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Factors associated with modern contraceptive utilization among reproductive age women in Cambodia; evidenced by the recent Cambodia demographic and health survey



Abstract

Introduction Cambodia is a low-income country with limited access to family planning (FP) in terms of modern contraceptive utilization. Despite several FP programs designed to make contraceptives accessible, adoption of contraceptives has been difficult in Cambodia, which has high rates of fertility and maternal mortality. This gap in essential care can put women and adolescent girls at greater risk of adverse outcomes such as stillbirth, spontaneous abortion, unwanted pregnancy, or even maternal death. One of the goals set by the government to decrease both maternal and child mortality and morbidity was increasing the modern contraceptives utilization. So, the main objective of this study was to evaluate spatial variations in modern contraceptives utilization and its contributing factors among women.

Methods Data from the Cambodia 2021–22 Demographic and Health Survey datasets were used for secondary data analysis. A total of 19,496 women of reproductive age participated in the study. A spatial and multilevel mixed effects analysis was done on the factors affecting modern contraceptives utilization among Cambodian women. Finally, the percentage, odd ratio, together with their 95% confidence intervals and the results of the spatial analysis were provided.

Result The prevalence of modern contraceptive use was 31.2% in Cambodia. Living in an urban area [AOR = 1.224; 95% CI = (1.126.1.330); P = 0.0001]; being married [AOR = 34.131; 95% CI= (12.673, 91.921); P = 0.0001]; and having a history of terminated pregnancy [AOR = 1.137; 95% CI= (1.055, 1.225); P = 0.0001] were found to be positively associated with modern contraceptive utilization. In contrast to this, being between the age range of 46–49 [AOR = 0.421; 95% CI = (0.364, 0.487); P = 0.0001]; being a female-headed household [AOR = 0.784; 95% CI = (0.723, 0.850); P = 0.0001]; and current breast feeding [AOR = 0.84; 95% CI = (0.75, 0.93); P = 0.010] were found to be negatively associated with modern contraceptive utilization. Additionally, the spatial analysis of modern contraceptive utilization showed that a higher proportion was utilized in the southern and southwest regions of Cambodia.

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Conclusion In this study, living in urban area, being married and having history of terminated pregnancy were found positively associated with modern contraceptive utilization. In contrast to this, being old age, being female headed household and being currently breast-feeding women were found negatively associated with modern contraceptive utilization. In addition to this, there were geographic (spatial) variations in modern contraceptive utilization among Cambodian's women across the country.

Keywords Modern contraceptive utilization, Multilevel, Spatial, Cambodia

Introduction

Contraception is the deliberate avoidance of pregnancy by the use of various methods, sexual behaviors, drugs, treatments, or surgical procedures [1]. A modern contraceptive method is a drug or medical procedure that prevents unintended pregnancy [2]. Modern contraceptive methods include barrier methods such as male and female condoms, diaphragm, cervical cap and sponge; hormonal contraceptives that include oral, injectable, transdermal, vaginal ring, and implants; intrauterine device (IUD) [3]. Modern contraceptive methods are essential for delaying births and raising the rates of neonatal and child survival [4]. In addition contraceptives have many advantages, such as those for empowering women, improving the health of mothers and children, fostering economic growth, and promoting education [5].

There are currently 1.9 billion women in the globe who are of reproductive age [15–49], of whom 1.1 billion require family planning, and the number of women in this age group is predicted to rise. Of them, 842 million utilize contraceptives and 270 million still require contraceptives, which is still not being met [6]. A modern contraceptive method of family planning was used by 58% of married or in-union women of reproductive age worldwide in 2017, accounting for 92% of all contraceptive users [7]. Cambodia, one of the least developed nations in Southeast Asia, has only about 16 million populations [8] with the lowest contraceptive prevalence rate [9].

Up to our knowledge; recently only the Cambodia DHS was conducted at the national level. But the Cambodia DHS reports simply report the proportion and frequency of modern contraceptive utilization without considering the factors associated with it. The major goal of this study was to evaluate spatial variations and the contributing factors of modern contraceptives utilization among women of reproductive aged 15–49 years. The findings of this study also would provide better evidence for policymakers and other stakeholders, which in turn might enable designing and executing appropriate interventions at different levels to increase the rate of modern contraceptive utilization and improve the health system as a whole.

Methods and material

Study setting and period

The National Institute of Statistics (NIS) in collaboration with the Ministry of Health (MoH) conducted the 2021– 22 Cambodia Demographic and Health Survey (CDHS). Data collection was took place from September 15, 2021, to February 15, 2022.

Data source

After permission was secured through an online request by explaining the aim of the study, the secondary data for this analysis were obtained from Cambodia 2021–22 demographic and health survey (2021–22 CDHS) that was found at DHS portal of (https://dhsprogram.com/ data/dataset_admin/index.cfm).

Study design

The community based cross-sectional study design was employed and a two-stage sample frame was used in the 2021–22 CDHS. The initial step involved picking sample sites (clusters) made up of EAs drawn out for the 2019 GPC. There were 709 clusters chosen in total, 241 of which were in urban areas and 468 in rural ones. Households were sampled systematically in the second stage. From April to August 2021, a household listing operation was conducted in each of the chosen EAs. Randomly chosen households were then selected from these lists to participate in the survey. For a total sample of 21,270 households, 30 households were selected from each cluster.

Study population and eligibility criteria

All women aged 15–49 who were permanent residents of selected households or guests staying in the household the night before the survey were eligible to be interviewed. Women who were in menopauses and under fifteens were excluded from this study. The women questionnaire was used to collect information from all eligible women aged 15–49 years. The number of eligible women was 19,845 of these qualified women, 19,496 women were interviewed with a response rate of 98.2%. 12,463 of the 19,496 women interviewed were from rural areas, while 7,033 were from urban areas. Since the outcome variable for this study was modern contraceptive utilization among women of reproductive age, the final sample size for this analysis was 19,496 [10].

Study variables

The outcome variable for this study was the modern contraceptive utilization, which was coded as "0" if the women utilize modern contraceptive and "1" if the women not utilize modern contraceptive (No method, Folkloric method, Traditional method).

Individual-level variable Age, religion, educational status, sex of household, wealth index, current marital status, frequency of listening radio, frequency of watching television, currently breastfeeding, and history of terminated pregnancy.

Community-level variable Place of residence.

Data management and analysis

In all the analysis, we adjusted for the complex nature of the survey design by accounting for clustering, stratification, and weighting. Due to the comparisons and combination (pooled data) of surveys from different regions, with different target population sizes, the weights were normalized. This was accomplished by dividing the standard weights of the women and the total number of women in the country by the appropriate survey sampling fraction. Using STATA version 14 software's, the data was extracted, recoded, and subjected to both descriptive and analytical analysis. Due to the hierarchical nature of the demographic and health survey data, the multilevel analysis was employed.

The Interclass Correlation Coefficient (ICC) was used to evaluate the regional variability. In order to choose variables for multivariate analysis, bivariate analysis was first performed on the following variables: Age, place of residence, religion, educational status, sex of household, wealth index, current marital status, frequency of listening radio, frequency of watching television, currently breastfeeding, and history of terminated pregnancy. Only variables with p-values less than 0.05 were taken into consideration for multivariate analysis.

Spatial analysis

The weighted frequency of modern contraceptive utilization, the cluster number, and the geographic coordinates were integrated in Stata 14. After that, data was exported to Excel and then imported for spatial analysis into Arc-GIS 10.3.

Spatial autocorrelation analysis

The spatial autocorrelation (Global Moran's I) statistic examines the distribution of modern contraceptive utilization among women of reproductive age in Cambodia. Moran's I is a spatial statistic that uses the entire data set to generate a single output value that varies from -1 to +1 in order to evaluate spatial autocorrelation. I, Moran's Values around -1 suggest scattered modern contraceptive utilization, whereas values near +1 indicate clustered modern contraceptive utilization, and values near 0 indicate random distribution of modern contraceptive utilization. A statistically significant Moran's I (p<0.05) lead to the failure to reject the alternative hypothesis and rejection of the null hypothesis (modern contraceptive utilization is randomly distributed) and indicates the presence of spatial autocorrelation.

Hot spot analysis (Getis-OrdGi* statistic)

Getis-OrdGi^{*} statistics were used to generate the GI^{*} statistics for each region to determine how the spatial autocorrelation varies in Cambodia. To determine the statistical significance of clustering, the p-value is assessed for significance using the Z-score. A "hot area" is suggested by high GI^{*} statistical output, whereas a "cold spot" is suggested by low GI^{*} statistical output.

Spatial interpolation

To determine the impact of a particular event throughout the country, it is highly expensive and time-consuming to gather trustworthy data. As a result, using the observed data, interpolation was utilized to estimate a portion of a certain area. The spatial interpolation approach was used to forecasts modern contraceptive utilization in the unstudied portions of the country based on sampled EAs from CDHS. In this work, modern contraceptive utilization in unobserved regions of Cambodia was predicted using the standard Kriging spatial interpolation approach. The proportion of modern contraceptive utilization in non-sampled regions was estimated for this study using the standard Kriging approach.

Ethical consideration

Since the demographic and health survey program used secondary, easily accessible survey data, ethical review and participant consent were not necessary for this particular study. The DHS Program granted the researchers permission to utilize data from their website.

Result

Socio-demographic characteristics

This study includes a total weighted sample of 19,496 reproductive-age women from the recent Cambodia demographic and health survey. From the total study participants, 3367 (17.3%) were between the age range of 35–39 years; 11,257 (57.7%) were from rural areas; 18,980 (97.4%) were Buddhist; 8277 (42.5%) were attending secondary education; 13,825 (70.9%) households were maleheaded; 6922 (35.5%) were poor; 13,269 (68.1%) were married; and modern contraceptive utilization was 6080 (31.2%) (Table 1).

 Table 1
 Socio-demographic characteristics of reproductive age

 women in Cambodia 2022. N = 19,496

Characteristics (n = 19496)	Categories	Frequency (%)
Age groups	15–19	2981(15.3)
	20–24	2589(13.3)
	25–29	2986(15.3)
	30–34	3272(16.8)
	35–39	3367(17.3)
	40–44	2598(13.3)
	45–49	1703(8.7)
Place of residence	Urban	8239(42.3)
	Rural	11,257(57.7)
Religion	Buddhist	18,980(97.4)
	Muslim	342(1.8)
	Christian	135(0.7)
	No religion	39(0.2)
Educational status	No education	2265(11.6)
	Primary	7554(38.7)
	Secondary	8277(42.5)
	Higher	13,999(7.2)
Sex of house hold head	Male	13,825(70.9)
	Female	5671(29.1)
Wealth index	Poor	6922(35.5)
	Middle	3831(19.7)
	Rich	8743(44.8)
Listening to radio	No	16,494(84.6)
-	Yes	3002(15.4)
Watching television	No	12,048(61.8)
-	Yes	7448(38.2)
Currently breastfeeding	No	17,434(89.4)
	Yes	2062(10.6)
Current marital status	Never in union	4788(24.6)
	Married	13,269(68.1)
	Living with partner	223(1.1)
	Widowed	400(2.1)
	Divorced	742(3.8)
	No longer living together/ separated	74(0.4)
Ever had a terminated	No	14,851(76.2)
pregnancy	Yes	4645(23.8)
Current use by method	No method	11,089(56.9)
type	Folkloric method	1(0.01)
	Traditional	2327(11.9)
	modern method	6080(31.2)
Modern contraceptive	Yes	6080(31.2)
utilization	No	13,416(68.8)

Spatial analysis results

Spatial distribution of modern contraceptive utilization in Cambodia

In Cambodia, modern contraceptive utilization was analyzed geographically using 709 clusters. The number of current modern contraceptive utilization instances in each cluster corresponds to one enumeration area at each spot on the map. The spatial distribution of modern contraceptive utilization showed that a higher proportion was utilized in the southern and southwest regions of Cambodia. The northern and northern east region of Cambodia had a low rate of modern contraceptive utilization (Fig. 1).

Spatial autocorrelation modern contraceptive utilization

The spatial autocorrelation result reveals whether modern contraceptive utilization in Cambodia is randomly distributed across the region, clustered, or dispersed. The results of the spatial autocorrelation study showed a clustering effect in the utilization of modern contraceptive across the country. The clustered patterns (on the right's red box side) demonstrated a clustering effect on the utilization of modern contraceptive in Cambodia. Each panel's right and left sides include automatically produced keys for the outputs. The likelihood that this clustered pattern is the result of random chance is less than 1%, based on the z-score of 31.1 (p-value=0.001). Bright red and blue colors on the terminal tails indicate a higher level of significance (Fig. 2).

The hotspot analysis result

The hotspot analysis result shows the high proportion (hotspot) and low proportion (cold spot) areas of modern contraceptive utilization in Cambodia. The green colors were seen in the north east region (Otdar Meanchey, Siemreap), North West region (Stung Treng, Ratanak Kiri), southern region (Kampot, Takeo) and southern west region (Svay Rieng, Prey Veng, Pailin, and Tboung Khmum) which are hot spot areas (had high proportion of modern contraceptive utilization). The red-colored coldspot (areas with a low percentage of women utilizing modern contraceptive) were found in northern west region (Banteay Meanchey, Battambang), central region (Kampong Thom, Kampong Chhnang, Kampong Cham, Prey Veng). (Fig. 3).

Spatial interpolation or prediction

Based on the sampled region, the spatial interpolation approach predicts the proportion of modern contraceptive utilization for unsampled areas. The area map was described using the standard Kriging method. The red color represents the projected low utilization of modern contraceptive. If the area's color shifted from red to blue, it indicates that more people in the area are utilizing modern contraceptives than was previously expected. The country is predicted to utilize modern contraceptive at a high rate, as shown by the blue color. According to the prediction's results, Otdar Meanchey, Siemreap, Stung Treng, Ratanak Kiri, Pailin, Tboung Khmum, Prey Veng, Svay Rieng, Takeo, Kep and Preah Sihanouk region have high rates of modern contraceptive utilization. The



Fig. 1 Spatial distribution of modern contraceptive utilization in Cambodia, 2022

red color prediction showed that the regions of Banteay Meanchey, Battambang, Kampong Thom, Kampong Cham, Kampong Chhnang, Kampong Speu and Kampot had the lowest rates of modern contraceptive utilization in Cambodia (Fig. 4).

Model comparison

The ICC in the null model showed that among women of childbearing age, there is an 8.83% difference in contraceptive use between communities. The variations of modern contraceptive utilization among women of childbearing age was described by individual-level variables with 13.32% of occurrences. Differences in modern contraceptive utilization among women of childbearing age are explained by 10.65% of community-level variables. Finally, 17.73% of the differences between women of reproductive age is due to variables at the individual and community levels. Deviation is used to assess the fit of the model for model comparison (AIC). As a result, Model IV, which includes both individual and community-level factors and has the lowest deviances (AIC), was determined to provide the best combination. Variables

Spatial Autocorrelation Report

Moran's Index: 0.690187

z-score: 31.110740

p-value: 0.000000



Given the z-score of 31.1107400749, there is less than 1% likelihood that this clustered pattern

could be the result of random chance.

Fig. 2 Spatial autocorrelation of modern contractive utilization in Cambodia, 2022

having a p < 0.05 were considered to be significant predictors of current modern contraceptive utilization among reproductive-age women (Table 2).

Bivariate and multivariable logistic regression

The result of the Bi-variable analysis demonstrated that contraceptive utilization had significant relationships with age, place of residence, educational status, and sex of household, wealth index, marital status, listening radio, watching television, currently breastfeeding and history of terminated pregnancy among reproductive age women.

According to the result of the multivariable regression the key variables related with modern contraceptive utilization among reproductive age women were women's age, place of residence, marital status, Sex of house hold head, currently breastfeeding, and history of terminated pregnancy.

The odd of modern contraceptive utilization among women who were found between the age range of 46–49 years were 0.421 times less likely [AOR=0.421; 95% CI



Fig. 3 Hotspot analysis of modern contraceptive utilization in Cambodia, 2022

= (0.364,0.487); P=0.0001] relative to women who were found between the age range of 15–19 years. The odd of modern contraceptive utilization among women who were live in urban area were 1.224 times more likely [AOR=1.224; 95% CI = (1.126.1.330); P=0.0001] relative to women who were live in rural the area. The odd of modern contraceptive utilization among women who were attending higher education were 0.705 times less likely to utilize modern contraceptive [AOR=0.705; 95% CI= (0.595,0.835); P=0.0001] compared to women who weren't attending education. The odd of modern contraceptive utilization among female heeded household were 0.784 times less likely [AOR=0.784; 95% CI = (0.723, 0.850); *P*=0.0001] relative to male heeded household.

The odd of contraceptive utilization among currently breast-feeding women were 0.728 times less likely to utilize modern contraceptive [AOR=0.728; 95% CI= (0.657,0.806); P=0.0001] compared to non-breast-feed-ing women. The odd of modern contraceptive utilization among married were 34.131 time more likely to utilize contraceptive [AOR=34.131; 95% CI= (12.673, 91.921); P=0.0001] relative to women who were single (never in union). The odd of modern contraceptive utilization among women who had history of terminated pregnancy



Fig. 4 Spatial interpolation of modern contractive utilization in Cambodia, 2022

Table 2	Revealed the random effect of modern contraceptive			
utilization and model comparison				

Parameters	Model I	Model II	Model III	Model IV
ICC (%)	8.83%	13.62	10.65%	19.47
Model fitness				
AIC	3512	3018	3235	2836

were 1.137 time more likely to utilize contraceptive [AOR=1.137; 95% CI= (1.055, 1.225); P=0.0001] relative to women who hadn't the history of pregnancy termination (Table 3).

Discussions

The hotspot analysis result shows the high proportion (hotspot) and low proportion (cold spot) areas of modern contraceptive utilization in Cambodia. In the north east region, North West region, southern region and southern west region of Cambodia were hot spot areas (had high proportion of modern contraceptive utilization). The cold spot areas (had low proportion of modern contraceptive utilization) were found in northern west region, and central region of Cambodia. This survey revealed that 31.2% of women utilized modern contraceptives. This finding was slightly higher than the studies which was conducted in Ethiopia [11] and east Africa [12], in

Characteristics	Categories	COR with 95% CI	AOR with 95% CI
Age group	15–19	1	1
	20–24	7.45(5.948, 9.332)***	0.656(0.504,0.856)**
	25–29	1.020(0.879, 1.184)	0.443(0.375,0.524)***
	30–34	0.500(0.436,0.574)***	0.364(0.313,0.423)***
	35–39	0.394 (0.34,0.450)***	0.341(0.295,0.393)***
	40–44	0.300(0.263,0.343)***	0.266(0.231,0.306)***
	45–49	0.418(0.363,0.480)***	0.421(0.364,0.487)***
Place of residence	Urban	1.351(1.269,1.437)***	1.224(1.126.1.330)***
	Rural	1	1
Religion	Buddhist	1	1
	Moslem	0.579(0.015,23.065)	0.58(0.01,23.07)
	Christian	0.726(0.018,29.156)	0.73(0.02,29.16)
	No religion	0.488(0.012, 19.781)	0.45(0.01,19.78)
Educational status	No education	1	1
	Primary	0.331(0.282,0.389)***	0.612(0.504,0.745)***
	Secondary	0.360(0.312,0.416)***	0.631(0.531,0.751)***
	Higher	0.648(0.560,0.749)***	0.705(0.595,0.835)***
Sex of house hold head	Male	1	1
	Female	0.588(0.547,0.631)***	0.784(0.723,0.850)***
Wealth index	Poor	1	1
	Middle	0.786(0.734,0.841)***	0.929(0.844,1.022)
	Rich	0.932(0.858,01.013)	1.023(0.91, 1.131)
listening radio	No	1	1
	Yes	0.776(0.702,0.857)*	0.840(0.747,0.944)
watching television	No	1	1
	Yes	1.003(0.942,1.067)	1.098(1.019, 1.183)
Currently breastfeeding	No	1	1
	Yes	1.473(1.341,1.619)***	0.728(0.657,0.806)***
Current marital status	Never in union	1	1
	Married	45.903(17.231,122.280)***	34.131(12.673,91.921)***
	Living with partner	0.128 (0.059,0.280)***	0.135(0.062,0.297)***
	Widowed	0.275(0.120,0.632)**	0.23(0.10,0.55)**
	Divorced	5.039 (1.776,14.299)**	0.12(0.06,0.27)***
	No longer living together	3.278(1.356,7.927)**	0.256(0.111,0.594)**
Ever had a terminated pregnancy	No	1	1
	Yes	2.103(1.964,2.252) ***	1.137(1.055,1.225)***

Table 3 Bi-variable and multivariable analysis of factors associated with modern contraceptive utilization among reproductive age women in Cambodia 2023. (*n* = 19496)

 $AOR = Adjusted \ odd \ ratio; COR = Crude \ odd \ ratio; CI = confidence \ interval; statistically \ significance = *p-value < 0.05; **p < 0.01; ***p < 0.001; ***p < 0.$

sub-Saharan African countries and Ghana [13]. On the other hand the finding of this study was lower than the study which was conducted in northwest Ethiopia [14], Uganda [15], central Ethiopia [16], in North and South Yangon, Myanmar [17] and in Yangon Region [18]. The possible reasons for this variation could be the difference in the study period, method of estimation, sample size, socioeconomic, sociocultural, and geographic location of the study area.

The findings of this study showed that the odd of contraceptive utilization among women who were found between the age ranges of 45–49 years were less likely relative to women who were found between the age ranges of 15–24 years. This finding was concurrent with studies which was conducted in Spain [19] and Ethiopia [20]. This might be perimenopausal women take contraceptives less due to decreased sexual activity and fertility [21]. Additionally, as women frequently believe they are too young or immature to care for a kid and may have to drop out of school or put their education on hold, they may have used contraceptives to avoid getting pregnant.

Women of reproductive age who resided in urban areas had higher odds of utilizing modern contraceptives than did women who lived in rural areas. Similar findings are reported by other studies conducted in sub-Saharan Africa [22], and Senegal [23]. Urban women were more empowered than rural women to decide on modern contraceptives [24]. On the other hand, most women face several barriers to obtaining and using modern contraceptives, particularly those who live in rural areas [25] such as, low educational attainment, low economic status, deep rooted sociocultural belief [26], poor spousal communication, the husband's role as the primary decision-maker, fear of side-effects [27, 28], long distances to healthcare facilities, and inadequate stock of preferred types of modern contraceptives [29, 30].

Modern contraceptive utilization among women who were attending higher education were less likely to utilize modern contraceptive compared to women who weren't attending education. Since, in our study educational status and modern contraceptive utilization had a negative association. So, we recommended further investigations on the relationship between educational level and modern contraceptive utilization in Cambodia. On the other hand, this finding was inconsistent with the studies which was conducted in Ethiopia [31], in Kenya [32] in Zaire [33]. The first possible reason for these variation were women who receive more maternal education may be more informed about the variety of contraceptive methods available, which will enable them to use contraception more effectively and make informed decisions [34]. The second reason were, when education levels rise, wealth and prestige tend to rise as well, and the desire to limit family size by utilizing modern contraceptives would increase [35].

According to this study, women with female headed household were less likely to use modern contraceptives than women in household headed by male. This finding was in line with the studies which were conducted in Ethiopia [36, 37], and Tanzania [38]. Women who made decisions for the household alone and the households that were headed by women were less likely to use contraceptive methods. This could be caused by several things, including stigma and discrimination because of their singlehood status, and a lack of support from their partner. These factors are impacted by cultural beliefs, and the social environment may also affect these women's access to and utilization of contraception [39].

According to the study's findings, women who are currently breast-feeding are less likely than non-breastfeeding women to use modern contraceptives. This was concurrent with studies which were conducted in Ethiopia [40], and in Burkina Faso and the Democratic Republic of Congo [41]. The reasons given by women for not using modern contraceptives during the postpartum period included fear of side effects, fear of spousal disapproval, fear of breast milk content changing as a result of the contraceptives, and menstrual cycle not returning or a decreased perceived risk for pregnancy [42–44]. Contrary to this finding, we hypothesize that a woman's risk of becoming pregnant rises as she transitions from exclusive breastfeeding to supplemental feeding. Because of this, more women may be utilizing modern methods of contraception to prevent unintended pregnancies.

This study showed that married women were more likely to use contraceptives than unmarried women. This finding were consistent with studies which were conducted in southern Ethiopia [24], north west Tanzania [45], and Kenya [46] and Zambia [47]. This may be explained by married adolescents receiving more social and financial support from spouses and parents, which makes contraceptives more affordable and accessible for them compared to their unmarried counterparts [48, 49]. Additionally, married women frequently engage in sexual activity that predisposes to unintended pregnancy. Therefore, they were utilizing modern contraceptives to prevent it [50]. Furthermore, societal norms and expectations related to unmarried women discourage women from engaging in sexual activity that results in low use of modern contraception.

The results of this study showed that women who had history of terminated pregnancy were more likely to utilize contraceptive relative to women who hadn't history of terminated pregnancy. This finding was concurrent with the studies that were conducted in Ethiopia [51], and Mongolian Women [52]. On the other hand, this was contradicted by the research studies carried out in Ethiopia, Nepal, and Cambodia, which showed that women weren't began post-abortion family planning as most of the women expressed fear and hesitation due to fear of side-effects, perceived low risk of conception, inconvenience to use, and sociocultural factors are common reasons for the low utilization of contraceptives acceptance in general and post abortion family planning in particular [53-55]. Additionally, women who had history of terminated pregnancy use the abstinence method as contraception [56].

Conclusions and recommendations

In this study, living in urban area, being married and having history of terminated pregnancy were found positively associated with modern contraceptive utilization. In contrast to this, being older age, being female headed household and being currently breast-feeding women were found negatively associated with modern contraceptive utilization. In addition to this, there were geographic variations in modern contraceptive utilization among Cambodian's women. Therefore, the Cambodian government with other stakeholders should greatly strengthen its efforts to enhance modern contraceptives utilization by giving particular attentions for women who were live in rural areas, current breast feeding, female headed household and for an area that had low proportion of modern contraceptives utilization (cold spot area).

Strengths and limitations of the study

The study had many strengths, for instance; the DHS has a similar design with identical variables in a different environment; the result may, therefore, be applicable to other similar locations. The study used a sufficiently large sample size at the national level to ensure its representativeness. Yet, we would like to assure our reader that a few limitations need to be taken into account. Recall bias is one of the potential drawbacks, especially for retrospective data based on past experiences. Additionally, the magnitude of the bias is often unknown, and correcting for the bias is difficult. Furthermore, this study was a cross-sectional study. It doesn't show temporal relationships between independent and dependent variables, which may affect the deterrent factors of modern contraceptives utilization.

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Author contributions

B.K. and G.M. worked on this study from start to finish, including design, data extraction, data cleaning and coding, data analysis and interpretation, and manuscript drafting and revision. G. M. then completed the final version of the manuscript.

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Data availability

Data was taken from the Cambodia Health and Demographic Survey 2021-2022 found on DHS's portal of (https://dhsprogram.com/data/dataset_admin/index.cfm).

Declarations

Ethics approval and consent to participate

Since this study was based on the analysis of secondary data. Therefore, ethical approval and agreement to participate are not relevant.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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