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Determinants of abortion among women of reproductive age in Ghana: multilevel analysis evidence from the 2022 Ghana demographic and health survey

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Abstract

Introduction Due to data gaps in most countries, the factors that affect the prevalence of abortion among women from a variety of social and economic backgrounds, especially in Africa, are little understood. We investigated abortion and its determinants among women of reproductive age in this study with the aim of providing policymakers in Ghana specific information.

Methods After obtaining authorization to analyze data on abortion among women of reproductive age, we looked at the data from the Ghana demographic health survey 2022 that we obtained from the DHS website. We used binary logistic regression, both bivariate and multilevel. A three-level binary logistic regression analysis was performed on community and individual-level abortion predictors, using *p*-values less than 0.05 and adjusted odds ratios (AOR) with 95% confidence intervals (CI).

Results In the current study, the prevalence of abortion was 39.84%. Factors associated with abortion were age group 20–24 (AOR = 1.65, 95%CI = 1.05–2.61), 25–29 (AOR = 2.55, 95%CI = 1.60–4.08), 30–34 (AOR = 2.97, 95%CI = 1.54–4.81), 35–39 (AOR = 2.54, 95%CI = 1.54–4.17), 40–44 (AOR = 4.73, 95%CI = 2.74–8.15), 45–49 (AOR = 4.73, 95%CI = 2.21–9.45), married women (AOR = 1.48, 95%CI = 1.07–2.04), women living with their partner (AOR = 1.42, 95%CI = 1.02–1.98), intention to use contraceptives (AOR = 0.73, 95%CI = 0.61–0.88), smokers (AOR = 0.05, 95%CI = 0.06–0.43), Northern region (AOR = 0.50, 95%CI = 0.26–0.96), North East region (AOR = 0.26, 95%CI = 0.11–0.59), Upper East region (AOR = 0.33, 95%CI = 0.16–0.71), and Upper West region (AOR = 0.29, 95%CI = 0.12–0.67).

Conclusion The magnitude of abortion was relatively higher than that of other African countries including Mozambique, Ghana, Côte d'Ivoire and Ethiopia. Education status, age, intention of using contraceptives, smoking, and region were determinants of abortion in Ghana. Therefore, comprehensive and culturally acceptable sexual and reproductive health services for women must be provided by those in charge. It is important to establish programs that support women's livelihood and education so that they can make educated decisions about things like using contraception and avoiding unintended pregnancies.

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Keywords Abortion, Demographic and health survey, Multilevel analysis, And Ghana

Introduction

Abortion is defined as the expulsion of a fetus from the uterus prior to its reaching the viable stage, which in humans is typically around the 20th week of pregnancy. Abortions can occur spontaneously, in which case they are sometimes referred to as miscarriages, or they can be intentionally caused, in which case they are commonly referred to as induced abortions [1]. Abortion is the known cause of maternal deaths worldwide [2]. Unsafe abortion is one of the primary, but preventable, causes of maternal mortality and morbidity. Women may experience problems with their mental and physical well-being in addition to financial and social expenses for themselves, their communities, and healthcare systems [3]. The issue surrounding the rise in abortion rates and the availability of services is the result of arbitrary legislation and cultural differences found in various communities worldwide [4]. Although access and use of abortion improved after legalization, the projected number of abortions did not decrease [5].

According to statistics from 2010 to 2014, 45% of all abortions are performed unsafely. Of all unsafe abortions, one third was performed in the least safe conditions, that is, by unskilled personnel using unsafe and invasive methods. Developing nations account for 97% of unsafe abortions performed. About 50% of unsafe abortions occur in Asia, with South and Central Asia accounting for the majority of these cases. In Latin America and Africa, about three of every four abortions are potentially harmful. Approximately 50% of abortions performed in Africa take place in unsafe settings [3, 6].

Compared to many other African nations, Ghana has comparatively liberal laws on the availability of legal abortion services. Abortion became lawful in 1985 when the Criminal Code was amended to include situations including rape, incest, fetal deformity, or disease, "defilement of a female idiot," or the protection of a person's physical or mental health. According to official guidelines, legal abortions must not only meet these requirements, but also be performed in a recognized facility by licensed health personnel (a physician, nurse, or midwife) who have received the necessary training [7, 8].

During the past 25 years, the Ministry of Health (MOH) and the Ghana Health Service (GHS) have worked to improve access to post-abortion care (PAC) and safe abortion services in an effort to decrease the detrimental impacts of unsafe abortion and increase access to legal abortion services [8]. For example, the GHS passed policy changes in 1996 that allowed midwifery training professionals to offer PAC, extending its availability beyond licensed physicians [8]. Ghana's national reproductive health policy allowed abortion in 2003, and in 2006 and 2012, the Comprehensive Abortion Care (CAC) operating procedures were released [9]. The MOH, GHS and other groups started initiatives to improve CAC service in a few areas between 2006 and 2016 [9, 10].

Illegal and unsafe abortions persist despite these significant attempts to include safe abortion in policy, training, and guidelines. Maternal morbidity and death are significantly increased by complications resulting from improper abortion practices [8, 11]. The use of CAC services is challenged by the stigma associated with abortion, the lack of awareness of the abortion law among the general public and medical professionals in Ghana [12–14], misconceptions about the safety of legal abortion [9, 15], and insufficient access to safe abortion services [14, 15]. Furthermore, many people cannot afford legal abortions because they are not covered by Ghana's National Health Insurance Scheme [16]. These factors put women at higher risk for abortion-related morbidity and mortality, since they frequently turn to hidden, risky abortions performed outside the medical system. Therefore, with this background in mind, there was still work to be done. Current research could contribute to the body of knowledge about these gaps for future policy decisions, allowing women to receive the service. Therefore, determining abortion and its associated factors using the recent Ghana demographic health survey is expected to be a great asset for this state of affairs in Ghana.

Methods and materials

Design

We used a cross-sectional study design based on data from the Ghana Demographic Health Survey (GDHS) 2022.

Data source

We requested and authorized to download the data on 04/02/2024. The study utilized the latest 2022 GDHS data, a publicly available, nationally representative dataset accessed from the DHS MEASURE Program website (www.dhsprogram.com). The dataset includes a nationally stratified sample of 18,450 households, with 15,014 women aged 15 to 49 and 7,044 men aged 15 to 59 interviewed. The Ghana Statistical Service developed the updated sample frame based on the 2021 Population and Housing Census. Data collection, which used a stratified two-stage cluster sampling approach, occurred between October 17, 2022, and January 14, 2023. Four questionnaires were employed: household, woman, man, and biomarker. Before analysis, we confirmed that the outcome variable was included in the GDHS dataset and checked

all study variables for missing data, excluding 432 observations with missing values. The dataset was weighted to address regional sample non-representativeness in Ghana, ensuring accurate estimates and standard errors. Our analysis was based on a weighted sample of 6,407 women of reproductive age. For a detailed sampling procedure, please refer to the full GDHS 2022 report. As stated in the 2022 survey report, the participants provided their informed consent verbally and the study's objective was made clear to them. They respect the option to decline participation in the survey, which was voluntary [17]. The Ghana Health Service Ethics Review Committee has given its approval to GDHS. The detailed sampling procedure is presented in a complete GDHS 2022 report.

Study variables and statistical data analysis

In this study, the outcome variable was defined as abortion, based on the EDHS question: "Have you ever had a pregnancy termination?" Responses were categorized as "yes" if the participant had experienced any form of abortion and "no" otherwise. This binary classification encompasses all types of pregnancy terminations, including miscarriage, abortion, or stillbirth [18–21]. The exploratory variables include every socio-demographic variable found in the chosen GDHS dataset, as well as individual or group variables that represent both the mother and the child. The data was cleaned in STATA version 17 (STATA Corporation, IC., TX, USA) after the dataset was downloaded and included in the study according to the criteria. After that, the data were weighted according to the primary sample unit, sampling weight, and strata before being analyzed in STATA version 17.

We evaluated abortion in 2022 data sets and observed that independent variables and outcome variables were correlated. Using pooled data from the datasets, multilevel logistic regression was used to assess individual and group-level predictors of abortion. Using 95% confidence intervals (CI), the significance level was established at $p < 0.05$. We evaluated all assumptions before applying multilevel logistic regression models. All variables were analyzed with bivariate analysis and only those with $p < 0.2$ were included in multilevel logistic regression models.

The random effect was determined by using intra-community correlation (ICC), which may be calculated as follows: $ICC = \delta a^2 / (\delta a^2 + \delta b^2)$, where δa^2 and δb^2 represent the variance at the community and individual levels, respectively. $\pi^2/3$ is a fixed value that represents the individual-level variance (δb^2). The calculation of the proportional change in variance (PVC) was performed as PVC= (Va1-Va2)/Va1, where Va2 is the neighborhood variance in the succeeding model and Va1 is the variance of the empty model. The formula for the median odds ratio (MOR) is $MOR = e0.95^{*}\sqrt{Va1}$. The goodness of fit was assessed using the deviation (-2LL) and the models were compared using the likelihood ratio (LR) test.

Results

In the current study, we analyzed the abortion status of 6,407 female populations aged 15–49 years from the GDHS 2022 data set. The prevalence of abortions was 39.84%. Weighted frequency analyzes conducted at the community level revealed that a greater proportion of participants were from the Ashanti (18.34%), Greater Accra (13.06%) and Central (11.01%) regions. The majority (62.8%) of the participants were from urban residences. At the individual level, the majority (23.91%) of the study participants were in the age group 25–29 years followed by women 30–34 years (22.69%). Regarding the educational status of women, those who learned secondary education were responsible (54.25%). More than half (57.55%) of the women included in this study were married followed by women living with a partner (22.52%). The majority (99.25%) of the study participants were nonsmokers (Table 1).

Multilevel analysis

In the null model, 20.9% of the total variation in abortion came from changes between clusters, with individual differences accounting for the remaining variations. The observed clustering effect led us to perform multilevel analyses. The intra-cluster correlation coefficient (ICC) of 20.9% in our study indicates that a significant portion of the variance in abortion rates is due to differences between clusters rather than within them. This suggests that regional or community factors, such as healthcare access, socioeconomic conditions, or cultural influences, affect abortion rates. Thus, accounting for these cluster-level differences is crucial for accurate analysis. The null model's median odds ratio for abortion was 2.4, confirming the variations amongst the clusters. We are unable to exclude variances between clusters; hence, we are unable to determine whether the outcomes of two randomly selected samples are different or comparable.

To take into consideration the inter-cluster variation mentioned above, we built the model using four phases. The null model, which is an intercept-only model, has suggested that model development could continue. According to the ultimate or mixed model, women in the age group 20–24 years were 1.65 times more likely to have an abortion (AOR = 1.65, 95%CI = 1.05–2.61), women aged 25–29 were 2.55 times (AOR = 2.55, 95%CI = 1.60–4.08), women in the age range 30–34 were 2.97 times (AOR = 2.97, 95%CI = 1.82–4.81), women aged 35–39 were 2.54 times (AOR = 2.54, 95%CI = 1.54–4.17), women 40–44 were 4.73 times (AOR = 4.73, 95%CI = 2.74–8.15), and women in the age group 45–49

Table 1 The descriptive characteristics of the study participants pooled from GDHS-2022 for the analysis of abortion in women of reproductive age

Variables	Categories	Weighted Frequency	Percentage
Maternal age	15–19	385.13	6.01%
	20–24	1367.44	21.34%
	25–29	1532.24	23.91%
	30–34	1453.92	22.69%
	35–39	1086.56	16.96%
	40–44	462.02	7.21%
	45–49	119.85	1.87%
Highest educational level	No education	1273.32	19.87%
	Primary	971.91	15.17%
	Secondary	3572.36	55.76%
	Higher	589.58	11.2%
Religion	Catholic	498.03	7.77%
	Anglican	32.62	0.51%
	Methodist	259.71	4.05%
	Presbyterian	294.83	4.60%
	Pentecostal/Charismatic	2567.12	40.07%
	Other Christian	930.72	14.53%
	Islam	1490.80	23.27%
	Traditional/Spiritualist	174.20	2.72%
	No religion	150.26	2.35%
	Other	8.86	0.14%
Ever had birth terminated	No	3854.29	60.16%
	Yes	2552.87	39.84%
Wealth index	Poorest	1377	21.49%
	Poorer	1276.26	19.92%
	Middle	1298.49	20.27%
	Richer	1295.54	20.22%
	Richest	1159.88	18.1%
Type of place of residence	Urban	3194.97	37.2%
	Rural	3212.2	62.8%
Region	Western	394.08	6.15%
	Central	705.27	11.01%
	Greater Accra	836.61	13.06%
	Volta	250.76	3.91%
	Eastern	500.77	7.82%
	Ashanti	1174.85	18.34%
	Western North	177.07	2.76%
	Ahafo	131.47	2.05%
	Bono	215.19	3.36%
	Bono East	325.56	5.08%
	Oti	213.85	3.34%
	Northern	636.75	9.94%
	Savannah	189.06	2.95%
	North East	184.27	2.88%
	Upper East	298.4	4.66%
	Upper West	173.2	2.70%
Intention to use contraceptives	Use later	1775.1	44.09%
	Unsure about use	122.12	3.03%
	Does not intend	2129.2	52.88%

Table 1 (continued)

Variables	Categories	Weighted Frequency	Percentage
Current marital status	Never in union	868.58	13.56%
	Married	3687.03	57.55%
	Living with partner	1443.05	22.52%
	Widowed	66.33	1.04%
	Divorced	78.87	1.23%
	Separated	263.3	4.11%
Smokes cigarettes	No	6359.19	99.25%
	Yes	47.97	0.75%
Respondent currently working	No	1380.1	21.54%
	Yes	5027.1	78.46%
Births in last five years	No births	605.3	9.45%
	One birth	3403.98	53.13%
	Two	2044.35	31.91%
	Three	327.68	5.11%
	Four	25.84	0.40%

were 4.58 (AOR = 4.73, 95%CI = 2.21–9.45) times more likely to have abortion than women aged 15–19 years. Regarding the marital status of women, married women were 1.48 times (AOR = 1.48, 95%CI = 1.07–2.04) and women who lived with their partner were 1.42 times (AOR = 1.42, 95%CI = 1.02–1.98) more likely to have abortion than women who are never in union.

According to the mixed model, the odds of being in the abortion group were 73% lower for women who had intention to use contraceptives with an AOR of 0.73 (95%CI = 0.61–0.88) compared to their counterparts. Similarly, the chances of being in the abortion group were 5% reduced for women who were smokers than for women of their counter parts (AOR = 0.05, 95%CI = 0.06–0.43). Regarding the region of women, women who reside in the Northern region, the North East region, the Upper East region and the Upper West region had 50%, 26%, 33% and 29% reduced abortion with an AOR of 0.50(0.26–0.96), 0.26 (0.11–0.59), 0.33 (0.16–0.71) and 0.29 (0.12–0.67) respectively compared to women who lived in the Western region (Table 2).

The comparison of each effect of Models 0–3 is shown in Table 3 below. We observed lower variance in the median odds ratio, deviation, and ICC. Both the proportional change in variances and the log likelihood ratio increased as global expectation. In particular, the smaller deviation indicates a well-fitting model (Table 3).

Discussion

Our research looked at abortion from both an individual and a community perspective. We collected 6,407 samples of women of reproductive age from the Ghana demographic health survey dataset of 2022 for the purpose of this study. According to the analysis, 39.84% of them had at least one abortion. The current finding is consistent with the research conducted in Malawi [22]. However, the magnitude is greater compared to research studies conducted in Ethiopia [18, 23], Mozambique [24], Ghana [24], and Côte d'Ivoire [25]. There are several possible reasons for this discrepancy, including variations in nations' health policies, as well as the research population, design, setting, and sociodemographic characteristics.

We found that women in the age group 20–24 years were 1.65 times more likely to have an abortion than women aged 15–19. The results agree with the DHS data from Nigeria, which showed that the prevalence of abortion was 2.34 times higher in adults aged 20–24 compared to youths aged 15–19 [20]. It may indicate that younger women are more likely to undergo abortions due to a lack of knowledge and less independent decision-making.

This study also found that the odds of being in the abortion group were 73% reduced for women who had intention to use contraceptives compared to women who do not intend to use contraceptives. Research among women of reproductive age in some high-fertility sub-Saharan African countries supports our finding [26]. Users should receive sufficient information and instructions on contraceptive use for a variety of reasons, including preventing unwanted pregnancies, reducing the risk of unsafe abortions and decreasing the rate of unsustainable population growth that has an adverse effect on the environment.

The current study also revealed that the odds of being in the abortion group were 5% reduced for women who were smokers than for women of their counterpart parts. This finding is supported by study conducted in China [27] where smoking was significantly associated with spontaneous abortion. In addition, our finding is also supported by the Centers for Disease Control and prevention (CDC) [28]. This is due to the fact that carbon monoxide found in tobacco smoke can deprive a growing

Table 2 Multilevel logistic regression on individual and community-level factors associated with abortion

Categories	Null Model	Model I	Model II	Model III
Maternal age				
15–19	-	Ref		Ref
20–24	-	2.12[1.32–3.39]**		1.65[1.05–2.61]*
25–29	-	3.85[2.38–6.05]***		2.55[1.60–4.08]***
30–34	-	4.53[2.77–7.38]***		2.97[1.82–4.81]***
35–39	-	4.56[2.77–7.51]***		2.54[1.54–4.17]***
40–44	-	6.24[3.63–10.72]***		4.73[2.74–8.15]***
45–49	-	7.71[3.87–15.37]***		4.58[2.21–9.45]***
Maternal education				
No education	-	Ref		Ref
Primary	-	1.50[1.15–1.95]**		1.27[0.93–1.73]
Secondary	-	1.24[0.98–1.58]		1.19[0.90–1.57]
Higher	-	1.01[0.67–1.53]		1.01[0.66–1.54]
Wealth index	-			
Poorest	-	Ref		Ref
Poorer	-	0.98[0.76–1.26]		0.80[0.59–1.08]
Middle	-	1.79[1.35–2.37]***		1.26[0.89–1.78]
Richer	-	1.92[1.41–2.62]***		1.27[0.87–1.84]
Richest	-	2.25[1.56–3.25]***		0.98[0.64–1.52]
Marital status				
Never in union	-	Ref		Ref
Married	-	1.14[0.83–1.56]		1.48[1.07–2.04]*
Living with partner	-	1.58[1.13–2.21]**		1.42[1.02–1.98]*
Widowed	-	2.14[1.00-4.59]*		1.14[0.50–2.58]
Divorced	-	1.02[0.40–2.61]		0.63[0.26–1.51]
Separated	-	1.56[0.89–2.71]		1.28[0.75–2.20]
Intention to use contraceptives	-			
Use later	-	Ref		Ref
Unsure about use	-	0.59[0.32–1.05]		0.73[0.43–1.25]
Does not intend	-	0.81[0.68–0.96]*		0.73[0.61–0.88]**
Smokes cigarette	-			
No	-	Ref		Ref
Yes	-	0.06[0.07–0.49]**		0.05[0.06–0.43]**
Residence	-			
Urban	-		Ref	Ref
Rural	-		0.80[0.67–0.94]**	1.07[0.80–1.43]
Region	-			
Western	-		Ref	Ref
Central	-		1.14[0.98–2.14]	0.75[0.39–1.43]
Greater Accra	-		1.26[0.85–1.86]	0.98[0.53–1.80]
Volta	-		1.36[0.86–2.13]	0.77[0.38–1.59]
Eastern	-		1.93[1.29–2.89]**	1.63[0.87–3.08]
Ashanti	-		1.66[1.14–2.41]**	1.13[0.62–2.06]
Western North	-		1.14[0.70–1.86]	0.86[0.41–1.81]
Ahafo	-		0.79[0.46–1.35]	0.79[0.35–1.78]
Bono	-		1.14[0.71–1.83]	0.90[0.44–0.86]
Bono East	-		0.75[0.48 – 0.17]	0.57[0.28–1.12]
Oti	-		0.93[0.57–1.50]	0.58[0.28–1.23]
Northern	-		0.47[0.31–0.72]***	0.50[0.26–0.96]*
Savannah	-		0.64[0.38–1.06]	0.49[0.22–1.05]
North East	-		0.29[0.16–0.51]***	0.26[0.11–0.59]**
Upper East	-		0.49[0.31–0.78]**	0.33[0.16–0.71]**
Upper West	-		0.45[0.26–0.78]**	0.29[0.12–0.67]**

NB: *=$P<0.01$; **=$P<0.05$; ***=$P<0.001$

Table 3 Comparison of models and distribution of random effects on determinants of abortion among women of reproductive age in Ethiopia

Parameters	Null model	Model I	Model II	Model III
Community-level variance	0.87	0.80	0. 65	0.39
Log likelihood	-4102.9	-4026.1	-2188.4	-2026.7
Deviance	8205.8	8052.2	4376.8	4053.4
MOR	2.4	2.3	2.09	1.6
PVC (%)	Reference	0.08	0.25	0.55
ICC (%)	20.9	19.6	16.4	10.5

fetus of oxygen. Other substances in tobacco smoke have the potential to harm unborn children.

Unlike the Western region, the Northern, North East, Upper East, and Upper West regions showed less association with abortion. This finding is supported by a nationally representative sample study conducted in Ghana [29]. It was not clear from the incident whether the real number or the stronger cultural restrictions in these areas contributed to the problem.

Strengths and limitations of the study

The study's strengths include the use of up-to-date, nationally representative data from the GDHS, which enhances the generalizability of the findings across Ghana. By employing multilevel analysis and weighting techniques, we effectively addressed intercommunity interactions and clustering effects and the GDHS methodology is globally recognized and scientifically validated. However, limitations include potential recall and social desirability biases impacting the accuracy of self-reported abortion data, given the sensitivity of the topic. Additionally, while our methods accounted for clustering and regional variances, the designation of economic status was country-specific, which may not fully capture all regional differences.

Conclusion

We shared findings on community, individual, and contextual evaluations of abortion among women in Ghana aged 15 to 49. Using weighted data for analysis, we obtained a country-level profile, which, despite being relatively higher than other African nations such as Mozambique, Côte d'Ivoire, and Ethiopia, reflects key determinants like education status, age, contraceptive use intentions, smoking, and region. To address these issues effectively, comprehensive and culturally acceptable sexual and reproductive health services should be provided. Establishing programs that support women's livelihood and education is crucial for enabling informed decisions about contraception and reducing unintended pregnancies. Additionally, future researchers should consider planning longitudinal studies to analyze the long-term impact of abortion-related factors. Such studies, utilizing long-term data, can help establish causal relationships and explore how factors influencing abortion decisions evolve over time, offering a more comprehensive understanding of this complex issue. This study lays the groundwork for further research on the sociodemographic determinants of induced abortion among Ghanaian women, aiding decision-makers, and program planners.

Abbreviations

AOR Adjusted Odds Ratio
CI Confidence Interval
GDHS Ghana Demographic and Health Survey
ICC Intra Class Correlation
LLR Log-Likelihood Ratio
MOR Median odds ratio
PVC Proportional Change in Variance

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Author contributions

Data collection, analysis, interpretation, and proposal preparation were carried out by BKL and WK. BKL, KUM, and MM participated in study design, data cleaning, and analysis. BKL wrote the first draft of the work, and all contributors made significant revisions and finishing touches. All authors have read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethical approval and consent to participate

The study involved the secondary data analysis of survey data that was made publically available by the MEASURE DHS programme. Participants provided their informed consent and ethical approval for the research. The Ghana Health Service Ethics Review Committee has given its approval to GDHS. All methods were carried out in accordance with relevant guidelines and regulations. Data for this study were obtained from the DHS website (www.dhsprogram.com) after requesting authorization online and providing justification for the investigation. No personal identity was present in the publicly accessible data used for this investigation. For more information, visit https://dhsprogram.com/methodology/Protecting-the-Privacy-of-DHS-Survey-Respondents.cfm.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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