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Duration and Some Determinants of Interbirth Intervals in a Sample of Women from Baghdad/ Iraq

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Abstract

Background Understanding the practice of birth spacing and factors which influence women's interbirth interval (IBI) is critical for countries like Iraq with high fertility levels.

Objectives This study aimed at measuring the duration of the interval between births and determining some of the factors favored optimal spacing intervals of Iraqi women.

Methods A cross-sectional study was conducted among ever married and having at least 2 live births 472 women during March 2008 in Al-Kadhimyia Teaching hospital. Data were obtained by interview questionnaire, included birth intervals, demographics, and fertility variables. Actual birth interval was measured and data were analyzed using a logistic regression model.

Results The mean birth interval was 31.16 ± 21.56 ranged 9–228 months, and 65.6% of interbirth intervals were of less than 36 months. The multivariate regression revealed that older woman, a woman's husband higher education and having male children were the significant predictors of longer interbirth interval.

Conclusions Relatively short interbirth interval found in the present study may help national health program conveying the message of optimum birth interval, with expanding education and employment opportunities for women can act as a motive for child spacing.

Key words Pregnancy spacing interval, contributing factors, Iraqi women.

Introduction

Interbirth interval (IBI) is the length of time between two successive live births including the period of postpartum amenorrhea, the menstruating interval, and the following period of gestation [(1)]. Birth spacing (the practice of timing the period between births) has been identified as an important life saving measure for mothers and children. Previously, health professionals have advocated for a two year birth interval. However, groundbreaking new research showed that there is substantially more health benefit gained from lengthening the birth interval beyond the previously recommended two years to a three to five year birth interval. The new research showed there is an optimal interval for birth spacing- a period associated with the lowest risks for adverse health outcomes-and that optimal interval is three to five years [(2)].

Moreover, natural fertility depends on the duration of effective reproductive span and length of birth interval. Analysis of those factors influencing the span and those affecting the length of birth interval has proven useful, since in many cases they appear to vary quite substantially across populations [3]. Thus, spacing of births through a deliberately prolonged interval between births and a delay in child bearing following marriage could be logical alternative strategies for fertility control [3,4].

There is a paucity of studies concerned with birth interval among Iraqi women, specifically lacking of adequate information on interbirth interval duration and its determinants, also little is known about the perception of Iraqi women regarding optimum birth spacing or their awareness of the advantages and disadvantages of long and short birth intervals. Such information would help planners and policymakers in developing strategies to encourage longer intervals between consecutive births that may ultimately decrease the number of children each woman has with subsequent beneficial effects on population and on the health status of the mother and her children.

Therefore, understanding the practice of birth interval and its determinants is helpful to design evidence based strategies for interventions. The objective of this study was to identify the duration and some determinants of interbirth interval among a sample of women attending Al-Kadhimyia Teaching Hospital from Baghdad, Iraq.

Methods

This cross-sectional study was conducted among female attendees to Al-Kadhimyia Teaching Hospital (third largest referral hospital in the capital Baghdad) during March 2008. All women eligible to participate in this study were interviewed after obtaining their informed consents.

Eligibility criteria were being ever married once only and having at least 2 live births. Women with history of infertility (primary or secondary) and those who were married more than once were excluded to avoid heterogeneity of interbirth intervals for the same woman.

Sample size was estimated based on the prevalence of contraception use reported by the Iraq Multiple Indicator Cluster Survey (MICS3), 2006 [5]. Among Baghdad population, the proportion of contraception users (p) was 0.53 and for non-users (q) was 0.47. The chosen degree of precision (d) was 0.045 at the 95% confidence interval. The total sample size was 472 women.

Data were collected using a specially designed questionnaire adapted from different literatures to obtain information regarding the participants' and their husbands socio-demographic profile (age, education, employment status), reproductive history and attitudes (age of child bearing, parity, history of abortion, and pregnancy outcomes including number, survival status and gender of children), and their perception of ideal age of child bearing, the ideal number of children for a family and the ideal interbirth interval.

The interbirth interval was calculated as the time (in months) between two consecutive birth dates of live births, and birth dates was used (rather than approximate dates of conception) for calculating the interbirth interval because this information was nearly 100 percent complete. Two types of intervals were omitted from our analysis: the interval between marriage and the first birth was excluded from the analysis because it is not an inter-birth interval, and the open interval between the last birth and the interview due to the problem of censoring, thus, only closed intervals were considered in this study.

Two data files were created: one for women interviewed and another for "interbirth intervals". The absolute mean of the interbirth interval for all children each woman had was estimated as well as the mean interbirth interval for each participant.

Data entry and analysis were performed using SPSS for windows version 16.0 (SPSS Inc., Chicago, IL, USA, 2007). Analysis of variance (ANOVA) and Student's t- test was used to compare the differences in means whenever applicable. Estimates of crude risk ratio with 95% confidence interval were computed to measure the association between each determinant and less than 36 months IBI. Multiple logistic regression analysis was conducted for the adjustment of confounding variables to evaluate the association between interbirth interval and its determinants. Statistical significance of results was judged at the 5% level.

Results

This study included 472 ever-married women aged 16-60 years (mean ± standard deviation 36.74 ± 11.12 years). The mean age of first child bearing of the participants was 20.37 ± 4.80 years, as 51.1% (n = 238) were married before 20 years of age (almost always Iraqi women conceive after marriage). The mean age of their husbands was 41.89 ± 12.11 years. The mean years of education for the participants was 7.72 ± 4.91years (ranged 0-24) and for their husbands was 9.69 ± 4.96 years (ranged 0-22), with 83.3% (n= 388) of the studied women were housewives and 53.9% (n = 251) of their husbands were self-employed.

The women had on average 5 pregnancies (mean ± standard deviation 4.73 ± 2.52) and 4 deliveries (mean ± standard deviation 4.08 ± 2.07), and more than one third of the women (38.2%) reported having abortion.

The 472 enrolled women contributed to 1435 interbirth intervals with an absolute duration mean ± standard deviation of 31.16 ± 21.56 months (95% C.I. for the mean: 30.05–32.28 months) ranged between 9–228 months and only less than one quarter of them (n= 342) with interbirth interval of more than 36 months. Nearly three quarters of the participants (72.6%) had 1-3 interbirth intervals and only 3 women had eleven IBI (Figures 1 and 2).

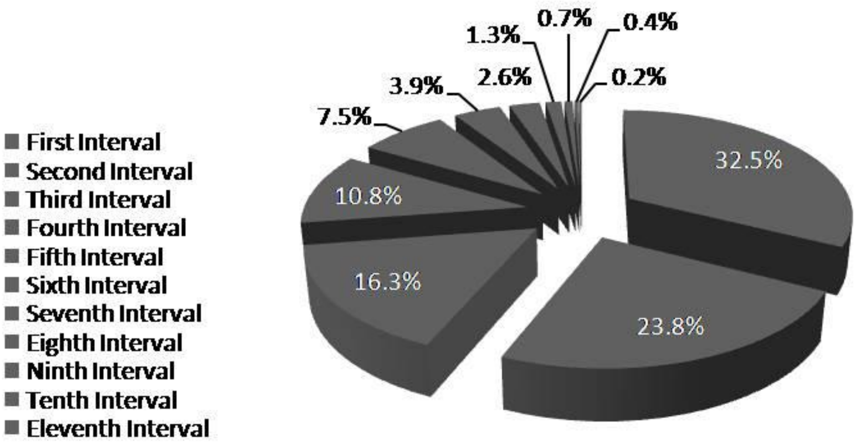

Figure 1. Distribution of 1435 IBI among the participated women

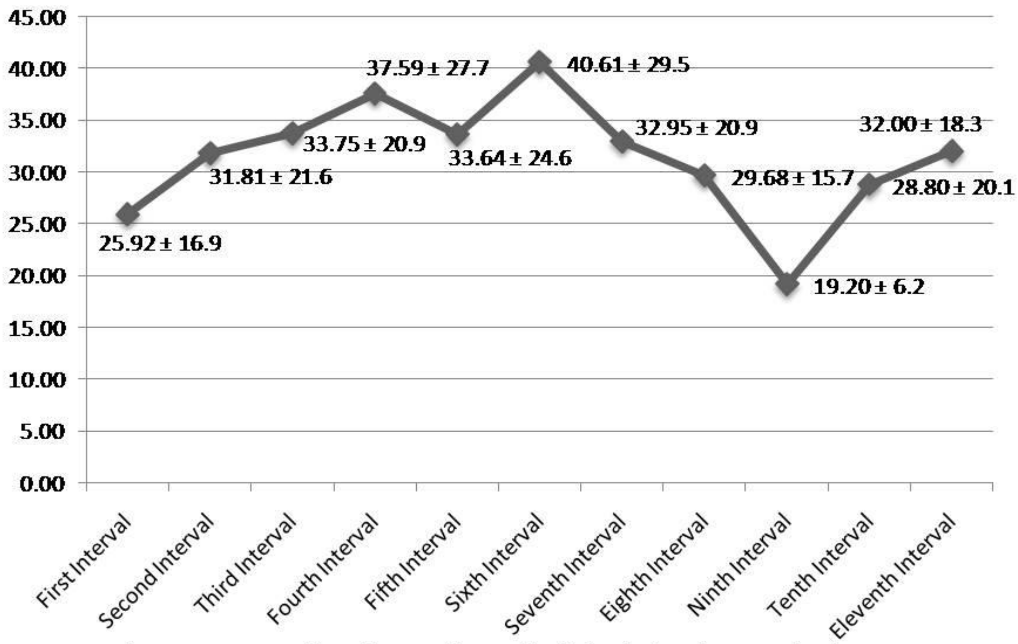

Figure 2. Mean duration and standard deviation in months for differet IBI

Women aged 35 years and older (constituted two thirds of the sample) were significantly spacing longer, with less risk for having IBI less than 36 months [risk ratio 0.87 (95% C.I.: 0.82–0.92)], however, both young and old mothers had mean IBI less than 36 months. On the other hand, the means IBI were nearly equal for women who conceived for the first time before or after the age of 20 years. Results also showed that older husbands (more than 40 years old) had significantly longer IBI than younger fathers with less risk of having IBI less than 36 months [risk ratio 0.88 (95% C.I.: 0.83–0.93)] (Table 1).

The study revealed that the educational level of both parents made significant difference in the duration of IBI being shorter for both illiterate mothers and fathers compared to highly educated parents [risk ratio 1.12 (95% C.I.: 1.01–1.24) for illiterate mothers] and [risk ratio 1.19 (95% C.I.: 1.07–1.31) for illiterate fathers] to have IBI more than 36 months. Nevertheless housewives had a mean IBI of 30.84 months compared to a mean of 33.29 months for governmental working participants with no statistically significant difference, while professional husbands had significantly longer IBI with 20% more probability to have IBI more than 36 months compared to governmental employee [risk ratio 1.20 (95% C.I.: 1.03–1.41)] (Table 1).

Four reproductive variables were considered in this study; analyzing the results of the 472 participants revealed that women having parity of 2 children had significantly shorter IBI as well as for women having equal number of male and female children compared to those having males more than females (male: female ratio >1) with about 20% more risk to have IBI less than 36 months [risk ratio 1.21 (95% C.I.: 1.08–1.36)] and [risk ratio 1.22 (95% C.I.: 1.06–1.42)] for both factors respectively, while neither having a history of abortion nor having a dead child made a difference in the duration of IBI (Table 2).

Table 1. The mean IBI of the sample according to some demographic factors.

Variable		No. (n=1435)	%	Mean IBI (months)	SD	(Significance)
Maternal Age (Yrs)	< 35 35 and more	435 1000	30.3 69.7	26.71 33.09	15.6 23.5	t = 5.19 (P = 0.00001)
Age at Child Bearing (Yrs)	< 20 20 and more	781 654	54.4 45.6	31.17 31.16	23.1 19.6	t = 0.01 (P = 0.99)
Husband's Age (Yrs)[a]	< 40 40 and more	420 913	31.5 68.5	27.34 32.86	17.8 23.2	t = 4.33 (P = 0.00002)
Maternal Educational Level	Illiterate Primary (1-6Yrs) Secondary (7-12Yrs) Higher (> 12Yrs)	338 501 420 176	23.6 34.9 29.3 12.2	28.02 30.32 34.69 31.17	18.2 19.0 26.8 19.4	F = 6.46 (P = 0.0001)
Husband's Educational Level[b]	Illiterate Primary (1-6Yrs) Secondary (7-12Yrs) Higher (> 12Yrs)	167 364 536 300	12.2 26.6 39.3 21.9	28.32 29.40 31.48 34.55	19.4 19.7 21.9 24.5	F = 4.24 (P = 0.005)
Maternal Occupation	Housewife Governmental Employee	1246 189	86.8 13.2	30.84 33.29	20.8 26.0	t = 1.46 (P = 0.15)
Husband's Occupation	Non-employed Self-employed Governmental Employee Professional	199 782 360 94	13.9 54.5 25.0 6.6	31.97 30.76 30.09 36.91	20.7 20.7 21.4 29.4	F = 2.71 (P = 0.04)

[a] 102 missing values

[b] 68 missing values

Table 2. The mean IBI of the sample according to some reproductive factors.

Variable		No. (n=472)	%	Mean IBI (months)	SD	(Significance)
Parity	2 3-5 ≥ 6	124 239 109	26.3 50.6 23.1	27.02 33.42 30.63	16.9 14.9 9.5	F = 7.91 (P = 0.000)
Sex of Offspring's	Males Only Females Only Male : Female Ratio = 1 Male : Female Ratio < 1 Male : Female Ratio > 1	60 46 100 126 140	12.7 9.7 21.2 26.7 29.7	31.71 28.35 27.16 31.67 34.00	20.5 13.9 13.5 12.2 14.5	F = 3.65 (P = 0.006)
History of Abortion	Positive Negative	181 291	38.3 61.7	32.13 30.47	13.2 15.6	t = 1.19 (P = 0.23)
Survival Status of Children	Dead Child Alive Child	43 429	9.1 90.9	28.22 31.37	10.8 15.1	t = 1.33 (P = 0.18)

Multivariate logistic regression revealed that older woman, a woman with higher educated husband, and having males children only, as opposed to equal number of male and female children, were the significant predictors of longer interbirth interval. While shorter interbirth interval was independently predicted by older child bearing age, a woman with governmental employee husband, and the presence of a dead child in the family (Table 3).

Table 3. Multivariate logistic regression of the predictors of interbirth interval

Predictors		Coefficient	Hazard ratio	95% CI	P-value
Maternal Age (Yrs)	<35[a]				
	35 and more	- 1.187	0.305	0.136–0.684	0.0041
Age at Child Bearing (Yrs)	<20[a]				
	20 and more	0.732	2.080	1.185–3.649	0.011
Husband's Age (Yrs)	<40[a]				
	40 and more	-0.731	0.481	0.219–1.061	0.070
Maternal Educational Level	Illiterate[a]				
	Primary (1-6Yrs)	-0.529	0.589	0.234–1.481	0.261
	Secondary (7-12Yrs)	-0.867	0.420	0.161–1.094	0.076
	Higher (> 12Yrs)	-0.397	0.672	0.197–2.299	0.527
Husband's Educational Level	Illiterate[a]				
	Primary (1-6Yrs)	-0.678	0.507	0.169–1.526	0.227
	Secondary (7-12Yrs)	-0.750	0.472	0.158–1.410	0.179
	Higher (> 12Yrs)	-1.469	0.230	0.068–0.785	0.019
Maternal Occupation	Housewife[a]				
	Governmental Employee	-0.210	0.810	0.361–1.818	0.610
Husband's Occupation	Non-employed[a]				
	Self-employed	0.531	1.701	0.705–4.103	0.237
	Governmental Employee	1.091	2.976	1.142–7.758	0.026
	Professional	0.389	1.475	0.446–4.878	0.524
Parity	2[a]				
	3-5	-0.092	0.912	0.403–2.063	0.825
	≥ 6	0.606	1.833	0.635–5.290	0.263
Sex of Offspring's	Male : Female Ratio = 1[a]				
	Females Only	-0.264	0.768	0.269–2.192	0.621
	Males Only	-1.177	0.308	0.126–0.757	0.010
	Male : Female Ratio < 1	-0.408	0.665	0.289–1.532	0.338
	Male : Female Ratio > 1	-0.399	0.671	0.295–1.527	0.342
History of Abortion	Negative[a]				
	Positive	-0.363	0.696	0.414–1.168	0.170
Survival Status of Children	Alive Child[a]				
	Dead Child	1.810	6.112	1.668–22.401	0.006
Constant		2.992	19.922		0.00001

[a] Reference category

Finally, a comparison of the real parity, the real age of child bearing, and the mean IBI practiced by each woman was done with their knowledge regarding the ideal values of these variables. Results showed that no statistical significant difference found between the actual values and their knowledge about the ideal values, moreover, the results showed that 324 (78.6%) of the 412 respondents, reported that IBI should be 36 months or less (Table 4).

Table 4. The differences of the mean IBI between their knowledge about the ideal spacing norms and the actual values

Variable		No.	Mean IBI (months)	SD	Significance
Age of child bearing	Real values Ideal values[a]	472 421	20.37 20.43	4.8 3.1	t = 0.22 P = 0.83
Number of children	Real values Ideal values[b]	472 441	4.01 3.90	2.1 1.9	t = 0.83 P = 0.41
IBI	Real values Ideal values[c]	472 412	31.10 32.23	14.7 14.6	t = 1.14 P = 0.25

[a] 51 missing values, [b] 31 missing values, [c] 60 missing values

Discussion

For countries like Iraq with total fertility rate of 4.3% and the current use of contraception of currently married women or their husbands of these women is 49.8% [(5)] understanding practice of birth spacing and factors which influence women's interbirth interval is essential.

The mean interbirth interval was found to be 31.16 ± 21.56 months with a median of two years among the study population. This mean is close to mean duration reported from Al-Oyaynah in Saudi Arabia 31.2 ± 10.1 months [(6)], from Ethiopia 33 ± 16.7 months[1] and from Al-Khobar in Saudi Arabia 33.5 ± 17.8 months [(7)], shorter from that reported from Jordan 40.36 ± 0.8 months [(8)], Armenia 41.12±31.15 months [(9)], India 48.6 months [(10)], and Iran 61.0±25.7 months [(11)], but longer than the mean reported from Al-Taif in Saudi Arabia 28.56±14.88 months [(12)]. However, a median of two years found in the present analysis is 8 months shorter from the 32 months reported for the median birth interval in developing countries based on the Population Reports analysis of 55 countries with Demographic Health Survey (DHS) data [(13)].

Four explanations can be justified for this relatively short IBI; the first is that the open interval between the last birth and the interview date was excluded from this analysis as open intervals tend to be longer than closed intervals [(14)], and to support this fact, the mean duration of this excluded interval was found to be (87.71±79.21 months) making the mean IBI if they were included to be (44.46±49.03months), the second explanation is the poor knowledge of the participants regarding the ideal IBI as our results showed that the participants believed that the ideal IBI is about 32 months which was very close to what they actually practice, the third explanation is that Iraqi women like other women in developing countries use long-term contraceptive methods for limiting births more commonly than using short-term methods for spacing [(13)], and the last reason appears to be the decline of traditional practices that contribute to longer birth intervals such as prolonged breastfeeding as the results of a recent study interviewed 2008 mothers from Baghdad /Iraq 1281 (63.8%) were using bottle feeding for their children whom age ranged between 0 and 24 months [(15)].

The study also found that 65.6% of IBI were of less than 36 months, and this is one of the high percents reported and close to the rates reported by the Population Reports from 9 out of the 55 countries of Demographic Health Survey (DHS) data analysis, including: Zambia 64%, Eritrea 65%, Central African Rep. 66%, Chad 66%, Haiti 66%, Mozambique 66%, Paraguay 66%, Philippine 66%, and Rwanda 66% (13).

A variety of factors influence a woman's birth spacing, some of which are rooted in social and cultural norms, others in the reproductive histories and behaviors of individual women, utilization of reproductive health services and other background factors (14).

Eleven explanatory variables for birth spacing have been selected for evaluation in this paper. These variables are parents' age, age at child bearing, parents' education, parents' occupation, parity, history of abortion, survival status of the children, and the sex of the children.

Many studies found that older mothers tend to have longer interbirth intervals. This could be due to two reasons: older women are later in their childbearing process and are likely to have achieved their desired family size and hence likely to have long subsequent spacing; they are also likely to be less fertile leading to long spacing (1,4,6-10,14,16,17). Our findings go in consistent with these studies and a significant negative impact of maternal age on short IBI was found. Also older women at child bearing age tend to have shorter IBI to catch up time to achieve the family size desired before losing fecundity and this may explain why age at child bearing had a significant positive correlation with short IBI on the regression analysis in spite of the absence of a sizeable difference in IBI between those under 20 and those in their 20s and older at child bearing (1,3,10).

Albeit the present findings showed that paternal age had significant impact on the duration of IBI, but it failed short of statistical significance in the regression analysis. However, older fathers like older mothers tend to have longer IBI because they have achieved their desired family size and try to persuade their wives to use long acting birth spacing methods.

Education is considered to be one of the most important socio economic factors having an indirect influence on birth interval length through its impact on one or more of the bio-behavioral variables. Sometimes better educated women compress child bearing into fewer years to participate in non child bearing activities and hence have shorter birth intervals than less educated (1,14). While in 38 of 51 countries with DHS data, women with no education were more likely than educated women to have shorter intervals (16). Also several other studies found that less educated women had shorter birth intervals than more educated ones (1,4,8,10). In the current study, not only maternal education, but both parents higher education was significantly associated with longer IBI, a finding reported also by studies from Saudi Arabia (7,12). Higher educational attainment improves a person's status, gives more decision-making power, lives in urban regions, and provides better employment opportunities, beside the use of contraception resulting in an increase in the spaces between births (6,12,16). However, the occupation of the husbands and not that of the participants contributed for longer IBI in this study as professionals (physicians, engineers, school teachers, and lawyers) had about 7 months longer IBI than governmental employees (clerks and officers).

In most countries women with low parity have shorter birth intervals than women with more children, but in a few countries the reverse is true [16]. Results of the current study showed U-shaped trend with significantly shorter IBI for women with 2 children or more than 5 children and longer intervals for those who have 3-5 children as the majority of Iraqi women prefer to give birth to their first children in quick succession resulting in significantly shorter early birth intervals, then birth intervals increased steadily with the increase in the number of surviving children, however, more fecund women who conceive easily and quickly are also those who are more likely to have more children with shorter IBI. Similar observations have been reported [14].

On the other hand, our results showed that child death had a positive impact on short IBI in the regression analysis; yet, it failed to show significant difference in the duration of IBI. This can be explained either by planning of the parents for a new pregnancy to replace a lost child, or due to the death of a child cuts short nursing durations which results in earlier resumption of menses and ovulation. This goes in agreement with findings from 55 countries surveyed by DHS between 1990 and 2001 [16], and studies from different areas [1,3,4,.7,10,14].

Among Iraqis preference for sons dominates, and couples who prefer son tend to have their next child soon after the birth of a daughter. Lack of sons among this study participants reduced the interbirth interval by an average of 6 months, after which IBI became considerably longer once women reached the desired balance of sons and daughter, thus, the sex of children was found to be another determinant factor for short birth spacing in the present regression analysis This finding is reported also in studies conducted in different places [1,3,7,8,10,12,17].

One last striking finding from our data showed that the participants had poor knowledge about the optimal birth spacing interval as only 44.7% of them (if we add up those reporting 36 months as ideal IBI) were knowledgeable mothers about birth spacing compared to 49.4% of Jordanian women reported an ideal spacing of 3 or more years [8], 60% knowledgeable mothers from Mozambique [14], and 66.6% of Saudi women preferred ≥ 3 years intervals [7].

Iraq is a country with poor reproductive health situation (high infant mortality 42 per 1000 live-births, child mortality 59 per 1000 children and maternal mortality 84 per 100000 live-births) [5]. This provides a rationale for focusing on Optimal Birth Spacing Initiative (OBSI) to be one of several interventions undertaken to promote the health and survival of women, infants and children, particularly few countries have policies and norms on birth spacing, and in Iraq as in many developing countries the need for birth spacing services is not being met.

This research is significant because no review specifically looking at interbirth interval and its determinants for Iraqi women was identified and it may provide a baseline as well as scientific endeavor to the future researchers working on this crucial area of human research.

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