Modern contraceptive use among female adolescents in rural Nigeria: Does exposure to family planning messages matter?

A cross-sectional study [version 1; peer review: 1 approved]

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Abstract

Background: The world currently has the highest number of adolescents in all of history. Africa is home to quite a number of them, with most of these adolescents in Africa live in rural areas where they are more disadvantaged and their reproductive decisions could have telling impacts on their lives, family planning (contraception) has been identified as important to avoid such impacts. Factors associated with the use of modern contraceptives among female adolescents have been extensively researched but the importance of mass media family planning messages on modern contraceptives use among female adolescents in rural Nigeria is under-researched, hence this study.

Method: This paper uses the 2013 Nigeria Demographic and Health Survey (NDHS) data with a weighted sample size (n=4473) to examine the association between exposure to family planning messages and use of modern contraceptives among female adolescents in rural Nigeria.

Results: Findings indicated that exposure to family planning messages on radio and television were significantly associated with use, however, educational attainment and region of residence were other factors that influenced contraceptive use. Therefore, family planning messages through traditional media (radio and television) is associated with the use of modern contraceptives among female rural adolescents in Nigeria.

Conclusion: The study concludes that family planning messages through mass media especially radio and television are associated with modern contraceptives use among rural adolescents. The continued use of mass media could create opportunities to achieve more results in family planning although the messages should be resident-specific and targeted to various cadres of people with consideration for the level of education to ensure efficiency of the message.
Keywords
Female Adolescents, Modern Contraceptive, Family Planning, Nigeria, National Demographic and Health Survey (NDHS)

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Introduction

The world is currently beaming with the highest number of young people in all of human history. Amongst these young people are an estimated 260 million women aged 15–19 years living in developing countries alone, with an estimated 70% of these adolescent women living in sub-Saharan Africa (United Nations, 2017). These groups of people between the ages 10–19 are always thought of as a healthy group. Nevertheless, quite a number of them suffer and die from causes that could have been easily preventable if the necessary reproductive health services like contraception were made available. This is because, they get involved in risky sexual behaviors, like having unprotected sexual intercourse, which makes adolescent females susceptible to unwanted pregnancies, may result in abortion, abortion-related complications, and other health and social problems like dropping out of school (Boamah et al., 2014; Muula, 2008) eventually hampering their life chances.

Nigeria is the seventh most populous country in the world with a population close to 200 million people, is projected to be the third most populated country by 2050, eclipsing the likes of USA and Brazil due to the nation’s high fertility rate and large youth population (United Nations, 2017). With the population growing at this rate, achieving the Sustainable Development Goals (SDGs) could be difficult for the nation. Like many less developed and developing countries in sub-Saharan Africa and other parts of the world, a significant number of the population of Nigeria live in rural areas, where the use of health services, especially reproductive health services, is considerably lower compared to the urban areas.

Contraceptives have been identified as a veritable tool in controlling excess population growth, the government and concerned stakeholders in many countries have been promoting the use of contraceptives through various ways, of which mass media is one (Ajaero et al., 2016; Okigbo et al., 2015). Aside reducing and controlling high population growth, contraception also has other direct health benefits including prevention of unintended pregnancy and subsequent reduction in maternal mortality and morbidity, and reduction in the spread of Sexually Transmitted Infections (STIs) (de Almeida et al., 2003; Okigbo et al., 2015; Osmani et al., 2015). Studies have found that urban dwellers are more likely to use contraceptives compared to their rural counterparts (Ajaero et al., 2016; Candia et al., 2017; Gupta et al., 2003). Mass media has been found to play a significant role on the use of contraception and promotion of family planning (Bankole, 1994; Bankole et al., 1996; Candia et al., 2017; Gupta et al., 2003; Jato et al., 1999; Parr, 2001) and it has been found that mass media based family planning messages have the capacity to raise an individual’s awareness, influence their attitude and increase the uptake of family planning (Omoera, 2010). Evidence abounds in the various literatures that exposure to family planning messages could inform people’s decision to family planning services including contraceptives. For instance, (Khan et al., 2012) in a study in Bangladesh found that ever use of contraceptive was positively associated with the exposure to mass media. Also, (Ajaero et al., 2016) found that access to mass media family planning messages increased the likelihood of respondents making use of family planning.

The importance of mass media in promoting the use of contraceptive cannot be downplayed since studies have already established that it plays an important role in positively influencing an individual’s decision to use a contraceptive. Considering the reported low likelihood of rural people using contraceptive compared to urban dwellers, there is need to focus the role played by mass media family planning messages in the use of modern contraceptive amongst rural adolescents because no nationally representative study has focused on rural adolescents. Hence, this paper examined the role of exposure to mass media family planning messages on the use of modern contraceptive among rural adolescent women in Nigeria, with the findings being helpful in identifying more effective ways to reach out to rural adolescents and eventually improve the use of modern contraceptives among them.

Methods

Data were extracted from the 2013 Nigeria Demographic and Health Survey (NDHS), with a representative sample of 38,948 women selected in two stages. The DHS data is collected at an interval of 5 years in many countries across the world by the statistical or population agencies of these countries with technical and financial support from the Measure DHS and USAID. The sampling procedure for the DHS is the use of a two-stage stratified sampling technique. All women in the reproductive age group 15–49 who were either permanent residents of the households or visitors who slept in the households the night before the survey were eligible for the interview, however, for the purpose of this study, an eligibility criterion was set for inclusion in the study. For eligibility for inclusion in the study, women aged 15–19 years of age and residing in the rural areas at the time of the survey were eligible and included which generated a weighted sample size of 4473 women.

Data were analyzed using Stata Version 13.0 at three stages of analysis. Firstly, a descriptive summary of all the independent variables was presented using frequency distributions. Secondly, using the Pearson’s chi-square, the test of association between use of modern contraceptives and the independent variables was observed and independent variables that were found to be significant at (p≤0.05) were considered for further analysis at the multivariable level. Finally, binary logistic regression models were fitted to examine the role of exposure to mass media on contraceptive use among rural adolescents. This was used because of the dichotomous nature of the dependent variable which was coded; use of modern contraceptive (1) and non-use (0), while the independent variables used in the study; access to mass media family planning messages were all dichotomized into Yes (1) and No (0) for television, radio and Newspaper/ Magazine. The independent variables considered in the study were the region of residence, level of education, household wealth index, religion, and marital status.
Results and discussions

Results
The pie chart below shows the distribution of the respondents by use of modern contraceptives, the majority of the rural adolescents (96%) were not using any method of modern contraceptive method, while 4% percent reported using at least one modern contraceptive method.

Table 1 below shows the distribution of the respondents by selected socio-economic and demographic characteristics. The majority of respondents stated that they did not hear family planning message on the radio in the last few months (86%) and less than 15% indicated they did, while 95% of the respondents said that they did not see or hear family planning message on television in the last few months. In terms of reading family

| Variables                        | Frequency (4473) | Percentage (%) |
|----------------------------------|------------------|----------------|
| **Heard about FP on radio last few months** |                  |                |
| No                               | 3828             | 85.57          |
| Yes                              | 645              | 14.43          |
| **Heard about FP on TV last few months** |                  |                |
| No                               | 4236             | 94.70          |
| Yes                              | 237              | 5.30           |
| **Read about FP on Magazine/Newspaper last few months** |                  |                |
| No                               | 4400             | 98.36          |
| Yes                              | 73               | 1.64           |
| **Level of Education**           |                  |                |
| No education                     | 1935             | 43.26          |
| Educated                         | 2538             | 56.74          |
| **Household Wealth Index**       |                  |                |
| Poorest                          | 1235             | 27.61          |
| Poorer                           | 1342             | 30.01          |
| Middle                           | 1060             | 23.71          |
| Richer                           | 626              | 14.00          |
| Richest                          | 209              | 4.67           |
| **Religion**                     |                  |                |
| Catholic                         | 437              | 9.78           |
| Protestants                      | 1340             | 29.97          |
| Islam                            | 2631             | 58.82          |
| Traditional/Others               | 63               | 1.42           |
| **Region**                       |                  |                |
| North-Central                    | 852              | 19.06          |
| North-East                       | 833              | 18.62          |
| North-West                       | 1622             | 36.26          |
| South-East                       | 247              | 5.52           |
| South-West                       | 642              | 14.35          |
| South-South                      | 276              | 6.19           |
| **Marital Status**               |                  |                |
| Married                          | 1850             | 41.36          |
| Unmarried                        | 2623             | 58.64          |
planning messages in newspapers or magazines, 98% indicated they had not, while less than 2% said they read about family planning in newspapers or magazines in the last few months.

The majority of the respondents were either not educated (43%) or were educated up to secondary level (42%). The univariate data analysis also revealed that less than 5% of the respondents were from the richest households, 30% from the poorer households, while the proportion of women from the poorest, middle and richer households were 27%, 24%, and 14% respectively. It was observed that 58% of respondents practice Islam, Christians were 30%, about 10% Catholics and almost 2% are traditionalists and other religions. The regional distribution of the respondents revealed that almost an equal proportion (19%) of the respondents are from the North-central and Northeast regions of the country; 36% and 5%, which is the highest and lowest proportions, are from the North-West and South-East regions respectively; while the South-South and South-West account for 6% and 14% of the respondents respectively.

Figure 1. Distribution of respondents by use of modern contraceptive.

Figure 2. Distribution of the ownership of mass media in households in rural Nigeria. In the graph below, the distribution of households’ ownership of radios and televisions in rural Nigeria revealed that 61% of the households’ own radios and 28% of households in rural areas reported owning a television set.
Figure 3. Engagement with mass media in rural households of Nigeria. The graph below revealed that 28% of respondents listen to the radio at least once a week, 23% watch television, while only 5% read newspapers/magazines at least once a week.

Bivariate analyses

Table 2 below presents the relationship between the independent variables and use of modern contraceptives using the chi-square analysis. The analysis shows that about 3% of those who claimed not to have heard about family planning message on the radio in the last few months were using modern contraceptives, while among those who heard 11% were using modern contraceptives. A significant relationship was found between hearing about family planning on the radio and the use of modern contraceptive. For those who heard or watched family planning messages on TV in the last few months, about 17% of them were using modern contraceptives. The highest proportion of modern contraceptive users were those who have in the last few months been exposed to family planning messages in newspapers/magazines with 20% and an association existed at p<0.05.

Considering the socio-economic and demographic characteristics of respondents, all examined variables were found to be significant with contraceptive use at the bivariate level. However, a deeper analysis revealed that less than 7% of educated women reported using a modern contraceptive, while almost 1% of the uneducated adolescent women reported using a modern contraceptive. By household wealth index, the analysis revealed that more contraceptive users were from the richest households (10%) while the lowest users of modern contraceptive were from the poorest household. The bivariate analysis results further revealed that the highest percentage of modern contraceptive users by religion were Protestants with 8%, and Muslims accounted for the lowest numbers of those using modern contraceptives. By region of residence, the highest proportion of rural adolescents using modern contraceptive were found in the South-South region of the country with more than 11%, and the lowest proportion was from the northern region; precisely the North-West region of the country at less than 1%. Considering marital status, the highest percentage of those using modern contraceptive was unmarried women with 6%, while less than 1% of married rural adolescents were using modern contraceptives. Since all the independent variables were found to be significantly associated with the use of modern contraceptives among rural adolescents, all the variables were used in the multivariate analysis to examine the role they play in the use of modern contraceptive among rural adolescents.

Multivariate analysis

Table 3 below presents the results of the binary logistic regression of the influence of exposure to mass media family planning messages on the use of modern contraceptives among adolescent women in rural areas of Nigeria. Two models are presented; the first model relates modern contraceptive use with exposure to family planning messages on radio, television and newspapers or magazines while in the second model, there was a control for the effect of other independent variables. In the first model, the study found that the odds of using modern contraceptive were 2.56 times significantly higher for those who heard about family planning on the radio in the last few months compared to those who did not. The odds of adolescent women who heard about family planning on TV in the last few months using modern contraceptives was found to be 2.48 times significantly higher than those who did not, the study also found that the odds of rural adolescents using modern contraceptives was
Table 2. Association between selected variables and use of modern contraceptive.

| VARIABLES | Non-Use | Use |
|-----------|---------|-----|
| Heard about Family Planning on radio last few months | | |
| No | 96.94 | 3.06 |
| Yes | 88.55 | 11.45 |
| $\kappa = 105.70$ | $\Pr = 0.000$ |
| Heard about Family Planning on TV last few months | | |
| No | 96.54 | 3.46 |
| Yes | 83.48 | 16.52 |
| $\kappa = 127.62$ | $\Pr = 0.000$ |
| Read Family Planning from Magazine/Newspaper last few months | | |
| No | 95.96 | 4.04 |
| Yes | 79.61 | 20.39 |
| $\kappa = 64.02$ | $\Pr = 0.000$ |
| Level of Education | | |
| No education | 99.88 | 0.12 |
| Educated | 93.14 | 6.86 |
| $\kappa = 117.77$ | $\Pr = 0.000$ |
| Household Wealth Index | | |
| Poorest | 99.55 | 0.45 |
| Poorer | 97.81 | 2.19 |
| Middle | 94.11 | 5.89 |
| Richer | 90.54 | 9.46 |
| Richest | 90.27 | 9.73 |
| $\kappa = 128.91$ | $\Pr = 0.000$ |
| Religion | | |
| Catholic | 92.27 | 7.73 |
| Protestants | 91.67 | 8.33 |
| Islam | 99.02 | 0.98 |
| Traditional/Others | 97.83 | 2.17 |
| $\kappa = 145.35$ | $\Pr = 0.000$ |
| Region | | |
| North-Central | 95.65 | 4.35 |
| North-East | 98.97 | 1.03 |
| North-West | 99.85 | 0.15 |
| South-East | 92.58 | 7.84 |
| South-West | 90.68 | 9.32 |
| South-South | 88.24 | 11.76 |
| $\kappa = 227.76$ | $\Pr = 0.000$ |
| Marital Status | | |
| Married | 99.34 | 0.66 |
| Unmarried | 93.56 | 6.44 |
| $\kappa = 85.22$ | $\Pr = 0.000$ |

Table 3. Logistic regression analysis of the influence of mass media exposure on the use of modern contraceptive.

| VARIABLES | MODEL 1 | MODEL 2 |
|-----------|---------|---------|
| | OR | 95%CI | OR | 95%CI |
| Heard FP on radio last few months | | |
| No | 1 | 1 |
| Yes | 2.56** | 1.79-3.65 | 1.94** | 1.35-2.78 |
| Heard FP on TV last few months | | |
| No | 1 | 1 |
| Yes | 2.48** | 1.62-3.81 | 1.32 | 0.86-2.01 |
| Heard FP from Newspaper/Magazine last few months | | |
| No | 1 | 1 |
| Yes | 2.05** | 1.16-3.61 | 1.84** | 1.05-3.23 |
| Region | | |
| North-Central | 1 |
| North-East | 0.48 | 0.23-1.02 |
| North-West | 0.11** | 0.02-0.46 |
| South-East | 1.05 | 0.57-1.92 |
| South-South | 1.96** | 1.27-3.03 |
| South-West | 1.74** | 1.02-2.95 |
| Level of Education | | |
| No Education | 1 |
| Educated | 8.52** | 1.89-38.29 |
| Wealth Quintile | | |
| Poorest | 1 |
| Poorer | 1.12 | 0.41-3.11 |
| Middle | 1.38 | 0.51-3.74 |
| Richer | 1.55 | 0.56-4.24 |
| Richest | 1.20 | 0.41-3.51 |
| Marital Status | | |
| Married | 1 |
| Unmarried | 1.63 | 0.85-3.13 |
| Religion | | |
| Catholic | 1 |
| Christians | 0.74 | 0.48-1.14 |
| Islam | 0.68 | 0.36-1.26 |
| Traditional/Others | 0.46 | 0.06-3.66 |

** implies significant with $p< 0.05$
In the second model, the analysis controlled for the effect of other variables and it was still found that hearing about family planning on the radio and in newspapers/magazines in the last few months were still found to be associated with the use of modern contraceptives among rural adolescent women in Nigeria, however, the odds reduced; the odds of using contraceptive for those who heard about family planning on radio in the last few months was 1.84 times higher than those who did not, the odds of using contraceptive was also found to be 1.86 times higher for those who heard about family planning in newspapers/magazines than those rural adolescents who did not. Considering other variables, the odds of using modern contraceptive was highest for rural adolescents from the South-South region (OR=2.01), followed by those from the South-West (OR=1.77), while those with the lowest odds of using modern contraceptive are rural adolescents from the North-West region of the country (OR=0.10). Pertaining to the level of education, the odds of using modern contraceptive was found to be 8.52 times higher for educated rural adolescent women than the uneducated ones, the result household wealth index reveals that rural adolescents from richer household have the highest odds of using modern contraceptive (OR=1.55), followed by those from the middle and richest households with odds of 1.38 and 1.20 respectively, although the variable was not found to be significantly associated with the use of modern contraceptives. Unmarried rural adolescent women were found to have a higher odds ratio of 1.63 of using modern contraceptive compared to their married counterparts. Finally, the results of the analysis also show that compared to the Catholics, the odds of using modern contraceptive was 0.74 lower for other Christians. The odds of using modern contraceptives was also found to be 0.68 times and 0.46 times lower for Muslims and traditionalists respectively compared to the Catholics. Unmarried adolescent women were found to have 1.63 times higher odds of using modern contraceptive compared to those who are currently married.

Discussion

In this study, our main tool of analysis was the binary logistic regression based on the 2013 Nigeria Demographic and Health Survey data, and the study examined the role of mass media in the use of modern contraceptives among rural adolescents. The study was informed by the fact that young people, especially adolescents in rural areas, are at a greater disadvantage in accessing healthcare compared to their counterparts in urban areas, they also seem to have limited access to mass media information and messages. It was found that hearing about family planning on radio, television and newspapers or magazines in the last few months was associated with the use of modern contraceptives among these adolescents, which is consistent with the finding that the common source of information on family planning in Ghana is radio and television Boamah et al. (2014), also with studies like Gupta et al. (2003) where it was found that women’s exposure to behaviour change communication (BCC) messages was significantly associated with increased contraceptive use. This association between exposure to radio family planning messages could be explained by the fairly ubiquitous nature of radio in Nigeria, especially in the northern part of the country. Even after controlling for the effect of other socio-economic and demographic characteristics of the adolescent women, it was still found that hearing about family planning messages on radio and newspaper or magazine in the last few months was associated with the use of modern contraceptives, this result echoes the result from the work of Jacobs (2016) in West Africa, where a positive relationship was also found between family planning message exposure and use of modern contraceptive among adolescents in Senegal and Burkina-Faso. The findings of this study are furthermore consistent with the findings of Khan et al. (2012) where a positive significant association was found between exposure to mass media and ever use of modern contraceptives.

A number of other socio-demographic variables were also found to be significantly associated with the use of modern contraceptives among these rural adolescent women. Education level and region of residence of the women were the other variables found to be significant with the use of modern contraceptive. The findings on education are consistent with findings in the literature (Ajaero et al., 2016; Khan et al., 2012; Osmani et al., 2015; Yidana et al., 2015). In most of these studies, a dose-response sort of relationship was found between education and use of contraceptive especially the modern methods.

Conclusion

This study is focused on exploring the role of exposure to mass media family planning messages on the use of modern contraceptives among rural adolescent women in Nigeria. Modern contraceptive use among these women was found to be influenced by exposure to family planning mass media messages especially from radio and newspapers/magazines even after controlling for the effect of other socio-economic and demographic characteristics of these women. Hence, this study has been able to point to the important role played by mass media in fronting information on the adoption of modern contraceptives in rural context by providing information mediums of family planning message dissemination that are needed to effect attitudinal and behavioral change among adolescent women. It is also important to note that this group of people is now drifting away from getting information from radios and newspapers to mobile phones, through such mediums as Facebook, SMS, Twitter and Instagram due to the affordability of smartphones and internet services even in rural areas. This could provide a cost-effective alternative method of disseminating this information to a far-reaching effect in the lives of these adolescents. In developing family planning programmes, residence categories, language, and means of information dissemination should be of utmost consideration.
Limitations to the study
The Cross-sectional research design for the data collection makes it impossible to infer causality in any way. Therefore, it might be difficult to establish causal factor of contraceptive use in relation to family planning messages through the mass media.

Data availability
The 2013 Nigeria Demographic and Health Survey (N-DHS) dataset used for this study is available online from the DHS website: https://dhsprogram.com/data/dataset/Nigeria_Standard-DHS_2013.cfm?flag=0 under the ‘Individual Recode’ subsection.

Data can be accessed by applying through the DHS website. Please see their data access help page for information.

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This is a fairly written article in a very important area of FP use among a critical group in underserved settings (rural) where use is minimal. There are a few comments that may need clarification:

Abstract:
  ○ In the key words, National DHS is not true. It's Nigeria DHS. Please revise.
  ○ When they mention "messages should be resident-specific", what do the authors mean?
  ○ The study did not find any issue about residence-specific messages because these were never assessed anyway. This conclusion thus may need revision.
  ○ What do the authors mean by "efficiency of the message."? This is unclear, especially in the context used.

Introduction:
  ○ The statement in the first paragraph stating that this group is always thought of as healthy is not backed by evidence. I don't think this is true.
  ○ Please add the word "unsafe" before “abortion” in the second last sentence of the 1st paragraph. I think that defines the danger related to abortion.
  ○ In the 2nd paragraph, what is the difference between less developed and developing countries? Aren’t these used interchangeably?

Results:
  ○ 96% is most (not just the majority, in my honest opinion).
Do not use the terms "below" when referring to tables and figures. The final print may not always show these to be below. Just indicate table and figure references.

Did the DHS have "last few months" defined? If not, please ignore comment.

In Table 1: I don't think you should collapse all education into educated and non-educated. If the variable is labelled “level of education”, then one expects to see the various levels. Either re-label the variable or do not collapse educated. The girls who have had some secondary are likely to be significantly different from others. On the other hand, those who have had only some primary level attendance up to lower primary cannot be classified as educated especially relating to message effect that the study is assessing. Also in this table, the authors use "protestant", but later in the discussion, they use "other Christians". Please be consistent.

Page 5, first paragraph: 98+ less than 2% do not yield 10%, please correct the wording.

2nd paragraph of page 5; where is the secondary level that is reported here in the table? It is missing in the table and drops here out of the blue. In the same paragraph, there is no need to repeat every figure from the table; only summarize, since the table is available for reference.

Where is the "n" for modern contraceptive methods use? Also the authors don't mention if this is current use or ever use. It would be interesting to also get a sense of ever use.

Figure 2 presents HH information. In my honest opinion, I think you need to show adolescents living in HHs that own a radio or TV, other than HHs that own these. There are HHs with more than one adolescent. Again do not use the word "below" because it's not always true that graphs are below (like in this case for instance). This comment applies to all of the results section.

Paragraph 2 of page 6: 7% of educated is not true. As I indicated earlier some primary up to lower level attendance cannot be classified as Educated. May be written, "some level of education."

Tables 2 and 3: Can the authors indicated the number of cases "n" for the models?

Is there a reason why we have confidence intervals so wide for education in Table 3? Quite surprising. What are the numbers like for this variable?

In the 2nd paragraph on page 8, please mention that the religion associations were not significant. This is missing. Also mark the use of protestant versus other Christians.

Conclusion:

The conclusion about other media like social media doesn't yield from this study. Also show evidence about these alternative sources and maybe move it to the discussion. I don't know where it will fit best though.
Limitations:
○ Could the numbers be an issue? Please check the CIs for education. The prevalence of 4%, what numbers are you including in the models as you control for other variables?

References:
○ I think a bit more reading to beef up the discussion will improve the paper significantly.

Otherwise, well done.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Yes

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Reproductive health, family planning research, Qualitative methodology.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 06 May 2019
Victor Chima, Obafemi Awolowo University, Ilé-Ife, Nigeria

Dear Simon,
Thank you for the detailed review of the paper. We have made corrections to some contextual observations such as labeling of the education variable, use of interchangeable words in the same sentence “less developed and developing”, the religion variable and use of specific adjectives to qualify contexts “unsafe” abortions.

Specifically, we would run the analysis over to identify reasons for the confidence interval in the education variable.

The survey used the household recode data collected for households and examined households that own radio and television, not by adolescents so we can only report based on adolescents living in household with radio and television, utilizing their frequency of engagement with these facilities.

Further readings would be done to improve the discussion section and uploaded in the next version of submission.

Best regards.

*Competing Interests:* No competing interest