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Spatial distribution and factors associated with unmet need for contraception among women in Ghana

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Abstract

Background Unmet need for contraception is a significant public health concern in sub-Saharan Africa, affecting over 20% of women. We assessed the spatial distribution and factors associated with unmet need for contraception among women in Ghana.

Methods The study was conducted in Ghana, and data was extracted from the 2022 Demographic and Health Survey. A weighted sample of 7762 women who were either married or cohabiting and aged 16–49 years was included in the study. Multilevel regression analysis was performed to identify the factors associated with unmet need for contraception. The results were presented using adjusted odds ratio (AOR) with their respective 95% confidence interval (CI). Spatial analysis using GetisOrd G hotspot and cluster and outlier analyses were employed to examine the patterns of unmet need for contraception at the district level.

Results The proportion of unmet need for contraception among the women was 26.7% [25.3–28.2]. The hotspot districts for a high unmet need for contraception in Ghana were West Mamprusi Municipal, Mamprugu Moagduri, East Mamprusi Municipal, Yunyoo-Nasuan, and East Gonja Municipal. Women's age was associated with a lower likelihood of unmet need for contraception with the lowest odds among those aged 35-39 years [AOR = 0.31, 95%CI = 0.18, 0.53] compared with those aged 16-19. Working women [AOR = 0.74, 95%CI = 0.60, 0.91] and those who heard family planning messages at community meetings [AOR = 0.84, 95%CI = 0.70, 0.99] had lower odds of unmet need for contraception compared to those who were not working and those who did not hear family planning messages at community meetings. Cohabiting women [AOR = 1.25, 95%CI = 1.01, 1.53] and those from female-headed households [AOR = 1.36, 95%CI = 1.13, 1.63] were more likely to have unmet need for contraception relative to their married counterparts and those from male-headed households, respectively. Parity was associated with unmet need for contraception, with the highest likelihood reported among women with four or more births [AOR = 6.47, 95%CI = 3.99, 10.48] compared to nulliparous women. Women residing in Greater Accra, Volta, Eastern and Bono East regions had higher odds of unmet need for contraception than those in the Western region, with the highest odds among those in Greater Accra [AOR = 2.38, 95%CI = 1.52, 3.72].

Conclusion Our study has shown that there are regional and district variations in the unmet need for contraception among women in Ghana. Improving access to and availability of contraceptive methods, particularly in hotspot districts in the northern parts of Ghana, is crucial. Targeted interventions for specific age groups, empowerment

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of women through employment, and the promotion of shared decision-making are recommended strategies to reduce the unmet need for contraception and enhance reproductive health outcomes.

Keywords Unmet need, Contraception, Ghana, Demographic and Health Survey

Plain language summary

Unmet need for contraception is a significant public health concern in sub-Saharan Africa. Addressing this issue is crucial to reducing adverse health outcomes such as unsafe abortions, sexually transmitted infections, and high fertility rates related to poverty. We examined the spatial distribution and factors associated with the unmet need for contraception among women in Ghana. A sample of 7762 women of reproductive age was drawn from the 2022 Demographic and Health Survey of Ghana. Percentages were used to examine the prevalence of unmet need for contraception. Multilevel binary logistic regression analysis was used to examine the factors associated with unmet need for contraception. Spatial analysis using GetisOrd G hotspot and cluster and outlier analyses were employed to analyse patterns at the district level. The results showed that the hotspot districts for a high unmet need for contraception in Ghana were West Mamprusi Municipal, Mamprugu Moagduri, East Mamprusi Municipal, Yunyoo-Nasuan, and East Gonja Municipal. Age of the women, marital status, parity, sex of the household head, and region of residence were the factors associated with the unmet need for contraception. This study shows that there are regional and district variations in the unmet need for contraception among women in Ghana. Targeted interventions for specific age groups, empowerment of women through employment, and the promotion of shared decision-making are recommended strategies to reduce the unmet need for contraception and enhance reproductive health outcomes, considering the hotspot areas identified in this study.

Introduction

Over one-fifth of women in sub-Saharan Africa have unmet contraception needs [1], making this a significant public health concern. The unmet need for contraception is the proportion of sexually active, childbearing women who do not use contraception despite not desiring any more children or delaying pregnancy for at least two years [2]. In terms of women's health and well-being, the use of contraceptives as a fertility regulator is widely acknowledged and essential [3]. Sustainable Development Goal (SDG) 3 draws attention to maternal health as a concern by aiming to reduce maternal mortality worldwide by 2030 via increased access to sexual and reproductive health services globally [4, 5]. Unsafe abortions, sexually transmitted infections, high fertility rates related to poverty, poor employment rates for mothers, and high death rates are all related to unmet demand for contraception [6].

In sub-Saharan Africa, the unmet demand for contraception ranges between 20–30% [7]. Evidence from the 2014 Ghana Demographic and Health Survey (2014 GDHS) report showed that 30% of married women in Ghana have an unmet need for contraception. However, this proportion varies significantly by age, place and region of residence, educational level, and family wealth index [8]. Lack of understanding of contraceptive use [9], worries about health [9], side effects of contraceptives [10], behavioural requirements, and objections from husbands [11] are some of the factors mitigating the use of contraceptives. It is also important to consider how different types of hormonal contraceptives affect metabolic and hormonal homeostasis [12, 13]. For example, combined oral contraceptives can influence insulin sensitivity and lipid metabolism, potentially impacting weight and metabolic health [13]. Progestin-only methods may have varying effects on hormonal balance and may be associated with changes in menstrual patterns and metabolic parameters [12]. Understanding these physiological impacts can help inform discussions about contraceptive choices and their implications for women's health. In 2012, an estimated 25% of reproductive-age women in Western Africa used modern contraception, which was much lower compared to other African countries [14].

Few studies have examined the factors associated with the unmet need for contraception among women in Ghana. For instance, a study conducted in the North Gonja District of Ghana found that the unmet need for contraception was associated with age, educational status, awareness of family planning, and previous contraception practice [15]. Another study conducted in Ghana using a multinomial mixed effects logistic regression modelling approach found that factors such as age, education, religion, wealth, and region were associated with unmet needs for family planning [16]. The study also found that women who had ever given birth, those with a higher number of living children,

and those with a shorter duration of marriage were more likely to have an unmet need for family planning [16]. Several factors have been identified as contributing to the unmet need for contraception among women in sub-Saharan Africa. These factors can be categorised into individual and community-level factors. Individual-level factors include age, education, parity, religion, contraceptive knowledge, and attitudes [1]. Women who are younger, less educated, and have more children are more likely to have an unmet need for contraception [17]. Community-level factors include access to family planning services, cultural and social norms, and gender inequality [1]. Women who live in rural areas, have limited access to health services, and live in communities with conservative cultural and social norms are more likely to have an unmet need for contraception [1]. Understanding the factors associated with unmet needs for contraception is critical for developing effective interventions to increase access to family planning services and reduce unintended pregnancies. This is particularly important in sub-Saharan Africa, where unintended pregnancies are common and contribute to high rates of maternal and neonatal morbidity and mortality [16].

The unmet need for contraception is most common in low-and middle-income countries like Ghana [17], but little is known about the factors contributing to it. Several studies in Ghana have suggested multiple strategies in the past to boost contraceptive uptake [15–18]. However, these studies used outdated datasets. We, therefore, examined the spatial distribution and factors associated with the unmet need for contraception among women in Ghana using the 2022 GDHS. The 2022 GDHS provides the most recent and nationally representative data on unmet need for contraception. Utilising this data allows for a timely and accurate assessment of the current situation in Ghana.

Methods

Data source

Our study was conducted in Ghana, a country in the western part of sub-Saharan Africa. Ghana shares boundaries in the north with Burkina Faso, east with Togo, west with Côte d'Ivoire, and South with the Gulf of Guinea. We extracted data from the 2022 GDHS for our study. Specifically, data pooled from the women's file. A weighted sample of 7762 sexually active women of reproductive age (16–49 years) who were either married or cohabiting during the survey were included in the study. A cross-sectional design was adopted for the GDHS, and respondents were sampled using a multistage sampling technique. The detailed DHS methodology encompassing the design, sampling, and data collection techniques has been stipulated in the DHS reports [19, 20]. In writing this paper, we referred to the Strengthening Reporting of Observational Studies in Epidemiology (STROBE) guidelines [21].

Variables

Outcome variable

Unmet need for contraception was the outcome variable in the study. We based the coding of the unmet need for contraception from the literature [22–24], which defines it as an aggregated sum of unmet needs for spacing and limiting. Reproductive age women who were married, fecund, and/or sexually active have unmet needs if they do not want any more children or want to postpone their next birth for at least two years but are not using contraception. Also, pregnant or amenorrheic women who had unwanted or mistimed pregnancies or births were considered having unmet need for contraception if they did not use contraception at the time they conceived. As a result, women who had an unmet need for contraception were coded as '1 = yes', and those without it were recoded as '0 = no' [22–25].

Explanatory variables

Seventeen explanatory variables: thirteen individual and four contextual level variables were included in the study. These variables were available in the DHS dataset and have been found to be associated with unmet need for contraception from previous studies [22–25]. The individual level variables were age of the women, level of education, marital status, current working status, parity, heard of family planning from newspaper or magazine last few months, heard of family planning from radio last few months, heard of family planning from television last few months, heard of family planning by text messages on mobile phone, heard of family planning at community meeting events, internet use visit to health facility in the last 12 months, and person who usually decides on respondent's health care. The contextual-level variables consisted of household wealth index, sex of household head, place of residence, and region. The detailed variable descriptions have been highlighted in the literature [18, 22, 24, 25].

Statistical analyses

Descriptive and multilevel regression analyses

We performed the descriptive and inferential analysis using Stata software version 17.0 (Stata Corporation, College Station, TX, USA). Descriptively, we presented the proportion of women with unmet need for contraception and its distribution across the explanatory using percentages with their respective 95% confidence interval (CI). At the inferential stage, multilevel binary logistic

regression analysis was used to examine the factors associated with unmet need for contraception. This analysis was preceded by a chi-square test of independence. Model I had no explanatory variables and had results that showed the variation in unmet need for contraception attributed to the clustering at the primary sampling unit. The variables at the individual level and contextual level were included in Models II and III, respectively. Variables from both Model II and III were included in Model IV, the complete model whose results were interpreted and used in the discussion. We presented the results using adjusted odds ratio (AOR) with their corresponding 95% CI. The threshold for statistical significance in the chi-square and regression analysis was established at $p < 0.05$. We weighted all analyses per the DHS guidelines to account for the disproportionate sample and non-response [19].

Spatial analysis

For the spatial analysis, the initial process began with using the spatial join tool in ArcGIS Pro version 3.3 to transfer district information, such as names, onto the DHS geographic coordinates. It is worth stating that not all districts could be featured in this study because there was no overlap with the geographic coordinates. Afterwards, geographic coordinates were linked with the surveyed data using IMB SPSS, where the cluster number was used as the primary key. This ensured that all the surveyed data had district names attached to their records. A crosstab analysis was conducted between the district name and the unmet need variable. The purpose of conducting the crosstab analysis was to generate a district-level proportion of unmet need for the spatial analysis. The results from the crosstab were saved as a CSV and joined to the district shapefile using the district name as the primary key. Upon successfully merging the proportion of unmet need to the district shapefile, the Moran's I spatial autocorrection analysis was conducted. The spatial autocorrelation was conducted to ascertain the spatial pattern of unmet need in Ghana. This analysis expects to understand whether the pattern of unmet need is dispersed, random or clustered. The results obtained necessitated the running of two additional analyses. These analyses were the Getis Ord G Hotspot and the Anselin Cluster and Outlier. The purpose of conducting the hotspot analysis was to obtain a spatial distribution of unmet need in Ghana at different statistically significant level. Further, the Anselin Cluster and Outlier analysis was conducted to validate the results from the hotspot analysis.

Ethical consideration

We did not seek ethical clearance for the study since the 2022 GDHS dataset is already available in the public domain. However, permission was sought from the Monitoring and Evaluation to Assess and Use Results Demographic and Health Surveys (MEASURE DHS) before using the dataset.

Results

Prevalence and distribution of unmet need for contraception across the explanatory variables

Table 1 shows the prevalence and distribution of unmet needs for contraception across the various explanatory variables. Overall, the proportion of unmet need for contraception was 26.7% [25.3, 28.2]. The highest proportion of unmet need was observed among women aged 40-49 (33.1%), those with primary education (29.7%), those who were cohabiting (29.1%), and women who were not currently working (31.3%). Additionally, women with four or more births had the highest unmet need (32.7%), as did those who did not hear family planning messages on the radio (27.4%) or newspapers/magazines (27.2%). Furthermore, the highest unmet need was observed among women whose health care decisions were made by someone else (40.6%), those categorised as poorest in terms of wealth (29.2%), households with a female head (29.8%), and women residing in the Bono East region (33.9%).

Spatial results

Evidence from Moran's spatial autocorrelation results revealed a clustering in the spatial pattern of unmet need for contraception at the district level in Ghana (Fig. 1). Thus, the prevalence of unmet need for contraception does not occur randomly but can be found among a group of districts around the same area. However, Moran's I spatial autocorrelation tool cannot show the exact districts depicting the clustering of unmet need for contraception. This necessitated the conduct of Hotspot and Cluster and Outlier analyses.

Spatial distribution of unmet need for contraception in Ghana

From the Getis Ord G Hotspot analysis, it was revealed that unmet need for contraception was predominantly high in some districts in northern Ghana. For instance, 20 districts such as West Mamprusi Municipal, Mamprugu Moagduri, East Mamprusi Municipal, Yunyoo-Nasuan and East Gonja Municipal, were found to be hotspots of unmet need at a 99% CI. In addition, 23 districts were found to be hotspots of unmet need for contraception at a 95% CI. This shows that about 17% of the districts in Ghana had unmet need

Table 1 Bivariate analysis of unmet need for contraception

Variable	Weighted n (%)	Unmet need for contraception		
		No [95% CI]	Yes [95% CI]	p-value
Prevalence		**73.3 [71.8, 74.7]**	**26.7 [25.3, 28.2]**	
Women's age (years)				0.002
16–19	208 (2.6)	68.8 [61.2, 75.4]	31.2 [24.6, 38.8]	
20–24	1,085 (14.0)	72.3 [68.6, 75.6]	27.7 [24.4, 31.4]	
25–29	1,528 (19.7)	76.1 [73.3, 78.8]	23.9 [21.2, 26.7]	
30–34	1,776 (22.9)	76.2 [73.6, 78.6]	23.8 [21.4, 26.4]	
35–39	1,614 (20.8)	72.9 [69.8, 75.7]	27.1 [24.3, 30.2]	
40–44	1,016 (13.1)	69.9 [65.9, 73.6]	30.1 [26.4, 34.1]	
45–49	535 (6.9)	66.9 [61.3, 72.1]	33.1 [27.9, 38.7]	
Level of education				0.031
No education	1,799 (23.2)	71.7 [68.9, 74.5]	28.3 [25.5, 31.1]	
Primary	1,149 (14.8)	70.3 [67.0, 73.4]	29.7 [26.6, 33.0]	
Secondary or higher	4,814 (62.0)	74.6 [72.8, 76.3]	25.4 [23.7, 27.2]	
Marital status				0.020
Married	5,568 (71.7)	74.2 [72.6, 75.7]	25.8 [24.3, 27.4]	
Cohabiting	2,194 (28.3)	70.9 [68.2, 73.5]	29.1 [26.5, 31.8]	
Current working status				0.001
Not working	1,256 (16.2)	68.7 [65.5, 71.8]	31.3 [28.2, 34.5]	
Working	6,506 (83.8)	74.2 [72.6, 75.7]	25.8 [24.3, 27.4]	
Parity				< 0.001
None	539 (6.9)	85.9 [81.6, 89.3]	14.1 [10.7, 18.4]	
One	1,360 (17.5)	77.9 [74.9, 80.6]	22.1 [19.4, 25.1]	
Two	1,455 (18.8)	75.8 [72.8, 78.6]	24.2 [21.4, 27.2]	
Three	1,326 (17.1)	74.6 [71.3, 77.7]	25.4 [22.3, 28.7]	
Four or more	3,082 (39.7)	67.3 [65.0, 69.4]	32.7 [30.6, 35.0]	
Heard of family planning from newspaper or magazine last few months				0.002
No	7,426 (95.7)	72.8 [71.3, 74.3]	27.2 [25.7, 28.7]	
Yes	336 (4.3)	83.5 [77.3, 88.3]	16.5 [11.7, 22.7]	
Heard of family planning from radio last few months				0.287
No	4,507 (58.1)	72.6 [70.8, 74.4]	27.4 [25.6, 29.2]	
Yes	3,255 (41.9)	74.2 [71.8, 76.4]	25.8 [23.6, 28.2]	
Heard of family planning from television last few months				0.004
No	4,153 (53.5)	71.4 [69.5, 73.2]	28.6 [26.8, 30.5]	
Yes	3,609 (46.5)	75.4 [73.3, 77.5]	24.6 [22.5, 26.7]	
Heard family planning by text messages on mobile phone				0.023
No	7,308 (94.1)	72.9 [71.4, 74.4]	27.1 [25.6, 28.6]	
Yes	454 (5.9)	79.0 [73.9, 83.4]	21.0 [16.6, 26.1]	
Heard family planning at community meetings events				0.021
No	5,167 (66.6)	72.3 [70.5, 74.0]	27.7 [26.0, 29.5]	
Yes	2,595 (33.4)	75.3 [73.2, 77.3]	24.7 [22.7, 26.8]	
Usage of internet				0.001
No	4,637 (59.7)	71.4 [69.6, 73.1]	28.6 [26.9, 30.4]	
Yes	3,125 (40.3)	76.1 [73.8, 78.3]	23.9 [21.7, 26.2]	
Visited health facility last 12 months				0.177
No	2,884 (37.1)	74.4 [72.2, 76.4]	25.6 [23.6, 27.8]	
Yes	4,878 (62.9)	72.6 [70.8, 74.3]	27.4 [25.7, 29.2]	
Person who usually decides on respondent's health care				0.010
Respondent alone	2,879 (37.1)	72.7 [70.3, 74.9]	27.3 [25.1, 29.7]	

Table 1 (continued)

Variable	Weighted n (%)	Unmet need for contraception		
		No [95% CI]	Yes [95% CI]	p-value
Respondent and partner	2,950 (38.0)	75.7 [73.4,77.9]	24.3 [22.1, 26.6]	
Partner alone	1,886 (24.3)	70.7 [67.9,73.4]	29.3 [26.6, 32.1]	
Someone else or other	47 (0.6)	59.6 [42.2,75.0]	40.6 [25.0, 57.8]	
Sex of household head				0.006
Male	5,856 (75.4)	74.3 [72.7, 75.8]	25.7 [24.2, 27.3]	
Female	1,906 (24.6)	70.2 [67.3, 73.0]	29.8 [27.0, 32.7]	
Wealth index				0.014
Poorest	1,593 (20.5)	70.8 [67.9, 73.5]	29.2 [26.5, 32.1]	
Poorer	1,452 (18.7)	71.9 [68.8, 74.9]	28.1 [25.1, 31.2]	
Middle	1,467 (18.9)	71.3 [68.4, 74.1]	28.7 [25.9, 31.6]	
Richer	1,631 (21.0)	74.4 [71.0, 77.5]	25.6 [22.5, 29.0]	
Richest	1,619 (20.9)	77.6 [74.0, 80.8]	22.4 [19.2, 26.0]	
Place of residence				0.232
Urban	3,961 (51.0)	74.1 [72.0, 76.2]	25.9 [23.8, 28.0]	
Rural	3,801 (49.0)	72.4 [70.4, 74.3]	27.6 [25.7, 29.6]	
Region				0.002
Western	463 (6.0)	78.9 [73.0, 83.8]	21.1 [16.2, 27.0]	
Central	783 (10.1)	76.0 [71.5, 80.0]	24.0 [20.0, 28.5]	
Greater Accra	1,049 (13.5)	69.4 [64.8, 73.6]	30.6 [26.4, 35.2]	
Volta	353 (4.6)	67.7 [63.0, 72.1]	32.3 [27.9, 37.0]	
Eastern	595 (7.7)	68.6 [62.8, 74.0]	31.4 [26.0, 37.2]	
Ashanti	1,348 (17.4)	73.8 [68.4, 78.6]	26.2 [21.4, 31.6]	
Western North	211 (2.7)	73.0 [67.5, 77.9]	27.0 [22.1, 32.5]	
Ahafo	176 (2.3)	73.0 [66.8, 78.4]	27.0 [21.6, 33.2]	
Bono	280 (3.6)	74.0 [69.8, 77.9]	26.0 [22.1, 30.2]	
Bono East	354 (4.6)	66.1 [60.7, 71.1]	33.9 [28.9, 39.3]	
Oti	236 (3.0)	70.8 [65.7, 75.4]	29.2 [24.6, 34.3]	
Northern	827 (10.6)	74.7 [70.3, 78.6]	25.3 [21.4, 29.7]	
Savannah	210 (2.7)	76.0 [69.6, 81.5]	24.0 [18.5, 30.4]	
North East	220 (2.8)	74.6 [70.1, 78.6]	25.4 [21.4, 29.9]	
Upper East	406 (5.2)	79.7 [76.1, 82.9]	20.3 [17.1, 23.9]	
Upper West	251 (3.2)	80.3 [74.9, 84.7]	19.7 [15.3, 25.1]	

for contraception between 95–99% CI (Fig. 2). Anselin Cluster and Outlier analysis was conducted to validate the hotspot analysis. It was found that 28 districts had a high incidence of unmet need and were surrounded by districts with a high incidence of unmet need. In addition, six districts were found to have high incidence of unmet need but surrounded by districts with low prevalence of unmet need. It is important to note that some districts in the southern part of Ghana were found to have a relatively high prevalence of unmet need compared to their neighbouring districts. This finding sheds more light on the results of the hotspot analysis.

Factors associated with unmet need for contraception among women in Ghana

Table 2 presents the results of the factors associated with unmet need for contraception among women in Ghana. Women's age was associated with a lower likelihood of unmet need for contraception with the lowest odds among those aged 35–39 years [AOR = 0.31, 95%CI = 0.18, 0.53] compared with those aged 16–19. Cohabiting women were more likely to have unmet need for contraception [AOR = 1.25, 95%CI = 1.01, 1.53] relative to their married counterparts. Currently working women were less likely to have unmet need for contraception compared to those who were

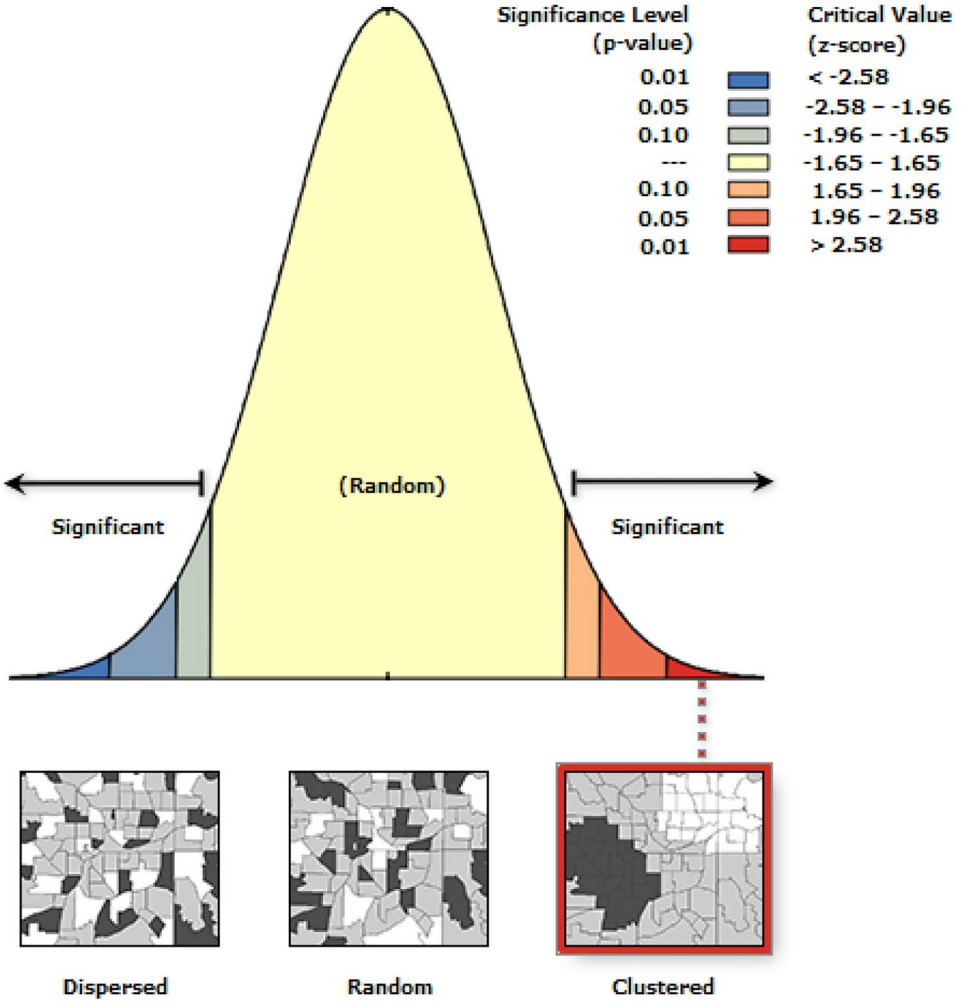

Fig. 1 Spatial pattern of unmet need for contraception at the district level in Ghana

not working [AOR = 0.74, 95%CI = 0.60, 0.91]. The study shows a positive association between parity and unmet need for contraception, with the highest likelihood being reported among those with four or more births [AOR = 6.47, 95%CI = 3.99, 10.48] compared to nulliparous women. Compared to those who did not hear family planning messages at community meetings, those who heard family planning messages at community meetings had lower odds of unmet need for contraception [AOR = 0.84, 95%CI = 0.70, 0.99]. Also, we observed a higher likelihood of unmet need for contraception among women in female-headed households than in male-headed households [AOR = 1.36, 95%CI = 1.13, 1.63]. Greater Accra, Volta, Eastern and Bono East regions had higher odds of unmet need for contraception than those in the Western region, with the highest odds among those in Greater Accra [AOR = 2.38, 95%CI = 1.52, 3.72].

Discussion

This study assessed the spatial distribution and factors associated with the unmet need for contraception among Ghanaian women. The SDG target 3.7 opines that by 2030, all women should have "access to sexual and reproductive healthcare services, including for family planning, information, and education" [26]. However, our study revealed that 26.7% of women currently in union had an unmet need for contraception in Ghana. The observed proportion of unmet need for contraception is similar to what has been reported in Ghana (35.2%) [27] and Burundi (32.4%) [28]. Our findings suggest a gap in the provision of essential reproductive health services and underscore a pressing need to enhance access to and availability of contraceptive methods.

Our study revealed the presence of spatial variations in the unmet need for contraception in Ghana, with districts in northern Ghana being identified as hotspots compared

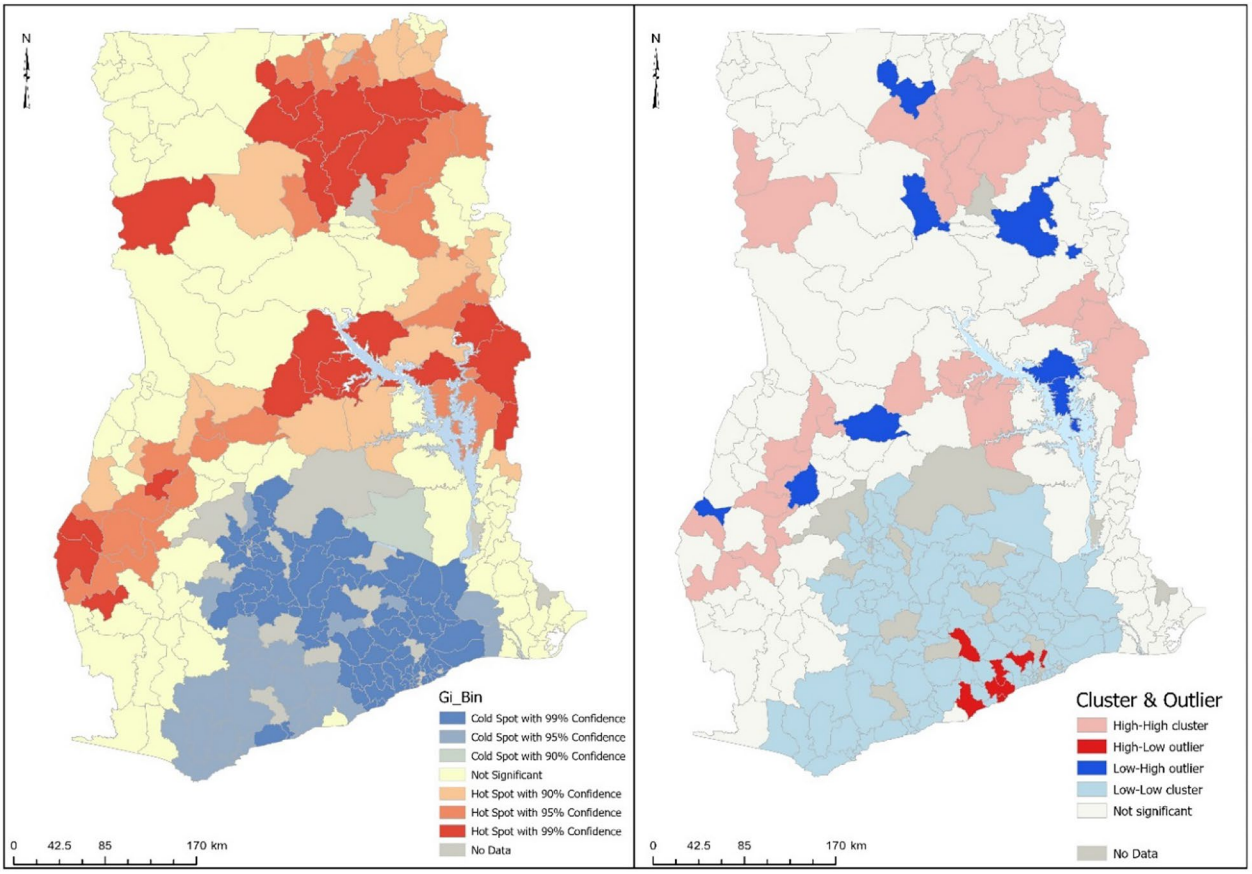

Fig. 2 Spatial distribution of unmet need for contraception in Ghana

to Southern Ghana, where most of the cold spots were identified. Similar findings have been reported in a study by Nyarko et al. [15] that found spatial variations in unmet need for contraception. The findings highlight regional disparities in access to and utilisation of contraceptive services, which may be influenced by various contextual factors such as cultural norms, socioeconomic conditions, healthcare infrastructure, and awareness levels. For instance, a study conducted in North Gonja district [15] (i.e., a district in Northern Ghana) posits that factors such as "fear of side effects, unacceptability of contraception, perception of inability to conceive if contraception is stopped, lack of contraceptive information, opposition from husband to contraceptive use, inability to afford contraceptives, and unaddressed myths" explain the high unmet need for contraception in Northern Ghana. The identification of Northern Ghana as a hotspot for unmet need for contraception signifies a need to prioritise resource allocation and target interventions in these hotspot districts.

Age emerged as being inversely associated with the unmet need for contraception. That is, the likelihood of having an unmet need for contraception significantly reduced with increasing age, with the lowest odds being reported among women in the late reproductive age (35–39 years) compared to adolescent girls. The result is corroborated by previous studies [23, 29] that have found the likelihood of unmet needs to be high among adolescents and significantly reduced as they transition to an older phase of reproductive age. Women may have had more opportunities to access and utilise contraceptive services as they age. Older women may have had longer exposure to family planning programs, educational campaigns, and reproductive health services, resulting in greater awareness and utilisation of contraception. This increased experience and knowledge about contraception may contribute to lower unmet needs among women in the late reproductive age category compared to adolescent girls. Moreover, many adolescent girls experience stigma when accessing contraceptives [15]. Hence exacerbating their risk of having an unmet need for contraception.

Table 2 Factors associated with unmet need for contraception among women in Ghana

Variable	Model I Empty model	Model II aOR [95%CI]	Model III aOR [95%CI]	Model IV aOR [95%CI]
Fixed effect				
Women's age (years)				
16–19		1.00		1.00
20–24		0.64 [0.40, 1.04]		0.67 [0.41, 1.09]
25–29		0.39*** [0.23, 0.67]		0.41** [0.24, 0.69]
30–34		0.32*** [0.19, 0.54]		0.33*** [0.19, 0.56]
35–39		0.31*** [0.18, 0.52]		0.31*** [0.18, 0.53]
40–44		0.34*** [0.19, 0.63]		0.35*** [0.19, 0.64]
45–49		0.43** [0.23, 0.80]		0.44** [0.23, 0.81]
Level of education				
No education		1.00		1.00
Primary		1.08 [0.86, 1.35]		1.06 [0.85, 1.33]
Secondary or higher		1.12 [0.88, 1.43]		1.13 [0.88, 1.44]
Marital status				
Married		1.00		1.00
Cohabiting		1.29* [1.06, 1.57]		1.25* [1.01, 1.53]
Current working status				
Not working		1.00		1.00
Working		0.73** [0.59, 0.91]		0.74**[0.60,0.91]
Total children ever born				
None		1.00		1.00
One		2.04*** [1.36, 3.06]		2.05*** [1.37, 3.08]
Two		3.17*** [1.98, 5.08]		3.17*** [1.98, 5.08]
Three or more		4.03*** [2.49, 6.53]		4.07*** [2.51, 6.60]
Four or more		6.34*** [3.92, 10.24]		6.47*** [3.99, 10.48]
Heard of family planning from newspaper or magazine last few months				
No		1.00		1.00
Yes		0.70 [0.42, 1.14]		0.71 [0.43, 1.17]
Heard of family planning from television last few months				
No		1.00		1.00
Yes		0.89 [0.74, 1.07]		0.90 [0.75, 1.09]
Heard family planning by text messages on mobile phone				
No		1.00		1.00
Yes		1.11 [0.76, 1.61]		1.10 [0.75, 1.61]
Heard family planning at community meetings events				
No		1.00		1.00
Yes		0.84* [0.71, 1.00]		0.84* [0.70, 0.99]
Usage of internet				
No		1.00		1.00
Yes		0.99 [0.81, 1.20]		0.99 [0.81, 1.21]
Person who usually decides on respondent's health care				
Respondent alone		1.00		1.00
Respondent and partner		0.91 [0.73, 1.12]		0.94 [0.76, 1.17]
Partner alone		1.03 [0.84, 1.26]		1.05 [0.86, 1.29]
Someone else or other		2.00 [0.84, 4.80]		1.99 [0.84, 4.73]
Wealth index				
Poorest			1.00	1.00
Poorer			0.73* [0.57, 0.94]	0.78 [0.61, 1.00]
Middle			0.75 [0.56, 1.01]	0.86 [0.64, 1.17]

Table 2 (continued)

Variable	Model I Empty model	Model II aOR [95%CI]	Model III aOR [95%CI]	Model IV aOR [95%CI]
Richer			0.58** [0.41, 0.80]	0.78 [0.54, 1.12]
Richest			0.45*** [0.31, 0.67]	0.73 [0.48, 1.13]
Sex of household head				
Male			1.00	1.00
Female			1.27** [1.07, 1.51]	1.36*** [1.13, 1.63]
Region				
Western			1.00	1.00
Central			1.12 [0.70, 1.79]	1.09 [0.68, 1.75]
Greater Accra			2.22*** [1.43, 3.45]	2.38*** [1.52, 3.72]
Volta			1.82* [1.14, 2.89]	1.95** [1.22, 3.12]
Eastern			1.90** [1.17, 3.07]	1.96** [1.21, 3.19]
Ashanti			1.42 [0.89, 2.27]	1.40 [0.86, 2.27]
Western North			1.27 [0.78, 2.06]	1.41 [0.87, 2.29]
Ahafo			1.27 [0.74, 2.19]	1.37 [0.79, 2.37]
Bono			1.23 [0.78, 1.95]	1.41 [0.88, 2.28]
Bono East			1.62 [0.99, 2.66]	1.79* [1.08, 2.97]
Oti			1.34 [0.81, 2.21]	1.45 [0.87, 2.42]
Northern			1.11 [0.71, 1.73]	1.33 [0.84, 2.12]
Savannah			0.95 [0.57, 1.58]	1.06 [0.63, 1.78]
North East			1.12 [0.70, 1.78]	1.31 [0.80, 2.17]
Upper East			0.78 [0.49, 1.25]	1.01 [0.62, 1.63]
Upper West			0.80 [0.49, 1.30]	0.97 [0.58, 1.62]
Random effect model				
PSU variance (95% CI)	0.82 [0.65, 1.05]	0.84 [0.66, 1.08]	0.74 [0.58, 0.94]	0.77 [0.59, 0.98]
ICC	0.20 [0.16, 0.24]	0.20 [0.17, 0.25]	0.18 [0.15, 0.22]	0.19 [0.15, 0.23]
N	7762	7762	7762	7762
Number of clusters		618	618	618

aOR adjusted odds ratios, *CI* Confidence Interval; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; 1.00 = Reference category; *PSU* Primary Sampling Unit, *ICC* Intra-Class Correlation, *AIC* Akaike's Information Criterion

The study indicates that women who were employed were significantly less likely to experience an unmet need for contraception compared to their counterparts who were not employed. This result aligns with a prior study conducted in Ghana [27]. It could be that employed women are likely to be empowered and more likely to be assertive in making healthcare decisions, including accessing and utilising contraceptive commodities and information [30].

In this study, women exposed to family planning messages at community meetings in Ghana were associated with lower odds of unmet need for contraception. Community meetings can raise awareness of the different contraceptive methods available, where to get them, and how to use them correctly. This can be especially helpful for women who may not have otherwise known about all their options.

Cohabiting women were more likely to have an unmet need for contraception compared to those currently married. Synonymous findings have been reported in sub-Saharan Africa [17] and Mexico [31]. In Ghana, cohabiting women often face stigma and discrimination from the community, their family, and religious communities because it is believed that formal marital rites have not been done [32]. This stigma may be a disincentive for cohabiting women to access and utilise contraceptives, worsening their unmet need for contraception.

Relatedly, women in female-headed households were more likely to have unmet contraception needs than those in male-headed households. This aligns with Ahinkorah et al. [17] study that found higher odds of unmet need for contraception among those in female-headed households. Women in female-headed households may face greater economic constraints and limited access to resources compared to those in male-headed households [33]. Financial challenges can hinder their ability to access and afford contraceptive services and products. This lack of financial resources may result in reduced

utilisation of contraceptive methods, leading to a higher unmet need for contraception among women in female-headed households.

The study also indicates that grand multiparous women were more likely to have an unmet need for contraception compared to nulliparous women—a result that mirrors previous evidence from sub-Saharan Africa [23], Nigeria [34], and Ethiopia [35]. We postulate that grand multiparous women may have different preferences or needs regarding contraceptive methods compared to nulliparous women. They may require more effective or long-term contraceptive options, and if these methods are not readily available or accessible, their unmet need for contraception may be heightened.

Implications for policy

Targeted resource allocation and interventions should prioritise hotspot regions and districts to address the regional disparities in access and utilisation of contraceptive services. The findings underscore the importance of addressing different age groups' specific needs and challenges. Adolescents require targeted interventions to address the high unmet need for contraception and reduce the associated stigma. Educational programs and awareness campaigns should focus on providing accurate information, dispelling myths, and addressing cultural and social barriers that hinder adolescents' access to contraception. Furthermore, the use of radio as a platform for health information and social behavioural change communication interventions has shown promise in reducing unmet needs for contraception. Scaling up radio programs that provide comprehensive and accurate information about contraceptive methods, their availability, and where women can access them can contribute to increased knowledge and utilisation of contraception.

Strengths and limitations

The current study demonstrates a significant strength through its utilisation of a national dataset, enabling a comprehensive examination of the unmet need for contraception and associated factors among women in Ghana. Using a larger sample size enhances the precision of the estimates, increasing the likelihood of generalizability and bolstering the validity of the study's findings. However, it is important to acknowledge the potential for recall bias as women may not accurately recall past experiences, introducing a limitation to the study. Furthermore, social desirability bias may be present, as participants may provide responses they perceive as socially acceptable to avoid stigma or judgment. Additionally, we are unable to establish a causal relationship in the associated factors of the unmet need for contraception among women in Ghana. The study excluded women not in a union; hence, the findings may not be extrapolatable to their population.

Conclusion

Our study has shown that there are regional and district variations in the unmet need for contraception among women in Ghana. The findings underscore the urgency of improving access to and availability of contraceptive methods, particularly in hotspot districts in northern parts of Ghana. Strategies should focus on targeted interventions for specific age groups, such as adolescents, multiparous women, and cohabiting women. Empowering women through employment, promoting shared decision-making, and addressing the unique challenges faced by cohabiting women and women in female-headed households are crucial steps in reducing unmet need for contraception.

Abbreviations

AOR	Adjusted odds ratio
CIs	Confidence intervals
DHS	Demographic and Health Survey
GDHS	Ghana Demographic and Health Survey
MEASURE DHS	Monitoring and Evaluation to Assess and Use Results Demographic and Health Surveys
SDG	Sustainable Development Goal
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology

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Author contributions

BOA, ENKB, and RGA conceived the study. RGA, BOA, and ENKB wrote the methods section and performed the data analysis. JO, YMO, and AO were responsible for the initial draft of the manuscript. All the authors reviewed and approved the final version of the manuscript.

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Data availability

The dataset is freely accessible at https://dhsprogram.com/data/dataset/Ghana_Standard-DHS_2022.cfm?flag=1.

Declarations

Ethics approval and consent to participate

We did not seek ethical clearance for the study since the 2022 GDHS dataset is already available in the public domain. However, permission was sought from the Monitoring and Evaluation to Assess and Use Results Demographic and Health Surveys (MEASURE DHS) before using the dataset. Detailed information about the DHS data usage and ethical standards is available at http://goo.gl/ny8T6X.

Consent for publication

Not applicable.

Competing interests

BOA is a deputy editor. The remaining authors declare that they have no competing interests.

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