



## Research article

# Peri-conception folic acid supplementation knowledge and associated factors among women visiting Maternal and Child Health clinics in Addis Ababa, Ethiopia

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## ABSTRACT

**Background:** Peri-conception care plays an essential and vital role for the health of the mother, her child and her family. Taking folic acid orally prior to conception and during the early stages of pregnancy plays a significant role in preventing Neural Tube Defects and has been associated with preventing other folic acid sensitive congenital anomalies. There exists problem in different parts of the globe on women's understanding of the importance of folic acid making them not to take this supplement in peri-conception period.

**Objective:** This study aimed at assessing the knowledge of peri-conception folic acid supplementation among women visiting Maternal and Child Health clinics of public health facilities in Addis Ababa, Ethiopia.

**Methods:** Institution based cross-sectional study was conducted from May 15 to June 20/2020 among 226 women visiting Maternal and Child Health clinics of health centers in Addis Ababa. Consecutive sampling technique was used to select study participants. Data were collected through interviewer administered structured questionnaire and analyzed using Statistical Package for Social Sciences version 24. Tables, charts and graphs were used for data presentation. Multivariable logistic regression analysis was done to identify the independent predictors of women's knowledge of folic acid at p-value  $\leq 0.05$ .

**Results:** More than two-third of the study participants, 156 (69.0%) had good knowledge on peri-conception folic acid supplementation and its health benefits. Participants with age 25–30 years were 2.14 times more likely to have good knowledge compared to those aged less than 25 years while women with age greater than 30 years were 5.20 times more likely to have good knowledge compared to those with age less than 25 years. Women who had attended high school were 2.93 times more likely to have good knowledge compared to those with no formal education. Likewise, women who had attended college and above were 4.18 times at odd of having good knowledge on periconception folic acid supplementation compared to those with no formal education. Women who had information on prenatal care were 1.48 times more likely to have good knowledge compared to those who never had no information.

**Conclusion:** Folic acid supplementation knowledge in more than two third of the study participants was good. Participants' age, educational status and information on prenatal care were the independent predictors of knowledge on folic acid supplementation. The Ministry of health, Addis Ababa city health bureau, the study facilities' management as well as Non-Governmental Organizations working on health in the city should focus on means to increase knowledge of peri-conception folic acid health benefits for women with poor knowledge on the same.

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## 1. Introduction

Maternal nutrition during pregnancy has been shown to play a critical role in fetal growth [1]. Developing organ systems directly respond with permanent adaptations to the availability of nutrients during critical periods of rapid development. Hence, timing of adequate maternal nutrition is important in determining the outcomes both in the fetus and the child [2].

Women in developing countries account for 95% of anemic pregnancies in the world [3]. High folate prior to conception has the most consistent evidence supporting an association with lower risk of pregnancy loss [4].

Folic acid (FA), the synthetic form of folate, also known as vitamin B9, is a water-soluble B vitamin (B9). Most women do not receive the recommended daily intake of folate from diet alone [5]. Maternal use of FA supplements before and in early pregnancy can prevent a child from having a neural tube defect (NTD) [6]. Many studies have reported that lack of knowledge of the importance of FA for optimal pregnancy outcomes were associated with not taking peri-conception FA supplements [7].

WHO recommends all pregnant women to take daily supplement containing 60 mg of elemental iron along with 400 µg FA supplement for 6 months (with extra 3 months supplementation post-partum in areas with high anemia prevalence) and women with a history of birth to a child with a neural tube defect should be informed about the risk of recurrence, and be advised that the intake of FA before and during pregnancy has a protective effect and thus should take high dose supplementation (5 mg folic acid daily). They should also be advised to increase their dietary folate [8, 9].

United States (US) National Health and Nutrition Examination Survey data from 2003 to 2006 revealed that 75% of non-pregnant women aged 15–44 years do not consume the recommended daily intake of FA for preventing NTDs [10] and the role in other pregnancy outcomes such as miscarriage, recurrent miscarriage, low birth weight, preterm birth (PTB), preeclampsia, abruption placentae, and stillbirth has been investigated [11].

The need for FA increases dramatically during pregnancy as new cells and DNA are forming and this product cannot be significantly stored in the body [12]. The most common cause of folate deficiency is a low daily intake due to lack of ingestion of folate containing food, chronic alcoholism or total parenteral nutrition [5, 13].

Hungarian randomized controlled trial revealed that peri-conception multi-vitamin supplementation containing FA (0.8 mg) showed a significant reduction in the first occurrence of NTDs [14]. The relationship between FA supplementation during the peri-conception period and the reduction of NTDs are well established. Taking FA orally prior to conception and during the early stages of pregnancy plays a significant role in preventing NTDs and has been associated with preventing other FA sensitive congenital anomalies [15, 16, 17, 18, 19, 20]. The US Public Health Service and the Food and Nutrition Board of the Institute of Medicine stated that National folate deficiency in pregnant women is a recognized cause of spinal bifida [21].

Despite the proven benefit of folate supplementation in reducing the occurrence of NTDs by as much as 70%, its prevalence, especially in developing nations, is still high and appear to be increasing [7, 15, 22]. In contrary, studies in some countries showed there is decline in the prevalence of spinal bifida because of FA fortification of grain supplies though the temporal relationship between fortification and the prevalence of anencephaly is unclear [20]. The changing epidemiological pattern may be the result of improving awareness of the need to seek health care by people in developing economies as well as a shift from the hitherto belief in witchcraft as a cause of diseases to the globally accepted causation of diseases. The non-usage, delayed usage or low usage of folic acid among African women may reflect the overall poor knowledge of this group about health issues [11, 20, 21, 22, 23, 24, 25].

Preconception FA use prior to neural tube closure continues to be low, exhibiting both social and ethnic disparities [18, 26, 27, 28].

Folate deficiency is widespread in Ethiopian women, indicating the need for sustainable folate intake through dietary diversification and appropriate public health measures [29, 30]. Health facilities in the country are currently providing this product with iron free of charge to pregnant women as per the country's guideline and other supportive studies for the control and prevention of micronutrient deficiencies even though user's adherence to the supplement is questionable [31, 32, 33]. A recent cohort study done in three teaching hospitals in Addis Ababa showed that, out of 115 cases that were medically terminated after 12 weeks of gestation, fifty-six (48.7%) were due to NTDs associated with folate deficiency. Women's understanding of pre and in pregnancy folic acid benefit was also low [34]. No study was undertaken in Addis Ababa on FA supplementation knowledge among women visiting MCH clinics to the time this study was undertaken and therefore this study aimed at assessing knowledge on peri-conception FA supplementation and associated factors among women visiting MCH Clinics at public health facilities in Addis Ababa, Ethiopia. The study is believed to show the gap on women's understanding of the importance of folic acid supplementation in peri-conception period in the study settings and in recommending all concerned to work towards filling this knowledge gap.

## 2. Methods

### 2.1. Study area and period

The study was carried out in health centers of Yeka sub-city, Addis Ababa from May 15 to June 20/2020. The sub-city is located in the Northeast part of Addis Ababa. It has a total of 15 health centers, two private and two public hospitals and 223 different level clinics. There were 1651 health professionals in public sectors providing care for around 450, 000 population as per 2020 sub city health department report. A total of 10,324 women were on MCH follow up in health centers of the sub-city at the time this study was done.

### 2.2. Study design

Facility based cross sectional study design was employed.

### 2.3. Population

#### 2.3.1. Source population

All women attending MCH clinics in health centers of Yeka sub city, Addis Ababa (10324 women).

#### 2.3.2. Study population

Women attending MCH clinics of the health centers during data collection period and fulfilled inclusion criteria.

### 2.4. Eligibility criteria

#### 2.4.1. Inclusion criteria

Women attending MCH clinics during the data collection period and willing to participate in the study.

#### 2.4.2. Exclusion criterion

Age less than 15 years old (Because the lower boundary of World Health Organization's reproductive age category is 15 years).

Women with documented psychiatric disorder and speaking difficulty.

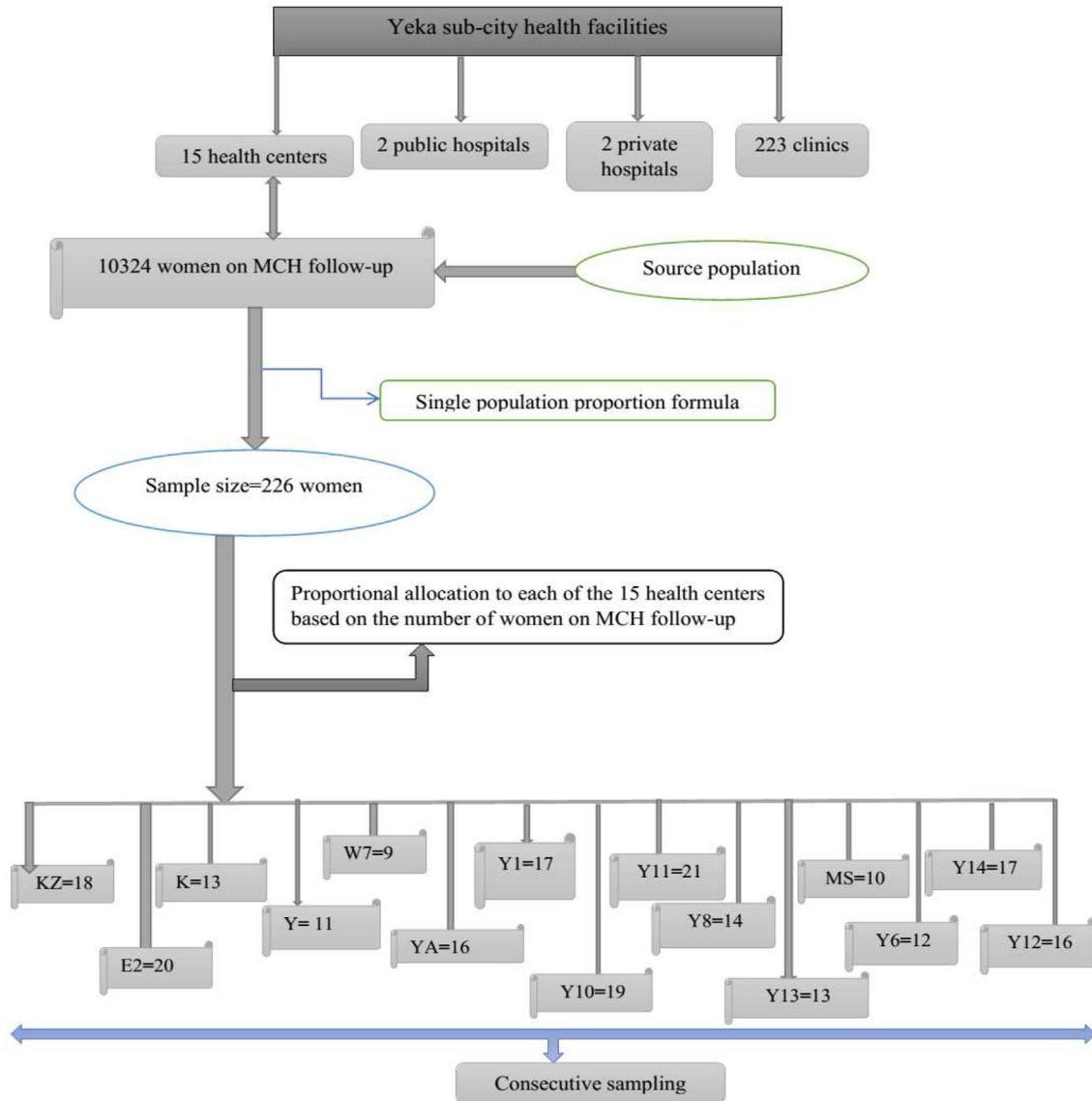
### 2.5. Sample size determination and sampling procedure

The sample size was calculated using a single-population proportion formula set by Lwanga and Lemeshow [35]:

$$n = \left[ \left( \frac{z_{(\alpha/2)}}{d} \right)^2 \frac{P(1-P)}{d^2} \right] \tag{1}$$

where  $z_{(\alpha/2)}$  = 95% confidence level (1.96),  $p$  = proportion of women with good knowledge on peri-conception FA supplementation in other area (i.e., Adet town, West Gojam Zone, Northwest Ethiopia with value

10.5%) [36] and marginal error of 4%. The sample size was then calculated to be  $\left[ \frac{(1.96)^2 * 0.105 * (1-0.105)}{(0.04)^2} \right] = 226$ . The total number of participants to be selected from each of the 15 health centers was determined based on proportionate to patient load. Consecutive sampling was used in interviewing the women at each health center



- KZ= Korea Zemachoch health center
- E2=Entoto Kutir 2 health center
- K= Kotebe health center
- Y=Yeka health center
- W7=Woreda 7 health center
- YA=Yeka Abado health center
- Y6= Yeka Woreda 6 health center
- Y14= Yeka Woreda 14 health center

- Y1=Yeka woreda 1 health center
- Y10=Yeka Woreda 10 health center
- Y11= Yeka Woreda 11 health center
- Y8= Yeka Woreda 8 health center
- Y13= Yeka Woreda 13 health center
- MS= Migbare Senay health center
- Y12= Yeka Woreda 12 health center

Figure 1. Sampling procedure of women visiting MCH clinics at public health facilities in Addis Ababa, Ethiopia, 2020.

(Figure 1). Care was taken not to reinterview women who participated in the study previously but revisit health facility in the data collection period.

2.6. Variables

Dependent Variable was knowledge while the independent variables included socio demographic features (age, religion, education, occupation of the husband, occupation of the women), types of pregnancy (planned/unplanned), gestational characteristics (gravidity, parity and trimester), contraceptive use history, information on prenatal care and co-morbid medical conditions.

2.7. Data collection method and instrument

Questionnaire consisting socio-demographic features, reproductive characteristics, and questions related to peri-conception care, gravidity, parity and history of unsuccessful parity, peri-conception FA supplementation knowledge, source of information on FA, history of contraceptive use, critical timing on FA use, and history of FA use was developed based on published material [36]. Questions that assessed knowledge on peri-conception FA supplementation were related to need for FA, information about FA, when to take FA, ability to physically identify the FA tablet, number of FA tablets to take per day, knowledge that FA is beneficial in the periconception period, FA protection against congenital disease and critical timing of FA intake. These knowledge questions composed 26 yes/no items. Knowledge about FA supplementation was measured by asking these 26 questions; the right (coded 0 for no and 1 for yes) responses were scored for each question and mean score was calculated. This mean score was used to classify participants' knowledge as poor or good. The data collection was undertaken through face-to-face exit interview by five diploma nurses under the supervision of principal investigator. The interview was undertaken in the morning session in all facilities (with 8 planned interviews per day) in a place far from sight.

2.8. Data analysis procedure

First, the collected data were checked for completeness, coded, entered into Epi-data version 3.1 and then taken to SPSS version 24 for analysis. Descriptive summary of different variables were presented in terms of frequency and percentage by using tables, charts and graphs. Binary logistic regression analysis was done at 95% confidence interval to examine the association of knowledge on FA supplementation with selected socio-demographic and obstetric characteristics. First bivariate logistic regression analysis was conducted to select variables for multivariable logistic regression at a p-value less than 0.25. Then multivariable logistic regression analysis was done to identify the independent predictors of women's knowledge of FA. Variables with a p-value ≤ 0.05 in the multivariable logistic regression were considered statistically significant predictors of FA knowledge. Multicoliniarity test (Variance Inflation Factor, VIF) was also done to check the correlation of the independent variables and none of the variables showed multicoliniarity symptom (VIF values for all independent variables were closer to 1).

2.9. Data quality control

The questionnaire was initially prepared in English and translated to Amharic and back translated to English to confirm message consistency. The tool was pretested on 23 women (10% of the sample) in 2 public health centers outside the study area to ensure its validity and to standardize it. The questionnaire and procedures were revised in light of the pretest made before beginning the actual data collection. The collected data were checked daily for completeness and data quality by principal investigator.

3. Operational definition

**Good knowledge:** A woman was considered as having good knowledge if she answered mean and above the mean score on 26 individual closed ended questions.

**Poor knowledge:** A women was considered as having poor knowledge if she answered below the mean score on 26 individual closed ended questions.

3.1. Ethical consideration

Ethical clearance was obtained from the Institutional Review Board of Rift Valley University Abichu Campus, Addis Ababa. Ethical clearance of the study was granted by official cooperation letter sent to the health facilities from the sub city's health department. Permission was also obtained from the directors of each health center before beginning the study. Written consent was obtained from all study participants after explaining the purpose of the study (as per Helsinki Declaration of 1975, as revised in 2013). Involvement in the study was fully voluntary, and the right to leave the interview was also granted. Confidentiality of the information was ensured throughout the study.

4. Results

4.1. Socio-demographic characteristics

This study was carried out among 226 women visiting MCH clinic. Almost all of the participants 224 (99.1%) were from urban area (Addis Ababa). Most of the participants were Orthodox, 173 (76.5%) Christians followed by Muslims, 34 (15.0%) in religion. The Mean age of the participants was 27.15 ± 4.73 years (range = 18–40 years). Approximately two third of the respondents were married, 155 (68.6%). Regarding occupation, house-wife accounted for 83 (36.7%) followed by government employee,

**Table 1.** Socio-demographic characteristics of women visiting MCH clinics at public health facilities in Addis Ababa, Ethiopia, 2020.

Variable	Category	Frequency (N)	Percent (%)
Age (in years)	<25	61	27.0
	25–30	95	42.0
	31 and above	70	31.0
	No formal Education	64	28.3
Educational status	Primary School	21	9.3
	Secondary School	34	15.0
	College and above	107	47.3
	House Wife	83	36.7
	Merchant	15	6.6
Respondents' Occupation	Government employee	67	29.6
	Student	4	1.8
	Daily worker	17	7.5
	Private employee	40	17.7
	Farmer	2	0.9
	Government Employee	49	21.7
	Merchant	53	23.5
Occupation of the husband	Daily laborer	8	3.5
	Private Employee	43	19.0
	Driver (public + private vehicle)	45	19.9
	Student	26	11.5
	Orthodox	173	76.5
	Muslim	34	15.0
	Protestant	16	7.1
Religion	Catholic	3	1.3

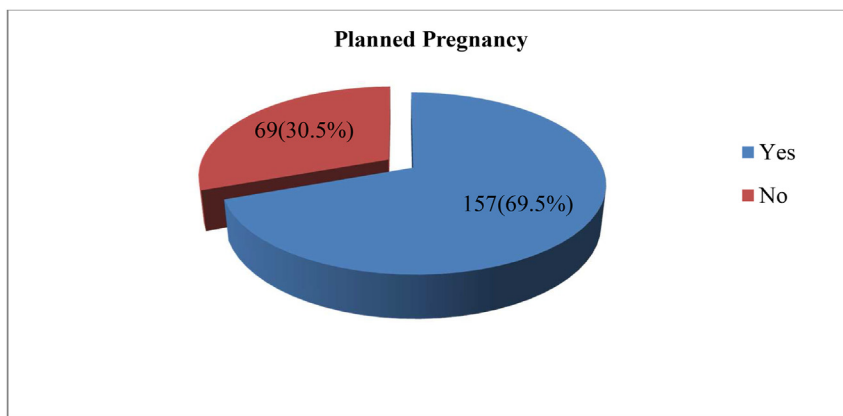


Figure 2. Pregnancy category among women visiting MCH clinics at Public Health Facilities in Addis Ababa, Ethiopia, 2020.

67 (29.6%). The most common occupation of corresponding husbands was merchant, 53 (23.5%). Nearly half of the respondents attended college and above, 107 (47.3%) while more than a quarter of the respondents, 64 (28.3%) had no formal education (Table 1).

Among study participants 118 (52.2%) had pregnancy before. The mean gravidity of the respondents was  $1.88 \pm 0.997$  (ranged from 2 through 7) while the mean family size was  $2.69 \pm 1.10$  with range from 1 to 7 members. Mean gestational age was  $19.28 \pm 8.14$  weeks (ranged from 1 to 41 weeks). More than half of the women were in second trimester. The women had mean  $0.69 \pm 0.911$  children.

Out of 118 women who had previous pregnancies, 84 (71.2%) had history of ANC visit (mean visit  $4.56 \pm 1.33$  times). Two thirds of the respondents 157 (69.5%) had a planned pregnancy (Figure 2).

4.2. Peri-conception care and knowledge on FA supplementation

Majority of the respondents, 191 (84.5%) had heard about the need for peri-conception care (Figure 3) and the main source of information for the same were health professionals, 176 (41.5%) while the least information source was school/college/university, 21 (5.0%). Forty women (17.7%) had chronic illness follow up of which nearly half, 19 (45.2%) were HIV/AIDS patients.

Nearly three fourth of the respondents, 166 (73.5%) have heard about FA and able to physically identify the tablet (Figure 4).

Among women who have heard about FA and its benefits (n = 166), 84.9% knew that FA should be taken at the time they become pregnant while 25.3% understand the need to take it right after stopping contraceptive when pregnancy is planned (Table 2).

More than two third of the women, 156 (69.0%) had good knowledge on peri-conception FA supplementation health benefits (Figure 5).

4.3. Factors associated with participants' folic acid supplementation knowledge

Types of pregnancy, contraceptive use history and co-morbid medical conditions showed p-value above 0.25 in bivariate analysis and therefore excluded from the multivariable logistic regression (Table 3).

The multivariable logistic regression analysis indicated that participants' age, educational status and Information on prenatal care (PNC) had significant association with folic acid supplementation knowledge. Participants with age 25–30 years were 2.14 times more likely to have good knowledge compared to those aged less than 25 years (AOR = 2.14, 95% CI = 1.05–4.36, p = 0.037) while women with age greater than 30 years were 5.20 times more likely to have good knowledge compared to

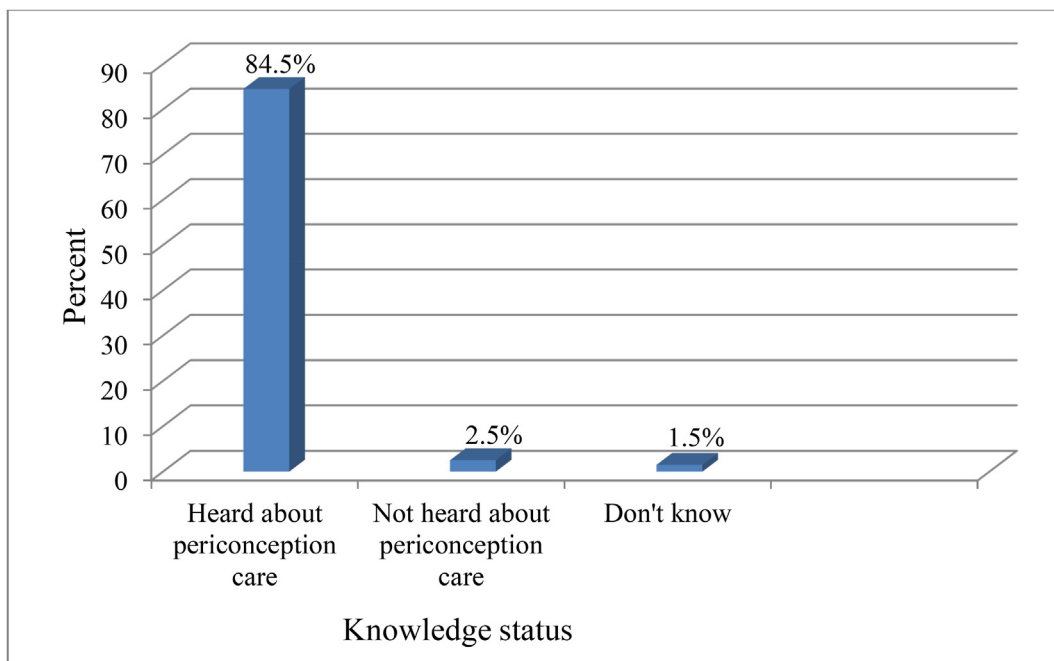


Figure 3. Knowledge on Peri-conception care among women visiting MCH clinics at Public Health Facilities in Addis Ababa, Ethiopia, 2020.



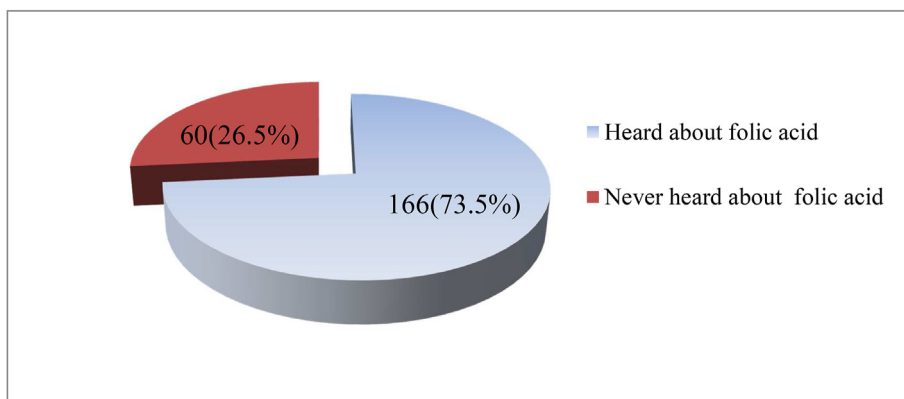


Figure 4. Information about FA among women visiting MCH clinics at public health facilities in Addis Ababa, Ethiopia, 2020.

Table 2. Knowledge on critical timing of FA supplementation among women visiting MCH clinics at public health facilities in Addis Ababa, Ethiopia, 2020 (N = 166).

*Critical timing in FA supplementation	Responses (N = 241)	Percent (%)
When thinking of becoming pregnant	58	34.9
When stopped using contraception and planned to become pregnant (if any)	42	25.3
At the time you become pregnant	141	84.9

\* Multiple responses possible.

those with age less than 25 years (AOR = 5.20, 95% CI = 1.82–14.87,  $p = 0.002$ ). Women who had attended high school were 2.93 times more likely to have good knowledge compared to those with no formal education (AOR = 2.93, 95% CI = 1.08–7.92,  $p = 0.035$ ). Likewise, women who had attended college and above were 4.18 times at odd of having good knowledge on preconception FA supplementation compared to those with no formal education (AOR = 4.18, 95% CI = 1.85–4.91,  $p = 0.001$ ). Women who had information on PNC were 1.48 times more likely to have good knowledge compared to those who had no information (AOR = 1.48, 95% CI = 1.31–5.75,  $p = 0.003$ ) (Table 4).

### 5. Discussion

The current study revealed that majority of the women 191 (84.5%) had heard about the need for peri-conception care including folic acid and the main source of information for the same was health professionals, 176 (41.5%) unlike a study conducted in Thailand and Northwest Ethiopia where media was found to be the most common

information source on FA supplementation [36, 37]. The higher stuck of health professionals in the city compared to the other area and the likely increase in health care seeking behavior of the pregnant women from the health care professionals compared to hearing from the media might be reasons for the disparity observed in this study [38, 39].

One hundred and sixty six (73.5%) of the women have heard about FA and able to physically identify the tablet while two third, 150 (66.4%) of the women knew how many tablets to take per day. This is almost similar to a study done in West Australia where 62% of the respondents knew how many tablets to take per day [24]. Similarly, 161 (71.2%) of the participants stated that they knew the benefit of FA just in line with a study done Canada (66%) [13]. Among women who claimed to know the benefits of FA almost all stated that FA protect against anemia, followed by autism and Spinal Bifida while very small proportion reported that FA prevents thrombotic related events.

As the knowledge of a woman on preconception FA is measured by the critical timing of FA, women were asked when they thought FA should be taken. Accordingly, more than half, 141 (62.4%) answered FA should be taken after they knew that they are pregnant similar to a study from low and middle income countries [40]. This finding indicates significant proportion of the women had knowledge gap on the critical timing of FA supplementation and therefore much work is required to improve women’s knowledge on this issue.

Although 69.5% of the pregnancies were planned among the women, only 58 (34.9%) stated that they have taken FA consistently during the protective period (four weeks before conception and four weeks after conception) to prevent NTDs and other abnormalities. This result is slightly higher than a study from Lebanon (33.6%) [41] but lower than the finding from Shaanxii, China (50.2%) [42]. This disparity might be

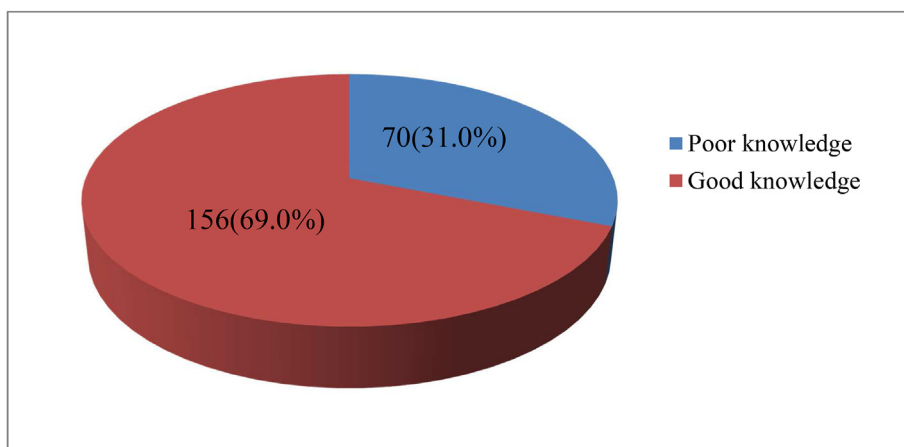


Figure 5. Knowledge on peri-conception FA supplementation among women visiting MCH clinics at public Health Facilities in Addis Ababa, Ethiopia, 2020.

**Table 3.** Bivariate analysis result for women's knowledge on peri-conception FA supplementation in MCH clinics at public health facilities in Addis Ababa, Ethiopia, 2020.

Variable	Category	Knowledge		Beta ( $\beta$ )	Standard Error (S.E.)	COR (95% CI)	P-value
		Good	Poor				
Age (in years)	<25	28 (45.9%)	33 (54.1%)			1	
	25–30	70 (73.7%)	25 (26.3%)	1.15	0.33	3.16 [1.65–6.05]	0.001
	31 and above	58 (82.9%)	12 (17.1%)	2.18	0.51	8.84 [0.29–9.78]	0.000
Educational status	No formal Education	38 (59.4%)	26 (40.6%)			1	
	Primary School	15 (71.4%)	6 (28.6%)	1.29	0.55	3.65 [0.25–10.65]	0.18
	Secondary School	26 (76.5%)	8 (23.5%)	1.56	0.48	4.75 [1.86–12.12]	0.001
	College and above	89 (83.1%)	18 (16.8%)	1.98	0.36	7.23 [3.55–14.71]	0.000
Types of pregnancy	Planned	123 (78.3%)	34 (21.7%)	1.37	0.31	3.95 [2.15–7.24]	0.341
	unplanned	33 (47.8%)	36 (52.2%)			1	
Gravidity	Primigravida	54 (51.4%)	51 (48.6%)	0.057	0.19	1	0.77
	Multigravida	102 (84.3%)	19 (15.7%)	1.62	0.32	5.07 [2.72–9.44]	0.000
Trimester	First trimester	39 (67.2%)	19 (32.8%)			1	
	Second trimester	77 (63.6%)	44 (36.4%)	−0.16	0.34	0.85 [0.44–1.65]	0.637
	Third trimester	40 (85.1%)	7 (14.9%)	1.02	0.49	2.78 [1.05–7.36]	0.039
contraceptive use history	Yes	123 (75.5%)	40 (24.5%)			1	
	No	33 (52.4%)	30 (47.6%)	−1.02	0.31	0.36 [0.19–0.66]	0.321
Co-morbid medical conditions	Yes	35 (87.5%)	5 (12.5%)	1.32	0.50	3.76 [1.41–10.06]	0.281
	No	121 (65.1)	65 (34.9%)	0.62	0.15	1	0.642
Information on PNC	Yes	150 (96.2%)	6 (3.9%)	1.21	0.43	3.35 [3.16–7.06]	0.004
	No	35 (41.2%)	50 (58.8%)			1	

due to study design; the current study might have a recall bias as opposed to the comparatives which were based on randomized controlled design.

More than two third of the women, 156 (69.0%) had good knowledge on peri-conception FA supplementation health benefits and this was similar to a study done Iran (69.6%) [43] and Lebanon (66%) [41]. It also agrees with a study from Canada where 66% of the participants were reported to have good knowledge on FA effect on pregnancy [12] but far from the result of a study done in Northwest Ethiopia (15.9%) [36] and Southwest Ethiopia (21.3%) [44]. The disparity observed on the knowledge status between the current study and the comparatives might primarily be due the fact that the comparative studies were conducted on non-pregnant child bearing age women as opposed to this study which was conducted on pregnant women coming to the facilities seeking MCH services. Another contributing factor might be educational status as the participants of this study were urban residents in majority (99.8%) unlike the comparatives which involved rural communities. The health seeking

behavior between the two populations might be another factor. As there was a gap of three years between the current study and reference studies, the time factor may also play significant role because the primary health care is being expanded by Ethiopian government.

The current study revealed that participants' age, educational status and information on PNC were significantly associated with FA supplementation knowledge. Participants with higher age, education and better information were found to have better knowledge compared to their counterpart in the current study similar to reports from Jordan and Southwest Ethiopia [44, 45]. Study from Pakistan also stated that better educated women had good knowledge on FA supplementation compared to those with lower education [46]. Women who had information on PNC were at odd of having better knowledge on FA supplementation compared to those who had no information. Increased experience with age, more reading and understanding with increased education and reduced understanding gap about an issue with increased access to

**Table 4.** Predictors of women's knowledge on peri-conception FA supplementation in MCH clinics at public health facilities in Addis Ababa, Ethiopia, 2020.

Variables	Category	Knowledge		Beta ( $\beta$ )	Standard Error (S.E)	AOR (95% CI)	P-value
		Good	Poor				
Age-(in years)	Less than 25	28 (45.9%)	33 (54.1%)			1	
	25–30	70 (73.7%)	25 (26.3%)	0.76	0.47	2.14 [1.05–4.36]*	0.037
	Above 30	58 (82.9%)	12 (17.1%)	1.65	0.87	5.20 [1.82–14.87]*	0.002
Educational status	No formal education	38 (59.4%)	26 (40.6%)			1	
	Primary school	15 (71.4%)	6 (28.6%)	0.91	0.89	2.48 [0.81–7.67]	0.288
	High school	26 (76.5%)	8 (23.5%)	1.07	0.71	2.93 [1.08–7.92]*	0.035
	College and above	89 (57.1%)	18 (25.7%)	1.43	0.50	4.18 [1.85–4.91]*	0.001
Gravida	Primigravida	54 (51.4%)	51 (48.6%)			1	
	Multigravida	102 (84.3%)	19 (15.7%)	1.13	0.46	3.11 [0.27–7.62]	0.315
Trimester	First trimester	39 (67.2%)	19 (32.8%)			1	
	Second trimester	77 (63.6%)	44 (36.4%)	0.54	0.52	1.72 [0.43–1.98]	0.519
	Third trimester	40 (85.1%)	7 (14.9%)	0.76	0.76	2.13 [0.48–9.52]	0.324
Information on PNC	Yes	150 (96.15%)	6 (3.85%)	0.39	0.47	1.48 [1.31–5.75]*	0.003
	No	35 (50.00%)	50 (50.00%)			1	

\* Significant at  $p$ -value < 0.055.

information might be reasons for increase in FA supplementation knowledge in the current study.

## 6. Strength and weakness of the study

The study assessed multiple variables including participants' socio-demographic features, reproductive characteristics, and peri-conception care including FA supplementation and its knowledge as strength while difficulty of making causal inference due to the cross-sectional nature of the study design was the weakness of the study.

## 7. Conclusion

The FA supplementation knowledge in more than two third of the study participants was good. Participants' age, educational status and information on prenatal care were the independent predictors of knowledge on folic acid supplementation. Ministry of health, city health bureau, facilities' management and health professionals and other stake holders should focus on means to increase the knowledge of peri-conception FA health benefits for women with poor knowledge on the same, especially for those with younger age, lower literacy rate and women with less previous prenatal care. Media based campaign, awareness creation through customer education, leaflet and other written material distribution can be beneficial in this regard. Discussion of service providers with clients on timing of folic acid supplementation is also expected much.

## Declarations

### Author contribution statement

Mesfin Fekadu, Kassahun Ketema: Conceived and designed the experiments; Performed the experiments.

Yitagesu Mamo: Analyzed and interpreted the data; Wrote the paper.

Temesgen Aferu: Contributed reagents, materials, analysis tools or data; Wrote the paper.

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### Data availability statement

Data will be made available on request.

### Declaration of interest's statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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