

Is There a Relationship between Repeat Induced Abortion and Current Use of Contraception among Women in the Reproductive Age? A Study in Ghana

Michael Boah^{1,2*}, Timothy Adampah^{1,3} and Dominic Achinkok⁴

¹Center for Endemic Disease Control, Chinese Center for Disease Control and Prevention, Harbin Medical University, Harbin 150081, China.

²Ghana Health Service, Private Mail Bag Bolgatanga, Ghana.

³Education, Culture and Health Opportunities (ECHO) Research Group International, Aflao, Ghana.

⁴School of Medicine and Health Sciences, University for Development Studies, Tamale, Ghana.

Authors' contributions

This work was carried out in collaboration among all authors. Authors MB, TA and DA conceived and designed the study. Author MB carried out the analysis. Authors TA and DA interpreted the results and wrote the draft manuscript. Author MB revised the draft manuscript. All authors read and approved the final manuscript.

Article Information

Editor(s):

(1) Dr. John Osaigbovoh Imaralu, Senior Lecturer, Department of Obstetrics and Gynaecology, Babcock University, Ilishan-Remo, Nigeria.

Reviewers:

(1) Sreelatha S, Rajiv Gandhi University of Health Sciences, India.

(2) Sarah Rominski, University of Michigan, USA.

(3) Osabohien Mathew Okoh, Johns Hopkins University, Nigeria.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/51396>

Original Research Article

Received 09 July 2019
Accepted 11 September 2019
Published 23 September 2019

ABSTRACT

Aims: Some women in the developing world use abortion to regulate fertility and space childbearing. However, repeat induced abortion has become common and it's linked to increased risk of adverse outcomes in future pregnancies. The aim of this study was to determine the relationship between repeat induced abortion and current use of contraception among women in Ghana.

Study Design: A secondary analysis of cross-sectional survey data.

Place and Duration of Study: The study was conducted in Ghana between July 2019 and August 2019.

Methodology: Data on a weighted sample of 4595 women aged 15-49 years with a lifetime history of induced abortion from the 2017 Ghana Maternal Health Survey were analysed using Chi-square (χ^2) test and multivariable survey logistic regression in STATA/IC 15.0. Statistical significance was set at the 5% level. The adjusted odds ratio was estimated.

Results: Out of 4595 women, 1591 (34.6%) experienced repeat-induced abortion. Current use of contraception was 36.7% (CI: 34.7-38.7). The majority used modern contraceptives (78%). The commonly used methods were injectables (20.3%), implants (19.7%), pills (16.6%) and rhythm (16.2%). After adjusting for potential confounding, repeat induced abortion was not significantly associated with current use of contraception. However, age, marital status, place of residence and ecological zone of residence were associated with current use of contraception. For instance, rural women with a history of repeat induced abortion were 1.3 times (AOR=1.27, 95% CI: 1.02-1.59, $p=0.036$) more likely to be on contraception compared to urban women.

Conclusion: Women's previous abortion experience was not independently associated with their current use of contraception. Other factors were significantly associated with women's use of contraception post-abortion. Further research is recommended to clearly understand this phenomenon among Ghanaian women in the reproductive age group.

Keywords: Associated; contraception; reproductive; women; induced abortion; Ghana.

1. INTRODUCTION

Induced abortion is a common practice among women. Globally, an estimated 55.7 million induced abortions occurred annually between 2010-2014 [1]. Abortion rates have declined significantly in developed countries but not in developing countries [2]. The women who induce abortion in low and middle-income countries are highly educated, wealthier and live in urban areas [3]. Furthermore, the reasons why women induce abortion are known and include birth spacing, financial challenges, no desire for more children and partner-related concerns [4]. However, abortion contributes significantly to maternal mortality in many countries worldwide. In Ghana, 15-30% of maternal deaths result from abortion [5].

Women who induce abortion may want to prevent prospective unwanted pregnancies and concomitant abortions. Therefore, the use of contraception can be vital in preventing unwanted pregnancies and reducing maternal deaths from unsafe abortions in settings where abortion is common. In 2012, an estimated 33% of maternal deaths in sub-Saharan Africa (SSA) were averted due to contraception [6]. It is therefore not surprising that family planning (FP) is among the pillars of the Safe Motherhood Initiative to reduce maternal deaths in low and middle-income countries. Nevertheless, from the 2014 Ghana Demographic and Health Survey (GDHS), only 23% of Ghanaian women use any form of contraception and an additional 30% have an unmet need for contraception [7].

Furthermore, post-abortion care (PAC) is an integral part of the comprehensive abortion care (CAC) strategy in Ghana. It outlines how service providers should respond to the needs of women who miscarry or induce abortion [8]. The provision of sexual reproductive health services including FP counselling and access to contraceptives is a key component of PAC. Nevertheless, repeat induced abortion is becoming a normal practice among Ghanaian women that requires attention. From a recent national study, repeat induced abortion accounted for 33% of induced abortions in Ghana [9]. Unfortunately, repeat induced abortion is linked to adverse pregnancy outcomes in future pregnancies. Women with a history of repeat induced abortion have increased risk of ectopic pregnancy, foetal loss, low birth weight babies and preterm delivery in prospective pregnancies [10].

The determinants of contraceptive use by Ghanaian women in the reproductive age have been explored by previous studies and include, but not limited to maternal education, parity, marital status, desire for children and wealth [11–15]. However, none of these studies explored the association between women's previous history of induced abortion and current contraceptive behaviour. In Angola, a positive association was reported between abortion history and current use of contraception [16]. Besides the differences in contraceptive prevalence and unmet need for FP between Angola and Ghana [17], the said study combined women with a single history of abortion to women with multiple histories of abortion due to the rarity of the

exposure in their sample. In addition, Marston & Cleland observed from their review of data from eleven countries that while the incidence of abortion declined with an increase in contraceptive use in some countries, the two indicators increased simultaneously in other countries. They concluded that induced abortion and contraceptive use are inversely related only when fertility itself is stabilized [18]. The relationship between repeat induced abortion and current use of contraception in Ghana is therefore arguable.

Therefore, the aim of this study was to determine the relationship between repeat induced abortion and current use of contraception among women in the reproductive age (15-49 years) in Ghana. We expect more women with a history of induced abortion to use contraception to avoid future unwanted pregnancies that may also end in abortion.

2. MATERIALS AND METHODS

This study used data from the most recent Ghana Maternal Health Survey (GMHS). The 2017 GMHS was conducted by the Ghana Statistical Service (GSS) with support from the DHS program. The survey sample was designed to provide national, zonal and regional estimates of key reproductive health indicators. The survey included women aged 15-49 years who met the eligibility criteria. The sample was stratified and selected in two stages from an updated sampling frame used for the 2010 population and housing census in Ghana. In the first stage, clusters were selected using probability proportional to size. The second stage involved selecting households from each cluster. The stratification of regions into urban and rural areas was also taken into account. A total of 25,062 women out of 25,304 eligible women were interviewed. Additional information about the design of the 2017 GMHS including the questionnaires used can be found in the published report [19].

The exposure and outcome of interest in this study were repeat induced abortion and current use of contraception respectively. The individual, births and household datasets were merged to obtain more information on the women. From the merged dataset, information on the current use of contraception was available for 3459 of the 3702 women with a lifetime history of induced abortion. Therefore, the analyses in this study involved 3459 (weighted n= 4595) women aged 15-49 years in Ghana.

2.1 Dependent Variable

The dependent variable in this study was the current use of contraception. This was based on women's self-report of her current use or partner's current use of any form of contraceptives. The variable was dichotomized: women who identified as currently using any form of contraceptives were categorized as "Yes" for current use of contraception. Those who did not identify as currently using any method of contraception were categorized as "No" for current use of contraception. The outcome of interest—"Yes" for the current use of contraception was coded as "1" and "0" for "No".

2.2 Main Independent Variable

The main independent variable was repeat induced abortion. The variable was constructed in binary form from the number of lifetime induced abortions reported by respondents. Women who reported a single episode of induced abortion in their lifetime were categorized as "No" for repeat induced abortion. Women who reported multiple episodes of induced abortions were categorized as "Yes" for repeat induced abortion.

2.3 Covariates

Respondent's age group, current marital status, highest level of education, religion, place of residence (urban/rural), ecological zone of residence (northern, middle and coastal)¹, wealth quintile², media exposure (Yes or No)³, knowledge about the fertile period (Yes or No)⁴, knowledge about abortion legislation in Ghana⁵ and knowledge about a source for family planning method were included as potential confounders.

¹ The northern zone comprised of Northern, Upper East and Upper West regions, the middle zone comprised of Eastern, Ashanti and Brong Ahafo regions, while the coastal zone included Western, Central, Volta and Greater Accra regions.

² The wealth quintiles in the GMHS were constructed from household assets using principal component analysis (PCA).

³ "Yes" for respondents who were involved in at least one of the following activities; read newspapers, listened to the radio, watched television or used the internet within the one week reference period in the GMHS, or "No" if otherwise.

⁴ Women who responded that the fertile period was "halfway between two periods" were classified as "Yes" for knowledge about the fertile period and "No" if otherwise.

⁵ Women who responded that abortion is legal in Ghana were classified as "Yes" for knowledge about abortion legislation and "No" if contrary.

2.4 Statistical Analysis

Weighting and clustering were used to account for the disproportional sampling design used by the DHS program [20]. Pearson Chi-square (χ^2) test was used to compare differences in categorical variables in univariable analysis. Survey logistic regression model was used to estimate the association between the explanatory variables and the dependent variable at a 95% confidence level in multivariable analysis. All variables with a p-value ≤ 0.05 in the univariable analysis were fitted in an adjusted logistic regression model to control for potential confounding. Educational level was included in the adjusted model in spite of the non-significant relationship with the outcome in the univariable analysis. Its inclusion was based on its known association with the trend in current use of contraception in Ghana [15].

All analyses were carried out in STATA/IC 15.0 for Windows (StataCorp LLC, College Station, Texas USA). The adjusted odds ratio (AOR) with their corresponding confidence intervals (CIs) were estimated. Statistical significance was set at the 5% level. The goodness-of-fit of the adjusted regression model was tested using the Archer & Lemeshow goodness-of-fit test for survey data [21]. We failed to reject the null hypothesis (at the 5% level) underlying the model that it is a good fit.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Background characteristics of the women included in this study

As revealed in Table 1, the mean age of the women was 33.3 \pm 8.4 years (range: 15-49 years), 67.2% were in a union (married/cohabitating), 65.7% had basic level education, 90.7% were Christians and 66.5% resided in urban areas.

3.1.2 Abortion and contraceptive-related characteristics of the women included in this study

Of the 4595 women, 34.6% had a history of repeat induced abortion, 36.7% (CI: 34.7-38.7) were currently using contraception, of which 78% were on modern contraceptives and 89.4% out of 3282 women knew a source for FP method (Table 2). The methods of contraception in order

of frequency included injectables (342), implants (332), pills (280), rhythm (273) and so on (Fig. 1).

Table 1. Background characteristics of the women included in this study

| Category/variable | Frequency | Percent |
|--|-----------|---------|
| Demographic characteristics | | |
| Age years (Mean:33.3, SD* :8.4) | | |
| 15-24 | 763 | 16.6 |
| 25-34 | 1766 | 38.4 |
| 35-49 | 2066 | 45.0 |
| Marital status | | |
| Single | 1508 | 32.8 |
| Married | 1679 | 36.6 |
| Cohabiting | 1408 | 30.6 |
| Highest level of education | | |
| No formal education | 490 | 10.7 |
| Basic level | 3021 | 65.7 |
| Secondary or higher | 1084 | 23.6 |
| Religious affiliation | | |
| Traditional | 104 | 2.3 |
| Christian | 4166 | 90.7 |
| Islam | 325 | 7.0 |
| Place of residence | | |
| Urban | 3056 | 66.5 |
| Rural | 1539 | 33.5 |
| Ecological zone of residence | | |
| Northern | 99 | 2.1 |
| Middle | 2035 | 44.3 |
| Coastal | 2461 | 53.6 |
| Wealth quintile | | |
| Poorest | 211 | 4.6 |
| Poorer | 726 | 15.8 |
| Average | 1028 | 22.4 |
| Richer | 1365 | 29.7 |
| Richest | 1265 | 27.5 |
| Media exposure | | |
| Yes | 2420 | 52.7 |
| No | 2175 | 47.3 |

*SD: standard deviation

3.1.3 Factors associated with current use of contraception in univariable analysis

The univariable analysis showed significant disparities in the current use of contraception by repeat induced abortion, age, current marital status, place of residence, ecological zone, wealth quintile and knowledge about the fertile period. Comparatively, women with a previous history of abortion, older women (35-49 years), single women, urban women, women from the

coastal zone, women in the richest wealth quintile, and women with knowledge about the fertile period were significantly less likely to be on contraception (Table 3).

Table 2. Abortion and contraceptive-related characteristics of the women included in this study

| Category/variable | Frequency | Percent |
|---|-----------|---------|
| Abortion History | | |
| Number of lifetime abortions | | |
| 1 | 3004 | 65.4 |
| 2 | 1161 | 25.3 |
| 3 | 287 | 6.2 |
| 4 or more | 143 | 3.1 |
| Repeat induced abortion | | |
| No | 3004 | 65.4 |
| Yes | 1591 | 34.6 |
| Knowledge about the fertile period (N=4190) | | |
| Yes | 2262 | 54.0 |
| No | 1928 | 46.0 |
| Knowledge about abortion legislation | | |
| Yes | 507 | 11.0 |
| No | 4088 | 89.0 |
| Contraceptives use/Knowledge | | |
| Currently using contraceptives | | |
| No | 2909 | 63.3 |
| Yes | 1686 | 36.7 |
| Modern contraceptives use (N=1686) | | |
| No | 371 | 22.0 |
| Yes | 1315 | 78.0 |
| Knowledge about a source for family planning method (N=3282) | | |
| Yes | 2935 | 89.4 |
| No | 347 | 10.6 |

3.1.4 Factors associated with current use of contraception in multivariable analysis

After controlling for potential confounding, a history of repeat induced abortion was not significantly associated with the current use of contraception, although relatively, women with a history of repeat induced abortion were 12% (AOR=0.88, 95% CI: 0.73-1.06) less likely to be

on contraception (Table 4). However, age, marital status, place of residence and ecological zone of residence were significantly associated with current use of contraception. Women in the age groups of 15-24 (AOR= 2.86, 95% CI: 2.18-3.77) and 25-34 (AOR=1.85, 95% CI: 1.54-2.23) were more likely than their counterparts in the age group of 35-49 years to be on contraception, albeit with a decreasing trend in use as age increases. Also, women in a union: married (AOR=1.69, 95% CI: 1.36-2.10) or cohabiting (AOR=1.37, 95% CI: 1.10-1.71), had increased odds for current use of contraception relative to single women. Furthermore, rural women were about 1.3 times likely to be on contraception compared to urban women (AOR=1.27, 95% CI: 1.02-1.59). Finally, women residing in the middle zone were about 2 times favoured to be on contraception relative to women in the coastal zone (AOR=1.52, 95% CI: 1.27-1.82) (Table 4).

4. DISCUSSION

The aim of this study was to determine the association between women's history of repeat-induced abortion and their current use of contraception. The results showed that 34.6% of the women had a previous abortion experience. However, 36.7% were currently on any form of contraception which is higher than what was reported in the 2014 GDHS [7]. After controlling for potential confounding, repeat-induced abortion was not significantly associated with the current use of contraception, although awareness about a source for family planning method was high (89%). Post-abortion contraceptive counselling and access to contraceptives are part of the CAC package implemented in Ghana [8]. In addition, contraceptives have been subsidized across all public health facilities in the country and these facilities have remained the major sources for family planning commodities [19]. Moreover, post-abortion counselling and access to post-abortion contraceptives are proven to increase contraceptive uptake by women [22,23]. The unanswered question is why Ghanaian women with an episode of abortion do not use contraception to prevent prospective unwanted pregnancies and subsequent abortions? Is it an issue of contraceptives unavailability, or poor access, or both, or other factors are responsible for contraceptives behaviour irrespective of abortion experience? The reasons need to be explored. We recommend further studies to understand this phenomenon. Specifically,

qualitative studies would prove vital to understanding this behaviour by women with multiple histories of induced abortion. Nevertheless, the following factors were

significantly associated with current use of contraception that cannot be ignored. They are maternal age, current marital status, place of residence and ecological zone of residence.

Table 3. Factors associated with the current use of contraception in univariable analysis

| Variable | n | Current use of contraception | | P-value |
|---|------|------------------------------|------------|-----------------|
| | | No | Yes | |
| Repeat induced abortion | | | | .01 |
| No | 3004 | 1847(61.5) | 1157(38.5) | |
| Yes | 1591 | 1062(66.8) | 529(33.2) | |
| Age | | | | <.001 |
| 15-24 | 763 | 387(50.7) | 376(49.3) | |
| 25-34 | 1766 | 1049(59.4) | 717(40.6) | |
| 35-49 | 2066 | 1473(71.3) | 593(28.7) | |
| Marital status | | | | .002 |
| Single | 1508 | 1025(68.0) | 483(32.0) | |
| Married | 1679 | 1041(62.0) | 638(38.0) | |
| Cohabiting | 1408 | 843(59.9) | 565(40.1) | |
| Highest level of education | | | | .67 |
| No formal education | 490 | 310(63.3) | 180(36.7) | |
| Basic level | 3021 | 1894(62.7) | 1127(37.3) | |
| Secondary or higher | 1084 | 705(65.0) | 379(35.0) | |
| Religious affiliation | | | | .95 |
| Traditional | 104 | 67(64.4) | 37(35.6) | |
| Christian | 4166 | 2634(63.2) | 1532(36.8) | |
| Islam | 325 | 208(64.0) | 117(36.0) | |
| Place of residence | | | | <.001 |
| Urban | 3056 | 2033(66.5) | 1023(33.5) | |
| Rural | 1539 | 876(56.9) | 663(43.1) | |
| Ecological zone of residence | | | | <.001 |
| Northern | 99 | 59(59.6) | 40(40.4) | |
| Middle | 2035 | 1183(58.1) | 852(41.9) | |
| Coastal | 2461 | 1667(67.7) | 794(32.3) | |
| Wealth quintile | | | | .003 |
| Poorest | 211 | 126(59.7) | 85(40.3) | |
| Poorer | 726 | 426(58.7) | 300(41.3) | |
| Average | 1028 | 606(58.9) | 422(41.1) | |
| Richer | 1365 | 904(66.2) | 461(33.8) | |
| Richest | 1265 | 847(67.0) | 418(33.0) | |
| Media Exposure | | | | .29 |
| Yes | 2420 | 1542(63.7) | 878(36.3) | |
| No | 2175 | 1367(62.9) | 808(37.1) | |
| Knowledge about the fertile period (N=4190) | | | | .02 |
| Yes | 2262 | 1464(64.7) | 798(35.3) | |
| No | 1928 | 1146(59.4) | 782(40.6) | |
| Knowledge about abortion legislation | | | | .90 |
| Yes | 507 | 323(63.7) | 184(36.3) | |
| No | 4088 | 2586(63.3) | 1502(36.7) | |
| Knowledge about a source for family planning method (N=3282) | | | | .19 |
| Yes | 2935 | 2591(88.3) | 344(11.7) | |
| No | 347 | 318(91.6) | 29(8.4) | |

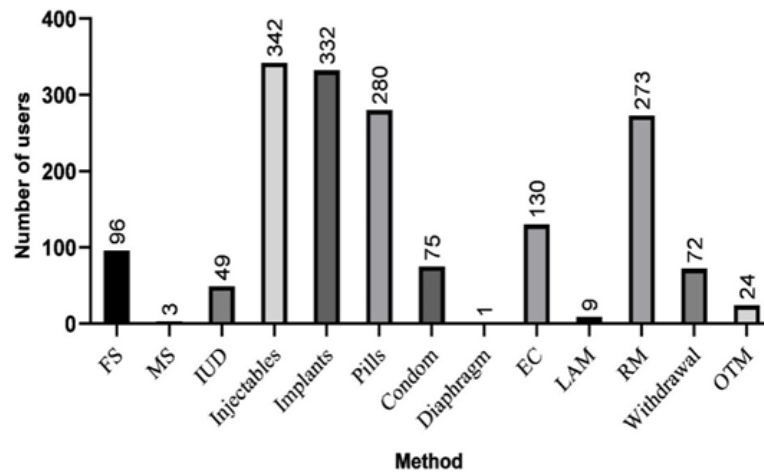


Fig. 1. Major contraceptives used by methods

(FS: Female sterilization, MS: Male sterilization, IUD: Intrauterine device, EC: Emergency contraception, LAM: Lactational amenorrhea method, RM: Rhythm method, OTM: Other traditional methods)

Table 4. Factors associated with the current use of contraception in multivariable analysis

| Variable | Current use of contraception AOR [95% CI] | P-value |
|---|--|---------|
| Repeat induced abortion | | |
| No | Reference | |
| Yes | 0.88 [0.73-1.06] | .17 |
| Age | | |
| 15-24 | 2.86 [2.18-3.77] | <.001 |
| 25-34 | 1.85 [1.54-2.23] | <.001 |
| 35-49 | Reference | |
| Marital status | | |
| Single | Reference | |
| Married | 1.69 [1.36-2.10] | <.001 |
| Cohabiting | 1.37 [1.10-1.71] | .004 |
| Highest level of education | | |
| No formal education | 1.25 [0.85-1.83] | .25 |
| Basic level | 1.16 [0.90-1.49] | .24 |
| Secondary or higher | Reference | |
| Place of residence | | |
| Urban | Reference | |
| Rural | 1.27 [1.02-1.59] | .04 |
| Ecological zone of residence | | |
| Northern | 1.04 [0.72-1.49] | .82 |
| Middle | 1.52 [1.27-1.82] | <.001 |
| Coastal | Reference | |
| Wealth quintile | | |
| Poorest | 1.06 [0.64-1.76] | .81 |
| Poorer | 1.23 [0.89-1.71] | .22 |
| Average | 1.20 [0.91-1.60] | .19 |
| Richer | 0.99 [0.78-1.28] | .98 |
| Richest | Reference | |
| Knowledge about the fertile period | | |
| Yes | Reference | |
| No | 1.15 [0.95-1.39] | .14 |

Goodness of fit test: F-adjusted test statistic = $F(9,710) = 0.827$, $Prob > F = 0.591$

The positive association between younger maternal age and the current use of contraception in this study is in contrast to the findings of a study in Angola [16]. In spite of that, a study by Achana et al. in northern Ghana found no significant association between age and use of contraception, although they observed a decline in use with increasing age which supports our findings [11]. Differences in findings might have emerged from differences in study locations and study methodologies. Notwithstanding, sexual intercourse outside marriage is a practice in Ghana [24]. Also, younger women may be unmarried or currently in school but engaged in risky sexual behaviour including unprotected sex and multiple sexual partners. Therefore, younger women's use of contraceptives may be motivated by their desire to prevent out of wedlock children and to stay in school. Conversely, older women may rely on their perceived insusceptibility to pregnancy due to a decrease in fecundity not to use contraception. In Ghana, 10% of women 30-49 years are menopausal [7]. Moreover, older women in this study were more involved in repeat induced abortion relative to younger women (data not shown). Therefore, we speculate that older women who become pregnant may be using induced abortion to control fertility [24]. This might have in one way or the other contributed to diluting our findings at the multivariable level hence the lack of significant association between repeat induced abortion and current contraceptives use by women in Ghana.

Also, the study found that women in a union were more likely to use contraception which is consistent with previously published studies from Ghana [11,13]. Logically, single women without sexual partners have no pregnancy risk. In contrast, women in a union may use contraception to space births or limit childbearing [11,12]. Additionally, spousal support encourages the use of contraception among women in union [25]. The finding that rural women were more likely to be on contraception contrasts other published studies [26,27]. However, this finding has been reported by other scholars [15]. The scale-up of the Community-based Health Planning and Services (CHPS) initiative in Ghana might have contributed to closing the gap in access to contraceptives by rural women. As part of the initiative, FP services are provided free of charge and the commodities are highly subsidized such that rural women can afford [28]. In addition, non-profit organizations such as

Marie Stopes International have supported in improving access to FP services in rural areas in all the ten administrative regions in Ghana. These and other factors explain the increasing trend in contraceptives use by rural women in Ghana [29].

Finally, the association between the ecological zone of residence and current use of contraception can be explained by differences in cultural and religious beliefs, variations in fertility rates, desire to limit childbearing and access to reproductive health services [7]. A study in Malawi supports this finding [27]. The non-significant association of the socioeconomic factors (education and wealth) in this study with the current use of contraception in the adjusted model is contrary to previous documentation [14,15,30]. The decline in socioeconomic-related inequalities in the use of contraception in many countries in SSA including Ghana and the positive association of wealth status with long-term contraceptives use may partly explain this finding [31].

The results of this study should be interpreted with caution under the following limitations and strengths. Firstly, the survey is cross-sectional in design and causal deductions cannot include birth. Secondly, it involved a recall of events on the exposure and outcome so recall bias cannot be ruled out. In addition, information was collected on current practices such as current use of contraceptives and current marital status. We are, therefore, not able to determine the state of these variables prior to the day the respondent was interviewed. Hence, it is possible that women's current practices may not reflect their previous practices. Thirdly, the independent variable did not differentiate modern contraceptives use from traditional contraceptives use. It is, possible that the explanatory variables may exhibit different relationship based on the type of contraception. Nevertheless, the key strength of this study is that it used a nationally representative sample and applied robust statistical analyses that allow for reliable conclusions and generalization of results across women in the reproductive age group in Ghana. The findings of this study serve as a foundation for future studies to promote post-abortion contraceptive use among women, especially those with a history of induced abortion. The findings also add to the growing literature on abortion and contraception in developing countries with limited information such as Ghana.

5. CONCLUSION

The study aimed at determining the relationship between repeat induced abortion and current use of contraception. After controlling for potential confounding, repeat induced abortion was not independently associated with current use of contraception. The findings suggest that other factors such as age, marital status, place of residence and ecological zone of residence were significantly associated with women's current use of contraception post-abortion regardless of a previous abortion experience. Our findings can inform future research and examine how to improve post-abortion contraception to prevent future unwanted pregnancies leading to induced abortion.

CONSENT

This study used already published data and did not require a review by an Institutional Review Board (IRB). However, permission to use the datasets was obtained from the DHS program through ICF international. The ethical considerations followed in the DHS surveys are published online (www.dhsprogram.org).

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENTS

We are grateful to ICF International for approving our request to use the 2017 GMHS datasets for this study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ganatra B, Gerdtz C, Rossier C, Ronald B, Jr J, Tunçalp Ö, et al. Global, regional, and subregional classification of abortions by safety, 2010 – 14: Estimates from a Bayesian hierarchical model. *Lancet*. 2017;390:2372–81. DOI: 10.1016/S0140-6736(17)31794-4
2. Sedgh G, Bearak J, Singh S, Bankole A, Popinchalk A, Ganatra B, et al. Abortion incidence between 1990 and 2014: Global, regional, and subregional levels and trends. *Lancet*. 2016;6736:30380–4. DOI: 10.1016/S0140-6736(16)30380-4
3. Chae S, Desai S, Crowell M, Sedgh G, Singh S. Characteristics of women obtaining induced abortions in selected low- and middle-income countries. *PLoS One*. 2017;12:e0172976.
4. Chae S, Desai S, Crowell M, Sedgh G. Reasons why women have induced abortions: A synthesis of findings from 14 countries. *Contraception*. Elsevier Inc. 2017;96:233–241. DOI: 10.1016/j.contraception.2017.06.014
5. Rominski SD, Lori JR. Abortion care in Ghana: A critical review of the literature. *Afr J Reprod Health*. 2014;18:17–35. DOI: 10.1111/jmwh.12243
6. Ahmed S, Li Q, Liu L, Tsui AO. Maternal deaths averted by contraceptive use: An analysis of 172 countries. *Lancet*. Elsevier Ltd. 2012;380:111–125. DOI: 10.1016/S0140-6736(12)60478-4
7. Ghana Statistical Service, Ghana Health Service, ICF International. Ghana Demographic and Health Survey, 2014. Rockville, Maryland, USA; 2015.
8. Ghana Health Service. Prevention & management of unsafe abortion: Comprehensive abortion care services standards and protocols. Accra; 2012.
9. Boah M, Bordotsiah S, Kuurdong S. Predictors of unsafe induced abortion among women in Ghana. *J Pregnancy*. 2019;2019:1–8. DOI: 10.1155/2019/9253650
10. Heikinheimo O, Gissler M, Suhonen S. Age, parity, history of abortion and contraceptive choices affect the risk of repeat abortion. *Contraception*. 2008;78: 149–154. DOI: 10.1016/j.contraception.2008.03.013
11. Achana FS, Bawah AA, Jackson EF, Welaga P, Awine T, Asuo-Mante E, et al. Spatial and socio-demographic determinants of contraceptive use in the Upper East region of Ghana. *Reprod Health*. 2015;12:29. DOI: 10.1186/s12978-015-0017-8
12. Apanga PA, Adam MA. Factors influencing the uptake of family planning services in the Talensi district, Ghana. *Pan Afr Med J*. 2015;20:1–9. DOI: 10.11604/pamj.2015.20.10.5301

13. Beson P, Appiah R, Adomah-Afari A. Modern contraceptive use among reproductive-aged women in Ghana: Prevalence, predictors, and policy implications. *BMC Women's Health*. 2018;18:157.
DOI: 10.1186/s12905-018-0649-2
14. Crissman HP, Adanu RM, Harlow SD. Women's sexual empowerment and contraceptive use in Ghana. *Stud Fam Plann*. 2012;43:201–212.
DOI: 10.1111/j.1728-4465.2012.00318.x
15. Nonvignon J, Novignon J. Trend and determinants of contraceptive use among women of reproductive age in Ghana. *African Popul Stud*. 2014;28:956–967.
16. Morris N, Prata N. Abortion history and its association with current use of modern contraceptive methods in Luanda, Angola. *Open Access J Contracept*. 2018;9:45–55.
DOI: 10.2147/oajc.s164736
17. United Nations, Department of Economics and Social Affairs, Population Division. *Trends in contraceptive use worldwide 2015*. New York; 2015.
Available: www.un.org/en/development/desa/population/publications/pdf/family/trends/ContraceptiveUse2015Report.pdf
18. Marston C, Cleland J. Relationships between contraception and abortion: A review of the evidence. *Int Fam Plan Perspect*. 2003;29:6-13.
19. Ghana Statistical Service, Ghana Health Service, ICF. *Ghana Maternal Health Survey 2017*. Accra, Ghana; 2018.
Available: www.dhsprogram.com/publications/publication-fr340-other-final-reports.cfm
20. Demographic and Health Survey. *Guide to DHS statistics*. Demographic and Health Surveys Methodology. Rutstein SO, Rojas G, Editors. Calverton, Maryland, Maryland, USA: Demographic and Health Surveys, ORC Macro; 2006.
21. Archer KJ, Lemeshow S. Goodness-of-fit test for a logistic regression model fitted using survey sample data. *Stata J*. 2006;6: 97–105.
DOI: <https://www.stata-journal.com/sjpdf.html?articlenum=st0099>
22. Rogers C, Dantas JAR. Access to contraception and sexual and reproductive health information post-abortion: A systematic review of literature from low- and middle-income countries. *J Fam Plan Reprod Heal Care*. 2017;43:309–318.
DOI: 10.1136/jfprhc-2016-101469
23. Benson J, Andersen K, Brahma D, Healy J, Mark A, Ajode A, et al. What contraception do women use after abortion? An analysis of 319,385 cases from eight countries. *Glob Public Health*. 2018;13:35–50.
DOI: 10.1080/17441692.2016.1174280
24. Blanc AK, Grey S. Greater than expected fertility decline in Ghana: Untangling a puzzle. *J Biosoc Sci*. 2002;34:475–495.
DOI: 10.1017/s0021932002004753
25. Tekelab T, Melka AS, Wirtu D. Predictors of modern contraceptive methods use among married women of reproductive age groups in Western Ethiopia: A community based cross-sectional study. *BMC Women's Health*. 2015;15:52.
DOI: 10.1186/s12905-015-0208-z
26. Islam AZ, Mondal MNI, Khatun ML, Rahman MM, Islam MR, Mostofa MG, et al. Prevalence and determinants of contraceptive use among employed and unemployed women in Bangladesh. *Int J MCH AIDS*. 2016;5:92–102.
DOI: 10.21106/ijma.83
27. Mandiwa C, Namondwe B, Makwinja A, Zamawe C. Factors associated with contraceptive use among young women in Malawi: Analysis of the 2015–16 Malawi demographic and health survey data. *Contraception and Reproductive Medicine*. 2018;3:12.
DOI: 10.1186/s40834-018-0065-x
28. Nyonator FK, Awoonor-Williams JK, Phillips JF, Jones TC, Miller RA. The Ghana community-based health planning and services initiative for scaling up service delivery innovation. *Health Policy Plan*. 2005;20:25–34.
DOI: 10.1093/heapol/czi003
29. Aviaisah PA, Dery S, Atsu BK, Yawson A, Alotaibi RM, Rezk HR, et al. Modern contraceptive use among women of reproductive age in Ghana: Analysis of the 2003-2014 Ghana Demographic and Health Surveys. *BMC Women's Health*. 2018;18:141.
DOI: 10.1186/s12905-018-0634-9
30. Bakibinga P, Matanda DJ, Ayiko R, Rujumba J, Muiruri C, Amendah D, et al. Pregnancy history and current use of contraception among women of

reproductive age in Burundi, Kenya, Rwanda, Tanzania and Uganda: Analysis of demographic and health survey data. *BMJ Open*. 2016;6.
DOI: 10.1136/bmjopen-2015-009991

31. Creanga AA, Gillespie D, Karklins S, Tsui AO. Low use of contraception among poor women in Africa: An equity issue. *Bull World Health Organ*. 2011;89:258–266.
DOI: 10.2471/BLT.10.083329

© 2019 Boah et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/51396>