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Determinants of maternal healthcare utilization among married adolescents: Evidence from 13 Sub-Saharan African countries

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ABSTRACT

Objectives: Child and adolescent marriage are widely prevalent in some developing countries, and yet evidence on the maternal healthcare utilization of married adolescents is sparse. This study sought to identify the determinants of maternal healthcare utilization among married adolescents in 13 countries with the highest adolescent marriage rates in Sub-Saharan Africa.

Study design: This is a multicountry cross-sectional analysis.

Methods: Demographic and Health Survey data on 4288 married adolescents were used. Multivariable logistic regressions were used to identify the individual- and household-level predictors of the utilization of antenatal care, safe delivery and postnatal care.

Results: Wealth and access to media were positively associated with the utilization of all types of maternal healthcare services. Female education and partner education were positively associated with antenatal care. Predictors of safe delivery included urban residence (odds ratio [OR] = 1.87; 95% confidence interval [CI] = 1.15—3.03), female education (OR = 1.37; 95% CI = 1.16—1.60) and number of living children (OR = 1.25; 95% CI = 1.01,1.54), whereas positive correlates of postnatal care were urban residence (OR = 1.35; 95% CI = 1.00 —1.82), partner education (OR = 1.32; 95% CI = 1.12—1.56) and employment (OR = 1.43; 95% CI = 1.07,1.89). Full antenatal care and safe delivery utilization were associated with increased postnatal care utilization. Second or third birth order and associated birth intervals were strong barriers to maternal healthcare utilization. Although autonomy in decision-making over financial spending and relationships were positively associated with full antenatal care (OR = 1.09; 95% CI = 1.03—1.14), the results suggest that autonomy over personal healthcare decisions had an opposite relationship (OR = 0.76; 95% CI = 0.58—1.01).

Conclusions: Living conditions and autonomy in decision-making over resources and relationships are facilitators of maternal healthcare utilization among married adolescents. Determinants observed in this multicountry study can help shape maternal healthcare interventions in context with high child and teenage marriage rates.

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Introduction

Under Sustainable Development Goal 5 (Target 5.3), the international community has committed to ending the practice of child, early and forced marriage by 2030.[1] Countries from Sub-Saharan Africa (SSA) present a unique case in the sense that they show high levels of both maternal and child (younger than five years) mortality,[2] as well as high prevalence of early marriage (of the top 20 countries for child marriage prevalence, 18 are in SSA[1]). Major determinants of early marriage in SSA are poverty, religion, ethnicity, poor education and place of residence.[3,4] In countries with the highest prevalence rates, drivers of early marriage also include polygamy, marrying girls at a young age to preserve family honour and social status (in Niger),[5] female genital mutilation in preparation for marriage and conflict where displaced girls are forced to marry their attackers after being raped (in Chad).[6,7] Although these countries have formulated action plans to end early and forced marriage and established national committees to monitor early marriage and develop effective policies, these efforts are hampered by challenges such as poverty and resistance from social and religious groups.[8]

Studies have found that early marriage results in limited autonomy in decision-making, school dropouts, poor livelihood opportunities and a high risk of getting infected with HIV.[9—13] The practice of early or child marriage is intertwined with early childbearing. Adolescent mothers are mostly child or teenage brides living in a stable relationship—marriage or union—with an older man, with higher frequency of sexual activity than their unmarried peers and more social pressure to give birth soon after marriage, which can lead to an increased likelihood of pregnancies.[14,15] However, early childbearing negatively affects the health outcomes for mothers and children.[16] Complications related to pregnancy and childbirth are common for women aged 15—18 years because their bodies are not fully developed and capable of carrying the child or to sustain prolonged labour at birth.[17] Compared with adult mothers, adolescent mothers typically lack access to skilled antenatal, delivery and postnatal care services and therefore are highly vulnerable to high-risk pregnancies, unsafe abortions, and maternal mortality and morbidity.[9,11,12,18,19] Adolescent mothers are also more likely to have stunted and underweight children, infants born with low birth weight and higher neonatal and infant mortality rates.[20—22]

Facilitating access to maternal health care has been proven to be a viable solution to correctly inform mothers and reduce child and maternal mortality, especially in rural areas.[23] The use of either private or public safe facilities has been shown to reduce neonatal mortality by up to thirty percent.[24] National and international efforts have been and are currently being implemented to improve adolescents' livelihoods in the developing world, and evidence is needed to ensure successful policies are adopted by interested stakeholders.[25—27] Therefore, understanding the determinants of maternal healthcare

utilization among young mothers is essential for developing successful maternal health policies and interventions. Yet, given the worrying levels of child and adolescent marriage in developing countries, evidence on the maternal healthcare utilization of married adolescents is nascent and has only focused on a few individual countries (Rai et al., 2012; Singh et al., 2012; Khanal et al., 2011). Multicountry studies have generally examined adolescents, regardless of their marital status.[28] This study intends to fill this knowledge gap.

This article aims to contribute to the empirical literature by investigating the factors correlated with maternal healthcare utilization among married adolescents in 13 SSA countries with the highest rates of child and teenage marriage. The study focussed on of the utilization of antenatal and postnatal care and delivery in a safe facility. The target population was married adolescents (i.e., girls younger than 19 years).

Methods

The study used data from the most recent Demographic and Health Surveys (DHS) for 13 countries: Burkina Faso (2010), Chad (2014—15), Democratic Republic of the Congo (2013—14), Ethiopia (2016), Guinea (2012), Madagascar (2008—09), Malawi (2015—16), Mali (2012—13), Mozambique (2011), Niger (2012), Nigeria (2013), Sierra Leone (2013) and Uganda (2011). DHS provide information on women and household characteristics, fertility, and contraceptive and healthcare utilization. The total sample size of women from the 13 countries was 220,004; of which, 39,220 were adolescents (younger than 19 years), and 8,050 were in union or married. However, only 4,288 married adolescents had complete information on maternal health care, and they, therefore, comprise the analytical sample.

The study used three indicators of maternal healthcare utilization: having received full antenatal care (ANC), having delivered in a safe facility (i.e., public or private health facility, where patients are assisted by health personnel), and having received a postnatal check-up within two months from delivery. Because the DHS from the selected countries were carried out between 2010 and 2016, full ANC is defined using the previous guidance from the World Health Organization: four antenatal visits, at least two tetanus toxoid injections during pregnancy or received one tetanus toxoid injection during pregnancy and at least one in the three years before pregnancy and received iron and folic acid tablets.[29]

The study examined the association between these outcomes and a set of predictors that represent socio-economic and sociodemographic aspects of adolescent woman (i.e., age, education, wealth, religion and employment status), her partner's educational attainment and household characteristics (i.e., household size, age and gender of the household head). Factors such as education, wealth and living in an urban environment are commonly associated with higher use of maternal health care among women in Sub-Saharan Africa[30,31] and also among female adolescents.[32—34] A composite variable representing the birth order of the most recent delivery and the interval between births (i.e., if the last delivery was the woman's first, second or third with an interval shorter than 24 months or second or third with an interval longer than

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[1] Based on data from girlsnotbrides.org. Retrieved at https://www.girlsnotbrides.org/where-does-it-happen/.

24 months) was added as a covariate. Evidence shows that women are more likely to use maternal health care for their first-born children as first-born children are culturally prioritized over other children.[33,35] Exposure to any type of media (i.e., television, radio or newspaper) and place of residence (urban/rural) were also included as a plausible determinant. Access to media sources increases healthcare knowledge and has been found to increase maternal healthcare utilization.[33] Other determinants include the following: an index for woman autonomy in decision-making inside the household, built using measures of autonomy in decisions over large purchases, own income and partner income's spending and visits to relatives or friends and decision-making autonomy over own health care (i.e., the woman is the only decision-maker over her health care). These decision-making variables can help shed light on whether autonomy in decision-making increases maternal healthcare utilization, as shown in previous studies.[34,36]

Statistics show that among sampled adolescents, marriage rates were highest in Niger (49.7%), Mali (34.4%) and Chad (31.3%), with Uganda showing the smallest percentage of adolescent women in union (6%). Even higher marriage rates are observed among sampled women aged 20–24 years (about 22,485), who married before the age of 19 years, in Niger (78%), Chad (75%) and Mali (69%). These statistics are consistent with the trends estimated by international organizations.[2]

The selected method to perform the analysis, given the binary nature of the outcomes, was a logistic regression model, explicated by the following equation.

$$Logit(\pi_i) = \log\left(\frac{\pi_i}{1 - \pi_i}\right) = \beta_0 + \beta(X) + \varepsilon$$

where π_i represents the probability of an individual of having received ANC or postnatal care or having delivered in a safe facility, β_0 represents the log odds of full care and the β coefficient estimates with full likelihood the differential log odds of care associated with determinants X. ε is the error term. Pearson's chi-squared test was used for goodness-of-fit estimation, and the results were reported. All regressions were performed using standard errors clustered at the country level. Bivariate analysis was initially performed to report the unadjusted odds ratios (ORs) of each determinant. Then, multivariable regressions with all determinants were carried out for the specified set of maternal healthcare outcomes. Analysis was performed using Stata version 15 (StataCorp, College Station, TX).

Results

Descriptive statistics

Fig. 1 shows that within the pooled (multicountry) sample of married adolescents, about 28% received full ANC, 45% delivered in a safe facility and 33% received postnatal checks. About 73% of the married adolescents used full ANC in Sierra Leone, whereas less than 50% used full ANC in the rest of the

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[2] Girls not Brides data, https://www.girlsnotbrides.org, based on DHS and UNICEF databases.

analysed countries. More than half of the married adolescents delivered in a safe facility in Burkina Faso, Democratic Republic of Congo (DRC), Malawi, Mali, Mozambique and Uganda, whereas the prevalence was less than 50% in Chad, Ethiopia, Guinea, Madagascar, Niger, Nigeria and Sierra Leone. Postnatal checks were received by more than 50% of the married adolescents in Burkina Faso, Guinea, Niger and Sierra Leone. Postnatal care data were not available for Mozambique.

Table 1 reports the descriptive statistics of the pooled sample. Differences between married adolescents who used/did not use maternal health care were assessed using t-test and chi-squared tests. The summary statistics show that users of maternal health care were significantly wealthier and more educated than their counterparts and were more likely to be employed at the time of the survey.

Determinants of maternal healthcare utilization

The results for both the bivariate and multivariable analyses are reported in Table 2. Pearson's chi-squared tests on goodness of fit indicate that all the regression models fit well. In bivariate analysis (unadjusted regressions), all the determinants were significantly correlated with at least one of the maternal healthcare indicators. Further analysis used multiple regression models that incorporated all the determinants.

The results of the multiple regression models show that wealth was the most consistent determinant of maternal healthcare utilization because it had statistically significant positive associations with the utilization of full ANC, safe delivery and postnatal care. Women in the top wealth quintile were more than two times more likely to receive full ANC (OR = 2.34; 95% confidence interval [CI] = 1.68–3.25) and nearly five times more likely to deliver in a safe facility (OR = 4.84; 95% CI = 2.92–8.04) than women in the bottom wealth quintile. Similarly, adolescents in the fourth wealth quintile were significantly more likely to have received postnatal checks than those in the bottom quintile (OR = 1.41; 95% CI = 1.12,1.78). Exposure to any type of media was beneficial to adolescent mothers as the results show that media users were better off than their counterparts on every indicator of maternal healthcare utilization. Respondents with primary education had a higher likelihood of delivering in a safe facility than uneducated women (OR = 1.37; 95% CI = 1.16–1.60). Postprimary education was associated with an even higher likelihood of safe delivery (OR = 2.25; 95% CI = 1.59–3.19). Postprimary education was also positively associated with greater utilization of full ANC, although this association was only significant at the $P < 0.1$ level (OR = 1.43; 95% CI = 0.96,2.13). Women married to educated men had a higher likelihood of receiving full ANC (OR = 1.40; 95% CI = 1.14,1.72) and postnatal care (OR = 1.32; 95% CI = 1.12–1.56) than women married to uneducated partners. Female employment was positively associated with postnatal healthcare utilization (OR = 1.43; 95% CI = 1.07,1.89). Living in an urban area was associated with a higher likelihood of a safe delivery (OR = 1.87; 95% CI = 1.15–3.03) and of receiving postnatal care (OR = 1.35; 95% CI = 1.00–1.82) when compared with living in a rural area. The number of living children was positively correlated with safe delivery (OR = 1.25; 95% CI = 1.01,1.54).
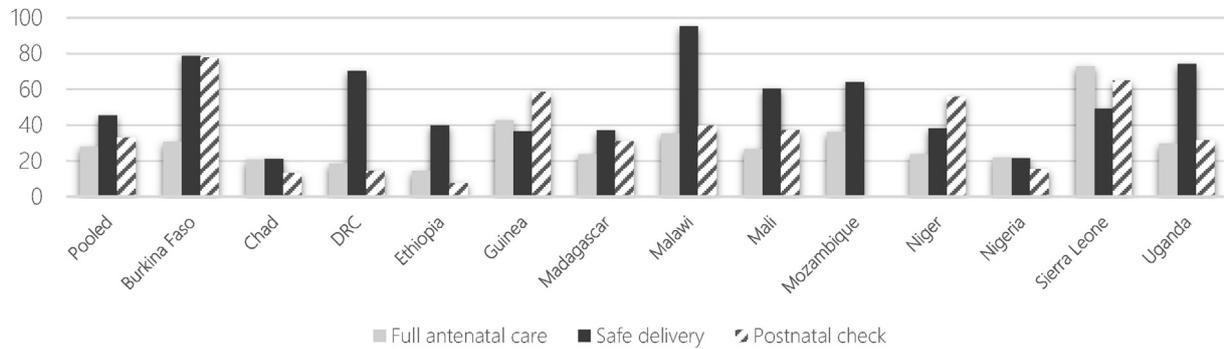
Fig. 1 — Prevalence (%) of married adolescents who received full antenatal care, delivered in a safe place and received postnatal care.

The effect of religion was only statistically significant for safe delivery, with Muslim women being the better-off group compared with those of other religions.

The multivariable regression results also show that an additional unit in the index for autonomy in decision-making over the spending of income and visits to kin and friends (on a scale from 0 to 8) increased the likelihood of using full ANC (OR = 1.09; 95% CI = 1.03–1.14). However, autonomy in decision-making over own health care was negatively associated with the utilization of full ANC, but this association was only significant at the $P < 0.1$ level (OR = 0.76; 95% CI = 0.58–1.01). Married adolescents with more living children were more likely to deliver in a health facility (OR = 1.25; 95% CI = 1.01–1.54). Birth order and associated interval were strong barriers to maternal healthcare utilization. Married adolescents whose most recent live birth was in the second or third birth order and who had an interval of more than 24 months between the last two live births were less likely to use full ANC (OR = 0.70; 95% CI = 0.55–0.89) and to use safe facilities (OR = 0.51; 95% CI = 0.38,0.68), when compared with adolescents whose last birth was their first-born child. Having second- or third-born children, born within a birth interval shorter than 24 months, was associated with an even lower utilization of full ANC (OR = 0.28; 95% CI = 0.10–0.80). Finally, married adolescents who received full ANC were more likely to deliver in a safe facility than their counterparts (OR = 2.69; 95% CI = 2.24–3.22). The utilization of full ANC (OR = 1.61; 95% CI = 1.17–2.23) and delivery in a safe facility (OR = 2.28; 95% CI = 1.71–3.04) were associated with a significantly higher likelihood of receiving postnatal check after delivery. Adolescent women's age and household size had no statistically significant association with maternal healthcare utilization.

Discussion

The body of literature investigating the association between household and community factors and the utilization of antenatal, postnatal and delivery care among married adolescents has focussed on individual countries from Sub-Saharan Africa (SSA) and Asia.[30,32,33,37–39] This study's interest, therefore, was to extend this analysis to a wider group of countries in SSA to assess the consistency of healthcare

utilization predictors in a pooled sample. The selected countries have the highest rates of child and teenage marriage. Married adolescents usually have a much higher birth rate than unmarried counterparts; therefore, it is imperative to assess their maternal healthcare utilization to design and implement meaningful and long-lasting health policies.

The study's results show that married adolescents who had a greater likelihood of using full ANC, safe delivery and postnatal care were wealthy and had access to media. The positive correlation between wealth and maternal healthcare utilization could be linked to the observation that poor households usually prioritize their basic daily needs and therefore allocate few resources for healthcare needs unlike wealthy households.[33] This finding suggests the need for antipoverty interventions in promoting maternal healthcare utilization among married adolescents. Access to media, which usually is greater among wealthier households, can raise awareness about maternal healthcare, increase healthcare knowledge and facilitate behavioural changes such as maternal healthcare seeking.[40,41] Better-educated adolescents were also more likely to use ANC and safe delivery facilities, while those who had greater autonomy in the making of decisions over the spending of income and visits to kin and friends were more likely to use full ANC than less autonomous women. These results are in line with the existing literature on the role of education and autonomy of women in decision-making. Previous studies have found educated women to be more knowledgeable about health behaviours and more likely to seek higher quality healthcare services.[33,34,42,43] They also found that educated women are more confident, have greater decision-making power than uneducated women and can communicate better with other family members on health-related issues.[34,42] In addition, women with high autonomy over decision-making and relationships are more likely to have high self-esteem and are unwilling to accept gender inequality in power which influences their decision to seek maternal health care.[43] Partner education was also a positive predictor of antenatal and postnatal care utilization, which is important because teenage brides are often forced to interrupt their education when getting married, making impossible for them to even finalize primary school.[14] One interesting result of the analysis is the negative and apparently counterintuitive association between being the ultimate decision-maker over health care and having accessed full ANC. However, this

Table 1 – Summary statistics for married adolescents aged 15–19 years in the total sample.								
	Full antenatal care			Safe delivery			Postnatal check[a]		
	Users N = 1,176	Non-users N = 3,049	Diff. t-test/ chi-squared	Users N = 1,937	Non-users N = 2,346	Diff. t-test/ chi-squared	Users N = 1,284	Non-users N = 2,607	Diff. t-test/ chi-squared
Household and individual characteristics									
Age of the HH head	35.31 (15.74)	32.43 (14.43)	<0.001	33.75 (15.32)	32.89 (14.47)	0.062	34.97 (15.54)	32.87 (14.59)	<0.001
Respondent age	17.44 (0.80)	17.38 (0.84)	0.103	17.42 (0.80)	17.39 (0.86)	0.266	17.46 (0.79)	17.40 (0.84)	0.0131
Household size	5.65 (3.87)	5.13 (3.42)	<0.001	5.36 (3.67)	5.23 (3.48)	0.267	5.72 (4.01)	5.17 (3.42)	<0.001
Education (%)									
No education	42.86	58.15	<0.001	38.10	67.31	<0.001	54.51	58.50	0.041
Primary	36.56	31.09		41.04	25.40		31.57	29.65	
Postprimary	20.58	10.76		20.86	7.29		13.92	11.85	
Partner has some education (%)	59.58	44.17	<0.001	62.43	36.42	<0.001	47.15	44.10	0.075
Religion (%)									
Protestant	18.93	30.99	<0.001	13.07	39.47	<0.001	12.52	37.84	<0.001
Muslim	40.66	35.23		42.58	31.89		54.82	28.02	
Catholic	22.08	9.87		15.35	12.37		17.42	10.56	
Traditional/animist	4.69	5.86		5.79	5.14		3.42	5.63	
Other/none	13.64	18.06		23.20	11.13		11.82	17.96	
Wealth index (%)									
Poorest	18.28	31.68	<0.001	19.15	35.08	<0.001	19.98	32.45	<0.001
Poorer	22.36	26.60		21.84	28.86		23.87	26.77	
Middle	21.60	18.73		20.55	18.50		22.85	18.03	
Richer	21.51	14.66		20.29	13.34		19.83	14.31	
Richest	16.24	8.33		18.17	4.22		13.76	8.44	
Respondent is employed (%)	55.02	50.20	0.005	53.38	50.36	0.049	58.79	47.70	<0.001
Autonomy in decision-making index[b]	1.98 (1.72)	1.78 (1.78)	0.002	1.94 (1.74)	1.77 (1.80)	0.001	1.79 (1.68)	1.76 (1.81)	0.632
Responded ultimate decision-maker over own health (%)	8.35	10.31	0.054	10.74	9.11	0.074	8.40	8.62	0.825
No. of living children	1.06 (0.41)	1.10 (0.49)	0.021	1.06 (0.40)	1.12 (0.52)	<0.001	1.08 (0.41)	1.10 (0.50)	0.309
Birth order (%)									
Birth order 1	85.11	80.97	0.001	87.08	77.95	<0.001	84.49	80.28	0.003
Birth order 2/3, interval ≤ 24 months	0.43	1.31		0.83	1.32		0.70	1.35	
Birth order 2/3, interval > 24 months	14.47	17.72		12.09	20.73		14.81	18.37	
Media exposure (%)	64.68	46.34	<0.001	62.45	41.82	<0.001	64.68	46.34	<0.001
Living in an urban area (%)	24.83	13.58	<0.001	26.38	8.70	<0.001	21.38	13.46	<0.001

Standard deviations are given in parentheses.
DHS, Demographic and Health Surveys; HH, household; HF, health facility.
[a] Mozambique DHS do not present data on postnatal care; every percentage/average related to the column excludes this country.
[b] Autonomy in the decision-making index ranges from 0 to 8.

Table 2 – Determinants of the utilization of full antenatal care, safe delivery facility and postnatal care among married adolescents in thirteen SSA countries (total sample).

Heading and individual characteristics	Full antenatal care		Safe delivery		Postnatal check	
	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR	Unadjusted OR	Adjusted OR
Age of the household head	1.01*** [1.01,1.02]	1.01** [1.00,1.01]	1.00* [1.00,1.01]	1.00 [1.00,1.01]	1.01*** [1.00,1.01]	1.00 [1.00,1.00]
Household size	1.04*** [1.02,1.06]	0.98 [0.95,1.02]	1.01 [0.99,1.03]	1.01 [0.98,1.04]	1.04*** [1.02,1.06]	1.01 [0.99,1.03]
Respondent's age	1.07 [0.99,1.16]	1.04 [0.92,1.17]	1.04 [0.97,1.12]	0.97 [0.89,1.05]	1.11** [1.02,1.21]	1.07 [0.94,1.22]
Respondent's education—referent: no education						
Primary	1.59*** [1.37,1.85]	1.26 [0.86,1.83]	2.85*** [2.48,3.27]	1.37*** [1.16,1.60]	1.14* [0.98,1.33]	1.24 [0.94,1.65]
Postprimary	2.59*** [2.14,3.15]	1.43* [0.96,2.13]	5.05*** [4.14,6.17]	2.25** [1.59,3.19]	1.26** [1.03,1.55]	0.98 [0.59,1.61]
Partner has some education	1.86*** [1.62,2.14]	1.40*** [1.14,1.72]	2.90*** [2.56,3.29]	1.16 [0.97,1.38]	1.13* [0.99,1.29]	1.32*** [1.12,1.56]
Respondent's religion—referent: Muslim						
Catholic	1.93*** [1.59,2.36]	1.16 [0.82,1.63]	0.93 [0.77,1.12]	0.82* [0.67,1.02]	0.84 [0.69,1.03]	0.92 [0.71,1.19]
Protestant	0.53*** [0.44,0.63]	0.77 [0.38,1.58]	0.25*** [0.21,0.29]	0.52*** [0.44,0.61]	0.17*** [0.14,0.20]	1.03 [0.71,1.47]
Traditional/animist	0.69** [0.50,0.96]	1.11 [0.73,1.67]	0.84 [0.64,1.11]	0.61*** [0.44,0.86]	0.31*** [0.22,0.44]	0.84 [0.46,1.55]
Other/none	0.65*** [0.53,0.80]	0.81 [0.59,1.09]	1.56*** [1.30,1.87]	0.71*** [0.56,0.91]	0.34*** [0.87,1.07]	0.76 [0.45,1.28]
Wealth index—referent: poorest						
Poorer	1.46*** [1.19,1.78]	1.33** [1.02,1.74]	1.39*** [1.17,1.65]	1.28** [1.02,1.61]	1.45*** [1.19,1.76]	1.24*** [1.08,1.43]
Middle	2.00*** [1.62,2.46]	1.67*** [1.24,2.26]	2.03*** [1.69,2.44]	1.60*** [1.15,2.22]	2.03*** [1.66,2.49]	1.45*** [1.19,1.75]
Richer	2.54*** [2.05,3.15]	2.06*** [1.36,3.13]	2.78*** [2.30,3.38]	1.85*** [1.26,2.73]	2.25*** [1.82,2.78]	1.41*** [1.12,1.78]
Richest	3.38*** [2.66,4.29]	2.34*** [1.68,3.25]	7.89*** [6.11,10.17]	4.84*** [2.92,8.04]	2.64*** [2.08,3.37]	1.14 [0.79,1.64]
Woman is employed	1.21*** [1.06,1.39]	0.96 [0.81,1.15]	1.13** [1.00,1.27]	0.97 [0.79,1.19]	1.56*** [1.37,1.79]	1.43** [1.07,1.89]
Autonomy in decision-making over spending and relationships	1.06*** [1.02,1.10]	1.09*** [1.03,1.14]	1.06*** [1.02,1.09]	1.02 [0.98,1.06]	1.01 [0.97,1.05]	1.01 [0.96,1.07]
Responded ultimate decision-maker over own health	0.79* [0.62,1.00]	0.76* [0.58,1.01]	1.20* [0.98,1.47]	0.89 [0.63,1.26]	0.97 [0.77,1.24]	1.08 [0.73,1.60]
No. of living children	0.84** [0.73,0.97]	1.13 [0.89,1.44]	0.76*** [0.67,0.87]	1.25** [1.01,1.54]	0.93 [0.81,1.07]	1.07 [0.70,1.63]
Birth order—referent: birth order 1						
Birth order 2/3, interval ≤ 24 months	0.31** [0.12,0.78]	0.28** [0.10,0.80]	0.56* [0.30,1.02]	0.82 [0.51,1.31]	0.49* [0.24,1.03]	0.64 [0.24,1.74]
Birth order 2/3, interval > 24 months	0.78*** [0.64,0.94]	0.70*** [0.55,0.89]	0.52*** [0.44,0.62]	0.51*** [0.38,0.68]	0.77*** [0.64,0.92]	0.80 [0.45,1.41]
Exposed to any type of media	2.12*** [1.84,2.44]	1.45*** [1.27,1.65]	2.31*** [2.05,2.62]	1.24** [1.02,1.53]	2.51*** [2.18,2.88]	1.28*** [1.11,1.49]
Living in an urban area	2.10*** [1.78,2.49]	1.15 [0.93,1.41]	3.76*** [3.16,4.48]	1.87** [1.15,3.03]	1.75*** [1.47,2.08]	1.35** [1.00,1.82]
Full antenatal care			3.01*** [2.61,3.47]	2.69*** [2.24,3.22]	2.75*** [2.37,3.19]	1.61*** [1.17,2.23]
Safe delivery					2.83*** [2.46,3.24]	2.28*** [1.71,3.04]
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N		4098		4091		3717
Pseudo R²		0.115		0.301		0.225
Pearson's chi-squared goodness-of-fit test		0.382		0.365		0.684

The values are given as exponentiated coefficients with 95% confidence interval in parentheses. Standard errors are clustered at the country level.
SSA, Sub-Saharan Africa; OR, odds ratio.
*P < 0.10.
**P < 0.05.
***P < 0.01.

inverse relationship has been observed in other studies. Despite having autonomy in own healthcare decisions, married adolescents may still be unwilling to use full ANC services because of their rural residence or because of the poor quality of health delivery services and their misperception and overvaluation of non-professional birth attendants' skills.[44,45] The results also show that the choice of place of delivery was significantly influenced by religious belief, although it should be noted that the majority of the population in the selected countries was Muslims, and it is plausible that religious minorities in these countries are marginalized and therefore may have less access to health facilities.

This study also finds that married adolescents were less likely to use full ANC and safe delivery facilities for their second- or third-born children, and utilization was even lower if the time between live births had been shorter than 24 months. Numerous studies have highlighted that women are more likely to use a safe facility for their first born,[46,47] even when they are adolescents.[33] In addition, delivery in a health facility is usually associated with a higher number of living

children. The study finds that women living in urban areas were more likely to deliver in a safe facility, which is consistent with the findings of Ronsmans et al.[49] who studied a sample of women (both adolescents and adults) in eight West African countries. Female employment is also an important predictor of maternal healthcare utilization, similar to the findings of previous studies.[42,48] This association could be linked to the income employed women receive from earnings, which can help them finance healthcare expenditures. This finding suggests the need for considering livelihoods and income-earning capabilities in interventions that seek to increase maternal healthcare utilization among married adolescents. Finally, it is interesting to note that respondents who had access to full ANC were more than 2.5 times more likely to deliver in a safe place than those who did not have access, and the use of postnatal checks was highly correlated with both ANC and safe delivery, highlighting the strong connection between access and utilization of different maternal healthcare components that has already been reported in numerous studies.[33,34]

The study faced several limitations. Information on the quality of maternal healthcare services and health insurance coverage was limited, and therefore, the analysis could not fully account for it. There were no data on postnatal care for Mozambique, and as such, the analysis of this indicator could only be carried out for 12 countries. The study relies on cross-sectional data and therefore only provides a one-off view of maternal healthcare utilization among married female adolescents. If available in the future, researchers could use longitudinal data to examine the dynamics of maternal healthcare utilization among married adolescents over time. The study's strengths are that it uses a population-based sample design with high response rates across multiple countries. The multicountry analysis of maternal healthcare utilization by married adolescents, which has received little attention in the literature, can help build a systematic and regular evidence base on women affected by child and teenage marriage.

This article examined the factors associated with maternal healthcare utilization among married adolescents in 13 countries with the highest child and teenage marriage rates in Sub-Saharan Africa. The findings suggest that empowering married adolescents through improvements in their living conditions and increasing their autonomy in decision-making over financial resources and relationships may be helpful targets for interventions aimed at increasing their maternal healthcare utilization. State and non-state actors could pursue a multisectoral approach that uses media channels to raise awareness on the importance of maternal health care; increases access to education and prevents school dropouts by married adolescents; and promotes employment and livelihood generation programmes to alleviate poverty, improve living conditions and increase married adolescents' control or autonomy over household resources. Such an approach could also play an important role in preventing early marriage.[6] The determinants observed in this multicountry study can help shape maternal healthcare utilization policies and interventions that improve maternal and child health and ultimately reduce maternal and child mortality in context with high child and teenage marriage rates.

Author statements

Ethical approval

Not required. The data used are from standard DHS which undergo ethical review from and are approved by the ICF Institutional Review Board (IRB).[3]

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Competing interests

None declared.

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[3] See: https://www.dhsprogram.com/What-We-Do/Protecting-the-Privacy-of-DHS-Survey-Respondents.cfm.

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