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ABSTRACT

Objectives Preconception care can have a major public health impact by reducing maternal and childhood mortality and morbidity. Despite this importance, preconception care is still not implemented in majority of developing countries. Therefore, this study aimed to assess the proportion of knowledge of preconception care and its associated factors among reproductive-age women in Debre Berhan Town, Ethiopia.

Design and methods A community-based, cross-sectional study was employed from 1 March to 30 March 2019 among reproductive-age women. Data were collected via a face-to-face, interviewer-administered questionnaire. Data were entered into EpiData V.4.6 and exported to SPSS V.25 for analysis. In a multivariable logistic regression analysis, variables with $p < 0.05$ were declared statistically significant. The strength of statistical association was measured using adjusted OR (AOR) and 95% CI.

Setting and participants The study was conducted in Debre Berhan Town, Ethiopia. A total of 414 reproductive-age women were enrolled in the study.

Outcome Knowledge of preconception (good or poor).

Results Of the total 414 participants, 71 (17.1%) had good knowledge about preconception care. Women's occupation (AOR: 8.68, 95% CI 1.25 to 60.3), monthly income (AOR: 9.89, 95% CI 1.93 to 50.76), gravidity (AOR: 0.28, 95% CI 0.14 to 0.58), contraceptive use (AOR: 4.95, 95% CI 1.09 to 22.39), history of congenital abnormality (AOR: 7.53, 95% CI 2.03 to 27.96), history of neonatal death (AOR: 6.51, 95% CI 1.62 to 26.18) and time to reach a health facility (AOR: 0.37, 95% CI 0.17 to 0.79) were statistically associated with knowledge about preconception care.

Conclusions In this study area, only less than one-fifth of reproductive-age women had good knowledge of preconception care. Therefore, to improve women's knowledge about preconception care, a strong collaborative effort including several sectors should be made.

INTRODUCTION

Prepregnancy maternal health status may be a major determinant of pregnancy outcomes and risk of maternal and child complications.¹ Preconception care (PCC) is a method

Strengths and limitations of this study

- This study addresses women in the reproductive-age group and provides valuable baseline data in this area.
- The research was conducted in a community setting, allowing the findings to be generalised to a larger population.
- As a cross-sectional design was used, the study does not establish a causal relationship between the outcome variable and the predictors.

of enhancing pregnancy outcomes by optimising women's health through biomedical and behavioural improvements before conception.² PCC seeks to improve the long-term health of newborns by reducing the risk of adverse pregnancy outcomes prior to conception and during the first trimester.³

PCC refers to the aspect of healthcare that includes provision of biomedical, behavioural and social health interventions to women of reproductive age and couples before they conceive.⁴ Preconception health is about people having and remaining healthy overall across their lives and this can help any woman.⁵ Safe motherhood starts before conception and continues with proper prenatal care, resulting in the prevention and treatment of complications and ensuring safe delivery of the baby and a healthy postpartum period.⁶

Around the world, less than a third of women of childbearing age attend health facilities to speak with a healthcare provider about their health status and possible effects on pregnancy outcomes before becoming pregnant.⁷ Every year, approximately eight million women experience pregnancy-related complications, with approximately half a million dying as a result.⁸ Every year, nearly nine million children die, with four million newborn babies dying in their

first month of life.⁷ In both developed and developing countries, PCC has a major public health impact by significantly reducing maternal and childhood mortality and morbidity and improving maternal and child health.⁴

Majority of pregnancy and childbirth complications could be prevented if adequate PCC is given.⁹ Iron supplementation decreases the risk of anaemia by 27% in non-pregnant reproductive-age women. Prenatal folic acid supplementation prevents neural tube defects in 72% of cases and reduces the risk of recurrence in 68% of cases. Prenatal multivitamin supplementation reduces congenital defects by 42%–62% and pre-eclampsia by 27%.¹⁰ Preconception counselling about contraception reduces first-time teenage pregnancy by 15% and repeat adolescent pregnancy by 37%.¹¹ In addition, good blood sugar regulation before and after pregnancy decreases the risk of pre-eclampsia, fetal macrosomia, congenital malformations and stillbirth in women with diabetes.¹²

In developing countries such as Sudan, Nepal, Ethiopia and Kenya, women's knowledge of PCC is 11%,¹³ 15.4%,¹⁴ 27.5%¹⁵ and 38.3%,¹⁶ respectively. According to the findings of different studies, knowledge of PCC is affected by age, educational status, geographical location, employment status, marital status, history of use of family planning services, previous miscarriage, stillbirth or termination due to fetal abnormality, pregnancy intention, parity, gravidity, and availability and accessibility of services.^{13–19}

Despite its importance in endorsing maternal and child health, majority of women lack any awareness of how their health before conception may influence their risk of an adverse pregnancy outcome. Therefore, this study intended to assess knowledge of PCC and the associated factors among reproductive-age women.

METHODS AND MATERIALS

Study design and setting

A community-based, cross-sectional study was conducted in Debre Berhan Town from 1 March to 30 March 2019. Debre Berhan Town is located in North Shewa Zone in Amhara Region, about 130 km northeast of Ethiopia's capital city, Addis Ababa. Today the town is the administrative centre of North Shewa Zone and has nine kebeles, with a total population of 103 450, of whom 46 553 are men and 56 897 are women. The town is also equipped with one referral hospital and four health centres.

Study population and eligibility criteria

All reproductive-age women residing in Debre Berhan Town during the study period were the study population. Women of reproductive-age who have resided in Debre Berhan Town for at least 6 months were included. Women with hearing problems and were critically ill were excluded.

Sample size determination and sampling technique

Sample size was calculated using the single population proportion formula with the following assumptions: a proportion of 50% ($p=0.5$) considering no local study was done during the study period, with 95% CI at 1.96, and a margin of error.

$$n = Z\alpha/2^2 p(1-p) \bar{x}$$

After adding a 10% non-response rate, the final sample size was 422 reproductive-age women.

All kebeles of Debre Berhan Town were included and the calculated sample size was proportionally allocated to each kebele based on the total number of households within each kebele. A systematic random sampling technique was used to select allocated households. The calculated sampling interval ($K=N/n$) was 45. Therefore, the first household was selected using a simple random sampling method and consecutive households were selected at a regular interval of 45 households. If more than one eligible woman was found within the selected household, the woman who would be interviewed was chosen by lottery.

Data collection procedure and data quality control

Data were collected using a structured and pretested questionnaire through face-to-face interviews. The questionnaire was composed of four sections: sociodemographic, obstetrics and maternal health service-related characteristics, women's health status-related characteristics, and women's knowledge of PCC.^{14–17} (see online supplemental file 1). The questionnaire was first prepared in English and then translated to the local language (Amharic) for data collection and back to English to ensure clarity and consistency during translation.

Five Diploma and two Bachelor of Science holder midwives were involved in data collection and supervision, respectively. Data collectors and supervisors were trained for 1 day on the study's objective, eligibility criteria, data collection processes and ethical issues. In addition, all filled questionnaires were checked daily for completeness and consistency.

Main outcome and measure of the study

- ▶ Preconception care: any PCC intervention such as advice or treatment and lifestyle changes that a woman received prior to being pregnant.¹⁵
- ▶ Knowledge of PCC: measured using 12 questions, where participants were asked to answer 'yes' and 'no'. A value of 1 and 0 was given for each 'correct' and 'incorrect' response, respectively. The total score ranged from 0 to 12. Women who scored $\geq 50\%$ were categorised as having good knowledge of PCC and women who scored $< 50\%$ were classified as having poor knowledge.¹⁵

Data entry and analysis

Data were entered into EpiData V.4.6 and exported to SPSS V.25 for analysis. Descriptive analysis was summarised using proportion, mean and SD. Bivariate and multivariable

logistic regression analyses were employed. Variables observed in the bivariate analysis with p value <0.25 were candidates for multivariable logistic regression analysis. In the multivariable logistic regression analysis, statistical significance was declared considering a p value of <0.05 , with adjusted OR (AOR) and 95% CI.

Patient and public involvement

Neither the public nor the patients were involved in this study, including recruitment, data collection, analysis, interpretation, writing or editing of the manuscript, and dissemination of the results.

RESULTS

Sociodemographic characteristics

A total of 414 reproductive-age women participated in the study, with a response rate of 98.1%. The mean age of the participants was 28.87 years (SD ± 6.72), and majority (209, 50.5%) were between the ages of 25 and 34 years. Of the participants, 316 (76.3%) were of Amhara ethnicity and 300 (72.5%) were Orthodox religious followers. Majority (289, 69.8%) of the participants were married and 167 (40.3%) had a monthly household income of 1000–3000 Ethiopian birr (ETB). Of the total respondents, 129 (44.6%) and 147 (50.9%) husbands were government employees and had completed college and above, respectively. Majority of the participants (209, 50.5%) have a family size of less than four (table 1).

Obstetric and maternal health service-related characteristics

Majority (303, 73.2%) of the respondents had a history of pregnancy. However, one-tenth (9.9%) had a history of abortion. More than half (66.7%) and 61.4% of the respondents were multigravida and multipara, respectively. Of the women, 278 (67.1%) had a history of use of family planning services (table 2).

Women's health status

Of the total number of reproductive-age women, 63 (15.2%) had a chronic health problem, of whom 23 (36.5%) were known patients with hypertension (figure 1). Of the total number of women with chronic diseases, 33 (52.4%) had received preconception counselling. Maintaining optimal weight control (51.5%), maintaining regular exercise programme (45.5%), ceasing tobacco, alcohol and drug use (36.4%), and maximising diabetes mellitus control (30.3%) are the main areas where women received counselling.

Knowledge of PCC

Among 414 participants, 147 (35.5%) had ever heard about PCC. Healthcare providers were the main sources of information for majority (92, 62.6%) of the participants. Of the reproductive-age women in Debre Berhan Town, 71 (17.1%) had good knowledge of PCC (figure 2).

Factors associated with knowledge of PCC

In the bivariate logistic regression analysis, 13 variables were candidates for multivariable logistic regression

analysis. However, in the multivariable logistic regression analysis, only women's occupation, monthly income, gravidity, contraceptive use, history of congenital abnormality, history of neonatal death and time to reach a health facility were statistically significant with having good knowledge about PCC (table 3).

Daily labourer women were 8.7 times more likely to have good knowledge about PCC than housewives (AOR: 8.68, 95% CI 1.25 to 60.3). Accordingly, women with monthly income above 5000 ETB were 9.9 times more likely to have good knowledge about PCC than women with monthly income below 1000 ETB (AOR: 9.89, 95% CI 1.93 to 50.76). Also, women who had a history of contraceptive use were five times more likely to have good knowledge about PCC than women who had no history of contraceptive use (AOR: 4.95, 95% CI 1.09 to 22.39).

The odds of having good knowledge of PCC were 7.5 times higher among women who had a history of congenital abnormality compared with those who had no history of congenital abnormality (AOR: 7.53, 95% CI 2.029 to 27.963). In addition, women who had a history of neonatal death were 6.5 times more likely to know about PCC than women who had no history of neonatal death (AOR: 6.51, 95% CI 1.62 to 26.18).

However, multigravida women were 72% (AOR: 0.28, 95% CI 0.14 to 0.58) less likely to know about PCC than primigravida women. Also, women who lived ≥ 34 min from a nearby health facility on foot were 63% less likely to know about PCC than women who took less than 34 min (AOR: 0.37, 95% CI 0.17 to 0.79).

DISCUSSION

PCC is a key means for reducing and preventing maternal and child morbidity and mortality.¹⁷ The primary aim of this study was to look into the proportion of knowledge about PCC and its associated factors. In this study, good knowledge about PCC among reproductive-age women was found at 17.1% (95% CI 13.4 to 20.3), which is consistent with the results of studies conducted in Nepal (15.4%)¹⁴ and Hawassa (20%).¹⁷ However, our finding is higher than the studies done in India (6%)²⁰ and Sudan (11%).¹³ The variation might possibly be due to differences in study setting, sample size, study participants and the time the study was conducted.

On the contrary, the finding of this study was lower than the studies done in Iran (68.8%),²¹ Nigeria (65.3%),¹⁸ Zambia (47.4%),¹⁹ Kenya (38.3%),¹⁶ West Gojjam (27.5%)¹⁵ and Jinka Town (51.1%).²² The discrepancy might possibly be due to mainly the lack of preconception units at the health facilities in Ethiopia, as well as differences in study setting, sample size and sociodemographic characteristics. Time when the studies were conducted could also be a reason for the difference; information dissemination and community awareness strategies for PCC have improved significantly over time.

Women who were daily labourers were 8.7 times more likely to have good knowledge about PCC than women

Table 1 Distribution of study subjects by sociodemographic characteristics in Debre Berhan Town, Ethiopia, March 2019 (N=414)

Characteristics	Category	Frequency (n)	%
Age of the mother	15–24	114	27.5
	25–34	209	50.5
	35–49	91	22.0
Religion	Orthodox	300	72.5
	Protestant	62	14.9
	Muslim	29	7.0
	Catholic	23	5.6
Ethnicity	Amhara	316	76.3
	Oromo	57	13.8
	Tigray	22	5.3
	Guragie	19	4.6
Marital status	Married	289	69.8
	Single	101	24.4
	Others*	24	5.8
Educational status of women	No formal education	139	33.6
	Primary school	142	34.3
	Secondary school	73	17.6
	College and above	60	14.5
Women's occupation	Housewife	139	33.6
	Government employee	96	23.2
	Market trade vendor	80	19.3
	Student	73	17.6
	Daily labourer	26	6.3
Husband's education	No formal education	16	5.5
	Primary school	50	17.3
	Secondary school	76	26.3
	College and above	147	50.9
Husband's occupation	Government employee	129	44.6
	Merchant	102	35.3
	Daily labourer	42	14.5
	Others†	16	5.5
Monthly household income (in Ethiopian birr)	<1000	70	16.9
	1000–3000	167	40.3
	3000–5000	112	27.1
	>5000	65	15.7
Family size	<4	209	50.5
	≥4	205	49.5

*Divorced and widowed.

†Student and farmer.

who were housewives. This is supported by a study from Iran.²¹ This might be because women who were daily labourers were more likely to be exposed to different sources of PCC information. Accordingly, women who had monthly income above 5000 ETB were more likely to have good knowledge about PCC than women whose

monthly income was below 1000 ETB, and these could be women who can easily access healthcare and are more likely to be exposed to PCC through different media.

The odds of having good knowledge about PCC were higher among women who had a history of contraceptive use compared with their counterparts. This is

Table 2 Distribution of study subjects by obstetric and maternal health service-related characteristics in Debre Berhan Town, Ethiopia, March 2019

Variable	Frequency (n)	%
History of pregnancy		
Yes	303	73.2
No	111	26.8
Number of pregnancy		
Primigravida	101	33.3
Multigravida	202	66.7
Number of live births (n=399)		
Primiparous	117	38.6
Multiparous	186	61.4
History of abortion		
Yes	30	9.9
No	273	90.1
History of stillbirth		
Yes	17	5.6
No	286	94.4
History of preterm birth		
Yes	14	4.6
No	289	95.4
History of congenital abnormality		
Yes	13	4.3
No	290	95.7
History of neonatal death		
Yes	14	4.6
No	289	95.4
History of contraceptive use		
Yes	278	67.1
No	136	32.9

consistent with the studies done in Sudan,¹³ Jinka Town²² and Adet woreda in Ethiopia.¹⁵ This might be because most of the components of PCC, such as tetanus toxoid

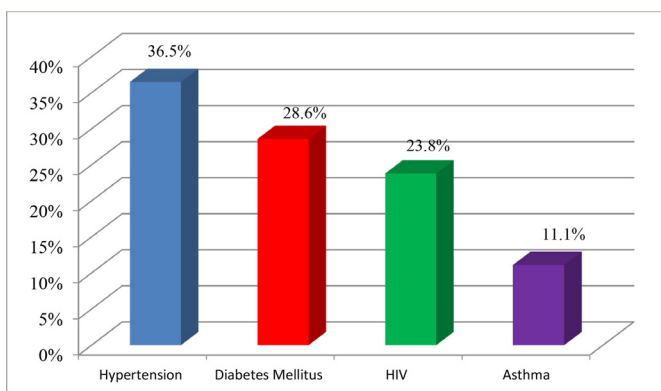


Figure 1 Types of chronic health problems among reproductive-age women in Debre Berhan Town, Ethiopia, March 2019 (n=63).

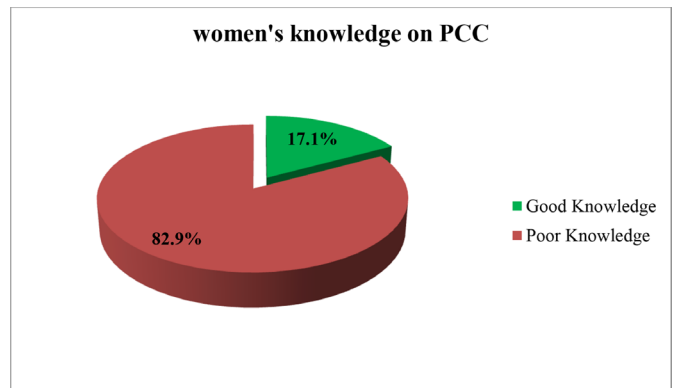


Figure 2 Women's knowledge about preconception care (PCC) in Debre Berhan Town, Ethiopia, March 2019 (N=414).

immunisation, HIV test and others, are being addressed through counselling in the family planning unit, which eventually results in women accessing information about PCC.

Women who gave birth to a newborn with congenital abnormality were more likely to have good knowledge about PCC than women who had no history of congenital abnormality. In addition, women who had a history of neonatal death were more likely to have good knowledge about PCC than women who had no history of neonatal death. This finding is not consistent with the study done in Jinka Town.²² This could be because mothers who had previous experience of adverse obstetric outcomes, such as congenital abnormality and neonatal death, were more likely to get advice from healthcare providers on when and how to prepare for subsequent pregnancies. Also, women with adverse obstetric outcomes were more likely to be interested about possible causes and prevention mechanisms of adverse obstetric outcomes, in the long run advancing their knowledge about PCC.

Furthermore, multigravida women were 72% less likely to have good knowledge about PCC than primigravida women. This could be because primigravida women might be more fearful about being pregnant. This might be due to that primigravida might have more fear of being pregnant which makes them highly prepared and wondered to access preconception-related information. In addition, women who live ≥ 34 min from a nearby health facility were 63.4% less likely to have good knowledge about PCC compared with women who were residing less than 34min from a nearby health facility. This could be because women living far away from health institutions have less health-seeking behaviour and less access to information about health, including PCC. The health-seeking behaviour of a community determines how they use healthcare services, including accessing healthcare information.²³

Limitations of the study

The findings of this study could help programmers, policy-makers and other interested bodies in strengthening community awareness about PCC. Besides, the study was conducted

Table 3 Factors associated with knowledge of PCC among reproductive-age women in Debre Berhan Town, Ethiopia, March 2019 (N=414)

Variable	Knowledge of PCC, n (%)		P value (<0.05)	COR (95% CI)	AOR (95% CI)
	Yes	No			
Occupation of women					
Housewife	12 (11.7)	91 (88.3)		1	1
Government employee	30 (25.4)	88 (74.6)	0.452	0.332 (0.160 to 0.688)	1.442 (0.556 to 3.741)
Merchant	11 (12.3)	79 (87.7)	0.313	0.285 (0.126 to 0.646)	0.586 (0.207 to 1.654)
Student	1 (1.4)	72 (98.6)	0.716	0.103 (0.013 to 0.783)	1.546 (0.149 to 16.075)
Daily labourer	1 (3.9)	25 (96.1)	0.029	0.504 (0.245 to 1.037)	8.683 (1.250 to 60.304)*
Monthly household income (in ETB)					
<1000	1 (1.4)	69 (95.6)		1	1
1000–3000	13 (7.8)	154 (92.2)	0.652	0.765 (0.309 to 1.895)	0.673 (0.120 to 1.895)
3000–5000	20 (18.3)	89 (81.7)	0.253	1.685 (0.698 to 4.065)	2.555 (0.511 to 4.065)
>5000	21 (32.8)	43 (67.2)	0.006	5.865 (2.421 to 14.210)	9.888 (1.926 to 50.758)*
Time to reach health facility (on foot) (min)					
<34	54 (21.5)	197 (78.5)		1	1
≥34	57 (28.1)	146 (71.9)	0.011	0.425 (0.237 to 0.763)	0.366 (0.169 to 0.792)*
Gravidity					
Primigravida	28 (27.7)	73 (72.3)		1	1
Multigravida	25 (12.4)	177 (87.6)	0.001	0.368 (0.201 to 0.674)	0.280 (0.135 to 0.580)*
History of congenital abnormality					
Yes	6 (46.2)	7 (53.8)	0.003	4.432 (1.425 to 13.777)	7.532 (2.029 to 27.963)*
No	47 (16.2)	243 (83.8)		1	1
History of neonatal death					
Yes	7 (50.0)	7 (50.0)	0.008	5.283 (1.769 to 15.755)	6.512 (1.624 to 26.117)*
No	46 (15.9)	243 (84.1)		1	1
History of contraceptive use					
Yes	52 (18.7)	226 (81.3)	0.038	1.417 (0.801 to 2.508)	4.950 (1.094 to 22.391)*
No	19 (14.0)	117 (86.0)		1	1

* Variables statistically significant at $p < 0.05$; 1 signifies reference category

AOR, adjusted OR; AOR, Adjusted Odds Ratio; COR, Crude Odds Ratio; ETB, Ethiopian birr; PCC, preconception care.

in a community setting, allowing the findings to be generalised to a larger population. The study also has some limitations. First, due to its cross-sectional nature, the cause and effect relationship was not shown. In addition, there is a risk of social desirability bias. Thus, the findings of the study should be interpreted considering these limitations.

CONCLUSIONS

The findings of this study showed that the level of knowledge about PCC was low among women of reproductive-age living in Debre Berhan Town. Women's occupation, monthly income, gravidity, contraceptive use, history of congenital abnormality, history of neonatal death and time to reach a health facility were statically associated with knowledge of PCC. Therefore, to improve women's knowledge about PCC, a strong collaborative effort including several sectors should be made.

Contributors TL has conceptualized and designed the study, carried out the statistical analysis, supervised the overall process of the study and writing and editing of the original draft. MS and BTT has contributed in the investigation, funding acquisition, data collection process, supervision of the study, and reviewed the final draft. MS has accepted full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish. All authors made critical review, read, and approved the final manuscript.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval Jimma University's Institutional Review Board provided ethical clearance and an approval letter to conduct this study (ref no: IHRPGC/688/017). Formal permission letters were also received from the administration of the North Shoa Zone Health Bureau. Informed written consent was obtained from each study participant after explaining the study's objective. The information obtained from the

participants was kept confidential. In general, the study's methods were carried out in compliance with the Helsinki Declaration, which sets out ethical standards for medical research involving human subjects.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. The data that support the findings of this study are available but some restrictions may apply to the provision of these data as there are some sensitive issues. However, data are available from the corresponding authors upon reasonable request.

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