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Spousal age differences and women's contraceptive use in sub-Saharan Africa

Pearl S. Kyei¹ and Ayaga A. Bawah^{1*}

Abstract

Background This study examines the likelihood of contraceptive use among married women in sub-Saharan Africa, focusing on the influence of spousal age difference.

Methods Binary logistic regressions predicting contraceptive use were estimated using a sample of 478,193 women in first union from 29 sub-Saharan African countries spanning two decades from 1999 to 2022. The data were sourced from the Demographic and Health Surveys (DHS).

Results The regression results indicate that spousal age difference is negatively correlated with the likelihood of contraceptive use with each additional year reducing the odds of using contraception by 1.1 percent. The association between the two variables has remained largely consistent over time. The findings also show substantial variation in the influence of spousal age differences on contraceptive use ranging from statistically significant and negative odds in some countries to not statistically significant but positive odds in others. Measures of female autonomy, education and healthcare decision-making, had a modest influence on the size and significance of the association between spousal age difference and contraceptive use.

Conclusions The relationship between spousal age difference and contraceptive use is of concern given the prevalence of age-disparate relationships in the context. These findings add to the literature on the potentially negative implications of age-disparate relationships, while highlighting that the association is not uniformly negative across countries.

Keywords Contraception, Contraceptive behavior in age-disparate relationships, Spousal age differences

Plain English Summary

This study examined the relationship between the age difference between a woman and her spouse and her likelihood of using contraception. The analysis used Demographic and Health Survey data from 29 sub-Saharan African countries. The surveys spanned a 24-year period from 1999 to 2022. The larger the age difference between a woman and her spouse, the less likely she is to use contraception. The findings add to the research on the potentially negative influence of relatively large differences between a woman's age and that of her partner and highlight the need for additional research on understanding the pathways through which spousal age differences influences contraceptive use.

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Introduction

Substantial literature has studied the determinants of contraceptive use in sub-Saharan Africa where contraceptive prevalence rates in the region remain lower than in other parts of the world [1]. Understanding the barriers



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to contraceptive use is of great academic and policy interest given the demographic, health, and economic benefits of contraception. The use of contraception is linked to improved maternal and infant outcomes, and reductions in unintended pregnancies, unsafe abortions, and maternal deaths [2–4]. Contraceptive use has also been linked to public sector health savings by preventing unintended pregnancies [5–7].

The individual determinants of contraceptive use are well-documented [8–10] as are partner characteristics such as partner education [9, 11, 12], and age relative to wife [12–14] on women's contraceptive use. Age-disparate relationships are generally associated with negative outcomes among women. Age-disparate relationships have been defined as unions in which one partner is more than five years older [15, 16]. This definition considers women in age-disparate marriages as a homogeneous group without adequate consideration of disparities within the group in terms of outcomes based on the size of the age difference. The age difference between partners is significantly associated with sexually transmitted infection risk [17–19] and an increased likelihood of risky sexual behaviors such as unprotected sex and multiple concurrent partners [17, 20, 21]. Women in age-disparate relationships are also at greater risk of intimate partner violence [22, 23].

The adverse consequences of age-disparate relationships are mainly attributed to the power dynamics at play where younger women have lower autonomy and decision-making power in unions with larger age differences [24–26]. Research has shown that decision-making around contraceptive use often involves negotiation between partners, with power differentials influencing the decision to use contraception or not [27–29]. Reduced female autonomy has implications for contraceptive use given the positive influence of female empowerment on contraceptive behavior [25, 26, 30–32]. Spousal age differences can thus be indicative of unequal power dynamics within marriages, with implications for women's agency and autonomy in reproductive decision making.

This study aimed to investigate patterns and trends in the relationship between spousal age difference and women's contraceptive use in 29 sub-Saharan African countries. The central hypothesis is that the size of the spousal age gap is inversely correlated with the likelihood of using contraception. The study further examines differences over time and across countries in the correlation between spousal age difference and contraceptive use. Finally, it explores whether women's autonomy moderates the strength of the association between spousal age difference and contraceptive use.

This study contributes to a deeper understanding of marital dynamics and power structures within relationships in sub-Saharan Africa regarding contraception usage. By examining contraceptive use across 29 countries over a two-decade period, this study offers a comprehensive overview of the influence of spousal age differences on women's reproductive choices in this sub-region. Second, by assessing trends in the relationship between contraceptive use and spousal age differences, the study sheds light on the extent to which reproductive autonomy for women in age-disparate marriages may have changed over time. Furthermore, the study also examines the potential influence of women's autonomy, in this case, education and decision-making about healthcare, as these factors may play a role in shaping decision-making concerning contraceptive use.

Data and methods

This study used data pooled from 91 standard Demographic and Health Surveys (DHS) conducted in 29 countries in sub-Saharan Africa between 1999 and 2022 [33] (see Table 5 in [Appendix](#)). Countries with only one survey conducted during this period were excluded from the sample. The rationale for pooling the datasets across time and countries was to obtain data that would allow the analysis of both time trends and cross-national differences. In pooling the sample, each survey contributed equally to the analysis, while individual sampling weights within surveys were applied.

The sample was restricted to currently married women in first union aged 15 – 49 years as information on partner age is available only for the current partner. Women who reported being pregnant at the time of the survey, with missing partner information, who reported being infertile or menopausal, and who reported never having had sex were excluded from the sample.

Binary logistic regression analysis was used to predict current contraceptive use. The dependent variable for the analysis was whether the woman is currently using any method of contraception (modern, traditional, or folkloric). The main independent variable was the spousal age gap which is calculated by subtracting the age of the woman from the age of the husband reported by the woman. The age difference distribution was winsorized [34] to delete outliers that fell below the 0.5th percentile and above the 99.5th percentile of the sample. The original range for the spousal age difference was -34 to 76 years. After winsorization, the spousal age difference ranged from -17 to 39 years in the final analytic sample of 478,193 women.

Marriage cohorts based on the year of first marriage were constructed for the analysis of time trends. Women

Table 1 Descriptive statistics of sample

Variable	Total	Not using contraception	Using contraception
<i>Current contraceptive use</i>			
Currently not using	68.25	--	--
Currently using	31.75	--	--
Spousal age difference (years)	8.34	9.11	6.70
<i>Person who usually decides on respondent's health care</i>			
Respondent alone	18.16	15.41	24.05
Respondent and husband/someone else	34.31	30.13	43.25
Husband alone	46.01	52.61	31.91
Someone else/other	1.51	1.85	0.79
<i>Year of marriage</i>			
1975—1979	3.05	3.54	2.00
1980—1984	5.99	6.67	4.52
1985—1989	9.12	9.57	8.15
1990—1994	13.05	13.12	12.89
1995—1999	17.29	16.94	18.03
2000—2004	18.88	18.58	19.53
2005—2009	15.85	15.45	16.70
2010—2014	10.75	10.37	11.58
2014—2019	5.10	4.97	5.37
2020—2022	0.93	0.80	1.23
<i>Education</i>			
No education	43.93	54.87	20.41
Primary education	31.56	27.07	41.22
Secondary education	20.16	15.13	30.97
Tertiary education	4.36	2.94	7.41
<i>Work status</i>			
Not working	29.35	30.95	25.90
Works for family member	11.19	12.36	8.69
Works for someone else	8.02	5.38	13.71
Self-employed	51.44	51.31	51.71
<i>Age</i>			
15–19	6.90	8.47	3.50
20–24	17.23	17.74	16.11
25–29	21.32	20.63	22.79
30–34	18.23	16.88	21.13
35–39	15.86	14.89	17.95
40–44	11.77	11.55	12.23
45–49	8.70	9.83	6.29
<i>Religion</i>			
Christian	51.97	42.83	71.62
Moslem	36.92	44.91	19.75
Traditional	4.22	5.54	1.37
Other/ No religion	3.13	3.37	2.60
Religion not available	3.76	3.35	4.66
<i>Fertility preferences</i>			
Both partners want no more	14.04	9.89	22.97
Only wife wants no more	8.04	7.64	8.89
Both want more	43.64	45.24	40.20
Husband desires unknown	23.75	27.70	15.28

Table 1 (continued)

Variable	Total	Not using contraception	Using contraception
Other	10.52	9.53	12.66
Number of children alive	3.36	3.33	3.41
<i>Births in the past year</i>			
No births in the past year	72.23	68.18	80.95
At least one birth in the past year	27.77	31.82	19.05
<i>Sex composition of children alive</i>			
No child	6.41	8.76	1.35
Girls only	15.54	15.30	16.04
Boys only	16.40	16.05	17.13
Both boys and girls	61.66	59.89	65.48
<i>Heard about family planning recently</i>			
Did not hear about family planning in the media (radio/TV/newspaper)	54.86	59.89	44.06
Heard about family planning in the media (radio/TV/newspaper)	45.14	40.11	55.94
Did not hear about family planning from health worker	73.08	77.77	63.01
Heard about family planning from health worker	26.92	22.23	36.99
<i>Polygamy</i>			
Only wife	73.65	70.04	81.40
First wife	11.13	13.32	6.42
Second wife	9.19	11.42	4.40
Third or higher wife/does not know rank/rank not available	6.03	5.22	7.79
<i>Co-residence with husband</i>			
Does not reside with husband	14.86	15.78	12.88
Resides with husband	85.14	84.22	87.12
<i>Husband's education</i>			
No education	37.27	46.85	16.66
Primary education	28.77	25.19	36.49
Secondary education	24.04	19.68	33.41
Tertiary education	7.76	5.89	11.79
Does not know husband's education	2.16	2.39	1.65
<i>Year of survey</i>			
<i>Type of place of residence</i>			
Rural	31.12	27.62	38.63
Urban	68.88	72.38	61.37
<i>Country</i>			
Benin	5.13	6.14	2.95
Burkina Faso	5.32	6.44	2.93
Burundi	1.87	1.90	1.82
Cameroon	2.80	3.13	2.10
Chad	2.39	3.20	0.63
Cote d'Ivoire	1.45	1.69	0.95
Democratic Republic of the Congo	2.12	2.36	1.61
Ethiopia	2.80	2.56	3.31
Gabon	0.55	0.58	0.48
Gambia	2.22	2.71	1.15
Ghana	2.27	2.23	2.36
Guinea	3.08	4.08	0.93
Kenya	5.73	3.18	11.21
Lesotho	2.08	1.45	3.45
Liberia	1.02	1.22	0.60

Table 1 (continued)

Variable	Total	Not using contraception	Using contraception
Madagascar	3.63	2.59	5.88
Malawi	6.37	4.21	10.99
Mali	5.93	7.62	2.31
Mozambique	1.66	1.94	1.04
Namibia	0.85	0.51	1.56
Niger	2.46	3.02	1.25
Nigeria	12.79	15.21	7.58
Rwanda	3.45	2.36	5.77
Senegal	5.55	6.30	3.92
Sierra Leone	3.50	4.16	2.09
Tanzania	3.73	3.22	4.82
Uganda	2.36	2.14	2.84
Zambia	3.84	2.53	6.65
Zimbabwe	3.08	1.34	6.82
Sample size	478,193	331,418	146,775

married before 1975 were excluded from the analysis due to the small sample sizes in those cohorts.

The analysis controlled for variables that we conceptualized might influence the likelihood of contraceptive usage based on prior literature: woman's age, religion,¹ husband's education, number of children alive, gender composition of children alive, type of place of residence (urban/rural), polygamous union, year of survey, country, co-residence with husband, heard about family planning in the media in the last few months, heard about family planning from a health worker (visited by a family planning worker in the past 12 months/ told about family planning at the health facility) and couple-level fertility preferences: a variable constructed by combining the questions asked in the DHS on whether a woman wants another child and husband's desire for children. The purpose of including these variables in the analysis is to examine whether even after controlling for mediating effects of these variable the conceptualized expected relationship between spousal age difference and contraceptive use persists.

Women's educational level and decision-making concerning women's health were included as proxies for women's reproductive autonomy with the assumption

that they will moderate the influence of spousal age difference on contraceptive use.

The analysis comprises three models on the pooled sample. The first model includes the independent and control variables to estimate the association between spousal age difference and contraceptive use. The second model adds the two moderating variables to assess whether they influence the strength of the association. The third model introduces an interaction between spousal age difference and year of marriage to determine whether there have been changes over time in the association between spousal age difference and contraceptive use. A fourth set of regressions examine the relationship between spousal age and contraceptive use in various countries, providing estimates at the national level, to provide insight on the cross-national differences in this relationship.

Results

Table 1 presents summary statistics of the sample. Almost a third (31.8%) of the total sample was currently using contraceptives. The mean spousal age difference in the sample is 8.3 years. The spousal age difference for women not using contraception (9.1) is about two-and-a-half years more than for women using contraception (6.7). With respect to year of marriage, a higher share of the women using contraception belong to the youngest marriage cohorts.

A higher share of women using contraception reported that they usually make the decision on healthcare choices on their (24.1%) compared to those not using contraception (15.4%). Five in every 10 (52.6%) women not using contraception reported that their husband alone made

¹ Five surveys, Lesotho (2004), Niger (2012), Rwanda (2000), and Tanzania (2005; 2015/16), did not have data on religion. For the countries that have a predominant religion in the country based on their other DHS surveys i.e. 95% of the women belonged to one religion, the religion was imputed. For Niger, all women were recoded as Muslims, and for Lesotho all women are recoded as Christian. For the other countries, a category not available (N/A) was created. Women who had missing values for religion in surveys where religion was asked were also added to the religion N/A category.

decisions on their healthcare compared to three in every 10 (31.9%) women who was using contraception.

The share of women not using contraception that had no education (54.9%) was more than twice the share of women who were using contraception (20.4%). Conversely, the share of women with tertiary education was higher for those using contraception (7.4%) compared to those who were not using (2.9%).

Table 2 presents variation in spousal age differences for selected covariates. The age difference decreases successively for each marriage cohort suggesting that spousal age gaps in the sub-region has been narrowing over time. Women whose husbands alone usually decide on their healthcare have the largest spousal age difference (9.5) followed by women who have someone else making decisions on their healthcare (8.4). The largest spousal age difference is observed for women with no education (10.2), more than a three-year difference compared to women with all other levels of education (6.9 or less).

There is substantial variation by country in the mean spousal age difference – ranging from 4.1 in Rwanda to 13.1 in Guinea. Generally, the countries with the largest spousal age differences are in West Africa while countries in East Africa have smaller age gaps between spouses.

Figure 1 presents the correlation between spousal age difference and current contraceptive use at the country level, indicating that countries with larger spousal age gaps generally have lower contraceptive prevalence.

Table 3 presents results of the logistic regression. Model 1 indicates that a one-year increase in the spousal age gap is correlated with a 1.4 percent lower likelihood of contraceptive use which is statistically significant. The results also indicates that the likelihood of using contraception is positively correlated with the year of marriage.

Model 2 adds the measures of women's autonomy which leads to a marginal reduction in the odds ratio for spousal age difference and reduction in the significance of the coefficient. This suggests that while these variables can be considered to have a moderating influence on the association between spousal age difference and contraceptive use, their influence is relatively minor.

In Model 3, none of the interaction terms are statistically significant suggesting that the relationship between spousal age difference and contraceptive use has largely remained unchanged over time. The odds ratios on the interaction terms also do not consistently increase over time, as observed for the coefficients for the marriage cohort. In this third model, there is a further reduction in the size and significance of the odds ratio for spousal age difference – each additional year is associated with a 1.1% lower likelihood of using contraception.

Table 4 presents country-level estimates of the association between spousal age difference and contraceptive

Table 2 Spousal age difference by selected covariates

Variable	Spousal age difference
<i>Year of marriage</i>	
1975—1979	9.54
1980—1984	9.34
1985—1989	9.10
1990—1994	8.77
1995—1999	8.40
2000—2004	8.12
2005—2009	7.89
2010—2014	7.75
2014—2019	7.65
2020—2022	6.31
<i>Person who usually decides on respondent's health care</i>	
Respondent alone	7.35
Respondent and husband/someone else	7.27
Husband alone	9.53
Someone else/other	8.40
<i>Education</i>	
No education	10.24
Primary education	6.93
Secondary education	6.91
Tertiary education	6.07
<i>Country</i>	
Benin	8.03
Burkina Faso	10.87
Burundi	4.71
Cameroon	9.92
Chad	9.92
Cote d'Ivoire	9.27
Democratic Republic of the Congo	7.06
Ethiopia	7.26
Gabon	8.57
Gambia	11.47
Ghana	7.10
Guinea	13.12
Kenya	6.51
Lesotho	5.60
Liberia	7.43
Madagascar	5.00
Malawi	5.28
Mali	11.47
Mozambique	6.11
Namibia	5.91
Niger	10.40
Nigeria	10.07
Rwanda	4.13
Senegal	11.08
Sierra Leone	9.81
Tanzania	7.07
Uganda	6.13
Zambia	5.98
Zimbabwe	6.48

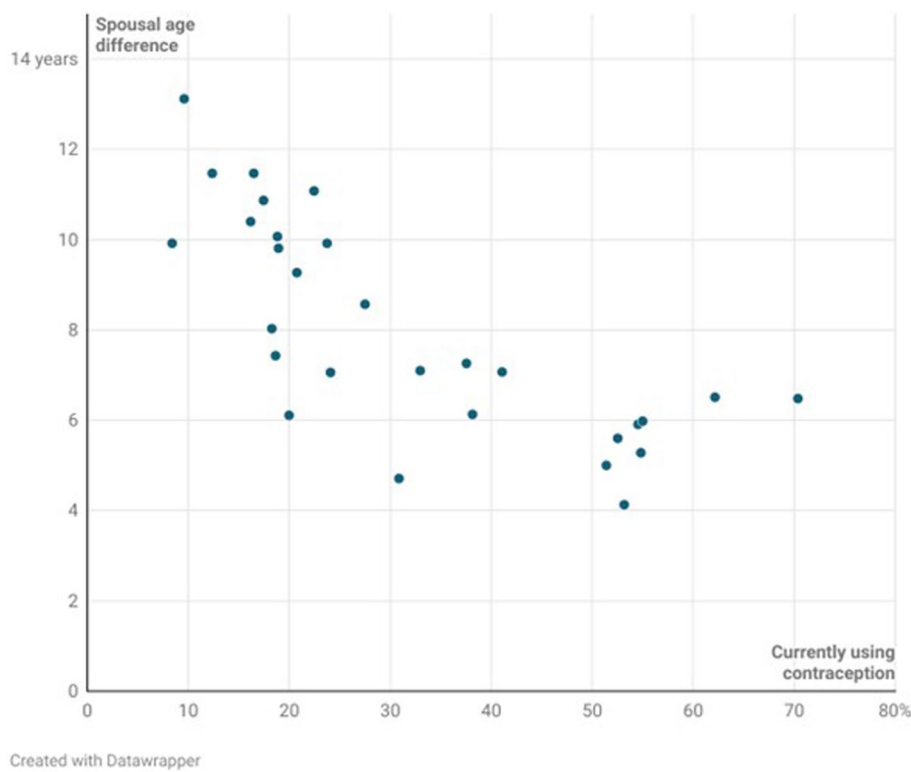


Fig. 1 Scatterplot of spousal age difference and contraceptive use by country

use. The results indicate substantial variation across countries in this relationship. In 11 of the 29 countries, the association is not statistically significant. Within this group the odds were negative for seven (7) and positive for four (4). In the remaining 18 countries, spousal age difference had a statistically significant and negative relationship with contraceptive use ranging from odds ratio of 0.97 to 0.99. The largest odds are recorded in Namibia where an additional year was correlated with a 2.6 percent lower likelihood of using contraception, which is twice the size of that recorded for the pooled sample (1.1%).

Discussion

This study examined contraceptive usage of women in 29 sub-Saharan African countries focusing on the influence of spousal age differences. The results indicate that the odds of contraceptive use are negatively correlated with the size of the spousal age difference, a finding that is consistent with previous studies on the subject [13, 14, 35, 36]. Large spousal age differences are often believed to confer gender imbalances in decision making in favour of males particularly in patriarchal settings in Africa [13].

However, the results show substantial variation across the countries in the association between spousal age difference and contraceptive use, indicating that spousal

age differences may not be detrimental with respect to contraceptive use in all settings. Among the countries where there is a statistically significant negative relationship, there is diversity in terms of geographic sub-region, level of contraceptive use, and mean spousal age difference. While countries in West Africa with larger spousal age differences predominate the countries where the association between spousal age difference and contraceptive use is not statistically significant, the group also includes two countries with the lowest spousal age differences. This variation highlights the need for subsequent research to further investigate the possible socio-cultural beliefs and practices, gender norms, and macro-level factors that could influence the association between the two variables.

The findings further indicate that the strength of the association between spousal age difference and contraceptive use has not changed over time, although contraceptive use is higher for women in later marriage cohorts.

The findings of this study support existing research on the potentially negative implications of age-disparate relationships. The explanation for the relationship between spousal age difference and contraceptive usage is the power imbalance in age-disparate marriages [24–26]. The magnitude and significance of the difference in contraceptive use for women in age-disparate

Table 3 Results of logistic regression predicting contraception use

Variable	Model 1				Model 2				Model 3					
	Odds ratio	T-stat	P > t	[95% conf. interval]	Odds ratio	T-stat	P > t	[95% conf. interval]	Odds Ratio	T-stat	P > t	[95% conf. interval]		
Spousal age difference (years)	0.986	-16.08	0.00	0.985	0.988	0.987	-14.76	0.00	0.986	0.989	-2.42	0.02	0.981	0.998
<i>Year of marriage</i>														
1975—1979	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1980—1984	1.196	5.21	0.00	1.118	1.280	1.160	4.24	0.00	1.083	1.242	2.54	0.01	1.034	1.299
1985—1989	1.404	9.91	0.00	1.313	1.502	1.321	7.98	0.00	1.234	1.414	5.96	0.00	1.247	1.548
1990—1994	1.616	13.35	0.00	1.506	1.734	1.497	11.01	0.00	1.393	1.608	7.35	0.00	1.348	1.674
1995—1999	1.812	15.41	0.00	1.680	1.955	1.648	12.71	0.00	1.526	1.780	9.20	0.00	1.501	1.870
2000—2004	2.053	17.12	0.00	1.891	2.229	1.828	14.09	0.00	1.681	1.988	10.52	0.00	1.650	2.075
2005—2009	2.355	18.47	0.00	2.150	2.579	2.015	14.82	0.00	1.837	2.211	11.54	0.00	1.814	2.315
2010—2014	2.643	19.04	0.00	2.391	2.921	2.158	14.77	0.00	1.948	2.389	12.00	0.00	1.948	2.527
2014—2019	2.948	18.67	0.00	2.632	3.302	2.321	14.26	0.00	2.067	2.606	11.32	0.00	2.002	2.678
2020—2022	3.490	16.05	0.00	2.996	4.065	2.709	12.66	0.00	2.321	3.161	9.57	0.00	2.193	3.286
<i>Interaction of spousal age difference and year of marriage</i>														
1975—1979	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1980—1984	1.000	0.02	0.98	0.989	1.011	1.000	0.02	0.98	0.989	1.011	0.02	0.98	0.989	1.011
1985—1989	0.994	-1.260	0.209	0.984	1.004	0.994	-1.260	0.209	0.984	1.004	-1.260	0.209	0.984	1.004
1990—1994	1.000	-0.080	0.937	0.990	1.009	1.000	-0.080	0.937	0.990	1.009	-0.080	0.937	0.990	1.009
1995—1999	0.998	-0.42	0.67	0.989	1.007	0.998	-0.42	0.67	0.989	1.007	-0.42	0.67	0.989	1.007
2000—2004	0.999	-0.31	0.76	0.989	1.008	0.999	-0.31	0.76	0.989	1.008	-0.31	0.76	0.989	1.008
2005—2009	0.998	-0.43	0.67	0.988	1.007	0.998	-0.43	0.67	0.988	1.007	-0.43	0.67	0.988	1.007
2010—2014	0.996	-0.740	0.461	0.986	1.006	0.996	-0.740	0.461	0.986	1.006	-0.740	0.461	0.986	1.006
2014—2019	1.001	0.11	0.91	0.989	1.012	1.001	0.11	0.91	0.989	1.012	0.11	0.91	0.989	1.012
2020—2022	1.002	0.21	0.83	0.982	1.022	1.002	0.21	0.83	0.982	1.022	0.21	0.83	0.982	1.022
<i>Person who usually decides on respondent's health care</i>														
Respondent alone	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Respondent and husband/someone else	1.040	2.75	0.01	1.011	1.070	1.040	2.75	0.01	1.011	1.070	2.750	0.006	1.011	1.070
Husband alone	0.867	-9.52	0.00	0.842	0.893	0.867	-9.52	0.00	0.842	0.893	-9.52	0.00	0.842	0.893
Someone else/other	0.729	-6.47	0.00	0.663	0.803	0.730	-6.47	0.00	0.663	0.803	-6.47	0.00	0.663	0.803
<i>Education</i>														
No education	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Primary education	1.615	34.26	0.00	1.571	1.659	1.615	34.25	0.00	1.571	1.659	34.25	0.00	1.571	1.660
Secondary education	2.151	42.82	0.00	2.076	2.227	2.151	42.82	0.00	2.076	2.227	42.83	0.00	2.077	2.227
Tertiary education	2.292	25.77	0.00	2.152	2.441	2.292	25.77	0.00	2.152	2.441	25.77	0.00	2.152	2.441

Table 3 (continued)

Variable	Model 1				Model 2				Model 3					
	Odds ratio	T-stat	P > t	[95% conf. interval]	Odds ratio	T-stat	P > t	[95% conf. interval]	Odds Ratio	T-stat	P > t	[95% conf. interval]		
<i>Work status</i>														
Not working	--	--	--	--	--	--	--	--	--	--	--	--		
Works for family member	1.067	3.18	0.00	1.025	1.111	1.055	2.59	0.01	1.013	1.098	2.59	0.01	1.013	1.098
Works for someone else	1.494	20.68	0.00	1.438	1.552	1.377	16.02	0.00	1.324	1.432	16.03	0.00	1.325	1.432
Self-employed	1.232	16.13	0.00	1.201	1.264	1.202	14.10	0.00	1.172	1.233	14.10	0.00	1.172	1.233
<i>Age</i>														
15–19	--	--	--	--	--	--	--	--	--	--	--	--	--	--
20–24	1.088	3.43	0.00	1.037	1.141	1.043	1.71	0.09	0.994	1.095	1.720	0.085	0.994	1.096
25–29	1.030	1.16	0.25	0.980	1.084	0.958	-1.65	0.10	0.910	1.008	-1.63	0.10	0.911	1.009
30–34	0.964	-1.29	0.20	0.913	1.019	0.873	-4.72	0.00	0.826	0.924	-4.70	0.00	0.826	0.924
35–39	0.843	-5.44	0.00	0.793	0.897	0.744	-9.23	0.00	0.698	0.792	-9.22	0.00	0.699	0.792
40–44	0.665	-11.56	0.00	0.620	0.712	0.573	-15.42	0.00	0.534	0.615	-15.42	0.00	0.534	0.615
45–49	0.371	-24.49	0.00	0.343	0.402	0.315	-27.84	0.00	0.290	0.341	-27.85	0.00	0.290	0.341
<i>Religion</i>														
Christian	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Moslem	0.681	-19.90	0.00	0.656	0.708	0.729	-16.30	0.00	0.702	0.757	-16.290	0.000	0.702	0.757
Traditional	0.441	-17.77	0.00	0.402	0.482	0.507	-14.92	0.00	0.464	0.555	-14.92	0.00	0.464	0.555
Other/ No religion	0.752	-8.79	0.00	0.705	0.801	0.808	-6.48	0.00	0.757	0.862	-6.470	0.000	0.757	0.862
Religion not available	0.645	-10.47	0.00	0.594	0.700	0.655	-9.99	0.00	0.603	0.712	-9.98	0.00	0.603	0.712
<i>Fertility preferences</i>														
Both partners want no more	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Only wife wants no more	0.834	-9.11	0.00	0.802	0.867	0.838	-8.76	0.00	0.806	0.872	-8.750	0.000	0.806	0.872
Both want more	0.578	-35.40	0.00	0.561	0.596	0.591	-33.64	0.00	0.573	0.609	-33.63	0.00	0.573	0.609
Husband desires unknown	0.504	-39.89	0.00	0.487	0.521	0.524	-37.37	0.00	0.506	0.542	-37.36	0.00	0.506	0.542
Other	0.938	-3.39	0.00	0.903	0.973	0.957	-2.31	0.02	0.921	0.993	-2.31	0.02	0.921	0.993
Number of children alive	1.092	23.33	0.00	1.084	1.100	1.109	26.97	0.00	1.101	1.118	26.97	0.00	1.101	1.118
<i>Births in the past year</i>														
No births in the past year	--	--	--	--	--	--	--	--	--	--	--	--	--	--
At least one birth in the past year	0.361	-83.69	0.00	0.353	0.370	0.358	-83.89	0.00	0.349	0.366	-83.92	0.00	0.349	0.366
<i>Sex composition of children alive</i>														
No child	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Girls only	7.891	51.87	0.00	7.298	8.531	7.861	51.61	0.00	7.268	8.501	51.59	0.00	7.267	8.500

Table 3 (continued)

Variable	Model 1				Model 2				Model 3			
	Odds ratio	T-stat	P > t	[95% conf. interval]	Odds ratio	T-stat	P > t	[95% conf. interval]	Odds Ratio	T-stat	P > t	[95% conf. interval]
Cote d'Ivoire	2.531	9.65	0.00	2.095 3.056	4.058	12.82	0.00	3.276 5.027	4.052	12.81	0.00	3.271 5.020
Democratic Republic of the Congo	1.766	6.05	0.00	1.469 2.123	2.367	7.87	0.00	1.910 2.934	2.365	7.86	0.00	1.908 2.931
Ethiopia	5.878	20.43	0.00	4.959 6.966	8.536	21.17	0.00	6.999 10.411	8.530	21.16	0.00	6.994 10.403
Gabon	1.556	3.60	0.00	1.223 1.980	2.004	5.17	0.00	1.540 2.608	2.002	5.16	0.00	1.538 2.606
Gambia	1.479	4.49	0.00	1.247 1.755	2.059	7.15	0.00	1.689 2.510	2.057	7.14	0.00	1.687 2.507
Ghana	2.103	9.42	0.00	1.802 2.454	2.901	11.22	0.00	2.409 3.494	2.899	11.21	0.00	2.407 3.491
Guinea	1.815	6.48	0.00	1.516 2.174	2.920	10.18	0.00	2.376 3.589	2.917	10.17	0.00	2.373 3.585
Kenya	7.172	26.98	0.00	6.216 8.276	9.206	24.70	0.00	7.719 10.979	9.200	24.69	0.00	7.714 10.972
Lesotho	10.512	29.89	0.00	9.009 12.266	12.481	26.80	0.00	10.377 15.012	12.464	26.79	0.00	10.364 14.991
Liberia	0.829	-1.97	0.05	0.689 0.999	1.242	1.89	0.06	0.993 1.554	1.241	1.89	0.06	0.991 1.553
Madagascar	6.481	22.58	0.00	5.510 7.622	8.073	21.37	0.00	6.665 9.778	8.074	21.37	0.00	6.666 9.779
Malawi	7.081	27.58	0.00	6.161 8.138	10.026	25.97	0.00	8.425 11.932	10.014	25.95	0.00	8.414 11.917
Mali	2.189	9.72	0.00	1.869 2.563	3.509	13.20	0.00	2.912 4.228	3.505	13.19	0.00	2.909 4.224
Mozambique	1.726	6.48	0.00	1.463 2.036	2.446	9.00	0.00	2.013 2.972	2.444	8.99	0.00	2.011 2.969
Namibia	8.849	24.83	0.00	7.449 10.511	9.166	21.11	0.00	7.462 11.260	9.152	21.09	0.00	7.450 11.242
Niger	4.403	15.86	0.00	3.666 5.289	6.988	18.29	0.00	5.673 8.606	6.978	18.27	0.00	5.665 8.595
Nigeria	1.864	8.27	0.00	1.608 2.160	2.479	9.93	0.00	2.072 2.965	2.476	9.92	0.00	2.070 2.962
Rwanda	6.020	24.94	0.00	5.228 6.933	8.077	23.27	0.00	6.773 9.630	8.067	23.25	0.00	6.766 9.619
Senegal	3.895	17.54	0.00	3.346 4.534	6.161	19.59	0.00	5.136 7.390	6.155	19.58	0.00	5.131 7.384
Sierra Leone	1.606	5.88	0.00	1.371 1.880	2.482	9.51	0.00	2.058 2.994	2.481	9.51	0.00	2.057 2.992
Tanzania	5.633	21.55	0.00	4.813 6.592	7.689	21.42	0.00	6.380 9.267	7.681	21.40	0.00	6.373 9.258
Uganda	3.159	14.88	0.00	2.715 3.676	4.220	15.33	0.00	3.511 5.073	4.215	15.32	0.00	3.506 5.066
Zambia	6.274	24.45	0.00	5.416 7.269	7.968	22.49	0.00	6.650 9.548	7.958	22.48	0.00	6.641 9.536
Zimbabwe	18.056	39.11	0.00	15.619 20.873	20.871	33.20	0.00	17.444 24.970	20.853	33.19	0.00	17.429 24.951
Constant	0.004	-49.71	0.00	0.003 0.005	0.003	-47.03	0.00	0.002 0.003	0.003	-45.21	0.00	0.002 0.003
Sample size	478,193				478,193				478,193			

The models also include dummy variables for year of survey

Table 4 Cross-national differences in the association between spousal age difference and contraceptive use

No.	Country	Odds ratio: spousal age difference (years)	T-statistic	P > t	[95% conf. interval]	
1	Namibia	0.974	-3.95	0.00	0.962	0.987
2	Burkina Faso	0.979	-4.84	0.00	0.970	0.987
3	Burundi	0.980	-3.43	0.00	0.969	0.991
4	Zambia	0.980	-4.13	0.00	0.971	0.990
5	Nigeria	0.981	-6.45	0.00	0.975	0.987
6	Zimbabwe	0.981	-4.65	0.00	0.974	0.989
7	Gabon	0.982	-1.31	0.19	0.956	1.009
8	Liberia	0.983	-1.90	0.06	0.967	1.001
9	Kenya	0.984	-4.40	0.00	0.977	0.991
10	Malawi	0.984	-4.27	0.00	0.977	0.991
11	Democratic Republic of the Congo	0.984	-2.16	0.03	0.970	0.999
12	Ethiopia	0.985	-2.67	0.01	0.974	0.996
13	Senegal	0.987	-3.37	0.00	0.980	0.995
14	Sierra Leone	0.987	-3.30	0.00	0.980	0.995
15	Guinea	0.988	-2.53	0.01	0.979	0.997
16	Ghana	0.989	-1.98	0.05	0.979	1.000
17	Tanzania	0.990	-2.52	0.01	0.983	0.998
18	Madagascar	0.991	-2.26	0.02	0.983	0.999
19	Mali	0.993	-1.73	0.09	0.984	1.001
20	Mozambique	0.994	-0.87	0.39	0.980	1.008
21	Cote d'Ivoire	0.994	-0.95	0.34	0.982	1.006
22	Uganda	0.994	-1.18	0.24	0.985	1.004
23	Rwanda	0.997	-0.87	0.39	0.989	1.004
24	Benin	0.998	-0.65	0.52	0.992	1.004
25	Niger	0.999	-0.14	0.89	0.988	1.011
26	Gambia	1.001	0.23	0.82	0.989	1.013
27	Lesotho	1.002	0.40	0.69	0.991	1.013
28	Chad	1.003	0.32	0.75	0.985	1.022
29	Cameroon	1.007	1.44	0.15	0.998	1.016

The models control for woman's age, religion, husband's education, number of children alive, gender composition of children alive, type of place of residence, polygamous union, year of survey, country, co-residence with husband, heard about family planning in the media in the last few months, heard about family planning from a health worker, fertility preferences, women's education and decision-making about own healthcare

relationships are somewhat reduced with the inclusion of measures of education and healthcare decision-making suggesting that promoting female autonomy may mediate the influence of spousal age differences on women's health outcomes.

The influence of individual-level factors correlated with larger spousal age differences such as lower educational attainment [24, 37], autonomy in healthcare decision-making [38], age at first marriage [24] and rural residence [24], on contraceptive use suggests that women in age-disparate relationships may be doubly disadvantaged highlighting the importance of continued study and development of targeted interventions. This is because the factors that are correlated with large spousal age

differences are also determinants of contraceptive use, many of which have odds that are greater in both size and magnitude relative to that of spousal age difference.

The results also highlight other statistically significant predictors of contraceptive use which are consistent with previous literature such as employment [9, 39], parity [39–41] hearing about family planning [40], and partner education [39]. Consistent with previous literature, this study found substantial variation across countries [40, 41] in contraceptive prevalence with the lowest rates recorded in the Western and Central regions which also tend to have higher spousal age differences.

Although the literature indicates that patterns of contraceptive use differ by marital status [42, 43], this study's

sample was limited to married women. This is because the Demographic and Health Survey does not collect data on the current partner age of unmarried women.

To conclude, our major conceptualized hypotheses is that countries where there are large spousal age differences which is indicative of unequal power dynamics and likely to be detrimental contraceptive use, the results attest to that fact, because we noticed that countries with larger spousal age gaps generally tended to have lower contraceptive prevalence. This result might be due to fact that women this category may lack the autonomy to make independent decisions and may constrain their use contraception. It is also significant to highlight the fact that women of more recent marriage cohorts tend to have higher contraceptive use than earlier cohorts. This result is expected and consistent with trends in contraceptive use in Africa where almost everywhere in the continent contraceptive use has been increasing over time.

Appendix

Table 5 List of surveys included in analysis

No.	Country	Number of Surveys	Survey Years
1	Benin	4	2001; 2006; 2011; 2017/18
2	Burkina Faso	2	2003; 2010
3	Burundi	2	2010; 2016/17
4	Cameroon	3	2004; 2011/12; 2018
5	Chad	2	2004; 2014/15
7	Cote d'Ivoire	2	2011/12; 2021
8	Democratic Republic of the Congo	2	2007; 2013/14
9	Ethiopia	2	2003; 2008; 2011
10	Gabon	2	2000; 2012
11	Gambia	2	2013; 2019/20
12	Ghana	4	2003; 2008; 2014; 2022
13	Guinea	3	2005; 2012; 2018
14	Kenya	4	2003; 2008/09; 2014; 2022
15	Lesotho	3	2004; 2009; 2014
16	Liberia	3	2006/07; 2013; 2019
17	Madagascar	3	2003/04; 2008/09; 2021
18	Malawi	4	2000; 2004; 2010; 2015/2016
19	Mali	4	2001; 2006; 2012/13; 2018

No.	Country	Number of Surveys	Survey Years
20	Mozambique	3	2003; 2011; 2022
21	Namibia	3	2000; 2006/07; 2013
20	Niger	2	2006; 2012
22	Nigeria	4	2003; 2008; 2013; 2018
23	Rwanda	5	2000; 2005; 2010; 2014/15; 2020
24	Senegal	4	2005; 2010/11; 2017; 2019
25	Sierra Leone	3	2008; 2013; 2019
26	Tanzania	4	2004/05; 2009/2010; 2015/16; 2022
27	Uganda	4	2000/01; 2006; 2011; 2016
28	Zambia	4	2001/02; 2007; 2013/14; 2018
29	Zimbabwe	4	1999; 2005/05; 2010/11; 2015
	Total surveys	91	

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Authors' contributions

PK conceptualized the study, analyzed data, interpreted the data analysis and was a major contributor to writing the manuscript. AB conceptualized the study, interpreted the data analysis and was a major contributor to writing the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets analyzed in the study are publicly available and can be accessed from the Demographic and Health Survey website at <https://dhsprogram.com>.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. United Nations. World family planning highlights. 2020.
2. Ahmed S, Li Q, Liu L, Tsui AO. Maternal deaths averted by contraceptive use: an analysis of 172 countries. *Lancet*. 2012;380(9837):111–25.
3. Rana MJ, Goli S. The road from ICPD to SDGs: health returns of reducing the unmet need for family planning in India. *Midwifery*. 2021;103:103107.

4. Stover J, Ross J. How increased contraceptive use has reduced maternal mortality. *Matern Child Health J.* 2010;14:687–95.
5. Concepcion K, Lacey S, McGeechan K, Estoesta J, Bateson D, Botfield J. Cost–benefit analysis of enhancing the uptake of long-acting reversible contraception in Australia. *Aust Health Rev.* 2019;44(3):385–91.
6. Kennedy EC, Mackesy-Buckley S, Subramaniam S, Demmke A, Latu R, Robertson AS, Tiban K, Tokon A, Luchters S. The case for investing in family planning in the Pacific: costs and benefits of reducing unmet need for contraception in Vanuatu and the Solomon Islands. *Reprod Health.* 2013;10:1–1.
7. Trussell J, Leveque JA, Koenig JD, London R, Borden S, Henneberry J, LaGuardia KD, Stewart F, Wilson TG, Wysocki S. The economic value of contraception: a comparison of 15 methods. *Am J Public Health.* 1995;85(4):494–503.
8. Achana FS, Bawah AA, Jackson EF, Welaga P, Awine T, Asuo-Mante E, Oduro A, Awoonor-Williams JK, Phillips JF. Spatial and socio-demographic determinants of contraceptive use in the Upper East region of Ghana. *Reprod Health.* 2015;12:1.
9. Blackstone SR, Nwaozuru U, Iwelunmor J. Factors influencing contraceptive use in sub-Saharan Africa: a systematic review. *Int Q Community Health Educ.* 2017;37(2):79–91.
10. Haider TL, Sharma M. Barriers to family planning and contraception uptake in sub-Saharan Africa: a systematic review. *Int Q Community Health Educ.* 2013;33(4):403–13.
11. Adjiwanou V, Bougma M, LeGrand T. The effect of partners' education on women's reproductive and maternal health in developing countries. *Soc Sci Med.* 2018;1(197):104–15.
12. Olakunde BO, Pharr JR, Chien LC, Benfield RD, Sy FS. Individual-and country-level correlates of female permanent contraception use in sub-Saharan Africa. *PLoS ONE.* 2020;15(12):e0243316.
13. Ibisomi L. Is age difference between partners associated with contraceptive use among married couples in Nigeria? *Int Perspect Sex Reprod Health.* 2014;40(1):39–45.
14. Manlove J, Ryan S, Franzetta K. Contraceptive use patterns across teens' sexual relationships: the role of relationships, partners, and sexual histories. *Demography.* 2007;44:603–21.
15. Chang AY, Maswera R, Moorhouse LR, Skovdal M, Nyamukapa C, Gregson S. The determinants and impacts of age-disparate relationships on women in Zimbabwe: a life course perspective. *SSM Popul Health.* 2021;16:100947.
16. Kunesch J, Hémono R, Gatere E, Kayitesi L, Packel L, Hope R, McCoy SI. Age-disparate relationships at first sex and reproductive autonomy, empowerment, and sexual violence among adolescent girls and young women in Rwanda. *SSM Popul Health.* 2024;25:101617.
17. Bajunirwe F, Semakula D, Izudi J. Risk of HIV infection among adolescent girls and young women in age-disparate relationships in sub-Saharan Africa. *AIDS.* 2020;34(10):1539–48.
18. Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. *Lancet.* 2010;376(9734):41–8.
19. Stein CR, Kaufman JS, Ford CA, Feldblum PJ, Leone PA, Miller WC. Partner age difference and prevalence of chlamydial infection among young adult women. *Sex Transm Dis.* 2008;35:447–52.
20. Beauclair R, Dushoff J, Delva W. Partner age differences and associated sexual risk behaviours among adolescent girls and young women in a cash transfer programme for schooling in Malawi. *BMC Public Health.* 2018;18(1):1–2.
21. Maughan-Brown B, Kenyon C, Lurie MN. Partner age differences and concurrency in South Africa: implications for HIV-infection risk among young women. *AIDS Behav.* 2014;18:2469–76.
22. Abramsky T, Watts CH, Garcia-Moreno C, Devries K, Kiss L, Ellsberg M, Jansen HA, Heise L. What factors are associated with recent intimate partner violence? Findings from the WHO multi-country study on women's health and domestic violence. *BMC Public Health.* 2011;11(1):1–7.
23. Adebawale AS. Spousal age difference and associated predictors of intimate partner violence in Nigeria. *BMC Public Health.* 2018;18(1):1–5.
24. Carmichael S. Marriage and power: age at first marriage and spousal age gap in lesser developed countries. *Hist Fam.* 2011;16(4):416–36.
25. Casterline JB, Williams L, McDonald P. The age difference between spouses: variations among developing countries. *Popul Stud.* 1986;40(3):353–74.
26. DiClemente RJ, Wingood GM, Crosby RA, Sionean C, Cobb BK, Harrington K, Davies SL, Hook EW III, Oh MK. Sexual risk behaviors associated with having older sex partners: a study of black adolescent females. *Sex Transm Dis.* 2002;29:20–4.
27. Kabir R, Alradie-Mohamed A, Ferdous N, Vinnakota D, Arafat SY, Mahmud I. Exploring women's decision-making power and HIV/AIDS Prevention practices in South Africa. *Int J Environ Res Public Health.* 2022;19(24):16626.
28. Loll D, Fleming PJ, Manu A, Morhe E, Stephenson R, King EJ, Hall KS. Reproductive autonomy and pregnancy decision-making among young Ghanaian women. *Glob Public Health.* 2020;15(4):571–86.
29. Okunlola DA. Women's and male partners' socio-demographic and economic characteristics associated with contraceptive decision making in Nigeria. *BMC Women's Health.* 2022;22(1):450.
30. Bawah AA, Asuming PO, Bangha M, Phillips JF, Vaughan-Smith M. Does the contribution of women to household expenditure explain contraceptive use? An assessment of the relevance of bargaining theory to Africa. *Afr Popul Stud.* 2013;27(2):216–28.
31. Kibira SP, Ndugga P, Nansubuga E, Sewannonda A, Kwagala B. Contraceptive uptake among married women in Uganda: does empowerment matter? 2014.
32. Yaya S, Uthman OA, Ekholueta M, Bishwajit G. Women empowerment as an enabling factor of contraceptive use in sub-Saharan Africa: a multilevel analysis of cross-sectional surveys of 32 countries. *Reprod Health.* 2018;15(1):1–2.
33. ICF. Demographic and Health Surveys (various) [Datasets]. Funded by USAID. Rockville: ICF [Distributor]. 1995–2019.
34. Wilcox R. Trimming and winsorization. *Encycl Biostat.* 2005;15:8.
35. Bankole A, Singh S. Couples' fertility and contraceptive decision-making in developing countries: hearing the man's voice. *Int Fam Plan Perspect.* 1998;24(1):15–24.
36. Kitila SB, Terfa YB, Akuma AO, Olika AK, Olika AK. Spousal age difference and its effect on contraceptive use among sexually active couples in Ethiopia: evidence from the 2016 Ethiopia demographic and health survey. *Contracept Reprod Med.* 2020;5:1–9.
37. Gustafson P, Fransson U. Age differences between spouses: sociodemographic variation and selection. *Marriage Fam Rev.* 2015;51(7):610–32.
38. Tesema ZT, Tesema GA, Boko MM, Akalu TY. Determinants of modern contraceptive utilization among married women in sub-Saharan Africa: multilevel analysis using recent demographic and health survey. *BMC Women's Health.* 2022;22(1):181.
39. Ba DM, Ssentongo P, Agbese E, Kjerulff KH. Prevalence and predictors of contraceptive use among women of reproductive age in 17 sub-Saharan African countries: a large population-based study. *Sex Reprod Healthc.* 2019;21:26–32.
40. Boadu I. Coverage and determinants of modern contraceptive use in sub-Saharan Africa: further analysis of demographic and health surveys. *Reprod Health.* 2022;19(1):18.
41. Crissman HP, Adanu RM, Harlow SD. Women's sexual empowerment and contraceptive use in Ghana. *Stud Fam Plann.* 2012;43(3):201–12.
42. de Vargas NunesColl C, Ewerling F, Hellwig F, De Barros AJ. 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):1–2.
43. Sidibé S, Delamou A, Camara BS, Dioubaté N, Manet H, El Ayadi AM, Benova L, Kouanda S. Trends in contraceptive use, unmet need and associated factors of modern contraceptive use among urban adolescents and young women in Guinea. *BMC Public Health.* 2020;20(1):1.

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