



## The Effect Birth Interval on Fetal Outcome at the University of Maiduguri Teaching Hospital – A Cross Sectional Study

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### Authors' contributions

This work was carried out in collaboration between all authors. Author ADG designed the study, and performed the analysis. Author GSK contributed in the data analysis and writing of the final version of the manuscript. Author AI took part in data collection, analysis and wrote the first draft of the manuscript. Author BGB was involved in data analysis and also wrote the final version of the manuscript while author AAK was involved in data collection and writing of the first draft version of the manuscript. All authors read and approved the final manuscript.

### Article Information

DOI: 10.9734/BJMMR/2015/19604

#### Editor(s):

(1) Yinhua Yu, Department of Gynecology, Obstetrics and Gynecology Hospital of Fudan University, Shanghai Key Laboratory of Female Reproductive Endocrine Related Diseases, China.

#### Reviewers:

(1) Magdy Abdelrahman Mohamed, Obstetrics & Gynecology, Sohag University, Egypt.

(2) Anonymous, Nirma University, India.

Complete Peer review History: <http://sciencedomain.org/review-history/10414>

Original Research Article

Received 18<sup>th</sup> June 2015  
Accepted 16<sup>th</sup> July 2015  
Published 5<sup>th</sup> August 2015

### ABSTRACT

**Background:** Birth spacing is a well-known and underutilized health intervention. Longer birth intervals are associated with multiple health benefits for both mother and the child.

**Aim:** To determine the effect of birth interval on fetal outcome in our environment.

**Methods:** A cross sectional study, conducted at the university of Maiduguri teaching hospital. The subjects were multiparous women carrying singleton pregnancy who come to deliver at the hospital Obstetrics and Gynaecology unit during the study period. A pretested questionnaire was used to obtain their sociodemographic and obstetric characteristics. The effect of birth interval on fetal outcome was determined using  $\chi^2$  test.

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**Results:** During the study period, 530 women fulfilled the inclusion criteria out of which complete data was obtained in 500 women; a response rate of 94.3%. The mean age of the study population was  $28.8 \pm 5.7$  years and the mean birth interval was  $32.3 \pm 18.1$  months. The mean gestational age at delivery was  $38.93 \pm 1.87$  weeks and the mean birth weight was  $3270 \pm 165$  gram. There was significant association between short birth interval and preterm delivery ( $\chi^2 = 18.45$ ,  $P = 0.005$ ) as well as fifth minute Apgar score of less than 7 ( $\chi^2 = 12.112$ ,  $P = 0.007$ ).

**Conclusion:** Short birth interval was significantly associated with preterm delivery and birth asphyxia.

*Keywords: Birth interval; preterm delivery; birth asphyxia; UMTH.*

## 1. INTRODUCTION

Birth spacing is a well known, underutilized and admittedly, not a fully understood health intervention [1]. Despite lack of data on the underlying biological mechanisms, longer birth intervals are associated with multiple health benefits for both mother and the child. It is associated with reduced risk for all categories of infant and neonatal mortality. It also reduces the risk of low birth weight, preterm birth asphyxia and small for gestational age [1,2]. Unfortunately, each year an estimated 20 million infants are born with low birth weight, condition directly linked to infant mortality as about 10 million infants and children globally die annually due to low birth weight and perinatal complications.<sup>1</sup> In Nigeria, the infant mortality rate was 100/1000 live births and the neonatal mortality rate was 48/1000 [2,3]. These immense and heart breaking number have remained roughly static since the early 1990 s.

In the light of new evidence, birth spacing is an important, feasible and practical intervention to address the problem of the high infant and child death rate, preterm delivery, low birth weight and small for gestational age infants in developing countries [1]. This may help in our quest to achieving millennium development goal of reducing infant mortality rate by 2/3 by the year 2015 of their 1990 levels [4].

Various studies have shown that the risk of neonatal of infant morbidity and mortality decreases with increasing the birth interval up to 36 months at which point the risk plateaus [2,3,5]. Similarly other studies showed that infant delivered with birth interval less than 15 months face approximately 50% increase risk of fetal death and early neonatal death. There is also 80-100% increase risk of very low birth weight, low birth weight, very preterm and small for gestational age [1,4,6]. Therefore, birth spacing could significantly reduce adverse perinatal outcome.

## 1.1 Aim

The aim of this study was to determine the effect of birth interval on preterm delivery, stillbirth, low birth weight and birth asphyxia at the University of Maiduguri Teaching hospital.

## 2. MATERIALS AND METHODS

This was a cross sectional study conducted at the Obstetrics and Gynaecological unit of University of Maiduguri Teaching Hospital, from 1<sup>st</sup> January, 2008 to 31<sup>st</sup> December 2008 to determine the effect of birth interval on fetal outcome. The subjects were pregnant women who come to deliver at the university of Maiduguri Teaching Hospital obstetrics and gynaecology unit; only multiparous women with uncomplicated singleton pregnancy who has complete records were use for the study. Ethical clearance was obtained from the ethical committee of the hospital.

A pretested questionnaire was used to obtain information from the study participants after getting their informed consent. The data obtained includes age, parity, educational status and occupation. Pregnancy outcome variables like gestational age at delivery, mode of delivery, birth weight and fifth minute Apgar score were also obtained. From the dates of the present birth and last termination of pregnancy (birth or otherwise), birth interval was calculate in months. Gestational age was calculated using last menstrual period and Ultrasound scan. Preterm delivery is defined as delivery before 37 completed weeks and birth weight of less than 2.5 Kg considered low birth weight. Statistical analysis was done with SPSS version 18.0 (SPSS, Chicago, ILL, USA). The socio-demographic characteristics were presented as number and percentages. Chi square was used to analyzed association between categorical variable with  $P < 0.05$  considered as statistical significant.

The sample size for the study was obtained according to WHO methodology using a prevalence rate of 50%, degree of confidence of 80% and an error margin of 3%. This yielded a sample size of 455, which was increased to 530 to account for attritions and increases power.

### 3. RESULTS

During the study period, 530 participants fulfilled the inclusion criteria out of which complete data was obtained in 500 women; a response rate of 94.3%. The mean maternal age of the study population was 28.8±6.9 years and the mean birth interval was 32.3±18.1 months. The mean gestational age at delivery was 38.9±1.9 weeks and the mean birth weight was 3.3±1.7 kilogram.

Two hundred and eighty two participants (56.4%) were aged 20-29 years and 326 (65.2%) of the women has parity of less than 5. Majority of women are unemployed as shown in Table 1.

**Table 1. Socio-demographic characteristics of the study population**

Characteristic	No. (%)
<b>Age group</b>	
<20	4 (0.8)
20-29	282 (56.4)
30-39	196 (39.2)
≥40	18 (3.6)
Total	500(100.0)
<b>Parity</b>	
<5	326 (65.2)
≥5	174 (34.8)
Total	500(100.0)
<b>Educational level</b>	
No formal education	132 (26.4)
Primary	60 (12.0)
Secondary	130 (26.0)
Tertiary	178 (35.6)
Total	500(100.0)
<b>Occupation</b>	
Unemployed	296 (59.6)
Business	52 (10.5)
Junior C/S	64 (12.8)
Senior C/S	161(32.2)
Others	56(11.2)
Total	500(100)

Table 2 shows the birth interval of the study group. Two hundred and ninety one of the women (58.2%) had birth interval of 15-35 months and 45 (9.0%) have birth interval of less than 15 months.

Table 3 depicts the delivery outcome of the women. Four hundred and fourteen women (82.8%) delivered at gestational age of 37-40 weeks and 18(3.6%) had preterm delivery, with 451 (90.2%) delivering vaginally. Thirty women (6%) delivered a low birth weight baby.

**Table 2. Birth interval of the study population**

Interval (months)	Frequency	Percentage
<15	45	9.0
15-35	291	58.2
36-59	126	25.2
≥60	38	7.6
Total	500	100.0

**Table 3. Delivery outcome of the study group**

Characteristics	No (%)
<b>Gestational age at delivery</b>	
<37	18 (3.6)
37-40	414 (82.8)
≥40	68 (13.6)
Total	500 (100)
<b>Type of delivery</b>	
Vaginal	451 (90.2)
Caesarean section	49 (9.8)
Total	500 (100)
<b>Birth weight(g)</b>	
<2500	30 (6.0)
2500-4000	447 (89.4)
>4000	23 (4.6)
Total	500 (100)
<b>Outcome</b>	
Alive	485 (97.0)
Stillborn	15 (3.0)
Total	500 (100)
<b>Apgar 5</b>	
<7	43 (8.3)
>7	457 (91.4)
Total	500 (100)

There was a statistically significant association between short birth interval (<15 months) and preterm delivery ( $\chi^2=18.45$ ,  $P=0.005$ ) and fifth minute Apgar score of less than 7 ( $\chi^2=12.112$ ,  $P=0.007$ ). Only 10.6% of women with birth interval less than 15 month delivered at 37 weeks and 40 weeks gestational age as shown in Table 4.

### 4. DISCUSSION

In this study, 56.4% of the women were aged 20-29 years and 65.2% were of parity less than 5. This finding agrees with similar study of Abebe in Ethiopia [7]. This may be because they represent women within active reproductive age group.

**Table 4. Relationship between birth interval and delivery outcome of the study population**

Outcome	Birth interval				Total	Significance
	<15	15-35	36-59	≥60		
<b>Gestational age</b>						
<37	9(50)	7(38.9)	2(11.1)	0(0)	18(100)	
37-40	44(10.6)	237(57)	98(23.7)	35(8.5)	414(100)	X <sup>2</sup> =18.45
>40	1(1.5)	46(67.6)	18(26.5)	3(4.4)	68(100)	P=0.005
<b>Mode of delivery</b>						
Vaginal	43(9.3)	267(59.2)	106(23.5)	36(8.0)	451(100)	X <sup>2</sup> =7.435
Caesarean	3(6.1)	24(49)	20(40.8)	2(4.1)	49(100)	P= 0.059
<b>Birth weight</b>						
<2500	5(16.7)	12(40)	9(30)	4(13.3)	30(100)	
2500-4000	39(8.7)	266(39.5)	110(24.6)	32(7.2)	447(100)	X <sup>2</sup> =6.435
>4	1(4.3)	13(56.5)	7(30.4)	2(8.7)	23(100)	P = 0.38
<b>Neonatal outcome</b>						
Alive	45(9.3)	283(58.4)	121(24.9)	36(7.4)	485(100)	X <sup>2</sup> =2.529
Stillborn	0(0)	8(53.3)	5(33.3)	2(13.3)	15(100)	P =0.47
<b>Apgar score 1</b>						
<7	20(46.5)	12(27.9)	9(20.9)	2(4.7)	43(100)	X <sup>2</sup> =12.112
>7	39(8.5)	275(60.2)	107(23.4)	36(7.9)	457(100)	P = 0.007

More so, in this part of the country, women venture into marriage at an early age.

Women whose birth intervals were less than 15 months were significantly more likely to deliver preterm, a finding that is in keeping with several other studies [8-11]. This may be due to failure of the body to allow expression of contraction associated protein to return to their pre-pregnancy levels [12].

No significant association between birth interval and birth weight was found in this study contrary to several large multicentre studies that showed significant association between short birth interval and lower birth weight [12-15]. This may be due to small sample size of this study. Also 35.6% of the women studied had tertiary education and these women are likely well informed about positive life style and good nutrition for a favourable pregnancy outcome.

From the population of the women studied, short birth interval was not found to be a risk factor for stillbirth. A finding not in keeping with other studies [16-18]. This finding may probably be explained by the fact that most of the women aged between 20-29 years and of low parity which were known to impact positively on neonatal outcome [12,15,17].

Longer birth interval, greater than 60 months is also associated with adverse perinatal outcome.

In this study 40% of the women that delivered with birth interval 59 months and beyond had their babies delivered via caesarean section. This agree with other studies [1,19]. This might be because pregnancies helps mothers gain growth supporting capacities, such as increase uterine blood and other physiological and anatomical adaptations of the reproductive system. After delivery these capacities may gradually decline and with prolonged birth interval women physiological characteristics may be similar to those of Primigravida with risk of caesarean section [19,20].

Short birth interval was found to be significantly associated with lower five minutes Apgar score in this study. This may be due to the fact that the fetus may not be having good reserves due to depletion of maternal nutritional reserves [12] and therefore easily became asphyxiated with the rigours of labour.

## 5. CONCLUSION

In conclusion short birth interval, was found to be prevalent in our environment. Also short birth interval was found to be associated with preterm delivery and lower Apgar score while birth interval of 59 months and beyond might be associated with risk of caesarean section.

It is recommended that birth interval should not be less than 15 months and not greater than 59 months. Helping mothers attain favourable birth interval can be promoted through the use of

contraception. This may help greatly in improving perinatal outcome.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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The peer review history for this paper can be accessed here:  
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