Long-acting reversible contraceptives use among adolescent girls and young women in high fertility countries in sub-Saharan Africa

Francis Sambah1,2, Richard Gyan Aboagye3, Abdul-Aziz Seidu1,4, Charles Lwanga Tengan5*, Tarif Salihu6 and Bright Opoku Ahinkorah7

Abstract

Background: Given the instrumental role long-acting reversible contraceptives (LARCs) play in reducing unintended pregnancies, there is a need to understand the factors that predict their use among adolescent girls and young women in high fertility countries. Our study examined the prevalence and predictors of LARCs use among adolescent girls and young women in high fertility countries in sub-Saharan Africa.

Materials and methods: We pooled data from the women’s files of the most recent Demographic and Health Surveys (DHS) from 2010 to 2020 of the top ten high fertility countries in sub-Saharan Africa, which are part of the DHS programme. The total sample was 5854 sexually active adolescent girls and young women aged 15–24 who were using modern contraceptives at the time of the survey. Descriptive and multilevel logistic regression models were used in the analyses. The results were presented using percentages and adjusted odds ratio (AOR) with their respective 95% confidence intervals (CIs).

Results: At the descriptive level, the overall prevalence of LARCs utilisation was 17.6% in the ten countries, with the lowest of 1.7% in Angola and the highest of 55.8% in Mali. Adolescent girls and young women who were married had a lower likelihood of LARCs utilisation than those who were never married [AOR = 0.63, 95% CI = 0.45, 0.88]. Adolescent girls and young women who wanted no more children had higher odds of LARCs use compared to those who wanted more children [AOR = 1.56, 95% CI = 1.09, 2.26]. Adolescent girls and young women with one to three births [AOR = 6.42, 95% CI = 4.27, 9.67], and those with four or more births [AOR = 7.02, 95% CI = 3.88, 12.67] were more likely to use LARCs compared to those who had no children. Countries in sub-Saharan Africa with lower probability of utilizing LARCs were Angola, Niger and Mozambique, whereas adolescent girls and young women in Mali had higher probability of utilizing LARCs.

Conclusion: Our findings suggest that LARCs utilisation among adolescent girls and young women is low in high fertility countries in sub-Saharan Africa. To reduce the rates of unplanned pregnancies and induced abortions, it is imperative that adolescent girls and young women in sub-Saharan Africa are educated on the advantages of utilising LARCs. Additionally, governments, policymakers, and stakeholders in sub-Saharan Africa should raise awareness by executing health promotion measures to enhance the demand for LARCs among adolescent girls and young women.
Background
Unintended pregnancy is a major problem among sexually active women and can result from incorrect, inconsistent, or non-use of contraception, or contraceptive failure—that is, becoming pregnant while using a family planning method [1]. There have been significant global efforts to reduce fertility rates and unplanned pregnancies [2]. Notwithstanding the increasing contraceptive availability, unplanned pregnancy remains a worldwide problem, representing as many as 30% of all known pregnancies [1]. Various approaches have been suggested to reverse this alarming trend, especially through the increased use of long-acting reversible contraceptives (LARCs) [1]. The World Health Organization (WHO) describes adolescents and young people as individuals aged 10–19 and 15–24 respectively. Adolescent pregnancy is a persistent global health problem [3]. Adolescent child birth account for 11% in the ten countries, with the lowest of 1.7% in Angola and the highest of 55.8% in Mali. Adolescent girls and young women who were married had a lower likelihood of using long-acting reversible contraceptives than those who were never married. Adolescent girls and young women who wanted no more children had higher odds of long-acting reversible contraceptive use compared to those who wanted more children. Adolescent girls and young women with one to three births, and those with four or more births were more likely to use long-acting reversible contraceptives than those who had no child. To reduce the rates of unplanned pregnancies and induced abortions, there is the need to educate adolescent girls and young women on the advantages of utilising long-acting reversible contraceptives. Additionally, governments, policymakers, and stakeholders in sub-Saharan Africa should raise awareness by executing health promotion measures to enhance the demand for long-acting reversible contraceptives among adolescent girls and young women.

Achieving these would not only prevent unplanned pregnancies and induced abortions, but also help meet the United Nation’s health and well being for all as enshrined in Sustainable Development Goals 3 and 5.

Keywords: Predictors, Long-acting reversible, Contraceptive, Sub-Saharan Africa, DHS

Plain language summary
The use of long-acting reversible contraceptives can contribute to the reduction of unintended pregnancies. Hence, knowledge of the prevalence and predictors of long-acting reversible contraceptives use among adolescent girls and young women in high fertility countries in sub-Saharan Africa is important in public health. Our study examined the predictors of long-acting reversible contraceptives among adolescent girls and young women in ten high fertility countries in sub-Saharan Africa. A sample of 5854 sexually active adolescent girls and young women were included in the study.

The overall prevalence of long-acting reversible contraceptives utilisation was 17.6% in the ten countries, with the lowest of 1.7% in Angola and the highest of 55.8% in Mali. Adolescent girls and young women who were married had a lower likelihood of using long-acting reversible contraceptives than those who were never married. Adolescent girls and young women who wanted no more children had higher odds of long-acting reversible contraceptive use compared to those who wanted more children. Adolescent girls and young women with one to three births, and those with four or more births were more likely to use long-acting reversible contraceptives than those who had no child. To reduce the rates of unplanned pregnancies and induced abortions, there is the need to educate adolescent girls and young women on the advantages of utilising long-acting reversible contraceptives. Additionally, governments, policymakers, and stakeholders in sub-Saharan Africa should raise awareness by executing health promotion measures to enhance the demand for long-acting reversible contraceptives among adolescent girls and young women.
long-term cost–benefit factors of LARC use in the adolescent population have been well established [10]. However, only 24.7% of adolescent girls and young women in SSA use modern contraceptives, which include LARCs [11]. Age, marital status, religion, employment status, parity, exposure to mass media, desire for more children, ideal number of children and age at first sex have been identified as predictors of modern contraceptive use among adolescent girls and young women aged 15–24 in SSA [11].

Extensive studies have been conducted on LARC use among adolescent girls [12–14]. However, there is limited literature on predictors of LARCs use among adolescent girls and young women in high fertility countries especially those within SSA. Given the instrumental role LARCs play in cutting down unintended pregnancies and ensuring high efficacy rates, there is the need to understand the factors that predict their use among adolescent girls and young women in high fertility countries. We examined the predictors of LARCs use among adolescent girls and young women in high fertility countries in SSA.

Methods

Data source and study design
This study involved secondary data analysis of the most recent Demographic and Health Surveys (DHS) data which were collected using a cross-sectional study design. Data from the top ten high fertility countries in SSA [15] were pooled from the women's file in each country for the study (Table 1). The most recent datasets of the ten countries dated between 2010 and 2020 were considered for inclusion in the study. As shown in the literature, DHS is a nationally representative study conducted in several LMICs across the globe [16]. The survey employed a two-stage sampling technique in recruiting respondents. Detailed sampling methodology has been highlighted in a previous study [17]. Structured questionnaires were used to collect the data from the respondents on health indicators such as contraceptive use [16]. A weighted sample of 5,854 adolescent girls and young women aged 15–24 was included in the final analysis. The survey dataset is freely available to download at https://dhsprogram.com/data/available-datasets.cfm. This manuscript was written per the Strengthening Reporting of Observational Studies in Epidemiology (STROBE) guidelines [18].

Variables

LARCs utilisation was the outcome variable in this study. To assess this variable, sexually active adolescent girls and young women were asked to indicate the type of contraceptive they were using. Those whose type of contraceptive fell outside the types of modern contraceptives were dropped. Among those using modern contraceptives, women who were using an intrauterine device (IUD) and implant were categorised as using LARCs and was coded as “1” whilst the remaining groups of modern contraceptives were coded as “0” not using LARCs. This categorisation of LARC was based on studies that used the DHS dataset [12, 13].

A total of twelve variables were included in the study as explanatory variables. These variables were further sectioned into individual level and contextual level variables. The individual level variables and their categorisation were as follows: age of the respondents (15–24), level of education (no formal education; primary; secondary or higher), marital status (never married; married; cohabiting; formerly married), current working status (not working; working), exposure to radio (no; yes), exposure to television (no; yes), exposure to newspaper or magazine (no; yes), desire for more children (wants more; wants no more; undecided); and parity (zero; one-three births; four or more births). Wealth index (poorest; poorer; middle; richer; richest), place of residence (urban; rural), and the 10 countries used for the study were the contextual level variables. The explanatory variables were selected based on their significant association with contraceptive use from literature as well as their availability in the DHS dataset [12, 13, 19–22].

Statistical analyses

Statistical analysis was carried out using Stata version 16.0. Initially, the data were pooled from each of the 10 countries. Data cleaning and weighting were carried out in each country before appending them for the analysis. The weighting was carried out to obtain unbiased estimates of the results. After appending, the data were reset to a survey type using the surveyset (svy) command in Stata and the surveyset command was used throughout

| S/N | Country | Year of survey | Weighted N | Weighted % |
|-----|---------|----------------|------------|------------|
| 1   | Burkina Faso | 2010 | 740 | 12.69 |
| 2   | Angola | 2015–16 | 769 | 13.18 |
| 3   | Burundi | 2016–17 | 575 | 9.85 |
| 4   | Gambia | 2019–20 | 186 | 3.19 |
| 5   | Mali | 2018 | 470 | 8.05 |
| 6   | Mozambique | 2011 | 618 | 10.59 |
| 7   | Nigeria | 2018 | 739 | 12.66 |
| 8   | Niger | 2012 | 183 | 3.13 |
| 9   | Chad | 2014–15 | 156 | 2.68 |
| 10  | Uganda | 2016 | 1399 | 23.98 |
| 11  | All countries | 2010–2020 | 5834 | 100.00 |
the analysis. Only the sample with complete observation for the variables of interest was included in the final analysis. Percentages were used to summarise the results of the prevalence of LARCs use, using a bar chart. Subsequently, cross-tabulations were performed to determine the distribution of LARCs use across the explanatory variables. A Pearson chi-square test of independence was later performed to examine the variables significantly associated with LARCs use. All significant variables were deemed qualified for inclusion into the regression model. Due to the complex data structure and the hierarchical nature of the DHS dataset, we adopted the multilevel regression model and this was carried out in a binary form. Four models were built to examine the predictors of LARCs use among adolescent girls and young women in the 10 countries. Model O (first model) was fitted to include only LARCs. The results from the model showed the variance of LARCs attributable to the clustering of the primary sampling (PSUs) without the explanatory variables used in the study. Model I, Model II, and Model III were fitted to include the individual-level variables, household/community level variables, and all the explanatory variables respectively. The results of the regression analysis were presented using adjusted odds ratio (aOR) with their respective 95% confidence intervals (CIs). Additionally, Akaike’s Information Criterion (AIC), an output of the random effect analysis was used to test for model fitness and for model comparison. The model with the least AIC was selected as the best-fitted model.

Ethical consideration
Ethical clearance was not obtained for this study since the dataset is freely available in the public domain. Permission to use the DHS dataset was however sought from the MEASURE DHS after which approval was given. We complied with the ethical guidelines on the usage of secondary data for publication. The detailed information on the DHS data usage and ethical standards are available at http://goo.gl/ny8T6X.

Results
Figure 1 shows the prevalence of LARCs utilisation in each of the 10 countries in SSA that participated in the study. The overall prevalence of LARCs utilisation among adolescent girls and young women in the 10 countries was 17.6%. This varied from 1.66% in Angola to 55.8 in Mali.

Table 2 presents the results of the distribution of LARCs utilisation across the explanatory variables. The results indicate high proportion of LARCs utilisation among adolescent girls and young women aged 20–24 years (29.7%). With educational level, the highest prevalence of LARCs use (24.7%) was found among those with no education. It was also found that adolescent girls and young women who were married recorded high prevalence of LARCs utilisation (25.2%), whereas the lowest was observed among those who were never married (10.2%). High proportion of LARCs utilisation was also recorded among those currently working (19.4%). In terms of mass media, adolescent girls and young women who were not exposed to newspaper or magazine (19.2%), those not exposed to radio (18.7%) and those not exposed to television (20.2%) had a higher prevalence of LARCs utilisation. With parity and desire for more children, high proportion of LARCs use was observed among those with four or more births (25.7%), and those who do not want anymore children (23.0%). In terms of wealth index, the highest prevalence of LARCs utilisation (22.7%) was recorded among those in the poorest wealth quintile whereas those in the richest wealth quintile recorded the lowest (14.7%). With place of residence, those in the rural areas reported high prevalence of LARCs utilisation (20.9%). All selected independent variables were significantly associated with LARCs utilisation, except exposure to radio (see Table 2).

Predictors of LARCs
Model III of Table 3 presents the results of the predictors of LARCs use among adolescent girls and young women in the 10 countries. The results revealed lower likelihood of LARCs utilisation among adolescent girls and young women who were married [AOR=0.63, 95% CI=0.45, 0.88] compared to those never married. In terms of desire for more children, it was discovered that adolescent girls and young women who wants no more children had higher odds of LARCs use [AOR=1.56, 95% CI=1.09, 2.26] compared to those who wanted more children. For parity, the study found that those with one to three births [AOR=6.42, 95% CI=4.27, 9.67] and those with four
or more births [AOR = 7.02, 95% CI = 3.88, 12.67] were more likely to use LARCs relative to those who had no child. Countries in SSA with a lower probability of utilising LARCs in model III of Table 3 comprised Angola [AOR = 0.09, 95% CI = 0.04, 0.24], Niger [AOR = 0.23, 95% CI = 0.11, 0.50] and Mozambique [AOR = 0.53, 95% CI = 0.31, 0.92], whereas adolescent girls and young women in Mali [AOR = 12.22, 95% CI = 8.10, 18.41] had higher probability of utilising LARCs compared to Burkina Faso (see Table 3).

Discussion
The purpose of this study was to examine the prevalence and predictors of LARCs utilisation among adolescent girls and young women in ten countries in SSA. The study revealed that the overall prevalence of LARCs utilisation is 17.6%. This varied from 1.7% in Angola to 55.8% in Mali. This indicates that the vast majority of adolescent girls and young women in these countries did not use LARCs. Our findings are consistent with prior studies in Kenya [14] and Ethiopia [23–25]. The consistency of these findings could be explained by the study's population characteristics, as the majority of adolescent girls and young women chose short contraceptive methods over the LARCs. However, the findings of this study are higher than other studies in Tanzania [26], North Ethiopia [27] and Guatemala [28]. It is possible that the use of LARCs in the study group has only lately risen. It had earlier not been recommended for this age group since they had not yet reached their preferred family size. Nevertheless, LARCs has currently been suggested and encouraged for adolescent girls and young women with no children, hence the rise in usage [14, 29, 30]. The result is lower than that of a study of sexually active women from 26 countries in SSA, which found that 21.73% of them use LARCs [12]. The rise in the use of LARCs could be attributed to enhanced community mobilisation and understanding of LARCs among women, as well as variations in study time, location, and socio-demographic backgrounds [31, 32].

The current study found marital status, desire for more children, and parity to be significantly associated with LARCs utilisation. Adolescent girls and young women who were married had lower odds of using LARCs compared to those who were never married. This finding is in line with prior studies that have showed negative relationship between marriage and current contraceptive utilisation [33, 34]. As indicated in the study at Democratic Republic of Congo, a greater percentage of married women were less likely to use modern procedures and LARCs for pregnancy prevention [34]. This could be due to pressure from family or society to have a child shortly after marriage [34]. Adolescent girls and young women should therefore be encouraged to use contraception during antenatal care contacts in order to hearten child spacing and postpone pregnancies. Our

| Variable | Weighted N | Weighted % | LARCs utilization Yes (%) | p-value |
|----------|------------|------------|---------------------------|---------|
| Age of the respondents | | | | |
| 15–19 | 1641 | 28.1 | 12.1 | < 0.001 |
| 20–24 | 4193 | 71.9 | 29.7 | |
| Educational level | | | | |
| No education | 915 | 15.7 | 24.7 | < 0.001 |
| Primary | 1737 | 29.8 | 18.8 | |
| Secondary or higher | 3182 | 54.5 | 14.8 | |
| Marital status | | | | |
| Never married | 2116 | 36.3 | 10.2 | < 0.001 |
| Married | 2014 | 34.5 | 25.2 | |
| Cohabitating | 1347 | 23.1 | 16.1 | |
| Formerly married | 357 | 6.1 | 23.4 | |
| Current working status | | | | |
| No | 2515 | 43.1 | 15.2 | < 0.001 |
| Yes | 3319 | 56.9 | 19.4 | |
| Exposure to newspaper or magazine | | | | |
| No | 4983 | 85.4 | 19.2 | < 0.001 |
| Yes | 851 | 14.6 | 8.1 | |
| Exposure to radio | | | | |
| No | 2916 | 50.0 | 18.7 | 0.362 |
| Yes | 2918 | 50.0 | 16.4 | |
| Exposure to television | | | | |
| No | 3205 | 54.9 | 20.2 | < 0.001 |
| Yes | 2629 | 45.1 | 14.3 | |
| Parity | | | | |
| Zero birth | 1741 | 29.8 | 5.6 | < 0.001 |
| One to three births | 3922 | 67.2 | 22.5 | |
| Four or more birth | 171 | 2.9 | 25.7 | |
| Desire for more children | | | | |
| Wants more | 5273 | 90.4 | 17.4 | < 0.001 |
| Wants no more | 374 | 6.4 | 23.0 | |
| Undecided | 187 | 3.2 | 11.3 | |
| Wealth index | | | | |
| Poorest | 539 | 9.2 | 22.7 | < 0.001 |
| Poorer | 765 | 13.1 | 21.5 | |
| Middle | 958 | 16.4 | 19.2 | |
| Richer | 1366 | 23.4 | 16.7 | |
| Richest | 2206 | 37.8 | 14.7 | |
| Place of residence | | | | |
| Urban | 2921 | 50.1 | 14.2 | < 0.001 |
| Rural | 2913 | 49.9 | 20.9 | |
Table 3  Fixed-random effects analysis of predictors of LARCs use among adolescent girls and young women

| Variables                  | Model O        | Model I AOR [95% CI] | Model II AOR [95% CI] | Model III AOR [95% CI] |
|----------------------------|----------------|----------------------|-----------------------|------------------------|
| Fixed-effect results       |                |                      |                       |                        |
| Age of the respondents     |                |                      |                       |                        |
| 15–19                      | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| 20–24                      | 1.16 [0.92,1.45]| 1.27 [0.99,1.64]     |                       |                        |
| Educational level          |                |                      |                       |                        |
| No education               | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Primary                    | 0.73* [0.55,0.97]| 0.9 [0.67,1.23]     |                       |                        |
| Secondary or higher        | 0.88 [0.67,1.15]| 0.91 [0.67,1.23]     |                       |                        |
| Marital status             |                |                      |                       |                        |
| Never married              | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Married                    | 0.96 [0.69,1.32]| 0.63** [0.45,0.88]   |                       |                        |
| Cohabiting                 | 0.65** [0.47,0.89]| 0.74 [0.53,1.04]     |                       |                        |
| Formerly married           | 1.00 [0.63,1.59]| 1.05 [0.67,1.65]     |                       |                        |
| Current working status     |                |                      |                       |                        |
| No                         | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Yes                        | 1.18 [0.98,1.42]| 1.13 [0.92,1.39]     |                       |                        |
| Exposure to reading newspaper or magazine |        |                      |                       |                        |
| No                         | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Yes                        | 0.53*** [0.36,0.77]| 1.04 [0.70,1.55]     |                       |                        |
| Exposure to listening to radio |            |                      |                       |                        |
| No                         | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Yes                        | 1.02 [0.83,1.24]| 1.07 [0.86,1.34]     |                       |                        |
| Exposure to watching television |              |                      |                       |                        |
| No                         | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Yes                        | 0.97 [0.79,1.21]| 0.85 [0.66,1.11]     |                       |                        |
| Desire for more children   |                |                      |                       |                        |
| Wants more                 | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Wants no more              | 1.21 [0.86,1.72]| 1.56* [1.09,2.26]    |                       |                        |
| Undecided                  | 0.55* [0.32,0.96]| 0.91 [0.51,1.64]     |                       |                        |
| Parity                     |                |                      |                       |                        |
| Zero birth                 | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| One to three births        | 5.04*** [3.43,7.40]| 6.42*** [4.27,9.67] |                       |                        |
| Four or more births        | 5.44*** [3.08,9.59]| 7.02*** [3.88,12.67] |                       |                        |
| Wealth index               |                |                      |                       |                        |
| Poorest                    | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Poorer                     | 0.97 [0.69,1.36]| 0.95 [0.67,1.34]     |                       |                        |
| Middle                     | 0.88 [0.62,1.24]| 0.92 [0.65,1.31]     |                       |                        |
| Richer                     | 0.80 [0.56,1.14]| 0.91 [0.64,1.31]     |                       |                        |
| Richest                    | 0.83 [0.56,1.22]| 1.09 [0.72,1.64]     |                       |                        |
| Place of residence         |                |                      |                       |                        |
| Urban                      | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Rural                      | 0.99 [0.75,1.32]| 0.94 [0.69,1.28]     |                       |                        |
| Country                    |                |                      |                       |                        |
| Burkina Faso               | 1 [1.00,1.00]  | 1 [1.00,1.00]        |                       |                        |
| Angola                     | 0.11*** [0.04,0.28]| 0.09*** [0.04,0.24] |                       |                        |
| Burundi                    | 2.28*** [1.52,3.42]| 1.53* [1.00,2.34]    |                       |                        |
| Gambia                     | 5.08*** [2.97,8.69]| 3.76*** [2.19,6.48] |                       |                        |
| Mali                       | 11.64*** [7.86,17.23]| 12.22*** [8.10,18.41]|                       |                        |
| Mozambique                 | 0.65 [0.40,1.05]| 0.53* [0.31,0.92]    |                       |                        |
findings, however, contradict prior studies in Ghana [35] and Nigeria [12, 36] which showed that married women were more likely to use modern contraception for child spacing and limiting births. A probable explanation may be that adult mothers seem to have more children, have reached their family size limit, and do not want any more children, therefore preferring the LARCs technique over short-acting contraceptives [13].

Desire for more children was revealed to have a statistically significant association with LARCs use among adolescent girls and young women in SSA. When compared to adolescent girls and young women who had desire for more children, those who had no desire for more children showed higher likelihood of LARCs utilisation. Thus, we discovered that adolescent girls and young women who did not want more children utilised LARCs more frequently, implying that they are employing procedures that fit their fertility goals. The number of living children was found to have a significant favorable impact on the utilisation of LARCs [14]. Our finding corroborates prior studies [13, 20, 37] which revealed that adolescent girls and young women who showed no desire for more children were more likely to use LARCs to prevent pregnancy. This is to be expected, as long-acting contraceptives are widely regarded as everlasting contraceptive techniques and are primarily used to prevent pregnancy [38]. One possibility is that these adolescent girls and young women had already achieved their reproductive goals.

Our study also discovered that LARCs utilisation was higher among adolescent girls and young women who had at least one child compared to adolescents and young women with no children. The likelihood of using a LARCs increases as the number of children rises [39]. This finding is in congruent with other studies [12, 13, 39–41], where parity was found to be significantly connected with individuals’ fertility behaviours, including request and utilisation of contemporary contraception. This conclusion could be explained by the fact that multiparous women are more likely to get family planning information and contraceptive usage counseling during their pregnancy period, boosting their chances of utilising LARCs [39]. Additionally, a woman with a higher parity may be exposed to several contraception information and experience throughout antenatal and postnatal contacts [39, 42]. The fact that the likelihood of using LARCs increased as the number of children increased could indicate that family planning/maternal child health programs are effectively integrated, because when adolescent girls and young women use these services, they are exposed to more LARCs information and services and can consider meeting their request for spacing or restricting children [14].

In our analysis, adolescent girls and young women in countries, including Angola, Niger, and Mozambique were shown to have a reduced likelihood of using LARCs, whereas adolescent girls and young women in Mali had a higher likelihood of using LARCs. This could be due to the fact that Mali has programs in place to encourage adolescents and young women to use LARCs. The Malian government and family planning professionals’ good efforts to promote modern contraception have resulted in increased LARCs utilisation [43, 44].

### Table 3 (continued)

| Variables     | Model O                          | Model I AOR [95% CI] | Model II AOR [95% CI] | Model III AOR [95% CI] |
|---------------|----------------------------------|----------------------|-----------------------|------------------------|
| Algeria      | 0.69 [0.12, 4.08]                | 0.60 [0.10, 3.44]    | 0.59 [0.10, 3.36]     | 0.58 [0.10, 3.29]      |
| Nigeria      | 1.43 [0.96, 2.14]                | 1.85** [1.21, 2.84]  |                       |                       |
| Niger        | 0.32** [0.15, 0.70]              | 0.23*** [0.11, 0.50] |                       |                       |
| Chad         | 1.19 [0.56, 2.52]                | 1.08 [0.50, 2.33]    |                       |                       |
| Uganda       | 1.43* [1.03, 2.01]               | 1.10 [0.76, 1.59]    |                       |                       |

Random effect results

| PSU variance (95% CI) | 0.93 [0.70, 1.24] | 0.82 [0.60, 1.12] | 0.84 [0.61, 1.15] | 0.79 [0.57, 1.10] |
| ICC              | 0.22               | 0.20               | 0.20               | 0.19               |

Wald Chi-square

| Reference      | 173.76***          | 335.52***          | 459.18***          |

Model fitness

| Log-likelihood | − 2657.37          | − 2492.68          | − 2340.47          | − 2215.75          |
| AIC            | 5818.74            | 5017.36            | 4712.94            | 4491.51            |
| N              | 5834               | 5834               | 5834               | 5834               |

Number of clusters 954 954 954 954

Exponentiated coefficients; 95% confidence intervals in brackets; AOR = adjusted odds ratios; CI = Confidence Interval; *p < 0.05, **p < 0.01, ***p < 0.001; 1[1.00,1.00] = Reference category; PSU = Primary Sampling Unit; ICC = Intra-Class Correlation; AIC = Akaike’s Information Criterion
Strengths and limitations
The study’s main strength is its relatively large sample size, which allows the findings to be applied to all adolescent girls and young women in the countries that participated in this study. A limitation of this study is that due to the cross-sectional nature of the survey we could only draw associations but not causality among the studied variables. Additionally, due to economic, cultural, and social disparities among countries in SSA, the various recommendations suggested in this study may not be relevant in all sub-Saharan African countries. Furthermore, the impacts of LARCs accessibility and adolescent girls and young women’s views about LARCs use were not taken into account in this study.

Conclusions
The use of LARCs was found to be relatively low in the ten countries included in this study. To improve the use of LARCs among adolescent girls and young women, it is important to implement various strategies and strengthen existing interventions taking into consideration the factors identified in this study.

Abbreviations
COR: Crude odds ratios; AOR: Adjusted odds ratio; CI: Confidence interval; LARCs: Long-acting reversible contraceptives; AGYW: Adolescent girls and young women; SSA: Sub-Saharan Africa; SDG: Sustainable development goal; LMIC: Lower middle-income country; DHS: Demographic and Health Surveys; IUD: Intrauterine device; AIC: Akaike’s information criterion; ICC: Intra-class correlation; PSU: Primary sampling unit.

Acknowledgements
We acknowledge measure dhs for giving us access to the data.

Author contributions
FS conceived the study. RGA, BOA and AS performed the analysis. FS, RGA, AS, CLT and TS had the final responsibility to submit. All authors read and approved the final manuscript.

Funding
None.

Availability of data and materials
Dataset is freely available at https://dhsprogram.com/data/dataset.

Declarations
Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
1. Department of Family and Community Health, Fred N. Binka School of Public Health, University of Health and Allied Sciences, Ho, Ho, Ghana. 2. Centre for Gender and Advocacy, Takoradi Technical University, Takoradi, Ghana.

References
1. Blumenthal PD, Voedisch A, Gemzell-Danielsson K. Strategies to prevent unintended pregnancy: increasing use of long-acting reversible contraception. Hum Reprod Update. 2011;17(1):121–37. https://doi.org/10.1093/humupd/dmq012.
2. Ahinkorah BO, Kang M, Perry L, Brooks F. Prevention of adolescent pregnancy in anglophone Sub-Saharan Africa: a scoping review of national policies. Int J Health Policy Manage. 2020. https://doi.org/10.34172/ijhpm.2020.185.
3. Saavedra-Avendano B, Andrade-Romo Z, Rodriguez ML, Darney BG. Adolescents and long-acting reversible contraception: lessons from Mexico. Matern Child Health J. 2017;21(9):1724–33. https://doi.org/10.1007/s10995-016-2013-1.
4. World Health Organization. WHO Guidelines on Preventing Early Pregnancy and Poor Reproductive Outcomes. 2011. http://whqlibdoc.who.int/publications/2011/9789241502214_eng.pdf?ua=1.
5. Savage AH, Lindsay SF. Adolescents and long-acting reversible contraception: implants and intrauterine devices. Obstet Gynecol. 2018;131(735):130–9.
6. Angeles L. Demographic transitions: analyzing the effects of mortality on fertility. J Popul Econ. 2010;23(1):199–120. https://doi.org/10.1007/s10995-009-0255-6.
7. The World Bank. Determinants and Consequences of High Fertility: In Determinants and Consequences of High Fertility: A Synopsis of the Evidence [Issue June]. The World Bank. 2010. https://doi.org/10.1596/27497.
8. Population Reference Bureau. Population of Older Adults Increasing Globally Partly Because of Declining Fertility Rates [PRB]. 2020. https://www.prb.org/news/population-of-older-adults-increasing-globally/.
9. United Nations. The End of High Fertility is Near. Department of Economic and Social Affairs Population Division. Population Facts., 2017. October(2017/3), 1–2. https://esa.un.org/unpd/wpp/Download/Standard/Archive/Fertility%20A; https://esa.un.org/unpd/wpp/Publications/Files/PopFacts_2017-3_ The-end-of-high-fertility.pdf.
10. Braervanek P, Adelman WP, Alderman EM, Breuner CC, Levine DA, Marcell AV, O'Brien RF. Contraception for adolescents. Pediatrics. 2014;134(4):e1244–56. https://doi.org/10.1542/peds.2014-2299.
11. Ahinkorah BO. Predictors of modern contraceptive use among adolescent girls and young women in sub-Saharan Africa: a mixed effects multilevel analysis of data from 29 demographic and health surveys. Contracept Reprod Med. 2020;5(1):1–12. https://doi.org/10.1186/s40834-020-00138-1.
12. Bolarinwa OA, Nwagbara UI, Okeye J, Ahinkorah BO, Seidu AA, Ameyaw EK, Igbaro V. Prevalence and predictors of long-acting reversible contraceptive use among sexually active women in 26 sub-Saharan African countries. Int J Health. 2021
13. Adedinin SA, Omisakin OA, Somfun OD. Trends, patterns and determinants of long-acting reversible methods of contraception among women in sub-Saharan Africa. PLoS ONE. 2019;14(6): e0217574.
14. Kungu W, Khaskahala A, Agwanda A. Use of long-acting reversible contraception among adolescents and young women in Kenya. PLoS ONE. 2020;15(11): e0241506.
15. Ahinkorah BO. Individual and contextual factors associated with mistimed and unwanted pregnancies among adolescent girls and young women in selected high fertility countries in sub-Saharan Africa: A multilevel mixed effects analysis. Plos one. 2020;15(10): e0241505.
16. Corsi DJ, Neuman M, Finlay JE, Subramanian S. Demographic and health surveys: a profile. Int J Epidemiol. 2012;41(6):1602–13.
17. Aliaga A, Ruilin R. Cluster optimal sample size for demographic and health surveys. Paper presented at the 7th International Conference on Teaching Statistics—ICOTS. 2006.

18. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. Initiative S. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. Int J Surg. 2014;12(12):1495–9.

19. Ghosh R, Mozumdar A, Chattopadhyay A, Acharya R. Mass media exposure and use of reversible modern contraceptives among married women in India: an analysis of the NFHS 2015–16 data. PLoS ONE. 2021;16(7):e0254400.

20. Gayatri M. The Utilization of long-Acting Reversible contraception and associated factors among women in Indonesia. Global J Health Sci. 2020;12(3):110–20.

21. Aminu MB, Dattijo LM, Shehu AM, Kadas SA, Chama CM. Factors responsible for discontinuation of long-term reversible contraceptives in a tertiary facility in North-eastern Nigeria. Port Harcourt Med J. 2019;13(2):67.

22. Bolarinwa OA, Olagunju OS. Knowledge and factors influencing long-acting reversible contraceptives use among women of reproductive age in Nigeria. Gates Open Res. 2019;3.

23. Ayenew AA. Determinants of long acting reversible contraceptive Utilization in Bahar Dar city, Ethiopia-results from institutional based cross sectional study. 2019.

24. Sahlemichael A, Temesgen KG. Determinants of long acting reversible contraceptives use among child bearing age women in Dendi District, Western Ethiopia. J Women’s Health Care. 2015;4(242):2167–420.

25. Taye A, Woldie M, Sinaga M. Predictors of long acting reversible contraceptive use among married women visiting health facilities in Jimma Town. J Women’s Health Care. 2014;4(217):2167–420.

26. Kiondo KS, Maro E, Kivango S, Alloysie JR, Shayo BC, Mahande MJ. Prevalence and factors associated with postpartum use of long-acting reversible contraception in Bukombe District, Geta Region, Tanzania: a community-based study. Contracept Reprod Med. 2020;5(1):1–8.

27. Alemayehu M, Belachew T, Tilahun T. Factors associated with utilization of long acting and permanent contraceptive methods among married women of reproductive age in Mekelle town, Tigray region, north Ethiopia. BMC Pregnancy Childbirth. 2012;12(1):1–9.

28. Aust K, Shah P, Rohloff P. Correlates of long-acting reversible contraception uptake among rural women in Guatemala. PLoS ONE. 2018;13(6):e0199536.

29. Kavanaugh ML, Fruchwirth L, Jerman J, Popkin R, Ethier K. Long-acting reversible contraception for adolescents and young adults: patient and provider perspectives. J Pediatr Adolesc Gynecol. 2013;26(2):86–95.

30. Tsui AO, Brown W, Li Q. Contraceptive practice in sub-Saharan Africa. Popul Rev Dev. 2017;43(Suppl 1):166.

31. Shiferaw K, Musa A. Assessment of utilization of long acting reversible contraceptive and associated factors among women of reproductive age in Harar City, Ethiopia. Pan Afr Med J. 2017;28(1).

32. Guo AB, Kae AP. Utilization of Long-Acting Reversible Contraceptives and associated factors among reproductive age women attending governmental health institutions for family planning services in Wondo Genet District, Sidama, National Regional State, Southern Ethiopia. Health Serv Res Managerial Epidemiol. 2021;8:23333928211002400.

33. Bankole A, Malarcher A. Removing barriers to adolescents’ access to contraceptive information and services. Stud Fam Plann. 2010;41(2):117–24. https://doi.org/10.1111/j.1728-4465.2010.00232.X.

34. Casey SE, Gallagher MC, Kakesa J, Kalyanpur A, Muselemu JB, Rafanoharana RV, Spilotros N. Contraceptive use among adolescent and young women in North and South Kivu, Democratic Republic of the Congo: a cross-sectional population-based survey. PLoS Med. 2020;17(3):e1003086.

35. Achana FS, Bawah AA, Jackson EF, Welaga P, Awine T, Asuo-Mante E, et al. Spatial and socio-demographic determinants of contraceptive use in the Upper East region of Ghana. Reprod Health. 2015;12(1):1–10.

36. Egede JO, Onoh RC, Umeora OUJ, Iyoke CA, Dimejiesi IBO, Lawani LO. Contraceptive prevalence and preference in a cohort of south–east Nigerian women. Patient Prefer Adherence. 2015;9:707.

37. Biza N, Abdull M. Long acting reversible contraceptive use and associated factors among contraceptive users in amhara region, ethiopia, 2016. A community based cross sectional study. Medico Res Chron. 2017;4(05):469–80.

38. Tibajuka L, Odongo R, Welikhe E, Mukisa W, Kugonza L, Busingye I, et al. Factors influencing use of long-acting versus short-acting contraceptive methods among reproductive-age women in a resource-limited setting. BMC Womens Health. 2017;17(1):1–13.

39. Anguzu R, Sempeera H, Sekandi JN. High parity predicts use of long-acting reversible contraceptives in the extended postpartum period among women in rural Uganda. Contracept Reprod Med. 2018;3(1):1–7.

40. Coll CDV, EVERLING F, HELLWIG F, DE BARROS AJD. Contraception in adolescence: the influence of parity and marital status on contraceptive use in 73 low-and-middle-income countries. Reprod Health. 2019;16(1):1–12.

41. Warthaka MW, Gichangi P, Thiongo M. Assessing the magnitude of and factors associated to demand for long acting reversible and permanent contraceptive methods among sexually active women in Kenya. medRxiv. 2020.

42. Bhandari R, Pokhrel KN, Gabrielle N, Amatya A. Long acting reversible contraception use and associated factors among married women of reproductive age in Nepal. PLoS ONE. 2019;14(3):e0214590.

43. Cisek CR, Klein K, Koseki S, Wood R. Strengthening family planning stewardship with a total market approach: Mali, Uganda, and Kenya experiences. Public Admin Dev. 2019;39(1):47–56.

44. Gold J, Burke E, Cissé B, Mackay A, Eva G, Hayes B. Increasing access to family planning choices through public-sector social franchising: the experience of Marie Stopes International in Malawi. Global Health: Sci Pract. 2017;5(2):286–98.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:
- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.
Learn more biomedcentral.com/submissions