ORIGINAL RESEARCH ARTICLE

Determinants of modern contraceptive use among married women and those living with a partner in Ghana

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Abstract

The objective of the study was to ascertain the determinants of modern contraceptive use in Ghana among married women and those living with a partner. Secondary data from the Performance Monitoring and Accountability 2020 Ghana 2015 survey were used for the study. A multivariate logistic regression analysis was used. Modern contraceptive use was 25.5%. The significant predictors of modern contraceptive use were exposure to the media (AOR 2.07, 95% CI 1.20 – 3.55), residence in the Upper East region (AOR 0.26, 95% CI 0.10 – 0.71), final decision makers on contraceptive method either by themselves or jointly (AOR 0.26, 95% CI 0.14 -0.92), return to provider (AOR 6.96, 95% CI 3.59 – 13.49), refer relative or friend to provider (AOR 2.67, 95% CI 1.27 – 5.68), and parity of 5 or more (AOR 4.42, 95% CI 1.49 – 13.12). Media exposure on contraceptives and client satisfaction has the potential to improve modern contraceptive uptake in Ghana. *(Afr J Reprod Health 2023; 27 [3]: 56-63).*

Keywords: Modern contraceptive; determinants; media exposure, Ghana, rural, urban

Résumé

L'objectif de l'étude était de déterminer les déterminants de l'utilisation de la contraception moderne au Ghana chez les femmes mariées ou celles vivant avec un partenaire. Les données secondaires de l'enquête Performance Monitoring and Accountability 2020 Ghana 2015 ont été utilisées pour l'étude. Une analyse de régression logistique multivariée a été utilisée. L'utilisation de contraceptifs modernes était de 25,5 %. Les prédicteurs significatifs de l'utilisation de contraceptifs modernes étaient l'exposition aux médias (AOR 2,07, IC à 95 % 1,20 - 3,55), la résidence dans la région de l'Upper East (AOR 0,26, IC à 95 % 0,10 - 0,71), les décideurs finaux sur la méthode contraceptive soit par eux-mêmes ou conjointement (AOR 0,26, IC à 95 % 0,14 -0,92), retour au prestataire (AOR 6,96, IC à 95 % 3,59 - 13,49), renvoi d'un parent ou d'un ami au prestataire (AOR 2,67, IC à 95 % 1,27 - 5,68) et parité de 5 ou plus (AOR 4,42, IC à 95 % 1,49 - 13,12). L'exposition médiatique sur les contraceptifs et la satisfaction des clients a le potentiel d'améliorer l'utilisation des contraceptifs modernes au Ghana. *(Afr J Reprod Health 2023; 27 [3]: 56-63).*

Mots-clés: Contraceptif moderne; déterminants; exposition médiatique, Ghana, rural, urbain

Introduction

Globally about 225 million women who want to avoid pregnancy are not using an effective contraceptive method[1]. In developed countries, contraceptive uptake is high and unmet need for contraception is low. The modern contraceptive prevalence rate among married women of reproductive age is 60% in more developed countries with a total fertility rate of 1.6[2]. In developing countries, however, women and couples appear to desire more children. Some may desire less children but due to other barriers may not have access to modern contraceptive. In Africa, the modern contraceptive prevalence rate among married women of reproductive age is 30% with a total fertility rate of 4.6[2]. In West Africa, the modern contraceptive prevalence rate is 14% among married women with a total fertility rate of 5.3[2,3].

Ghana had an estimated population of 29 million in 2018 with 23.2% being women of reproductive age and with an intercensal growth rate of 2.5%[4]. The total fertility rate is 4.2 with variations in the fertility rate between the regions, urban and rural settlements[5]. The modern

contraceptive prevalence was 22% and unmet need for contraceptive was 30% for married women[5].

Some gains have been made in modern contraceptive use in Ghana. In 1988 modern contraceptive prevalence was 5.2%, increased to 18.7% in 2003 and reduced slightly to 16.6% in 2008 and increased to 22.2% in 2014[5]. Ghana has a high unmet need for contraceptive in sub-Saharan Africa[6]. Most women of reproductive age in Ghana are not using contraceptives.

Modern contraceptives have numerous benefits. In countries where the use of contraceptives is low, people resort to abortion which is usually unsafe when laws are strict[7]. Contraception prevents unintended pregnancy which would be reduced by 70% if all unmet need for modern contraception were met [1]. Contraception is not only used to limit the number of births but also for birth spacing. Smaller families and longer birth intervals have contributed to better health of infants, children and mothers and have improved the social and economic role of women [8]. Even with a low contraceptive prevalence of 22.3% in 2010, 35% of expected maternal deaths (1527) were averted in Ghana[9].

The factors that affect contraceptive use are multidimensional; they could be predisposing, enabling and need factors. Some of the predisposing factors are age, marital status, education, occupation. Some of the enabling factors are wealth quintile, availability of health personnel and services and need factor is the perceived need for the contraceptive. A population-based survey in Ethiopia found that being wealthy, more educated, being employed, and having a higher number of living children were predictors of modern contraceptive use while living in a rural area and being older had a negative influence on modern contraceptive use[10]. Other studies on modern contraceptive utilisation in Pakistan, Tanzania and Ethiopia have described varying predictors including woman's age, wealth quintile, women empowerment, male-female age difference, child desire, women's educational level and having a radio[11-13].

Studies of contraceptive use have varying significant determinants depending on the setting. We therefore set out to describe the determinants of modern contraceptive use using a survey-based dataset that involves all the regions in Ghana with both rural and urban settings. The specific objective was to determine the predictors of modern contraceptive use among women of fertility age group who were married or living with a partner.

Methods

Secondary data from Performance Monitoring and Accountability 2020 Ghana (PMA 2020) 2015 Round 4 data were used. Details of methodology used in PMA2020 are available[14]. A multi-stage sampling technique was used. PMA2020 survey used enumeration areas (EA) provided by the Ghana Statistical Service representative at the national, urban-rural and the 10 administrative regions of the country. All eligible women in selected households were approached for informed consent to take part in the study. The final sample included 4,028 households, 4,567 females[14]. For this study the inclusion criteria were women of reproductive age 15-49 who were married or currently living with a partner. The household questionnaire with information about the household was used to construct the wealth quintile index for the selected women. Questions on age, marital status, parity, education, region, place of residence urban/rural, family planning; access, choice and use, quality of family planning, exposed to family planning in the media from the female questionnaire were used.

Study variables

The dependent variable was current use of modern contraceptive method. Use of modern contraceptive method was classified as binary (Yes/No). Modern contraceptive use was defined by self-reported use of the pill, injectables, diaphragm, intrauterine contraceptive device, implant, female and male sterilisation, female and male condom, emergency contraception, diaphragm, foam/jelly, standard days method and lactational amenorrhea as at the time of the survey. Traditional methods include rhythm or periodic abstinence, withdrawal, folks, and herbs.

Age, marital status, educational level and exposure to media variables formed the predisposing factors for modern contraceptive use. The enabling resources factor variables were wealth

quintile, paid for family planning services, cost of the contraceptive method, region, place of residence(urban/rural), obtained preferred method, return to provider, refer relative/ friend to provider, and who made final decision about the method. The variable who made the final decision was categorised into 'Self/Jointly' and 'Not self' (defined as excluding self –which could be provider/ partner/ others). The need factor variables were parity and visit to a health facility in the last six months.

Statistical analysis

Data were analysed with Stata version 14[15]. Descriptive statistics was performed on the socio-demographic characteristics and modern contraceptive use and the methods of contraceptive used and presented as frequencies and percentages. The Pearson chi-square test were used to establish the relationship between the categorical variables and modern contraceptive use. Univariate logistic regression was then done to further test the strength and direction of the associations between independent variables and the use of modern contraceptives reporting unadjusted odds ratio and their corresponding 95% confidence intervals (CI).The Anderson model of health service utilisation was the theoretical basis for this analysis[16]. According to this model, for health service utilisation there should be the need, predisposing and enabling factors. This was used for contraceptive utilisation and the variables were classified into predisposing, enabling and need factors.

Multivariate logistic regression was then done between independent variables and the use of modern contraceptives reporting adjusted odds ratio and their corresponding 95% confidence intervals (CI). Statistical significance was set at p-value of less than 5%. The Hosmer-Lemeshow goodness-of-fit test were done for the models. The predisposing variables and modern contraceptive use were entered as the first model in a forward stepwise manner. Then the enabling and need characteristics were added on also in a forward stepwise manner. None of the predisposing variables were dropped due to their known effect from other studies in influencing contraceptive use and the theoretical

model being used. The variable 'cost of the family planning method' was dropped due to the correlation with the variable paid for family planning method. The need characteristics was finally added to the last model. Statistical significance was set at 0.05% with 95% confidence interval. The likelihood ratio test was used to test the model's stability.

Results

Sociodemographic characteristics

The mean age of the respondents was 31.8 years (S.D ±0.15). Majority (75.8%) of the respondents were married. About 35% of the respondents were in the lowest wealth quintile. Most of the respondents (73.4%) have been exposed to family planning through the media such as television and radio (See Table 1). Majority of the respondents (96.9%) obtained the contraceptives they wanted, and 62.6% paid for the contraceptives obtained. Majority of the respondents (81.1%) who paid for contraceptives paid $4.7 (10.00 Ghana cedis) or less. In assessing the autonomy of the respondent, a question was asked 'who made the final decision of the family planning product?' and only 7.6% said the decision was taken excluding them (decision made by provider and/or partner).

The quality of care was assessed in terms of information given to respondents on contraceptives. About 64% said they were given information about the side effects of the family planning method chosen. Among those who were given information about side effects, 84.9% said they were told what to do should they experience side effects. About 66% were told about other family planning products. Client satisfaction with service was assessed using two questions 'would you return to this provider?', and 85.6% responded yes and 'would you refer a relative or friend to this provider/facility?' and about 85% said yes.

Contraceptive use

The modern contraceptive prevalence among respondents was 25.5% while traditional contraceptive prevalence was 5.2%. The distribution of the contraceptive methods used are injectables 35%, pills 17%, implants 15%, condom

Table 1: Background characteristics of respondents

Characteristics	Frequency (%)
Age (years)	
15 – 19	135 (4.4)
20 – 24	484 (15.7)
25 – 29	637 (20.7)
30 – 34	636 (20.6)
35 – 39	553 (17.9)
40 – 44	353 (11.5)
45 – 49	282 (9.2)
Marital Status	
Married	2336 (75.8)
Living together	744 (24.2)
Parity	
None	379 (12.3)
1	620 (20.1)
2	587 (19.1)
3	494 (16.1)
4	395 (12.8)
5 or more	608 (19.6)
Education	
No education	990 (32.1)
Primary	603 (19.6)
Middle/ JHS	979 (31.8)
Secondary	310 (10.1)
Tertiary/Higher	196 (6.4)
No response	2 (0.1)
Wealth Quintile	
Lowest	1070 (34.9)
Second	610 (19.9)
Middle	494 (16.1)
Fourth	437 (14.3)
Highest	455 (14.8)
Region	
Ashanti	609 (19.8)
Brong Ahafo	297 (9.6)
Central	254 (8.2)
Eastern	229 (7.4)
Greater Accra	320 (10.4)
Northern	643 (20.9)
Upper East	140 (4.6)
Upper West	98 (3.2)
Volta	240 (7.8)
Western	248 (8.1)
Place of Residence	
Urban	1345 (43.7)
Rural	1735 (56.3)
Exposed to Family planning media	
No	820 (26.6)
Yes	2260 (73.4)

8%, intrauterine contraceptive device 2%, sterilisation 2%, other modern methods 5%, and traditional methods 16%.

In multivariate analysis, the significant predictors of modern contraceptive use were exposure to media, region, autonomy, return to provider, refer relative or friend to provider, and parity. Respondents who have had media exposure to family planning (Adjusted Odds Ratio (AOR): 2.07, 95% Confidence Interval (CI) 1.20 – 3.55) (Table 2). Respondents who were resident in the Upper East region compared to those in Ashanti region were less likely to use modern contraceptive method (AOR: 0.26, 95% CI 0.10 – 0.71). Women who made the final decision on family planning method by themselves or jointly were less likely to use modern contraceptive method (AOR: 0.36, 95% CI 0.14 -0.92). Respondents who said they would return to provider were more likely to use modern contraceptives (AOR: 6.96, 95% CI 3.59 – 13.49). Women who said they would refer relative or friend to provider were more likely to use modern contraceptive use (AOR: 2.67, 95% CI 1.27 – 5.68). Women with parity of 5 or more were more likely to use modern contraceptive (AOR: 4.42, 95% CI 1.49 – 13.12).

Discussion

The study found out that the predictors of modern contraceptive use were exposure to media, region, decision making autonomy of the women, those who were satisfied with service provided at health facility, and parity. Women who have been exposed to the media on family planning were more likely to use modern contraceptives (AOR: 2.07, 95% CI 1.20 – 3.55). This is comparable to studies done in Mali and Uganda which also found exposure to health-related programs in the media to be significant in family planning behaviour[17,18]. It is expected that when people are well informed about family planning products and commodities and the associated health and wealth benefits, the uptake of family planning would improve.

Residents in the Upper East region of Ghana when compared with those in the Ashanti region were significantly less likely to have used modern contraceptives. Regional context influences modern contraceptive use. The sub-national context has different resources, and the areas are at different developmental stages. The Upper East region may have peculiar features and further studies are needed to establish why it has a significantly lower contraceptive use[19]. It may be due to different cultural beliefs, socio-economic status, and women empowerment. A study done in

Table 2: Univariate and multivariate analysis of modern contraceptive use

Characteristic	Unadjusted Odds Ratio	95% Confidence Interval	Adjusted Odds Ratio	95% Confidence Interval
Age group				
15-19	1		1	
20-24	**1.59**	**1.01 – 2.49***	2.02	0.69 – 5.91
25-29	1.21	0.78 - 1.87	1.09	0.33 – 3.62
30-34	1.38	0.89 - 2.14	0.94	0.26 – 3.45
35-49	1.30	0.83 – 2.01	0.88	0.21 – 3.63
40-44	0.74	0.46- 1.20	1.41	0.28 – 7.20
45-49	**0.48**	**0.28 = 0.83****	0.82	0.19 – 3.61
Marital Status				
Married	1		1	
Living together with a partner	**1.57**	**1.31 – 1.88*****	1.11	0.57 – 2.16
Education Level				
No Formal Education	1		1	
Primary	**2.19**	**1.71 – 2.79*****	0.91	0.45 – 1.82
Middle/JHS	**2.08**	**1.67 – 2.58*****	0.80	0.39 – 1.64
Secondary	**2.05**	**1.52 – 2.75*****	0.91	0.28 – 2.94
Tertiary/Higher	**2.05**	**1.44 – 2.92*****	1.50	0.47 – 4.69
Media Exposure				
No	1		1	
Yes	**1.64**	**1.35 – 2.00*****	**2.07**	**1.20 – 3.55***
Place of residence				
Urban	1		1	
Rural	0.92	0.78 – 1.08	1.11	0.58 – 2.13
Region				
Ashanti	1		1	
Brong Ahafo	1.04	0.77 - 1.41	0.56	0.18 – 1.75
Central	**1.43**	**1.05 – 1.95***	0.46	0.18 – 1.15
Eastern	0.99	0.71 – 1.37	1.31	0.32 – 5.40
Greater Accra	0.76	0.56 – 1.04	0.46	0.13 – 1.67
Northern	**0.34**	**0.26 – 0.46*****	0.28	0.63 – 1.28
Upper East	0.96	0.64 – 1.44	**0.26**	**0.10 – 0.71***
Upper West	**1.98**	**1.28 – 3.06***	0.69	0.14 – 3.52
Volta	**0.58**	**0.41 – 0.83*****	0.25	0.04 – 1.52
Western	**0.43**	**0.30 – 0.63*****	0.38	0.13 – 1.17
Wealth Quintile				
Lowest	1		1	
Lower	1.92	1.53 – 2.41***	0.90	0.41 – 1.97
Middle	1.76	1.39 -2.25***	2.57	0.90 – 7.35
Higher	1.38	1.06 – 1.80*	1.18	0.43 – 3.20
Highest	1.41	1.09 – 1.83***	1.75	0.56 – 5.40
Final decision about method selected				
Not self	1		1	
Self/ Jointly	0.62	0.37 – 1.06	**0.36**	**0.14 – 0.92***
Obtained method desired				
No	1		1	
Yes	**4.83**	**2.37 – 9.83*****	0.81	0.19 – 3.49
Return to Provider				
No	1		1	
Yes	**4.92**	**3.33 – 7.28*****	**6.96**	**3.59 – 13.49*****
Refer to relative/friend				
No	1		1	
Yes	**2.89**	**1.94 – 4.29*****	**2.67**	**1.27 – 5.68***
Paid for Family Planning Method				
No	1		1	
Yes	1.82	0.54 – 6.15	0.87	0.44 – 1.72
Told about side effects				

Characteristic	Unadjusted Odds Ratio	95% Confidence Interval	Adjusted Odds Ratio	95% Confidence Interval
No	1		1	
Yes	1.15	0.83 – 1.61	1.11	0.63 – 1.96
Told about other Family Planning methods				
No	1		1	
Yes	**2.06**	**1.59 – 2.69*****	0.84	0.42 – 1.67
Parity				
None	1		1	
1	1.03	0.76 – 1.38	1.45	0.68 – 3.09
2	0.98	0.73 – 1.33	1.28	0.51 – 3.19
3	1.19	0.87 – 1.62	2.49	0.76 – 8.14
4	1.29	0.94 – 1.78	1.33	0.48 – 3.69
5 or higher	1.01	0.75 – 1.36	**4.42**	**1.49 – 13.12****
Visited a health facility in the last 6 months				
No	1		1	
Yes	**1.34**	**1.13 – 1.59*****	1.14	0.68 – 2.15

*= p < 0.05
**= p≤0.01
***= p≤0.00
ⱦFinal decision about selected family planning method is defined as who made the final decision about selected method (not self/ self or jointly with partner or provider)

Egypt, found that an individual's contraceptive use was influenced by living in a geographical region[20].

Women who made the final decision on the family planning method by themselves or jointly which is either with their partner and/or with a health worker, were less likely to use modern contraceptive method (AOR 0.26, 95% CI 0.14 - 0.92) compared with those for whom the final decision was taken without their involvement. This shows that the partner taking decision on family planning is important in influencing contraceptive uptake. This is similar to a study in Kenya where men and women were influenced more by the social network approval of family planning than their own approval[21]. In Egypt where patriarchal role leaves little room for women to make decisions, the partner approving family planning played a key role in modern contraceptive use[20]. Though various GDHS results do not list partner approval as a major factor in contraceptive non-use, the generally male-dominated climate in Ghana may affect contraceptive use[5,22]. Ejembi and others suggest that when the level of women autonomy is high, modern contraceptive use is likely to increase[23]. In our study however, when the woman takes the decision alone, she is less likely to use modern contraceptive which may imply the level of autonomy of the women in our setting is not high enough. It is surprising that

when the woman takes the decision jointly with a health worker, she is less likely to use contraceptive. This could mean that the health worker might either have his/her own prejudices which does not help the client or the communication is not done properly[24].

Respondents who would return to provider had a significantly higher odds of using modern contraceptives (AOR 6.96, 95% CI 3.59 – 13.49). Respondents who would refer relatives or friends to provider were more likely to use modern contraceptive use (AOR 2.67, 95% CI 1.27 – 5.68). This shows clients who were satisfied with service are likely to use modern contraceptives[25]. This is also indicative of the quality of care given to clients and when the quality of service is good, clients are more likely to use modern contraceptives.

Women with parity of 5 or higher were more likely to use modern contraceptive (AOR 4.42, 95% CI 1.49 – 13.12). Women who have their desired number of children would not want to have anymore[26]. The Ghana Demographic Health Survey reports over the 3- 5 years shows a slight increase in the total fertility rate to 4.2 in 2014 and efforts should be put in to reduce it though in sub-Saharan Africa it is among the lowest[5]. Having a parity of 5 is high compared with countries like Tunisia, Canada, Australia and China with replacement

fertility rates and more education and other barriers should be worked on so that contraceptives will be used at a much lower parity to limit birth[27].

The study can be generalized for the country since a nationally representative data were used. Some known determinants were not assessed since the secondary data used did not include it like the cultural beliefs about fertility. Caution should be taken in making causal inferences since the design is not experimental or in a controlled environment. This study shows with exposure to media on family planning, an enabling environment with improved quality of care, modern contraceptive uptake would improve in Ghana. More messages on family planning should be in the media and male involvement is essential in Ghana. More research needs to be done to better explain sub-national differentials in contraceptive use. The National Population Policy was to reduce TFR to 3.5 by 2024 and to increase contraceptive prevalence rate among married women to 34% and this is unlikely to be achieved at the current rate[28].

Ethical approval

Ethical approval was obtained for the PMA2020 study. The data was de-identified. The outcomes did not allow for re-identifying the participants. Permission was sought from the Principal Investigator to use the data. Ethical approval for the PMA2020 Ghana was given by the institutional review board of Kwame Nkrumah University of Science and Technology and John Hopkins Bloomberg School of Public Health[29].

Acknowledgements

Competing interest

References

1. United Nations Population Fund, Guttmacher Institute. Adding it up 2014: Global fact sheet: UNFPA , Guttmacher Institute, 2014.
2. Population Reference Bureau. 2017 World Population Data Sheet. USA, 2017.
3. Ottawa Charter for Health Promotion, First International Conference on Health Promotion, Ottawa, 21 November 1986 – WHO/HPR/HEP/95.1.
4. Ghana Statistical Service, Ghana Health Service, ICF International. Ghana Demographic and Health Survey 2018. Rockville, Maryland, USA: GSS, GHS, ICF International, 2019.
5. Ghana Statistical Service, Ghana Health Service, ICF International. Ghana Demographic and Health Survey 2014. Rockville, Maryland USA GSS, GHS and ICF International, 2015.
6. United Nation, Department of Economic and Social Affairs, Population Division. Trends in Contraceptive Use Worldwide 2015. (ST/ESA/SERA/349). New York: UN, 2015.
7. Finer LB, Hussain R. Unintended Pregnancy and Unsafe Abortion in the Philipiines. In Brief. New York: Guttmacher Institute, 2013.
8. Centers for Disease Control and Prevention. Ten great public health achievements--United States, 1900-1999. MMWR Morbidity and mortality weekly report, 1999:241.
9. Ahmed S, Li Q, Liu Land Tsui AO. Maternal deaths averted by contraceptive use: an analysis of 172 countries. *The Lancet* 2012;380(9837):111-25. doi: 10.1016/S0140-6736(12)60478-4
10. Lakew Y, Reda AA, Tamene H, Benedict S and Deribe K. Geographical variation and factors influencing modern contraceptive use among married women in Ethiopia: evidence from a national population based survey. *Reprod Health* 2013;10(1):52. doi: 10.1186/1742-4755-10-52
11. Azmat SK, Ali M, Ishaque M, Mustafa G, Hameed W, Khan OF, Abbas G, Temmerman M and Munroe E. Assessing predictors of contraceptive use and demand for family planning services in underserved areas of Punjab province in Pakistan: results of a cross-sectional baseline survey. *Reprod Health* 2015;12(1):25.
12. Kidayi PL, Msuya S, Todd J, Mtuya CC, Mtuy T and Mahande MJ. Determinants of modern contraceptive use among women of reproductive age in Tanzania: evidence from Tanzania demographic and health survey data. *Adv Sex Med* 2015;5(3):43-52.
13. Tekelab T, Melka AS and Wirtu D. Predictors of modern contraceptive methods use among married women of reproductive age groups in Western Ethiopia: a community based cross-sectional study. *BMC Womens Health* 2015;15(1):52. doi: 10.1186/s12905-015-0208-z

14. PMA2020, KNUST. Detailed Indicator Report: Ghana 2013. Baltimore, MD: PMA2020, 2013.

15. Stata Statistical Software [program]. College Station, TX, 2013.

16. Andersen R. A behavioral model of families' use of health services. [Chicago]: Center for Health Administration Studies, University of Chicago 1968.

17. Kaggwa EB, Diop N and Storey JD. The role of individual and community normative factors: a multilevel analysis of contraceptive use among women in union in Mali. *International family planning perspectives* 2008:79-88.

18. Paek H-J, Lee B, Salmon CT and Witte K. The contextual effects of gender norms, communication, and social capital on family planning behaviors in Uganda: a multilevel approach. *Health Education & Behavior* 2008;35(4):461-77.

19. Ghana Statistical Service. 2010 Population and Housing Census- Regional Analytical Report, Upper East Region. Ghana, 2013.

20. Giusti C and Vignoli D. Determinants of contraceptive use in Egypt: a multilevel approach. *Statistical Methods and Applications* 2006;15(1):89-106.

21. Dynes M, Stephenson R, Rubardt M and Bartel D. The influence of perceptions of community norms on current contraceptive use among men and women in Ethiopia and Kenya. *Health & place* 2012;18(4):766-73.

22. Ghana Statistical Service, Ghana Health Service, ICF International. Ghana Demographic and Health Survey 2008. Rockville, Maryland, USA: GSS, GHS, and ICF Macro, 2009.

23. Ejembi CL, Dahiru T and Aliyu AA. Contextual factors influencing modern contraceptive use in Nigeria. *DHS Working Papers* 2015(120)

24. Sebikali B. How healthworkers influence attitudes and decisions about family planning. Vital. North Carolina, USA: Intrahealth International, 2011.

25. Dagnew T, Tessema F and Hiko D. Health service utilization and reported satisfaction among adolescents in Dejen District, Ethiopia: a cross-sectional study. *Ethiop J Health Sci* 2015;25(1):17-28. doi: 10.4314/ejhs.v25i1.4 [published Online First: 2015/03/04]

26. Mohammed A, Woldeyohannes D, Feleke A and Megabiaw B. Determinants of modern contraceptive utilization among married women of reproductive age group in North Shoa Zone, Amhara Region, Ethiopia. *Reprod Health* 2014;11(1):13. doi: 10.1186/1742-4755-11-13

27. Searchinger T, Hanson C, Waite R, Lipinski B, Leeson G and Harper S. Achieving replacement level fertility. World Resources Institute working paper, Instalment 3 of "Creating a Sustainable Food Future", 2013.

28. National Population Council. Factsheet on 2017 Ghana Rapid, Effective Population Management for Better Quality of Life 2018.

29. Zimmerman LA, Bell SO, Li Q, Morzenti A, Anglewicz P, Group PMAPI and Tsui AO. Individual, community and service environment factors associated with modern contraceptive use in five Sub-Saharan African countries: A multilevel, multinomial analysis using geographically linked data from PMA2020. *PLoS One* 2019;14(6):e0218157-e57. doi: 10.1371/journal.pone.0218157.