Journal of Health Education Research & Development

Shallo and Gobena, J Health Educ Res Dev 2019, 7:1
DOI: 10.4172/2380-5439.1000292

Research Article Open Access

Duration of Birth Interval and Associated Factors among Married Women in Dodota Woreda, Arsi Zone, Ethiopia

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Received date: February 13, 2019; **Accepted date:** March 06, 2019; **Published date:** March 15, 2019

Abstract

Background: Birth interval refers to the time duration between two consecutive live births. Children born soon after previous birth are at high risk for health problems and died at a younger age, especially if the interval between the births is less than two years. However, factors contributing to short birth intervals are not well addressed and few studies were conducted on this issue using maternal memory (recalling) to measure the duration between births. This may lead to over or underestimation of birth interval duration.

Methods: Community-based cross-sectional study design was used. We used Simple random sampling technique to select one urban and four rural kebeles (the smallest administrative unit in a given district in Ethiopia) and after the sample size was proportionally allocated to selected kebeles', systematic random sampling method was used to select a total sample size of 660 women who gave at least two live births. Face to face interview was applied to collect data using pre-tested and structured questionnaire. Data were analyzed using SPSS statistical software version 20. Univariate, bivariate and multiple logistic regression analysis were done. With 95% CI, the P value of less than 0.05 was taken as the level of significance.

Results: In this study the median birth interval duration was 32 months, and being in age between 19-24 at last pregnancy (AOR=5.4, 95% CI (1.54, 8.9)), not using family planning (AOR=1.66, 95% CI (1.09, 2.77)), breast-feeding of index child for less than 24 months (AOR=9.6, 95% CI (8.93, 19.39)), and earlier history of short birth interval (AOR=2.5, 95% CI (1.48, 4.11)) were independent predictors of short birth interval.

Conclusion and recommendation: median birth interval duration is 32 months, which means one in every two inter-birth intervals among married women is less than the least recommended duration of birth intervals. The focus should be given not only to family planning service coverage, but also to awareness creation about optimal birth interval duration for reproductive age women.

Keywords: Birth interval duration; Reproductive age women; Maternal health; Child health; Fertility rate

Background

The high fertility rate is one of the concerns for different countries of the world; because it can affect the overall economic, political and social aspects of a given country. In addition, high fertility is also a concern to health professionals as it has serious implications on the health of mothers and children [1].

Africa has the highest rate of fertility and the largest percentage of population growth in the world. By 2050 close to 40 percent of all births will take place in Sub-Saharan Africa, and 37 percent of children under age of five will live in it. Because of this, the number of under-five deaths could stagnate or even increase without more progress in the region [2].

Ethiopia is the second most populous country in Africa with total fertility rate of 4.6 (2.3 for Urban and 5.2 for rural). High numbers of reproductive age women (58%) were illiterate. With this very low literacy rate, the contraceptive prevalence of the country is about only 35%. Currently, there is improvement in total fertility rate (TFR) reduction from 5.8 in 2000 to 4.6 in 2016. But, the change in fertility is not consistent throughout the country's region and society. According to the data from 2016 Ethiopian demographic and health survey, out of 20 live births, one child dies each year before her first birth day [3,4].

Birth interval refers to the time duration between two consecutive live births. It has been the main strategy of health promotion program for mothers and children, and the important indicators of fertility scenario of a country. Because of its implication for fertility and for maternal and child health, birth interval has received attention in demography and public health research [4].

The recommended optimal duration of the birth interval is not agreed upon by different researchers. Some studies recommend that a minimum birth to birth interval should be 27 months and the maximum interval should be 59 months [5,6]. But, World Health Organization (WHO) technical consultation on birth spacing recommended a birth to a birth interval of at least 33 months before couples deliver the next child. This recommendation was based on aims to reduce the risk of adverse maternal, perinatal and infant outcomes [7].

Studies supported by the United States Agency for International Development have suggested that optimal birth spacing of three to five years is more advantageous. These studies confirmed that in less developed countries if no births occur within thirty-six months of a preceding birth, infant mortality and under-five mortality rates would drop by 2% and 35% respectively [8]. A short birth interval is known to have negative effects on maternal, perinatal and neonatal outcomes as well as on child health. The hypothetical causal mechanisms which explains the association between short inter-birth intervals and adverse outcomes were: maternal nutritional depletion, folate depletion, cervical insufficiency, vertical transmission of infections, suboptimal lactation related to breastfeeding–pregnancy overlap, sibling competition, transmission of infectious diseases among siblings, incomplete healing of uterine scar from previous cesarean delivery, and abnormal remodeling of endometrial blood vessels [9,10].

Longer intervals between consecutive births decrease the number of children a woman can have. This results in beneficial effects on the health status of mothers and their children. A longer interval between consecutive births has a greater advantage in reducing abortions, complication related to unsafe abortion and unwanted pregnancies. It also improves children's development by improving the nutritional status of the preceding child [11].

The community-based cross-sectional study conducted among 3600 women ever gave live births in North Gondar in 2010 indicated that for every additional pregnancy, the risk of neonatal death was 2.5 and majority of deaths were contributed to the premature birth and underweight at delivery [12].

Meta-analysis study in 2014 from Ethiopia showed that Short birth intervals substantially reduce children's chances of survival, especially if the interval is less than two years [13]. For example, according to data from Ethiopian Demographic and Health Survey (EDHS) of 2011, children born less than two years after the preceding birth were 2.5 times more likely to die within the first year of life and within the first five years of life compared to children born three years after the preceding birth [3]. So, by promoting the length of the birth interval to at least two years we can reduce under-one mortality by half [13].

The community-based cross-sectional study conducted in 2013 on consequence and determinants of short birth intervals in Bangladesh revealed that birth intervals of less than 21 months were associated with a greater than a two-fold increased risk of adverse pregnancy outcome, stillbirth and neonatal mortality [14]. A meta-analysis was done using 52 demographic and health survey data from developing countries; Latin America, Asia, Africa and Middle East countries indicated that compared with a preceding birth-to-pregnancy interval of greater than 36 months, children conceived with interval durations of less than 24 months have significantly higher risks of mortality [15].

In a case-control study done in 2014 in South East of Ethiopia on risk factors for low birth weight, mothers who gave birth within birth interval of 2 years and below were 3.2 times more likely to give low birth weight baby than mothers who gave birth greater than 2 years apart (AOR=3.2; (95% CI=1.58-6.31) [16].

Short intervals between births is also an indicator that the women didn't breastfeed her previous child, as proper breastfeeding delays the mother's early regaining of fecundity [17]. Short interbirth interval prompts the preceding child to start weaning before the appropriate age. This will contribute to malnutrition, infection, and poor school performance [11].

A cross-sectional study conducted in 2012 in Bangladesh using key informants on births and deaths happened among married women and their children, also indicated that women who gave births within a birth interval of less than 21 months were 2 times more likely to give stillbirth and neonatal death in succeeding pregnancy [14].

Irrespective of its adverse effect, in many parts of the world's developing countries, women were practicing short birth interval i.e., the birth interval of less than 33 months. Longitudinal studies conducted over eleven years in Tanzania among 15,373 married women using data extracted from demographic surveillance survey indicated that nearly fifty percent of births happened below the recommended minimum length of 33 months between two live births [18]. But, Studies from developed country showed that the median birth interval is higher compared to developing countries. For instance, in Iran more than 70% of childbearing age women were practicing birth interval of greater than 2 years [19].

Studies in different parts of Ethiopia also showed similar results. For instance, in community-based cross-sectional study conducted in 2008 among 645 married women in Jimma, South West Ethiopia, 27% of births were happened within less than 24 months from previous birth, while only 33% of births happened between 33 and 35 months after a previous birth [20], and in retrospective study done in 2012 among 617 women in Gondar, Northern Ethiopia, the median birth interval was 32.6 months (95% CI: 31.2-34.1) which is less than the minimum recommended inter birth interval [21].

In general, previously conducted studies in different parts of developing and developed countries have proved that short birth intervals have an impact on maternal and child health. However, few studies conducted to assess factors contributing to a short birth interval in Ethiopia have some limitations. For instance, almost all the previous studies measured the duration of birth interval based on the maternal memory of her children birth date. This could either underestimate or overestimates the birth interval duration because of recall bias. The other limitation is variation in the cut of a point among different studies to classify the birth interval as short or optimal. For example, the study conducted in Lemo, Southern part of Ethiopia, and study in Yabello, Oromia region, used 36 months as cutoff point for classifying birth interval into short or optimal and they used mothers memory of her child's birth date [22,23], while study conducted in Gondar, Northwest Ethiopia, didn't use any cutoff point for duration of birth interval, and rather they only analyze the median duration and chance of giving birth after index child [21]. So, this study aimed to assess duration and determinants of birth intervals based on recorded data of children's birth date instead of maternal memory recall. The world health organization standard for classifying birth spacing duration to low or normal was used as a reference.

In addition, this specific study area also lacks information on birth interval duration and factors affecting it, and this problem is not addressed well. In addition, understanding the practice of birth interval and its determinants is helpful to design evidence-based strategies for interventions in this study area.

Therefore, the overall objective of this study was to assess duration of birth interval and associated factors among married women in Dodota Woreda, Arsi Zone, Ethiopia.

The specific objectives of this study were:

- To determine by how much interval did the women were giving births,

- What factors affects the length between two consecutive birth intervals?

Methods

Study design and area

The community-based cross-sectional study was conducted among married women of childbearing age living in Dodota Woreda, Arsi Zone, Ethiopia. Dodota is one of the 16 woredas in Arsi zone and Dera is Woreda's town. Dera is located at distance of 125 km from Addis Ababa, the capital city of Ethiopia, and 25 km on the way from Adama to Asella city, the capital city of East Arsi. The Woreda has 15 kebeles (3 urban and 12 rural). The total population of the Woreda was projected to be 63,302, according to 2007 Ethiopian population and house Census. There were two government health centers, 12 health posts, three private clinics and three pharmacies in the Woreda. There were 24 health extension workers who were assigned to each kebele in the Woreda. Majority of the resident of the district were Oromo in ethnicity followed by Amhara (DododtaWoreda Health Office, 2016).

Study population

The study population for this study was childbearing age women who were married and gave at least two live births and whose last birth was within last three years prior to data collection period, living in the five randomly selected kebeles i.e., kebele 01 from urban and Bedosa Batala, Lode hada, Awash Bishola and Dilfaqar kebeles from rural. The study was conducted from March 1 to 15/2016.

Sample size determination and sampling procedure

To determine the sample size for this study, outcome variable and various factors significantly associated with the outcome variables were considered. Accordingly, for each objective the sample size was calculated, and the larger sample size was taken as follows:

The sample size for the first specific objective is calculated with the following factors assumed: level of confidence was 95%, (Zα/2)=1.96, marginal error (d)=0.05, Single population proportion (p=0.25) was used as proportion of childbearing age women practicing short birth spacing from cross-sectional study conducted by Jonge et al. [14]. In addition, 5% non-respondent rate was added and since the sampling technique contains multistage sampling, design effect (deff) of 1.5 was considered and the final sample size was 453.

$$n = \frac{(Z_{\alpha/2})^2\, p(p-1)}{d^2} = \frac{(1.96)^2 \times 0.25(1-0.25)}{(0.05)^2} = \frac{0.72}{.0025} = 288$$

For design effect=288*1.5=432

The sample size for second specific objective was calculated based on the following assumptions:

The confidence level is 95%, power 80%, ratio 1:1, and by using variable which has significant association with dependent variable from previous study, contraceptive use (the % of outcome in exposed was 51.5% and the % of outcome in unexposed was 65.1%) gives the largest sample size of all other variables [22], by inserting this values into Epi info version 7 the final sample size was 426.

Then by multiplying for the design effect of 1.5 and adding 5% non-respondent rate, the final sample size was 660. This sample size was taken since it can accommodate the sample size for both specific objectives.

Out of the total 15 kebeles (3 urban and 12 rural) in the Woreda, five kebeles (one urban and 4 rural) were selected by lottery method. Labeling of the households which fulfill inclusion criteria was conducted in each selected kebele by health extension workers. Households in which eligible women found were labeled by giving code. Then, by allocating sample size to each selected kebele proportionally, systematic random sampling technique was conducted to select needed sample size.

In case two or more women who were eligible for interview exists in the same household, lottery method was used to select one of them (Figure 1).

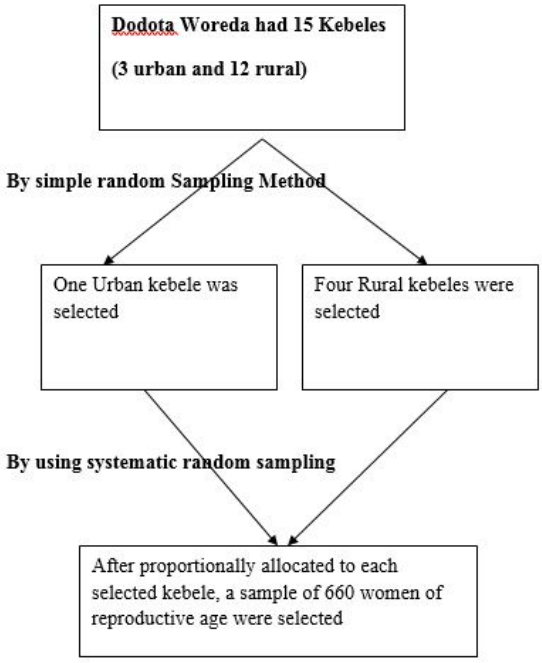

Figure 1: Schematic diagram indicating sampling procedure.

Inclusion and Exclusion Criteria

Inclusion criteria

Women who gave births for the index child in the last three years were included. This was for mainly three reasons. The first reason was to get the recent and up to date information about birth interval durations. The second was to reduce incomparability of the data by the variation in duration length. The third was to reduce recall bias.

Birth interval measuring procedure

Since a single woman can contribute more than one birth intervals, this study was confined only to the recent birth interval to reduce recall bias. To measure the duration between the recent two consecutive births, the years and months in which the two last births happened were referred from previously recorded family folder data in respective kebele. Since each birth in a given kebele is recorded by health

extension workers and filed as family folder. First, the lists of eligible women were obtained from kebele. Based on their lists, coding for the eligible women's house was done by health extension workers (HEW's). Then, the birth date of their respective last two children was referred from recorded data. Finally, the duration of the birth interval was calculated by subtracting the two birth dates, one from the other.

Data collection tools, methods and procedures

Face to face interview was conducted using structured questionnaire containing both open ended and close ended questions for eligible women after giving necessary orientation. For data collection, structured questionnaire was prepared in English language and translated into the local language (Afan Oromo), based on reviewed literature and extracting from related studies. The questionnaire contains socio-demographic characteristics of the woman and her husband, obstetric history, family planning history, mother's breastfeeding habits and the question of knowledge of women related to a birth interval.

There was a total of 45 questions which takes from 30 to 40 minutes to complete. The questionnaire was pre-tested and necessary modification was done accordingly.

For data collection, ten health extension workers (diploma level community nurses) were recruited and trained for two days on how to fill a questionnaire, how to take consent and how to orient the study participants. Two-degree holder public health experts supervised the data collection process.

After collected data were checked for completeness, it was entered into Epi Data Version 3.02 for documentation. After checking for consistency of entered data, it was exported to SPSS Version 20 statistical software for statistical analysis. Data were checked for typing errors using SPSS menu. Descriptive statistics: frequency distribution, median, mean was computed. In order to assess the association between dependent and independent variables, first bi-variate analysis was done. Variables which had the association with dependent variable at P-value<0.25 were competent for multivariate logistic regression analysis. In addition, variables which were highly associated with the dependent variable from the previous study were also considered to be competent for multivariate logistic regression. Odd ratio with 95% CI, and level of significance at P<0.05 was considered.

Data Quality

To ensure the quality of our data the following measures were taken:

- To ensure the reliability and Validity of the data, the questionnaire was developed by reviewing relevant literatures on the subject, extracted from similar previous study, pre-tested and modified where necessary.
- training was given for data collectors and supervisors,
- Orientation was given for the study participants on the objective of the study, on confidentiality of their response, and on their rights during and after participation.
- During field work, each completed questionnaire was checked immediately after received from respondents to ascertain all the questions had been answered consistently.

Operational definition

Birth intervals: time duration/period between two recent consecutive live births measured in months.

Short birth intervals: a birth interval of less than 33 months following preceding live birth.

Optimal birth interval: it denotes a birth interval of 33 months and above between the birth of index child and the immediately preceding live birth [7].

Index child: the first child of the recent two births.

Ethical consideration

Before data collection process was started, the proposal was submitted to Institutional Health Research Ethical Review Committee of Haramaya University College of Health and Medical Sciences for approval and clearance. The letter of support was then written to the Dodota Health office. Written consent was also taken from each study participants after clearly explaining the objective of the study and reading the consents for them.

Results

Socio-demographic characteristics of study participants

Out of 660 married women planned to be included in the study, 647 have participated in the interview making respondent rate of 98%. The mean age of women at last pregnancy was 31.5+6 SD years. The majority (47.8%) were aged between 25 and 30 years. Sixty-four percent of the women had no formal education, and 92.7% of them were a housewife in occupation. Thirty-seven percent of women were married at age of less than 18 years. Five hundred thirty-four (82.5%) of the husbands were a farmer in occupation. The majority (76.5%) of the participants were from rural in residency. The mean age of study participants at first birth was 19.8 (2.8SD) (Table 1).

Variables	Frequency (N=647)	Percent (%)
Age at last pregnancy		
19-24	54	8.3
25-30	309	47.8
31-35	146	22.6
36+	138	21.3
Residency		
rural	495	76.5
urban	152	23.5
Religion		
Muslim	396	61.2
Orthodox	214	33.1
protestant	37	5.7
Ethnicity		
Oromo	609	94.1

Amhara	35	5.4
Gurage	3	0.5
Women Education		
No formal Educ.	415	64.1
Elementary	162	25
High school	59	9.1
College and above	11	1.7
Husband educational status		
No formal Education	195	30.1
Elementary	339	52.4
High school	77	11.9
College and above	36	5.6
Women occupation		
Housewife	600	92.7
Farmer	12	1.9
Employee	11	1.7
Merchant	24	3.7
Husband occupation		
Farmer	534	82.5
Government Employee	68	10.5
Merchant	30	4.6
others	15	2.3
Age at marriage		
<=17	245	37.9
18+	402	62.1

Table 1: Socio-demographic characteristics of Married Women in DodotaWoreda, Arsi Zone, Central Ethiopia, 2016.

Obstetric and behavioral characteristics of the study participants

The majority (64%) of the respondents gave four births and above about 74% of the women gave birth to their first child when they were in the age of 18 to 24. Fifty-four percent of index child were male in sex (Table 2).

Variables	Frequency (N=647)	Percent (%)
Parity		
2	134	20.7
3	99	15.3
4+	414	64
Age at first birth		
<=17	124	19.2
18-24	477	73.7
>=25	44	6.8
History of FP use before the last child		
Yes	240	37.1
No	407	62.9
Types of FP used (n=240)		
pills	24	10
Injectables	204	85
Norplant	12	5
Sex of index child		
male	351	54.3
female	296	45.7
Exclusive Breast Feeding		
>=6	453	70
<6	194	30
Overall BF duration for Index		
>=24	335	51.8
<24	312	48.2
History of ANC for index child		
No	144	22.3
Yes	498	77
Place of deliv. of index		
At home	444	68.6
Health institution	201	31.1
Living status of index child		
Yes	619	95.7
No	28	4.3
History of abortion		
Yes	24	3.7
No	623	96.3

Table 2: Obstetric and behavioral history of married women in Dodota Woreda, Arsi Zone, Ethiopia, 2016.

Birth interval duration of the study participants

Out of total 647 study participants interviewed, 24 (3.7%) women had a history of pregnancy loss (abortion) between the index child and the preceding pregnancy. Those women were removed from analysis because of they can bias the results by falsely increasing the birth interval duration, thus 623 respondents were included for analysis of

duration of birth interval and its predictors. Accordingly, 108 (17.3%), 210 (33.7%) and 305 (49%) of the women gave birth within an interval duration of less than 24 months, 24-32 months, and 33 and above months respectively. With the minimum of 12 and maximum of 60 months of actual birth interval duration, the median (the data was not normally distributed) birth interval duration was 32 months.

Women's awareness towards optimal birth interval

The respondents were asked whether they have ever heard about optimal length of duration of birth intervals, and 441(70.1%) responded that they have heard the optimal birth duration. Of those who responded that they have heard optimal birth interval duration, 304(68.9%) of them responded the optimal birth interval duration is between 24 and 33 months while 114(25.85%) were responded as the optimal is 33 months and above. The remaining responded the optimal birth interval was less than 24 months.

Factors associated with a birth interval duration

First, binary logistic regression was done and variables which had association with the dependent variable at p-value of less than 0.25 were selected and entered into multiple logistic regression analyses [24].

In the multiple logistic regression analysis, Six independent variables: being in the age of 19-24 during last pregnancy (AOR=5.4, 95% CI: (1.54, 8.97)), rural residency (AOR=3.0, 95% CI: (1.35, 6.80)), contraceptive nonuse (AOR=1.66, 95% CI: (1.09, 2.77)), being Para three (AOR=3.25, 95% CI: (1.29, 8.23)), over all breast feeding duration of index child for less than 24 months (AOR=9.66, 95% CI: (8.93, 19.40)), and having history of a short birth interval (AOR=2.47, 95% CI: (1.48, 4.11)), were independent predictors of short birth interval (Table 3).

Co-variables	Short Birth interval		Crude OR	Adjusted OR With 95% CI
	Yes	No		
Age at last pregnancy				
19-24	35(5.6%)	15(2.4%)	4.22	5.40 (1.537, 8.974)*
25-30	173(27.8%)	128(20.5%)	2.444	1.94 (1.014, 3.692)
31-35	63(10.1%)	77(12.4%)	1.48	1.12 (0.552, 2.271)
36+ (ref)	47(7.5%)	85(13.6%)		1
Resident				
Rural	257(41.3%)	222(35.6%)	1.6	3.00 (1.35, 6.8)*
Urban(ref)	61(9.8%)	83(13.3%)		1
Women Education				
No formal Edu.	233(37.4%)	167(26.8%)	2.265	1.36 (0.736, 2.540)
Has Formal Education. (ref)	85(13.6%)	138(22.15%)		1
Husband Edu.				
No formal Edu.	130(20.9%)	64(10.3%)	3.281	1.80 (0.396, 8.180)
Elementary	148(23.8%)	174(27.9%)	1.374	1.05 (0.251, 4.429)
High school	27(4.3%)	46(7.4%)	0.948	1.12 (0.285, 4.358)
College and above(ref)	13(2.1%)	21(3.4%)		1
Women Occupation				
Employee	3 (0.5%)	6(1.0%)	0.455	0.58(0.077, 4.408)
Merchant	6(1.0%)	18(2.9%)	0.303	0.64(0.153, 2.720)
House wife(ref)	309(49.6%)	281(45.1%)		1
Husband occupation				
Farmer(ref)	21(3.4%)	45(7.2%)		1
Employee	10(1.6%)	18(2.9%)	0.388	0.41(0.150, 1.161)
Merchant	4(0.6%)	7(1.1%)	0.461	0.41 (0.100, 1.682)

Others **	283(45.4%)	235(37.7%)	0.475	0.41(0.039, 4.392)
Parity				
2 (ref)	50(8.0%)	78(12.5%)		1
3	58(9.3%)	38(6.1%)	2.381	3.25 (1.28, 8.23)
4+	210(33.7%)	189(30.3%)	1.733	2.47 (1.04, 5.87)
Age at first birth				
<=17	14(2.3%)	30(4.8%)	1.18	0.37 (0.121, 1.14)
18-24	261(42.0%)	201(32.4%)	2.78	1.27 (0.462, 3.52)
>=25(ref)	41(6.6%)	74(11.9%)		1
History of FP use				
User	87(14.0%)	142(22.8%)		1
Non-user	231(37.1%)	163(26.2%)	2.313	1.66 (1.09, 2.76)
Sex of index child				
Male	186(29.9%)	153(24.6%)	1.4	0.72(0.445, 1.17)
Female(ref)	132(21.2%)	152(24.4%)		1
Breast Feeding duration for index child				
<24 months	250(40.1%)	50(8.0%)	18.75	9.66 (8.931, 19.399)*
>=24 months	68(10.9%)	255(40.9%)		1
History of short Birth Interval				
Yes	169(27.3%)	79(12.7%)	3.202	2.47(1.484, 4.108)*
No	149(24.0%)	223(36.0%)		1

Table 3: Multiple logistic regression on birth interval duration of data from married women in Dodota Woreda, Arsi Zone, Ethiopia, 2016.

Discussion

This study aimed to assess birth interval duration and its predictors among married women, who gave at least two live births, in Dodota Woreda. In this study, it was found that the median birth interval duration was 32 months. This means 50% of the last births happened in short birth interval duration which is known to be a threat to maternal and child health especially at an early infancy. In addition, this indicates a significant proportion of women in the study area were at risk of adverse maternal and child health outcome related to birth spacing. This result is similar with the recent study done in Dabat, Northwest Ethiopia in which median birth interval duration was 32.6 months [21] and relatively greater than the result obtained in Myanmar, India, which was 30 months [25]. However, this median birth interval is less than the recommended minimum birth to a birth interval of 33 months [7].

In this study, overall breastfeeding duration is found to be the strongest predictor of birth interval duration. Breastfeeding duration is directly related to duration of birth interval i.e., women who breastfed their index child for less than 24 months were more likely to give birth within-short birth interval duration and vice versa. This could be due to the effect of breastfeeding which results in lactational amenorrhea, extends postpartum infertility by suppressing ovulation and reducing the chance of conception through hormonal effect. This result is in line with the result obtained in a community-based study done in Yabello, Southern Oromia (AOR=30, 95% CI:6.9, 136) and in Manipur, south India [23,26]. Results from EDHS of 2011, in Ethiopia, also indicated that post-partum amenorrhea and abstinence contributes about 16 months for the duration of post-partum insusceptibility [3].

Contraceptive utilization status was another variable associated with duration of a birth interval in this study. Women who didn't use any contraceptive method between index child and last pregnancy were 1.6 times more likely to give birth in short interval. This result supports community-based study done in Lemo, Southern part of Ethiopia, in which contraceptive non-users were 1.56 times more likely to practice short birth interval (AOR=1.56 95%CI: (1.1, 2.2)) [22].

But this is in contrast to the result from the institutional-based study in Daresalam, Tanzania which claimed that contraceptive use was not promoted healthy timing and spacing (AOR=1, 95% CI:0.5-1.9) [27]. The difference could be due to study setting and sample size variation. Since as sample size increase, we could able to identify small variation between groups. The latter study was institutional based and smaller sample size compared to the current study.

In contrast to study done in Bangladesh which claimed as the age of women increased by one year, the likelihood of short birth interval increased by 11% [14], this study showed that the likelihood of short birth interval decreased as the women age increased. Compared to women of age greater or equal to 36 years at their last pregnancy, women in the age of 19 to 24 were 5.4 times more likely to give birth in a shorter interval. This could be for two reasons. The first reason is women in old age are more likely to reach their desired number of family size, and they are also less likely to be fecund compared to the lower age. The second reason could be women in early age are less likely to use contraceptive as they desire to bear a child [28].

The other predictors found to be associated with duration of the birth interval was having the history of short birth interval in previous births. Women who have the previous history of short birth interval were 2.5 times more likely to become pregnant in short birth interval. This result can be supported by data from Ethiopian Demographic and Health Survey, which claimed that there were no substantial differences in the median birth interval by birth order [3].

In this study, women's awareness about optimal birth interval duration and its health advantage were assessed. Almost all of them agreed that spacing duration between births has health advantage for both mothers and her child. Even though the majority of the respondents claimed that they had ever heard optimal birth interval duration, more than 52.5% of them were either miss informed or had no sufficient information about optimal birth interval duration. This could be one justification for the lower median birth interval in this study area. A study conducted in Ghana in 2014 on knowledge of women towards birth spacing and birth interval duration also indicated that 55% of the women were claimed the optimal birth interval was less than two years and 80% of the women were practiced birth interval of less than two years [11].

Limitation of the study

As it was cross-sectional type, it doesn't indicate cause and effect relationship.

Conclusion

In this study, median birth interval duration is 32 months, which means one in every two inter-birth intervals among married women was less than the least recommended duration of birth interval.

Birth interval duration is varied significantly by the length of breastfeeding duration, contraceptive use, residence, maternal age at last pregnancy and previous history of short birth interval.

A majority of women in the study area had awareness of different methods of birth spacing. However, the majority of those who claimed to be informed was either misinformed or had no factual information about optimal birth interval duration.

In order to improve the maternal and child health, special focus should be given to improving short birth interval duration, one of the known risk factors for adverse maternal and child health outcome. To achieve this and to promote healthy timing and spacing of pregnancies, attention should be given to addressing misinformation about optimal birth interval duration. Therefore, counseling during family planning service delivery should address about the recommended optimal birth spacing.

Knowledge is the pillar for healthy practice in order to develop a positive attitude among couples towards a longer space of time between pregnancies and to carry out this practice. Since the major gap seen in this study area was lack of information, community and facility-based urgent awareness creation should be conducted. The Woreda Health Office and other organizations working with maternal and child health in the Woreda should arrange this programme. Such intervention should give priority for rural area.

Finally, contraceptive prevalence was claimed to be high (80%) in the study area. However, the contraceptives were found to be less significant than breastfeeding in influencing the practice of optimal birth spacing. So, we encourage if further studies conducted on the quality of the Family Planning Services in that area.

Declaration

Ethical approval and consent to participate

The proposal for the study was submitted to the Institutional Health Research Ethical Review Committee of Haramaya University College of Health and Medical Sciences for approval and clearance. Accordingly, the study was checked for its ethical issue and permission letter was obtained. The letter for support was written from the college of medicine and Health Sciences, Haramaya University to Dodota Woreda Health office.

Consents from participants

Before starting the data collection process, written consent was taken from each respondent after the consent form was read for them or they read consent form.

The consent form was prepared by the Institutional Health Research Ethical Review Committee (IHRERC) of Haramaya University College of Health and Medical Sciences.

Consent for publication

Not applicable.

Availability of data and material

All data generated or analyzed during this study were included in this published article and its supplementary information files are in the hands of the correspondent author.

Competing interests

The authors declare that they have no competing interests in this section.

Funding

This study was funded by the Ethiopian federal ministry of education. The funded organization has no role in designing the study, data collection, or manuscript preparation.

Authors' contributions

Seifadin Ahmed developed the proposal, analyzed data, and the major contributor of the manuscript.

Tesfaye Gobena had read the study throughout the progression of study, starting from proposal development to final manuscript preparation. All authors read and approved the final manuscript.

Acknowledgments

We would like to acknowledge the Federal Ministry of Education for being the source of fund for this study and we would like to thank Dodota Woreda health office, data collectors and study participants for their collaboration. Our thank goes also to Margareta Langbacka Walker who has edited the manuscript for language.

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