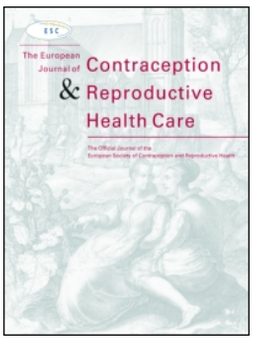

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RESEARCH ARTICLE

Contraceptive use among women with a history of induced abortion: findings from a national sample of sexually active, non-pregnant women in Ghana

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ABSTRACT

Objective: The aim of the study was to examine the relationship between a history of induced abortion and current use of contraception among reproductive-aged women in Ghana.

Methods: The analysed data were a weighted sample of 6544 sexually active, non-pregnant women aged 15–49 years, obtained from the 2014 Ghana Demographic and Health Survey. Survey logistic regression analysis was used to estimate the odds of currently using any contraception and of using a modern method of contraception, given a history of induced abortion in the period 2009–2014.

Results: A history of induced abortion between 2009 and 2014 was reported by 17.4% of women (95% CI 16.0%, 18.9%); 28.7% (95% CI 26.9%, 30.6%) were currently using a method of contraception and 23.0% (95% CI 21.4%, 24.7%) were currently using a modern method of contraception. The majority (80.1%) of current contraceptive users were using a modern method. The adjusted analysis revealed no statistically significant association between a history of induced abortion and current contraceptive behaviour. Other factors were associated with modern contraceptive use.

Conclusion: Overall, the use of contraception among sexually active women in Ghana was found to be low. Our findings showed that women's experience of induced abortion was unlikely to influence their current use of modern contraception.

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Abortion; contraception; family planning; Ghana; Ghana demographic and health survey; reproduction; women

Introduction

Reduction of the maternal mortality rate is a worldwide aim and is included in the Sustainable Development Goals, which replaced the Millennium Development Goals in 2016. Five broad, strategic objectives were laid out as a framework for the development and implementation of interventions to end preventable maternal deaths. These objectives include ensuring universal health coverage to provide comprehensive sexual, reproductive, maternal and newborn health care [1]. Nearly all maternal deaths that occur annually worldwide are recorded in low- and middle-income countries. In Ghana, the maternal mortality ratio is estimated to be as high as 308 deaths per 100,000 live births [2].

The available evidence suggests that effective contraception reduces the incidence of maternal deaths, averts unplanned pregnancies and their associated consequences, promotes child health and encourages overall socioeconomic development [3]. However, the use of contraception in sub-Saharan Africa, including Ghana, remains low and consequently may lead to unwanted pregnancies [4], unsafe abortions [5] and maternal deaths [6]. Contraceptive use would have a major impact on reducing these outcomes. The Ghana Health Service, under the auspices of the Ministry of Health, has taken steps to promote the use of contraception by women in Ghana. The implementation and rapid scale-up of the nationwide Community-based Health Planning and Services strategy helped to close the gap in physical access to primary health care facilities, where family planning services are provided to disadvantaged groups and communities [7,8]. In addition, subsidised contraceptives are provided at all government health facilities, which are the major source of contraception provision in Ghana [9, 10].

Yet, contraceptive supply shortages, fear of side effects, sociocultural and religious beliefs, spousal refusals and the desire for more children are notable barriers to the use of contraception by women in low- and middle-income countries [11,12]. Consequently, repeat induced abortion is becoming a common practice among women globally, including in Ghana [5] and other parts of sub-Saharan Africa [13].

Previous studies have investigated the determinants of contraceptive use among women of reproductive age in Ghana [14–18]. However, these studies did not examine the relationship between having a history of induced abortion and current use of contraception. It is therefore not clear whether women's experience of abortion influences their current contraceptive behaviour. As such, this study aimed to investigate the relationship between a history of

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induced abortion and the current use of contraception among sexually active women in Ghana.

Methods

Data source and sample

This was a secondary analysis of cross-sectional household data for women collected during the 2014 Ghana Demographic and Health Survey (GDHS), conducted by the Ghana Statistical Service, the Ghana Health Service and the National Public Health Reference Laboratory. The 2014 GDHS used a stratified, multistage sample design. In the first stage, 427 primary sampling units were selected, consisting of 211 rural and 216 urban enumeration areas. In the second stage, a number of households were systematically selected from all primary sampling units to provide adequate estimates for key indicators with acceptable precision. The inclusion criterion was all women aged 15–49 years who had slept in the selected households the night before the day of the interview. A total of 9656 eligible women aged 15–49 years were identified, of whom 9396 were interviewed, giving a response rate of 97%. The details of the survey and the women's questionnaire used can be found in the final report of the 2014 GDHS [19].

In the 2014 GDHS dataset, the period of induced abortions ranged from 1980 to 2014. For the purpose of the present study, we included 6868 women with no history of induced abortion and 964 women with a history of induced abortion during 2009–2014, giving a total of 7832 women, of whom 6574 were sexually active. Because of the unequal probability sampling techniques used by the DHS Programme to select the survey sample, sampling weights were used to ensure the proper representation of estimates [20]. Our analyses therefore involved a weighted sample of 6544 sexually active, non-pregnant Ghanaian women aged 15–49 years.

Variables and measurement

Dependent variables

Two dependent variables were selected: current use of any form of contraception and current use of modern contraception. The variables were derived from women's self-report of their or their partner's current use of a contraceptive. Modern contraceptives were classified according to previous reports [21]: female and male sterilisation, oral contraceptive pills (OCPs), intrauterine devices (IUDs), injectables, implants, male and female condoms, lactational amenorrhoea (LAM), emergency contraception and other modern methods. Methods including periodic abstinence, withdrawal and other traditional methods were classified as traditional contraceptive methods. The dependent variables were dichotomised and coded as 0 and 1. Women who reported currently using contraception were coded as 1; otherwise they were coded as 0. Similarly, women who were using a modern contraceptive method were coded as 1 and those who were using a traditional method were coded as 0.

Main independent variable

The main independent variable was a history of induced abortion between 2009 and 2014. This information was obtained from women's self-report of their lifetime history of induced abortion and the year of abortion. It was constructed in binary form as 'yes' for women who identified with a history of induced abortion and 'no' for women who did not identify with a history of induced abortion.

Covariates

The following covariates were included as potential confounders: maternal age, education, marital status, religious affiliation, region (of residence), setting of residence (rural or urban), wealth quintile, employment status, number of living children, and women's self-esteem, desire for children, exposure to information on family planning and knowledge of the ovulatory period. The self-esteem score was the sum of the scores of five dichotomous questions. Each score was measured based on responses to individual questions on whether a husband is justified in beating or hitting his wife in the following scenarios: (1) if she goes out without telling him; (2) if she neglects the children; (3) if she argues with him; (4) if she refuses to have sex with him; and (5) if she burns food. For each question, a value of 1 was assigned if the response was 'no' and 0 if the response was 'yes'. The values were then added, resulting in a score from 0 (lowest self-esteem) to 5 (highest self-esteem) (Cronbach's $\alpha = 0.8539$). Women who were exposed to information on family planning included all women who reported receiving information on family planning from one or more of the following in the last 12 months: television, radio, newspaper/magazine, visit by a family planning worker and visit to a family planning facility. Women's knowledge of the ovulatory period was assessed using two questions: (1) 'From one menstrual period to the next, are there certain days when a woman is more likely to become pregnant?' (2) 'Is this time just before her period begins, during her period, right after her period has ended, or halfway between two periods?' Knowledge of the ovulatory period was 'yes' if the woman responded that the ovulatory cycle was halfway between two periods; otherwise, it was 'no'.

Statistical analysis

Design-based bivariate analyses and multiple logistic regression were used to investigate the association between women's history of induced abortion and their current use of contraceptives. A survey logistic regression model was used to calculate the maximum likelihood estimates of the crude odds ratios (ORs) and adjusted ORs (AORs) and the 95% confidence interval (CI). First, in bivariate regression analyses we examined the association between a history of induced abortion, as well as other sociodemographic and obstetric variables, and the current use of contraception. Second, using only the subsample of women who reported currently using contraception, we examined the association between a history of induced abortion and the current use of modern contraception. The variables with a p-value $\leq .05$ in the bivariate regression analysis were then fitted in an adjusted regression model

to measure their independent association with the current use of a modern contraceptive method. All statistical analyses were conducted using Stata statistical software, version 13 (StataCorp LP, College Station, TX, USA). Statistical significance was set at $p < .05$. The fit of the adjusted model was examined using the Archer–Lemeshow goodness-of-fit test for a logistic regression model fitted with survey data [22]. We found no statistical evidence of lack of fit.

Ethics statement

The study did not require review by an institutional review board because the research team did not have any direct contact with the survey respondents. Additionally, the dataset used in the present study did not contain personal identifiers to the 2014 GDHS respondents. However, written approval to use the data was granted by the DHS Programme. The ethical considerations of the DHS Programme can be found at the DHS Programme website (www.dhsprogram.com/what-we-do/protecting-the-privacy-of-dhs-survey-respondents.cfm).

Results

Sociodemographic characteristics

The sociodemographic characteristics of the study participants are presented in Table 1. Of the 6544 women, 1139 (17.4%; 95% CI 16.0%, 18.9%) reported a history of induced abortion between 2009 and 2014, 61.7% had at least secondary education, 61.9% were in a union, 79.9% were Christians, 53.0% lived in an urban area, 80.8% were employed and 75.3% had been exposed to information on family planning. The mean age of the participants was 30.9 ± 9.0 years.

Contraceptive use

Of 6544 women, 1879 (28.7%; 95% CI 26.9%, 30.6%) reported currently using a method of contraception and 1506 (23.0%; 95% CI 21.4%, 24.7%) were using a modern method of contraception. We estimated that of the 1879 women who reported using contraception at the time of the study, 80.1% (95% CI 76.9%, 82.9%) were using a modern contraceptive method. Overall, the most widely used methods were injectables (26.4%), followed by implants (17.2%), OCPs (17.2%), periodic abstinence (13.0%), male condom (9.5%) and withdrawal (6.0%) (Figure 1).

Factors associated with contraceptive use in bivariate analyses

We first examined the relationship between reporting a history of induced abortion in the period 2009–2014 and the use of contraception, irrespective of whether it was a traditional method or a modern method. The results showed that a history of induced abortion was not statistically significantly associated with the use of contraception. However, there was statistical evidence that maternal age, education, marital status, region of residence, wealth quintile, self-esteem, desire for children and exposure to information on family planning were associated with the use of any contraception.

When the analysis was restricted to the subgroup of women who reported using contraception, we found an association between a history of induced abortion between 2009 and 2014 and the current use of modern contraception: women with a history of induced abortion had reduced odds of current use of modern contraception (OR 0.65; 95% CI 0.45, 0.95; $p < .05$). We also found that women with at least secondary education (OR 0.16; 95% CI 0.08, 0.31), Christians (OR 0.29; 95% CI 0.11, 0.80), women in the south (OR 0.10; 95% CI 0.05, 0.18), women with knowledge of the ovulatory period (OR 0.64; 95% CI 0.47, 0.87), and women who desired children within 2 years (OR 0.47; 95% CI 0.28, 0.79), were unsure of the timing for their next child (OR 0.42; 95% CI 0.24, 0.74) and those who were undecided (OR 0.61; 95% CI 0.39, 0.96) were less likely than their counterparts to report currently using modern contraception (all $p < .05$). By contrast, women aged 25–34 and 35–49 years; currently and previously in a union; rural women; women with one to three and four or more living children; and women in the poorest, poorer and middle wealth quintiles were more likely to report using modern contraception relative to their counterparts. Finally, a one point increase in women's self-esteem was associated with 15% increase in the odds of using modern contraception (OR 1.15; 95% CI 1.06, 1.25; $p < .05$) (Table 1).

Independent factors associated with current use of modern contraception

The results of the multivariable analyses are presented in Table 2. After adjusting for potential confounders, a history of induced abortion was not significantly associated with women's current use of modern contraception. In fact, the findings showed that, comparatively, women who reported a history of induced abortion in the period 2009–2014 had reduced odds of reporting current use of modern contraception (AOR 0.78; 95% CI 0.51, 1.19; $p = .246$). Similarly, lower odds of current use of modern contraception were found among women in the south (AOR 0.21; 95% CI 0.11, 0.40; $p < .001$) and women with knowledge about the ovulatory period (AOR 0.69; 95% CI 0.49, 0.96; $p = .027$), compared with their counterparts.

By contrast, the odds of current use of modern contraception were higher among women previously in a union compared with women who had never been in a union (AOR 3.08; 95% CI 1.30, 7.29; $p = .011$); higher among women with between one and three living children compared with women with no children (AOR 1.67; 95% CI 1.10, 2.55; $p = .016$); and higher among women in the poorest (AOR 4.68; 95% CI 1.90, 11.51; $p = .001$), poorer (AOR 3.23; 95% CI 1.50, 6.96; $p = .003$) and middle (AOR 3.17; 95% CI 1.82, 5.51; $p < .001$) wealth quintiles compared with women in the richest quintile (Table 2).

Discussion

Findings and interpretation

This study examined the relationship between a history of induced abortion and the current use of contraception among sexually active Ghanaian women of reproductive age. The findings showed that of the 6544 sexually active, non-pregnant women analysed, 17.4% reported a history of

Table 1. Percentage of women and crude odds of current contraceptive use by the explanatory variables.

		Any contraception ($n = 6544$)		Modern contraception ($n = 1879$)	
Variable	Weighted %	Weighted %	OR (95% CI)	Weighted %	OR (95% CI)
History of induced abortion					
No	82.6	28.1	Ref.	81.5	Ref.
Yes	17.4	31.6	1.18 (0.96, 1.44)	74.2	0.65 (0.45, 0.95)*
Age, in years[a]					
15–24	29.0	31.2	Ref.	73.3	Ref.
25–34	34.8	33.2	1.09 (0.91, 1.31)	81.8	1.63 (1.15, 2.31)*
35–49	26.2	22.4	0.64 (0.51, 0.79)*	85.3	2.10 (1.35, 3.28)*
Education					
None	21.1	20.7	Ref.	94.6	Ref.
Basic	17.2	29.9	1.63 (1.32, 2.01)*	91.2	0.59 (0.29, 1.21)
Secondary or higher	61.7	31.1	1.73 (1.45, 2.07)*	73.8	0.16 (0.08, 0.31)*
Marital status					
Never in a union	26.6	28.9	Ref.	65.5	Ref.
Currently in a union	61.9	29.7	1.04 (0.87, 1.23)	84.7	2.92 (2.04, 4.16)*
Previously in a union	11.5	23.2	0.74 (0.55, 0.99)*	90.7	5.11 (2.49, 10.49)*
Religion					
Other[b]	5.1	23.4	Ref.	92.7	Ref.
Muslim	15.0	21.0	0.87 (0.57, 1.32)	85.8	0.48 (0.16, 1.45)
Christian	79.9	30.5	1.44 (0.99, 2.09)	78.8	0.29 (0.11, 0.80)*
Region					
Greater Accra	19.5	28.7		69.0	
Western	11.5	33.4		77.6	
Central	11.0	33.0		89.1	
Volta	7.7	33.7		90.1	
Eastern	9.4	28.5		80.5	
Ashanti	17.7	26.6		71.0	
Brong Ahafo	8.5	35.3		82.9	
Northern	8.5	13.0		97.1	
Upper East	3.9	24.2		99.1	
Upper West	2.3	27.9		95.5	
Region (combined)[c]					
North	14.7	18.3	Ref.	97.4	Ref.
South	85.3	30.5	1.96 (1.63, 2.36)*	78.3	0.10 (0.05, 0.18)*
Setting of residence					
Urban	53.0	27.3	Ref.	73.7	Ref.
Rural	47.0	30.4	1.16 (0.97, 1.39)	86.6	2.30 (1.55, 3.40)*
No. of living children					
0	24.3	28.5	Ref.	61.7	Ref.
1–3	47.2	29.0	1.03 (0.81, 1.30)	83.5	3.13 (2.29, 4.28)*
4+	28.5	28.4	0.99 (0.78, 1.28)	90.0	5.60 (3.45, 9.10)*
Wealth group					
Poorest	16.5	24.6	0.75 (0.57, 0.99)*	94.9	9.30 (4.96, 17.44)*
Poorer	17.6	28.4	0.91 (0.67, 1.23)	89.5	4.26 (2.65, 6.85)*
Middle	21.2	30.4	1.00 (0.76, 1.32)	87.4	3.45 (2.24, 5.31)*
Richer	22.2	28.8	0.93 (0.72, 1.20)	70.3	1.18 (0.81, 1.73)
Richest	22.5	30.3	Ref.	66.7	Ref.
Employment status ($n = 6531$)					
Unemployed	19.2	27.1	Ref.	77.7	Ref.
Employed	80.8	29.1	1.10 (0.93, 1.31)	80.6	1.19 (0.84, 1.68)
Knowledge of the ovulatory period					
No	62.1	28.2	Ref.	83.0	Ref.
Yes	37.9	29.6	1.07 (0.93, 1.23)	75.6	0.64 (0.47, 0.87)*
Self-esteem					
0 (lowest self-esteem)	40.5	27.1	1.07 (1.03, 1.12)*	72.9	1.15 (1.06, 1.25)*
1	4.1	23.7		89.8	
2	6.6	21.8		87.9	
3	12.5	27.3		85.4	
4	21.0	30.6		83.6	
5 (highest self-esteem)	15.3	36.0		83.4	
Desire for children					
Want no more	27.1	28.7	Ref.	83.5	Ref.
Within 2 years	17.8	15.9	0.47 (0.37, 0.60)*	70.5	0.47 (0.28, 0.79)*
After 2+ years	32.8	34.7	1.32 (1.10, 1.58)*	82.5	0.93 (0.63, 1.37)
Unsure of timing	12.6	26.4	0.89 (0.68, 1.16)	68.2	0.42 (0.24, 0.74)*
Undecided	9.7	30.8	1.11 (0.82, 1.48)	75.7	0.61 (0.39, 0.96)*
Exposure to information on family planning					
No	24.7	22.4	Ref.	83.6	Ref.
Yes	75.3	30.8	1.54 (1.29, 1.84)*	79.3	0.75 (0.50, 1.12)

[a]Mean ± standard deviation 30.9 ± 9.0.
[b]Other includes no religion and traditional religion.
[c]Because of small cell numbers, the regions were grouped into north and south. The north included Upper East, Upper West and Northern regions, while the remaining seven regions were categorised into south.
*$p < .05$.

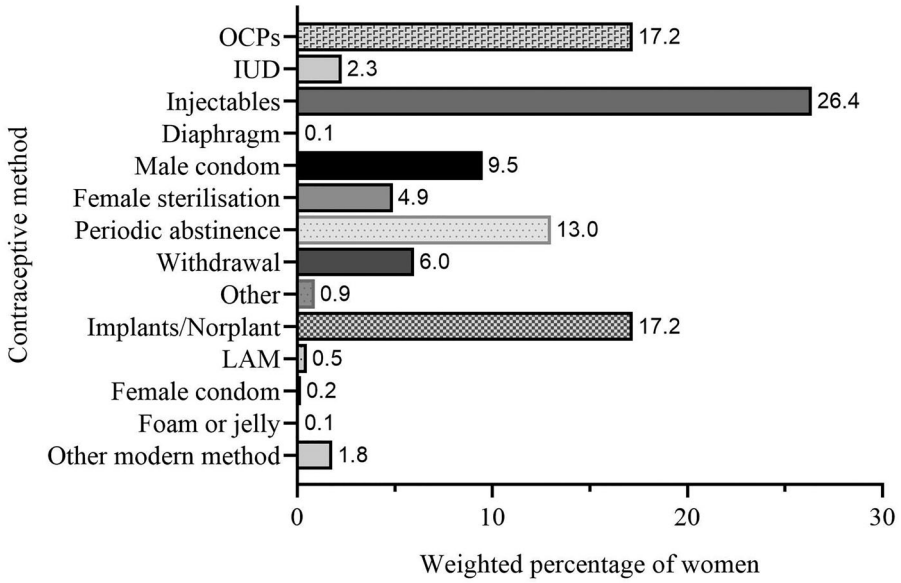

Figure 1. Percentage distribution of contraceptive methods used by Ghanaian women ($n = 1879$).

Table 2. Factors associated with women's current use of modern contraception in the adjusted multiple logistic regression model ($n = 1780$).

	Use of modern contraception	
Variable	AOR (95% CI)	*p*-value
History of induced abortion (2009–2014)		
No	Ref.	
Yes	0.78 (0.51, 1.19)	.246
Self-esteem	1.03 (0.88, 1.21)	.712
Age, years		
15–24	Ref.	
25–34	1.17 (0.74, 1.86)	.501
35–49	0.67 (0.35, 1.26)	.213
Education		
None	Ref.	
Basic	0.86 (0.42, 1.78)	.687
Secondary or higher	0.48 (0.23, 1.03)	.061
Marital status		
Never in a union	Ref.	
Currently in a union	1.72 (0.75, 3.96)	.203
Previously in a union	3.08 (1.30, 7.29)	.011
Religion		
Other	Ref.	
Muslim	0.87 (0.28, 2.69)	.815
Christian	0.78 (0.31, 2.00)	.608
Region		
North	Ref.	
South	0.21 (0.11, 0.40)	<.001
Setting of residence		
Urban	Ref.	
Rural	0.86 (0.48, 1.53)	.605
No. of living children		
0	Ref.	
1–3	1.67 (1.10, 2.55)	.016
4+	1.94 (0.97, 3.88)	.06
Wealth group		
Poorest	4.68 (1.90, 11.51)	.001
Poorer	3.23 (1.50, 6.96)	.003
Middle	3.17 (1.82, 5.51)	<.001
Richer	1.19 (0.77, 1.86)	.431
Richest	Ref.	
Knowledge of the ovulatory period		
No	Ref.	
Yes	0.69 (0.49, 0.96)	.027
Desire for children		
Want no more	Ref.	
Within 2 years	0.82 (0.47, 1.43)	.486
After 2+ years	1.39 (0.80, 2.43)	.240
Unsure of timing	1.26 (0.67, 2.38)	.467
Undecided	0.95 (0.55, 1.66)	.869

Goodness-of-fit test (*F*-adjusted test statistic) $F = 1.194$ (9379), $p = .297$.

induced abortion in the period 2009–2014, 28.7% reported current use of contraception (any method) and 23.0% reported current use of modern contraception. However, when we analysed only women who were currently using contraception at the time of the study ($n = 1879$), we found that 80.1% were using a modern contraceptive method. These findings may suggest that a significant proportion of sexually active women in Ghana use abortion to control fertility. Furthermore, the use of contraception to control fertility was also low. Collectively, this may be an indication that both abortion and contraception are used by reproductive-aged women to control fertility and achieve their reproductive goals [23–25].

We anticipated that women's use of contraception would increase after an abortion because of the experience of abortion and post-abortion interventions, including access to a wide range of effective contraceptive methods, combined with comprehensive abortion care education or information on sexual reproductive health [26]. Our bivariate analysis showed, however, that a history of abortion was not associated with the current use of contraception. However, among the subgroup of women who were using contraception, the findings from the unadjusted analysis indicated that women who reported a history of abortion were less likely to use a modern method of contraception compared with women with no history of induced abortion. Nevertheless, in the adjusted model, there was a lack of statistical evidence linking a history of abortion with current use of modern contraception. These data suggest that at the population level in Ghana, women's experience of abortion may not influence their current contraceptive behaviour. In addition, abortion experience was unlikely to influence the use of a modern contraceptive method.

We found that previous marital status and region of residence were independently associated with the use of modern contraception. Our analysis also clearly demonstrated that the number of living children was positively associated with modern contraceptive use. We noted that women with no children were less likely to report current use of modern contraception compared with women with between one and three living children, which was consistent with findings from other parts of sub-Saharan Africa [27]. Women with one to three children may choose to use

contraception to prevent unwanted pregnancies and space childbirth [15,28].

The finding of particular interest was that women who belonged to the richest wealth quintile were less likely to report current use of modern contraception. This finding is inconsistent with findings from Angola, where no significant association was reported between wealth and modern contraceptive use [29]. The finding is also inconsistent with reports that the use of modern contraceptive methods was generally seen in wealthier households [27,30]. Modern contraceptive use among wealthier women may not be limited by cost and/or accessibility. Therefore, a plausible explanation for the underuse of modern contraception by wealthier women is that they might have overweighed the risks of using contraception against the benefits [31]. Moreover, wealthier women may be using abortion as an alternative to contraception to regulate fertility. The high incidence of induced abortion among wealthier women in Ghana lends support to this assertion [32,33].

The results also showed that women who had knowledge about the ovulatory period were less likely to report current use of modern contraception. This finding contrasts with those of a study from Malawi [34]. Nonetheless, it may be explained that women with knowledge about the period of ovulation may be using that knowledge instead of effective contraception to avoid sexual intercourse around the time of ovulation when they are most fertile. It is evident from the present study that 13% of our total sample used periodic abstinence as a method of controlling fertility. However, although this method is free from side effects, it is not reliable for women with irregular menstrual cycles or for those whose cycles are affected by childbirth and illness. More importantly, sexual intercourse increases during the ovulation period, which may increase the risk of unintended pregnancies because couples may not be able to limit sexual intercourse to only the safe period [35].

In summary, the present study examined the relationship between a history of induced abortion and current contraceptive behaviour in women in Ghana. We found that a high proportion of women had had an induced abortion between 2009 and 2014. Additionally, the current use of contraception, especially modern contraception, among sexually active women in Ghana was low. Our findings also indicated that women's experiences with abortion did not influence their current use of contraception or their use of modern contraception. Other factors, including current marital status, number of living children, wealth quintile and employment status, were found to be associated with the use of modern contraception by sexually active women of reproductive age in Ghana.

Differences and similarities in relation to other studies

First, the lack of significant association between a history of induced abortion and current use of modern contraception contradicts the findings of a study in Angola, which reported that women with a history of abortion were 1.23 times more likely to use a modern contraceptive method [29]. However, the incidence of induced abortion among women in that study was lower (9.8%) than the rate reported in the present study (17.4%), which might have influenced the results. Second, the low current use of contraception, especially modern contraception, and the determinants of modern contraceptive use reported in the present study agree with findings from other studies among women in Ghana [14,16,17,36] and sub-Saharan Africa as a whole [37]. These studies are similar in that they all broadly explored the factors associated with the use of contraception among women in low- and middle-income countries. Moreover, similar to the present study, some of the studies used nationally representative data, which allow for the generalisation of results [14,16,17].

Nevertheless, there are some differences. For instance, the study by Aviisah et al. [14], although nationally representative, used a sample that was limited to women who were currently in a union (i.e. married or cohabiting). Therefore, it is not known from their findings how single marital status or non-cohabitation among sexually active women influences modern contraceptive use. The study by Nyarko [17] was limited to adolescent girls aged 15–19 years. Moreover, it is unclear from the data whether the adolescents in that study were sexually active. There is substantial evidence that women are more likely to use a method of contraception if they are sexually active than if they are not [37]. In addition, adolescents have reportedly often relied on traditional methods of contraception because of the difficulties they faced in accessing modern contraceptive methods [38]. Finally, the studies by Nketiah-Amponsah et al. [16] and Ba et al. [37] explored the factors associated with the use and non-use of any form of contraception, unlike the present study which explored the factors associated with the use of modern contraception.

Strengths and weaknesses

The present study used a nationally representative sample, which allows for the generalisation of the findings to all women aged 15–49 years in Ghana. In addition, we analysed the subsample of sexually active women who had an increased risk of unwanted pregnancy.

Although this study used a nationally representative sample and employed robust statistical methods to produce reliable estimates, some limitations should be noted. First, we used secondary data and could not explore all the variables with a known association with modern contraceptive use. Second, owing to the cross-sectional design used by the DHS Programme, we cannot ascertain causal linkages. Third, the history of induced abortion and current use of contraception were self-reported. These two indicators are sensitive and some respondents might have been reluctant to report actual events. It is therefore likely that we have underestimated the incidence of induced abortion and the prevalence of current contraceptive use. These limitations should be borne in mind when interpreting the findings.

Relevance of the findings: implications for clinicians and policy-makers/health care providers

Modern contraceptive use reduces the incidence of maternal deaths, averts unplanned pregnancies and their associated consequences, promotes child health and encourages overall socioeconomic development [3]. The underuse of

modern contraception among women with a history of induced abortion may lead to unwanted pregnancies, which may result in abortion, including unsafe abortion and related complications [39]. More broadly, the underuse of modern contraception by sexually active women of reproductive age has important negative implications on population growth, health outcomes, socioeconomic development and the attainment of the Sustainable Development Goals.

Each pregnancy exposes a woman to pregnancy-related complications. Therefore, the underuse of modern contraception could contribute to an increase in the fertility rate and the rates of maternal morbidity and mortality resulting from pregnancy and unsafe abortion [3,40,41]. In addition, the non-use of effective contraception may lead to large family sizes and increased poverty, as large families often depend on limited household earnings. A positive relationship between fertility rate, family size, poverty, food consumption, childhood undernutrition and deaths has been documented worldwide [42].

Although the present study did not elucidate the reasons behind the non-use of modern contraception, it seems likely that poor knowledge about method use and perceptions of safety, combined with myths and misinformation about modern contraceptives, as well as partner opposition are significantly contributing to non-use of modern contraception among reproductive-aged women in Ghana and in sub-Saharan Africa in general [28,30,43–45]. Moreover, as public health facilities are the main providers of some contraceptive methods in Ghana, the unavailability of chosen methods in private health facilities, especially the widely used injectables, could be contributing to modern contraceptive underuse [46]. Addressing these barriers might substantially increase women's use of modern contraception. Involving male partners in contraceptive counselling, home visits by health workers to discuss contraception, post-abortion counselling and access to a wide range of modern contraceptive methods are important strategies in promoting modern contraceptive use by families in low- and middle-income countries, including Ghana [47,48].

Unanswered questions and future research

Owing to the design of the study, we are unable to tell with any degree of certainty whether the women used contraception before and after induced abortion, discontinued it after abortion or started using it only after induced abortion. Prospective studies would therefore provide more information and increase our understanding of women's contraceptive behaviour before and after abortion. Further research is also required to understand how private and public health facilities can effectively collaborate to ensure that women have access to a wide range of modern contraceptive methods. For instance, the widely used injectables (i.e. 3 month and monthly injectables) were available in almost all public health facilities but were only available in some pharmacies and private hospitals and not available in licenced chemical shops [46]. Long-acting reversible methods were also not available in pharmacies and licenced chemical shops.

Disclosure statement

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author contribution

TA and MB conceived and designed the study. TA, LMA and DA interpreted the results and wrote the draft manuscript. AD and MB analysed the data and reviewed the draft manuscript. All authors critically reviewed and approved the final manuscript for submission.

Data availability

The authors do not have the authority to share the dataset used for this study with other researchers without permission from the DHS Programme. Interested researchers can obtain the dataset from the DHS Programme at www.dhsprogram.com/data/available-datasets.cfm. We did not have any access privileges that others would not have.

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