

# Epidemiological Aspects of Stillbirth and Neonatal Deaths in the Delivery Room at the Libreville Mother-Child University Hospital from 2019 to 2022

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## Abstract

**Introduction:** Stillbirths are estimated at 2 million each year, of which more than 40% occur during labour. Our objective was to study the epidemiological aspects of stillbirth and neonatal deaths in the delivery room in our health facility. **Patients and methods:** Prospective, descriptive and analytical study, conducted at the Jeanne Ebori Foundation Mother-Child University Hospital over 4 years (January 2019-December 2022). All neonatal deaths in the delivery room or foetal death in utero, were included. **Results:** Among the 18,346 deliveries performed, 512 newborns were declared dead in the delivery room (27.9‰ live births), divided into in *utero* foetal death (19.0‰) and immediate neonatal death (8.9‰). The mean age was 34.3 weeks of amenorrhoea. The rate of preterm birth was 60.4%. The sex ratio was 1.1. The average weight was 2186.6. The main causes were vascular (46.1%), foetal (20.2%), adnexal (17.1%) and asphyxia per partum (16.6%). Foetal causes were more likely to result in IUFD than other causes (OR = 6.4 [2.4 - 15.7],  $p < 0.001$ ). After birth, partum asphyxia was more likely to lead to death before 15 minutes of life than other causes (OR = 11 [6.1 - 18.9],  $p < 0.001$ ). **Conclusion:** The causes of stillbirth and early neonatal mortality are dominated by maternal vascular pathologies. However, the proportion of childbirth-related causes remains worrying. Better monitoring of pregnancy and labour will minimize this prevalence in our hospital.

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## Keywords

Stillbirth, Neonatal Death, Delivery Room, Epidemiology, Libreville-Gabon

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## 1. Introduction

According to the WHO, 2.4 million children worldwide died in their first month of life in 2019. Approximately 6700 newborn deaths occur per day, accounting for 47% of all deaths of children under 5 years of age [1]. Neonatal deaths are therefore a major public health problem. In addition to these neonatal deaths, there is a significant rate of stillbirth [2]. It is defined as the death of a foetus after 20 weeks of pregnancy or with a weight of more than 350 grams according to the Americans [2], or after 28 weeks of pregnancy, but before or during delivery according to the WHO [3]. It is a tragedy estimated at nearly 2 million each year, or one every 16 seconds, and more than 40% of these stillbirths occur during labour [3]. However, this is a neglected tragedy according to UNICEF because global data on the issue remains largely absent [4]. If the neonatal mortality rate in our hospital is known (11.9% in 2022), this is not the case for stillbirths where there are no statistics in our country. The main objective of this study was to study the epidemiological and etiological aspects of perinatal deaths in the delivery room, to have an overview of the problem and organise a response at the Libreville Mother-Child University Hospital.

## 2. Methodology

This was a prospective, descriptive and analytical study conducted at the Jeanne Ebori Foundation Mother-Children University Hospital (CHUMEFJE), over 4 years (January 2019-December 2022).

The study population consisted of newborns in the delivery room of the CHUMEFJE. Were included in this study were all newborns who died at birth or within the first 15 minutes of life and with a gestational age greater than or equal to 22 weeks of amenorrhoea and a weight greater than or equal to 500 g at birth. Late-term abortions, newborns delivered out of the CHUMEFJE and arriving deceased, and refusal to participate by the mother or legal guardian were criteria for non-inclusion.

### 2.1. Parameters Studied

The parameters studied in the mother were: age, marital status, occupation, pregnancy follow-up, and intercurrent pathologies during pregnancy. In the newborn they were, gestational age (GA), sex, anthropometric parameters reported on the Leroy and Lubchenco growth curve [5], foetal heart sounds (FHSs) on arrival in the delivery room, state at birth (In Utero Foetal Death (IUFD) or alive), causes of foetal or neonatal death.

## 2.2. Course of the Study

Once the diagnosis of fetal death was made or the occurrence of death after failure of resuscitation, the parturients were entrusted to psychologists. During their interview, the psychologist initiated the request for informed consent which was finalized by the investigator if agreement was obtained. The variables studied were then entered on a standardized form.

## 2.3. Statistical Analysis

Information from patients and newborns were recorded in a database with the MS Excel 2019 spreadsheet and analysed with SPSS 19.1 software. Qualitative variables were described using percentages. Proportions were compared using Pearson's Chi-2 test. We calculated the odd ratio to establish the strength of the link between an aetiology and death in utero or death occurring within 15 minutes postnatal. For all analyses, the significance threshold was set at 0.05 (5%).

## 2.4. Ethical Aspect

Informed consent from the parents (mother, and/or father and legal guardian when the parturient was a minor) was obtained. Similarly, the agreement of the CHUMEFJE's scientific committee was obtained. Patient confidentiality and anonymity were respected.

## 3. Results

### 3.1. Prevalence of Neonatal Mortality in the Delivery Room

During our study period, 18,346 deliveries were performed at the CHUMEFJE, among them, 512 newborns were declared dead in the delivery room, giving a neonatal mortality rate of 2.8% (or 27.9 per thousand live births). The proportion of IUFD was 1.9% (n = 349) or 19.0‰ live births. Meanwhile, that of immediate neonatal deaths was 0.9% (n = 163) or 8.9‰ live births. Among the 349 (68.2%) stillbirths observed, 283 (81.1%) were fresh stillbirths and 66 (18.9%) were macerated.

### 3.2. Maternal Characteristics

The number of mothers included was 504, including 6 twin pregnancies. The mean age of mothers was 29.1 years with extremes ranging from 14 to 47 years, among which 62.1% (n = 313), were between 18 and 35 years of age. They were primigravida in 20.2% (n = 102) of the cases, primiparous in 34.9% (n = 176) and multiparous in 38.9% (n = 196) of the cases. The proportion of single mothers was 66.3% (n = 334) and that of mothers with income-generating activity was 31.7% (n = 160). The mean Prenatal Contact (PNC) was 2.1 with extremes ranging from 0 to 8. In 18.3% (n = 92) of the cases, the pregnancy was not followed meanwhile, in 22.0% (n = 111) the parturient had completed less than 3 PNCs. A history of stillbirth was found in 5.2% (n = 26) of the cases and spontaneous abortion in 6.7% (n = 34). The mean number of living children was 2.3

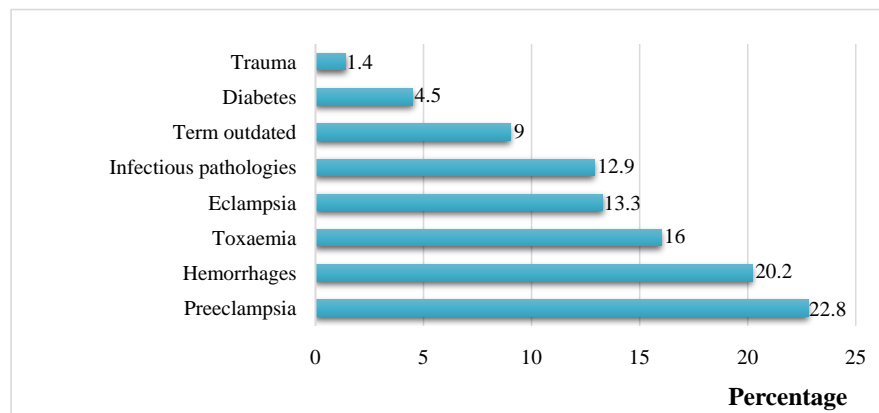
with extremes ranging from 0 to 7. In 70.6% (n = 356) of the cases, an intercurrent pathology at pregnancy was observed. The three main intercurrent pathologies observed during pregnancy were preeclampsia (22.8%), haemorrhages (20.2%) and toxemia (16.0%). **Figure 1** shows the intercurrent pathologies during pregnancy.

### 3.3. Anomalies during Labour

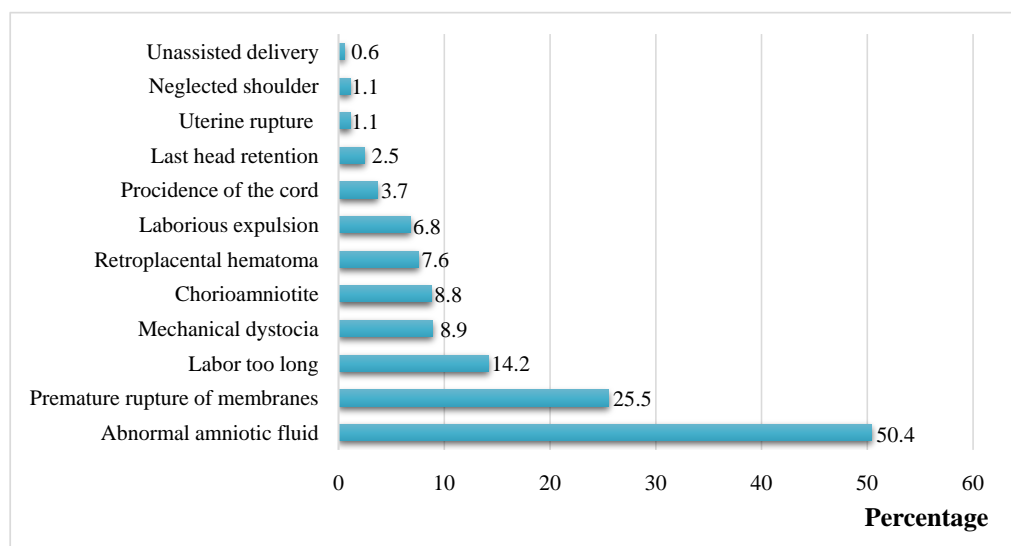
During labour, an abnormality was observed in 68.9% of parturient (n = 353), the top three were abnormal amniotic fluid (50.4%), premature rupture of membranes (25.5%) and labor too long (14.2%). **Figure 2** shows the various abnormalities observed during labour.

### 3.4. General Characteristics of Newborns

The mean gestational age was 34.3 with extremes ranging from 22 to 44 weeks of amenorrhea. The rate of prematurity was 60.4% (n = 309), while 89.3% (n = 276)



**Figure 1.** Intercurrent pathologies during pregnancy.



**Figure 2.** Various abnormalities observed during labour.

of the cases died in *utero*. The average weight was 2111.6 g (extreme ranging from 500 to 5760 g). The sex ratio was 1.1. In 55.1% (n = 282) of the cases, birth weight was <2500 g and among them, intrauterine growth restriction was observed in 29.8% (n = 84/282). The proportion of macrosomia was 8.6% (n = 44). Among the 6 surrogate mothers with twin pregnancies, the death of 2 twins was observed in 2 mothers. **Table 1**, summarises the characteristics of newborns who died in the delivery room.

### 3.5. Aetiologies of Neonatal Deaths in the Delivery Room

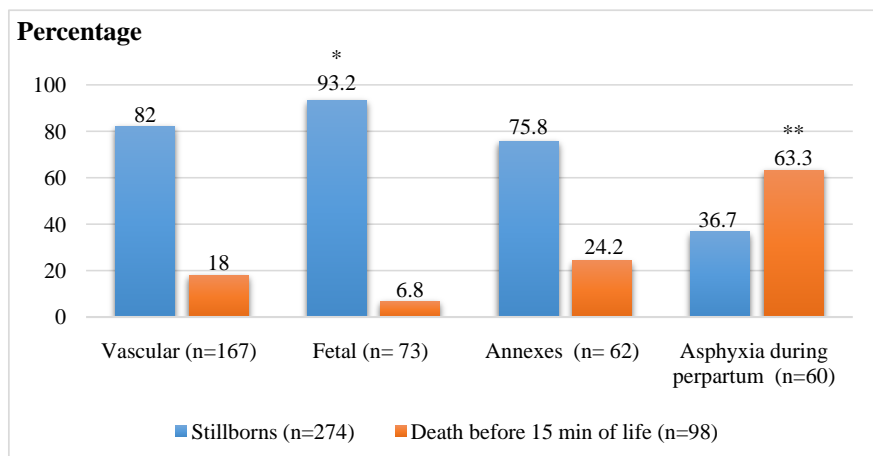
In the sample investigated during our study, 70.7% (n = 362) were identified with a death cause. Four main aetiological groups were identified, among which, vascular, adnexal, foetal and *peripartum* events (**Table 2**). Among the 73 foetal deaths, 8 (11.0%) were antenatally diagnosed. Vascular, adnexal and foetal causes were more common in the IUFD group. Also, perinatal asphyxia was more observed in the group of early deaths in the delivery room group. Foetal causes were more likely to lead to IUFD, than other causes (OR = 6.4 [2.4 - 15.7], p < 0.001). After birth, peripartum asphyxia was more likely to result in death before 15 minutes of life than other causes (OR = 11 [6.1 - 18.9], p < 0.001) (**Figure 3**).

**Table 1.** Characteristics of newborns who die in the delivery room.

Parameters (n = 512)	n	Percentage (%)
<b>Gestational Ages (GA)</b>		
<29	85	16.6
29 - <32	88	17.2
33 - <37	136	26.6
≥37	160	31.2
Unknown	43	8.4
<b>Foetal heart sounds on arrival in the delivery room (bat/min)</b>		
>100	82	16.0
<100	81	15.8
Absent	349	68.2
<b>Presentation mode</b>		
Cephalic	392	76.6
Seat	97	18.9
Other	23	4.5
<b>Birth weight (g)</b>		
<1500	123	24.0
1500 - <2500	159	31.1
2500 - <4000	196	38.3
>4000	34	6.6

**Table 2.** Causes of neonatal mortality and stillbirth in the delivery room at the CHUMFJE.

Aetiologies (n = 362)	n	Percentage (%)
<b>Vascular (n = 167, 46.1%)</b>		
Retroplacental hematoma	106	63.5
Severe pre-eclampsia	33	19.8
Eclampsia	28	16.7
<b>Foetal (n = 73, 20.2%)</b>		
Birth	42	57.5
Infections	14	19.2
Intrauterine growth restriction	11	15.1
Anasarca (allo-immunisation)	6	8.2
<b>Adendices (n = 62, 17.1%)</b>		
Calcified placenta	18	29.0
Uterine rupture	14	22.6
Tight circular cord	12	19.3
Cord procdence	7	11.3
Cord breakage	7	11.3
Haemorrhagic placenta previa	4	6.4
<b>Per partum asphyxia (n = 60, 16.6%)</b>		
Work too long	22	36.7
Laborious deportation	16	26.7
Vicious Presentations	14	23.3
Uterine hyperkinesia	5	8.3
Unknowns	3	5.0

**Figure 3.** Causes of stillbirth and neonatal mortality in the delivery room at the CHUMFJE. \*  $p < 0.01$ , \*\*  $p < 0.01$ .

## 4. Discussion

The main limitation of our study is that it is single-center and cannot be representative of the national prevalence of neonatal deaths in the delivery room.

### 4.1. Prevalence of Stillbirths

In our work, the stillbirth rate was 1.5% (15‰ live birth). Takamte Kamgang RR, in his work on the evaluation of the care of the newborn in the delivery room and during the first week of life in Niamey, notes a live birth frequency of 68.8%, *i.e.*, 31.2% of stillbirth [6]. Diallo *et al.*, in Conakry observed a stillbirth rate of 8.2% [7] and Mkoiko *et al.*, in Brazzaville a rate of 19 deaths per 1000 live births [8]. The neonatal death rate was 0.5% in 5 months in Yaoundé according to Chelo *et al.*, [9]. In Lubumbashi, it was 4% in the work of Mpoy CW *et al.*, [10]. These different rates are very disparate and may not even be comparable because the elements of the definition of stillbirth differ from country to country. Indeed, the WHO defines the limits of foetal viability at 22 weeks of amenorrhea and/or a birth weight  $\geq 500$  g [3]. However, the WHO speaks of stillbirth if the foetus has reached 28 weeks of amenorrhea and/or a weight  $\geq 1000$  g [11]. This explains the discrepancy and is responsible for a multitude of definitions of stillbirth. Thus, it is defined early on as the death of a foetus before birth, from 22 weeks of amenorrhea [12], from the 20<sup>th</sup> week of amenorrhea [13] or greater than 28 weeks of amenorrhea or a neonatal weight greater than 1000 g [8] [10]. This discrepancy in definition is likely related to the level of care provided to newborns in each country. The higher the level of care, the lower the threshold for the definition of stillbirth. In our context, all antenatal or postnatal deaths are considered as soon as the pregnancy reaches the limits of viability defined by the WHO ( $\geq 22$  weeks of amenorrhea and/or  $>500$  g). This justifies the high stillbirth rate observed in this study. If we had considered the threshold set by the WHO, 85 deaths (number of foetuses with a GA between 22 and 28 weeks) *in utero*, would have to be subtracted from the stillbirth count of this study, thus reducing it to 264 instead of 349 cases. This shows how much this lack of a universal definition has an impact on the actual stillbirth rate on a global scale.

However, the prevalence of stillbirths remains high, estimated at 13.9 stillbirths per 1000 live births in 2021 worldwide [14]. And whatever the threshold chosen in terms of the evolution of pregnancy, it is a real tragedy for families as well as for society. This tragedy is more observed in developing countries, particularly in West and Central Africa, with stillbirth rates ranging from 19.8 to 27.7 per 1000 live births, while it is only 2.7 - 3.0 per 1000 live births in Western Europe [14].

### 4.2. Aetiologies of Deaths Reported in the Delivery Room

In the group of in utero deaths, we observed that 81.1% were fresh stillbirths, and Mpoy *et al.*, reports a fresh death rate of 60.3% [10]. This condition signals a death within 6 hours of birth according to the WHO and is considered in this case as a peripartum stillbirth [11]. This justifies the fact that vascular patholo-

gies (particularly RPH, pre-eclampsia, eclampsia), adnexal pathologies (calcified placenta, uterine rupture, tight circular cord) and *intrapartum* events (too long labour, dystocia, etc.), constitute almost all the causes of foetal and neonatal mortality reported in the delivery room during our study. Mpoy *et al.*, shows that eclampsia and retroplacental hematoma were the main aetiologies in their study [10]. Similarly, Mokoko *et al.*, observed maternal arterial hypertension and adnexal involvement as associated factors [8].

Prematurity characterised most of the population in this study. This observation is also made by Mokoko *et al.*, and Mpoy *et al.* [8] [10]. This justifies the high rate of low birth weight and can be explained by the rate and severity of maternal vascular pathologies on the one hand and by the fact that prematurity and low birth weight are in themselves factors of neonatal mortality due to the physiological vulnerability that characterizes them on the other hand.

Male sexes were mostly found in this study as well as in that of Mokoko *et al.* [8] and are a well-established factor in stillbirth and neonatal mortality in the literature, although the reasons are not well elucidated [2].

Good follow-up of pregnancy with prompt treatment of infections, early diagnosis of serious foetal abnormalities, ease in the practice of therapeutic abortions, and good monitoring of labour in developed countries minimises the prevalence of stillbirth and perinatal mortality [12]. In this study, only 27.4% of mothers had more than four prenatal contacts and 40.3% had fewer than three. This easily justifies the fact that among the 73 deaths from foetal causes, only 8 (11.0%) were diagnosed antenatally. In the study of Mpoy *et al.*, in the DRC, 52.4% of the women who gave birth did not follow their pregnancy [10] and in that of Mokoko *et al.*, in Congo Brazzaville, an insufficiently follow-up of the pregnancy and a low use of the partogram multiplied the risk of stillbirth [8].

To reduce the rate of stillbirth and neonatal mortality, a meta-analysis carried out by the Cochrane Database of Systematic Reviews in 2020, shows the need for certain interventions in pregnant women such as a rich and balanced diet, prevention and treatment of infections, use of insecticide-treated mosquito nets, assessment of cardio-foetal rhythm during labour of delivery, staff training, including community relays with home visits [12]. These actions are relatively simple and within the reach of most developing countries. In our context, special emphasis must be placed on the monitoring of pregnancy and labour of delivery.

## 5. Conclusion

The hospital prevalence of stillbirth and early neonatal mortality in the delivery room is not negligible. The causes are dominated by maternal vascular pathologies, but the proportion of causes occurring in the *interpartum*, all of which are preventable, remains a concern. Better monitoring of pregnancy and labour will minimise this prevalence in our hospital.

## Conflicts of Interest

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



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