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The Born Before Arrivals (BBAs): Occurrence, Maternal and Early Neonatal Complications in two Highly turn over Maternities in Yaoundé

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ABSTRACT

Background: The term born before arrival (BBA) encompasses the birth of any infant at ≥ 20 weeks of gestation and >400g birth weight before arrival at the hospital or birth centre setting. These exclude planned home births attended by a health professional.

Objective: The main objective of the study was to evaluate the born before arrivals, its occurrence, maternal and early neonatal complications in two highly turn over maternities in Yaoundé.

Methods: We conducted a retrospective case-control study at the Yaounde Gynaecology Obstetrics and Paediatric Hospital and the "Centre d'Animation Sociale et Sanitaire" at Nkoldongo district health service. We collected retrospective data for a period of five years beginning from January 2017 to January 2022 inclusive. We reviewed files of all the deliveries that occurred in the two hospitals during that period. From these files, we identified BBAs as cases and every file of a hospital delivery that occurred after the BBA was selected as control.

Results: There were 6.4%. deliveries that occurred before arrival to the hospitals. There was a significant association between the level of education and born before arrival (p<0.001). Women who were educated were less likely to deliver before arriving the hospital. The mean gravidity and mean parity were high and statistically significant among women who delivered before arriving the hospital 3.61 ± 1.84 vs 2.94 ± 1.94 , (OR=1.194, 95% CI 1.042-1.368, p= 0.010) and 3.00 ± 1.43 vs 2.38 ± 1.65 , (OR 1.257, 95% CI 1.070-1.477, p=0.005). The birth interval among women who delivered before arriving the hospital was shorter and statistically significant 38.42 ± 1.82 vs 54.58 ± 2.41 , OR 0.984, 95% CI 0.971-0.998, p=0.024]. Hospital deliveries were more associated with live newborns (P=0.019) and a higher birth-weight (P = 0.002)

Conclusion: BBAs had adverse maternal and neonatal outcomes.

Keywords

Born-before-arrival, Occurrence, Factors, outcomes.

Introduction

The term born before arrival (BBA) encompasses the birth of any infant at \geq 20 weeks of gestation and >400g birth weight which occurs outside of the hospital or birth centre setting, excluding

planned home births attended by a health professional [1]. Other terms attributed to BBAs are accidental, unplanned or out-ofhospital births. These births usually occur within homes or "enroute" to the hospitals without medical attendance [2]. In high income countries, BBAs are uncommon and their prevalence vary between 1/1000 births in Finland, 4.6/1000 births in Australia, 5.2/ 1000 births in the UK, 7.4 /1000 births in Hong Kong, 19.9/1000 births in the USA, and 28.9 /1000 in Oman. In these high-income settings, the most widely agreed upon predisposing factor for BBAs is poor antenatal care attendance, although this trend is not universal [3-16].

Maternal outcomes highlighted in a systematic review include increased complications and higher morbidity including more frequent vaginal/perineal tears, postpartum haemorrhage (PPH), perinatal mortality and increased risk of longer third stage of labour [3,10,11,17-20].

Neonatal complications associated with BBAs include neonatal hypothermia, neonatal respiratory distress, neonatal intensive care admissions, low birth weight and preterm births [5,15,20-24]. Neonatal mortality following BBAs has been reported as 6 to 11 times greater than hospital births [25]. Nevertheless, the studies that examined unplanned out-of-hospital deliveries and their obstetric and perinatal outcomes often lack appropriate comparison groups [24-27].

In low-income countries and Africa in particular, several complications have been attributed to BBAs in South Africa, Nigeria and Zambia [22,28-30]. In Cameroon, little is known about the frequency and the outcome of BBAs. In order to improve neonatal and maternal prognosis in our settings, we carried out this study which general objective was to study the born before arrivals in two reference hospitals, specifically to determine the occurrence of BBAs in these two hospitals, to assess the factors associated with BBAs, to identify the early neonatal and maternal complications of BBAs, and to compare maternal and early neonatal outcomes between hospital deliveries and BBAs.

Material and Methods

It was a retrospective case - control study of BBAs versus normal hospital deliveries that lasted six months and covered a period of five years from January 2017 – January 2022. The settings were the maternities of Yaoundé Gynaecology Obstetrics and Paediatrics hospital and that of "Centre d'Animation Sociale et Sanitaire" (CASS) of Nkoldongo District Hospital. These health facilities have the highest turnover of deliveries in Yaoundé, with an average of 300 deliveries and 1500 gynaecological consultations including antenatal contacts per month. This enabled us to reach the minimum size for the study.

Sampling was consecutive and exhaustive. The study population consisted of all the deliveries recorded in both facilities during the study period. We included files of women who gave birth before arrival at the hospital (Cases) and files of women who gave birth in the hospital (controls). We excluded incomplete files and files of caesarean deliveries. For every case, we immediately recruited 2 controls matched for age and parity. The minimal sample size of cases was obtained using the Schlesselman's formula. N=2*($Z_{\&}+Z_{B}$)² * P (1-P) / ($P_{0}-P_{1}$)² $Z_{\&}$ = 1.96 and Z_{B} =1,28. P_{0} = prevalence of cases, P_{1} = prevalence of control, n= sample size, P= prevalence, α = cases, β = control with P= ($P_{0}+P_{1}$)/2, P_{0} =0.5, P_{1}

= 0.25, Thus n=77. Given that the ratio was 1:2, we had 77 cases and 154 controls.

After obtaining ethical clearance and research authorisations from the hospital administrators, the research was then carried out, data collection took place as follows: delivery registers and obstetric emergency registers were examined cautiously to obtain the total number of deliveries then the number of BBAs over the study period, in order to determine the occurrence of BBAs. Data were collected in a predesigned questionnaire. Studied variables were sociodemographic, obstetrical, BBA characteristics, maternal and neonatal complications and outcomes.

Data collected were entered into a Microsoft Excel 2016 spreadsheet then extracted and analysed using SPSS (Statistical Package for Social Sciences) version 26.0. Tools used to represent results were frequencies, percentages, means with their standard deviation, Odds Ratios (OR) and their 95% confident interval and p values. P was statistically significant for any value < 0.05.

Results

Out of 2672 files of women found in the 2 health facilities, 2096 (78.44 %) were vaginal deliveries and 576 (21.56%) were caesarean deliveries. We found 172 files of BBAs, giving 6.43 % of occurrence among all deliveries, and 8.20 % of all vaginal deliveries.

A total of 77 cases (25 files of BBA mothers at YGOPH and 52 files at CASS) fulfilled our selection criteria and were recruited. For any case of BBA, we directly chose the 2 next files of normal vaginal hospital delivery of similar age and parity with the control. We analysed 77 cases and 154 controls.

Socio-demographic Profile

The age range in our study varied from 15 to 44 years. The median maternal age for BBA mothers was 29 years for the cases and 28 years for the controls. The highest percentage of BBA mothers in the cases who had ages ranging from 25-35 years was 54.5% and 60.4% for the controls. Concerning residence, all BBA and hospital delivered mothers lived in the urban region.

Apart from the level of education that had heterogenous distribution (p<0.001), all other studied sociodemographic variables had a homogenous distribution between cases and controls, with respectively maternal age (p = 0.483), marital status (P = 0.412), occupation (P = 0.703), the distances from home to the health facility with BBAs (P = 0.424).

The birth weights for babies borne before arrival were smaller. Hospital deliveries were more associated with live newborns (P=0.019) and a higher birth-weight (P = 0.002). The differences in newborn's gender (p=0.140) as well as temperature were not statistically significant in the two groups (P>0.05). Gestational age within the range of 37 to 42 weeks for BBA mothers was statistically significant to the occurrence of BBA (p<0.001)

Variable	Cases n= 77(%)	controls n=154(%)	p-value	OR (95% CI)
Maternal age			0.483	
[15-25]	23 (29.9)	32 (20.8)		
[25-35]	42 (54.5)	93 (60.4)		
≥ 35	12 (15.6)	29 (18.8)		
Marital Status			0.412	
Single	30 (39)	64 (41.6)		
Cohabitation	19 (24.7)	41 (26.6)		
Married-monogamy	27 (35.1)	46 (29.9)		
Married- polygamy	1 (1.3)	3 (1.9)		
Occupation			0.703	
Housewife	15 (19.5)	27 (17.5)		
Farmer	6 (7.8)	2 (1.3)		
Trader	5 (6.5)	11 (7.1)		
Tailor	5 (6.5)	14 (9.1)		
Hairdresser	17 (22.1)	14 (9.1)		
Student	6 (7.8)	27 (17.5)		
Civil servant	8 (10.4)	17 (11)		
Private sector	8 (10.4)	9 (5.8)		
Other	15 (19.5)	33 (21.4)		
Level of education			< 0.001	
None	2 (2.6)	55 (35.7)		
Primary	6 (7.8)	1 (0.6)	0.004	25.043 (2.873- 218.320)
Secondary	39 (50.6)	21 (13.6)	< 0.001	4.788 (2.507-9.143
Tertiary	23 (29.9)	77 (50)		
Distance from home to health facility			0.424	
< 10km	67 (87)	139 (90.3)		
10-50 km	10 (13)	14 (9.1)		
>51 km	0 (0)	1 (0,6)		

 Table 1: Distribution of the study population according to sociodemographic profile.

Table 2: Distribution of the study population according to the obstetric profile.

Variables		Cases n= 77(%)	Control n=154(%)	OR (95% CI)	p-value
Gravidity (M ± SD)		3.61 ± 1.844	2.94 ± 1.94	1.194 (1.042- 1.368)	0.010
Parity (M ± SD)		3 ± 1.433	2.38 ± 1.653	1.257 (1.070- 1.477)	0.005
History of BBA		7 (9.1)	3 (1.9)	1.410 (0.338- 5.884)	0.638
Outcome of last birth					0,406
Uneventful		42(80.8)	24(72.7)	1.167 (0.182- 7.481)	0.871
Perineal tear		7(13,5)	5(15,2)	0.933 (0.111- 7.820)	0.949
Episiotomy		0 (0)	1 (3)	-	
PPH		0 (0)	1 (3)	-	
Other		3 (5,8)	2 (6,1)	-	
Birth Interval (M \pm SD)		38.42 ± 21.82	54.58 ± 42.410	0.984 (0.971- 0.998)	0.024
Type of	Singleton	77 (100)	152 (98.7)	-	
pregnancy	Multiple	0 (0)	2 (1.3)	-	

Gravidity, parity and birth interval were associated with the BBAs.

Table 3: Distribution of mothers according to BBA characteristics.

Characteristics	Effective (n= 77)	Frequency (%)	
Assistant at birth			
A relative (brother, sister, mother)	17	26.2	
Health personnel	10	15.4	
Nobody	29	44.6	
Other	9	13.8	
Reason for BBA			
Delay at home	11	14.3	
Delay of taxi	16	20.8	
Fast labour	10	13	
Didn't feel contraction	3	3.9	
Strong contractions	8	10.4	
Failure to recognize onset of labour	29	37.7	
Transportation			
On foot	3	3.9	
Motocycle	2	2.6	
Public transport vehicle	66	85.7	
Others	6	7.8	
Location of delivery			
At home	40	51.9	
By the road	4	5.2	
In the vehicle	33	42.9	

About 44.6% of BBA mothers had no assistance at birth. The most used means of transportation was the public vehicles (85.7%).

Table 4: Distribution of the study population according to the newborn and maternal parameters.

Variables		Cases (n= 77)	Control (n=154)	OR (95%CI)	p-value	
New born parameters						
Gestation in weeks	<37weeks		12(15.6)	19(12.3)	0.88(0.786-0.988)	0.030
	[37;42]		65(84.4)	133(86.4)	2.29(2.151-2.485)	< 0.001
	>4	2	0(0)	2(1.3)	-	-
Live newborn (%)		72(93.5)	153(99.4)	0.074(0.009-0.646)	0.019	
Birth Weight in G (IQR))		3100(2700- 3415)	3200(2950- 3600)	0.999(0.999-1)	0.002	
Gender (%)		Male	33(42.9)	80(51.9)	0.670(0.394-1.140)	0.140
	Female		44(57.1)	74(48.1)	-	-
Temperature (mediane (IQR))		36.7(36.5- 37)	37(36.6-37.2)	0.698(0.420-1.159)	0.164	
Maternal parameters						
Perineal/ vaginal tear		26(33.8)	51(33.1)	0.781(0.450-1.358)	0.381	
Placenta retention requiring uterine evacuation		63(81.8)	51(33.1)	7.859(4.109- 15.031)	< 0.001	
Puerperal fever		2(2.6)	1(0.6)	1.707(0.208- 10.418)	0.562	
HIV Status		6(7.8)	7(4.5)	1.975(0.662-5.894)	0.222	

Associated factors	OR (CI of 95%)	p-value	aOR (95% CI)	p-value adjusted
Level of education	4.788(2.507-9.143)	< 0.001	9.301(0.512- 10.865)	0.021
Gravidity	1.194(1.042-1.368)	0.01	1.025(0.460-2.281)	0.938
Parity	1.257(1.070-1.477)	0.005	1.206(0.420-3.462)	0.614
Birth Interval	0.984(0.971-0.998)	0.024	0.983(0.957-1.009)	0.235
Gestational age	0.88(0.786-0.988)	0.03	0.985(0.650-1.493)	0.878
Live new born	0.074(0.009-0.646)	0.019	5.614(1.292-24.404)	0.445
New born weight	0.999(0.999-1)	0.002	1(0.998-1)	0.773
Uterine	7.859(4.109-	< 0.001	7.206(2.157-24.070)	0.001

Table 5: Multivariate analysis of the associated factors.

After multivariate analysis only level of education (aOR 9.3, 95%CI 0.512-10.865, *P*=0.021) and uterine evacuation were significant (aOR 7.2, 95%CI 2.157-24.070, *P*=0.001)

Complications

 Table 6: Distribution of the study population according to the complications.

Variables	Cases n= 77(%)	Control n= 154(%)	OR (95% CI)	P-value
Newborn				
Prematurity	12(15.6)	19(12.3)	2.29(2.151-2.485)	< 0.001
Neonatal infection	5(6.49)	2(1.34)	0.698(0.420-1.159)	0.164
Death	5(6.49)	1(0.6)	0.074(0.009-0.646)	0.019
Maternal				
Puerperal infection	2(2.6)	1(0.6)	1.707(0.280-10.418)	0.562
Post-partum hemorrhage	5(6.49)	0(0.0)	-	-
Death	0(0.0)	0(0.0)	-	-

Newborns of BBA mothers had more complications; prematurity was 15.6% and neonatal infection 6.49%, whereas newborns of hospital delivered mothers, prematurity was 12.3% and neonatal infection was 1.34%. These complications in newborns from BBA mothers led to five deaths unlike hospital delivered newborns where one death was recorded.

Maternal complications in BBA mothers were dominated by postpartum haemorrhage (6.49%) followed by puerperal infection (2.6%). Premature newborns from BBA were significantly more numerous.

Discussion

Occurrence

About of 6.43 % of deliveries occurred before arrival in the hospital, much higher than what was reported in the USA in 1991. The phenomenon of born before arrival remains engraved in our society due to a multitude of reasons.

Socio-demographic Characteristics

The median age was 29 years for the cases and 28 years for the controls. In a similar study carried out in Australia between the years 2000 and 2011, the median age for women who delivered

before arriving the hospital was 29.9 years and 30.4 for those who delivered in the hospital [1]. A slightly older population with a mean age of 35.2 ± 6.0 years was reported in Germany among women who delivered before arriving the hospital as against a mean age of 35.8 ± 5.7 years among women who delivered in the hospital [26]. The extremes of ages in our report were 15 to 44 years. A study of BBA in Ireland in 2011 had extremes of ages ranging from 18 to 43 years with a median age of 30 years [9]. The age bracket 25-35 years was the most represented in the Irish study (54.5% among the cases and 60.4% in controls). Cohort studies carried out in Scandinavia in 2019 and Kenya in 2020 on the prognosis of out-of-hospital births had the same dominant age bracket of 25-35 years [23-35]. Maternal age was not significantly associated with the occurrence of BBA in our study (p=0.483) unlike the studies in Australia and in Kenya where age was statistically significantly associated with the occurrence of BBA [1,35].

Marital Status

Single women were the most common in this study (39% among the cases and 41.6% in the controls). Studies in Nigeria had a predominantly married population (97.7% among the cases and 96.6% in the controls) [33]. Studies in Kenya found that 61.5% of the cases were single compared to only 38.5% of the controls [35]. Marital status was not significantly associated with the occurrence of BBA in our study (p=0.412) as is the case with the studies in Nigeria [7]. This low percentage of single women that we found among the cases compared to the controls as well as the non-association, can be explained by the larger number of controls (154) compared to cases (77). Single women are known to take longer times to get to the hospitals for delivery when labour begins. This explains the high percentages of single women in other studies like the one carried out in Kenya where an association was found between single marital status and the occurrence of BBA (p=0.023) [35].

Occupation

In this study, hairdressers were the most represented among the cases 22.1% vs 9.1% among the controls, followed by housewives (19.5% for cases vs 17.5% for controls) and those who fell in the category of others not included in the other occupational subgroups (19.5% for cases vs 21.4% for controls). In a study carried out in Kenya, unemployment was found among 54.1% of women who delivered before arriving the hospital compared to 45.9% among women who delivered in the hospital [35]. No association between occupation and the occurrence of BBA was found in our study (P=0.703). This may be explained by the different distributions of occupational subgroups in the two studies.

Level of Education

The level of education among the cases and controls in this study was statistically associated with the occurrence of BBA (p<0.001). Secondary education was the most common among the cases 50.6% vs 13.6% in the controls. Tertiary level of education was the most common among the controls (50% vs. 29.9% in the cases). Similar trends were reported in Kenya and Germany with low

levels of education among the cases and higher levels of education among the controls [24,35]. The reason for these similar results could be that women with a lower level of education do not have the same understanding of labour and danger signs of pregnancy when compared with women with higher levels of education.

Distance from the Health Facility

In this study, 87% of cases and 90.3% of controls lived within 10 km from the health facility. Studies in the USA in 1991 found that the majority of the population of women who delivered before arriving the hospital and those who delivered in the hospital lived closer to a health facility [34]. Our results differ a little from that reported in Kenya where 82% of women who delivered before arriving the hospital and 79.2% of those who delivered in the hospital lived at least 10km from a health facility [35]. In our findings, distance from the health facility was not associated with the occurrence of BBA (p=0.424) compared to the Kenyan study that established this relationship (p=0.006) [35]. This difference can be explained by the fact that the further the health facility is from the home of the pregnant woman, the more likely that she delivers before arriving the hospital.

Gravidity

The mean gravidity for women who delivered before arriving the hospital was 3.61 ± 1.844 versus 2.94 ± 1.94 for women who delivered in the hospital. Gravidity was associated with the occurrence of BBA (p=0.010). Studies in Germany had an average gravidity substantially equal between women who delivered before arriving the hospital and those who delivered in the hospital $(3.2 \pm 1.7 \text{ vs. } 3.4 \pm 1.9)$. The studies did not find an association between gravidity and the occurrence of BBA (p=0.56) [26]. In Australia it was found that primiparous women were more among those who delivered in the hospitals as against those who delivered before arriving the hospital (42.3% vs. 13.3%, p<0.001) [1]. These results can be explained by the fact that women with higher gravidities have greater knowledge on the signs of labour which is a component of comprehensive antenatal package, they know that delay at home until labour is in an advanced stage increases the risk of delivery before arrival to the hospital.

Parity

The mean parity found in this study was 3 ± 1.433 for the cases and 2.38 ± 1.653 for the controls and parity was statistically associated with the occurrence of BBA (p=0.005). These results are similar to those reported in Kenya where 46% of women who delivered before arriving the hospital had parities more than 4 vs 22.2% among women who delivered in the hospitals (p=0.006) [35]. Studies in Australia did not find any differences in parities among women who delivered before arriving the hospital. Studies carried out in Germany had an equal mean parity for both cases and controls (2.9 ± 1.5 , p=0.89) [1-26]. The high parity as well as the high gravidity in our context for the born before arrivals explain the fact that labour is faster when gravidity and parity are high and thus increases the risk of delivery before arrival at the hospital. This risk is very pertinent

in our context due to the low level of education as women do not sufficiently understand the warning and danger signs of labour. They tend to wait for the active phase of labour at home which is faster in multiparous women.

Obstetrical History

The prognosis of the last delivery was not associated with the occurrence of BBA in our study (p=0.406). About 80.8% of last deliveries among women who delivered before arrival were uneventful compared to 72.7% of women who delivered in the hospitals. Perineal/vaginal lacerations were common in 13.5% of cases and 15.2% of controls and this was not statistically significant.

A history of episiotomy or perineal laceration was not associated with the occurrence of BBA in our study. In Germany studies found previous obstetric history associated with the occurrence of BBA such as instrumental vaginal delivery (p=0.004) [26]. Other factors such as episiotomy or 1st or 2nd degree perineal lacerations were not associated with the occurrence of BBA (p=0.79). In Australia an association between a history of episiotomy or perineal laceration with the occurrence of BBA was established (p<0.001) [1]. This difference with our results can be explained by the fact that none of the women in our study had a history of episiotomy.

Assistance at Birth

In this study, 44.6% of women who delivered before arrival to the hospital had no assistance at the time of delivery. About 26.2% of the women were assisted by a relative and only 15.4% were assisted by medical personnel. These results are different from a study carried out in Nigeria where 50.9% of women who delivered before arrival to the hospital were assisted by health personnel and 34.4% by a relative [33]. This result in our context can be explained by the fact that the pregnant woman lived a solitary life and remained solitary until the last weeks of pregnancy.

Reasons of BBA

The main reason for BBA in this study was the inability of the women to recognise signs of labour (37.7%) followed by lack of prearranged means of transport (20.8%), delay at home (14.3%) and fast labour (13%). Studies in Kenya found that the inability to recognise signs of labour among women who delivered before arrival to the hospital accounted for 36% of the causes just behind the inability to remember the expected date of delivery, 44% [35]. Other factors such as poor road infrastructure, distance from the health facility greater than 10 km, and availability to have means of transportation. Preparation for delivery is part of the antenatal care package and this should be emphasized during antenatal contacts. Our findings call attention to the problems of quality of antenatal consultations and the effectiveness of communication on the fight against maternal and infant mortality in our context.

Transportation

The most common means of transportation used by the BBA mothers was public transport vehicles (85.7%). The means of

transportations was identified in only 26% of cases in a study carried out in Kenya [35]. The low socio-economic status of our population could explain why the majority of the women who delivered before arrival used public transport vehicles. These women do not have private vehicles as means of transportation. The availability of public transport vehicles is not always guaranteed, the turnaround time is increased and the risk of out-ofhospital delivery increased. This calls attention to the essence of preparation for childbirth during the prenatal consultations.

Location of Delivery

In this study, about 51.9% of women who had an out of hospital birth delivered at home, followed by 42.9% of women who delivered in public transport vehicles. This was due to the fact that the majority of the women did not recognise the signs of labour which are sometimes unexpected associated with the fact that most of them were multigestational and multiparous. These types of women usually have faster labour which often does not allow them to reach the hospital; especially women who did not prepare well for delivery.

Newborn Parameters

The newborns of women who delivered before arrival had a significantly lower survival rate compared to those of mothers who delivered in the hospital (93.5% vs 99.4%), p=0.019). Studies in Germany had similar results with percentages of 98.5 for cases and 99.5 for controls (p<0.05), same with studies in Nigeria (87.4% for cases and 93.7% for controls (p=0.019) and as well as studies in Kenya (76% for cases and 93.1% for controls) where p=0.040 [33-35]. These results can be explained by the fact that the hospital settings are a healthier environment for all deliveries due to the aseptic nature of the obstetric and neonatal units as opposed to any other setting out of the hospital milieu.

Temperature was not associated with neonatal prognosis in our study (p=0.164) unlike the study done in the USA where hypothermia was significantly higher in newborns from BBA mothers (p<0.002) [34]. Gender was not significant in our study as compared to other African and Western studies

Maternal Parameter

The performance of uterine evacuation was significantly higher among BBA mothers (P<0.001). This result can be explained by the fact that active management of the third phase of labour was not done correctly among women who delivered before arrival and therefore favouring the high risk of placental or placental debris retention that may be responsible for postpartum haemorrhage hence the need for a uterine evacuation.

Vaginal and perineal lacerations (p=0.381), puerperal fevers (p=0.562) and HIV status (p=0.222) were not statistically significant with the occurrence of BBA in our study.

Multivariate Analysis to the Associated Factors

After multivariate analysis, the level of education (p=0.021)and uterine evacuation (p=0.001) were the only two factors

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significantly associated with born before arrival to the hospital. than hospital delivered mothers. Following multivariate analysis of the Scandinavian study of 2019, the statistically significant factors associated with born before arrival to the hospital were multiparity, prematurity, maternal pathologies and hypothermia [23]. Gravidity, parity and shorter birth intervals were statistically significant for BBAs during univariate analysis but were not risk factors after multivariate analysis. The newborn's weight and its viability were no longer statistically significant to the occurrence of BBA after multivariate analysis.

Study Limitations

This study was carried out in just two highly turn over maternities in Yaounde out of about 9,000 health facilities that carry out deliveries in Cameroon. The results cannot be a true representative of the real picture of the plague of born before arrival in the whole country. As synonymous with all retrospective data collection, some files had turned out pages and some did not have the complete information that we were looking for. There was a recall bias because we could not contact all the women for incomplete information. We had difficulty to control selection thus we were challenged to select solid match for the control group.

Conclusion

The occurrence of BBAs was 6.4%. Newborns of BBA mothers had more complications such as prematurity 15.6% and neonatal infection 6.49%, whereas among newborns in the hospitals, prematurity was 12.3% and neonatal infection was 1.34%. These complications in newborns from BBA mothers led to five deaths unlike among hospital delivered newborns where only one death was recorded. Maternal complications in BBA mothers were dominated by postpartum haemorrhage (6.49%) followed by puerperal infection (2.6%). We also noticed that 33.8% of BBA mothers presented with perineal/vaginal lacerations. The study found the following factors to be associated with BBAs: level of education was significantly influenced the occurrence of BBA, gravidity, parity and the birth interval significantly influenced the occurrence of BBA. Under newborn parameters, we found that newborn's survival rate was associated with the occurrence of BBA. In maternal parameters, only uterine evacuation was significantly associated with the occurrence of BBA. In multivariate analysis, level of education increased the probability of being a BBA mother. Maternal and early neonatal outcomes found between normal hospital deliveries and BBA were as follows: Newborns from BBA mothers had a significantly lower survival rate (93.5%) compared to those borne of hospital delivered mothers (99.5%).

Suggestions

We suggest that healthcare providers should lay emphasis on the preparation of deliveries during antenatal contacts, pregnant women should reduce the distance between where they live and where they intend to deliver by moving to live with family members or friends who live closer to maternities. The government should enhance the education of the girl child as the level of education is directly proportional to hospital deliveries. Pregnant women should increase their health seeking habits and enrol in antenatal care. Families and friends of pregnant women should remain closer to the women when they are in their third trimester of pregnancy to enhance transportation when labour begins.

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