half of them in sub-Saharan Africa and nearly a third in South Asia [2] [3]. The situation in the Central African Republic (CAR) is very worrying. The maternal death rate in 2003 was 1355 per 100,000 live births (LBW), which corresponds to 1 maternal death every 5 hours [4] [5]. In response to this problem, in 2011 the country drew up a strategic plan entitled "Strategies to reduce maternal mortality". Implementation of this plan has reduced the maternal death rate by 882 per 100,000 live births [6]. With this in mind, we conducted this study to identify the determinants that contribute to maternal morbidity and mortality in the gynaecology and obstetrics department of the Centre Hospitalier Universitaire Communautaire (CHUC). And in specific ways:

- Determine the maternal mortality ratio at the CHUC.
- Describe the socio-economic and demographic characteristics of pregnant women and women who have given birth who are victims of maternal death.
- To study the circumstances in which maternal deaths occur.

2. Patients and Method

We conducted a retrospective study from 1st January 2017 to 31 December 2021, over a period of 5 years in the obstetrics and gynaecology department of the CHUC.

The study population consisted of the records of women who died in the department during the period of our study. According to the World Health Organisation, maternal mortality is defined as the death of a woman during pregnancy or within 42 days of the end of pregnancy, irrespective of the duration or location of the pregnancy, from any cause determined or aggravated by the pregnancy or the care it required, but neither accidental nor fortuitous [7].

All women who died in the department during pregnancy, childbirth and the post-partum period up to 42 days after delivery were included in the study.

Women who died while not pregnant were not included, as were those who died outside the post-natal period and those whose medical records were not available.

We chose non-probability sampling using the exhaustive selection technique.

A pre-established questionnaire containing the parameters studied was used as a data collection tool. The data sources were patient files and registers found in the operating theatre, the obstetric emergency unit and the pathological post-natal unit.

The parameters studied included socio-demographic and economic characteristics, antecedents, causes of death and factors influencing maternal death.

After quality control, the data were immediately entered using Epi-info software version 7.2.1.0 and recorded and processed. The results were analysed to calculate the mean and percentage. Relationships were studied using the chi-square test. A p value < 0.05 is statistically significant.

Ethics: A study protocol was validated by the ethics committee of the University of Bangui before the study was carried out.

3. Results

During the period of our study, we recorded 98 maternal deaths in the Gynaecology and Obstetrics Department of the CHUC. During the same period, 17,172 live births were recorded, giving a maternal mortality ratio of 570.70 per 100,000 live births.

The evolution of maternal mortality ratios over the last 5 years shows that after a significant decrease from 2018 to 2020, there is a slight increase in 2021.

The median age was 26 years, with extremes ranging from 16 to 41 years (Table 1).

The under-25 age group accounted for 41.58% (Table 1).

The frequency of maternal death was higher among the poorest 37.75% (Table 2) and the poorest 29.59% (Table 2).

Direct causes were dominated by abortion complications (31.34%), followed

Table 1. Distribution of deceased according to age group.

Age group	Frequency	Percentage
≤19 years old	13	13.26
20 - 24 years old	**28**	**28.6**
25 - 29 years old	16	16.32
30 - 34 years old	16	16.32
35 - 39 years old	17	17.34
≥40 years old	8	8.16
Total	98	100.00%

by puerperal infections (17.91%) and post-partum haemorrhage (16.41%) (Figure 1). In terms of indirect causes, anaemia came first with a proportion of 45.16% (Figure 2).

Most maternal deaths occurred after vaginal delivery, 19 cases or 63.33%, while 11 deaths or 36.66% occurred after caesarean section (Table 3).

Primiparity was associated with the occurrence of direct causes, with a statistically significant difference.

Age less than or equal to 25 years was associated with the occurrence of direct causes (Table 4) and abortion complications (Table 5), with statistically significant differences.

Patients who died of direct causes often died on immediate admission to hospital, with a statistically significant difference.

Table 2. Frequency of deaths according to gesture and parity.

Items	Frequency (n = 98)	Percentage
Gesture		
Primigesture	16	16.35
Paucigesture	**37**	**37.75**
Multi gesture	23	23.46
Grand multigesture	22	22.44
Parity		
Nulliparous	10	10.23
Primiparous	**29**	**29.59**
Pauciparous	24	24.48
Multiparous	23	23.46
Grandmultiparous	12	12.24

Table 3. Frequency of deceased according to time of death.

Time of death	Frequency	Percentage
during the pregnancy	20	20.40
During the labor	14	14.28
During post-partum	**34**	**34.71**
During post-abortion	30	30.61
Total	98	100.00

Table 4. Distribution of the deceased according to age in relation to the causes.

Causes	Age		p
	≤25 years old	>25 years old	
Direct	41	26	0.014
Indirect	10	21	

Table 5. Distribution of deceased by age in relation to direct causes (n = 67).

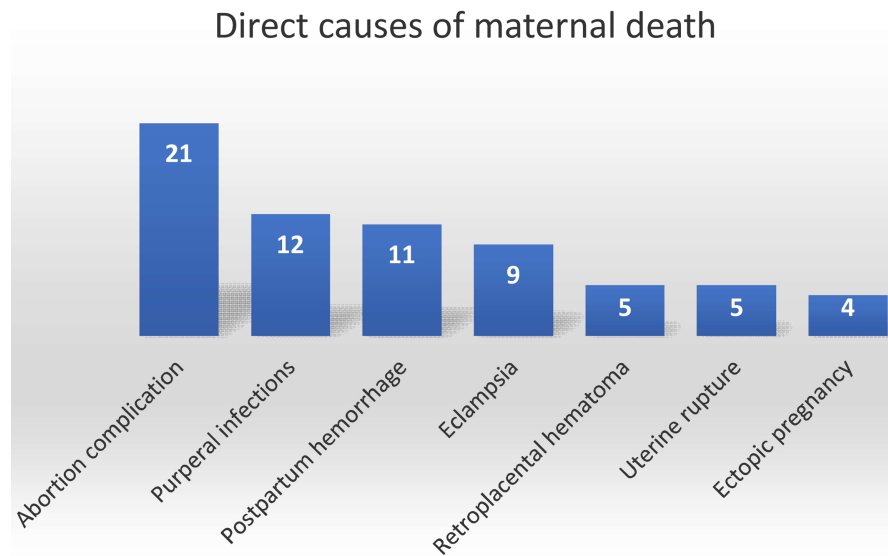| Direct causes	Age		p
	≤25 years old	>25 years old	
Abortion	15	6	0.018
Other causes	17	29	

Figure 1. Distribution of deceased according to direct causes (n = 67).
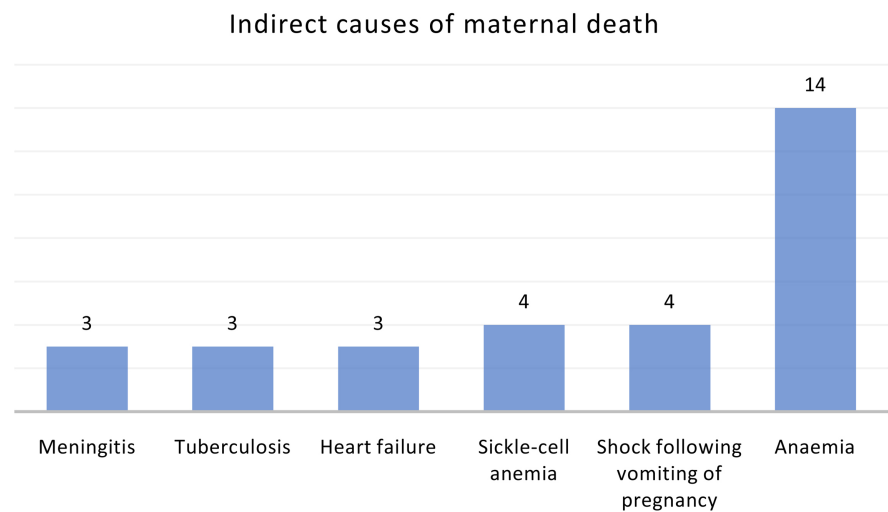

Figure 2. Distribution of deceased according to indirect causes (n = 31).

4. Discussion

Our study focused on the determinants of maternal mortality in the Gynaecology and Obstetrics Department of the Centre Hospitalier Universitaire Communautaire, which is a referral centre. A study of the records of patients who died during the study period enabled risk factors and common causes to be identified, with a view to identifying certain measures that could help reduce maternal

mortality.

The Maternal Mortality Ratio (MMR) in our series was 570 per 100,000 live births. Changes in MMR over the last 5 years show that after a significant drop from 2018 to 2020 (987 to 250), there is a slight increase in 2021 (250 to 400). This result is below the national rate but comparable to that reported by Mbaye et al. in Senegal, with a rate of 592/100,000 live births over 7 months [8]. This rate is also comparable to that of other countries in the sub-region (500 to 999 per 100,000 live births) [9], although it is much higher than that of developed countries (9 per 100,000 live births) [10].

In our study, young girls aged under 25 were the most represented. The average age was 26, virtually the same as that found by Alida *et al.* in 2016 in the same department [11]. The same trend was found by Kané in Mali who found an age range of 14 to 25 years [12] and Baldé with an age range of 14 to 16 years [13]. On the other hand, Thiam *et al.* in Senegal reported ages ranging from 20 to 39 years, with an average age of 28.4 years [14].

Analysis in this study showed that age less than or equal to 25 years was associated with maternal causes of death, with a statistically significant difference (Chi2 = 5.9979; p < 0.014). Similarly, complications of abortion occur much more frequently in young women aged 25 or under, with a statistically significant difference (Chi2 = 5.5549; p < 0.018). This high maternal mortality rate among young girls is explained by the fact that the contraceptive prevalence rate among young people remains low (12%) [15], which more often than not exposes them to unwanted pregnancies with their attendant complications. A study conducted by Sépou in Bangui found that girls began having sex at the age of 14 [16] [17]. This means that adolescent girls are often exposed to the risk of morbidity and mortality.

Primiparity and multiparity play an important role in the causes of maternal death [18]. According to some authors, nulliparity and multiparity are a risk factor for maternal death: Friday E. *et al.* in Nigeria 31% and Diakariadia in Mali 24.24% [19] [20]. As pointed out by another author, the two extreme parities are mainly affected, 11.8 per thousand for primiparous women and 16.7 per thousand for large multiparous women [21]. Our series is dominated by primiparous women (29.59%) followed by poor women (24.48%). The analysis also showed that primiparity was associated with the causes of maternal death, with a statistically significant difference (Chi2 = 10.0855; p < 0.00014). Anki Yambare in Congo found a similar result with 40% of primiparous women [22]. Baldé reports 67.3% of nulliparous women, whereas Diakariadia reports 24.4% of large multiparous women.

Although women of extreme parity (primiparous and multiparous) are more represented, we believe that maternal mortality does not spare any parity category.

The antenatal consultation is an important part of pregnancy monitoring, as it enables anomalies to be detected and treated. It is also the ideal time to carry out

certain preventive measures (screening for risk factors, anti-tetanus vaccination, etc.) and to educate women about the progress of pregnancy and childbirth [18]. The new WHO recommendations recommend eight (8) contacts for better pregnancy monitoring [23]. In our study, 53.06% of the women who died did not attend antenatal clinics. This result is comparable to those of Diakaradia (63.6%) and Baldé (57.7%) [13] [19]. In contrast, Thiam *et al.* found that 75% of women attended antenatal clinics [14]. This difference may be explained by the low level of education and unfavourable socio-economic conditions in the Central African Republic.

According to estimates, direct causes account for 80% of maternal deaths compared with 20% of indirect causes [24]. In our series, direct causes predominated, at 68.36%, compared with 31.63% for indirect causes, data similar to those of other authors [13] [14] [25]. In the latest report by the national committee of experts on maternal mortality (2001-2006), obstetric haemorrhage was the leading cause of death, accounting for 25% of direct obstetric causes [26]. Direct causes were dominated by complications following unsafe abortions (31.34%), followed by puerperal infections (17.91%) and postpartum haemorrhage (16.41%). Indirect causes, on the other hand, were dominated by anaemia (45.16%). The increasing incidence of complications in high-risk abortions has been reported in some studies [11] [27]. However, Fomulu found haemorrhage, eclampsia and infection in order of frequency [25]. Baldé found that 32.6% of women died as a result of eclampsia [13].

This difference may be explained by the young age of our patients, the early onset of sexual relations and the high frequency of clandestine abortions [16] [17]. The majority of deaths occurred after childbirth (34.61%), followed by abortion (30.60%). This result is comparable to that of Bohousou *et al.* in Côte d'Ivoire (58.5% [28]) and Baldé in Mali (82.7% [13]). This high rate of death after childbirth could be explained by poor monitoring of newborns, leading to late diagnosis of postpartum haemorrhage, which is responsible for a large number of maternal deaths.

The referral and counter-referral system is a pillar in the fight against maternal mortality. In our study, most of the women who died had come from home without having been to a health facility. These women often come late because the decision to come to a health facility is often taken late (type 1 delay). Moreover, Sépou *et al.* [29] demonstrated in a study that late evacuation contributes to maintaining the maternal mortality rate at a high level. In our series, the referral was not related to the cause of death.

5. Conclusion

At the end of this study, complications of unsafe abortion and poverty are all factors contributing to the rise in the maternal mortality rate. Emphasis should be placed on promoting family planning, as this would make a major contribution to reducing maternal mortality.

Conflicts of Interest

The authors declare that they have no conflict of interest in relation to this manuscript.

References

[1] Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A.B., Daniels, J.D., *et al.* (2014) Global Causes of Maternal Death: A WHO Systematic Analysis. *The Lancet Global Health*, **2**, e323-e333. https://doi.org/10.1016/S2214-109X(14)70227-X

[2] Kassebaum, N.J. (2016) Global, Regional, and National Levels and Trends in Maternal Mortality between 1900 and 2015, with Scenario-Based Projections to 2030: A Systematic Analysis by UN Maternal Mortality Estimation Inter-Agency Group. *The Lancet*, **388**, 1775-1812.

[3] Organisation mondiale de la santé (2008) Health in Asia and the Pacific.

[4] Ministère de l'Economie, du plan et de la coopération Internationale (2003) Recensement Générale de la population et de L'Habitation de 2003. 74 p.

[5] Ministère de l'Economie, du Plan, des Statistiques et de la Coopération Internationale (1988) Recensement Générale de la Population de 1988. 28 p.

[6] Union Européenne (2018) Évaluation des interventions du Fonds Békou dans le secteur santé de la République Centrafricaine. Rapport final de Mai 2018, 11 p.

[7] (1993) Classification statistique internationale des Maladies et des Problèmes de santé connexes. Dixième Révision. Genève, 1: 1335 p.

[8] Mbaye, M., Gueye, S.M. and Gueye, M. (2006) Les soins obstétricaux et néonataux d'urgence au centre niveau II de Rufisque: Impact du redéploiement du personnel de la maternité du CHU Le Dantec. *Journal de la SAGO*, **7**, 5-10.

[9] OMS, UNICEF, FNUAP et le groupe de la Banque mondiale (2019, Septembre 19) Mortalité maternelle: Niveaux et tendances, 2000 à 2017. 13 p.

[10] Organisation Mondiale de la Santé. Mortalité maternelle en 2005 (2005) Estimations établies par l'OMS, UNICEF, le FNUAP et la banque mondiale. Genève, 45 p.

[11] Koïrokpi, A., Matoulou-Mbala Wa-Ngogbé, S., Ngalé, N.R., Gaunefet, C.E. and Sépou, A. (2016) Réduction de la mortalité maternelle hospitalière: Quelle stratégie pour "l'hôpital communautaire de Bangui"? *Annale université de Bangui, Série D*, **2**, 19-24.

[12] Kané, A. (2017-2018) Audit des décès maternels au centre de Santé de référence de la commune IV du district de Bamako. Thèse de doctorat, Université des sciences, des techniques et des technologies de Bamako; Faculté de médecine et d'odonto-stomatologie, Bamako, 55 p.

[13] Baldé, M. (2018-2019) Mortalité maternelle chez les adolescentes à l'hôpital Fousseyni Daou de Kayes sur une période de 10ans. Thèse de doctorat, Université des Sciences des Techniques et des Technologies de Bamako; Faculté de médecine, et d'odontostomatologie, Bamako, 81 p.

[14] Ousmane, T., Mamadou, L.C., Mouhamadou, M.N., *et al.* (2014) Mortalité maternelle au centre de santé Roi Baudouin de Dakar (Senegal): À propos de 308 cas. *Mali Medical*, **29**, 1-24.

[15] Ministère de la Santé Publique et de la Population (2020) Enquête rapide sur les soins obstétricaux et néonataux d'urgence (ER-SONU). 55 p.

[16] Sépou, A., Yanza, M.C., Domandé-Modanga, Z. and Nguembi, E. (2002) Paramètres sexuels chez les femmes centrafricaines en milieu urbain. *Médecine d'Afrique Noire*,

49, 87-91.

[17] Sépou, A., Serdouma, E., Gody, C., Koffi, A., Godot, D., Fongbia, J.P. and Moussa, E.C. (2011) Sexualité et maternité précoces à Bangui. *RCA Annale de la SOGGO*, **16**, 1-4.

[18] Saizonou, J., Aguele, D.V., Aguemon, B., Mogboade, V., Assavedo, S. and Makoutode, M. (2014) Evaluation de la qualité des services de consultation prénatale recentrée à l'hopital de Suru-Lere au Benin. *Santé Publique*, **2**, 249-257.
https://doi.org/10.3917/spub.138.0249

[19] Diakariadia, S.D. (2013-2014) Evolution de la mortalité maternelle dans le service de gynécologie obstétrique à l'hôpital Fousseni Daou de Kayes sur 5 ans et demi. Thèse de doctorat, Université des sciences, des techniques et des technologies, Faculté de médecine et d'odontostomatologie, Bamako, 93 p.

[20] Okonofua, F.E., Abejide, A. and Makanjuola, R.A. (1992) Maternal Mortality in Ile-Ife, Nigeria: A Study of Risk Factors. Vol. 23, Population Council, New York, 319-324. https://doi.org/10.2307/1966529

[21] Diallo, F.B., Diallo, A.B., Diallo, Y., Goma, O., Camara, Y., Cisse, M. and Diallo, M.S. (1998) Mortalité maternelle et facteurs de risques liés au mode de vie. *Médecine d'Afrique Noire*, **45**, 723-727.

[22] Yambaré, A. (2013-2015) Analyse des déterminants de la mortalité maternelle prépartum en République du Congo. 21 p.

[23] Alkema, L., Chou, D., Zhang, S., Moller, R. and Germmil, A. (2016) Recommandations de l'OMS concernant les soins anténatals pour que la grossesse soit une expérience positive. Résumé d'orientation. *The Lancet*, **387**, 462-474.
https://doi.org/10.1016/S0140-6736(15)00838-7

[24] Gnizin Sebout, D. (2014-2015) Audit des décès maternels et néonatals dans le district Sanitaire de Kolokani. Thèse de doctorat, Université des sciences, des techniques et des technologies de Bamako, Faculté de médecine et d'odonto-stomatologie, Bamako, 161 p.

[25] Fomulu, J.N., Ngassa, P.N., Nong, T., Nana, P. and Nkwabong, E. (2009) Mortalité maternelle à la maternité du centre hospitalier universitaire de Yaoundé, Cameroun: Étude rétrospective de 5ans (2002 à 2006). *Health Sciences and Disease*, **10**, 1-6.

[26] Benbassa, A., Bouvier-Colle, M.H., Connehaye, P., Fillette, D., Joly, J., *et al.* (2007) Rapport du comité national d'expert sur la mortalité maternelle (CNEMM). Rapport de recherché, Institut national de la santé et de la recherche médicale, France.

[27] Ngazabayo, Z. (2006) Analyse de la mortalité maternelle à l'hôpital Communautaire de Bangui (République Centrafricaine). Thèse de doctorat en medicine, Faculté des Sciences de la Santé, Université de Bangui, Bangui, 1-103.

[28] Bohoussou, M.K., Djanhan, Y., Boni, S., Koné, N., Welffens-Ekra Chr and Touré, C.K. (1992) La mortalité maternelle à Abidjan en 1988. *Médecine d'Afrique Noire*, **39**, 480-484.

[29] Sépou, A., Goddot, M., Ngbalé, R., Gaunefet, C., Domandé-Modanga, Z., Fandéma, E., *et al.* (2009) Evolution de la fréquence et des problèmes liés aux évacuations sanitaires vers le service de gynécologie-obstétrique de l'Hôpital Communautaire de Bangui. *Clinics in Mother and Child Health*, **6**, 1007-1012.