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Original Research Article

Prevalence, immediate neonatal outcomes, and factors associated with short birth intervals among mothers delivered at Mubende Regional Referral Hospital, Uganda

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ABSTRACT

Background: Short birth intervals (SBIs) pose significant public health risks, particularly in low-resource settings like Uganda, where they are associated with adverse neonatal outcomes. Despite WHO recommendations for optimal birth spacing, high rates of SBIs persist, largely due to socio-economic, cultural, and healthcare access challenges. This study aimed to determine the prevalence, immediate neonatal outcomes, and associated factors of SBIs among mothers at Mubende Regional Referral Hospital.
Methods: A cross-sectional study was conducted from May to August 2024, involving 422 postpartum mothers. Data on sociodemographic, obstetric, and behavioral factors were collected, and logistic regression analysis was used to identify factors associated with SBIs and assess the impact on neonatal outcomes, including small for gestational age, preterm birth, early neonatal death, and External congenital defects.
Results: The study revealed an SBI prevalence of 40.3%. The most common adverse neonatal outcomes were Small for gestational age (31%), and preterm birth (26%). Key factors associated with SBIs included young maternal age (<20 years, aOR 2.18, 95% CI: 1.13-4.22), rural residence (aOR 2.84, 95% CI: 1.69-4.78), lack of antenatal care (aOR 4.64, 95% CI: 1.80-11.95), unplanned pregnancies (aOR 2.15, 95% CI: 1.35-3.41), and short breastfeeding duration (<12 months, aOR 3.26, 95% CI: 2.05-5.20).
Conclusions: The study identified a high prevalence of SBIs, with significant associations to adverse neonatal outcomes such as Small for gestational age, and preterm birth. Factors contributing to SBIs included young maternal age, rural residence, limited antenatal care, and unplanned pregnancies, are highlighting the need for targeted family planning and maternal health interventions.

Keywords: Immediate neonatal outcomes, Kampala International University, Postpartum mothers, Short birth interval, Yei civil hospital

INTRODUCTION

Since the mid-20th century, family size has steadily decreased, accompanied by a shorter interval between births. This shift resulted in greater variability in fertility rates stemming from the timing of births rather than the total number of children, spurring researchers to explore patterns in birth spacing and its implications.[1] Early research focused on birth interval trends and their sociocultural correlates.[2,3]

A significant challenge in these studies has been distinguishing the concepts of "birth stopping" (the decision to cease having more children) from "birth spacing" (the interval between successive births). Both affect fertility rates but may have distinct influences on family planning and health outcomes.[4] While some models, like the Coale-McNeil model, attempt to differentiate timing from occurrence in reproductive events, their applicability to subsequent births (beyond first births) remains uncertain due to varying factors influencing later births.[4]

In response to accumulating evidence, the WHO and other health organizations recommended in 2005 a minimum interval of 2-3 years between pregnancies to mitigate risks such as infant mortality and adverse maternal outcomes.[5,6] USAID further suggested that even longer intervals, of 2-5 years, might confer greater health advantages. The recommendations underscored the potential benefits of birth spacing for reducing risks such as malnutrition, preterm birth, and Small for gestational age, often associated with inadequate maternal recovery time between pregnancies.[7]

Today, birth spacing remains a key area of research and public health policy, with a growing emphasis on understanding how various socioeconomic, behavioral, and health factors influence short birth intervals. Family planning and educational programs are crucial in promoting recommended birth intervals, which improve health outcomes for both mothers and children. Short birth intervals (SBIs), defined as intervals of less than 24 months between consecutive live births, are a significant public health concern due to their association with adverse maternal and neonatal outcomes. Globally, approximately 25% of births occur within short intervals, with higher rates in low- and middle-income countries (LMICs) like Uganda, where the prevalence is 25.9%.[6,8] SBIs are linked to increased risks of preterm birth, small for gestational age (SGA), early neonatal death, and congenital defects.[7]

Globally, approximately 25% of births still occur at intervals shorter than the recommended 24 months, with certain regions showing even higher rates. For example, Central Asia reports a high prevalence, with 33% of births occurring within short intervals, while sub-Saharan Africa reports 20% .[9]

In East Africa, Kenya and Tanzania have short birth interval rates of 18% and 19%, respectively, reflecting substantial public health challenges associated with birth spacing.[10]

In Uganda, despite efforts to promote optimal birth spacing, high fertility rates (6.2 children per woman) and limited access to family planning services contribute to the persistence of SBIs.[5,11] Where the prevalence is 25.9%.[6,8] SBIs are linked to increased risks of preterm birth, small for gestational age (SGA), early neonatal death, and congenital defects.[7]

The purpose of this study was to document the prevalence, immediate neonatal outcomes, and factors associated with short birth intervals among mothers delivered at Mubende Regional Referral Hospital, Uganda, where currently no data on prevalence exist. This study aims to fill that gap and provide valuable insights for optimal birth interval.

METHODS

Study design and settings

We employed a cross-sectional study design from May to August 2024, involving 422 postpartum mothers delivering the maternity ward of the Mubende Regional Referral Hospital, Uganda. The inclusion criterion were women who were in immediate postpartum period at the maternity ward of Mubende Regional Referral Hospital who had at least one previous birth, multiple birth and have given their consent to participate in the study. Primipara women and women with known mental illness were excluded from the study. Eligible women were recruited in this study by systematic random sampling method.

Sample size estimation

The sample size was calculated using the Kish Leslie formula (1965) based on previous study prevalence conducted at Yumbe Hospital, Uganda in which the prevalence of short birth interval was estimated to be 52.4% [11].

$$n = \frac{Z^2 p(1-p)}{e^2}$$

$Where;\ n$: Estimated minimum sample size required

p: Estimated prevalence of SBI from previous study in Uganda, 52.4%.[11]

e: The acceptable margin of error set at 5%.

Z: 1.96 (for 95% confidence interval).

$$n = \frac{(1.96)^2 \times 0.524 \times (1-0.524)}{0.05^2} = 384\ participants$$

After adjusting for a 10% non-response rate, the overall prevalence was 422 participants

Data collection procedure and recruitment

The participants were interviewed using a pre-tested questionnaire to obtain information on sociodemographic factors such as age, level of education, as well as obstetric and behavioral factors such as parity, ANC attendance, number of ANC contacts, sex of index child previous pregnancy plan, survival status of index child, history of

abortions, breastfeeding practices and contraceptive use before last pregnancy information of birth intervals.

Women who were in immediate postpartum ward of MRRH during the study period and had at least one previous birth and had given their consent to participate in the study.

Participants were also recruited from the postnatal room, maternity ward of MRRH if they meet the inclusion criteria. The primary investigator was in charge of recruitment. A discrete side room set aside for the study was used to protect privacy. The general information about the research was conveyed to each participant, and the specific information that requires further explanation was provided to the participants through education and counseling. Those who agreed were consented to the study by the principal investigator, and then the participants signed the consent form.

Data management and analysis

Information from each questionnaire was summarized in Microsoft excel version 16, coded and transferred into STATA version 15 for analysis. Descriptive statistics, including frequencies and proportions, was calculated in one-way tabulations for the prevalence of short birth interval and covariates. Bivariate analysis at 95% confidence interval was done and factors with p≤0.2 were analyzed further at multivariate level to remove confounders and those which had p≤0.05 were considered significant in this study.

RESULTS

Characteristics of the study participants

This study included 422 participants. Almost half were in their 20s, and about two-thirds lived in rural areas. In terms of education, a little over 40% completed secondary school, and nearly half were unemployed. About two-thirds were married. Most participants had between 1 to 4 previous births. Around half had 1 to 4 antenatal visits, and the gender of index children was almost evenly split. Planned pregnancies were more common than unplanned. For behavioral factors, most mothers breastfed for 12 months or longer. More than half used contraception before pregnancy, and just over half knew the recommended birth interval (Table 1).

Prevalence of birth intervals among study participants

In this study, 170 (40.3%) of participants had a short birth interval (SBI) (95% CI: 35.6% to 45.1%), while 252 (59.7%) maintained an optimal/long interval. The mean birth interval was 27.8 months (SD=11.4), with a median of 26 months and an interquartile range (IQR) of 20 to 34 months. Birth intervals varied substantially, ranging from 8 to 88 months, illustrating considerable diversity in birth spacing and emphasizing the prevalence of SBI within the study population (Figure 1).

Table 1: Characteristics of the study participants (n=422).

Variable	Category	Frequency (N)	Percentage (%)
Sociodemographic factors			
Age category (in years)	<20	64	15.17
	20–29	192	45.5
	30–39	113	26.78
	40+	53	12.56
Residence	Rural	285	67.54
	Urban	137	32.46
Level of education	None	31	7.35
	Primary	159	37.68
	Secondary	175	41.47
	Tertiary	57	13.51
Employment status	Formal	82	19.43
	Informal	147	34.83
	Unemployed	193	45.73
Marital status	Not married	153	36.26
	Married	269	63.74
Obstetric factors			
Parity	1 to 4	316	74.88
	5+	106	25.12
ANC contacts	None	29	6.87
	1 to 4	197	46.68
	5+	196	46.45
Prefers specific sex for baby	No	209	49.53
	Yes	213	50.47
Previous pregnancy plan	Planned	247	58.53
	Unplanned	175	41.47
Behavioral factors			
Breastfeeding duration	≥12 months	254	60.19
	<12 months	168	39.81
Contraception before previous pregnancy	Yes	270	63.98
	No	152	36.02
Knowledge of recommended BI	Yes	236	55.92
	No	186	44.08

Immediate neonatal outcomes among women with short birth intervals

The most common adverse neonatal outcomes were small for gestational age (31%), and preterm birth (26%) (Figure 2).

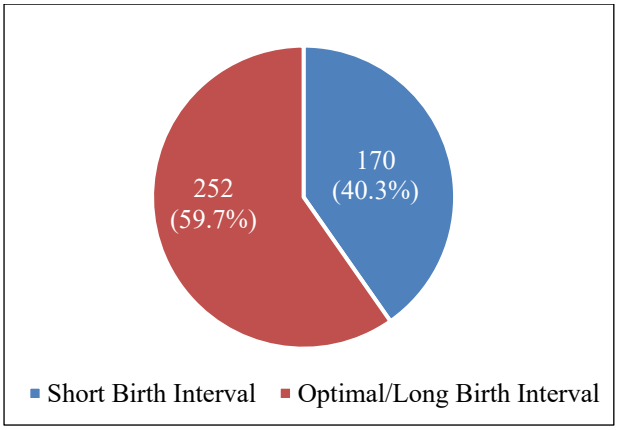

Figure 1: Prevalence of short birth intervals among study participants.

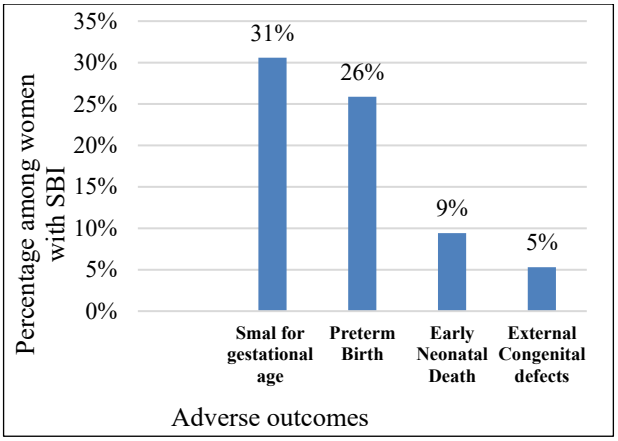

Figure 2: Percentage of adverse neonatal outcomes among women with a short birth interval (SBI).

Table 2: Multivariate analysis of the factors associated with short birth intervals (n=422).

Variable	Category	SBI (%)	NBI (%)	cOR	95% CI (Bivariate)	P value	aOR	95% CI (Multivariate)	P value
Social demographics									
Maternal age (in years)	<20	48.44	51.56	1.97	1.11 - 3.50	0.021	2.18	1.13 - 4.22	0.021*
	20-29	32.29	67.71	Ref	-	-	Ref	-	-
	30-39	44.25	55.75	1.66	1.03 - 2.69	0.037	1.9	1.09 - 3.31	0.253
	40+	50.94	49.06	2.18	1.17 - 4.04	0.014	2.87	1.41 - 5.84	0.017*
Residence	Rural	47.72	52.28	2.77	1.76 - 4.35	<0.001	2.84	1.69 - 4.78	<0.001*
	Urban	24.82	75.18	Ref	-	-	Ref	-	-
Employment	Formal	29.27	70.73	Ref	-	-	Ref	-	-
	Informal	38.1	61.9	1.49	0.83 - 2.66	0.18	1.59	0.82 - 3.09	0.174
	Unemployed	46.63	53.37	2.11	1.21 - 3.67	0.008	2.22	1.18 - 4.20	0.014*
Obstetric factors									
Parity	1 to 4	40.82	59.18	Ref	-	-			
	5+	38.68	61.32	1.09	0.70 - 1.72	0.697			
ANC Contacts	None	65.52	34.48	4.01	1.76 - 9.13	0.001	4.64	1.80 - 11.95	0.001*
	1 to 4	44.67	55.33	1.7	1.13 - 2.57	0.011	1.47	0.91 - 2.36	0.113
	5+	32.14	67.86	Ref	-	-	Ref	-	-
Prefers specific sex for baby	Male	49.3	50.7	2.15	1.45 - 3.20	<0.001	1.85	1.17 - 2.92	0.009*
	Female	31.1	68.9	Ref	-	-	Ref	-	-
Previous pregnancy plan	Unplanned	49.14	50.86	1.88	1.26 - 2.79	0.002	2.15	1.35 - 3.41	0.001*
	Planned	34.01	65.99	Ref	-	-	Ref	-	-
Behavioral factors									
Breastfeeding duration	<12 months	55.36	44.64	2.85	1.90 - 4.27	<0.001	3.26	2.05 - 5.20	<0.001*
	≥12 months	30.31	69.69	Ref	-	-	Ref	-	-
Contraception use	No	54.61	45.39	2.53	1.68 - 3.81	<0.001	2.82	1.76 - 4.53	<0.001*
	Yes	32.22	67.78	Ref	-	-	Ref	-	-
Knowledge of BI	No	44.62	55.38	1.38	0.93 - 2.04	0.107	1.3	0.82 - 2.07	0.262
	Yes	36.86	63.14	Ref	-	-	Ref	-	-

SBI=Short Birth Interval, NBI= Normal Birth Interval, ANC = Antenatal care, *p<0.05, cOR=Crude Odds Ratio, CI=Confidence Interval, aOR = adjusted Odds Ratio, Ref=Reference category

Multivariate analysis of the factors associated with short birth intervals

Our findings indicated that; young maternal age <20 years (aOR=2.1, 95% CI: 1.13-4.22, p=0.021), old maternal age >40 years (aOR=2.8, 95% CI: 1.41 - 5.84, p=<0.017), rural residence (aOR=2.8, 95% CI: 1.69-4.78, p<0.001), lack of antenatal care (aOR=4.6, 95% CI: 1.80-11.95, p=0.001), unplanned pregnancies (aOR 2.2, 95% CI: 1.35-3.41, p=0.001), short breastfeeding duration <12 months, (aOR=3.3, 95% CI: 2.05-5.20, p<0.001) and non-

contraceptive users (aOR=2.8, 95% CI: 1.76-4.53, p<0.001) were independently associated with short birth interval at Mubende Regional Referral Hospital (Table 2).

DISCUSSION

Prevalence of short birth interval

Our study found that the prevalence of short birth intervals among postpartum mothers at Mubende Regional Referral Hospital was 40.3%. This is higher than the national prevalence reported in the Uganda Demographic and Health Survey (UDHS), which stands at 25.9%.[8] Our findings are consistent with a study conducted in Yumbe Hospital, Uganda, which reported a prevalence of 52.4%.[11] Similarly, studies from Ethiopia and Nigeria reported high rates of short birth intervals ranging from 29% to 47%.[12,13] However, our study differs from findings in Kenya and Tanzania, where the prevalence was 18% and 19%, respectively.[10] These differences may be due to variations in access to family planning services, cultural norms regarding fertility, and differences in healthcare-seeking behaviors between regions.

Adverse neonatal outcome among women with short birth interval

Our study revealed that the most common adverse neonatal outcomes associated with SBIs were small for gestational age (31%) and preterm birth (26%). These findings are consistent with a meta-analysis which demonstrated a significant association between SBIs and risks of preterm birth, low birth weight, and neonatal mortality.[7] Similarly, studies in Sub-Sahara Africa and Bangladesh reported higher risks of adverse neonatal outcomes such as intrauterine growth restriction and neonatal deaths among mothers with SBIs.[14,15] However, our study differs from research in six LMICs, where neonatal mortality was the most significant outcome associated with SBIs.[16] The discrepancy may be explained by improvements in neonatal care at our study site, which may reduce mortality but not prevent growth restriction and preterm birth.

Factors associated with short birth interval

Our study identified several factors independently associated with SBIs, including young maternal age (<20 years), old maternal age (>40 years), rural residence, lack of antenatal care, unplanned pregnancy, short breastfeeding duration (<12 months), and non-use of contraception. These findings are consistent with studies in Uganda, Ethiopia and Pakistan that identified maternal age, poor ANC attendance, and lack of contraceptive use as predictors of SBIs.[5,17,18] Similarly, a study from Nigeria and Uganda highlighted that; unplanned pregnancies are strongly contributed to shorter birth intervals.[5,19] However, our study differs from findings in Brazil, where socioeconomic status and partner involvement were stronger determinants of SBIs.[20] The difference could be due to cultural and healthcare system differences, as family planning programs and male involvement in reproductive health remain limited in Uganda.

Study strengths

The study addressed an important gap by providing the first data on SBI prevalence and outcomes at Mubende Regional Referral Hospital. The use of a systematic random sampling method minimized selection bias. The large sample size (n=422) increased the study's representativeness and reliability. Use of multivariate analysis allowed control of confounding variables.

This study has few limitations. Being a cross-sectional design, causality between SBIs and neonatal outcomes cannot be established. Self-reported data on breastfeeding and contraceptive use may be prone to recall or social desirability bias. The study was conducted in one referral hospital, which may limit generalizability to other regions of Uganda. The study did not assess long-term child outcomes, such as developmental delays and morbidity beyond the neonatal period.

CONCLUSION

The prevalence of short birth intervals in Mubende Regional Referral Hospital was high (40.3%), higher than the national prevalence. Short birth intervals were significantly associated with adverse neonatal outcomes, particularly small for gestational age and preterm birth. Factors associated with short birth intervals included young and older maternal age, rural residence, lack of antenatal care, unplanned pregnancies, short breastfeeding, and non-use of contraception.

Recommendations

Strengthen family planning services and community awareness campaigns to promote optimal birth spacing. Improve maternal and neonatal care services, with targeted monitoring of mothers with SBIs to reduce risks of preterm birth and SGA. Enhance ANC coverage and counseling, including breastfeeding support and contraceptive education, particularly targeting rural and young mothers.

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Ethical approval: The study was approved by the Institutional Ethics Committee of Bishop Stuart University, Uganda

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