

# Obstetrical Outcomes of Pregnancy during a Period of Socio-Political Instability in the Buea and Bamenda Regional Hospitals, Cameroon

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## Abstract

**Background:** Armed conflict increases the occurrence of adverse obstetrical outcomes especially in low and middle-income countries. However, there is paucity of data on obstetrical outcomes in the South-West and North-West Regions of Cameroon since the onset of the socio-political instability. **Objectives:** Our aim was to evaluate obstetrical outcomes in the Buea and Bamenda Regional Hospitals, Cameroon during the period of socio-political instability. **Methods:** A hospital-based retrospective cohort study was carried out at the aforementioned hospitals. Data was collected from case notes of pregnant women before the period of socio-political instability (from January 1, 2014 to December 31, 2016) and during the period of socio-political instability (from January 1, 2017 to October 31, 2019). The Chi square and Fischer's exact test were used to compare categorical variables where appropriate and modeled into multivariate analysis. A p-value < 0.05 was considered statistically significant. **Results:** The mean maternal age was 27.09 ( $\pm 5.25$ ) years, before and during the conflict. The mean weight of neonates (regardless of gestational age) during the conflict was significantly higher [3.28 ( $\pm 0.65$ ) kg] compared to that before the conflict [3.21 ( $\pm 0.52$ ) kg] ( $p < 0.001$ ). Maternal age < 20 yrs [OR = 1.97; CI (1.16 - 3.37),  $p = 0.01$ ], and delivery during the period of socio-political instability [OR = 1.97; CI (1.16 - 3.37)],  $p = 0.01$  and [OR = 1.89; CI (1.53 - 2.33)],  $p < 0.01$  were significant predictors of adverse maternal outcomes. The number of maternal age [OR = 2.22; CI (1.48 - 3.33)], and time of evaluation [OR = 1.83; CI (1.57 - 2.14)],  $p < 0.01$  respectively were associated with adverse neonatal outcomes. **Conclusion:** This study identifies increased incidence of adverse maternal outcomes in mothers exposed to socio-political instability.

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## Keywords

Socio-Political, Instability, Regions, Obstetrics, Outcomes, Cameroon

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### 1. Introduction

Armed conflict is defined as sustained contest between two or more organized adversaries, making purposive use of armed force. It involves combat, rather than the one-sided application of lethal force [1]. Armed conflict has been described as a public health problem due to its negative impact on health systems and population health. It has been known to potentially pose serious challenges to access and quality of maternal and reproductive health (MRH) services [2].

Pregnant women have been shown to be highly vulnerable to stress [3]. It is believed that armed conflicts aggravate social factors that increase maternal psychosocial stressors [4]. Prenatal stress has detrimental effects on obstetric outcomes, fetal development and the development of an individual later in life. As well as causing stress to the mother, armed conflicts can decimate local infrastructures making it increasingly difficult to access general healthcare including antenatal care [5]. Increases in adverse pregnancy outcomes have been recorded in some conflict and post-conflict settings such as the Zapatista armed conflict in Mexico [6].

The Southwest and Northwest Regions of Cameroon have observed socio-political instability for four years now and yet no study has documented the trend of obstetrical outcomes during this socio-political instability. The goal of this study was to evaluate obstetrical outcomes in the Buea and Bamenda Regional Hospitals.

### 2. Problem

Maternal outcomes in any labour and delivery vary. Some could be really bad especially during a crisis that baffects people,s movements like the case of the North West Region of Cameroon since 2016. The consequences of any crisis on maternal, obstetrical and neonatal outcomes are enormous as there are often many confounding factors. This is the reason for this study.

### 3. Objectives

- 1) To identify maternal and obstetrical characteristics and outcomes;
- 2) To identify neonatal characteristics and outcomes;
- 3) To identify factors in association to adverse maternal and obstetrical outcomes;
- 4) To identify factors in association to adverse neonatal outcomes.

### 4. Materials and Methods

A 6-year hospital-based retrospective study was carried out at the Buea and Ba-

menda Regional Hospitals, Cameroon from January 1, 2014 to October 31, 2019. Two periods were considered; before the instability (January 2014-December 2016) and during the instability (January 2017-October 2019). Data were collected from case notes of patients who gave birth during this period. Only records which had incomplete data were excluded. Information was said to be complete if there was data on socio-demographic, abortions, preterm labor, caesarean section, postpartum hemorrhage, maternal death, prematurity, low birth weight, birth asphyxia and neonatal death. Data collection was done using a pre-tested data extraction form containing socio-demographic data and obstetrical information. Ethical clearance was obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Bamenda, 2020/0037H/UBa/IRB and administrative authorization from the Regional Delegation of Public Health for the North-West Region RII/MINSANTE/SWR/RDPH/PS/520/746 and the South west Region on the 5th April 2020. Data collected were entered into EPI Info version 7 and exported to SPSS version 25.0 for analysis. Chi squared test was used to compare categorical variables and the independent student T test were used to compare means and medians of continuous variables respectively where appropriate. A p-value < 0.05 was considered statistically.

## 5. Results

During the study period, (from January 1, 2014 to October 31, 2019), 10,000 files were assessed of which 3990 files were excluded because of incomplete data. Therefore, analysis was done for 6010 files.

### 5.1. Socio-Demographic Characteristics of the Study Population

The mean maternal age of the study population was 27.09 ( $\pm 5.25$  years). There was no statistical difference in the mean maternal ages before and during the period of instability. Most were married women, having a university degree and unemployment was common in both married and single. (**Table 1**)

### 5.2. Maternal and Obstetrical Characteristics and Outcomes

The number of caesarean deliveries was significantly higher, during the period of instability 741 (25.3%), when compared to 449(15.5%) caesarean deliveries before the instability with a p-value < 0.01. Fewer women (n = 6) (**Table 2**) attended more than eight antenatal consultations during the period of instability. Furthermore, maternal mortality ratios were statistically significant with higher rates during the instability with a p-value < 0.01.

### 5.3. Neonatal Characteristics

Overall, the mean weight of newborns regardless of gestational age during the period of instability was not statistically significant ( $3.28 \pm 0.65$  kg) compared with that before the instability ( $3.21 \pm 0.52$  kg). More babies (n = 1513, 26.1%) weighing > 3.5 kg were born during the time of instability with a p-value < 0.01.

More premature babies were born during the period of instability ( $p < 0.01$ ). (Table 3)

#### 5.4. Factors Associated with Adverse Maternal and Obstetrical Outcomes

After bivariate logistic regression analysis, the factors associated with adverse maternal outcomes were: number of ANC visits (OR 0.46; 95% CI: 0.34 - 0.62;  $p < 0.01$ ), maternal age (OR 1.97; 95% CI: 1.16 - 3.37;  $p = 0.01$ ), and time of delivery (OR 1.89; 95% CI: 1.53 - 2.33;  $p < 0.01$ ), were associated with an adverse maternal composite outcome (maternal death, post-partum hemorrhage, preterm labor and abortions).

On multivariate model number of ANC visits (aOR 0.57; 95% CI: 0.41 - 0.79;  $p < 0.01$ ) and time of delivery (aOR 1.45; 95% CI: 0.14 - 1.83;  $p < 0.01$ ) categories were significant predictors of an adverse maternal outcomes. (Table 4)

**Table 1.** Sociodemographic characteristics of study population (N = 6010).

VARIABLES	Before Conflict During Conflict		Total N = 6010	p-value
	n = 2984 (49.65%)	n = 3026 (50.35%)		
Age of mother (mean (SD))	27.01 (4.92)	27.16 (5.55)	27.09 (5.25)	0.29
<b>Marital status</b>				
Single	874 (30.0)	674 (33.0)	1848 (31.5)	0.01
Married	2040 (70.0)	1975 (67.0)	4015 (68.5)	
<b>Level of education</b>				
No formal education/primary	7 (0.2)	4 (0.1)	11 (0.2)	0.38
Secondary	1105 (37.9)	1159 (39.3)	2264 (38.6)	
University	1802 (61.8)	1788 (60.6)	3590 (61.2)	
<b>Occupation</b>				
Employed	869 (29.8)	975 (33.0)	1844 (31.4)	0.01
Unemployed	1298 (44.5)	1207 (40.6)	2505 (42.7)	
Student	747 (25.6)	770 (26.1)	1517 (25.9)	
<b>Distance from hospital</b>				
Near (<2 Km)	678 (23.3)	534 (18.1)	1212 (20.7)	<0.01
Average (2 - 6 Km)	1038 (35.6)	863 (29.2)	1901 (32.4)	
Far ( $\geq 6$ Km)	1198 (41.1)	1555 (52.7)	2753 (46.9)	
<b>Location</b>				
Bamenda Regional Hospital	1481	1504	2894	0.97
Buea Regional Hospital	1503	1522	3026	

**Table 2.** Maternal obstetrical characteristics and outcomes.

VARIABLES	Before conflict n = 2984 (49.65%)	During conflict N = 3026 (50.35%)	Total 6010	p-value
<b>Number of ANC's</b>				
<8 ANC	2886	2911	5797	0.77
≥8 ANC	7	6	13	
<b>Abortions</b>				
Spontaneous	22 (84.6)	34 (77.3)	56	0.46
Induced	4 (15.4)	10 (22.7)	14	
<b>Mode of delivery</b>				
Vaginal delivery	2456 (84.5)	2186 (74.7)	4642 (79.6)	<0.01
Caesarean delivery	449 (15.5)	741 (24.49)	1190 (20.4)	
<b>Preterm labor</b>	88 (2.9)	131 (4.3)	219 (3.6)	<0.004
<b>Postpartum hemorrhage</b>	28 (10)	86 (2.84)	114 (2.0)	<0.01
<b>Systolic BP</b>				
Antepartum systolic BP	119.73 (8.39)	121.48 (4.01)	120.61 (8.95)	<0.01
Postpartum systolic BP	117.66 (6.36)	119.29 (3.94)	118 (6.71)	<0.01
<b>Maternal deaths</b>	3 (0.1)	33 (1.1)	36 (0.6)	<0.01
<b>Maternal death rates per 100,000 live births</b>	104.81	1150.67	627.74	<0.01

**Table 3.** Neonatal characteristics and outcomes.

VARIABLES	Before conflict n = 2984 (49.65%)	During conflict n = 3026 (50.35%)	Total n = 6010	p-value
<b>Gestational age, median (IQR)</b>	39 (39 - 40)	39 (38 - 40)	39 (38 - 40)	0.22
<b>Weight of baby, mean (SD) Kg</b>	3.21 (0.52)	3.28 (0.65)	3.25 (0.59)	0.22
<b>Maturity of the baby at birth</b>				
Preterm	171 (5.9)	334 (11.3)	505 (8.6)	<0.01
Term	2721 (93.5)	2601 (88.2)	5322 (90.8)	
Post term	17 (0.6)	15 (0.5)	32 (0.5)	
<b>Birth weight</b>				
<2.5 Kg	143 (5.0)	232 (8.0)	375 (6.5)	<0.01
≥4 Kg	623 (21.6)	890 (30.6)	1513 (26.1)	
<b>APGAR score</b>				
First minute, median (IQR)	9 (8 - 10)	9 (8 - 10)	9 (8 - 10)	0.21
Fifth minute, median (IQR)	10 (9 - 10)	10 (9 - 10)	10 (9 - 10)	0.21
<b>Neonatal death</b>				
Still births	50 (1.7)	120 (4.1)	170 (2.9)	<0.01
Postnatal deaths	10 (0.3)	7 (0.2)	17 (0.3)	0.45
<b>Neonatal mortality rate</b>	14.58	24.0	19.29	<0.01

**Table 4.** Factors associated with adverse maternal outcomes.

Variable	No adverse maternal outcome	adverse maternal outcome	OR (95% CI)	p-value
<b>Number of ANC</b>				
≤4 (reference)	4004 (92.4)	330 (7.6)		<0.01
>4	1422 (96.3)	54 (3.7)	0.46 (0.34 - 0.62)	
<b>Age categories</b>				
<18	113 (87.6)	16 (12.4)	1.97 (1.16 - 3.37)	0.01
≥18 (reference)	5354 (93.3)	384 (6.7)		
<b>Marital status</b>				
Single	1707 (92.4)	141 (7.6)	1.20 (0.97 - 1.48)	0.09
Married	3756 (93.5)	259 (6.5)		
<b>Number of pregnancies</b>				
≤3	4217 (93.3)	302 (6.7)		0.39
>3	1247 (92.6)	99 (7.4)	1.11 (0.88 - 1.40)	
<b>Level of education</b>				
No formal education/ primary/secondary	2118 (93.1)	157 (6.9)		
Tertiary	3347 (93.2)	243 (6.8)	0.97 (0.79 - 1.21)	0.85
<b>Occupation</b>				
Employed	1714 (93.0)	130 (7.0)	0.959 (0.76 - 1.18)	0.64
Unemployed	3752 (93.3)	270 (6.7)		
<b>Time of evaluation</b>				
Before instability	2642 (95.2)	142 (4.8)		
During instability	2765 (91.4)	261 (8.6)	1.89 (1.53 - 2.33)	<0.01

### 5.5. Factors Associated with Adverse Neonatal Outcomes

Number of ANCs (OR 0.52; 95% CI: 0.42 - 0.64;  $p < 0.01$ ), Age (OR 2.22; 95% CI: 1.48 - 3.33;  $p < 0.01$ ), marital status (OR 1.28; 95% CI: 1.09 - 1.50;  $p < 0.01$ ), occupation (OR 0.81; 95% CI: 0.69 - 0.96;  $p = 0.01$ ), level of education (OR 0.84; 95% CI: 0.72 - 0.98;  $p = 0.02$ ) and time of delivery (OR 1.83; 95% CI: 1.57 - 2.14;  $p < 0.01$ ) were associated with an adverse neonatal composite outcome (neonatal death, prematurity, LBW and birth asphyxia) using bivariate logistic regression.

On multivariate model number of ANCs (aOR 0.69; 95% CI: 0.55 - 0.86;  $p < 0.01$ ) and time of delivery categories (aOR 1.55; 95% CI: 1.30 - 1.85;  $p < 0.01$ ) were significant predictors of an adverse maternal outcomes. (Tables 5-7)

## 6. Discussion

Stress during each trimester of pregnancy has been implicated in adverse obstet-

tric outcomes. Several studies suggested that stress during the third trimester is most harmful, while others have implicated stress in the first and second trimesters [4]. Stress especially chronic stress, can increase risk of premature labor [7]. Chronic stress causes long-term changes in the body's vascular system, hormone levels, and the ability to fight infection. These changes could all potentially influence labor to start before the baby is full-term (at least 37 weeks gestation) [8].

**Table 5.** Factors independently associated adverse maternal outcomes.

Variable	Adjusted OR	(95% CI)	p-value
Age (<18 years)	1.35	(0.73 - 2.53)	0.34
Time evaluation (during instability)	1.45	(1.14 - 1.83)	<0.01
ANC (>4 visits)	0.57	(0.41 - 0.79)	<0.01
Marital status (single)	1.05	(0.83 - 1.31)	0.70

**Table 6.** Factors associated with adverse neonatal outcomes.

Variable	No adverse fetal outcome	adverse fetal outcome	OR (95% CI)	p-value
<b>Number of ANC</b>				
≤4 (reference)	3701 (85.4)	633 (14.6)		<0.01
>4	1355 (91.8)	121 (82.8)	0.52 (0.42 - 0.64)	
<b>Age categories</b>				
<18	97 (75.2)	32 (24.8)	2.22 (1.48 - 3.33)	<0.01
≥18 (reference)	4995 (87.1)	743 (12.9)		
<b>Marital status</b>				
Single	1567 (84.8)	281 (15.2)	1.28 (1.09 - 1.50)	<0.01
Married	3521 (87.7)	494 (12.3)		
<b>Number of pregnancies</b>				
≤3	3899 (86.3)	620 (13.7)		
>3	1191 (88.5)	155 (00.15)	0.81 (0.68 - 0.99)	0.04
<b>Level of education</b>				
No formal education/ primary/secondary	1946 (85.5)	329 (14.5)		
University	3145 (87.6)	445 (12.4)	0.84 (0.72 - 0.98)	0.02
<b>Occupation</b>				
Employed	1630 (88.4)	214 (11.6)	0.81 (0.69 - 0.96)	0.01
Unemployed	3461 (86.1)	561 (13.6)		
<b>Time of evaluation</b>				
Before instability	2699 (90.4)	285 (9.6)	1.83 (1.57 - 2.14)	
During instability	2536 (83.8)	490 (16.2)		<0.01

**Table 7.** Factors independently associated with adverse neonatal.

Variable	Adjusted OR	(95% CI)	p-value
Age (<18 years)	1.55	(0.98 - 2.46)	0.06
Time evaluation (during instability)	1.55	(1.30 - 1.85)	<0.01
ANC (>4 visits)	0.69	(0.55 - 0.86)	<0.01
Marital status (single)	1.08	(0.90 - 1.30)	0.42
Occupation (employed)	0.91	(0.74 - 1.12)	0.38
Number of pregnancies (>3)	0.91	(0.75 - 1.12)	0.38
Level of education (tertiary)	0.96	(0.80 - 1.16)	0.70

Preterm births are a concern, as of the 15 million babies worldwide born premature each year, about 1 million will die due to complications [9]. Birth weight is commonly used as a measure of infant health.

The method of determining the prematurity of the newborn in both hospitals is still largely based on estimation of gestational age. Prematurity before and during the instability was statistically significant ( $p < 0.01$ ) with more premature babies during the period of instability. Stillbirths were significantly increased during the instability period. This could be explained by the fact that the rate of service delivery was lower during the period of conflict. We believe women in high conflict zones and with limited access to care would be less likely to visit a health facility if they had any pregnancy related complications. This could partially explain the spuriously low number of stillbirths in the health facilities.

There was no statistical difference in the rate of abortion before and during the conflict, which was different from what was reported in another study where higher rates of abortions during periods of conflicts were observed [10]. This could be due to the fact that many clandestine abortions could have been under reported.

There was a statistically increased rate of caesarean deliveries during the conflict in our study. Similar findings were reported in Libya [4]. The proportion of caesarean deliveries in our study increased significantly from levels that were already high by international standards (25.3% of all deliveries), highlighting the problem faced internationally and possibly related to either a greater number of complicated cases or also by a reduction in ANC visits hence hindering the ability to quickly identify complications.

Similarly, to Keasley *et al.*, our study recoded a statistically significant increase in maternal deaths during the instability as opposed to before the instability ( $p < 0.01$ ) [10]. A statistical significance was observed in the maternal mortality ratio (MMR) and neonatal mortality rates before and during the instability with an increase in MMR and neonatal mortality rates. The average MMR for both hospitals was 627.74 deaths per 100,000 live births which is higher than the maternal mortality ratio in Cameroon at 467 deaths per 100,000 live births.

On the contrary the average neonatal mortality rate was 19.29 deaths per 1000



live births; this is slightly lower than the neonatal mortality rate of Cameroon at 24 deaths per 1000 live births. This could be explained by under reporting especially in high conflict areas where access to health facilities was difficult or documentation was deemed unnecessary.

### **Study Limitations and Strengths**

For limitations, this study was carried out in only one health facility in each of the Regions, thus the findings cannot be generalized to reflect what is going on in the entire regions. The files in the hospitals were not properly stored thus many files were destroyed. This made it almost impossible to get files according to calendar months for each year. Despite this short coming a substantial number of files were reviewed giving credibility to our findings. The exploitation of the data was also quite challenging because of the lack of a computerized system for archival of hospital records.

The major strength of this study is that it is the first study done to evaluate the trend of obstetrical outcomes before and during the period of socio-political instability in Cameroon. Also, a large number of files were reviewed permitting an indebt appraisal of the problem in a contextual manner.

### **7. Conclusions**

There was an increase in adverse materno-fetal outcomes in the two-referral hospitals during periods of socio-political instability. The factors associated with these adverse outcomes were; marital status (being single), occupation (being unemployed), lesser number of ANC's, and far distance from the hospital.

We therefore recommend; regularly monitoring pregnant women, sensitizing pregnant women to attend at least 8 ANC, proper documentation/archiving of medical record of patients, promoting feasible and cost effective care during conflict periods.

### **Recommendations**

- 1) All health authorities must pay particular attention to maternal and obstetrical characteristics and outcomes in their various jurisdictions
- 2) Health care workers and mothers should look out for any neonatal characteristics and outcomes that may affect health adversely
- 3) All factors found to be in association to adverse maternal and obstetrical outcomes should be eliminated by health education on the prevention

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### **Conflicts of Interest**

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

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