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Inter-pregnancy interval and associated factors among parous women in neighboring low-land ecologies of arsi & east shoa zone, southeast Ethiopia: a community-based cross-sectional study

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Abstract

Background The World Health Organization (WHO) recommends an interval of at least 24 months from the date of a live birth to the conception of the next pregnancy in order to reduce the risk of adverse maternal, perinatal, and infant outcomes. There is limited data about the implementation of this recommendation and its contributing factors in low-land ecologies in Oromia, which is the biggest regional state in Ethiopia.

Objective To assess the inter-pregnancy interval and determine associated factors among parous women in selected low-land districts of Arsi and East Shoa Zone.

Methods A community-based cross-sectional study was conducted. Data were collected from a random sample of 563 women using a structured, pre-tested questionnaire. Bivariate and multivariate analysis was conducted, and the magnitude of the association between the inter-pregnancy interval and explanatory variables was measured using adjusted odds ratios and their 95% confidence intervals.

Results The rate of short inter-pregnancy interval (SIPI) was 28.20% (95% CI: 24.48-31.92%). After multiple logistic regression analysis, women with primary education, women who believed that low contraceptive use contributed to SIPI, women who thought SIPI could impact small for gestational age, and women who thought SIPI could affect birth defects had a lower chance of having SIPI; aOR of 0.54 (95% CI: 0.30–0.79), 0.33 (95% CI: 0.16–0.68), 0.57 (95% CI: 0.32–0.94 and 0.63 (95% CI: 0.40–0.96), respectively.

Conclusion Women with primary educational status, those who had better contraception literacy, and who knew about the adverse maternal and perinatal health impacts of SIPI were more likely to follow the recommended inter-pregnancy interval. Improving women's family planning literacy is crucial to lowering the rate of SIPI currently observed in the study area.

Keywords Inter-pregnancy interval, Parous women, Factors, Arsi, East shoa, Ethiopia

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Introduction

A short inter-pregnancy interval is when the interval between the date of the live birth and the conception date of the next pregnancy is less than 24 months [1]. Healthy timing and spacing of pregnancy (HTSP) is an approach to family planning that helps women and families delay, space, or limit their pregnancies to achieve the healthiest outcomes for women, newborns, infants, and children. It works within the context of free and informed contraceptive choice and takes into account fertility intentions and desired family size [2]. This is the period when a woman recuperates her health and the last born child secures his/her right to sufficient lactation and comprehensive care [3]. The World Health Organization (WHO) recommends an interval of at least 24 months from the date of live birth to the next pregnancy in order to reduce the risk of adverse maternal, perinatal, and infant outcomes [1, 4].

Globally, more than half of births occur less than three years after the previous live birth [4]. A significant proportion of women in sub-Saharan African countries have short inter-pregnancy intervals: 30.2% in Chad [5], 27.1% in the Democratic Republic of the Congo [5], and 33% in Uganda [6]. A multilevel analysis of recent DHS data from nine SSA countries (Niger, the Democratic Republic of the Congo, Mali, Chad, Angola, Burundi, Nigeria, Gambia, and Burkina Faso) showed a short inter-pregnancy interval of 58.74% [7]. A short inter-pregnancy interval is also quite common among Ethiopian women, with rates of 23.3% in Debre Berhan town (close to Addis Ababa) [8], 40.9% in northern Ethiopia [9], and 56.0% in eastern Ethiopia [10].

Adverse maternal and infant health outcomes have been associated with a short inter-pregnancy interval less than 24 months [11, 12]. Pregnancy and newborn complications associated with the short inter-pregnancy interval are low birth weight, preterm birth, small for gestational age, and a low Apgar score [1, 11, 13, 14], uterine rupture [15, 16], congenital anomalies [13, 17], maternal, fetal, neonatal, or infant death [13], premature rupture of membranes, preeclampsia, and placental abruption [13]. A short inter-pregnancy interval is also linked with an increased risk of maternal anemia [13, 18–20], maternal nutritional depletion [18, 21, 22], and sibling competition [13, 18]. According to the Maternal Depletion Syndrome, mothers with short inter-pregnancy intervals do not have enough time to replace macro- and micro-nutrients, which may cause the mother and fetus to compete for essential nutrients [12]. Autism in children is also linked to short inter-pregnancy intervals [13, 22]. Prior research carried out in Ethiopia revealed that having formal education and knowledge/awareness about using contraception to achieve an optimum inter-pregnancy interval are factors contributing to a short inter-pregnancy interval [7, 10].

While the global trend data on actual and preferred birth intervals show that more women want to avoid and are avoiding short intervals than in the past, many women still have shorter intervals than they would have liked, and some women increasingly prefer intervals that are even longer than optimal [4]. The appropriate use of modern contraceptives is the principal strategy that women can use to delay the next pregnancy until the recommended period of time has passed since the last birth. While postpartum amenorrhea due to breastfeeding and postpartum abstinence do delay the next conception, by themselves they are not enough to ensure the 24-month inter-pregnancy interval. About one-quarter of women worldwide want to use contraception to space their next birth. Unfortunately, for almost half of the women who have a need for contraception to space births, that need is unmet [1, 4].

In Ethiopia, the proportion of married women using modern contraception has significantly increased over the previous 20 years, rising from 6% in 2000 to 41% in 2019 ([23]. The percentage of married women using modern contraception has increased over the past 20 years in Oromia as well, going from 6.6% in 2000 to 40.7% in 2019 ([24, 25]. Yet, there is a high disparity between the number of Ethiopian women desiring to delay pregnancy and the number using modern contraception, for which that gap is 71.4% ([25]. Despite its importance, there are limited studies on the short inter-pregnancy interval and associated factors in Ethiopia, which are only in a few regions [8–10, 14], while no study was conducted in Oromia Region, the biggest region in Ethiopia. The lowland areas of Ethiopia, including the lowland ecologies of Oromia Region, have much lower rates of literacy, access to formal education, and availability of water and sanitation than the country as a whole. The highest rates of fertility and the lowest markers of mother and child health services are found in lowland areas. The Lowlands region's average population growth rate is more than 2.5% ([26, 27]. Therefore, it is important to assess the short inter-pregnancy interval and associated factors in the lowland ecologies of Arsi Zone, oromia region in order to develop appropriate and context-specific family planning interventions.

Materials and methods

Study setting

The study was conducted in Dodota and Ziway Dugda Districts of Arsi Zone and Dugda District of East Shoa Zone, Oromia, Regional State, Southeast Ethiopia. All the selected districts are located in the same lowland ecology, and they are neighbors even though they are administratively in different zones. Hogolcho, the capital of Zeway

Dugda district, is located 169 km southeast of Addis Ababa; Dera, the capital of Dodota district, is located 125 km southeast of Addis Ababa; and Meki, the capital of Dugda woreda, is located 127 km south of Addis Ababa. The people in these three districts follow exactly the same lifestyle. Like other people in low-land areas, their income is based partly on agriculture and partly on rearing live stocks. They don't usually harvest much due to the small amount of rain that falls in the area (Fig. 1).

Study design and period

Community based cross-sectional study design was used to collect data from January 01–31, 2022.

Study population

Randomly selected women who gave at least two births (the last birth was within the past two years) or pregnant women who gave at least one birth and were living in selected districts during the data collection period were included in the study.

Sample size and sampling process

The single population proportion formula was used to estimate the optimum sample. The sample size was calculated using the following parameters: 95% confidence level, 5% margin of error, 10% non-response rate, and 1.5 design effect, along with a proportion (P) of 40.9%, which is the SIPI level from a prior study carried out in the central region of Ethiopia ([8]. This resulted in a sample size of 612. Zeway Dugda district contains 22, Dodota district has 18, and Dugda district contains 23 kebeles. Four kebeles—a total of 12 kebeles—were chosen at random from each district. These kebeles were randomly selected to represent the low-land ecologies of the Arsi and East Shoa Zones. Kebele is the smallest administrative unit in Ethiopia. Then all women fulfilling inclusion criteria were included from the selected kebeles.

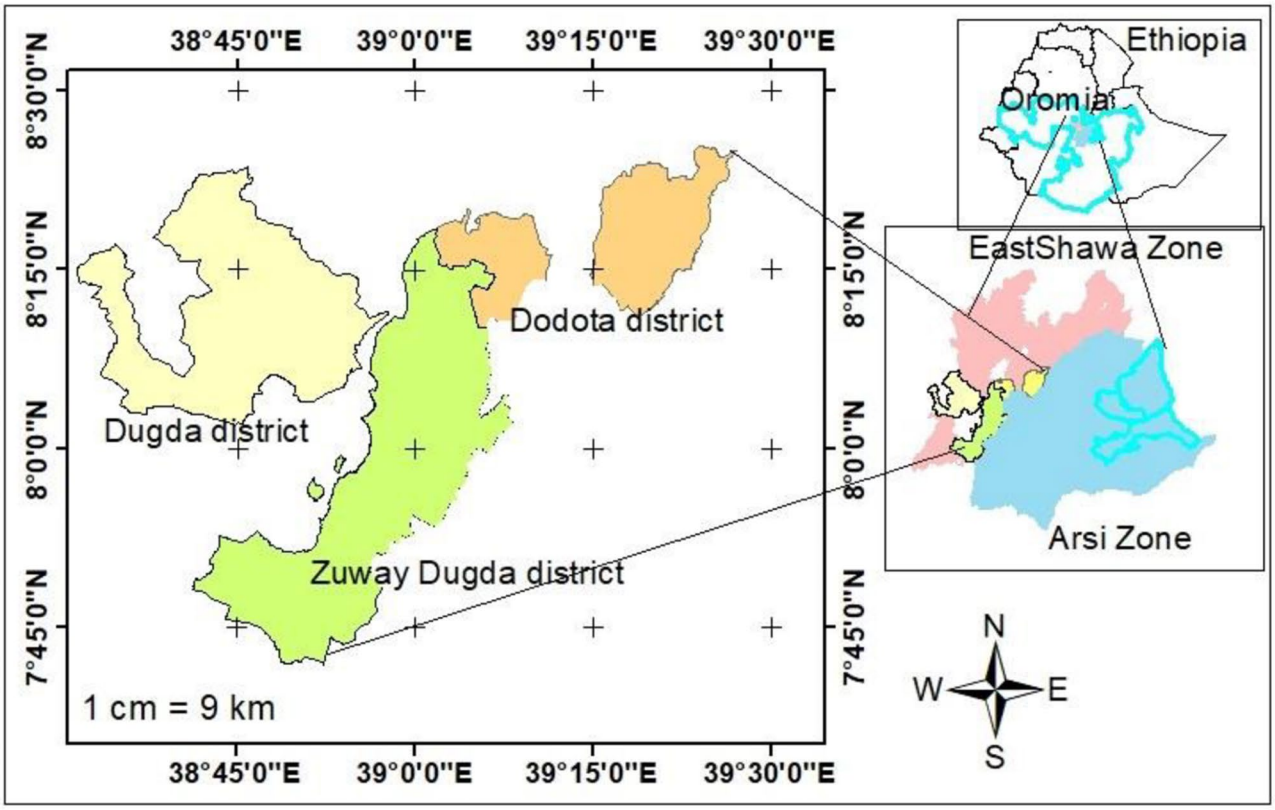
Study variables

Outcome variable

Inter-pregnancy interval.

Independent variables

Socio-demographic characteristics such as a woman's age, education level, and partner's education level, place of residence, ethnicity, religion, marital status, and household income sources were regarded as independent variables. Knowledge about the right inter-pregnancy



Study area map, Arsi and East Shoa zone, Ethiopia, 2022

Fig. 1 Study area map, Arsi and East Shoa zone, Ethiopia, 2022

interval, community-level antenatal care service availability, proximity of women's households to health facilities, receiving antenatal care, receiving postnatal care, and counseling about health timing and spacing were also independent variables. Other independent variables in this study included waiting until menstruation to start contraception after child birth, prior child sex, breastfeeding, the number of ANC and PNC visits for prior child births, and the total number of children in the family who were still alive.

Operational definition for the outcome variable

The inter-pregnancy interval (birth-to-pregnancy interval) is the interval between the date of the live birth and the conception date of the next pregnancy. When this interval is smaller than 24 months, it is referred to as a "short inter-pregnancy interval" ([1, 2].

Measurement

For women who were pregnant during the data collection time, we determined the date of birth of the last child from the vaccination card and the gestational age of the current pregnancy in the completed month on their ANC card. Then, we determined the interval between these events in months. Finally, we deducted the gestational age in months to get the inter-pregnancy interval in months. For women who weren't pregnant at the time of the data collection but had a child under 2 years old, date of births were taken from the vaccination card for the most recent and closest sibling. Finally, we deducted 9 months to get the inter-pregnancy interval in months. Most women had their child's vaccination card at home. But for those who didn't have one, we asked them their children's dates of birth in the Ethiopian calendar, and they could and were sure about it.

Data collection tools and procedures

Data collecting questionnaires were written in English and then translated into Afan Oromo, the local language. The questionnaire was then pre-tested on 5% of the entire sample in different district. Twelve degree-holding healthcare professionals who are proficient in Afan Oromo were recruited for the data gathering. Three health experts with master's degrees were also hired to supervise the gathering of field data. Data collectors received three days of training on the tools and the data collection procedure. Three field supervisors, one for every four data collectors, were tasked with monitoring the quality of the data collection process by observation of interviews and review of completed surveys.

Data processing and analysis

Data was entered in to Epi-Info version 7 software, and then exported to SPSS version-21 for analysis. Before analysis, data was checked for completeness and consistency. Descriptive statistics was used to describe the sample as per the considered characteristics. Bivariate analysis was carried out to see the association of each independent variable with IPI to select candidate variables for the final model. Independent variables with p-values below 0.2 remained in the multivariate analysis. Adjusted Odds Ratios was generated for each variable and the independence of any association was controlled by entering all variables into the model using backward stepwise method (backward conditional). The magnitude of the association between the independent variables with IPI was measured using adjusted odds ratios (aOR) and 95% confidence interval (CI). Moreover, *p*-values below 0.05 was considered statistically significant.

Results

Socio-demographic characteristics of the study participated women

A total of 563 women were included in the study, with a 92% response rate. Among them, 289 (51.33%) were in the age range of 26–35, and 548(97.32%) were currently married. Two hundred seventy (65.72%) were Muslims, and 558(99.11%) were Oromo by ethnicity. By place of residence, 453(80.46%) were from rural areas. Primary level education was obtained by 347 (61.63%) of women and 345 (61.28%) of their husbands. These results show that although both women and men had a majority of primary education, more women (18.29% versus 7.46%) could not read and write (Table 1).

Women's knowledge of healthy timing and spacing of pregnancies (HTSP)

Only 238 (42.27%) of the total number of women interviewed correctly knew the right healthy timing and spacing of pregnancy. The vast majority of women were aware of the adverse maternal and child health impacts of a short inter-pregnancy interval. However, the majority of respondents (52.62%) did not know or believe that SIPI could cause a birth problem. Four hundred eighty-two (85.61%) said that low use of contraception contributes to the high level of short inter-pregnancy intervals (Table 2).

Utilization of basic maternal health services and receipt of HTSP counseling

Of the total number of women interviewed, 27 (5.11%) reported having received ANC just once, whereas 365 (69.13%) had received it twice or three times, and 136 (25.76%) had received it four or more times.

Of the 528 women who had ANC during their previous pregnancy, 260 (49.24%) had HTSP counseling during the ANC sessions. Of these, 116 (44.62%) were counseled once, 123 (46.92%) twice, and 22 (8.46%) four or more times. 297 (52.75%) women reported giving birth in a

Table 1 Socio-demographic characteristics of the interviewed women, Arsi and East Shoa, 2022

Variables	Frequency (*N* = 563)	Percentage (%)
Districts		
Dodota	200	35.52
Dugda	169	30.02
Ziway Dugda	194	34.46
Age		
15–25	253	44.94
26–35	289	51.33
>35	21	3.73
Woman's current marital status		
Never Married	8	1.42
Currently Married	548	97.32
Others*	7	1.24
Woman's religion		
Muslim	370	65.72
Catholic	7	1.24
Protestant	40	7.10
Orthodox	105	18.65
Others	41	7.28
Woman's Ethnicity		
Oromo	558	99.11
Others**	5	0.89
Woman's Residence		
Rural	453	80.46
Urban	110	19.54
Woman's Education level		
Cannot read and write	103	18.29
Can read and write	44	7.82
Primary education	347	61.63
Secondary and above	69	12.26
Husband's education level		
Cannot read and write	42	7.46
Can read and write	26	4.62
Primary education	345	61.28
Secondary and above	150	26.64
Household sources of income		
Farming	458	81.35
Trade	59	10.48
Employed in Government or Private	32	5.68
Other	14	2.49

*(widowed = 5, divorced = 1, separated = 1)

** (Amhara = 2, silte = 3)

health facility, and 121 (40.74%) of them got HTSP counseling. A total of 242 women (42.98%) reported receiving PNC for a prior birth, of which 153 (63.22%) received HTSP counseling (Table 3).

Inter-pregnancy interval

Out of the 563 women who were interviewed, 159 (28.20%) had an inter-pregnancy interval of less than 24 months (95% CI: 24.48-31.92%).

Factors associated with short inter-pregnancy interval

After adjusting for a number of factors in multiple logistic regression analysis, women's educational level, their perception that low contraceptive use contributes to the higher SIPI, and their belief that SIPI can impact small for gestational ages and birth defects were found to be significantly associated with a short inter-pregnancy interval (Table 4).

Table 2 Women's knowledge about the right healthy timing and spacing of pregnancies (HTSP), Arsi and East Shoa, 2022

Variables	Frequency (*N* = 563)	Proportion (%)
Whether they know the right HTSP		
Yes	474	84.19
No	89	15.81
Women's knowledge about the right IPI in months(*N* = 474)		
<12 months	29	5.15
12–23 months	207	36.77
≥ 24 months	238	42.27
SIPI can impact maternal health problem		
Yes	521	92.54
No	33	5.86
Don't know	9	1.60
SIPI can impact preterm birth		
Yes	405	71.94
No	60	10.66
Don't know	98	17.41
SIPI can impact low birth weight		
Yes	505	89.70
No	36	6.39
Don't know	22	3.91
SIPI can impact small for gestational age		
Yes	462	82.06
No	44	7.82
Don't know	57	10.12
SIPI can impact birth defect		
Yes	267	47.42
No	116	20.60
Don't know	180	31.97
Low use of contraception contributes to the high level of short IPI		
Yes	482	85.61
No	81	14.39

Discussion

This study was carried out to ascertain the inter-pregnancy interval and the factors that are linked with it among reproductive-age women in the adjoining lowland ecologies of Arsi and East Shoa Zones, Southeast Ethiopia.

In our study, 28.20% of women (95% CI: 24.48–31.92%) had a short inter-pregnancy period. This demonstrates that over a quarter of the study area's women are becoming pregnant again within less than 24 months of their prior childbirth. The magnitude of SIPI found in our study is higher than the 6% reported by the 2019 Ethiopian Demographic and Health Survey ([28], the 23.3% found in a study conducted in northern Ethiopia ([9], and the 17.1% reported by a study carried out in Brazil ([29]. Our result, on the other hand, is much lower than those of other studies from Ethiopia, which revealed SIPIs of 40.9%, 43.4%, 46%, and 46.9%, respectively ([8, 30–32]. A study in Uganda also reported a SIPI of 52.4% ([33]. There are a number of possible reasons for these discrepancies. The studies from northern Ethiopia that we compared with our result reported a higher rate of SIPI, indicating a higher rate of SIPI in the area. The other study we compared with our findings was carried out in Ethiopia's developing regions (Afar, Somali, Gambella, and Benishangul-Gumuz), where it is well known that the SIPI rate is high ([23]. The systematic review and meta-analysis study that reported the highest SIPI rate, which we used for comparisons, included studies conducted before 10 years, which can be a possible reason for variation.

Our study demonstrated that women's educational level was associated with a short inter-pregnancy interval. In comparison to women who didn't have formal education, those who completed primary education had a 46% lower chance of having a short inter-pregnancy interval (aOR = 0.54; 95% CI: 0.30–0.79). This result is consistent with findings reported in other studies conducted in Ethiopia ([10, 28, 31, 34–36], Pakistan [37], and Brazil ([29]. The possible explanation could be that women who have already attained some level of education may be able to receive and make use of the proper

Table 3 Utilization of Basic Maternal Health Services and receipt of HTSP Counseling during previous pregnancy, Arsi and East Shoa, 2022

Variables	Frequency (*N* = 563)	Proportion (%)
Availability of antenatal care services in woman's village		
Yes	549	97.51
No	14	2.49
Availability of a health facility near to woman's home(≦ 1 h walking distance)		
Yes	495	87.92
No	68	12.08
Woman received ANC during her previous pregnancy		
Yes	528	93.78
No	35	6.22
Frequency of the received ANC		
Once	27	5.11
Two –three times	365	69.13
Four & above times	136	25.76
Woman gave birth in a health facility for her previous birth		
Yes	297	52.75
No	266	47.25
Woman received PNC for her previous pregnancy		
Yes	242	42.98
No	321	57.02
Woman counseled about HTSP during the ANC of her previous pregnancy		
Yes	260	49.24
No	268	50.76
Frequency of the received counseling about HTSP during ANC visits		
Once	116	44.62
Two –three times	122	46.92
Four & above times	22	8.46
Woman counseled about HTSP during the delivery of her previous pregnancy		
Yes	121	40.74
No	176	59.26
Woman counseled about HTSP during the PNC of her previous pregnancy/child		
Yes	153	63.22
No	89	36.78

information regarding the advised inter-pregnancy interval from sources that are available. This has been illustrated by studies in Peru and India. According to a study conducted in Peru, increasing women's education was found to reduce the likelihood of short birth intervals and unintended pregnancies, possibly as a result of changes in women's cognitive abilities, financial resources, and autonomy ([38]. The National Family Health Survey (NFHS) in India revealed a clear impact of increasing levels of women's education (higher and primary level education) on the utilization of maternal health care, including family planning ([39].

In this study, the odds of having a short inter-pregnancy interval was 67% lower among women who thought that low contraceptive use was a contributing factor in the increased short inter-pregnancy interval than among women who didn't think that way (aOR = 0.33, 95% CI: 0.16–0.68). Similar findings were reported by other studies conducted in Ethiopia ([8, 9, 32, 34] and Uganda ([33]. This is expected, as women who have good family planning literacy are likely to use contraceptives and have an adequate inter-pregnancy interval. This reinforces Ethiopia's National Guideline for Family Planning Services' emphasis on raising knowledge about family planning ([40].

In our study, short inter-pregnancy intervals were found to have a statistically significant association with women's beliefs that such intervals can impact adverse neonatal health outcomes. Women who believed that a short inter-pregnancy interval could impact small gestational ages were 43% less likely to have a short inter-pregnancy interval than women who believed that it had no effect on small gestational ages (aOR = 0.57, 95% CI: 0.32–0.94). Similarly, women who thought a short inter-pregnancy interval would affect birth defects were 37% less likely to have a short inter-pregnancy interval than

Table 4 Factors associated with short inter-pregnancy interval, Arsi and East Shoa, 2022

Variables	Inter-pregnancy Interval		cOR(95% CI)	ajOR (95% CI)	*P*-Value
	< 24 months	≥24 months			
Age					
15–25	68	185	0.89(0.61–1.28)	0.97(0.61–1.53)	0.89
>25	91	219	1.00	1.00	
Residence					
Rural	131	322	1.19(0.74–1.92)	1.70(0.95–3.05)	0.07
Urban	28	82	1.00	1.00	
Religion					
Muslim	97	273	0.86(0.42–1.75)	1.01(0.43–2.35)	0.99
Christian	50	102	1.19(0.56–1.52)	1.33(0.58–3.02)	0.50
Other	12	29	1.00	1.00	
Women's Education level					
Secondary & above	27	42	1.41(0.78–2.56)	0.60(0.29–1.22)	0.16
Primary education (1–8)	86	261	0.72(0.47–1.11)	0.54(0.30–0.79)	0.04*
No formal education	46	101	1.00	1.00	
Husband's Education level					
Secondary & above	45	105	0.69(0.38–1.26)	1.82(0.88–3.73)	0.11
Primary education (1–8)	88	257	0.55(0.32–0.96)	0.82(0.51–1.34)	0.43
No formal education	26	42	1.00	1.00	
Low use of contraception contributes to the higher SIPI					
yes	149	333	0.32(0.16–0.63)	0.33(0.16–0.68)	0.01*
no	10	71	1.00	1.00	
Received ANC during the previous pregnancy					
yes	147	381	0.74(0.36–1.52)	0.74(0.32–1.69)	0.47
no	12	23	1.00	1.00	
Facility birth for the previous pregnancy					
yes	83	214	0.97(0.67–1.40)	0.84(0.48–1.49)	0.56
no	76	190	1.00	1.00	
Received PNC during the previous pregnancy					
yes	73	169	1.180.82–1.71)	0.88(0.45–1.72)	0.71
no	86	235	1.00	1.00	
Counseling about HTSP during ANC					
yes	79	181	1.22(0.84–1.76)	1.35(0.85–2.16)	0.20
no	80	223	1.00	1.00	
Counseling about HTSP during Delivery					
yes	34	87	0.99(0.63–1.55)	0.89(0.49–1.63)	0.71
no	125	317	1.00	1.00	
Counseling about HTSP during PNC					
yes	50	103	1.34(0.89–1.01)	1.56(0.79–3.09)	0.20
no	109	301	1.00	1.00	
Women perceive that SIPI can impact adverse maternal health outcome					
yes	147	374	0.98(0.49–1.97)	1.22(0.53–2.79)	0.64
no	12	30	1.00	1.00	
Women perceive that SIPI can impact preterm birth					
yes	112	293	0.90(0.60–1.35)	0.84(0.53–1.35)	0.48
no	47	111	1.00	1.00	
Women perceive that SIPI can impact low birth weight					
yes	145	360	1.27(0.67–2.38)	1.37(0.64–2.93)	0.422
no	14	44	1.00	1.00	
Women perceive that SIPI can impact small for gestational age					
yes	125	337	0.73(0.46–1.16)	0.57(0.32–0.94)	0.04*
no	34	67	1.00	1.00	

Table 4 (continued)

Variables	Inter-pregnancy Interval		cOR(95% CI)	ajOR (95% CI)	*P*-Value
	< 24 months	≧24 months			
Women perceive that SIPI can impact birth defect					
yes	65	202	0.69(0.48-1.00)	0.63(0.40–0.96)	0.04*
no	94	202	1.00	1.00	
Preceding child sex					
Male	94	227	1.13(0.78–1.64)	1.18(0.80–1.76)	0.40
Female	65	177	1.00	1.00	
Total alive children in the family					
one	25	61	1.09(0.62–1.94)	1.23(0.66–2.31)	0.51
two	33	97	0.91(0.55–1.52)	1.18(0.67–2.11)	0.57
three	51	112	1.22(0.77–1.94)	1.17(0.70–1.95)	0.55
four & above	50	134	1.00	1.00	

*statistically significant at *P* value < 0.05

their counterparts who thought it had no influence on birth defects (aOR = 0.63, 95% CI: 0.40–0.96). We can observe that the opinion of women in this regard is quite correct because research undertaken in the past in many regions of the world has clearly shown a link between a short inter-pregnancy interval and adverse neonatal outcomes ([41–45].

In our study, there are some drawbacks worth mentioning. Some of the information relied on the past memories of the study participants, which could lead to recall biases. We obtained data through the self-report of the interviewed women. As a result, the data accuracy might not be at a level that can be obtained objectively. Some of information might perhaps be a little too personal for the women who were interviewed, resulting in social desirability bias. Nevertheless, women were given thorough instructions about the value of giving accurate information by explaining the purpose of the study and also assuring privacy, anonymity, and confidentiality. The inevitable limitation of a cross-sectional study design is also present in our study, which limits us from establishing cause-and-effect relationships between the considered variables. We conducted a community-based study, which has certain advantages over facility-based studies and might be considered strength.

Conclusion and recommendations

The proportion of short inter-pregnancy intervals (28%), which we looked at among the study's women participants, is quite high. Women with better educational status, those who had better contraception literacy, and who knew about the adverse maternal and perinatal health impact of SIPI were more likely to follow the HTSP recommendation. Therefore, the Ministry of Health and Oromia Regional Health Bureau should reinforce routine awareness creation on the optimal IPI, and its impact on maternal and perinatal health, and improve PPFP literacy at the community level and throughout the continuum of care (ANC, childbirth, PNC, and child immunization). The district health offices, healthcare facilities, and health extension workers ought to regularly work to raise public awareness of the recommended IPI and increase PPFP.

Abbreviations

ANC	Antenatal care
AOR	Adjusted odds ratio
CI	Confidence interval
FMOH	Federal ministry of health
FP	Family planning
HEW	Health extension workers
HTSP	Healthy timing and spacing of pregnancy
IPI	Inter-pregnancy interval
MNCH	Maternal, newborn and child health
OR	Odds ratio
PNC	Postnatal care
PPFP	Postpartum family planning
SIPI	Short inter-pregnancy interval
SPSS	Statistical package for social sciences
SVD	Spontaneous vaginal delivery
WHO	World health organization

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Author contributions

GHJ, JS, RB, and TYS conceptualized the study. All authors contributed to the methodology of the study. GHJ oversee the data collection. GHJ conducted the analysis and wrote the first draft of the manuscript. All authors reviewed and edited the manuscript. JS, RB, and TYS supervised the entire manuscript-writing process. All authors read and approved the final.

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Data availability

Data sets supporting the presented findings were incorporated into the manuscript and are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The Arsi University College of Health Science Institutional Review Boards (IRB) granted ethical approval for the study with the project protocol number A/HSC/RC/68/2022 and the ethical clearance reference number A/U/H/S/C/120/12450/14, written on June 28, 2022. Supportive letters was obtained from the college. Before data collection, women were informed about the purpose of the study, the right to refuse participation and discontinue the interview. The interviewers discussed the issue of confidentiality and obtained verbal consent from all selected women before interview started.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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