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Factors Associated with Short Births Intervals among Women Delivering at Mbarara Hospital

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Abstract
Background: Birth interval is the time between two consecutive births. World Health Organization recommends a minimum birth to pregnancy interval of 24months after live birth and 6months after abortion. Short birth interval is associated with adverse perinatal and maternal outcomes. Few studies have described factors associated with birth intervals. Knowing these factors will enable stake holders and care providers to modify practice to address them thus improving neonatal infant and maternal health. **Methods**: This was a case-control study. We enrolled 56cases and 162 controls that consented to the study and interviewed them. Statistical analysis was done using SPSS statistical software, version 20 (SPSS, Chicago, IL, USA). Cross tabulations were conducted to obtain descriptive statistics. Bivariate and multivariate logistic regression models were used to test the association. **Results**: The age of participants ranged from 17 to 42years. The most frequent birth interval was 36months. The factors associated with short birth intervals included the following, age below 30 years OR 2.3, 95% CI [1.17-4.67], p=0.015, low education level p= 0.005, lack of contraceptive use p< 0.001 and lack of contraceptive p<0.001. A previous good fetal birth outcome and having live child was negatively associated with short birth intervals p<0.001, p<0.001 respectively.**Conclusion and recommendations**: Contraceptive knowledge and use of programs targeting mothers below 30 years should be strengthened especially in the postnatal period. Universal secondary school education program should be promoted. Programs to improve neonatal and child survival should be emphasized as they directly affect child spacing thereby indirectly affecting maternal health.
Key words: Birth interval, Delivery.

Introduction:

Birth interval is the time between two consecutive births. Birth to pregnancy interval refers to the interval between the date of a live birth and the start of the subsequent pregnancy. World Health Organization recommends a minimum birth to pregnancy interval of 24months after live birth and 6months after abortion,[1]. Birth intervals less than 21months are associated with increased still birth rate and neonatal mortality,[2, 3]. IPI less than 6months have an increased odds of induced abortion, miscarriage, and still birth compared to those with IPI of 27-50 months,[4]. The risk of preterm delivery increases with decrease in birth interval, [5, 6] Birth intervals shorter than 12 months are independently associated with low birth weight and small for gestational age, [5-7].Short birth intervals are significantly associated with increased risk of congenital anomalies like cardiac, neural tube, and central nervous system defects,[8].

In a study done in Latin America it was found that women with short intervals (< 6 months) between pregnancies are at increased risk of maternal death, third trimester bleeding, premature rupture of membranes, puerperal endometritis, and anemia[9]. For mothers more than 35years, birth interval less than 18months is an independent risk factor for maternal mortality,[3]. There is an increased risk of uterine rupture among mothers with a birth interval of less than 18 months after a previous caesarean section[10]. The effect of short birth interval on maternal, infant and child mortality and morbidity is thought to be due to maternal depletion syndrome. Closely spaced pregnancies do not allow sufficient time for the mother to recover from depletion in both macro- and micronutrients. Women who were undernourished before pregnancy, have an increased energy needed to breastfeed, this increases time required to fully recover for the next conception[11, 12].

Uganda has a high fertility rate (6.2 per woman), higher fertility is associated with short inter-pregnancy interval.[13]. The demographic survey in Uganda found 25% of birth occurs within 24months of previous birth[13]. We aimed to find factors associated with short birth intervals. Knowing these factors will enable stake holders and care providers to modify practice to address them thus improving neonatal infant and maternal health.

METHODS AND MATERIALS

Study design: This is an unmatched case-control.
Study site: The study was done postnatal wards of Mbarara Regional Referral Hospital (MRRH) in south western Uganda. MRRH is a teaching hospital for Mbarara University of science and technology and a regional

referral hospital for south western Uganda while Itojo hospital is one of the district hospitals in south western Uganda. MRRH is located in Mbarara municipality, Mbarara district, South Western Uganda, located 280 kilometers from the capital, Kampala. The hospital is owned and financed by the Government of Uganda through Ministry Of Health and serves 5 million people and 10 districts including the neighboring countries of Tanzania, Rwanda and Democratic Republic of Congo. The hospital delivers about 10,000 mothers annually.

Statistical analysis: The data was entered in an EXCEL spreadsheet and analyzed using SPSS statistical software, version 20 (SPSS, Chicago, IL, USA). Cross tabulations was conducted to obtain descriptive statistics which were presented as frequencies, percentages and Pearson Chi-square statistics. Bivariable and multivariable logistic regression models were used to test the association of the independent variables with the dependent (outcome) variable. Variables with p-value <0.05 at bivariable analysis were included in multivariable logistic regression analysis. Results were presented with odds ratios and the corresponding 95% Confidence Intervals and significance was accepted at $p < 0.05$.

RESULTS

A total of 218 participants (56 cases and 162 controls) were analyzed. The age of the respondents ranged from 17 to 42. The modal age of respondents was 30 years (11.8%) n= 26 and modal age group was 20-30yrs (73.2%). Most mothers were married 216 (98.2%). The time interval from previous to current pregnancy ranged from 11months to 17years. The most frequent interval was 3 years (11. %) n=25 followed by 2years (8.2%) n=18.

Table 1: Participants' characteristics

characteristics		N=218 (%)
Age		
	15-19	5(92.3)
	20-30	161 (73.2)
	31-40	51 (23.2)
	>40	3(1.4)
Residence type.		
	Rural	140(63.6)
	Urban	78 (36.4)
Parity		
	Multiparous (para 2-4)	156(70.9)
	Grand mutipara (para 5 and above)	62 (28.2)
Mode of previous delivery		
	SVD	156(70.9)
	C/Section	58 (25.0)
Feotal outcome of previous delivery		
	Live birth	193(88.9)
	Perinatal death	20 (9.1)
	Abortion	4 (1.8)
Survival of previous baby		
	Alive and well	185(86.4)
	Died	281 (13.6)
Client's highest education level		
	Below secondary	140(63.6)
	Secondary+	76 (36.4)
Client's marital status		
	Single	4(1.8)
	Married/Cohabiting	216(98.2)
Client's occupation		
	Employed	111(51.2)
	Not employed	103 (58.8)
Client's HIV serostatus		
	Negative	170(77.3)
	Positive	40(18.2)
Knowledge of contraceptives		
	No	82(37.3)
	Yes	138 (62.7)
Use of contraceptives before current pregnancy		
	No	94(42.7)
	Yes	126 (57.3)
Knowledge of emergency contraceptives		
	No	179(81.4)
	Yes	41 (18.6)
Intention of ended pregnancy		
	Intended ended pregnancy	115(52.3)
	Unintended ended pregnancy	105 (47.7)

Table 2: Socio-demographic characteristics Vs Pregnancy Interval

variable	Birth interval (years)		OR [95%CI]	P value
	<2.5	2.5+		
Age in years			2.3 [1.17-4.67]	0.015
<30	43	95		
30+	13	67		
Residence type			0.7 [0.47-1.65]	0.948
Rural	35	106		
Urban	21	56		
Client's occupation			0.9 [0.47-1.61]	0.663
Employed	27	84		
Not employed	28	75		
HIV serology			1.7 [0.71-4.14]	0.230
Negative	45	124		
Positive	7	33		
Marital status			1.3 [1.30-1.50]	0.235
Single	0	4		
Married/Cohabiting	56	158		
Education level			3.1 [1.38-6.78]	0.005
Primary and below	14	16		
Secondary+	41	143		
healthcare system at previous delivery			0.7 [0.40-1.370]	0.335
hospital				
health centers	27	90		
	28	69		
H/centre at immunization			1.0 [0.47-2.08]	0.975
Health center	27	103		
Hospital	13	49		

Table 3; Obstetric factors Vs Birth intervals

variable	Birth interval in years		OR [95% CI]	P value
	<2.5	2.5+		
Fetal outcome			0.2 [0.09-0.53]	0.000
Live birth	42	150		
Perinatal death/abortion	13	10		
Parity category			0.8 [0.4-41.64]	0.632
2-4	38	117		
>=5	18	43		
Mode of previous delivery			1.3 [0.65-2.78]	0.431
SVD	43	113		
C/Section	12	43		
Survival of previous baby			0.2 [0.08-0.39]	0.000
Alive and well	36	148		
Not alive	17	12		
Contraceptive use			3.2 [1.71-6.08]	0.000
No	36	58		
Yes	20	104		
Knowledge of contraceptives			3.1 [1.64-5.75]	0.000
No	32	49		
Yes	24	113		
Knowledge of emergency contraceptives			1.5 [0.67-3.59]	0.306
No				
Yes	48	128		
	8	33		
Intention of ended pregnancy			0.6 [0.33-1.13]	0.119
pregnancy Intended	24	89		
pregnancy Unintended	32	73		
Desire to have delayed pregnancy			1.3 [0.70-2.39]	0.412
Yes	30	78		
No	25	84		

Factors which were significantly associated with short birth interval included age below 30years (p=0.015), low education level (p= 0.005), (table 2). Other factors were lack of contraceptive use (p<0.001) and lack of contraceptive (p<0.001). A previous good fetal birth outcome and having live child was protective (P<0.001),(P<0.0001) respectively (table 3).

Discussion

In this study modal birth interval was 36months, it is similar to that found in Ethiopia (32.6months), [14] and India (34months)[15]. It is above the recommended minimum of 24months, [16] and national median interval (30.2 months),[13]. It was lower than that found in rural Bangladesh (55months),[2]

The study found age to be significantly associated with short birth interval. Those giving birth below 30years were more likely to have a short birth interval. This may be because fecundity decreases with age and it was found that most Ugandans have their first birth at 18.9years [13] therefore by 30years most have attained their family size. This finding is supported by study done in Ethiopia, which showed age below 19 years was at increased risk of having short birth interval[14]. In Iran age mother's age wasn't significantly associated with short birth interval however age at marriage was, with those marrying at older age having short birth intervals. The median age at first marriage in Iran is 23.5 years, [17]. However a study done in Denmark showed that women above 30 years were more likely to have a short birth interval[18]. Studies in Denmark have shown that teenagers and mothers with short inter-pregnancy interval are more likely to have induced abortion, [19]so many young mothers may have been excluded from the study explaining the differences. In our study contraception was found to be significantly associated with short birth interval with those lacking knowledge and not using contraception at increased risk of having short birth intervals. This concurs with findings from studies done in India, Bangladesh and Ethiopia,[14, 15, 20]. Contraception reduces short fertility rate,[21]. Having a live child from previous pregnancy was protective against short birth interval. This may be because as having perinatal death and infant death creates a depressed mood and desire to replace the child among the parent's, this is not the case with a live child. Mothers with infant and perinatal deaths also lack the protective mechanism of lactation amenorrhea. These findings are similar to findings observed in Ethiopia[14], Kisumu-Kenya,[22] and India,[15].

The study found mothers with low education level to be at increased risk of short birth interval. This concurs with results from India,[15] and Bangladesh,[20].These results may be compared with those found in Ethiopia,[14], which showed low spouse education to be associated to short birth interval. This is in contrast with study done in Kisumu Kenya which showed education less than 8 years to be associated with prolonged birth interval and Iran which showed that increased level of education decreased interval,[17, 22]. This may be explained by different study setting.

Different from our study, studies in Denmark and India found parity unplanned pregnancy and area of residence to be statistically associated with short birth interval[15, 18] . The difference may be due to differences in study settings.

Conclusion and recommendations: Our study found age, previous infant death, low level of education and lack of contraceptive use to be statistically associated with short birth intervals.

Contraceptive knowledge and use of programs targeting mothers below 30years should be strengthened especially in the postnatal period. Universal secondary school education program should be promoted. Programs to improve neonatal and child survival should be emphasized because they directly affect child spacing thereby indirectly affecting maternal health.

Competing interests: Authors did not have any conflict of interest

Authors' contributions

1. Mayanja Ronald.MD, Principal investigator, conceived the idea, developed the concept, involved in data collection, entry, analysis and manuscript writing
2. Mubiru Musa. MD, involved in data collection, entry, analysis and manuscript writing
3. Masembe Sezalio MD, manuscript writing.
4. Nkonwa Innocent. MD, data collection and manuscript writing
5. Njagi Joseph. MD, manuscript writing
6. Chakura Andrew. MD, manuscript writing
7. Kayondo Musa. MD, analysis of result and manuscript writing.
8. Ngonzi Joseph. MD, developed the concept, manuscript writing and submission

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