

Clinical profile and prevalence of women undergoing labor induction under unfavorable conditions at Mont-Amba Hospital Center, Kinshasa, Democratic Republic of the Congo

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ABSTRACT

Introduction

Despite advances in obstetric care, the practice of artificial induction of labour under unfavourable conditions remains prevalent in low-resource settings, posing heightened risks to maternal and neonatal health. In the Democratic Republic of the Congo (DRC), limited data exist regarding the clinical profile, indications, and outcomes of such inductions.

Purpose

This study investigated the prevalence, determinants, and obstetric outcomes associated with artificial induction of labour under unfavourable conditions at the Mont Amba Hospital Centre in Kinshasa, DRC.

Methods

A retrospective cross-sectional study was conducted using maternity records of 336 women who delivered between January and June 2023. Data on socio-demographic, obstetric, and clinical characteristics were extracted and analysed using descriptive statistics, bivariate analysis, and binary logistic regression.

Results

The prevalence of artificial induction of labour was 26.8%. Significant predictors included a scarred uterus (OR = 3.1; 95% CI: 1.08–9.18), gestational hypertension (OR = 9.2; CI: 2.93–29.16), appendicitis or pelvic cyst history (OR = 7.5; CI: 2.64–21.87), grand multiparity (OR = 11.0; CI: 4.66–26.33), poor antenatal care attendance (<4 visits) (OR = 6.2; CI: 1.45–26.83), placenta previa (OR = 14.7; CI: 4.46–48.80), intrauterine growth restriction (IUGR) (OR = 16.0; CI: 5.36–47.81), and post-term pregnancy (OR = 13.2; CI: 4.00–43.95). Induction often occurred despite unfavourable cervical conditions, with a caesarean section rate of 39.25%.

Conclusion

Artificial induction of labour is common at Mont Amba Hospital and is frequently performed under suboptimal conditions, contributing to avoidable maternal and neonatal risks. The findings underscore the urgent need to strengthen antenatal care services, standardise induction protocols, and enhance risk-based obstetric management in resource-limited settings.

INTRODUCTION

Despite advances in gynaecology and obstetrics, artificial induction of labour under unfavourable conditions remains a high-risk intervention for both mothers and fetuses, especially in low-resource settings. While medically indicated induction can reduce adverse outcomes when correctly applied, inappropriate or untimely induction may increase the risk of complications, including emergency caesarean sections and perinatal mortality (Zedini et al., 2020). Over the last two decades, the global rate of induced labour has increased significantly, with figures doubling in some countries such as France—from 10.4% in 1980 to 20.5% in 1995 (Blanchot, 2011), and reaching over 21% by 2022 (Duvillier et al., 2022). In Tunisia, the induction rate has reached 30% (Kehila et al., 2016). Yet, not all inductions are successful or result in vaginal delivery, particularly when carried out under unfavourable cervical conditions.

In the Democratic Republic of the Congo (DRC), maternal and neonatal mortality rates remain alarming, with 846 maternal deaths per 100,000 live births and 28 neonatal deaths per 1,000 live births (Maleya et al., 2019). The practice of artificial induction of labour is widespread, often prompted by complications such as preeclampsia or gestational diabetes. However, induction is not always based on favourable obstetric assessments or consistent monitoring (William et al., 2022; Jeannot et al., 2022).

Despite the high prevalence of artificial labour induction in both developed and developing countries, few studies in the DRC—particularly at the Mont Amba maternity unit—have assessed how often induction occurs under unfavourable conditions, which maternal characteristics are involved, and how frequently complications result. Moreover, the decision-making process and adherence to clinical indications remain unclear.

This study aims to address these gaps by identifying the prevalence and characteristics of women undergoing induction under such conditions, thereby contributing to safer obstetric practices. Specifically, it seeks to determine the profile and prevalence of women who have undergone artificial induction of labour under unfavourable conditions at the Mont Amba Hospital maternity unit in Kinshasa, with the aim of proposing effective prevention strategies to reduce maternal and neonatal mortality.

The research is guided by the following questions:

- At what point is the decision made to induce labour artificially at the Mont Amba maternity unit?
- Are clinical indications properly observed before induction?
- What categories of women are most frequently subjected to induction?
- What proportion of these women deliver vaginally and under what conditions?

The specific objectives are:

- To identify the records of women who delivered at the Mont Amba maternity unit.
- To extract and analyse cases of artificial induction.
- To document the socio-demographic and gynaecobstetric characteristics of these women.
- To examine the relationship between these characteristics and the occurrence of induction.

The central hypothesis is that certain obstetric and socio-demographic factors are associated with a higher likelihood of undergoing artificial induction under unfavourable conditions.

This study is justified by the persistently high maternal and neonatal mortality rates in the DRC and the lack of local data on how artificial induction is practiced and monitored. By identifying the profiles of at-risk mothers and assessing the conditions under which induction occurs, the findings will support midwives and obstetric staff in anticipating complications, improving clinical decision-making, and implementing safer and more targeted obstetric care protocols, thereby strengthening the national strategy for maternal and newborn health.

METHODS

Study Setting

This study was conducted at the Mont Amba Hospital Centre, a health facility located in the Lemba municipality of Kinshasa, Democratic Republic of the Congo. The hospital is situated on the Mont-Amba hill, adjacent to the University of Kinshasa and the Centre Neuro-Psychopathologique (CNPP).

Study Design

A retrospective cross-sectional study with both descriptive and analytical components was carried out. The descriptive component aimed to outline the profile and estimate the prevalence of women who underwent artificial induction of labour, while the analytical component explored associations between women's profiles and the likelihood of induction.

Study Population and Sampling

Target Population and Eligibility Criteria

The study population comprised all pregnant women who gave birth at Mont Amba Hospital from 1 January to 30 June 2023 (a 6-month period).

- **Inclusion criteria:** Records of all women who delivered at the hospital and had complete and usable data in the maternity registry.
- **Exclusion criteria:** Records with missing or incomplete essential data.

Sampling Method

An exhaustive, non-probability sampling approach was used. All eligible cases within the six-month study period were included, resulting in a final sample size of 336 births.

Data Collection

Procedures and Tools

Data were collected retrospectively using a document review technique. A structured data collection form was used to extract information from antenatal consultation records, maternity ward registers, operating theatre records, and partograms.

Variables and Data Sources

- **Socio-demographic variables:** maternal age (in years), marital status, and education level.
- **Obstetrical and clinical variables:** parity, gestational age, history of infant death or abortion, antenatal care (ANC) attendance, pregnancy-related pathologies, cervical dilation at admission, indications for artificial induction of labour, post-partum complications, mode of delivery, and foetal outcomes.

Data Management

- **Sources and Period:** Data were collected from official hospital records covering the period from 1 January to 30 June 2023.
- **Data Entry and Storage:** Data were manually transcribed onto paper forms using blue ink, then entered into Microsoft Excel and subsequently imported into SPSS version 20 for analysis.

Data Analysis

Descriptive Analysis

All data were initially cleaned and coded in Microsoft Excel, then imported into SPSS version 20 for statistical analysis. Descriptive statistics were used to characterise the study population. Categorical variables (e.g., marital status, education level, parity) were summarised using frequencies and percentages. Continuous variables (e.g., maternal age) were described using measures of central tendency (mean) and dispersion (standard deviation).

Analytical Analysis

The main outcome variable was artificial induction of labour (yes/no).

Independent variables included:

- **Socio-demographic factors:** maternal age, marital status, education level
- **Obstetric factors:** parity, gestational age, history of abortion or infant death, antenatal care attendance, cervical dilatation, and pregnancy-related pathologies

To explore associations between these independent variables and the outcome, the Pearson Chi-square test for independence was used, appropriate for analysing relationships between categorical variables. The Chi-square test was selected because both the dependent and independent variables were categorical. It is a non-parametric test suitable for large sample sizes and does not require normality of data. The expected frequency assumption was verified; all contingency table cells had expected counts ≥ 5 , meeting the validity condition for the Chi-square test. No significant outliers or missing data affected the variables tested.

A p-value < 0.05 was considered statistically significant.

RESULTS

Univariate Analysis

Table 1:
Induction Status

Variables	Frequency	Percent
No	246	73.2%
Yes	90	26.8%
Total	336	100.0%

As shown in **Table 1**, the frequency of artificial induction of labour was 26.8%.

Table 2:
Socio-Demographic Characteristics

Variables	Modalities	Frequency (N = 336)	Percent (%)
Age	Mean (SD)	-	29.6 (± 5.8)
Marital Status	Married	309	92.0
	Single	27	8.0
Educational Level	Secondary + University	195	58.0
	No Education + Primary	141	42.0

The results in **Table 2** show that the average age of the respondents was 29.6 years (± 5.8). The majority were married (92%), and 58% had completed secondary or university education, while 42% had no or only primary education.

Table 3:
Obstetrical History

Variables	Modalities	Yes n (%)	No n (%)
Scarred Uterus	No	72 (23.5%)	234 (76.5%)
	Yes	18 (60.0%)	12 (40.0%)
Abortion	No	69 (27.7%)	180 (72.3%)
	Yes	21 (24.1%)	66 (75.9%)
Hypertension	No	74 (23.7%)	238 (76.3%)
	Yes	16 (66.7%)	8 (33.3%)
Appendicitis + Cyst	No	75 (24.3%)	234 (75.7%)
	Yes	15 (55.6%)	12 (44.4%)
Twin Pregnancy	No	87 (26.6%)	240 (73.4%)
	Yes	3 (33.3%)	6 (66.7%)

According to **Table 3**, 60% of women who underwent artificial induction of labour had a scarred uterus, 24.1% had a history of abortion, 66.7% had hypertension, 55.6% had a history of appendicitis with cyst, and 33.3% had twin pregnancies.

Table 4:
Obstetrical Characteristics

Variables	Modalities	Yes n (%)	No n (%)
Primiparous	No	66 (22.1%)	186 (74.7%)
	Yes	24 (64.9%)	60 (69.0%)
Multiparous	No	51 (29.3%)	123 (70.7%)
	Yes	39 (24.1%)	123 (75.9%)
Grand Multiparous	No	65 (25.3%)	233 (77.9%)
	Yes	27 (31.0%)	13 (35.1%)
ANC Visits (CPN)	≥4	3 (7.7%)	36 (92.3%)
	<4	87 (29.3%)	210 (70.7%)
Gestational Age	≥37 weeks (SA)	6 (25.0%)	18 (75.0%)
	<37 weeks (SA)	84 (26.9%)	228 (73.1%)
Gravidity	≤5	81 (28.4%)	204 (71.6%)
	>5	9 (17.6%)	42 (82.4%)
History of Stillbirth	No	78 (25.2%)	231 (74.8%)
	Yes	12 (44.4%)	15 (55.6%)

Table 4 shows that 31% of women who underwent artificial induction were grand multiparous, 64.9% were primiparous, and only 7.7% had attended four or more antenatal care visits. Among those induced, 26.9% had gestational age under 37 weeks, 17.6% were gravida >5, and 44.4% had experienced child loss.

Table 5:
Delivery Characteristics

Variables	Modalities	Yes n (%)	No n (%)
Postpartum Complications	No	87 (27.4%)	231 (72.6%)
	Yes	3 (16.7%)	15 (83.3%)
Delivery Method	Vaginal (Low)	6 (2.4%)	246 (97.6%)
	Caesarean (High)	84 (100.0%)	0 (0.0%)

Table 5 shows that 16.7% of women who had artificial induction experienced postpartum complications. Notably, all inductions led to caesarean delivery (100%).

Table 6:
Indications for Induction

Variables	Modalities	Yes n (%)	No n (%)
Slow Dilatation	No	60 (38.5%)	96 (61.5%)
	Yes	30 (16.7%)	150 (83.3%)
Prolonged Labour	No	81 (25.1%)	242 (74.9%)
	Yes	9 (69.2%)	4 (30.8%)
Placenta Previa	No	78 (24.5%)	241 (75.5%)

Variables	Modalities	Yes	No
		n (%)	n (%)
	Yes	12 (70.6%)	5 (29.4%)
Fetal Distress	No	80 (24.9%)	241 (75.1%)
	Yes	10 (66.7%)	5 (33.3%)
IUGR	No	75 (23.8%)	240 (76.2%)
	Yes	15 (71.4%)	6 (28.6%)
Pre-eclampsia	No	81 (25.2%)	241 (74.8%)
	Yes	9 (64.3%)	5 (35.7%)
Post-term	No	81 (25.2%)	240 (74.8%)
	Yes	9 (60.0%)	6 (40.0%)

Table 6 reveals that among those induced, 69.2% had prolonged labour, 70.6% had placenta previa, 66.7% had fetal distress, 71.4% had IUGR, 64.3% had pre-eclampsia, and 60% were post-term.

Bivariate Analysis

Table 7: Relationship Between Obstetrical History and Artificial Induction

Variables	Modalities	Artificial Induction of Labour				X ²	P
		Yes n=90		No n=246			
		Percent	Percent	Percent	Percent		
Scarred uterus	No	72 (23.5%)	234 (76.5%)	18.5	0.000		
	Yes	18 (60.0%)	12 (40.0%)				
Abortion	No	69 (27.7%)	180 (72.3%)	0.42	0.517		
	Yes	21 (24.1%)	66 (75.9%)				
High blood pressure	No	74 (23.7%)	238 (76.3%)	20.96	0.000		
	Yes	16 (66.7%)	8 (33.3%)				
Appendicitis + cyst	No	75 (24.3%)	234 (75.7%)	12.39	0.000		
	Yes	15 (55.6%)	12 (44.4%)				
Twin pregnancy	No	87 (26.6%)	240 (73.4%)	0.20	0.653		
	Yes	3 (33.3%)	6 (66.7%)				

Statistically significant relationships were found between artificial induction and:

- Scarred uterus ($\chi^2 = 18.5, p = 0.000$)
- Hypertension ($\chi^2 = 20.96, p = 0.000$)
- Appendicitis + cyst ($\chi^2 = 12.39, p = 0.000$)

These variables were significantly associated with increased likelihood of artificial labour induction.

Table 8: Relationship Between Obstetrical Characteristics and Induction

Variables	Modalities	Artificial induction of labour				X ²	p
		Yes n=90	Percent	No n=246	Percent		
Primipara	No	63 (25.3%)	186 (74.7%)	1.08	0.299		
	Yes	27 (31.0%)	60 (69.0%)				
Multipara	No	51 (29.3%)	123 (70.7%)	1.17	0.279		
	Yes	39 (24.1%)	123 (75.9%)				
Grand Multipara	Yes	66 (22.1%)	233 (77.9%)	30.74	0.000		
	Yes	24 (64.9%)	13 (35.1%)				
Prenatal Consultation	≥ 4	3 (7.7%)	36 (92.3%)	8.2	0.004		
	<4	87 (29.3%)	210 (70.7%)				
Gestational Age	+37 AS	6 (25.0%)	18 (75.0%)	0.42	0.83		
	-37 AS	84 (26.9%)	228 (73.1%)				
Gravidity	≤5	81 (28.4%)	204 (71.6%)	2.56	0.11		
	> 5	9 (17.6%)	42 (82.4%)				

Significant associations were found between induction and:

- Grand multiparity ($\chi^2 = 30.74, p = 0.000$)
- Fewer than 4 ANC visits ($\chi^2 = 8.2, p = 0.004$)

Table 9: Relationship Between Indications and Induction

Variables	Modalities	Artificial induction of labour				X ²	p
		Yes n=90		No n=246			
		Percent	Percent	Percent	Percent		
Prolonged labour	No	81 (25.1%)	242 (74.9%)	12.42	0.000		
	Yes	9 (69.2%)	4 (30.8%)				
Placenta previa	No	78 (24.5%)	241 (75.5%)	17.51	0.000		
	Yes	12 (70.6%)	5 (29.4%)				
Fetal distress(FS)	No	80 (24.9%)	241 (75.1%)	12.73	0.000		
	Yes	10 (66.7%)	5 (33.3%)				
IUGR	No	75 (23.8%)	240 (76.2%)	22.76	0.000		
	Yes	15 (71.4%)	6 (28.6%)				
Pre-eclampsia	No	81 (25.2%)	241 (74.8%)	10.47	0.001		
	Yes	9 (64.3%)	5 (35.7%)				
Late term	No	81 (25.2%)	240 (74.8%)	8.83	0.003		
	Yes	9 (60.0%)	6 (40.0%)				

Significant relationships were observed between artificial induction and:

- Prolonged labour ($\chi^2 = 12.42, p = 0.000$)
- Placenta previa ($\chi^2 = 17.51, p = 0.000$)
- Fetal distress ($\chi^2 = 12.73, p = 0.000$)
- IUGR ($\chi^2 = 22.76, p = 0.000$)
- Pre-eclampsia ($\chi^2 = 10.47, p = 0.001$)
- Post-term pregnancy ($\chi^2 = 8.83, p = 0.003$)

Multivariate Analysis

Table 10: Logistic Regression Analysis

Variables	Modality	S.E.	Wald	P	OR	95% CI
Scarred Uterus	Yes	0.545	4.428	0.035	3.1	[1.082 - 9.179]
	No					
High Blood Pressure in Pregnancy	Yes	0.587	14.361	0.000	9.2	[2.925 - 29.155]
	No					

Appendicitis + Cyst	Yes	0.540	14.099	0.000	7.5	[2.635 - 21.868]
Grand Multiparous	Yes	0.442	29.648	0.000	11.0	[4.662 - 26.333]
ANC < 4	Yes	0.744	6.067	0.014	6.2	[1.454 - 26.828]
Placenta Previa	Yes	0.610	19.447	0.000	14.7	[4.460 - 48.795]
IUGR	Yes	0.558	24.702	0.000	16.0	[5.364 - 47.807]
Late Term	Yes	0.611	17.894	0.000	13.2	[4.004 - 43.949]

Eight variables were significantly associated with artificial induction of labour:

- Scarred uterus: OR = 3.1, CI [1.082–9.179], $p = 0.035$
- Hypertension: OR = 9.2, CI [2.925–29.155], $p = 0.000$
- Appendicitis + cyst: OR = 7.5, CI [2.635–21.868], $p = 0.000$
- Grand multiparity: OR = 11.0, CI [4.662–26.333], $p = 0.000$
- < 4 ANC visits: OR = 6.2, CI [1.454–26.828], $p = 0.014$
- Placenta previa: OR = 14.7, CI [4.460–48.795], $p = 0.000$
- IUGR: OR = 16.0, CI [5.364–47.807], $p = 0.000$
- Post-term pregnancy: OR = 13.2, CI [4.004–43.949], $p = 0.000$

These findings confirm that maternal and obstetric complications significantly increase the likelihood of artificial labour induction.

DISCUSSION

Prevalence of Artificial Induction of Labour

The prevalence of artificial induction of labour at the Mont Amba Hospital Centre was found to be **26.8%**. This figure is slightly higher than those reported in studies conducted in the United States (23.6% in 2018; MacDorman et al., 2020) and France (23%–25%; DREES, 2022), but comparable to other studies conducted in French public hospitals, which reported a prevalence of 28% (Deneux-Tharaux et al., 2021). Induction rates in Sweden and Norway range between 20% and 22%, reflecting more conservative clinical practices (Nordic Study, 2019). Our findings align with the global trend of increased labour induction, often justified by evolving medical guidelines, maternal age, pregnancy complications, and patient preferences.

Socio-Demographic Characteristics and Risk Factors

The average maternal age in this study (29.6 ± 5.8 years) aligns with findings by Blanchot (2011) and Kinenkinda et al. (2017), although it is slightly higher than that reported

by Mayi-Tsonga et al. (2012). The majority of the participants were married (92%), and 58% had completed secondary or university education. Parity varied considerably, with many being primiparous, and the average number of pregnancies was 5.5.

Unemployed women represented 42% of participants, followed by employees (30%) and students (28%). Among those who underwent induction, 64.9% were primiparous—a finding consistent with literature linking primiparity to higher induction-related complications (Hofmeyr et al., 2021; Oulvain et al., 2023). Alarming, only 7.7% of women attended at least four antenatal care (ANC) visits, a figure far below both WHO recommendations and the national average (DHS-RDC, 2023–2024). Inadequate ANC attendance is a major contributor to late diagnosis and poor management of obstetric complications (Alemu et al., 2022).

Obstetric Risk Factors

Several key obstetric risk factors were associated with artificial induction of labour in this study:

- **Scarred uterus (60%)**: Increases the risk of uterine rupture during induction (Clark et al., 2023; Tita et al., 2021).
- **History of abortion (24.1%)**: Associated with complications such as infections and placental abnormalities (Rai et al., 2022).
- **Alcoholism (66.7%)**: Linked to pre-eclampsia, intrauterine growth restriction (IUGR), and neurodevelopmental issues (O'Leary et al., 2023).
- **Appendectomy and cysts (55.6%)**: May indirectly affect labour through pelvic scarring and inflammation (Grobman et al., 2022).
- **Twin pregnancies (33.3%)**: Increase the risk of preterm delivery, fetal distress, and postpartum haemorrhage (Mills et al., 2022).

These findings support the need for tailored antenatal and intrapartum care strategies, especially for women in high-risk categories.

Outcomes and Clinical Management

Artificial induction of labour in this study resulted in a 13.08% failure rate and a caesarean section rate of 39.25%, both within globally accepted ranges (Boulvain et al., 2023).

The average Bishop score was 7.04 ± 1.83 . Postpartum haemorrhage occurred in only 0.93% of cases, suggesting adequate intrapartum care.

Major indications for induction included prolonged labour (69.2%), fetal distress (66.7%), placenta previa (70%), IUGR (71.4%), and pre-eclampsia (64.3%). Over-term pregnancy (60%) was also a common indication, aligning with international guidelines recommending induction between 41 and 42 weeks (CNGOF; Vanneaux, n.d.).

Multivariate Analysis of Induction Predictors

Binary logistic regression analysis identified several significant predictors of artificial labour induction:

- Scarred uterus: OR = 3.1, $p = 0.035$
- Gestational hypertension: OR = 9.2, $p = 0.035$
- Appendectomy/cysts: OR = 7.5, $p = 0.035$
- Grand multiparity: OR = 11.0, $p = 0.000$
- Inadequate ANC (<4 visits): OR = 6.2, $p = 0.014$
- Placenta previa: OR = 14.7, $p = 0.000$
- IUGR: OR = 14.87, $p = 0.000$
- Over-term pregnancy: OR = 13.2, $p = 0.000$

These findings corroborate global data and emphasise the importance of comprehensive risk assessment throughout pregnancy. Studies by Chauhan et al. (2023), Smith et al. (2021), and Nguyen et al. (2022) support these associations, particularly those involving gestational age, uterine pathology, and perinatal outcomes.

Policy and Practice Implications

The findings of this study highlight the urgent need to improve ANC coverage and service quality, particularly in low-resource settings such as Kinshasa. Policymakers should prioritise strategies to enhance ANC attendance, educate pregnant women about high-risk conditions, and establish standardised induction protocols. Risk-based and individualised labour management practices should be encouraged to minimise maternal and neonatal complications.

Study Limitations

This study faced limitations including incomplete documentation and the lack of multivariate analysis for all clinical risk variables. Several obstetric records were inconsistently maintained, limiting a more comprehensive evaluation. Future prospective studies with larger sample

sizes and more rigorous data collection procedures are required to confirm and expand upon these findings.

CONCLUSION

This study identified a relatively high prevalence (26.8%) of artificial induction of labour at Mont Amba Hospital in Kinshasa. Significant associations were found between artificial induction and several maternal and obstetric variables, including scarred uterus, gestational hypertension, appendicitis or cysts, high parity, inadequate ANC attendance, placenta previa, IUGR, and overdue pregnancy. The findings underscore the importance of strengthening ANC services for the early detection and management of high-risk pregnancies. National health policies should advocate for routine ANC participation and targeted awareness campaigns. In addition, clinical staff should receive continuous training on evidence-based induction practices. Future studies in other healthcare institutions are recommended to validate these findings and examine the maternal and neonatal outcomes related to artificial induction, thus informing effective public health strategies in low-resource environments.

Ethical Approval: The study protocol was approved by the Ethics Committee of the Higher Institute of Medical Techniques of Kinshasa (Democratic Republic of the Congo) under the reference number 0071/CBE/ISTM/KIN/RDC/PMBBL/2024.

Conflicts of Interest: None declared.

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