Socio-demographic factors associated with current Depot Medroxyprogesterone Acetate (DMPA) use in Leogane, Haiti: A secondary data analysis

Abstract

Objectives

To examine the association of women's socio-demographic factors and Depot Medroxyprogesterone Acetate (DMPA) knowledge with current DMPA utilization.

Methods

Secondary analysis of data from a cross-sectional study of women conducted via translator-administered questionnaire in Leogane, Haiti, in 2015 and 2016. Logistic regression was performed to analyze associations of key factors including age, parity, educational status, male partner cohabitation and a calculated composite DMPA knowledge score with current DMPA use.

Results

The analysis sample consisted of 516 women of reproductive age (15-45 years) using modern family planning methods. DMPA use was reported in 18% of women (n=91). Over half of the women had high knowledge of DMPA (54 %, n=278). Adjusting for covariates, the odds of DMPA use among parous women was more than three times the odds in nulliparous women (AOR = 3.22, 95 % CI = 1.22 -10.18, p <0.05). Women who lived with a male partner had higher odds of DMPA utilization than women who did not (AOR =
1.85, 95 % CI = 1.08 - 3.23 p<0.05). Women with primary education had 2.72 times the odds of DMPA use compared to women with no education (AOR = 2.72, 95 % CI = 1.93-7.79, P <0.05). High knowledge of DMPA was not statistically significantly associated with its use.

Conclusions
Parity, cohabiting with a male partner and educational status were statistically significantly associated with current DMPA use. Increased utilization in parous women, in women living with a male partner and in women with primary education compared to no education, may arise from convenient access, issues of secrecy or privacy or cultural barriers that need further elucidation to meet women’s reproductive health needs.

Keywords Contraception, Sexual and Reproductive Health, Injectable contraception

Hypothesis
The conceptual model that guides our rationale for analyzing the socio-demographic factors associated with current DMPA utilization is adapted from that used by Kinaro et. Al.¹ We hypothesize that healthcare access mediates the pathway connecting socio-demographic factors to current DMPA use (outcome) and moderated by women’s attitudes, beliefs, and knowledge of DMPA.

Factors
Several studies have identified factors such as maternal age, parity, maternal educational status, residential status, and decision making in the household (as a proxy for autonomy)
as associated with the use of modern contraceptive methods, including injectable contraception.\textsuperscript{2,3,4,5}

**Mediators**

The lack of healthcare facilities including inadequate sexual and reproductive health services creates an accessibility barrier for Haitian women. Lack of infrastructure leading to insufficient healthcare access gains particular importance in the wake of the 7.0 magnitude earthquake that struck Haiti in January 2010. The quake destroyed infrastructure across the country including hospitals, significantly degrading the health of Haitian families.\textsuperscript{6} Additionally, Haiti was hit by a cholera outbreak in October of the same year.\textsuperscript{7} In the midst of these natural disasters, maintaining and providing sexual health and family planning services to displaced people was a significant governmental challenge. Since government-funded health resources were severely impacted the burden of re-establishing health of Haitians fell mainly on the NGO sector including international aid organizations.\textsuperscript{8} There existed a lack of consistency across providers and a lack of guidelines on the information mandatory to patients during their visits among several service delivery centers – short-term clinics & private clinics.\textsuperscript{8} Structural constraints caused by natural disasters likely led to barriers to accessing contraceptive care.

**Moderators**

Lack of knowledge of DMPA may create barriers to its utilization. A study from Brazil demonstrated that pregnant teens in Brazil have high unintended pregnancy rates because of lack of contraceptive use.\textsuperscript{9} More than half of participants had a low level of
knowledge of contraceptive methods and had never used a contraceptive method. In another study conducted in Nigeria among University students, having good knowledge of emergency contraception (as measured by a composite emergency contraception knowledge score) was statistically significantly associated with emergency contraception use compared to having poor knowledge. \( (\chi^2 = 5.97, \, df=1, \, p<0.001) \).

Women’s beliefs and attitudes concerning effectiveness, appropriateness, and acceptance of contraceptive methods influence their decision-making process about contraceptive use. In Haiti, evidence exists about the fear of side effects from starting a modern family planning method, the largest among them is the fear of infertility. Moreover, globally, about 50% of married women and 35% of never-married women with unmet need cite side effects as a reason for contraceptive non-use. The strong sense of fear may have led Haitian women to believe that family planning should only be adopted after bearing children so as not to risk infertility.

Lastly, religious beliefs and stigma can influence women’s decision making.
Introduction

Voluntary uptake of family planning services enables women to avoid unwanted pregnancies and space pregnancies, thereby reducing maternal mortality and morbidity.\textsuperscript{13,14,15} By exerting their fundamental right to make informed decisions about their lives, women also yield psychological, economic and social benefits.\textsuperscript{13,14,15} Additionally, family planning is a major contributing factor in the reduction of child mortality. The relevance of family planning for child survival is unquestionable.\textsuperscript{13,14,15} Lastly, by reducing the public costs of births from unwanted pregnancies, family planning benefits communities and societies.\textsuperscript{16,17} However more than 220 million women in developing countries lack access to contraceptive and family planning services.\textsuperscript{18}
Haiti’s total fertility rate is among the highest in the Latin American and Caribbean region and at 3.5 parallels rates in certain African countries. Additionally, Haiti’s modern contraceptive prevalence rate remains the lowest in the Latin American and Caribbean region despite an increase from 13.2% in 1994 to 31.3% in 2012. More than 35% of women report an unmet need for family planning, with 20% desiring contraception to limit births and 16% wanting to space pregnancies. In particular, a greater need for contraception exists among sexually active never-married women than in married women, with 59% of sexually active, never-married women having an unmet need, which is the highest percentage among all Latin American and Caribbean, Asian and African nations.

Injectable contraceptives are highly effective (failure rates - 3% in typical use and 0.3% with perfect use), reversible and relatively long-lasting. Depot Medroxyprogesterone Acetate (DMPA) an injectable widely available in Haiti, combines high effectiveness with reversibility and privacy of users. The secrecy-use hypothesis posits that women adopt injectable contraception to hide their contraceptive practices from their partners as well as families that may negatively judge them for its use. The secret-use hypothesis gains significance as evidence exists about its role in the reason for the rapid increase in uptake of the method. Since DMPA can be obtained quickly in clinics, and it leaves no traces behind in the house to be discovered by others it could have gained popularity among Haitian women considering the pressure to bear children that exists in the community. Other advantages of DMPA include scanty to absent
menses that accompanies use, safe use in breastfeeding mothers and appeal to women who want to avoid side effects with the use of oral contraceptive pills.\textsuperscript{28}

Due to its several advantages as well as availability, injectable contraception is a prevalent form of contraception globally.\textsuperscript{28} With 35 million women using DMPA worldwide, it is one of the most available methods in developing countries.\textsuperscript{28} In Haiti, 64.76\% of women use injectable contraceptives, 15.68\% prefer pills, and less than 1\% use an IUD.\textsuperscript{11} Previous studies from around the world have demonstrated that factors such as maternal age, parity, maternal and paternal educational status, type of residence (rural vs. urban) and equal participation by both partners in family planning decisions are associated with the use of modern contraceptive methods.\textsuperscript{1,2,3} However, research demonstrating the socio-demographic factors associated with DMPA use in Leogane is limited.

Our study analyzes the socio-demographic factors associated with DMPA use in Leogane, Haiti. Results from our analysis along with existing research from Leogane will aid in creating a better understanding of the factors associated with current DMPA use.

**Methods**

**Data collection**

A cross-sectional study about contraceptive knowledge, attitudes, and practices was conducted among Haitian women via self-administered questionnaires in Creole by Duke University global health undergraduate students over two eight week periods
(from June through July 2015 and June through July 2016). The survey was created by Duke students based on previous studies conducted by Family Health Ministries on contraception and family planning. Data were collected using a convenient sample of women in villages and neighborhoods within the Leogane commune in Haiti. Two way English to Creole translation was facilitated by local translators affiliated with Family Health Ministries. Throughout the data collection process, continuous translation and back-translation ensured that the meaning from the original English language was reflected in the Creole translations and vice versa. An excel sheet consisting of coded data was maintained to record responses.

**Data Sampling**

725 women were initially surveyed. Women aged 16 and above that lived in the Léogâne community were invited to participate. Women younger than 16 were deemed too young to participate and were thus excluded. The post-fieldwork analysis included the elimination of coding errors and impractical and inadequate responses. Additionally, the participant’s data was disqualified from the initial analysis in cases of non-response to questions or incorrect responses to questions that provided evidence of coding error within the data entries. Erroneous data was further removed during initial data analysis. The final data analysis sample consisted of 664 women (n = 664) with ages between 16 and 86 years.

**Study participants**
The final data analysis sample consisted of 516 (n=516) women of reproductive age. This was calculated in a stepwise manner as demonstrated in figure 1. Firstly, an erroneous inclusion of data entries of 5 men was removed from the initial sample of 664 women. Secondly, 122 women older than 45 years were removed to create a data analysis sample consisting of reproductive age women (16-45 years). Additional exclusion criteria included women who chose not to answer about contraception use (n=2), women who used no method of contraception (n =8) and women who used traditional methods of contraception (n= 11). Oral contraceptive pills, male condoms, female condoms, injectables (DMPA), intrauterine devices, implants, vasectomy and tubal ligation comprised of the category of modern methods. Sexually inactive women were not excluded from our data analysis.

Figure 1: Final analysis sample, Haiti data
Variables

Dependent variable

Current DMPA use was the outcome variable of interest. It was assessed dichotomously. It described if the respondents were currently using DMPA. Segregation of injectable use was conducted from the questionnaire which asked about current use of modern method followed by method type. The respondent gave a “yes” or “no” answer to injectable use. Non-responders were eliminated from analysis. For purposes of this analysis, two categories were included: injectable use = 1 and injectable non-use = 0.
Independent variables

Knowledge score

As an assessment of knowledge of injectable use, women were asked a series of six questions that indicated their knowledge of each contraceptive method. They were first asked if they knew, in a general sense, what the method was. If they denied knowing what the method was, they were not asked any more questions about that particular method. However, if they responded positively to that question, then they received 1 point for the question. They were then asked if they knew how to use the method. Again, if they answered positively, they received a point. The final four questions were all geared to measure their level of knowledge further and were multiple-choice questions with correct answers. Do males or females use the method? What is the frequency of use of the method? Does a health clinic need to be visited to use the method? Can the method be seen by the partner when used? For each question they answered correctly, the participant received an additional point. Points were tallied to give a final score for the level of knowledge of that method, called the “Knowledge Score,” with scores ranging from 0 to 6. If the participant claimed not to have knowledge of the method, then questioning ceased, the rest of the questions were marked as 0, or incorrectly answered, and they received an overall knowledge score of 0. (For coding). The knowledge score ranged from 0 to 6. It was then dichotomized into two categories where scores from 0 to 3 were considered “low”, whereas scores of 4, 5 and six were considered “high.” Thus, knowledge is assessed in two categories – low = 0 and high = 1.
Educational level

This variable describes the highest level of education attained by the respondent. The level of education is grouped in the following categories: No education = 0, elementary = 1, middle school = 2, High school = 3, post-high school = 4.

Parity

This variable described parity based on the number of living children as asked in the questionnaire. Women who answered having one or more children were considered parous (parity = 1) while those without any living children were considered nulliparous (parity = 0).

Partner cohabitation

Living with a partner was described dichotomously, with women answering living with a partner (partner = 1) or not living with a partner (partner = 0).

Age

Age was the only variable that was assessed continuously rather than categorically. Data about age was collected and coded continuously, and conversion of a continuous variable into categorical variables may lead to loss of information as well as statistical power. Additionally, exploratory data analysis demonstrated a better “goodness of fit” as assessed by the AIC for age assessed continuously rather than categorically.

Ethical considerations
Since we analyzed de-identified data and conducted a secondary data analysis Non-human subject research (NHSR) IRB approval was acquired from the University of North Carolina, Chapel Hill and no additional IRB approval from Duke University was deemed necessary.

**Data analysis**

Frequency distributions were conducted to get an overview of the dataset and the characteristics of the women. Descriptive analyses were conducted for all sample characteristics by the primary outcome, current DMPA use (Tables 1). Two-way contingency tables and the Pearson’s chi-squared test were used to examine the relationships between socio-demographic determinants, knowledge of contraceptive methods and the outcome, current DMPA use. Logistic regression analysis was used to investigate the associations between each independent variable and the outcome variable. Each factor was tested independently to provide a crude odds ratio. Then multivariate logistic regression was used to determine the adjusted odds ratios of the factors in relation to the outcome variable, with all factors combined together in the final model. Results are demonstrated in table 2. Statistical significance was set to a p-value <0.05 and confidence intervals were set at 95% in the regression analysis. All statistical analyses were performed using the R studio statistical software package, version 1.0.153.

**Results**
Table 1 presents sociodemographic characteristics of respondents who currently use DMPA compared with respondents who do not. The study consisted of 516 women of reproductive age, 18% of whom currently used DMPA (n=91). The mean age of women respondents was 28.15 years with a standard deviation of 7.2. Most DMPA users were between 25 and 34 years of age, had elementary schooling, lived with a partner, were parous and had a high knowledge score. DMPA non-users were more likely to have a high school education or post-high school education (88.3% and 93.1%) respectively. Women who lived with partners had close to 2.5-fold greater use of DMPA compared to women who did not cohabit with male partners (24.5% vs. 10.1%, p <0.001). DMPA use among parous women was more than five times that of DMPA use among nulliparous women (22% vs. 4%, p<0.05). DMPA use was higher among women with a higher knowledge score than a lower knowledge score (23.8% vs. 15.8%, p<0.05).

Since, education, parity, living with a partner and DMPA knowledge score had a statistically significant bivariate association with DMPA use they were included in the logistic regression analysis. Despite age not having a statistically significant bivariate association with the outcome, it was included in the logistic regression analysis to control for its effects.

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**DMPA knowledge score**

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Logistic regression analysis was used to obtain crude and adjusted odds ratios for the socio-demographic factors and DMPA knowledge with current DMPA use. Results from the same are presented in table 2. Results from the crude analysis demonstrate that women who had a high DMPA knowledge score, were parous, currently lived with a partner, had primary education compared to no education and had high school education compared to no education had a significantly higher association with DMPA use. However, increase per year in age and middle or post-high school education compared to no education did not have a statistically significant association with current DMPA use. When all socio-demographic factors along with the composite DMPA knowledge score were combined in a multivariate logistic regression model, per year increase in age became significantly associated with current DMPA use with all other covariates held constant. Every year of increase in age was associated with 4 % decrease in odds of using DMPA currently (AOR = 0.96, 95 % C.I = 0.18 – 0.47, p <0.05). Education took a different pattern than age because as the educational level increased, the odds of current DMPA use decreased. Primary level education compared to no education continued to be associated significantly with current DMPA use in both the crude and adjusted analysis (AOR = 2.72, 95 % C.I = 1.09 – 7.79, p <0.05). Women who cohabited with a partner continued to have statistically significantly increased odds of being a current DMPA user (AOR = 1.85, 95 % C.I = 1.08 – 3.23, p <0.05). While the odds of current DMPA use dropped to almost half in the multivariate model to 3.20 from 6.61 as compared with the
unadjusted logistic model, parity continued to be statistically significantly associated with current DMPA use even after adjusting for the effects of all other covariates (AOR = 3.22, 95 % C.I = 1.22-10.18, p <0.05).

Table: 2 Crude and Adjusted Odds Ratios and 95% Confidence Intervals for socio-demographic factors associated with current DMPA use among women, Leogane study

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Source: Leogane study. OR = Odds Ratio, CI = Confidence Interval, *p<0.1, ** p<0.05, ***p<0.01

**Discussion**

**Key findings**

This study examined the association of socio-demographic factors and DMPA knowledge with current DMPA use. Our results were similar to studies from Mali, Pakistan, Rwanda, and Ethiopia, which likewise found current DMPA use to be associated with various socio-demographic factors. DMPA use was reported in 18% of women (n=93). This number coincides with DMPA use nationally, with 19% of reproductive age women currently in a union using DMPA. Adjusting for covariates, the odds of DMPA use among parous women was more than three times the odds in nulliparous women. Previous research in Leogane echoes our findings, where all sixteen women in a qualitative study by Yang et al. stated that they began using contraception after having at least one child. Chakhtoura et al. emphasized that nulliparous women in Leogane were very unlikely to use modern contraceptives due to the immense pressure on young women to
reproduce.\textsuperscript{32} Results from Leogane are similar to results from several African countries, where women who had two or more children were much more likely to use injectable contraception than women with one or no children.\textsuperscript{25} The odds ratio was highest in Malawi at about 8:1, 5:1 in Zimbabwe and 4:1 in Tanzania.\textsuperscript{25} Additionally, in most countries, the odds for using injectable contraception were highest for women with more than five living children.\textsuperscript{25}

Women who lived with a male partner had higher odds of DMPA utilization than women who did not in our study. In our particular setting accessibility may be an important factor associated with DMPA use. Access to contraception and family planning services is defined as the degree to which users of contraception and family planning can obtain the services and supplies at a level of cost and effort considered acceptable and within the means of the vast majority of the population.\textsuperscript{33} In Haiti, limited health-care expenditure by the government and the high out of pocket cost restrains access to healthcare for most of the population.\textsuperscript{34} However, free antenatal care is generally provided by non-governmental organizations (NGOs) in some areas with a majority of pregnant women in Haiti receiving at least one antenatal visit (90%).\textsuperscript{34} Antenatal care (ANC) in these NGOs supported clinics is often the first point of contact for women of childbearing age with the healthcare system.\textsuperscript{34} ANC visits may provide opportunities to motivate and discuss contraception. Since nulliparous women may typically not have access to these free ANC visits, they often may be denied access to DMPA. This may explain greater odds of use in parous women compared to nulliparous women. Another plausible reason may lean towards the secret use hypothesis. Chakhtoura et al. revealed the existence of a belief
that sterile women were cured by black magic thus leaving especially young women unable to exercise their choice to contracept willingly.\textsuperscript{32} Yang et al. further emphasized that there was an omnipresent dictum that women should only begin utilizing contraception after having their first child.\textsuperscript{31} This social milieu may predispose women living with partners to use DMPA secretly, lending weight to the secret-use hypothesis.

Husband disapproval of modern contraceptives as a barrier to modern contraceptive use by women is also reported in several African and Asian countries.\textsuperscript{35,36,37,38,39,40,41,42} These findings shed light on the importance of initiating discussions between partners about fertility and family planning.

Odds of DMPA use increased statistically significantly in women with primary education compared with no education in our study. This may be explained by the difference in the effect of education on DMPA use is the greatest of the groups with no education and primary education and lesser differences among other groups. In contrast, Chatoura et al. found that a high school level education or higher was associated with 2.81 higher odds of contraceptive use compared with no education.\textsuperscript{31} Similarly, results from Uganda demonstrate that women who had attained a post-secondary level of education had very high odds (OR = 11.82; p = 0.005) of using contraceptives compared to those who had never gone to school.\textsuperscript{43} Studies from Nigeria and Ethiopia have revealed a similar pattern of relationship between educational status and family planning utilization.\textsuperscript{44,45,46}

Increasing age was negatively associated with current DMPA use. It can be safely assumed that women’s fertility desires change by planning pregnancies, switching
methods of family planning which may explain our results. Over half of the women had high knowledge however high knowledge of DMPA was not statistically significantly associated with its use. Results from Brazil and Nigeria differ from our results.\textsuperscript{9,10.}

Thus, studies from Leogane and developing countries around the world have identified socio-demographic factors associated with the use of modern contraceptive methods, including DMPA utilization. Therefore, socio-demographic factors need to be taken into consideration in formulating policies and implementing programs to increase the contraceptive prevalence rate among women.

**Strengths and limitations**

This quantitative study evaluates the association of socio-demographic factors and DMPA knowledge with current DMPA use in Leogane, Haiti thus contributing to the existing literature on factors associated with DMPA use in other countries. Another strength of this study is the well-organized data process and minimal loss of information in translation between Creole and English. Lastly, our study has a fairly large sample size which improved statistical power and precision of estimates. Limitations to our study include the inability to establish a causal relationship between independent variables of interest and current DMPA use given the cross-sectional study design.\textsuperscript{47} As the exposure and outcome are simultaneously assessed, there is generally no evidence of a temporal relationship between exposure and outcome.\textsuperscript{47} Without longitudinal data, it is not possible to establish a true cause and effect relationship.\textsuperscript{47} Another significant weakness is the difficulty to determine whether the outcome followed exposure in time or exposure
resulted from the outcome, i.e., whether parity influences DMPA use or vice versa. Moreover, the multicollinearity in our independent variables makes it difficult to assess the effects of each variable without completely negating the effect of another leading to inaccurate results. We used a convenience sample and thus cannot assure the generalizability of our results. Social-desirability bias and respondent bias may also have impacted the validity of our data. Social desirability response bias can lower the validity of measures. Thus, the “knowledge” measures as calculated by the DMPA composite score used in this study should be interpreted conservatively. Respondent bias may have occurred in this study since contraception use and sexual activity are sensitive issues. Respondents may have provided inaccurate information to guard their privacy.

**Conclusions**

Parity, cohabiting with a male partner and educational status were positively associated with current DMPA utilization. Understanding social, access and cultural barriers to DMPA use among nulliparous women are crucial for future family planning programs to meet women’s reproductive health needs. Increased utilization in parous women and women living with a male partner may arise from convenient access or due to issues of secrecy or privacy. Further elucidation of these dynamics should be a part of continuing contraception research agenda.

**Recommendations and significance for Maternal and Child Health**

The problem of unmet need for family planning services is a significant concern in reproductive and maternal health in Haiti today. Continued interest by public health
professionals is crucial in meeting women’s unmet need and improving their reproductive health outcomes in Leogane. While evidence about the association of socio-demographic factors with DMPA utilization exists, it is limited. Thus, future contraceptive research agenda should prioritize gaining a deeper understanding of the socio-demographic determinants of DMPA utilization and how they interact to formulating effective policies and programs to increase the DMPA use among reproductive women of Haiti.

References

12. Sedgh G et al., Unmet Need for Contraception in Developing Countries: Examining Women’s Reasons for Not Using a Method, New York: Guttmacher Institute, 2016
44. Babalola S, Fatusi A. Determinants of use of maternal health services in Nigeria - Looking beyond individual and household factors. BMC Pregnancy and Childbirth. 2009;9(43)
47. Limitation of a cross-sectional study Solem, R. ChristianAmerican Journal of Orthodontics and Dentofacial Orthopedics , Volume 148 , Issue 2 , 205
Appendix

Contraception Survey

Demographic Survey FEMALE

Hello, Good morning/afternoon! My name is _________. I am working with Family Health Ministries and Duke University on this health survey. First, I need to find out, do you recall students asking you questions about Contraceptive use last summer? (Instructions: If no, continue. If yes, discontinue.) Thank you for your willingness to participate.

Before we start, I would like to remind you that there is no right or wrong answer. We are interested in knowing what you think, so please feel free to be honest and share your point of view. At any time if you do not feel comfortable answering the question, we can skip it, and if you do not understand the question well, please let me know and I will be happy to explain further. Your answers will be used as information to analyze and might be repeated to people outside of this room but your identity will be kept secret. Your name will not be associated with your responses as this is completely anonymous. No one will know what we have said in this meeting. At any time if you need a break, please let me know.

STUDY ID: ___________________

Demographics

1. How old are you this year? ________
2. Do you own a phone?
   o Yes
   o No
3. What is your highest educational level?
Never went to school
- Elementary (Grade 7-11)
- Middle (Grade 3-6)
- High School (Grade 0-2)
- Post-high school

4. What is your employment status?
- Not employed
- Job with salary
- Unpaid work
- Other, specify: ___________

5. What is your current monthly household income in gourdes? _____Gourdes

6. What is your current monthly expenditure in gourdes? ______Gourdes

7. Do you currently live with a male partner?
- Yes
- No

8. Are you currently sexually active?
- Yes
- No

9. Do you have children of your own?
- Yes, how many and how old are they? _____
- No

10. Do you plan on having (more) children?
- Yes, how many in total? _________
- No

11. Who decides how many children you should have?
- Myself
- My partner
- Family members (e.g. Mother, Grandmother, Aunty etc.)
- My religion
- My community
- Others, please specify __________

12. Did (Will) you plan when to have any of your children?
- Yes
- No

13. Do you know what are contraceptives/family planning/birth controls?
- Yes
  - i. If yes, who told you about modern contraceptives/family planning or birth spacing?
    1. Male Partner
    2. Family Member
    3. Friend or Neighbor
    4. Pastor or Religious Leader
    5. Health Provider
6. Exposure to family planning messages (mass media)
7. Other: ______________________
   ii. Do you think that knowing about family planning is important?
      1. Yes
      2. No
         o No (skip to Question 21)
14. Can using a family-planning method help you decide if you want a child and when you want to have a child?
   o Yes
   o No
   o Don’t know
15. Can using a family-planning method prevent you from having any unwanted/unintended pregnancies?
   o Yes
   o No
   o Don’t know
16. Can you get pregnant even if you used planning but do not use it consistently or at least when sexually active?
   o Yes
   o No
   o Don’t know
17. Can starting a family-planning method now affect my chances of getting pregnant later?
   o Yes
   o No
   o Don’t know
18. If you are using a non-permanent family-planning method and you are ready to have a child now, do you agree that you can stop using a family-planning method anytime?
   o Yes
   o No
   o Don’t know
19. Choose one, if a family planning method is not suitable for me, what can I do:
   o Stop using and not look for another method
   o Stop using and look for another method that is suitable for me
   o Continue using the method
   o Don’t know
20. Do you know where to get modern family-planning methods?
   o Yes, Where?
      i. Clinic
      ii. NGO
      iii. Others, please specify? ______
   o No
21. I am going to list a few modern family-planning methods, tell me if you know about them. (Probe further if they know about them. Such as if they know how to use them, if the planning method are used for men or women (if applicable), what is the period of each use as in every time you have sex/take it every day/take it every 3 months/last more than 3
years/permanent, does it require visiting a health clinic, and whether it can be seen by your partner when used:

i. Pills
   1. Know/Don’t Know *(proceed only if they know)*
   2. Know how to use/Don’t know how to use
   3. For men/for women
   4. Every time you have sex/take it every day/take it every 3 months/more than 3 years/permanent
   5. Need visit to health clinic/ do not need visit to health clinic
   6. Can be seen/Cannot be seen

ii. Injectable/ Depo provera (Shot for Birth Control)
   1. Know/Don’t Know *(proceed only if they know)*
   2. Know how to use
   3. For men/for women
   4. Every time you have sex/take it every day/take it every 3 months/more than 3 years/permanent
   5. Need visit to health clinic/ do not need visit to health clinic
   6. Can be seen/Cannot be seen

iii. Male Condoms
   1. Know/Don’t Know *(proceed only if they know)*
   2. Know how to use
   3. Every time you have sex/take it every day/take it every 3 months/more than 3 years/permanent
   4. Need visit to health clinic/ do not need visit to health clinic
   5. Can be seen/Cannot be seen

iv. Norplant or other implants
   1. Know/Don’t Know *(proceed only if they know)*
   2. Know how to use
   3. For men/for women
   4. Every time you have sex/short term/long term/permanent
   5. Need visit to health clinic/ do not need visit to health clinic
   6. Can be seen/Cannot be seen

v. IUD/Intrauterine Device/Copper T
   1. Know/Don’t Know *(proceed only if they know)*
   2. Know how to use
   3. For men/for women
   4. Every time you have sex/take it every day/take it every 3 months/more than 3 years/permanent
   5. Need visit to health clinic/ do not need visit to health clinic
   6. Can be seen/Cannot be seen

vi. Tubal ligation (female permanent sterilization)
   1. Know/Don’t Know *(proceed only if they know)*
   2. Know how to use
   3. Every time you have sex/take it every day/take it every 3 months/more than 3 years/permanent
4. Need visit to health clinic/ do not need visit to health clinic
5. Can be seen/Cannot be seen

vii. Vasectomy (male permanent sterilization)
1. Know/Don’t Know (*proceed only if they know*)
2. Know how to use
3. Every time you have sex/take it every day/take it every 3 months/more than 3 years/permanent
4. Need visit to health clinic/ do not need visit to health clinic
5. Can be seen/Cannot be seen

viii. Female Condom
1. Know/Don’t Know (*proceed only if they know*)
2. Know how to use
3. Every time you have sex/take it every day/take it every 3 months/more than 3 years/permanent
4. Need visit to health clinic/ do not need visit to health clinic
5. Can be seen/Cannot be seen

22. Do you know of any side effects from using any modern family-planning method?
   o Yes
   o No (skip to Q24)

23. I am going to list some conditions, please let me know if they can be possible side effects for using a modern family-planning method.
   o Bleeding
     i. Yes/No
   o Headache
     i. Yes/No
   o Weight Loss
     i. Yes/No
   o Infertility
     i. Yes/No
   o Weight gain
     i. Yes/No
   o Induced Abortion
     i. Yes/No
   o Nausea
     i. Yes/No
   o Depression
     i. Yes/No
   o Mood Swing
     i. Yes/No
   o No menstruation
     i. Yes/No
   o Decreased sex drive
     i. Yes/No

24. Do you know of any traditional family planning method?
   o Yes, which one? __________
   o No
Attitudes

25. How long do you think you should wait between having one child and the next?
   o 3 months or less
   o 4 to 6 months
   o 6 months to 1 year
   o 2 years
   o More than 2 years
   o Don’t know/Never thought about it

26. Can you become pregnant if you had sex without protection?
   o Yes
   o No

27. Do you think that unintended or unwanted pregnancies are undesirable consequences to family life?
   o Yes
   o No

28. Do you think that a family-planning method should be used before having the first child?
   o Yes
   o No

29. Who do you think should use a family-planning method?
   o Women
   o Men
   o Both

30. Who do you think should decide whether to use a family-planning method?
   o Myself
   o My partner
   o Myself and my partner
   o Family member
   o Others____
   o Don’t know/Never thought about it

31. Does your community or religion allow family-planning methods?
   o Only community
   o Only religion
   o Both allow
   o Both don’t allow
   o Don’t know

32. Are family-planning methods generally affordable?
   o Yes
   o No
   o Don’t know

33. Are family-planning methods convenient to get?
   o Yes
   o No
   o Don’t know

34. Do you think traditional family-planning methods are effective?
35. Will you continue using traditional family-planning methods if they are proven to be ineffective?
   - Yes
   - No (skip to Question 37)

36. Comparing traditional and modern family-planning methods. Do you think that
   - Traditional methods are as effective as modern methods
   - Traditional methods are more effective than modern methods
   - Traditional methods are not as effective as modern methods

37. When choosing a family-planning method, will you prefer a short (i.e. 1-3 months) or long-term (more than 2 years) method?
   - Short
   - Long

38. Would you mind using a family planning method,
   - If the method was not hidden from your partner?
     - Yes
     - No
   - If the method requires a minor surgery done by a doctor? (E.g. incision under the skins or inside the uterus)
     - Yes
     - No

39. When you no longer want to have children, would you consider a family planning method that will make you infertile?
   - Yes
   - No

40. Would your _______ accept that you use a family planning method that will make you infertile?
   - Partner
     - Yes
     - No
     - Don’t know
   - Community
     - Yes
     - No
     - Don’t know
   - Religion
     - Yes
     - No
     - Don’t know

41. At what age did you first have penetrative sexual intercourse? ________
42. Did you use any form of family planning method before, traditional or modern?
   - Yes
   - No (Skip to Question 44)
43. Are you still currently using this family-planning method?
   o Yes

   I. Which method are you using?
      o Male Condom
      o Female Condom
      o Pills
      o Injectable
      o IUD
      o Implant
      o Tubal Ligation
      o Vasectomy
      o Traditional methods
      o Others, please specify ______

   II. How long have you been using this family-planning method?
      o Less than 3 months
      o 3-6 months
      o 6-12 months
      o 12 months to 2 years
      o More than 2 years

   III. Did anyone discuss with you any possible side effects for that family-planning method?
      o Yes
      o No

   IV. Did you experience any side effects?
      o Yes
      i. What was the side effect?
         1. Feeling sick
         2. Bleeding
         3. Headache
         4. Others, please specify ______
      ii. Were you ever told about using another method that may be more suitable?
         a. Yes
         b. No

   V. Did you get the family-planning method on your own?
      o Yes
      o No
      i. Please specify: ______________

   VI. Did anyone tell you if that family-planning method would be suitable for you?
      o Yes
      o No

   VII. Are you satisfied with the method?
      o Yes
42. Why did you stop using this method?
   o Wanted children again
   o Experienced side effect
   o Partner opposition
   o Lack of knowledge
   o Others, please specify __________

(ONLY IF ANSWERED NO iN QUESTION 42)
44. Would you ever use modern family-planning method?
   o Yes
   i. If yes, which method would you prefer to use?
      1. Male Condom
      2. Female Condom
      3. Pill
      4. Injectable
      5. IUD
      6. Implants
      7. Tubal ligation
      8. Others, please specify: __________
   o No

45. If no, what is the primary reason you decided not to use modern methods for contraception?
   ______________________________________________________________________________
   __

Is there anything else? Do you have any questions?

Initiate closure

Thank you for taking the time to talk to us. This is valuable information that will allow us to understand more about contraception in the community. We hope you have a great evening. Thank you.