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The Hospital Characteristics (Public and Private) Utilization by Caesarean Section Delivery in Thailand

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Abstract
Cesarean delivery (C-section) rates continue to rise worldwide, with Thailand showing a significant spike in the past two decades, surpassing WHO recommended rates. Hospital characteristics, such as ownership, financial incentives, and medical staffing patterns, can influence cesarean delivery rates. Private hospitals may be more susceptible to non-medical motivations, while public hospitals often face high patient volumes and resource constraints. This study aimed to investigate the use of cesarean delivery in relation to hospital characteristics, with a comparative focus between public and private hospitals in Thailand. This study used a cross-sectional quantitative approach with secondary data from the Thailand Multi Indicator Survey (MICS) 2022. The study sample consisted of 1,046 women who delivered by cesarean section and 1,720 women who did not, with the dependent variable being hospital utilization by caesarean section delivery. Data analysis was performed using univariate, bivariate (Chi-square test), and multivariate (binary logistic regression) tests to analyze the effect of independent variables on the choice of hospital type. The study findings were that in women undergoing cesarean section, wealth and region of residence were significantly associated with private hospital utilization, with women from the fourth wealth quintile (OR = 14.61; 95% CI: 1.88–113.85) and the richest (OR = 23.67; 95% CI: 3.03–185.09) more likely to use private hospitals than the poorest, while those living outside Bangkok were less likely. In women without cesarean section, living in rural areas (OR = 0.36; 95% CI: 0.16–0.81) and outside Bangkok also significantly decreased the odds of private hospital utilization.

Keywords: Caesarean Section, Delivery, Hospital Utilization, MICS Thailand.

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1. INTRODUCTION

The rate of cesarean section (C-section) births continues to increase worldwide, becoming a significant public health concern (Betran et al., 2021). Although cesarean sections can be lifesaving when medically indicated, their overuse poses risks to maternal and newborn health (Sandall et al., 2018). The World Health Organization recommends that cesarean section rates ideally be between 10% and 15% of all births, but many countries have reported rates well beyond this threshold (World Health Organization, 2015). This increasing trend reflects not only clinical need but also systemic factors including hospital practices, provider preferences, and socioeconomic influences (Vogel et al., 2015).

In Southeast Asia, Thailand stands out for its significant increase in the number of cesarean births over the past two decades. Data from national health surveys and hospital records show that the cesarean rate in Thailand has exceeded recommended levels, raising questions about the underlying drivers (Liabsuetrakul et al., 2019). Among the possible contributing factors are maternal demand, medical-legal issues, and hospital-level practices (Nuampa et al., 2023). The dual structure of Thailand's health care system—which includes public and private hospitals—further complicates the phenomenon (Patamasingh Na Ayudhaya et al., 2024).

Hospital characteristics, including ownership (public versus private), level of care, financial incentives, and medical staffing patterns, may influence cesarean section utilization rates (Yu et al., 2022). Private hospitals, which often operate under different financial and organizational models than public facilities, may be more susceptible to non-medical motivations for performing cesareans (Zehnati et al., 2021). In contrast, public hospitals tend to adhere more closely to national clinical guidelines but may be burdened with high patient loads and limited resources, which influence decision-making during labor and delivery (Raghunathan et al., 2024).

Understanding how hospital characteristics contribute to cesarean section rates is critical for health system improvement and evidence-based policymaking (Metwali et al., 2024). In Thailand, the Universal Health Coverage (UHC) scheme has expanded access to institutional delivery services, but it may also introduce new dynamics in how hospitals manage deliveries (Leerapan et al., 2021). Different reimbursement systems between the public and private sectors may create unintended incentives, potentially contributing to the trend of increasing cesarean deliveries (Opiyo et al., 2020).

Despite growing concerns over the rising cesarean section rates in Thailand, the existing literature has focused primarily on maternal-level determinants, such as age, parity, educational status, and antenatal care utilization (Etcheverry et al., 2024). Older maternal age and higher socioeconomic status are associated with increased odds of cesarean delivery (Rydahl et al., 2019). However, much less attention has been paid to health system factors—especially hospital-level characteristics such as type of ownership, level of care, geographic location, availability of specialized personnel, and institutional protocols (Yu et al., 2022). The need for more research on how institutional incentives, such as different reimbursement policies under the Universal Coverage Scheme (UCS), Social Security Scheme (SSS), and Civil Servant Medical Benefit Scheme (CSMBS), may influence obstetric decision-making in hospitals (Witthayapipopsakul et al., 2024). However, few studies have rigorously examined this public-private gap in the Thai context using nationally representative data or hospital-level indicators. This is a critical gap in the literature that requires further investigation, especially given its implications for maternal health equity and health system efficiency. Therefore, this study aims to investigate cesarean section utilization in relation to hospital characteristics, specifically comparing public and private hospitals in Thailand.

2. RESEARCH METHOD

This study employed a cross-sectional quantitative design using secondary data from the 2022 Thailand Multiple Indicator Cluster Survey (MICS). The survey was conducted across all regions of Thailand and is representative of the country's total population.

The MICS Thailand 2022 fieldwork was implemented over a five-month period, from June to October 2022. Interviewer training was conducted in two separate sessions: the first held from June 9 to 17, and the second from June 30 to July 8, 2022. The survey was nationally representative, encompassing all regions of the country, including Bangkok, Central, Northern, Northeastern, and Southern Thailand.

The study sample was categorised based on the type of delivery: women who had a caesarean section and those who did not. Both groups shared the same dependent variable-hospital utilization, determined by the reported place of delivery. A total of 1,046 women had caesarean deliveries, while 1,720 had non-caesarean deliveries. The analysis focused on women who gave birth in either public or private hospitals, excluding those who were delivered in other settings. The independent variables included age group, educational level, wealth index, place of residence (urban or rural), geographic region, and health insurance coverage.

The data were analyzed using univariate, bivariate, and multivariate methods. Univariate analysis presented the distribution of variables through frequencies and percentages. Bivariate analysis was conducted using the Chi-square test to examine associations between independent variables and hospital type within both groups. Multivariate analysis employed binary logistic regression to assess the effect of all independent variables on the likelihood of choosing a private hospital, with public hospital use as the reference category. Variables included in the regression model were selected based on theoretical relevance and bivariate significance ($p < 0.05$). All analyzes were performed using STATA software, with a 95% confidence interval considered statistically significant.

Ethical clearance for the original MICS survey was granted by UNICEF. Since this study used anonymized secondary data and did not involve direct contact with participants, additional ethical approval was not required.

3. RESULTS AND DISCUSSION

Table 1. The general characteristics of the study sample

Variables	Caesarean section (n = 1,046)		Non caesarean section (n = 1,720)	
	n	%	n	%
Hospital type				
Public	932	89.10	1,675	97.38
Private	114	10.90	45	2.62
Age group				
15 - 24	150	14.34	446	25.93
25 - 34	555	53.06	910	52.91
35 - 49	341	32.60	364	21.16
Education level				
Lower	105	10.04	16.8	16.80
Lower secondary	185	17.69	485	28.20
Upper secondary	246	23.52	488	28.37
Higher	510	48.76	458	26.63
Wealth index				
Poorest	152	14.53	412	23.95
Second	166	15.87	406	23.60
Middle	229	21.89	413	24.01
Fourth	250	23.90	299	17.38

Richest	249	23.80	190	11.05
Place of residence				
Urban	516	49.33	772	44.88
Rural	530	50.67	948	55.12
Region				
Bangkok	69	6.60	98	5.70
Central	146	13.96	206	11.98
North	170	16.25	266	15.47
Northeast	260	24.86	468	27.21
South	401	38.34	682	39.65
Health insurance ownership				
Yes	1,015	97.04	1,638	95.23
No	31	2.96	82	4.77

The results of this study consisted of univariate, bivariate, and multivariate analyses. Univariate analysis is presented in Table 1, which shows that the majority of women chose to give birth in public hospitals, regardless of the type of delivery. Specifically, 89.10% of women who gave birth by caesarean section and 97.38% of those who gave birth without caesarean section utilized public hospitals. In terms of age distribution, the largest proportion in both groups was found in women aged 25 to 34 years, accounting for 53.06% among caesarean section users and 52.91% among non-caesarean section users. In terms of educational attainment, the highest proportion of caesarean section users had a higher education (48.76%), while among non-caesarean section users, the largest group had completed high school education (28.37%). Regarding the wealth index, the highest proportion of women who gave birth by caesarean section belonged to the fourth wealth quintile (23.90%), while those who gave birth without caesarean section mostly came from the middle quintile (24.01%). In terms of residential location, more than half of the women lived in rural areas, accounting for 50.67% of caesarean section users and 55.12% of non-caesarean section users. Finally, based on region, the highest percentage of women in both groups came from the South, accounting for 38.34% of caesarean section users and 39.65% of non-caesarean section users. The majority of women in both groups were also found to have health insurance coverage.

Table 2. The Chi-square test result of factors associated with hospital type utilization

Variables	**Caesarean section**		**Total**	**Chi-square**	**Non caesarean section**		**Total**	**Chi-square**
	Public (%)	**Private (%)**			**Public (%)**	**Private (%)**		
Age group				10.3442**				2.4894
15 - 24	95.33	4.67	150		98.21	1.79	446	
25 - 34	89.55	10.45	555		97.36	2.64	910	
35 - 49	85.63	14.37	341		96.43	3.57	364	
Education level				33.4826***				34.9414***
Lower	97.14	2.86	105		97.92	2.08	289	
Lower secondary	95.14	4.86	185		99.18	0.82	485	
Upper secondary	92.68	7.32	246		98.77	1.23	488	
Higher	83.53	16.47	510		93.67	6.33	458	
Wealth index				91.5151***				53.5859***

Poorest	99.34	0.66	152		98.79	1.21	412	
Second	98.19	1.81	166		98.77	1.23	406	
Middle	94.76	5.24	229		99.03	0.97	413	
Fourth	85.60	14.40	250		95.99	4.01	299	
Richest	75.10	24.90	249		90.00	10.00	190	
Place of residence				15.3833***				23.0343***
Urban	85.27	14.73	516		95.34	4.66	772	
Rural	92.83	7.17	530		99.05	0.95	948	
Region				114.4499***				84.1378***
Bangkok	56.52	43.48	69		83.67	16.33	98	
Central	80.14	19.86	146		96.12	3.88	206	
North	86.47	13.53	170		96.99	3.01	266	
Northeast	93.85	6.15	260		98.50	1.50	468	
South	96.01	3.99	401		99.12	0.88	682	
Health insurance ownership				1.9368				0.3671
Yes	88.87	11.13	1.015		97.44	2.56	1.638	
No	96.77	3.23	31		96.34	3.66	82	

Note: **p-value <0.05, **p-value <0.01, ***p-value <0.001*

Table 2 presents the results of bivariate analysis using Chi-square test. The analysis revealed that several independent variables were significantly associated with hospital utilization based on hospital type. Among women who delivered by cesarean section, significant variables associated with the type of hospital used included age group, education level, wealth index, residence, and region. For women who delivered by non-cesarean section, significant variables were education level, wealth index, residence, and region. In contrast, health insurance ownership was not found to be significantly associated with private hospital utilization in both groups.

Table 3. The binary logistic regression of factors associated with hospital type utilization

Variables	**Caesarean section (n = 1,046)**				**Not caesarean section (n = 1,720)**			
	Odd ratio	**95% conf.**	**Interval**	**p-value**	**Odd ratio**	**95% conf.**	**Interval**	**p-value**
Age group								
15 - 24	ref							
25 - 34	1.32	0.54	3.24	0.543	0.92	0.37	2.26	0.853
35 - 49	1.65	0.65	4.16	0.290	1.18	0.43	3.22	0.751
Education level								
Lower	ref							
Lower secondary	0.92	0.22	3.80	0.904	0.48	0.12	1.96	0.310
Upper secondary	1.36	0.36	5.20	0.652	0.47	0.13	1.74	0.257
Higher	1.66	0.46	5.98	0.434	2.00	0.59	6.78	0.265
Wealth index								
Poorest	ref							
Second	2.29	0.23	22.85	0.480	1.11	0.29	4.16	0.882
Middle	5.90	0.73	47.57	0.095	0.59	0.14	2.45	0.468

Fourth	14.61	1.88	113.85	0.010	2.32	0.65	8.36	0.196
Richest	23.67	3.03	185.09	0.003	3.57	0.96	13.28	0.058
Place of residence								
Urban	ref							
Rural	0.81	0.50	1.32	0.405	0.36	0.16	0.81	0.014
Region								
Bangkok	ref							
Central	0.36	0.18	0.73	0.005	0.23	0.09	0.62	0.003
North	0.29	0.14	0.62	0.001	0.27	0.10	0.75	0.012
Northeast	0.14	0.07	0.31	0.000	0.12	0.04	0.35	0.000
South	0.07	0.03	0.15	0.000	0.08	0.03	0.22	0.000
Health insurance ownership								
Yes	ref							
No	0.72	0.09	6.00	0.758	1.50	0.35	6.49	0.586
cons	0.03	0.00	0.32	0.004	0.13	0.02	0.96	0.046

Note:
**p-value <0.05, **p-value <0.01, ***p-value <0.001*
Number of obs = 1,720, LR chi2(15) = 100.61, Prob > chi2 = 0.0000, Log likelihood = -158.05486, Pseudo R2 = 0.2414
Number of obs = 1,046, LR chi2(15) = 171.22, Prob > chi2 = 0.0000, Log likelihood = -274.62447, Pseudo R2 = 0.2376

Table 3 presents the results of binary logistic regression for two groups of women based on cesarean section status. Among women who underwent cesarean section, after adjusting for other independent variables, significant factors associated with private hospital utilization were wealth index and region. Compared with women in the poorest wealth quintile, those in the fourth and richest quintiles were 14.61 and 23.67 times more likely to use private hospitals, respectively. Furthermore, compared with women living in Bangkok, those living in the Central, Northern, Northeastern, and Southern regions were 64%, 71%, 86%, and 93% less likely to deliver in a private hospital, respectively. Furthermore, analysis of women who did not undergo cesarean section revealed that residence and region were significantly associated with private hospital utilization. Specifically, women living in rural areas were 64% less likely to use private hospitals compared with their urban counterparts. Similarly, compared with women living in Bangkok, those living in Central, North, Northeast, and South regions were 77%, 73%, 88%, and 92% lower odds of delivering in a private hospital, respectively. Overall, the cesarean section model explained 24.14% of the variation in private hospital utilization, while the non-cesarean section model explained 23.76%. The remaining variation may be due to other factors not included in this study.

The findings of this study indicate that most women, both those who gave birth with and without cesarean section, chose government hospitals as their place of delivery. This is consistent with previous studies which showed that public facilities are often the primary choice due to the availability of more affordable maternity services and health insurance coverage (Dalinjong et al., 2018). The choice of government hospitals may also be influenced by national programs such as the National Health Insurance (JKN) which facilitates childbirth in public facilities (Soraya et al., 2023). The highest proportion of women in the 25–34 age group corresponds to the optimal reproductive age range and is also in line with previous study which stated that this age group is the most active in terms of fertility and access to maternal health services (Tatem et al., 2014). The high level of education among cesarean users may reflect a higher awareness of the risks of childbirth and a preference for medical intervention (Long et al., 2018). The finding that the fourth and middle wealth groups are more dominant

in cesarean users and non-users respectively suggests the influence of economic status on the choice of type of delivery, which was also confirmed in a study in developing countries (McCall et al., 2021). Meanwhile, the dominance of rural residences but still with access to hospitals indicates the possibility of successful equalization of services through referral facilities. Finally, the dominance of the Southern region can be attributed to population distribution, availability of health facilities, and effective implementation of local policies in maternity services (Tangcharoensathien et al., 2018).

The results of the bivariate analysis showed that socio-demographic factors such as education level, wealth index, residence, and region were significantly associated with hospital utilization based on hospital type, both for deliveries with and without cesarean section. This finding is in line with studies which stated that women with higher education levels and economic status tend to prefer private hospitals because they are considered to have more comfortable and responsive services (Akhter et al., 2020). The influence of residence and region also reflects the existence of inequality in the distribution of health facilities and varying accessibility between regions (Yin et al., 2018). Interestingly, health insurance ownership did not show a significant relationship with private hospital utilization in both groups, which may be due to limited insurance coverage for services at private hospitals or the public's preference for government hospitals because of easier claim procedures. This finding emphasizes the importance of considering structural factors and public perceptions in policies to improve access to equitable delivery services.

The results of binary logistic regression showed that in the group of women who gave birth by caesarean section, wealth index and region of residence were significant factors in the utilization of private hospitals. The higher the level of wealth, the more likely women were to choose private hospitals, indicating that private health services are still considered a more expensive option and tend to be accessed by the upper economic groups. This supports previous findings which stated that economic capacity plays a major role in determining access to high-quality health services, including deliveries with medical interventions such as caesarean sections (Yu et al., 2019). Women from the fourth and highest wealth quintiles were 14.61 and 23.67 times more likely to use private hospitals than the poorest group, respectively, indicating significant inequality in access based on economic status (Bintabara & Mwampagatwa, 2023).

In addition, geographical region also had a significant effect on the utilization of private hospitals. Women who lived outside Bangkok, especially in the Central, Northern, Northeastern, and Southern regions, were much less likely to give birth in private hospitals. This indicates that the concentration of private hospitals is still focused in large urban areas such as Bangkok, and accessibility to private hospitals in other areas is still low. This finding is in line with literature which shows regional disparities in access to health services in developing countries (Pan et al., 2016). This regional disparity reflects the importance of strengthening infrastructure and equalizing private facilities outside large urban centers so that women across regions have equal service options.

In the group of women who gave birth without a caesarean section, the two main factors that were significantly associated with private hospital use were residence and region. Women who lived in rural areas were 64% less likely to use private hospitals than those who lived in urban areas. This can be explained by the limited number of private hospitals in rural areas and community perceptions of affordability and quality of services (Wang et al., 2017). In addition, the same pattern as the caesarean section group is seen in the data that women outside Bangkok were significantly less likely to use private hospitals, reinforcing the finding that private services are highly concentrated in the capital city.

Overall, both regression models only explained about a quarter of the variation in private hospital utilization, suggesting that there are many other factors that were not measured in this study. Factors such as individual preferences, previous experiences, service quality, family support, or even health worker recommendations may contribute to hospital selection

decisions, as proposed in health behavior theory (Gehlert & Ward, 2019). The limitations of this study were that secondary cross-sectional data limit the ability to establish causality and may omit important variables such as individual preferences, quality of care, and health worker influence, which could affect hospital choice. Despite these limitations, the findings highlight significant socio-economic and regional disparities in access to private maternity services. Policymakers should focus on reducing these inequalities by improving the distribution and affordability of private healthcare facilities outside major urban centres, particularly Bangkok, and by enhancing public hospital capacity to ensure equitable access. Therefore, further research with a qualitative approach or additional variables is needed to gain a more comprehensive understanding of the determinants of private hospital utilization in maternity services.

4. CONCLUSION

The conclusion of the analysis shows that most women give birth in public hospitals, and factors such as education level, economic status, region, and place of residence significantly influence the use of private hospitals, especially among women with cesarean sections. Wealthier women and women living in urban areas, especially in Bangkok, are more likely to use private hospitals. However, health insurance ownership was not shown to have a significant effect. Therefore, it is recommended that the government strengthen access and equity of affordable private health services outside urban areas to reduce the gap in delivery services. Ministry of Public Health Thailand need to consider for health services for those holding the private health insurances.

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