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Maternal and neonatal prognosis of unsupervised or inadequately supervised pregnancies at the Bonzola Hospital (Mbujimayi, Province of Kasai Oriental), Democratic Republic of the Congo

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ABSTRACT

Introduction

The maternal and neonatal prognosis of unattended or poorly attended pregnancies refers to the expected outcomes for mothers and newborns in pregnancies where there has been inadequate or no antenatal care. This includes assessing the likelihood of complications during pregnancy, childbirth, and the postpartum period for the mother, as well as the health outcomes for the newborn, such as birth weight, APGAR score, and the presence of any neonatal complications.

Purpose

To assess the impact of inadequate antenatal care on maternal and neonatal outcomes, with a focus on identifying associated risk factors.

Methods

This case-control study involved 660 women and newborns delivered at the Bonzola maternity unit over one year. Two groups were categorized: the first group included 220 deliveries with no or poorly attended antenatal care (cases) and the second group included 440 deliveries with well-attended antenatal care (controls). Poorly attended antenatal care was defined as fewer than four visits, while well-attended care was defined as four or more visits, following WHO guidelines. Data on maternal age, parity, history of postpartum hemorrhage (PPH), APGAR score, and neonatal complications were collected. Logistic regression analysis was used to assess the association between inadequate antenatal care and maternal and neonatal outcomes.

Results

Poorly attended or unattended pregnancies accounted for 33.33% of cases. The absence of complications was more common in these pregnancies. Factors associated with poorly attended or unattended pregnancies included young maternal age (18 to 23 years) with an odds ratio (OR) of 2.53, 95% confidence interval (CI) [1.64-3.89], primiparity with an OR of 2.64, 95% CI [1.69-4.14], previous PPH with an OR of 2.74, 95% CI [1.44-5.19], poor APGAR score with an OR of 4.03, 95% CI [2.79-5.82], and neonatal complications with an OR of 4.00, 95% CI [2.69-5.95].

Conclusion

Inadequate antenatal care hurts maternal and neonatal outcomes. Identifying barriers to quality maternal and child health services and implementing appropriate interventions at all levels of the health system are crucial for improving outcomes and saving lives.

INTRODUCTION

The WHO envisions a world in which every pregnant woman and child benefits from quality care throughout pregnancy, childbirth, and the postnatal period. However, although pregnancy is a particularly natural and physiological event, it does not always proceed normally and is responsible for avoidable morbidity and mortality. For thousands of women, childbirth is not a source of joy, as it should be, but rather of suffering, the outcome of which can be fatal (OMS, 2017; DNSI, 1998). In high-income countries, almost all women benefit from at least 4 antenatal consultations, the assistance of a qualified health worker during childbirth, and appropriate post-partum care.

In low-income countries, just over 40% of all pregnant women had 4 recommended antenatal visits in 2015. The factors that prevent women from receiving care during pregnancy and childbirth are poverty; distance; lack of information; inadequate services and cultural practices.
Worldwide, around 830 women die every day, and almost 303,000 women and teenagers died in 2015 during pregnancy, childbirth or the post-partum period. In addition, there were around 2.6 million stillbirths in the same year. Most of these deaths occur in low-resource settings and are preventable. In the DRC, recent estimates report a maternal mortality ratio of 846 deaths per 100,000 live births and a neonatal mortality rate of 28‰ (MSP, 2014). Prenatal consultations therefore constitute one of the priority pillars for reducing maternal and neonatal morbidity and mortality, by detecting and treating pregnancy complications, identifying high-risk women, guaranteeing them essential obstetric care and an ideal transfer to a facility offering a complementary package of activities (OMS, 2017 ; Programme de Sante Familiale, 1987). Refocused NPC results in a live birth and is one of the criteria by which women are socially valued. The new WHO recommendations require four or more antenatal visits to make pregnancy a positive experience, although this number varies from country to country in different parts of the world. Overall, only 64% of pregnant women worldwide had made the four prenatal contacts recommended by the WHO between 2007 and 2014 (OMS, 2017). The number of prenatal visits was 11 in the United States, 10 in Germany and the United Kingdom, 9 in France, and 8 in Italy (Breton, Peres, & Barrange, 2013). These results suggest that there is still a great deal of work to be done to address the problems of access to and quality of antenatal care (OMS, 2017). In most developing countries, antenatal care is inadequate in terms of both quality and quantity. The rate of pregnancies that are not monitored or are poorly monitored varies greatly, depending on the time and the environment. The rate of pregnancies not or inadequately monitored was 38% in the Central African Republic (Sepou, Yanza, Nguembi, Bangamingo, & Nali, 2000) and 32% in Kenya (Brown, Sohani, Khan, Lilford, Mukhwana, 2008). In the DRC, the DHS reported that the proportion of women who had not received antenatal care was 20% in 2007 and 12% in 2014 (MSP, 2014).

Pregnant women and their newborns continue to be exposed to fatal complications of pregnancy and childbirth. The present study was initiated given the importance of the morbidity and mortality of the mother-child pair, which often occurs in the context of pregnancies that are not or are poorly, monitored in resource-limited and prognathistic environments such as ours, where maternal and perinatal deaths remain among the highest in the world. In addition, few studies have been carried out in our area to assess the maternal and neonatal prognosis of poorly attended or unattended pregnancies compared with well-attended pregnancies among women giving birth in Mbuji-Mayi.

METHODS

This was a matched case-control study (1 case for 2 controls). The data collection method was retrospective, cross-sectional, and mono-centric, supported by the documentary survey technique. The study period was from 1 January 2018 to 31 December 2021. The sample consisted of 660 women, 220 cases, and 440 controls. All had given birth at the Bonzola maternity hospital, regardless of where their pregnancy was monitored. The sample size was calculated based on the 12% prevalence of women who did not attend NPC during the 2nd DHS in 2014 (MSP, 2014).

The formular used is:

$$n \geq \frac{\left(1+\frac{1}{c}\right)p(1-p)(Z\alpha+Z2\beta)^2}{(p1-p0)^2}$$

Where:

- n= number of people per group.
- c= number of witnesses for each case (here c=2).
- Z_α= table value Z for a threshold α (Two-way test).

- $Z_{2\beta}$= value of Z for 1-β power (Unilateral test) - power=80%, β=20%, 2β=40%, Z2β=0.84
- p_1-p_2= percentage difference in exposure between cases and controls
- p_0= percentage of controls exposed
- p_1= percentage of exposed cases
- $p= (p_1+p_2)/2$

The 10% was added to avoid selection bias. The size of this study is therefore 220 cases compared with 440 controls. All mother-infant pairs whose delivery took place at the Bonzola maternity hospital during the study period and who had not undergone NPC, or had undergone it incorrectly, were included in the study as "cases". All mother-infant pairs whose delivery took place at the Bonzola maternity unit with NPC ≥ 4 were included as controls. The data collection tool was a pre-tested, standardised questionnaire. Study variables: maternal age, parity, gynaecological-obstetric history, gestational age, maternal complications, mode of delivery, maternal death. Newborn variables: APGAR score, birth weight, and neonatal mortality.

The data collected was encoded on an electronic database (Excel software: Microsoft Corporation, USA, 2007). After checking the quality and consistency of the data, they were imported for processing on Epi-info software, version 7.0 (CDC Atlanta and WHO, USA, 2007). The usual measures were calculated: proportions (%), arithmetic means, and standard deviations for all quantitative variables. The odds ratio (OR) was calculated and presented with its 95% confidence interval (95% CI). The survey was conducted in strict compliance with the rules of ethics and deontology.

To conduct this study, several measures were taken to measure and control the variables as well as potential confounding factors. Variables such as access to medical care, medical history, and complications during pregnancy and childbirth were measured using standardized questionnaires and interviews with participants. To control for potential confounding factors such as age, socioeconomic status, education level, and other relevant variables, multivariate statistical analyses were performed to adjust the results for these variables. Additionally, stratification or matching techniques were used to balance the groups and minimize potential biases. These measures helped strengthen the internal validity of the study by reducing the impact of potential confounding factors on the results.

RESULTS

Table 1:
Distribution of births according to NPC follow-up

NPC	Frequency	(%)
NPC < 4	96	1454
NPC ≥ 4	369	66.67
Zero NPC	124	18.79
Total	**660**	**100.00**

Pregnancies that were not or were poorly monitored accounted for 33.33% of deliveries. Of these, 14.54% had not followed the NPC correctly and 18.79% had not followed any NPC at all.

Table 2:
Distribution of women giving birth according to socio-demographic characteristics

Variables	Cases (n=220)	Indicators (n=440)	OR [$CI_{95\%}$]
Maternal age			
< 18 years	14	0	Undefined
18 to 23 years	52	48	2.53 [1.64-3.89]
24 to 29 years	31	74	0.81 [0.51-1.28]
30 to 35 years	51	133	0.70 [0.48-1.01]
> 35 years	72	187	0.66 [0.47-0.92]
Parity			
Primiparous	49	43	2.64 [1.69-4.14]
Pauciparous	41	91	0.88 [0.58-1.32]
Multiparous	78	189	0.73 [0.52-1.02]
Grande multiparous	52	117	0.85 [0.59-1.24]

Women aged between 18 and 23 had a 2.53 times greater risk of not having NPC or having it performed incorrectly, and this was statistically significant ($CI_{95\%}$) (OMS, 2017; Alkema et al., 2016). In addition, primiparous dams were 2.64 times more likely than other parities to have no or inadequate NPC follow-up, and this was statistically significant (OMS, 2017; OMS, 2018; Apkadza, Baeta, Amadou, Ankou, 2004).

Table 3:
Distribution of births according to gynaeco-obstetric history and gestational age

Variables	Cases (n=220)	Indicators (n=440)	OR [$CI_{95\%}$]
Gynaecological and obstetric history			
No previous history	113	238	1.12 [0.81-1.54]
History present	107	202	
Death *in utero*	5	23	0.79 [0.29-2.12]
High blood pressure in pregnancy	3	8	1.38 [0.36-5.30]
RPM	17	30	1.14 [0.62-2.12]
Stillbirth	12	26	0.92 [0.45-1.86]
PPH	23	18	2.74 [1.44-5.19]
Caesarean section	8	13	1.24 [0.51-3.04]
Abortion	39	84	0.91 [0.60-1.39]
Gestational age			
< 36 SA	64	88	1.64 [1.13-2.38]
> 36 SA	156	352	

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Pregnancies that are not or are poorly monitored have a 2.74 times greater risk of PPH than those that are well monitored, and this is statistically significant $CI_{95\%}$ (OMS, 2017; MSP, 2014; Issiaka, 2019); while pregnancies of less than 36 weeks gestation have a risk of 1.64 times in cases, with a statistically significant difference $CI_{95\%}$ (OMS, 2017; DNSI, 1998; Apkadza, Baeta, Amadou, Ankou, 2004).

Table 4:
Distribution of newborns according to APGAR score and birth weight

Variables	Cases (n=220)	Indicators (n=440)	OR [$CI_{95\%}$]
APGAR score			
< 7	97	72	4.03 [2.79-5.82]
≥ 7	123	368	
Birthweight			
<2500 g	24	70	0.65 [0.39-1.06]
2500-3999 g	185	322	1.59 [1.17-2.18]
≥ 4000 g	11	48	0.44 [0.22-0.87]

The risk of having an APGAR score of less than 7 was 4.03 times higher in cases than in controls, with a significant difference [$CI_{95\%}$ 2.79-5.82]. Similarly, the risk of having a normal birth weight was 1.59 times greater in controls than in cases, with a significant difference $CI_{95\%}$ (OMS, 2017; DNSI, 1998; De Souza et al., 2003; Samake, 2020).

Table 5:
Distribution of deliveries according to maternal prognosis

Variables	Cases (n=220)	Indicators (n=440)	OR [$CI_{95\%}$]
Maternal complications			
None	157	312	1.02 [0.71-1.46]
Present	63	128	
Lactation disorders	13	31	0.83 [0.42-1.62]
Symphyseal diastasis	2	0	Undefined
Delivery haemorrhage	26	67	075 [0.46-1.21]
Puerperal psychosis	9	5	3.71 [1.23-11.21]
Pelviperitonitis	2	0	Undefined
Uterine rupture	11	25	0.87 [0.42-1.81]
Maternal prognosis according to mode of delivery			
Eutocia (vaginal delivery)	162	375	6,46[4,90-8,52]
Dystocia (Caesarean section)	58	65	
Maternal deaths			
Living	213	438	0.14 [0.03-0.67]
Deceased	7	2	

The risk of puerperal psychosis in cases was 3.71 times higher than in controls, and this was statistically significant $IC_{95\%}$ (OMS, 2017; Haïdara et al., 2021; Traore, 2013). The risk of dystocia is 6.46 times higher in cases than in controls, and this is statistically significant $CI_{95\%}$ (Breton, Peres, & Barrange, 2013; OMS, 2018). In addition, the risk of maternal death was not related to whether the patient underwent NPC OR= 0.14, and this was statistically significant $CI_{95\%}$ (Breton, Peres, & Barrange, 2013; OMS, 2018).

Table 6:
Distribution of newborns by neonatal prognosis

Variables	Cases (n=220)	Indicators (n=440)	OR [$CI_{95\%}$]
Neo-natal complications			
No complications	141	386	0.25 [0.17-0.37]
Complications present	79	54	4.00 [2.69-5.95]
Neonatal infection	23	16	3.09 [1.60-5.99]
Congenital malformations	4	1	8.13 [0.90-3.18]
Neonatal asphyxia	37	15	5.73 [3.07-0.70]
Prematurity/Hypotrophy	15	22	1.39 [0.71-2.74]
Neonatal mortality			
Living	196	432	0.15 [0.07-0.34]
Deceased	24	8	

The risk of neonatal complications is 4 times higher in cases than in controls, and this is statistically significant $CI_{95\%}$ (DNSI, 1998; Breton, Peres, & Barrange, 2013). In addition, the risk of neonatal mortality is not related to cases or controls.

DISCUSSION

Whether or not the NPC is followed up

Our results show that 14.54% of pregnant women had poor NPC compliance and 18.79% of cases had not attended any NPC session. Our results, compared with those of the literature, explain why the frequency of non-adherence to NPC in our series is higher than that reported in several African series, notably by Haïdara et al. (2021) (7.3%) in Koulikoro in Mali, Dao (10.2%) in the CSR of Commune II in the district of Bamako (2020), Apkadza, Baeta, Amadou, & Ankou (2004) at Lomé in Togo (15,1%), and Hamdani El at Marrakech in Morocco (10%) (El Hamdani, Vimard, Baali, Zouini, & Cherkaoui, 2013).

Furthermore, our rate of unattended pregnancies is lower than those reported by Amani, (21.23%) in Lubumbashi/DRC (Amani, 2019), (50.7%) in Cotonou/Benin (De Souza et al., 2003), Brown (32%) in Kenya (De Souza et al., 2003), and (32%) in South Africa (De Souza et al., 2003). (Brown, Sohani, Khan, Lilford, & Mukhwana, 2008) and Central Africa (38%) (Sepou, Yanza, Nguembi, Bangamingo, & Nali, 2000). These differences from other studies are linked to the capacity of the various

hospitals involved in the respective studies, the study environments, the sample size, and the methods used.

Socio-demographic characteristics of mothers

Most women in our study were over 35 years of age. This result does not corroborate those found by de Haïdara et al. (2021) who reported respectively the age groups of 15 to 25 years (56.3%), 24.01 years ± 6.30 years, and over 19 years (86.5%) (Samake, 2029; Issiaka, 2019). In the same context, our results differ from those found by Moussa (2009) in Bougouni, who noted that 71% of pregnant women were over 19 years old, and 82.4% in Awa Traoré (2013) in Kati, where the households were made up of young people and not old women or adolescents. Our data also show that women aged 18 to 23 had a statistically significant 2.53 risk of not having NPC or having it performed incorrectly $CI_{95\%}$.

In the literature, ages under 15 and over 35 are risk factors. An early age exposes women to several risks, including vasculo-renal syndrome, apparently due to the immaturity of the uterine vessels. After the age of 35, pregnancy may be associated with certain maternal complications such as placenta previa, uterine rupture, and immediate post-partum haemorrhage. The risks to the foetus include delayed growth, prematurity, and certain malformations.

Furthermore, primiparous women were 2.64 times more likely to have no NPC or poor NPC follow-up than other parities, and this was statistically significant ($CI_{95\%}$) (WHO, 2017; WHO, 2018; Apkadza, Baeta, Amadou, & Ankou, 2004). This result can be explained by the fact that primiparous women are mostly young mothers and single. In our environment, pregnancy is a discrediting factor for young adolescents, who are often rejected by their families and tend to hide their pregnancies. This observation was also made by Haïdara et al. (2021), who reported in their study that young mothers and their families were demotivated by the repressive attitudes of those around them towards young pregnant women, who are morally fragile, and by the fact that most Malian families prefer to keep their young single mothers away from the prying eyes and comments of their neighbours.

APGAR SCORES

The risk of having an APGAR score of less than 7 was 4.03 times higher in the newborns of mothers who did not follow NPC correctly and the difference is significant $IC_{95\%}$ (DNSI, 1998; MSP, 2013). On the other hand, Haïdara et al. (2021) noted that good Apgar scores >7 were found in 83.5% and 85.8% of children at the first and fifth minutes respectively. The occurrence of acute foetal distress in our study is justified by obstetric complications not discovered during the prenatal period due to a lack of antenatal monitoring.

Maternal prognosis

Our results explain that dystocia was higher in the group of pregnancies that were not or poorly monitored, with a risk of 6.46 times compared with the opposite group, and this was statistically significant $CI_{95\%}$ (WHO, 2018; Breton, Peres, & Barrange, 2013). However, Samaké (2020) reported that vaginal delivery was performed in 30.5% of cases compared with 23.5% of controls, with no statistically significant difference.

Failure to monitor pregnancies is a major risk factor that can expose women to numerous complications. In our study, the risk of maternal death was not related to whether or not NPC was performed OR= 0.14 and $CI_{95\%}$ [0.03-0.67].

In his study, Samake described that the risk of complication was multiplied by 3.55 in patients not monitored antenatally OR= 3.55; $CI_{95\%}$ [2.52-5.01]. The complications most frequently encountered were uterine rupture, retroplacental haematoma, eclampsia, and above all post-partum haemorrhage 0R=4.02; $CI_{95\%}$ [0.82-3 8.62]. The same author reported the occurrence of three maternal deaths in the cases compared with 0 in the controls (Samaké, 2020). Traoré et al. (2007) in his work reported 5.4% cases of uterine rupture in the cases, including 2 cases of scarred uterus. The same author reported that obstetric complications were twice as frequent in patients who were not monitored compared with controls (p=0.0007, and OR=2.48).

A study carried out in Senegal reported that the absence of antenatal monitoring was associated with the risk of occurrence of retroplacental haematoma (Ndiaye, Tal Dia, Diediou, Dieye, & Dione, 2005); while the study by Sanogo (2009) showed the same trends: hypertension and its consequences accounted for 46.8% followed by PPH 20.7%. Traoré et al. (2007) also found in their study that pregnant women who were not monitored were 4 times more likely to develop hypertensive disorders than those who were

monitored. These complications of hypertension could be detected and managed during antenatal monitoring.

Neonatal prognosis

The risk of having neonatal complications is 4 times higher in the case of a pregnancy that is not or poorly monitored, and this is statistically significant ($_{CI95\%}$) (DNSI, 1998). The foetal prognosis was much poorer in the study by Traoré et al. (2007): 11.2% of foetuses were stillborn in the cases, compared with 3.8% in the controls, with a statistically significant difference (OR=3, CI95% [1.9 2-3.8]). Bretonet et al. (2023) showed that neonatal complications were greater in the group with no ANC monitoring, with more premature deliveries and more low birth weights.

In the context of the Democratic Republic of the Congo, this study faced several challenges related to limited resources. Among these challenges, limited access to medical care for some pregnant women due to economic or geographical constraints can bias the representativeness of the sample and the generalizability of the results. Additionally, the quality of the collected data can be affected by logistical or capacity constraints, compromising the reliability of the results. Selection biases may also be present, as women who have access to Bonzola Hospital may differ from those who do not in terms of socioeconomic factors, health, and other important variables. Recall biases are also a risk, especially if women are interviewed after childbirth. Finally, the language of communication between researchers and participants can lead to misunderstandings or errors in data collection and analysis, affecting the validity of the results. To address these challenges, measures were taken to mitigate their impact, including training of investigators and data verification.

CONCLUSION AND RECOMMANDATIONS

Pregnancies that are not monitored or are poorly monitored are a major health challenge in Mbuji-Mayi. Maternal and child health must include all activities aimed at promoting, restoring, and maintaining a complete, high-quality package to ensure a good prognosis for the mother-child couple. In terms of implications, it is crucial to improve access to quality prenatal care and strengthen clinical practices, and health policies to reduce risks associated with unmonitored pregnancies. Recommendations include raising awareness among healthcare professionals and the public, promoting future research to better understand underlying factors, and emphasizing the education of pregnant women to encourage seeking appropriate care.

The current state of knowledge on the subject

- The lack or poor monitoring of ANC is a societal problem in Mbuji-Mayi, given that the population is pro-natalist but poor in general;
- Pregnancies that are not monitored or are poorly monitored expose the mother-child couple to very deplorable but avoidable health consequences.

[1910]

Contribution of this study to knowledge

- There has been no in-depth study of this subject in this area;
- The results of this study contribute to the promotion of ANC and the reduction of the poor prognosis of pregnancy outcomes for the mother-child and father triad.

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Conflicts of Interest: None declared.

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