Cambodia Journal of Public Health

Sociodemographic Inequality in Perceived Barriers to Accessing Healthcare among Women of Reproductive Age in Cambodia: Evidence from Cambodia Demographic and Health Survey 2021-2022

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Received: July 10, 2024; revised September 10, 2024; accepted October 26, 2024

ABSTRACT

Introduction

Health equity means everyone can access quality healthcare to achieve the best health outcomes. Perceived barriers to accessing healthcare among women of reproductive age (WRA) 15-49 years had been indicated to be high in Cambodia, with 60% in 2021-2022. We aimed to identify associated sociodemographic inequality with perceived barriers to healthcare access among WRA in Cambodia.

Methods

The analysis included 19,496 women aged 15-49 extracted from the Cambodia Demographic and Health Surveys 2021-2022. Multiple logistic regression was used to assess associated factors with perceived barriers to healthcare access among WRA. Adjusted odds ratios (AORs), and 95% confidence intervals (CIs) were computed to measure the strength of this association.

Results

Overall, 60.4% of Cambodian WRA reported having at least one barrier to accessing healthcare for themselves. Young women aged 15–19 had higher odds of having perceived barriers of healthcare access with AOR = 1.17 (95% CI: 0.97-1.41), no formal education (AOR = 2.18, 95% CI: 1.69-2.80), primary education (AOR = 1.79, 95% CI: 1.45-2.20), unemployment (AOR = 1.19, 95% CI: 1.05-1.34), living in poorest households (AOR = 2.69) and poorer households (AOR = 1.82), experience visiting health facilities in the past year (AOR = 1.23, 95% CI: 1.12-1.36), living in Coastal regions (AOR = 3.99, 95% CI: 3.17-5.03), Mountain regions (AOR = 2.39, 95% CI: 1.94-2.94), and Tonle Sap regions (AOR = 2.15, 95% CI: 1.79-2.58).

Conclusion

Sociodemographic inequality was commonly a barrier to accessing healthcare services, with significantly high proportion of WRA 15-19 have no formal education, living in poorer households, and living a long geographical distance from health facilities. These findings suggest that further strengthening and redistributing healthcare services to those women for the attainment of universal health coverage and equity of health.

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Citation: Um S, Pall C, Heng S, Suong S. Sociodemographic Inequality in Perceived Barriers to Accessing Healthcare among Women of Reproductive Age in Cambodia: Evidence from Cambodia Demographic and Health Survey 2021-2022, *CJPH (2024) 05:08*

Keywords: Perceived barriers, Accessing to healthcare, Associated factors, WRA, Cambodia Demographic and Health Surveys, Cambodia

Introduction

Between 2000 and 2020, the global maternal mortality ratio (MMR) significantly declined from 339 to 223 per 100,000 live births– a reduction of one-third (34.3%) [1]. However, maternal and child health were still significant concerns and were unmet the Millennium Development Goals (MDGs) agendas for low-income countries [1, 2]. Cambodia has significantly reduced MMR from 488 to 154 per 100,000 live births between 2000 and 2021-2022, respectively [3-6]. This improvement can be attributed to the country's efforts to expand access to maternal health services. Key initiatives include enhancing antenatal care through skilled providers, promoting institutional births, and ensuring the presence of skilled birth attendants during delivery [2, 6]. Recent data from the Cambodia Demographic and Health Survey (CDHS) 2021-2022 indicated that 12% of married women and 60% of sexually active unmarried women had reported an unmet need for family planning services, which was linked to various barriers to accessibility and utilization. Approximately, 60.4% of Cambodian women reported at least one problem in accessing healthcare for themselves, followed by 51% of women have a problem getting money for treatment, 35% do not want to go alone to access healthcare, 24% have a problem getting permission to go for treatment, and 21% reported the distance to the health facility as a problem in accessing healthcare [6].

Recognizing the importance of Universal Health Coverage (UHC), the Royal Government of Cambodia (RGC) has prioritized achieving UHC by 2035 as part of the Sustainable Development Goals (SDGs). This commitment is reflected in several national strategic plans and policies, such as the National Strategic Development Plan 2019-2023, the Health Strategic Plans for 2016-2020, the National Social Protection Policy Framework, and the "Roadmap Towards UHC 2024-2035" launched in May 2024 [7-10]. By December 2023, the social health protection system covered approximately 41% of Cambodia's population [8].

Cambodia's healthcare system has two main pillars: (1) the Health Equity Fund (HEF) and (2) the National Social Security Fund (NSSF), which provides social health protection for both public and private sector employees [9]. Expanding health insurance aims to reduce financial barriers to healthcare and promote equitable access [13]. The UHC roadmap for 2024-2035 targets 80% of the total population coverage under the social health protection system in accessing essential health service coverage and reducing out-of-pocket health expenditure to at most 35% of the total health expenditure [8].

Previous studies have identified various factors hindering women's access to healthcare, including socioeconomic and demographic factors, cultural characteristics, behavioral risks, and geographical inequality created barriers to accessing healthcare [11-14]. Low education, low household income, remote location, unemployment, and limited autonomy affect women's ability to access health services [11-16]. Additionally, studies have shown that young women aged below 18 years with new experiences of giving birth have indicated the perceived barriers to assessing healthcare in developing countries [13]. For women, smoking and drinking alcohol have been associated with perceived barriers to assessing healthcare [16-18]. Similarly, women unexposed to media may also encounter such barriers to healthcare assessment [19]. Gender inequity limits women's ability to protect their health and achieve optimal health status compared to men [13, 16, 17]. While several studies have examined barriers to assessing healthcare at different sites, specific research has yet to be done to identify factors associated with perceived barriers to healthcare access among women of reproductive-aged (15-49 years) in Cambodia is limited. Our study aims to identify factors that associated with these perceived barriers and inform healthcare policymakers to improve women's healthcare through service strengthening and redistribution, ultimately achieving healthcare equity in Cambodia.

Methods

Data source

We used women's data from the most recent CDHS 2021–2022, a population-based household survey conducted every five years with nationally representative samples [6]. A two-stage stratified cluster sampling method was used to collect the samples from all provinces in Cambodia. For the first stage, 709 enumeration areas (EAs) (241 urban and 468 rural EAs) were selected. In the second stage, systematic random sampling was employed to select 30 households in each cluster or EA. In total, 19,496 women aged 15–49 who were born in the five years

preceding the survey in the complete list of selected households were interviewed face-to-face using the survey standard questionnaire, with a response rate of 98.2% [6]. Data was collected from September 15, 2021, to February 15, 2022, with information from women on several health indicators, such as maternal healthcare service utilization, maternal and child health, nutrition, reproductive health services, and perceived barriers to healthcare access [6].

Measurement variables

Outcome variable

The outcome variable used in this study was that women of reproductive age (WRA) had perceived barriers accessing to healthcare. Perceived barriers to accessing healthcare were computed from four questions related to problems with healthcare access (including getting money for treatment, not wanting to go alone, getting permission to go for treatment, and distance to the health facility) [6, 16, 17]. If interviewed women reporting at least one problem with healthcare access, they were considered to have perceived healthcare access barriers, coded as "1". Otherwise, women reported no problem with healthcare access, they were supposed to have no barriers to accessing healthcare, coded as "0".

Independent variables

Independent variables consisted of sociodemographic factors, behavioral factors, and experience using healthcare services, age group (15–19, 20–29, 30–39, 40–49 years), marital status (single, married, and ever-married), educational level (no education, primary, secondary, and higher), occupation (not working, professional/formal, non-professional/informal), health insurance coverage (yes and no), and household wealth quintile (poorest, poorer, middle, richer, and richest) [6]. Behavioral factors: consumed alcohol at least one time in the last month, smoking, and exposure to mass media. Health facility visits in the past year, contraceptive use methods (not use, traditional and modern), prior births (no birth, one birth, 2-3 births, and 4+ births), currently pregnant. Cambodia's geographical regions are Phnom Penh city, Plains, Tonle Sap, Coastal/sea, Mountains, place of residence (rural and urban), and religion (Bundist, Muslim, Christian, and others).

Statistical analysis

We accounted for CDHS sampling weight and complex survey design using the survey package in our descriptive and logistic regression analyses performed using STATA V18 (Stata Crop, 2023). Descriptive statistical analyses were carried out to estimate the prevalence of barriers to accessing healthcare, and key socio-demographic factors were described in weighted frequency and percentage. Chi-square tests were applied to assess associations between socio-demographic factors and perceived barriers to accessing healthcare. All variables associated with perceived barriers to accessing healthcare at p-value ≤ 0.10 or with a potential confounder variable, including women's age, wealth index, education, and place of residence, were included in multiple logistic regression analyses [20]. Also, multicollinearity between independent variables was checked before fitting the multiple logistic regression model. No collinearity was found. Multiple logistic regression was then used to assess independent factors associated with perceived barriers to accessing healthcare after adjusting for other potential confounding factors in the model. Variables with less than 5% p-values in the multiple logistic regression model were considered independent factors associated with perceived healthcare barriers. We also evaluated the model with the potential effect modification of statistically significant associations between age, education, occupation, wealth index, and geographical regions with perceived barriers to healthcare access in the adjusted logistic regression analysis. The results from the interaction model were then further visualized as predicted probabilities using the margins command [21].

Results

Socio-demographic characteristics and behavioral factors of the study participants

The mean age of women was approximately 31.0 years old (SD = 9.5 years), with 15.3% aged 15-19 and 28.6% aged 20-29. Over 69.2% were married or living with a partner. About 7.2% had higher education, 11.6% had no formal education, and 27.3% were unemployed. Of the total sample, 35.5% were from poor households, and 21.7% had health insurance. A majority (56.9%) of women were not utilizing contraceptives, and 11.9% were using traditional methods, 53.4% were not exposed to any media. Only 1.5% of women were smoking, 16.3% consumed alcohol last month, 26.8% had three or more children, and over half (57.7%) of women resided in urban areas **(Table 1)**.

Table 1. Socio-demographic characteristics and behavioral factors of women reproductive-aged 15–49 years in Cambodia, 2021-22 (N = 19,496, weighted count)

Variables	Frequency	Percent
Mean age (±SD) in years	31.0 (±9.5)	
15-19	2,981	15.3
20-29	5,575	28.5
30-39	6,639	34.1
40-49	4,301	22.1
Marital status		
Never in union	4,788	24.6
Married or lived with a partner	13,492	69.2
Previously married	1,216	6.2
Education		
No education	2,265	11.6
Primary education	7,554	38.7
Secondary education	8,278	42.5
Higher	1,399	7.2
Current work status		
Not working	5,320	27.3
Professional/Formal	5,925	30.4
Non-professional/Informal	8,252	42.3
Total children ever born		
No birth	5,807	29.8
1-2	8,459	43.4
3+	5,231	26.8
Wealth index		
Poorest	3,393	17.4
Poorer	3,529	18.1
Middle	3,831	19.7
Richer	4,266	21.9
Richest	4,477	23.0
Health insurance coverage		
No	15,273	78.3
Yes	4,223	21.7
Contraceptive use		
Not use	11,089	56.9
Traditional	2,327	11.9
Modern	6,080	31.2

Variables	Frequency	Percent
Visited health facility in the last 12 months		
No	12,412	63.7
Yes	7,084	36.3
Smokes cigarettes		
Non-Smoker	19,208	98.5
Smoker	288	1.5
Alcohol consumption in the last month		
No	16,323	83.7
Yes	3,173	16.3
Exposure to mass media		
None	10,408	53.4
One	6,208	31.8
Two or more	2,880	14.8
Place of residence		
Rural	8,239	42.3
Urban	11,257	57.7
Region		
Phnom Penh	3,160	16.2
Plain	6,589	33.8
Tonle Sap	5,922	30.4
Coastal	1,222	6.3
Plateau/Mountain	2,603	13.4

Notes: Survey weights are applied to obtain weighted percentages. **Phnom Penh** capital city; **Plains**: Kampong Cham, Tbong Khmum, Kandal, Prey Veng, Svay Rieng, and Takeo; **Tonle Sap**: Banteay Meanchey, Kampong Chhnang, Kampong Thom, Pursat, Siem Reap, Battambang, Pailin, and Otdar Meanchey; **Coastal/sea**: Kampot, Kep, Preah Sihanouk, and Koh Kong; **Mountains**: Kampong Speu, Kratie, Preah Vihear, Stung Treng, Mondul Kiri, and Ratanak Kiri.

Perceived barriers to healthcare access among women of reproductive age

Over 60.4% (95% CI: 59.0-61.8) of women aged 15-49 reported having at least one problem accessing healthcare. More than half (50.6%) had a problem getting money for treatment, 34.5% did not want to go alone to access healthcare, 24.4% had a problem getting permission to go for treatment, and 21.3% reported the distance to the health facility as a problem (**Table 2**).

Table 2. Prevalence of women aged 15-49 who reported they had problems accessing healthcare when they are sick **(N = 19,496, weighted count)**

Problems in Accessing Healthcare	Freq.	Percent	[95%CI]
Getting permission to go for treatment			
No problem	14,738	75.6	[74.3-76.8]
Big problem	4,758	**24.4**	**[23.2-25.7]**
Distance to the health facility			
No problem	15,350	78.7	[77.4-80.0]
Big problem	4,146	**21.3**	**[20.0-22.6]**
Not wanting to go alone			
No problem	12,779	65.5	[64.3-66.8]
Big problem	6,717	**34.5**	**[33.2-35.7]**
Getting money needed for treatment			
No problem	9,630	49.4	[48.0-50.8]
Big problem	9,866	**50.6**	**[49.2-52.0]**

Problems in Accessing Healthcare	Freq.	Percent	[95%CI]
At least one problem accessing healthcare			
No barrier	7,716	39.6	[38.2-41.0]
1+barrier	11,780	**60.4**	**[59.0-61.8]**

Notes: Survey weights are applied to obtain weighted percentages.

Factors associated with perceived barriers to healthcare access in adjusted logistic regression

According to **Table 3,** it showed that women aged 15–19 had higher odds of having perceived barriers to healthcare access 1.17 times higher than those aged 40-49 (95% CI: 0.97-1.41). Similarly, the odds of perceived barriers to healthcare access to those who had no formal education (AOR = 2.18, 95% CI: 1.69-2.80), primary (AOR = 1.79, 95% CI: 1.45-2.20), and secondary (AOR = 1.53, 95% CI: 1.26-1.85) higher compared to those who had higher education. Also, women who had non-professional or informal jobs and unemployed jobs were 1.37 and 1.19 times more likely to have perceived barriers to healthcare access than those who had professional or informal jobs (AOR = 1.37, 95% CI: 1.79 to 2.53), unemployed women (AOR = 1.19, 95% CI: 1.05-1.34). The poorest women, poorer, and middle-wealth quintiles had higher odds of perceived barriers to healthcare access higher, compared to the richest women with (AOR = 2.69, 95% CI: 2.18-3.31), poorer (AOR = 1.82, 95% CI: 1.51-2.20), and middle (AOR = 1.63, 95% CI: 1.37-1.95) respectively. For those women who had visited health facilities in the last 12 months, the odds of perceived barriers to healthcare access increased by 23% compared to those without visits (AOR = 1.23, 95% CI: 1.12-1.36). The likelihood of having perceived barriers to healthcare access among smokers increased 49% compared to non-smokers (AOR = 1.49, 95% CI: 1.05-2.09). Women residing in Coastal, Mountain, and Tonle Sap regions were more likely to have perceived barriers to healthcare access than women in Phnom Penh; Coastal regions (**Table 3**).

Table 3. Factors associated with perceived barriers to healthcare access in unadjusted and adjusted logistic regression analysis **(N=19,496)**

Variables	Perceived barriers (n=11,780)		Unadjusted (N=19,496)			Adjusted (N=19,496)		
	Freq.	Percent	OR	95%CI	P-value	AOR	95%CI	P-value
Age in years								
40-49	2,024	67.9	Ref.			Ref.		
30-39	3,261	58.5	0.83	0.73-0.93	0.002	0.92	0.80-1.04	0.188
20-29	3,823	57.6	0.86	0.76-0.97	0.018	0.97	0.84-1.12	0.685
15-19	2,671	62.1	1.29	1.13-1.48	<0.001	1.17	0.97-1.41	0.098
Marital status								
Never in union	3,017	63	Ref.			Ref.		
Married or living with a partner	7,964	59	0.85	0.77-0.94	0.002	0.79	0.65-0.97	0.025
Previously married	798	65.6	1.12	0.94-1.33	0.196	1.17	0.91-1.51	0.224
Education								
Higher	1,647	72.7	Ref.			Ref.		
Secondary education	4,825	63.9	2.27	1.92-2.69	<0.001	1.53	1.26-1.85	**<0.001**
Primary education	4,781	57.8	2.94	2.44-3.53	<0.001	1.79	1.45-2.20	**<0.001**
No education	526	37.6	4.43	3.52-5.58	<0.001	2.18	**1.69-2.80**	**<0.001**
Current work status								
Non-professional/formal	3,361	63.2	Ref.			Ref.		
Not working	2,944	49.7	1.74	1.56-1.94	<0.001	1.19	1.05-1.34	**0.007**
Non-Professional/Informal	5,475	66.3	2	1.79-2.23	<0.001	1.37	**1.23-1.53**	**<0.001**
Total children ever born								
No birth	3,616	62.3	Ref.			Ref.		
1-2	4,880	57.7	0.83	0.74-0.92	<0.001	0.86	0.71-1.04	0.113
3+	3,284	62.8	1.02	0.91-1.14	0.702	0.89	0.72-1.10	0.286
Wealth index								
Richest	2,703	79.7	Ref.			Ref.		
Richer	2,398	68	1.93	1.66-2.25	<0.001	1.47	1.25-1.73	**<0.001**

Variables	**Perceived barriers (n=11,780)**		**Unadjusted (N=19,496)**			**Adjusted (N=19,496)**		
	Freq.	Percent	OR	95%CI	P-value	AOR	95%CI	P-value
Middle	2,430	63.4	2.53	2.19-2.93	<0.001	1.63	1.37-1.95	**<0.001**
Poorer	2,429	56.9	3.1	2.65-3.62	<0.001	1.82	1.51-2.20	**<0.001**
Poorest	1,820	40.7	5.72	4.83-6.78	<0.001	2.69	**2.18-3.31**	**<0.001**
Health Insurance Coverage								
No	9,374	61.4	Ref.			Ref.		
Yes	2,406	57	0.83	0.74-0.93	0.002	0.95	0.84-1.07	0.375
Contraceptive use								
Not use	6,856	61.8	Ref.			Ref.		
Traditional	1,232	52.9	0.69	0.60-0.80	<0.001	1.03	0.86-1.24	0.715
Modern	3,692	60.7	0.95	0.87-1.05	0.341	1.06	0.93-1.19	0.387
Visited health facility in the last 12 months								
No	7,259	58.5	Ref.			Ref.		
Yes	4,521	63.8	1.25	1.14-1.37	<0.001	1.23	1.12-1.36	**<0.001**
Smokes cigarettes								
Non-Smoker	11,549	60.1	Ref.			Ref.		
Smoker	230	79.9	2.65	1.88-3.74	<0.001	1.49	1.05-2.09	0.024
Alcohol consumption in the last month								
No	10,002	61.3	Ref.			Ref.		
Yes	1,778	56	0.81	0.71-0.91	0.001	0.84	0.74-0.96	0.011
Exposure to Mass Media								
None	6,535	62.8	Ref.			Ref.		
One	3,623	58.4	0.83	0.74-0.93	0.001	1.03	0.92-1.15	0.598
Two or more	1,622	56.3	0.76	0.64-0.91	0.002	1.06	0.89-1.27	0.513
Place of residence								
Rural	4,141	50.3	Ref.			Ref.		
Urban	7,638	67.9	2.09	1.87-2.33	<0.001	1.12	0.98-1.28	0.103
Region								
Phnom Penh	1,181	37.4	Ref.			Ref.		
Plain	3,568	54.2	1.98	1.67-2.34	<0.001	1.16	0.97-1.38	0.115
Tonle Sap	4,139	69.9	3.89	3.26-4.64	<0.001	2.15	1.79-2.58	**<0.001**
Coastal	953	78	5.93	4.73-7.44	<0.001	**3.99**	**3.17-5.03**	**<0.001**
Plateau/Mountain	1,938	74.5	4.88	4.02-5.91	<0.001	**2.39**	**1.94-2.94**	**<0.001**

Notes: Survey weights are applied to obtain weighted percentages. **Phnom Penh** capital city; **Plains**: Kampong Cham, Tbong Khmum, Kandal, Prey Veng, Svay Rieng, and Takeo; **Tonle Sap**: Banteay Meanchey, Kampong Chhnang, Kampong Thom, Pursat, Siem Reap, Battambang, Pailin, and Otdar Meanchey; **Coastal/sea**: Kampot, Kep, Preah Sihanouk, and Koh Kong; **Mountains**: Kampong Speu, Kratie, Preah Vihear, Stung Treng, Mondul Kiri, and Ratanak Kiri.

Results from this interaction model indicated that the predicted probabilities of having barriers to healthcare access was higher for young women from the poorest families with no education living in coastal and mountain regions **(Fig. 1)**

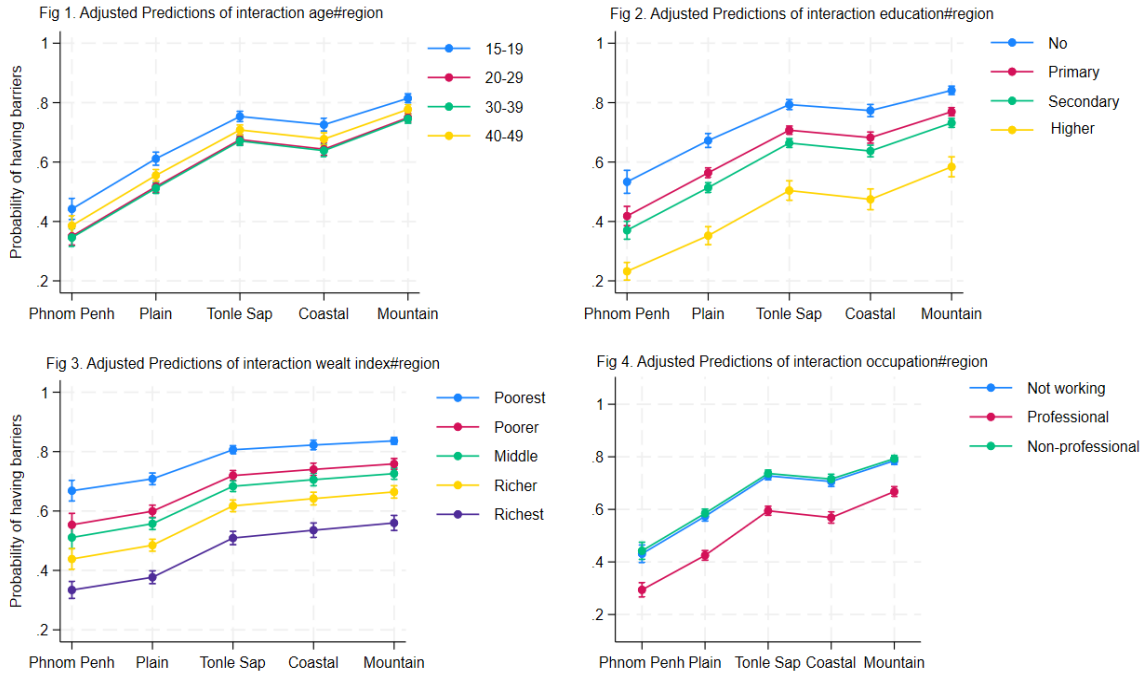

Fig 1. Predicted probability of perceived barriers to healthcare access in Cambodia by age, education, household wealth index, and occupation

Discussion

This study indicated that about 60.4% of WRA reported at least one healthcare access barriers, mainly the difficulties obtaining money for treatment do not want to go alone to access healthcare, need to getting permission to go for treatment, the distance to the health facilities. Despite these perceived barriers rates are significantly lower than previous CDHS reports (84.0% in 2005), 71.5% in 2010, and 74.5% in 2014 [3-5], it is still a concern for public healthcare system. Women in low- and middle-income countries generally remain concerned about barriers to accessing healthcare services [16].

To address these challenges, the RGC has implemented policies to address healthcare access barriers, including reducing financial barriers through HEFs, NSSF, and Community-Based Health Insurance (CBHI) [22]; expanding primary healthcare facilities and providing mobile clinics [7, 23]; and infrastructure and human resource limitations through healthcare workforce training and facility upgrades [7]. These efforts contribute to Cambodia's progress in reducing maternal and child mortality and may lower perceived barriers among women. Additionally, the country's economic growth in the last 15 years since 2009 and its policy revision to provide essential maternal and child health services free of charge also play a role [7, 24, 25].

Since the formal launch of the Cambodia NSSF in 2008 [7, 26], health insurance coverage for women has increased from 16% to 22% [6]. Due to government efforts, this expansion has been covering workers in the formal and informal sectors [27, 28] and their family members [9, 27, 28]. Furthermore, in 2024, the government officially has launched the Roadmap for UHC 2024-2035, which aims for universal access [8]. Our findings were lower than studies in Tanzania in 2018 (68%) and Ethiopia in 2016 (69.9%) that women reported having at least one barrier to accessing healthcare [16, 29].

Our study found several factors associated with increased odds of having perceived barriers to accessing healthcare among Cambodian WRA, especially young women aged 15-19 who have low economic and education, unemployed and non-professional/informal, women smokers, who have visited health facilities in the last 12 months and living in Coastal, Mountain, and Tonle Sap regions. Young women were associated with increased odds of having perceived barriers to accessing healthcare compared to older women. This is consistent with

previous studies conducted in 30 low-middle-income countries using DHS datasets, indicating that young people reported more barriers to accessing healthcare than older adults [30]. This could be explained by financial hardship and dependency affecting young women more than older women [16]. Additionally, women from poorer households and regions also experience higher barriers. Moreover, the interaction analysis (Fig 1) further supports these findings, highlighting how women's age, wealth index, education, occupation, and geographical region influence perceived barriers to healthcare access. Specifically, the increased probabilities of healthcare barriers among young women are exacerbated when they belong to poorer households and have limited education.

Unemployed and informal sector women were also more likely to report barriers. This aligns with studies in Ethiopia and Tanzania [16, 29]. Women with better economic status and education may have better access to healthcare while working women can earn household support and participate in decision-making about healthcare. Women with lower education levels also reported higher odds of perceived barriers, reflecting findings from studies in Mozambique, Ethiopia, and Tanzania [16, 29, 31]. Education may improve awareness and encourage better health-seeking behavior.

Women in remote coastal, mountain, and Tonle Sap regions face higher healthcare access barriers than those in the capital. Results from interaction analysis (Fig 1) further support these findings, highlighting how geographical regions interact to influence perceived barriers to healthcare access. Specifically, there is an increased probability of healthcare barriers among women living on the coast and mountains, similar to previous studies in Tanzania, Ghana, and South Africa [11, 16, 29]. Geographical accessibility and poverty remain significant challenges to healthcare assessment [32].

Our study used representative data to assess women's healthcare access barriers in Cambodia. The data has a high response rate, and the study's designs followed best practices, such as gathering data with experienced data collectors. The findings can be generalized to all women of reproductive ages in Cambodia. Moreover, the study employed advanced statistical models that accounted for individual factors. Despite its strengths, the study also has some limitations. First, this cross-sectional research restricted our capacity to draw underlying deductions for the cause-effect relationship, which requires a longitudinal design but could not be determined. Second, due to the limited number of variables collected by the 2021-2022 CDHS, we could not examine complete factors related to healthcare accessibility, particularly the health system and health worker-related factors, and we did not consider the women empowerment model in our analysis. Third, the characteristics of the CDHS questionnaire regarding some individual situations or status might be subjective to social desirability bias. Lastly, the study's outcome is the binary variables combination of perceived barriers to healthcare access defined by women reporting at least one problem coded as having barriers, and those reporting no barriers were coded as not having. This approach does not account for the varying severity of barriers, as those experiencing only one of the barriers (e.g., distance to a health facility) were grouped with those facing multiple or all four (e.g., distance, lack of money, lack of permission, and not wanting to go alone). Further studies should be analyzed separately in the barriers domain, particularly investigating spatial analysis using a geographic information system to address hotspot barriers.

Conclusions

A significant proportion of WRA still faced barriers to healthcare access, of which money and distance were the common ones. Sociodemographic inequality was commonly a barrier to assessing healthcare services, with a significantly high proportion among WRA age group 15-19 who have no formal education, have no financial ability, and live in a geographic long distance from health facilities. These findings suggest that further strengthening and redistribution of healthcare services is significantly essential. In addition, program planners and decision-makers shall improve the vulnerabilities of younger, poor women, reinforcing the need for targeted interventions that address both financial and young age issues. Moreover, policymakers and stakeholders shall design targeted intervention programs that take into account younger women who live in low-income families, have limited education, and reside in coastal and mountain areas with highly affected regions of Cambodia.

Ethical statement

The CDHS 2021–2022 is publicly available, with all personal identifiers of study participants removed. Permission to analyze the data was granted by registering with the CDHS program website at (URL: https://dhsprogram.com/data/available-datasets.cfm). Written informed consent was obtained from the parent/guardian of each participant under 18 before data collection. The Cambodia National Ethics Committee for Human Health Research (NECHR) approved the data collection tools and procedures for CDHS 2021-2022 for Health Research on 10 May 2021 (**Ref # 83 NECHR**), and ICF's Institutional Review Board (IRB) in Rockville, Maryland, USA.

Author Contributions

Samnang Um. and **Sovandara Heng.** Contributed to conceptualizing, searching the literature, and writing the draft manuscript. **Samnang Um** contributed to project administration, software, methodology, data analysis, data interpretation, and data visualization, and **Sopheap Suong** and **Chamroen Pall**. contributed to supervision. **Samnang Um**, **Sopheap Suong,** and **Chamroen Pall**. Writing—review and editing. All authors contributed to the final manuscript and approved the submitted version.

Funding Statement

The authors received no specific funding for this work.

Conflict of Interest

The authors declare that the research was conducted without commercial or financial relationships that could create a conflict of interest.

Acknowledgments

We thank the DHS program for giving us permission to use the CDHS 2021-2022 datasets. We thank the reviewer, Mr. **Chamnab Ngor**, Senior Research Coordinator at the School of Public Health (SPH), at the National Institute of Public Health (NIPH), for his valuable feedback and comments. We also sincerely thank Professor **Heng Sopheab**, Editor of the Cambodia Journal of Public Health, SPH at the NIPH for his insightful feedback and comments.

Data Availability Statement

The Cambodia Demographic and Health Survey (CDHS) 2021-22 datasets data are publicly available from the website at (URL:https://www.dhsprogram.com/data/available-datasets.cfm).

Abbreviations

AOR, Adjusted odds ratio; CDHS, Cambodia Demographic Health Survey; CI, Confidence intervals, EA, Enumeration areas; PPS, Probability proportional to size; WHO, World Health Organization.

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