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# BMJ Open Prevalence and factors associated with modern contraceptive use among women of reproductive age in 20 African countries: a large population-based study

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## ABSTRACT

**Objective** To assess the prevalence and factors associated with modern contraceptive (CP) use among women of the reproductive age.

**Design** Cross-sectional study.

**Setting** We used data from the Multiple Indicator Cluster Surveys (MICSs) from 20 African countries collected between 2013 and 2018.

**Participants** Data on 1 177 459 women aged 15–49 years old.

**Methods** Multivariable logistic regression was used to identify factors associated with modern CP use, while controlling simultaneously for independent variables, and accounting for clustering, stratification and sample weights from the complex sampling design. We used random effects meta-analysis to pool adjusted estimates across the 20 countries.

**Results** The overall prevalence of modern CP use was 26% and ranged from 6% in Guinea to 62% in Zimbabwe. Overall, injectable (32%) was the most preferred method of CP, followed by oral pill (27%) and implants (16%). Women were more likely to use a modern CP if they: had a primary (adjusted prevalence odds ratios (aPORs): 1.68, 95% CI: 1.47 to 1.91) or secondary/higher education (aPOR: 2.16, 95% CI: 1.80 to 2.59) compared with women with no formal education; had no delivery in the last 2 years (aPOR: 3.89, 95% CI: 2.76 to 5.47) compared with women who delivered in the last 2 years; were aged 25–34 years (aPOR: 1.33, 95% CI: 1.20 to 1.47) compared with women aged 15–24 years; were of middle-income status (aPOR: 1.25, 95% CI: 1.11 to 1.39) or rich (aPOR: 1.53, 95% CI: 1.27 to 1.84) compared with poor women and had two or more antenatal care visits compared with women without a visit. Perceived domestic violence was not associated with modern CP use (aPOR: 0.98, 95% CI: 0.92 to 1.05).

**Conclusion** Our findings are relevant in a global context, particularly in the African region, and improve our understanding on relevant factors essential to increasing modern CP use.

## BACKGROUND

Modern contraceptives (CPs) have been identified as an effective method for fertility

## Strengths and limitations of this study

- This study draws from many representative household surveys from countries within the African region, and therefore our findings should be generalisable to many of the countries within the region.
- Pooled analysis was suitable for making our findings generalisable across many countries.
- The current findings are useful to inform intervention development to improve contraceptive coverage.
- The findings of our study cannot establish causality.

reduction, and are thus being widely promoted to slow rapid population growth, particularly in developing countries.<sup>1–3</sup> Promoting access to modern CPs among women of reproductive age has also proven to be an effective public health intervention to improve maternal and child health outcomes.<sup>4 5</sup> There is a plethora of research evidence demonstrating that increase in CP use directly averts maternal mortality by preventing unplanned pregnancies, teenage pregnancy, unsafe abortions, high-risk pregnancies and allows for spacing of pregnancies.<sup>1 4 6</sup> Some modern CPs, such as condom use, have been lauded not only for family planning purposes, but also for their role in preventing sexually transmitted infections including HIV/AIDS.<sup>1</sup> Modern CP methods are also essential to help nations achieve the Sustainable Development Goal five, which aims at achieving gender equality and empowering all women and girls.<sup>7</sup>

Globally, the demand and use of modern CPs has increased in most countries.<sup>8</sup> However, its acceptor rate remains low, and there is persistently high unmet need for family planning among women in developing countries despite its overwhelming benefits.<sup>1</sup> Data available have shown that the prevalence



of modern CP use among married women or those in relationships in Africa was low: estimated at 23.9% in 2012 and 28.5% in 2017.<sup>9</sup> Studies have also reported low utilisation of modern CPs in Africa among women in their reproductive age.<sup>10 11</sup>

There are mixed findings in terms of the factors influencing the low use of modern CPs among women in Africa. Studies have established strong associations between higher socioeconomic status and modern CPs, and between being married and an increase use of modern CPs,<sup>3 12</sup> but these findings were inconsistent with others from the African region.<sup>13 14</sup> This suggests that modern CP use might also differ across different sociocultural contexts.<sup>15</sup> Additionally, previous studies on modern CP use in Africa have focused on individual countries.<sup>10 12 16</sup> Very few have been equipped to assess the prevalence and drivers of modern CP use across Africa.<sup>11</sup> Again, none of these studies have considered meta-analysing the data on CP use for us to better understand the overall prevalence of modern CP use in the African region.

The aim of our study therefore was to assess the prevalence and factors associated with modern CP use among women of reproductive age using a large population-based survey from the 20 African countries. The research findings will be relevant in a global context, particularly within the African region to improve maternal and child health outcomes by improving the use of modern CPs among women of the reproductive age.

## METHODS

### Study population and data source

We used data from the Multiple Indicator Cluster Surveys (MICSs) from the 20 African countries from 2013 to 2018. These countries include; Ghana, Democratic Republic of Congo (DRC), Gambia, Lesotho, Madagascar, Sierra Leone, Togo, Tunisia, Benin, Guinea Bissau, Guinea, Cameroon, Côte d'Ivoire, Kenya, Malawi, Mali, Mauritania, Nigeria, Sudan and Zimbabwe. MICS is a UNICEF-led cross-sectional nationally representative household study conducted in many countries, and provides robust data on women, men and children. The survey measures key indicators that are considered relevant to allow countries to generate data that can be used to inform policy and practice.<sup>17</sup> We limited our study population to only women aged 15–49 years old.

The MICS uses a two-stage sampling procedure that involves selection of census enumeration areas from each sampling strata using a probability proportional to size of the number of households in each enumeration area in the first stage. In the second stage, households are sampled using systematic random sampling from each enumeration areas, which forms the survey clusters. A detailed description of the MICS sampling design and data collection procedures have been published elsewhere.<sup>18 19</sup>

### Primary outcome

The primary outcome of interest was the current use of modern CP among women of the reproductive age (15–49 years). Modern CP use was dichotomised as '1' for a woman currently using any modern CP method, and '0' for those who reported not using modern CPs. Use of modern CP was defined as currently using any of the following CP methods: sterilisation (male or female), intrauterine device (IUD), injectable, implant, pills, condom (male or female), diaphragm and foam/jelly. Our definition of modern CPs was adopted from the Guttmacher Institute.<sup>20</sup> This definition has been used to guide data collection and analysis in several similar studies.<sup>21–24</sup>

### Independent variables

The independent variables in our study were: age, marital status, educational level, health insurance status, delivery period, parity, antenatal care attendance in the last 2 years, residency status, wealth status, media use and perceived domestic violence. Age was categorised as: 15–24, 25–34 and 35–49 years with 15–24 years as the reference category. The remaining variables were categorised as follows: marital status (never married='1', married/union='0'); educational level (secondary or higher education='2', primary education='1', no formal education='0'); health insurance status (no insurance='1', insurance='0'); delivery period (no delivery in the last 2 years='1', delivery in the last 2 years='0'); parity (nulliparous='1', parous='0'), antenatal care attendance ( $\geq 4$ ='4', 3='3', 2='2', 1='1', 0='0') and residency status (rural='1', urban='0'). We used wealth quintiles to construct our wealth status variable. The upper two, middle and lower two wealth quintiles were used to denote rich, middle income and poor (reference value), respectively. Media use was when a woman reported any of the following: read the newspaper/magazine, listened to radio, watched television or used the internet at least once a week or almost every day. Women who used the media were assigned as the reference category ('0'), while those who did not use the media were coded as '1'. Perceived domestic violence was also dichotomised as: perceived domestic violence='1' and no perceived domestic violence='0'. Perceived domestic violence was defined as any woman who reported that her husband/partner will not be justified in beating/hitting her if she committed any of the following events: if she goes out without telling him; if she neglects the children; if she argues with him; if she refuses to have sex with him and if she burns the food.

### Data analysis

Descriptive statistics and multivariable logistic regression was conducted using SAS V.9.3 (SAS Institute), while random effects meta-analysis was performed using Stata V.16 SE (Stata Corp, College Station, Texas, USA). All data sets for each country were checked to ensure that they had the variables of interest prior to the analysis. We used descriptive statistics to determine the prevalence of modern CPs, and the type of modern CP method in

each country. We also conducted a multivariable logistic regression controlling simultaneously for all independent variables to estimate the adjusted prevalence odd ratios (aPORs) for all variables. Missing data were dropped. In all descriptive and multivariable logistic regression analysis, we accounted for clustering, stratification and applied sampling weights from the complex sampling design to ensure representativeness with each country.

### Synthesis of results across the 20 countries

A random effects meta-analysis was used to synthesise the results in view of the substantial heterogeneity across different populations. Statistical heterogeneity was reported using the  $I^2$  statistics. An estimate of  $I^2 > 50\%$  was considered to be of substantial heterogeneity, and an estimate of  $I^2 > 75\%$  may be of considerable heterogeneity.<sup>25</sup> The random effects meta-analysis was used to pool the estimates of: the prevalence of modern CP use, prevalence of method of modern CP use and aPORs for independent variables across all the 20 countries using inverse-variance weighing. We present our results stratified by each country and overall using forest plots.

### Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research as we used secondary data.

## RESULTS

### Study sample and prevalence of modern CPs

A total of 1 177 459 women aged 15–49 years were included in our study. The data from the 20 countries ranged from 2013 to 2018 with only one MICS survey for each country (table 1). The overall prevalence of modern CPs use was 26% (95% CI: 18% to 34%). Zimbabwe had the highest prevalence of modern CP use, 62% (95% CI: 61% to 63%). This was followed by Malawi (56%, 95% CI: 55% to 57%), Kenya (56%, 95% CI: 52% to 60%), Lesotho (55%, 95% CI: 53% to 57%), Tunisia (50%, 95% CI: 49% to 52%) and Madagascar (35%, 95% CI: 34% to 37%). Guinea (6%, 95% CI: 5% to 7%) reported the lowest use of modern CPs (figure 1). There was high heterogeneity on the prevalence of modern CP use across all countries ( $I^2=99.9\%$ ,  $p$  value $<0.001$ ).

With regards to methods of modern CPs (figures 2 and 3), overall highest prevalence of the method of modern CPs was injectable (32%, 95% CI: 22% to 42%), followed by pills (27%, 95% CI: 18% to 37%), implants (16%, 95% CI: 12% to 20%) and condoms (15%, 95% CI: 13% to 18%). Injectable was a more preferred choice in Madagascar (67%, 95% CI: 65% to 69%), Malawi (56%, 95% CI: 54%, 57%), Kenya (52%, 95% CI: 46% to 58%), Gambia (51%, 95% CI: 46% to 56%), Sierra Leone (50%, 95% CI: 47% to 53%) and Mali (40%, 95% CI: 37% to 43%). Oral pills were a more preferred choice in Sudan (84%, 95% CI: 81% to 87%), Mauritania (68%, 95% CI: 63% to 72%), Zimbabwe (60%, 95% CI: 58% to 62%), Tunisia

**Table 1** Sample size and survey year of the MICSs by country (n=1 177 459)

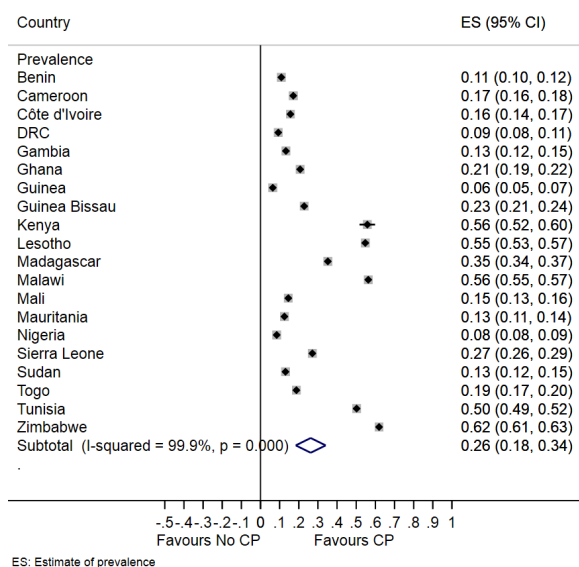
| Country                 | Year      | Sample size | % Sample |
|-------------------------|-----------|-------------|----------|
| DRC                     | 2017–2018 | 91 659      | 7.8      |
| Gambia                  | 2018      | 56 438      | 4.8      |
| Ghana                   | 2017–2018 | 52 930      | 4.5      |
| Lesotho                 | 2018      | 21 223      | 1.8      |
| Madagascar              | 2018      | 67 592      | 5.7      |
| Sierra Leone            | 2017      | 65 671      | 5.6      |
| Togo                    | 2017      | 28 142      | 2.4      |
| Tunisia                 | 2018      | 35 164      | 3.0      |
| Benin                   | 2014      | 63 405      | 5.4      |
| Guinea Bissau           | 2014      | 42 326      | 3.6      |
| Cameroon                | 2014      | 37 648      | 3.2      |
| Guinea                  | 2016      | 40 901      | 3.5      |
| Côte d'Ivoire           | 2016      | 46 503      | 3.9      |
| Kenya (Kakamega county) | 2013–2014 | 3 917       | 0.3      |
| Malawi                  | 2013–2014 | 100 324     | 8.5      |
| Mali                    | 2015      | 88 434      | 7.5      |
| Mauritania              | 2015      | 58 436      | 5.0      |
| Nigeria                 | 2016–2017 | 143 447     | 12.2     |
| Sudan                   | 2014      | 81 398      | 6.9      |
| Zimbabwe                | 2014      | 51 901      | 4.4      |
| Total                   |           | 1 177 459   | 100.0    |

DRC, Democratic Republic of Congo; MICSs, Multiple Indicator Cluster Surveys.

(49%, 95% CI: 47% to 52%) and Côte d'Ivoire (40%, 95% CI: 36% to 44%). Implants were more commonly used in the Gambia (33%, 95% CI: 28% to 38%), Mali (33%, 95% CI: 29% to 36%), Guinea Bissau (25%, 95% CI: 22% to 28%), Benin (24%, 95% CI: 21% to 27%) and Togo (24%, 95% CI: 20% to 28%), while condoms were more preferred in Cameroon (69%, 95% CI: 66% to 72%), DRC (45%, 95% CI: 39% to 50%), Guinea Bissau (37%, 95% CI: 33% to 40%), Lesotho (31%, 95% CI: 28% to 34%) and Togo (25%, 95% CI: 22% to 29%). There was high heterogeneity among modern CP methods across all countries as follows: sterilisation ( $I^2=97.7\%$ ,  $p$  value $<0.001$ ), injectable ( $I^2=99.8\%$ ,  $p$  value $<0.001$ ), pills ( $I^2=99.8\%$ ,  $p$  value $<0.001$ ), condoms ( $I^2=99.5\%$ ,  $p$  value $<0.001$ ), IUD ( $I^2=99.0\%$ ,  $p$  value $<0.001$ ) and implants ( $I^2=99.0\%$ ,  $p$  value $<0.001$ ). However, there was low heterogeneity in the prevalence of diaphragm/foam/jelly across the 20 countries ( $I^2=69.0\%$ ,  $p$  value $<0.001$ ).

### Factors associated with the use of modern CPs among women

The aPORs of independent variables and modern CP use by each country can be seen in the online supplemental table 1. The results of our meta-analysis showed



**Figure 1** Prevalence of modern contraceptive (CP) use. DRC, Democratic Republic of Congo.

that women with primary (aPORs: 1.68, 95% CI: 1.47 to 1.91) and secondary or higher education (aPOR: 2.16, 95% CI: 1.80 to 2.59) were more likely to use modern CPs compared with women without a formal education. Older women aged 25–34 years had 33% higher odds of modern CP use compared with younger women aged 15–24 years (aPOR: 1.33, 95% CI: 1.20 to 1.47). The prevalence of modern CP use was similar between women aged 35–49 and women aged 15–24 years (aPOR: 0.89, 95% CI: 0.74 to 1.06) (figure 4). Women who were rich and of middle-income status had 53% and 25% higher odds of CP use, respectively, when compared with poor women. Women who were never married had 35% lower odds of use of CPs compared with women who were married women. Our results also showed that women from rural settings had 13% lower odds of modern CP use compared with women living in urban areas (figure 5).

Women who received antenatal care on two, three and on four or more visits, respectively, had 2.27, 2.37 and 2.84 times the odds of using CPs compared with women who did not receive an antenatal care. However, receiving antenatal care on only one visit was not associated with modern CP use (figure 6). Additionally, women who had not delivered in the last 2 years were more likely to use modern CPs compared with women who delivered within the last 2 years (aPOR: 3.89, 95% CI: 2.76 to 5.47). No access to media among women reduced the odds of using CPs by 18% compared with women with access to media. Nulliparous women had 89% lower odds of CP use compared with parous women. Also, being a registered health insurance member and perceived domestic violence were not associated with use of modern CPs (figure 7).

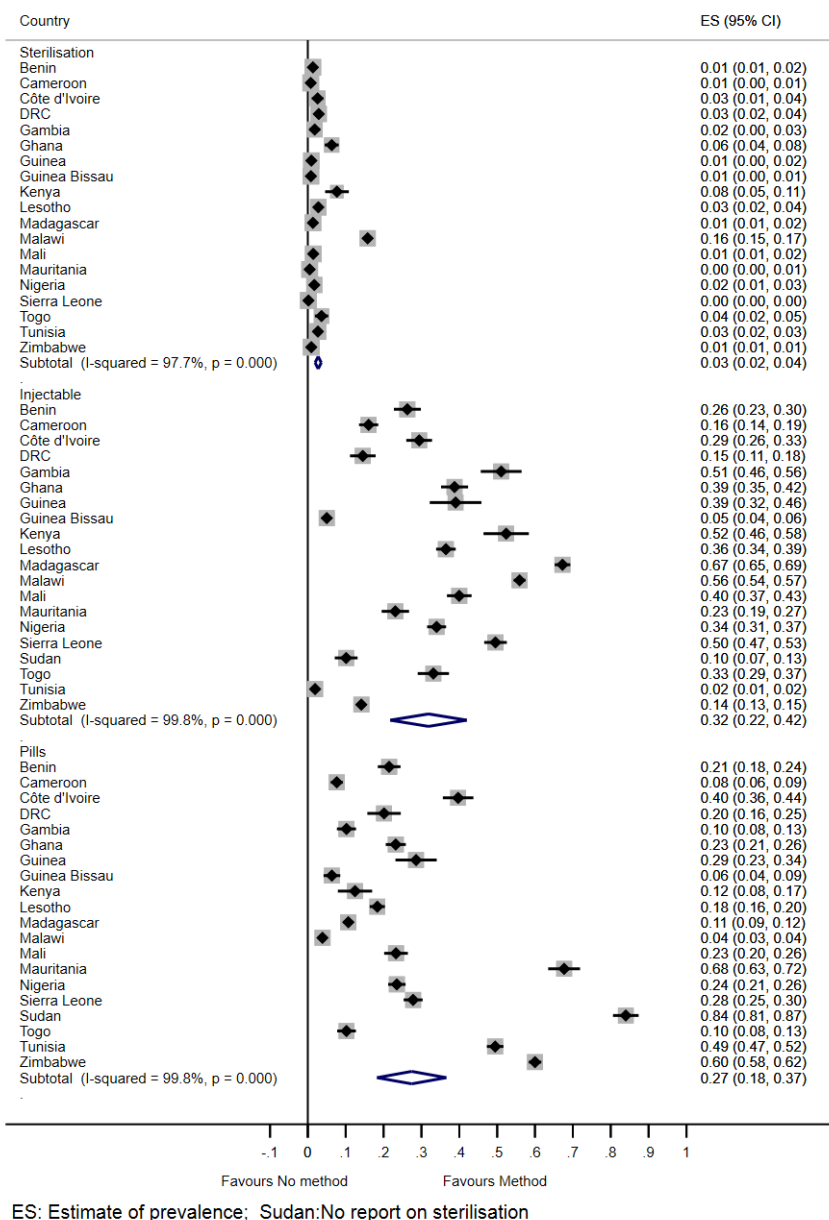
## DISCUSSION

Our analysis found that overall prevalence of modern CP use was low and varied across the 20 countries. Overall, injectable was the most preferred method of modern CP followed by oral pills and implants. Factors positively associated with modern CP use were: primary education, secondary or higher education, two or more antenatal care visits, no delivery in the last 2 years, women aged 25–34 years and women of middle- and high-income status. We found that women living in rural settings, never married, no access to the media and nulliparous women were less likely to use modern CPs. However, perceived domestic violence and being a registered health insurance member were not associated with modern CP use.

There has been an appreciable increase in modern CP use over the past 30 years consistent with behavioural change and ongoing family planning programmes.<sup>26</sup> However, our study found that the overall use of modern CP still remains low in Africa. This latest finding is consistent with similar studies that reported low level of CP use within the African region.<sup>15</sup> It is therefore not surprising that the scale-up of CPs in Africa has been recommended to avert unintended pregnancies and maternal mortality.<sup>4 27</sup> The variation in prevalence of modern CP use by country in our study might reflect the differences in culture, religion and family planning service delivery among African countries.<sup>28</sup> The high prevalence of modern CP use in Zimbabwe could be due to the high prevalence of secondary and higher education coupled with the sound foundation for motivating women to use CPs.<sup>29</sup> Our finding on injectable being the most preferred method of modern CP is consistent with findings from similar studies completed in Africa.<sup>13 15 30</sup>

We found that women aged 25–34 years were more likely to use CPs compared with women aged 15–24 years. One possible explanation to this is that women aged 15–24 years might not have better understanding of the consequences of engaging in unprotected sex or the benefits of the CP use as compared with women aged 25–34 years.<sup>31 32</sup> This reflects the high rates of teenage pregnancy across Africa.<sup>32</sup> Our findings on the positive association between women with at least a primary education and modern CP use are corroborate with many previous African-based studies.<sup>30 31 33 34</sup> This is not surprising because education helps women to be well informed on the benefits of CPs. It also empowers them to have the autonomy to make decisions on their fertility, and in the exercise of their reproductive rights.<sup>31</sup> With regards to the finding on the relationship between economic class and CP use, our study demonstrates that women of high- and middle-income class status were more likely to use CPs as compared with poor women. This is as a result of the financial barriers that exist in Africa, limiting poor women from having easy access to CP services and education.<sup>12 35</sup>

Our analysis showed that two or more antenatal care visits were associated with modern CP. Like many other studies, this observed association is not unique to our

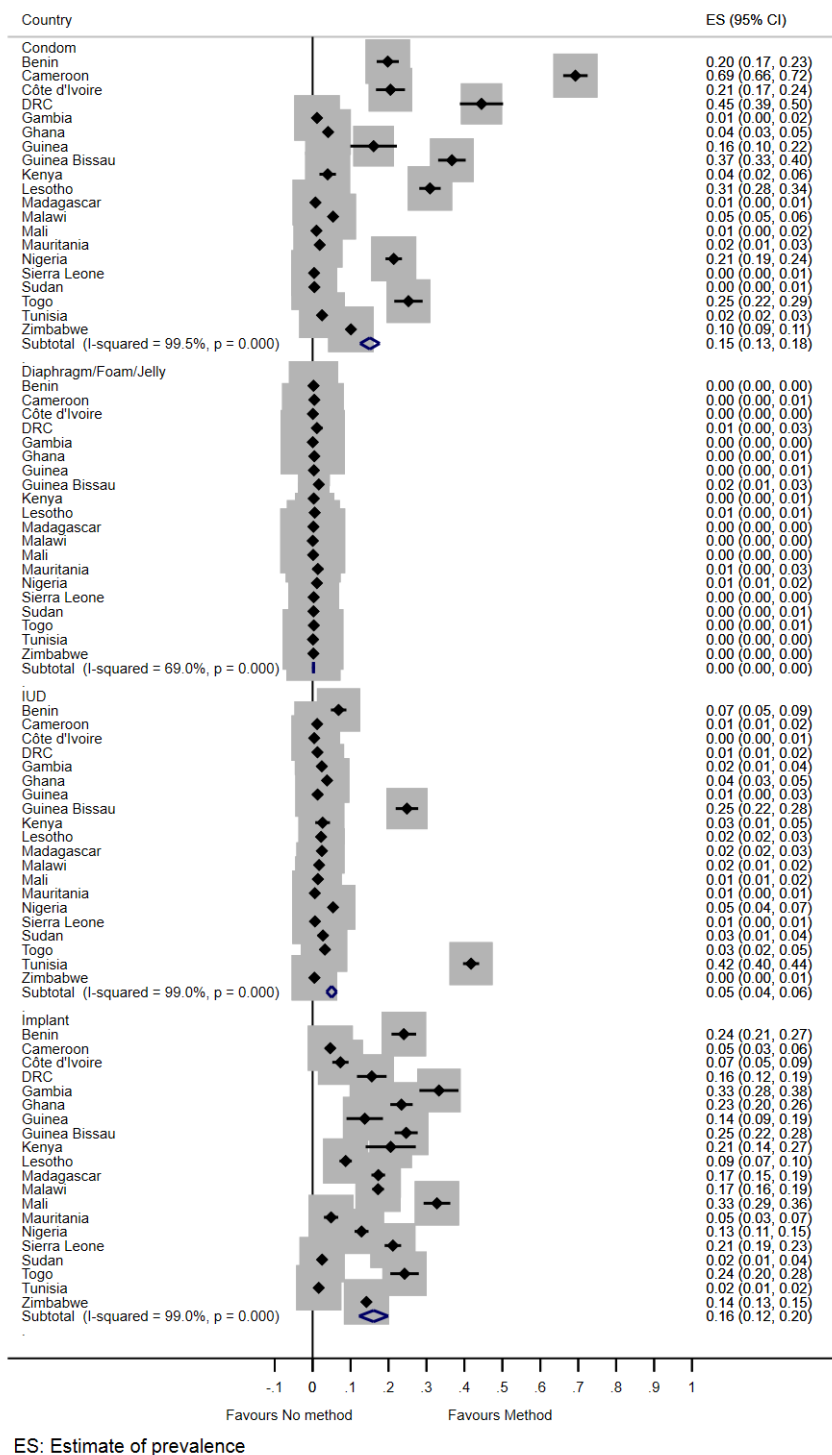


**Figure 2** Prevalence of method of modern contraceptive use. DRC, Democratic Republic of Congo.

study.<sup>36 37</sup> Antenatal care represents a unique opportunity to interact, educate and provide family support to women from diverse socioeconomic status, and this facilitates the uptake of modern CPs.<sup>38</sup> This finding, which adds to the existing literature, provides a benchmark for integrating family planning services during antenatal care to improve maternal and child health outcomes.<sup>39</sup> In our study, women who had no delivery in the last 2 years were more likely to use CPs when compared with their peers that delivered within the last 2 years. This finding is interesting and has maternal and child health implications for women who delivered within the last 2 years, and do not use CPs. In theory, we would expect women to engage in CP use within this period to reduce the risk of neonatal mortality and preeclampsia.<sup>40</sup> Timely use of CPs

is therefore critical for women to space their children, and helps improve their health and their ability to take care of their children.<sup>41</sup> We also observed in our study that nulliparous women were less likely to use CPs than parous women. This finding is consistent with previous studies,<sup>16 42</sup> but contrary to the findings of Geremew and Gelagay.<sup>34</sup>

In the results, we reported that women resident in rural settings were associated with reduced use of CPs compared with their colleagues from urban settings. This finding has also been reported in previous studies.<sup>31 38</sup> The increase in use of CPs among women in urban settings might be due to experience of late marriage as compared with their counterparts in rural settings.<sup>43 44</sup> We further reported that women who were never married were less

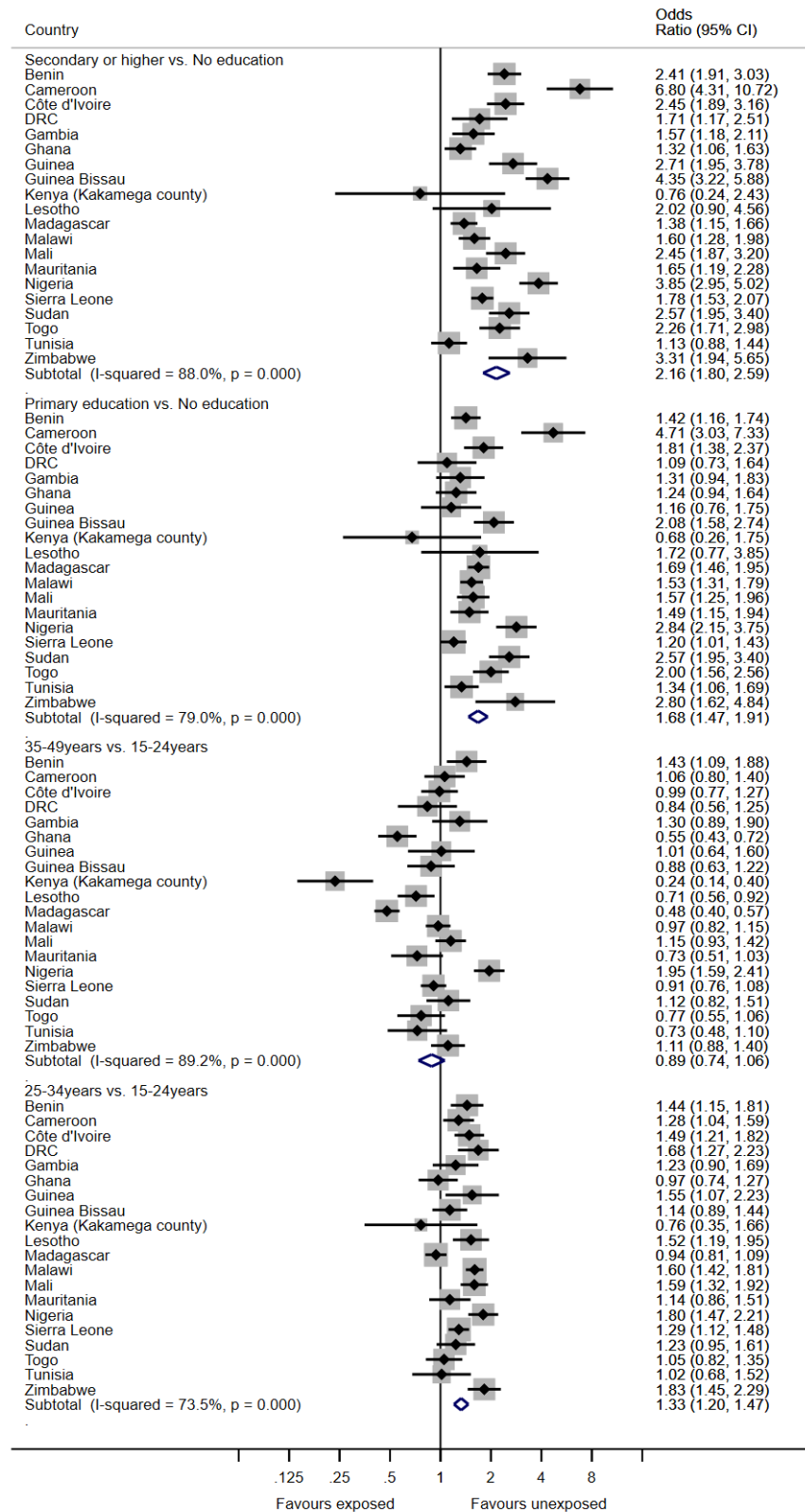


**Figure 3** Prevalence of method of modern contraceptive use. DRC, Democratic Republic of Congo; IUD, intrauterine device.

likely to use CPs than married women. Our reported finding is contrary to recent findings of Ba *et al's* study which examined any form of CP use.<sup>15</sup>

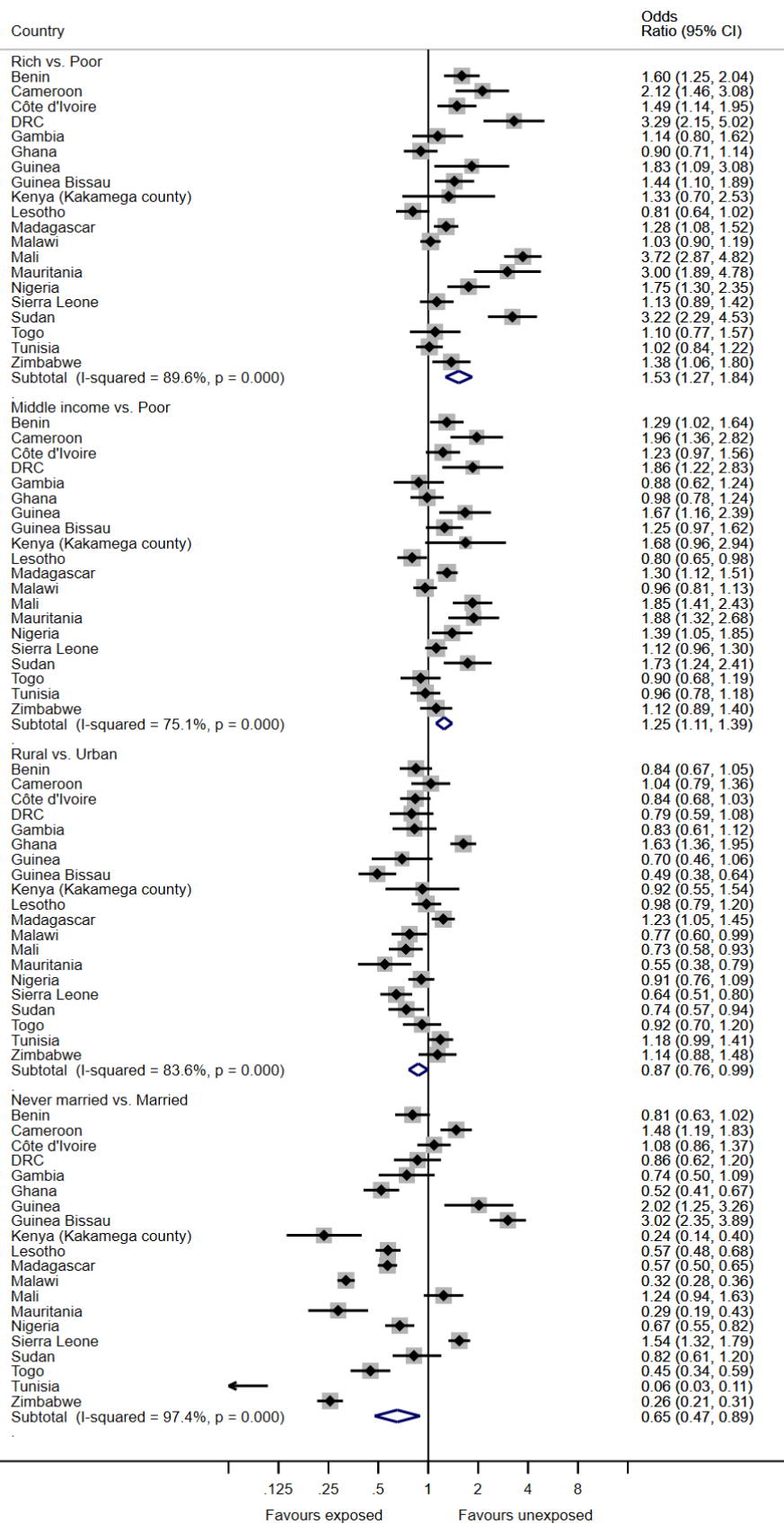
The media (ie, print and electronic) plays a role in promoting public health in Africa. Studies on the role of media have revealed that access to radios, televisions and newspapers increased CP use among women.<sup>45 46</sup> In

our study, we found that women with no access to media were less likely to use modern CPs compared with women that had access to the media. In their study, Islam *et al* concluded that television, radio and the print media should be adopted in the dissemination of family planning messages.<sup>45</sup> Our study also revealed that being a registered health insurance status member was not

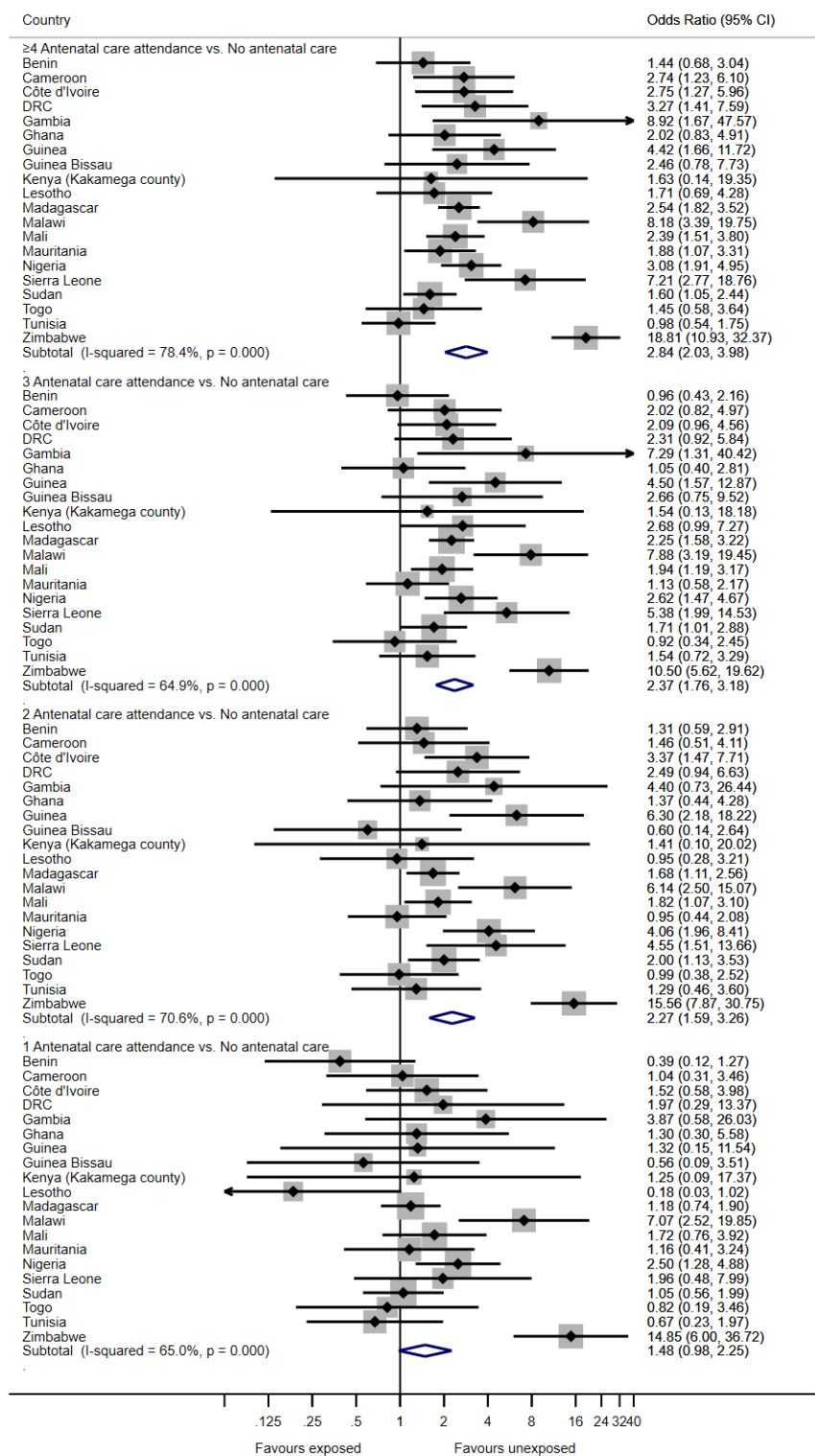


**Figure 4** The association between age, educational level and use of modern contraceptives. DRC, Democratic Republic of Congo.





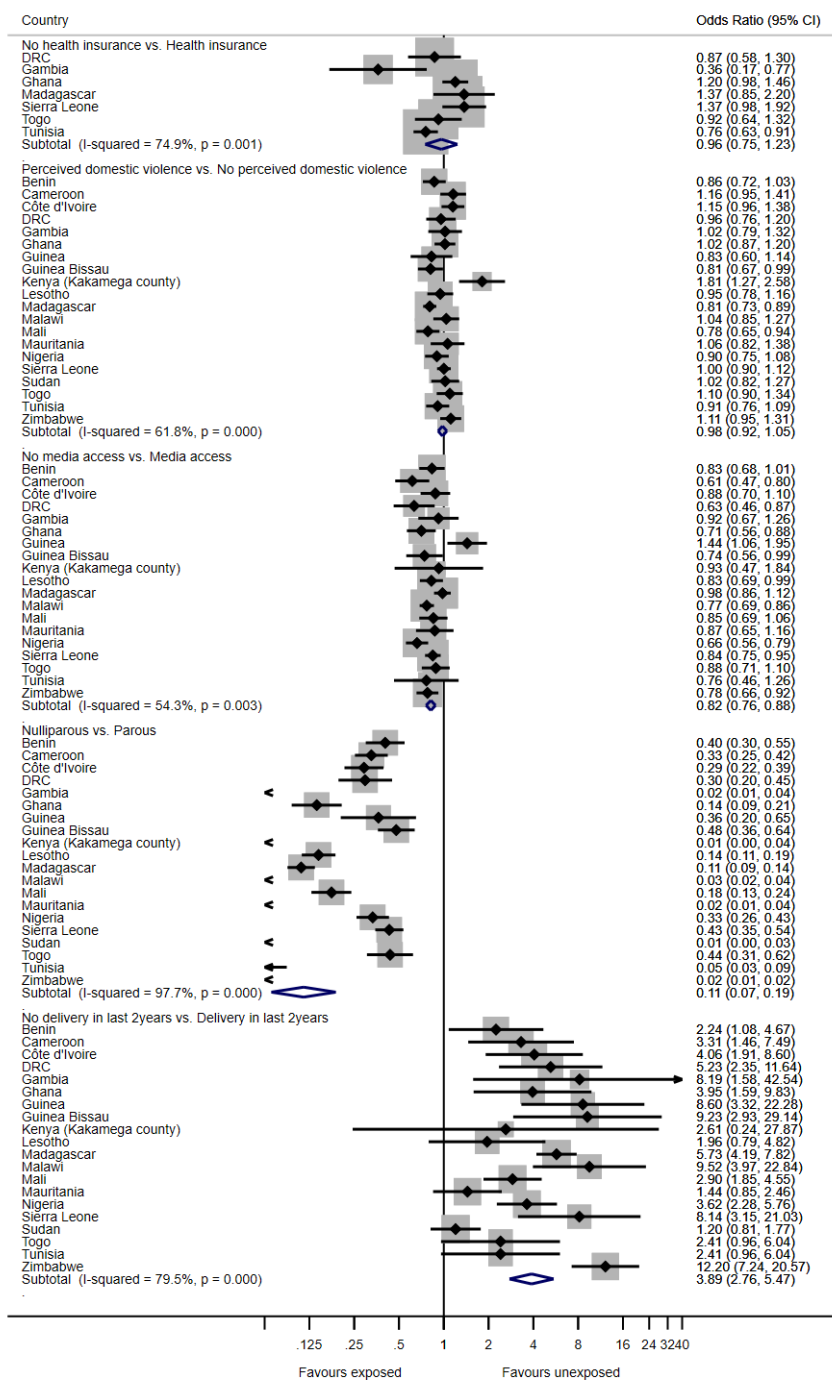
**Figure 5** The association between wealth status, residency status, marital status and use of modern contraceptives. DRC, Democratic Republic of Congo.



**Figure 6** The association between antenatal care attendance and use of modern contraceptives. DRC, Democratic Republic of Congo.

independently associated with modern CP use. This finding might be due to the free or subsidised CPs offered to clients in some African countries, and is likely to close the differences in the cost of obtaining a CP

between clients with and without a health insurance.<sup>47–49</sup> Our null finding on the association between perceived domestic violence and modern CP use is unique. To the best of our knowledge, there has not been a large



Only seven countries had data on health insurance status; Sudan:No report on access to media

**Figure 7** The association between health insurance status, perceived domestic violence, access to media, parity, period of delivery and use of modern contraceptives. DRC, Democratic Republic of Congo.

population-based study in the African context that has examined the influence of perceived domestic violence on modern CP use among women of reproductive age, though studies on domestic violence on CPs use more generally have been reported.<sup>50 51</sup> This finding may imply that women recognise the importance of modern CPs, and therefore perceived domestic violence may not play a role in its usage. It may also suggest that women in Africa

do not understand what constitutes domestic violence as women have reportedly argued that they deserve the beatings meted out to them by their husbands/partners for behaviours they exhibited.<sup>52 53</sup>

Our study had some strengths and limitations. Our findings can be generalised to the African region, and other similar low-middle-income developing country settings. The main limitation however is that our study

was cross-sectional, and we cannot establish causality. Another limitation is that some of our independent variables were self-reported, and thus are subject to recall bias. We expect recall bias to be similar between women on modern CPs, and those not on it. However, we expect less recall bias on our primary outcome as it was measured on the current use of modern CPs. There was also high heterogeneity between many of the countries for most of our variables. Though some have argued against pooling with high heterogeneity, pooling may still be very appropriate for our study.<sup>54</sup> One other limitation is that, data in Kenya were only in one county (Kakamega), and therefore findings may not be generalisable to Kenya.

## CONCLUSION

Our findings showed low overall prevalence of modern CP use with variation among the 20 African countries. The preference of method of CP also varied among countries. We found that primary education, secondary or higher education, two or more antenatal care visits, no delivery in the last 2 years, women aged 25–34 years and women of middle-income and high-income status were positively associated with modern CP use. We recommend that African Governments should strengthen their family planning programmes with a focus on making family planning information more accessible. Education should also be intensified during the postnatal period on the importance of birth spacing to improve maternal and child health outcomes. Encouraging pregnant women participation in antenatal care is also relevant for increasing the coverage of modern CPs.

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**Contributors** PAA, MTK and EAA conceived the study. PAA conducted the data analysis. PAA, MTK, EAA and MBU wrote the manuscript and critically reviewed the manuscript for its intellectual content. RA provided intellectual guidance. All authors read and approved the manuscript for submission.

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**Patient consent for publication** Not required.

**Ethics approval** This study did not require ethics approval as we used secondary data that are publicly available. Details of ethics approval for Multiple Indicator Cluster Surveys are available at: <https://mics.unicef.org/tools>.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available in a public, open access repository. Multiple Indicator Cluster Surveys data are publicly available at: <https://mics.unicef.org/surveys>.

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