

# Management of Obstetric Emergencies in a Tertiary Hospital in Cameroon: A Milestone for End of Preventable Maternal Deaths

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**How to cite this paper:** Tchounzou, R., Njamen, T.N., Ngalame, A.N., Baleba, V., Rakya, I., Wekam, D.M., Wambo, A.G.S., Tatah, H.N., Kamdem, D.E., Bilkissou, M., Elong, F.A., Tamchom, D.D., Batta, J.N. and Mboudou, E.T. (2020) Management of Obstetric Emergencies in a Tertiary Hospital in Cameroon: A Milestone for End of Preventable Maternal Deaths. *Open Journal of Obstetrics and Gynecology*, 10, 1749-1762. <https://doi.org/10.4236/ojog.2020.10120158>

**Received:** October 31, 2020

**Accepted:** December 27, 2020

**Published:** December 30, 2020

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## Abstract

**Background:** Maternal mortality was insufficiently reduced in Cameroon in 2015 despite the adoption of Millennium development goals. To tackle the situation and meet the sustainable Millennium goals target of 140/100,000 live births by 2030, the Government adopted the strategies of building reference hospitals where high quality obstetric care, timely and optimal management of obstetric emergencies will be offered. **The objective** of this study was to describe the patterns of obstetric emergencies in **Douala Gynaeco-obstetric and Paediatric Hospital**, evaluate the outcomes of their management and the contribution to maternal mortality. **Patients and Methods:** 418 patients with obstetric emergencies were included in a two-phase cross-sectional study. Data were retrieved from patients' case notes during the retrospective phase and a questionnaire filled for each case received during the prospective phase. Patterns of obstetric emergencies were determined and for each, the following were analysed: patient managed in this hospital or referred from other hospitals, management according to hospital guidelines, timing of care, result of management (recovery with no admission in ICU (*intensive care unit*), admission in ICU, death). Factors associated with each case of death were analysed. **Results:** The patterns of obstetric emergencies (*OE*) were dominated by HDP (*hypertensive diseases in pregnancy*) (20.57%), abortions (14.83%),

Ectopic pregnancies (13.87%), Acute foetal distress (13.15%) and Obstructed labour (9.56%). PPH (*post partum haemorrhage*) represented 7.65% and Sickle cell crisis (SCA) 0.91%. 40% of cases were referred from other hospitals. Six cases of deaths were recorded with a global case fatality of 1.43%. The causes of death were PPH, HDP, and Sickle cell anaemia 33.33% each. The case fatality of SCA was 50%, disclosing our worst performance. **Conclusion:** Management of OE following standardized hospital guidelines, reinforcement of referral systems, upgrading obstetrical services with ICU will result in least adverse maternal outcomes and especially reduced maternal mortality.

## Keywords

Obstetric Emergencies, Tertiary Hospital, Maternal Outcome, Maternal Death

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## 1. Introduction

Reducing maternal mortality by the year 2015 was one of the most challenging millennium goals pledged by the United Nations' members in 2000. The target was to reduce by 75% the high maternal mortality ratios of the 1990's by the year 2015 [1] [2]. There has been a period of escalation of maternal mortality in low and middle income countries (LMIC) and especially in sub-Saharan Africa where the majority of the world maternal death was recorded [1] [3] [4] [5]. The evaluation of the achievement of the goal showed a global reduction of 44% worldwide but with a lot of disparities in the efforts of countries [2] [6] [7]. In a new publication of WHO, entitled Ending preventable maternal mortality (EPMM), new target at country level was established at a maternal mortality rate (MMR) not more than 140/100,000 live births [8]. In Cameroon MMR has almost doubled from 430/100,000 live births in 1998 to 782 in 2011 [3] [5] [9]. To respond to this situation, the Cameroon government has adopted amongst other strategies the one of constructing tertiary hospitals with high technology equipment, skilled health workers and other facilities with the missions of offering high quality obstetric care (state of the art obstetric care). These hospitals are expected to offer evidence based reproductive health care to women to minimise maternal deaths. Tebeu *et al.* in a study conducted in a tertiary hospital in Cameroon, in 2010, reported an MMR of 287.5%/100,000 live births as compared to 782 at National level [9]. Amongst the strategies proven efficient to reduce maternal and perinatal deaths are management of obstetric and neonatal emergencies, the antenatal care, skilled birth attendants, and good health care delivery system. Appropriate and timely management of obstetric emergencies in hospital (reducing the third delay) has been proven as an efficient strategy to reduce maternal and neonatal mortality by many authors [8] [10]. In a study conducted in Nigeria, Lamina Mustafa *et al.* [11] found that obstetric emergencies constitute 18.5% of deliveries and represented 70.6% of causes of maternal death. Di-

rect obstetric causes of MM in Cameroon include post partum haemorrhage (29.2%), unsafe abortions (25%), ectopic pregnancy (12.5%), hypertensive diseases in pregnancy (8.3%) and indirect causes include malaria (8.2%) and cardiac diseases in 4.2% [9]. Studies designed to determine the case fatality of individual causes of maternal and perinatal death are scarce in Cameroon. The objective of this study was to describe the patterns of obstetric emergencies in HGOPED, the outcome of management and the contribution of each of these to maternal death.

## **2. Patients and Methods**

### **2.1. Study Site**

DGOPH is a tertiary Hospital created in 2013 and inaugurated in 2015, mainly dedicated to mother and child care. The three missions of this institution comprise of 1) providing high standard and quality care to targeted patients, 2) contributing to Medical training and 3) healthcare related research. The infrastructure and equipment are of high quality; human resources include 9 obstetrician and Gynaecologists, 5 Paediatricians, 3 intensive care workers, radiologists, surgeons, qualified midwives, nurses and many other categories of workers involved in management of emergencies. The laboratory service host one of the most functional blood bank units of the country where blood products like whole blood, frozen plasma, packed cells, platelets are always available.

In this study, an obstetrical emergency was any life-threatening medical condition during pregnancy, labour or post partum. The scope included direct obstetrical causes and acute complications of some indirect causes like malaria, cardiac diseases, and sickle cell anaemia.

### **2.2. Work Organization and Management of Obstetrical Emergencies (OE) at DGOPH**

The work organization in the department of Obstetrics and Gynaecology is divided into two shifts for medical physicians, residents in Obstetrics and Gynaecology: the daily routine activities and the call duties. Besides routine duties, the service is covered every day by a team comprised of the above mentioned workers' categories, supervised by a consultant obstetrician and gynaecologist who work in close collaboration with the team of midwives, nurses and other paramedical staff. The hospital has elaborated guidelines for the standardized management of the most frequent OE and gynaecological emergencies. Thought not exhaustive, these guidelines are qualitatively and quantitatively updated on regular basis.

### **2.3. Study Design**

We carried out a two phases cross sectional study with the retrospective phase consisting of review of service delivery records of cases of obstetrical emergencies from August 2015 to December 2017. In the prospective phase same infor-

mation was recorded to refine the analysis from January 2018 to December 2019.

#### **2.4. Inclusion Criteria**

All cases of obstetrical emergencies received and managed during the period of study were included.

#### **2.5. Exclusion Criteria**

Those with incomplete data in the files (retrospective phase) or who died less than two hours after admission in our maternity (prospective phase) were excluded. We also excluded all patients who refused to participate in the study.

#### **2.6. Variables Collected and Analyzed**

We compiled the following information from patients' files or directly from patients or relatives in the prospective phase and entered in a pre-tested data collection sheet: 1) Socio-demographic data such as age, level of education and profession; 2) obstetric information: parity, gestational age and 3) therapeutic information: patient managed in this hospital or referred, diagnosis or type of obstetric emergency, management according to hospital guidelines or no, obstetrician present at arrival or not, maternal outcome (successful with no admission in intensive care unit (ICU), admission in ICU, death, referred to other health facilities).

Case fatality was determined for each type of obstetric emergency and in case of death, factors involved were analysed (existence of protocol of management, timing of management, availability of carers, and availability of blood products) to evaluate the use of evidence-based and standard health care procedures.

Data analysis was done using SPSS version 23 software.

#### **2.7. Ethical Considerations**

We obtained clearance from the hospital institutional review board and the General Manager granted administrative authorization.

### **3. Results**

*The results were similar for the retrospective and the prospective phases and are analysed conjointly.*

#### **3.1. Socio-Demographic Characteristics of Study Population**

Out of the 2634 deliveries recorded during the study period, 418 (15.86%) presented as obstetrical emergencies. **Table 1** summarises the socio-demographic characteristics of the study population. The mean age of patients was  $29.37 \pm 5.76$  years with extreme ages of 16 and 47 years. 284 (67.95%) of study population had university level of education and only 29 (6.94%) primary level. The majority of our participants had a revenue generating profession with 20.33% of them being civil servants, 20.33% self-employed and 21.29% workers of the private sector.

**Table 1.** Socio-demographic distribution of patients.

	Frequency	Percentage (%)
<b>Profession (n = 418)</b>		
Unemployed	52	12.45
Self employed	85	20.33
Civil servant	85	20.33
Private salary	89	21.29
Students	107	25.60
<b>Parity (n = 418)</b>		
0 - 1	206	49.28
2 - 3	108	25.83
4 - 5	68	16.26
>5	36	8.62
Total	418	
<b>Level of education (n= 418)</b>		
Primary	29	6.94
Secondary	105	25.11
University	284	67.95
Total	418	100

### 3.2. Primary Site of Patients' Management

Forty per cent of patients with obstetric emergencies (167) were referred from other health facilities while 251(60%) started management in the study site.

**Table 2** highlights the patterns of obstetric emergencies recorded during the study period. Hypertensive diseases in pregnancy (HDP) mostly Preeclampsia/eclampsia (PEE) constituted the most frequently encountered 86/418 (20.57%) followed by ectopic pregnancy, 58 (13.87%).

### 3.3. Maternal Outcome after Management

Out the 418 patients, 412 (98.56%) were managed successfully with only 19.61% admitted in ICU. Six (6) maternal deaths were recorded giving a case fatality of 6/418 (1.4%) of obstetric emergencies and an MMR of 228/100,000 live births. The causes of death are summarized on **Table 3**.

Of the 418 patients, 336 (80.38%) were managed without admission in ICU. It must be noted that some of the patients who needed intensive care were managed in the routine wards because of limited places and equipment in ICU.

Three diseases namely post partum haemorrhage (PPH), sickle cell anaemia (SCA), and preeclampsia/eclampsia (PEE) dominated the causes of maternal death with equal proportion of 2 (33.33%) each. The case fatality for PPH was 2/32 (6.25%), 2/4 (50%) for SCA and 2/86 (2.32%) for PEE.

**Table 2.** Patterns of obstetric emergencies.

Obstetrical emergency	Number	Percentage (%)
Hypertensive diseases in pregnancy (HDP)	86	20.57
Post partum haemorrhage (PPH)	32	7.65
Placenta previa (PP)	16	3.82
Placenta abruption (AP)	13	3.11
Abortions (AB)	62	14.83
Ectopic pregnancy (EP)	58	13.87
Obstructed labour (OL)	40	9.56
Sickle cell disease crisis (SCA)	4	0.91
Acute foetal distress (AFD)	55	13.15
Other indirect causes (OIC)	52	12.44
Total	418	100

**Table 3.** Therapeutic characteristics and maternal outcomes of OE.

OE	Number	Percent (%)	NICU	ICU	Ref	MIS	DEATH
HDP	86	20.57	26	60	42	44	2
PPH	32	7.65	26	6	17	15	2
PP	16	3.82	16	0	4	12	0
AP	13	3.11	11	2	3	10	0
AB	62	14.83	62	0	7	55	0
EP	58	13.87	58	0	18	40	0
OL	40	9.56	40	0	13	27	0
SCA	4	0.91	0	4	4	0	2
AFD	55	13.15	55	0	27	28	0
OIC	52	12.44	42	10	32	20	0
Total	418	100	336	82	167	251	6

Legend: NICU: not admitted in intensive care unit; ICU: admitted in intensive care unit; Ref: referred from other facilities; MIS: started management in site.

### 3.4. Management Processing Time

As shown in **Table 4**, the minimal processing time was 10 minutes and the maximum 1140. The shortest mean processing time was recorded for abortions and the longest for sickle cell anaemia.

**Table 4.** Mean and median management processing time.

Obstetrical emerg	Processing time		Mean time $\pm$ SD	Median time N (%)
	Min	Max		
Global management	10	1140	65.46 $\pm$ 99.7	45 (35 - 60)
PPH	20	180	35.15 $\pm$ 42.5	20 (15 - 30)
EP	22	180	45.40 $\pm$ 28.74	40(37 - 45)
RPH	29	48	39.29 $\pm$ 6.26	41( 35 - 45)
PP	30	120	62 $\pm$ 31.90	51 (42.25 - 75)
HDP	15	180	61.53 $\pm$ 85.49	40 (25 - 62)
Abortions	15	130	32.65 $\pm$ 25	27.50 (23 - 63)
SCA	20	1140	105.29 $\pm$ 222.61	50 (45 - 60)
Labour dystocia	25	360	86.69 $\pm$ 83.15	50 (45 - 112.50)
Other indirect causes	10	1140	104.29 $\pm$ 222	50 (45 - 60)

Min: minimal; Max: maximal.

#### 4. Discussion

Our study has shown a global obstetric emergency rate of 418/2634 (15.86%) which is consistent with the figures of Mustapha Lamina *et al.* who found a rate of 18.5% in Nigeria [11]. We recorded 6 maternal deaths during the period under study, which represented an MMR of 228/100,000 live births slightly different from the figures found by Fomulu *et al.* in 2013 in a retrospective study in a reference hospital in Yaounde between 2002 and 2006 (365/100,000) and Tebeu *et al.* in 2015 in the Yaoundé Gynaeco-obstetric and Paediatric hospital (287.5/100,000) [3] [9]. Our relative low rate may be explained by the smallest sample size. Like the previous authors who evaluated the MMR in the reference hospitals of the country between 2000 and 2015, this rate was lower than the national level which was 782/100,000 and other rates reported in some reference hospitals in sub-Saharan Africa [12] [13]. Lower rates are recorded in Asian countries of the same levels of care, 141/100,000 live births in India (n = 104/73,935) [14]. All the cases of maternal death were due to obstetric emergencies with 66.66% (n = 4) due to direct causes and 33.33% (n = 2) to indirect causes. It is well established that obstetric emergencies constitute the major causes of maternal deaths in LMIC. **Table 5** summarises pictures of maternal deaths reported in some LMIC.

**Patterns** of obstetric emergencies were dominated by hypertensive diseases in pregnancy, EP, PPH and obstructed labour which is not different from what is described in other low or middle income settings [1] [5] [9] [11].

**Table 5.** Picture of maternal reported by some authors in LMIC.

	MMR	GOE	Direct causes	Indirect causes
Our results	228(n = 6)	418/2634	100%	0
Fomulu <i>et al.</i> (2002-2006) [3]	365 (n = 39/10662)	-	89.7%	10.3%
Tebeu PM <i>et al.</i> (2006-2010) [9]	287.5(n=26/9045)	-	75%	25%
Mustapha Lamina <i>et al.</i> (2005-2007) [11]	-	262/1420	70.6%	29.4%
Papa Dasri <i>et al.</i> (2008-2012) [14]	141	106/73,935	90%	10%

**Post partum haemorrhage (PPH)** represented one of the most frequent causes of maternal death in our study (7.65%). Two out 32 patients who presented with PPH died, making a case fatality of 6.25%. Case fatality of PPH reported in LMIC varies widely (1.3% to 27.3%) with countries and levels of care and also when evidence-based interventions are implemented or not [15]-[20]. Ezugwu EC *et al.* reported that case fatality of PPH without evidence-based health intervention will be as high as 13.6% as compared to 2.5% when timely and standardized management is applied [16]. Determinants of death related to post partum haemorrhage include women's characteristics, pre-delivery maternal anaemia, lack of blood products, unskilled birth attendants, inadequate or no antenatal care, transfer from other health facilities, delays in management in the hospital amongst others [15] [18] [19] [20]. All the cases of maternal death recorded in our study were referred from other health facilities with critical conditions which warranted admission in intensive care unit. The role of poor referral system has been demonstrated by other authors in Cameroon like Belinga Etienne *et al.* [21] who quoted that 70% - 90% of maternal deaths are due to referred cases according to Perrin in Benin.

**Hypertensive diseases in pregnancy (HDP) (mostly preeclampsia/eclampsia)** constituted 33.33% of maternal deaths (MD). According to WHO, HDP is one of the four main causes of maternal death (WHO report 2019) and Lale Say *et al.* reporting a global maternal death causes according to WHO review found these to represent 11.6% to 21% causes of MD [10]. In studies conducted in tertiary hospitals in Cameroon, Tebeu and coll. And Fomulu *et al.* 8.3% and 15.4% respectively [3] [9] while Dasari *et al.* in India reported HDP to represent 17% of causes of MD [14]. The case fatality of HDP was 2.32% which is similar to the outcome of few authors in sub-Saharan Africa like Edward T. Dassah *et al.* in Ghana (2.2%) and EC. Ezugwu in Nigeria (2.5%) [16] [22] but in constrats was very low compared to 11% described by Rob Mooij *et al.* in Tanzania [23]. Mekoya D. Mengistu, TilatumRuma and coll. reported no death in a retrospective study enrolling 156 cases of HDP in Addis Ababa. We attribute our relative good performance to many factors including:

1) The existence of management protocols in the service to which almost all carers are strictly bound;



2) The availability of skilled workers (obstetricians, midwife, and reanimators) when needed;

3) The availability of drugs (antihypertensive drugs, magnesium sulphate);

4) The Presence of an ICU where critical cases needing special attention are admitted though with insufficient beds and resuscitation equipment. In fact, our protocol of management recommends, in accordance with the state of the art in developed countries that all cases of severe preeclampsia and eclampsia be admitted in ICU and hospitals with obstetric units should have an obstetric ICU [24] but we could not achieve this objective because of the aforementioned reasons. This is a shortcoming in the management of emergencies in general and HDP in particular.

5) Concerning the timing of management, the mean proceeding time was  $61.53 \pm 85.49$  (see **Table 4**) with extremes of 15 minutes to 3 hours. American college of Obstetricians and Gynecologists (ACOG) recommends that expeditious management of confirmed severe HDP should be initiated within 30 - 60 minutes [25]. Our proceeding time did not always fall within this timeline and delays of up to 3 hours were observed due to several factors including frequent stock outs of emergency drugs, lack of financial means (payment was made out of patients pockets!) and at time absence of one or many members of the multi-disciplinary therapeutic team.

We admitted 4 cases of **sickle cell anaemia (SCA)** in pregnancy; all referred from other peripheral hospitals with acute onset complications. The reasons for referral included severe anaemia, pains crisis or the two complications combined. All the 4 cases were admitted in ICU during part or all the duration of their hospital stay. The 4 patients delivered through caesarean section and 2 (50%) died in the early post caesarean period in severe acute respiratory syndrome which we suspected to be due to acute thoracic syndrome. The case fatality of this obstetric emergency appears extremely high compared to what is reported in the literature that ranges from almost no maternal mortality in United Kingdom and USA [26] [27], 0.4% (total of 255 patients) in Saudi Arabia [28], 5.98 relative risk of death in a systemic review conducted by Eugene Oteng Ntim *et al.* in 2014 [29] to 11.4% in a study by Projestine S. Muganyizi *et al.* in Tanzania [30]. This high mortality can be explained by the reduced number of cases, the fact that patients were all referred in critical conditions but also can delineate the suboptimal performance of our ICU which is not specialized in such diseases.

The **other diseases** were successfully managed with some mild adverse maternal outcomes but no maternal death. Contrary to other studies carried in Cameroon and other sub-Saharan countries which displayed an important contribution of abortions (up to 25%) and sepsis, Ectopic pregnancy to maternal death, we recorded no death for these conditions. Although we attribute the relative good performance to the limited number of our sample size, the role of enough qualified staff, the relatively good plateau technique, the availability of management guidelines appear to be contributing factors.

## 5. Conclusion

Obstetric emergencies were high in the DGOPH, representing 15.4% of all live births. The management of these emergencies resulted in a relatively low rate of adverse maternal outcomes and only 6/418 deaths were recorded making a case fatality of 1.43%. Of the causes of maternal death, the case fatality of PPH and HDP was comparable to the high performance hospitals in LMIC. Determinants of this performance include the plateau technique, the quality of personnel, the existence of treatment guidelines and an ICU. These findings suggest that the strategy of building reference hospital where “state of the art obstetric care” can be implemented is an important milestone in the attainment of the sustainable millennium goals.

## Authors Contribution

Robert Tchounzou, Theophile Nana Njamen Vanessa Baleba, Alphonse Ngalame Nyong, Inna Rakya, Humphry Neng Tatah designed the study and wrote the protocol; Moustapha Bilkissou, Diane Estelle Kamdem, Julie Ngo Batta and Darolles Mwadjie Wekam participated in patients recruitment. Robert Tchounzou wrote the manuscript, André Gaetan Simo Wambo, Theophile Nana Njamen, Dominique Djomo Tamchom revised the manuscript. Emile TMBoudou supervised the manuscript writing. All the authors approved the final version.

## Acknowledgements

We are immensely grateful to all the medical and technical staff of the Gynecology and Obstetrics Service, the emergency unit, the intensive care unit, the imaging and laboratory units, the theatre and the outpatient department of Gynecology and Obstetrics and to the general administration of the DGOPH for their contribution in patients’ management and in keeping the records. Special thanks go to Drs. Noura Benmoussa, Eyanga Olivia and Mrs. Chuo Yvette.

## Conflicts of Interest

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

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## Appendix

Determinants of post operative infection following gynecological and obstetrical surgeries in the Douala Gynaeco-obstetric and Paediatric Hospital.

### Data Collection Sheet

#### 1) Identification

a) Name ID: \_\_\_\_\_ DATE: \_\_\_\_/\_\_\_\_/\_\_\_\_

b) Age (years): \_\_\_\_\_ c) Parity: \_\_\_\_\_ d) Residence: \_\_\_\_\_

e) Level of education:

i) Primary                      ii) Secondary                      iii) University

#### 2) Past history

a) Chronic disease:

i) Sickle cell anaemia      ii) Diabetes                      iii) HTN (hypertension)  
iv) Cancer                      v) other

b) Past surgery:

i) No                              ii) Yes                              Indication \_\_\_\_\_

c) Tobacco consumption: i) No                              ii) Yes

d) Chronic infection:

i) HIV                              ii) Tuberculosis                      iii) Hepatitis

#### 3) Patient's condition at the time of diagnosis of OE

a) Primary site of management:

i) DGOPH                      ii) other hospital

b) Timing of Management: time of arrival \_\_\_\_\_ time management started \_\_\_\_\_

c) Type of OE:

i) EP                              ii) HDP                              iii) PPH                              iv) AB  
v) OL                              vi) SCA                              vii) PP                              viii) AP  
ix) AFD,                              x) Malaria                              xi) HIV-AIDS  
xii) Cardiac disease                              xiii) Other

d) Health carers present:

i) Emergency nurse                      ii) emergency physician                      iii) obstetrician  
iv) Anaesthetist                      v) midwife                      vi) other

#### 4) Management and maternal outcome

a) Patient management according to protocol: i) Yes                      ii) No

b) Patient needed ICU:                      i) Yes                      ii) No

c) Patient admitted in ICU:                      i) Yes                      ii) No

d) Duration of hospital stay \_\_\_\_\_

e) Treatment outcome:

i) Total recovery                      ii) referred to other hospital                      iii) death

#### 5) Causes of death

a) NA

b) Late referral

c) Critical condition of patient

d) Inappropriate care

### **Liste of Abbreviations**

AB: abortions

AFD: acute foetal distress

AP: abruption placentae

EP: ectopic pregnancy

HDP: hypertensive diseases in pregnancy

ICU: intensive care unit

MMR: maternal mortality rate

MIS: management in the site

PEE: preeclampsia/eclampsia

PP: placenta previa

PPH: post partum haemorrhage

OE: obstetric emergencies

OIC: other indirect causes

OL: obstructed labour

SCA: sickle cell anaemia