

# Knowledge on ovulatory period among reproductive age group women in Ethiopia: Further analysis of 2016 Ethiopian demographic and health survey. Multilevel analysis

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## Abstract

**Background:** Knowledge of the fertile period is one of the science techniques used to delay pregnancy. Although it is highly effective method most women lack correct knowledge about it and end up in unintended pregnancies and undergone through unsafe abortion, which is among the leading factor for maternal death. Therefore, this study is aimed to assess the knowledge about fertile period and its determinant factors among reproductive age women in Ethiopia.

**Methods:** The data were extracted from the 2016 national cross-sectional Ethiopian Demographic and Health Survey. The data were collected using a two-stage cluster design. Descriptive statistics were used to summarize the study findings. The determinants of knowledge about fertile period were analyzed using a multilevel binary logistic regressions model.

**Results:** A total of 15, 683 women were included. From this, 23.6% (95% CI: 23 - 24) had knowledge about fertile period. Age group 20-24 (AOR =1.51; 95% CI = 1.15 - 1.97), 25-29 (AOR=1.63; 95% CI = 1.25- 2.13), 30-34(AOR=1.91; 95%CI = 1.45 - 2.52), 35-39(AOR=1.51; 95% CI = 1.14-2.01), 40-44(AOR=1.74; 95% CI =1.27 - 2.35) , 45-49 (AOR=1.55; 95%CI = 1.11- 2.15), accomplishment of primary education (AOR=1.35; CI = 1.16 - 1.57), secondary education (AOR=2.03; CI = 1.61-2.55) and higher education (AOR=2.61; CI = 1.94- 3.53), partner level of education (AOR=1.36; CI = 1.1-1.73), wealth index of poorer (AOR=1.34; CI = 1.09 - 1.65), middle (AOR=1.29; CI = 1.03-1.61), richer (AOR=1.41; CI = 1.11-1.78) and richest (AOR=1.62; CI = 1.2-2.17), listening radio < once in a week (AOR=1.2; CI = 1.02-1.42), and watch tv at least once in a week (AOR=1.4; CI = 1.11- 1.75) and who ever heard about family planning (AOR=1.3; CI=1.12-1.52), internet usage in the last 12 months (AOR=1.55; CI = 1.17- 2.05) and community family planning message exposure (AOR=1.52; CI = 1.16-2) were significantly associated with knowledge about fertile period.

**Conclusion:** Reproductive age women who know about fertile period is low in Ethiopia. Age above19, respondent's having formal education, partner level of education, being poorer to richest wealth index, radio listening, watching tv, ever heard FP, internet use and community family planning exposure were significantly associated with good knowledge about fertile period. Hence awareness rising about female fertile period for Ethiopian women of reproductive age is required with a due emphasis to adolescent, illiterate partner, illiterate respondent, protestant religion followers, internet non-users, poorest women and to those who are not exposed to tv, radio and family planning messages.

**Abbreviations:** EA: Enumeration Areas; EDHS: Ethiopian Demographic and Health Surveys; FP-Family Planning; PHC: Population and Housing Census; SNNPR: Southern Nations, Nationalities, and People's Region; USA: United States of America; WHO: World Health Organization.

## Introduction

Knowledge regarding fertile period is one of the natural family planning methods, which has applied scientific techniques used to postpone pregnancy. It is mainly used by those who don't want to use mechanical, hormonal, or surgical means of contraception [1]. These methods include the basal body temperature method, the cervical mucus (or Billings) method and the symptom thermal method. These methods are helpful to determine the fertile period and for successful application of these methods. For periodic abstinence, the women need to correctly identify the fertile period of her menstrual cycle [2]. However, most women often lack good knowledge as to when, during their menstrual cycle, they are most likely to get pregnant [3].

Maternal mortality is still high in Ethiopia, amounting to 412 per 100000 [4]. One of the most important factors in maternal mortality is

unsafe abortion. In general, women who do not have proper knowledge of the fertility period are subjected to unsafe abortion [5]. About half of all maternal deaths is occur in Africa resulted from this unsafe abortion, while this unsafe abortion is mostly due to unintended pregnancy and preventing this problem is remains a challenge in Africa [6]. In Africa, 99% of abortions are categorized as unsafe abortions, resulting in one maternal death for every 150 cases [7].

Knowledge of the fertility period is a better strategy for mitigating unintended pregnancies than modern methods of contraception, while study conducted by world health organization (WHO) shows that

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two-thirds of women who wished to delay or limit childbearing stopped using modern contraception for fear of side effects, health concerns and underestimation of the likelihood of conception [8]. Women who know her ovulatory period correctly will be safe from undesired and unplanned pregnancies. Similarly, non-users of contraception with no knowledge about their fertile period is high risk factor for unintended pregnancy [5].

Moreover, couples who were actually practicing fertile period did not rely upon the notion of fertile period and most couples are not aware of their fertility period because of their limited knowledge, they go to infertility clinics to seek help from healthcare providers [9]. Furthermore, knowledge of the fertile period has been one of the most contributory factors to the reduction of high fertility which exerts negative influences on economic and social development [10].

Providing adequate information on fertile times and related physiology would help women understand their risk of pregnancy, plan their pregnancies appropriately, and recognize their pregnancies early [11].

A study conducted in the United States showed that approximately 40% of women have no knowledge of the ovulatory period [12]. A similar study conducted in the United States showed that 51% of women do not know the fertile period [13]. Another study carried out in the US among black women showed that nearly 91% of respondents had not correctly identified the time of the fertile period [14]. A study in Australia found that about 40% of participants are unclear about when menstrual cycle design is most likely to occur [15]. Likewise, a study of young people in Turkey found that knowledge about the fertility period was low, while only 40% of young people were well informed [16]. Moreover, the results of a study conducted in Pakistan on certain adult populations revealed that only 46% of them knew about the fertile period of the female cycle [17].

The study done among women in 29 countries using Demographic and Health Surveys (DHS) conducted in sub-Saharan Africa among women of reproductive age in Africa revealed that, only 8.3% have knowledge of ovulation which is generally low [18]. A study done on Ghanaian male adolescents' knowledge about female fertile period showed that about 14.2% of them only correctly identified the specific fertile period within the female menstrual cycle [19]. Similarly, a study in Kenya found that less than eight percent of respondents correctly identified only their fertile years [20].

Different study findings indicate that some socio demographic factors affect the knowledge the women could have regarding her fertile period from these sex, residence, economic status, and educational status were the commonest one. Whereas a study done at Turkey in university students on knowledge about fertile period showed that about half of female students, and one third of males were knowledgeable and can correctly identified fertile period [16].

DHS survey conducted in 29 African countries in a reproductive woman showed that knowledge about fertile period was low among young women, rural residents, poor economic status, and women with low levels of education [13,18]. A study finding from Ghanaian male indicates knowledge about the female fertile period was significantly associated with the age of respondent, level of education and region of residence [19].

Although there are numerous studies on the various natural methods of contraception, there are no studies that address the knowledge of the fertile period. Planning conception by having the knowledge of fertile period is a highly effective family planning (FP) method for those who choose it especially in a country with high low literacy level population, such as Ethiopia. Therefore, this study assessed knowledge on

fertile period and it's the determinants among reproductive age group women in Ethiopia.

## Methods

### Data source, Sampling technique and population

This study was based on 2016 national cross-sectional study of Ethiopian demographic health survey (EDHS), the fourth survey conducted from January 18, 2016, to June 27, 2016. It used the Ethiopian Population and Housing Census (PHC). The frame was a complete list of 84,915 enumeration areas (EAs) in which each EAs covers an average 181 households.

The 2016 EDHS sample was stratified and selected in two stages. In the first stage, 645 EAs (202 in urban areas and 443 in rural areas) were selected. In the second stage, 28 households per cluster were selected from the newly created household listing. All necessary information about the sampling strategy, questioner, or other important information exists in the 2016 EDHS report [4]. Finally, for this study, a total weighted sample of 15,683 reproductive age group women were involved.

### Variables of the study

The outcome of this study was knowledge about fertile period, it was classified in two categories good knowledge and poor knowledge. Those who answered fertile period as it is at the middle of the menstrual cycle was categorized as having good knowledge while other responses other than these answers were classified under poor knowledge category. The independent variables for this study were; Age, residence, religion, ethnicity, partner education, occupation, educational status, marital status, monthly income, media exposure and internet utilization. These independent variables were developed using different literatures.

### Data processing and analysis

To make suitable for descriptive and analytical analysis, the data is further coded using STATA version 14.0 software. In addition, sampling weight were done to adjust for non-proportional allocation of the sample to strata and regions during the survey process. Using a two-level binary logistic regression modelling, we examined the effect of a number of individual-level and community -level variables. Variables with  $p$  value  $< 0.05$  were considered as significant predictors of knowledge on fertile period.

## Results

### Sociodemographic factors

From the total participants interviewed in EDHS 15,683 weighted sample were involved in this study. Out of these study participants 43.3% were orthodox by religion. About 77.8% were living in rural areas, and 21.6% were in the age group of 15-19 years. Majority of the respondents and their husband were with no education, (47.8% and 45.8) respectively. While half (49.9%) of them were unemployed by occupation. From the respondents about 63.85% of them were married (Table 1).

### Modifying factors

Majority of the respondents (75.9%) had not heard of family planning on radio last few months from this 79.6% of them have poor knowledge about fertile period, and from who haven't heard radio at all 71.3% of them have poor knowledge. From those who haven't heard family planning on tv last few months about 86.4% of them have poor knowledge about fertile period. Out of the respondent's the majority

**Table 1.** Socio demographic characteristic of the study participants in Ethiopia, 2016 (N=15683.)

variables	Category	Weighted frequency (%)
Age group	15-19	3380(21.56)
	20-24	2761(17.61)
	25-29	2956(18.85)
	30-34	2345(14.95)
	35-39	1932(12.32)
	40-44	1289(8.22)
	45-49	1016(6.48)
Residence	Urban	3476(22.16)
	Rural	12207(77.84)
Religion	Orthodox	6,786(43.27)
	Protestant	3,674(23.43)
	Muslin	4,892(31.20)
	Others	330(2.1)
Education	No education	7,498(47.8)
	Primary	5490(35)
	Secondary	1817(11.59)
	Above secondary	877(5.59)
Husbands/partners education	No education	4763(46.59)
	Primary	3772(37)
	Secondary	975(9.5)
	Higher	713(6.97)
Respondents occupation	Non-employee	7819(49.86)
	Employee	7864(50.14)
Husbands occupation	Non-employee	807(7.89)
	Employee	9416(92.11)
Marital status	Never in union	4036(25.74)
	Married	10223(65.19)
	Widowed	429 (2.74)
	Divorced	994(6.34)
Wealth index	Poorest	2633(16.79)
	Poorer	2809(17.91)
	Middle	2978(18.99)
	Richer	3099(19.76)
	Richest	4163(26.55)
Region	Tigray	1129(7.2)
	Amhara	3714(23.68)
	Oromia	5701(36.35)
	SNNPR	3288(20.97)
	Addis Ababa	930(5.93)
	others	921(5.87)

(96.8%) who have never use internet have poor knowledge about fertile period (Table 2).

### Factors associated with knowledge about fertile period

From the respondents 23.6% (95% CI: 23-24) of them have good knowledge about fertile period. Age from 20-49, protestant religion, respondent level of education, partner level of education, wealth index, heard of family planning, listening of radio, frequency of watching tv and internet utilization were significant factors from individual factors while community FP messages exposure were the significant factors from community level factors.

The odds of good knowledge were increased by 1.51 times in the age group 20-24 (AOR =1.51; CI =1.15-1.97). Similarly, 1.63 times higher in age group 25-29 (AOR=1.63; CI=1.25-2.13) 1.99 times higher in age from 30-34(AOR=1.91; CI=1.45-2.52), 1.51 times higher in age 35-39(AOR=1.51; CI=1.14-2.01), 1.74 times higher in age 40-44(AOR=1.74; CI=1.27-2.35) and 1.55 times higher in the age group 45-49 (AOR=1.55; CI=1.11-2.15) than age group 15-19.

Accomplishment of primary education increases the odds of good knowledge by 1.35 times than with those no education (AOR=1.35; CI =1.16-1.57), while it is 2.03 times in those who completed secondary education (AOR=2.03; CI= 1.61-2.55) and 2.61 times (AOR=2.61; CI= 1.94-3.53) more in those who completed higher education as compared to those with no education at all. Similarly, high level of partner education attainment (AOR: 1.36; CI=1.10, 1.73) increased the odds of knowledge about fertile period 1.36 times as compared to respondents with no formal education.

Wealth index of poorer (AOR=1.34; CI=1.09, 1.65), middle (AOR= 1.29; CI=1.03, 1.61), richer (AOR=1.41; CI= 1.11, 1.78) and richest (AOR=1.62; CI= 1.20, 2.17) increased the odds of knowledge about fertile period than poorest group.

Listening radio less than once in a week increase the odds of good knowledge by 1.2 times (AOR=1.2; CI=1.02-1.42), and similarly who watch tv at least once a week increase the odds of good knowledge by 1.4 times (AOR=1.4; CI=1.11- 1.75) than with those who never watch tv at all. Whereas the odds of good knowledge increased by 1.3 times in those who ever heard family planning (AOR=1.3; CI=1.12-1.52). Furthermore, internet utilization in the last 12 months (AOR:1.55 (1.17, 2.05) increased the odds of knowledge about fertile period 1.55 times as compared to those who never use internet.

**Table 2.** Modifying factors on knowledge about fertile period of respondents in Ethiopia, 2016 (N=15,683)

Variables	Category	Weighted frequency (%)	Poor knowledge	Good knowledge
Heard family planning on radio last few months	No	11,907(75.93)	9,540(79.60)	2,368(64.02)
	Yes	3,775(24.07)	2,445(20.40)	1,330(35.98)
Frequency of listening to radio	Not at all	10,338(65.92)	8,546(71.31)	1,939(52.43)
	less than once a week	2,644(16.86)	1,835 (15.31)	782 (21.13)
	at least once a week	2,701(17.22)	1,603(13.38)	978(26.43)
Heard family planning on tv last few months	No	12,844(81.90)	10,349(86.35)	2,495(67.48)
	Yes	2,838(18.10)	1,635(13.65)	1,203(32.52)
Use of internet	Never	14,903(95.03)	11,601(96.80)	3,303(89.30)
	Yes, last 12months	693(4.42)	328(2.74)	364(9.87)
	Yes, before last 12 months	86(0.55)	55(0.46)	30(0.83)

**Table 3.** A multivariable multilevel analysis of Individual and community level factors associated with knowledge of fertile period among reproductive age women in Ethiopia, 2016(N=15,683)

Variables	Model I	Model II	Model III	Model IV
		AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Age				
15-19		1		1.00
20-24		1.52 (1.16, 1.98) *		1.51(1.15, 1.97) *
25-29		1.66 (1.27, 2.16) *		1.63 (1.25, 2.13) *
30-34		1.94 (1.48, 2.56) *		1.91 (1.45, 2.52) *
35-39		1.55 (1.16, 2.10) *		1.51 (1.14, 2.01) *
40-44		1.78 (1.32, 2.40) *		1.74 (1.27, 2.35) *
45-49		1.58 (1.14, 2.19) *		1.55 (1.11,2.15) *
Religion				
Orthodox		1		1.00
Catholic		1.09 (.53, 2.23)		1.05 (.51, 2.15)
Protestant		0.85		0.81 (.65, 0.99) *
Muslim		1.03 (.88, 1.22)		0.99 (.83, 1.18)
Traditional		0.71 (.29, 1.78)		0.69 (.28, 1.70)
Other		0.64 (.27, 1.52)		0.59 (.25, 1.41)
Respondent Education				
No formal Education		1		1.00
Primary		1.36 (1.17, 1.59) *		1.35 (1.16, 1.57) *
Secondary		2.04 (1.63, 2.57) *		2.03 (1.61, 2.55) *
Higher		2.67 (2.00, 3.60) *		2.61 (1.94, 3.53) *
Partner's Education				
No formal Education		1		1.00
Primary		1.12 (.96, 1.30)		1.10 (.95, 1.28)
Secondary		1.13 (.92, 1.40)		1.11 (.90, 1.37)
Higher		1.39 (1.10, 1.76) *		1.36 (1.10, 1.73) *
Don't know		1.06 (.59, 1.89)		1.05 (.58, 1.87)
Currently working				
No		1		1.00
Yes		1.05 (.93, 1.19)		1.04 (.92, 1.18)
Wealth index				
Poorest		1		1.00
Poorer		1.37 (1.11, 1.68) *		1.34 (1.09, 1.65) *
Middle		1.34 (1.08, 1.66) *		1.29 (1.03, 1.61) *
Richer		1.51 (1.20, 1.89) *		1.41 (1.11, 1.78) *
Richest		2.02 (1.59, 2.57) *		1.62 (1.20, 2.17) *
Heard of FP				
No		1		1.00
Yes		1.32 (1.13, 1.53) *		1.30 (1.12, 1.52) *
Frequency of listening to radio				
Never		1		1.00
less than once a week		1.20 (1.02, 1.42) *		1.20 (1.02, 1.42) *
at least once a week		1.06 (.89, 1.27)		1.07 (.89, 1.27)
Frequency of watching TV				
Never		1		1.00
less than once a week		1.15 (.93, 1.41)		1.12 (.91, 1.37)
At least once a week		1.47 (1.17, 1.84) *		1.40 (1.11, 1.75) *
Heard of FP from TV				
No		1		1.00
Yes		1.15 (.94, 1.42)		1.12 (.91, 1.38)
Internet use				
Never		1		1.00
Yes, last 12 months		1.56 (1.17, 2.07) *		1.55 (1.17, 2.05) *
Yes, before last 12 months		2.05 (.97, 4.36)		1.99 (.94, 4.26)
Residence				
Rural			1	1.00
urban			1.76 (1.37, 2.27) *	1.30 (.94, 1.80)
Community poverty				
High			1	1.00
Low			1.32 (1.06, 1.65) *	1.13 (.87, 1.47)

Contextual Region			
Metropolitans		1	1.00
Agrarian		0.90 (.76, 1.07)	0.82 (.67, 1.02)
Pastoralist		0.63 (.46, .86) *	0.80 (.56, 1.15)
big community health facility distance problem			
Low		1	1.00
High		1.04 (.87, 1.25)	1.19 (.96, 1.46)
Community media exposure			
Low		1	1.00
High		1.06 (.85, 1.33)	0.99 (.77, 1.28)
Community ANC utilization rate			
Low		1	1.00
High		1.06 (.86, 1.29)	0.97 (.78, 1.22)
Community female education			
Low		1	1.00
High		1.13 (.92, 1.40)	0.86 (.67, 1.09)
Community FP messages exposure			
Low		1	1.00
High		1.85 (1.45, 2.34) *	1.52(1.16, 2.0) *
Community FP utilization rate			
Low		1	1
High		0.91 (.77, 1.06)	0.85(.70, 1.02)

Among community level variables, high community FP messages exposure increased the odds of knowledge about fertile period 1.52 times than low community FP messages exposure (AOR=1.52; CI=1.16, 2.0) (Table 3).

## Discussion

The aim of study was to determine knowledge about fertile period and its determinant factors among women in reproductive age groups in Ethiopia, using the national 2016 EDHS data. Among the determinants factors; Age from 20-49, protestant religion, respondent level of education, partner level of education, wealth index, heard of family planning, listening of radio, frequency of watching tv and internet utilization were significant factors from individual factors while community FP messages exposure were the significant factors from community level factors were found be significantly associated with knowledge about fertile period.

Those who knew fertile period in this study was about 23.6% (95% CI: 23-24). This finding is higher than from a study done at DHS, Ghana and Kenya (18-20). this might be attributed to the differences that exists in religious and cultural practices. But lower than a study done at Turkey, USA and Australia and this could be due to better health education access and literacy rate in this developed country [11,15,16]. Moreover, study indicate that poor communication about sexual matters in the family, school and community were a reason to women in Africa not to have better knowledge about ovulatory period [18].

The current study indicated that having good knowledge were higher in the age group 20-24 than the reference group, which is in contrast with this study a study done at USA, which revealed that age group 18-24 years demonstrated less knowledge regarding ovulation period [12] and DHS done in some African countries showed that young women 20-24 years are less likely to have good knowledge of ovulation timing [18]. This might be due to socioeconomic and demographic differences among the nations.

Protestant by religion were found to decrease the odds of knowledge about fertile period than Orthodox religion. The possible explanation

may be due to religious taught difference of the two churches on modern contraception. In protestant rituals it is allowed to use modern contraception, thus they do not depend and need to know about their fertile period unlike that of orthodox religion.

The finding of this study showed that those at richest wealth status has good knowledge than those with poorest wealth index group. This is similar result with DHS finding done in 29 countries [13,18]. Moreover, in this study higher level educated respondents were found to have good knowledge than with those at low-level respondents. This is in line with DHS finding which revealed that knowledge about fertile period was low among respondents with low levels of education [18]. Also, partners level of education was found to positively affect knowledge about ovulation. This finding is supported by a study done in Ghana in which, higher level of education of males contributes to have good knowledge about ovulation [19]. This could be due to the possibility of delivering education about female fertile period is higher at higher level of education.

Those who heard radio and watch tv were found to have good knowledge than with those who never hear radio at all and who never watch tv the possible explanation for this finding is, this groups are more likely to be exposed to the essential health information because there are a lot of programs held on contraception and related health issues in such medias. In addition, whoever heard about family planning were found to have good knowledge about fertile period. From the community level factors of the current study, community FP messages exposure increased the likelihood of having good level of knowledge about fertile period. Thus, the likelihood of having good knowledge on ovulatory period is high than with those who do not get a chance to be exposed to such medias and FP messages.

The limitation of this study is, as the present study was extracted from EDHS data, which was collected for another purpose, it limited us to incorporate important other determinants of knowledge about fertile period. However, with the above limitation the present study tried to pictured out the national magnitude of knowledge about fertile period and its determinants among reproductive age women of the country.

## Conclusion

Reproductive women who knew about female fertile period is low in Ethiopia. Age above 19, respondents with education, high level of partner education attainment, being at poorer to richest wealth index, radio listening, watching tv, internet use, ever heard about FP and high exposure to community family planning message were significantly associated with having good knowledge about fertile period. While age below 19, respondents with no formal education, illiterate partner, poorest wealth index, protestant religion follower, non-listener of radio, never heard about FP, no watching of tv, non-users of internet and low exposure to community family planning message were found to be associated with poor knowledge about fertile period.

## Ethical approval

The study used data from the 2016 EDHS. Since it is secondary data from demographic and health survey, we accessed the data set based upon request ([www.dhsprogram.com](http://www.dhsprogram.com) online) and there was no ethical approval required.

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