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Obstetric Service Utilization in Public Health Facilities during COVID-19 Pandemic among Cross-border Migrants in Thailand, 2019–2022

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Abstract

The COVID-19 pandemic caused changes in obstetric care for the general population in Thailand. This study aimed to determine changes in obstetric admissions among migrants and assess potential factors influencing obstetric inpatient visits during the COVID-19 pandemic. An ecological time-series cross-sectional study was conducted using nationwide data between 2019 and 2022. Descriptive statistics were used to investigate outcome variables, including incidence number for obstetric inpatient care among insured migrants and uninsured migrants, and admission rate for obstetric inpatients among insured migrants. Independent variables included the cumulative incidence number of COVID-19 cases in a particular quarter, the number of hospital beds, geographical regions and time periods. This study then used random-effects negative binomial regression to explore the relationships between the outcome and independent variables. The incidence of all outcome variables during the COVID-19 pandemic (2020–2022) was higher than in 2019. The incidence of COVID-19 cases did not show a strong effect towards the change in obstetric admissions. For every 1,000-bed increase in hospital capacity, the admission rate decreased by approximately 8% (IRR 0.92, 95% CI 0.89–0.95) when adjusted for yearly periods, and by 9% (IRR 0.91, 95% CI 0.89–0.94) when adjusted for 6-monthly interval periods. Compared to Greater Bangkok, other regions exhibited lower numbers of hospital admissions for both insured and uninsured migrants. Conversely, the admission rate among insured migrants was higher in these regions. Continuous monitoring of the utilization of obstetric services by migrants offers benefits for proper policy design to ensure universal healthcare access for all.

Keywords: migrants, obstetrics, COVID-19, Thailand, cross-sectional study

Introduction

The coronavirus disease 2019 (COVID-19) pandemic caused changes in the landscape of healthcare delivery in Thailand, including obstetric care. In some areas, patients with non-urgent health conditions might have minimized their hospital visits to avoid contact with the virus.[1] Healthcare personnel were also occupied with caring for COVID-19 patients, leading to a shortage of staff to provide care for patients with other diseases.

Obstetric care, a fundamental pillar of maternal and child health, faced challenges during the pandemic. Evidence from other countries suggested a significant reduction in access to maternal and child health interventions, including antepartum care, immunizations, and institutional deliveries. Moreover, a substantial decline in the number of emergency visits by women with obstetric and gynecologic severe conditions were reported at the beginning of the pandemic.[2–5]

Although the Thai Government has health security measures in place, pregnant migrants have faced challenges in accessing maternal health care. This has been due to lack of knowledge of existing resources, language barriers, discrimination and stigmatization, and poor living conditions.

Migrants can be categorized into two groups: documented and undocumented migrants. Documented migrants are non-Thais who are legally admitted to Thailand, whereas undocumented migrants are non-Thais who enter or remain in Thailand without legal authorization. Documented migrants are, in theory, enrolled in public insurance schemes, while undocumented migrants are not. In this context, this study used the term insured migrants as a proxy for documented migrants, and uninsured migrants for undocumented migrants.

Little was known about the state of obstetric care for insured and uninsured migrants during the COVID-19 pandemic in Thailand. This study hypothesized that the burden of COVID-19, as reflected by the incidence of confirmed cases, might have strained the healthcare system and impacted the volume and utilization of obstetric services among migrants. The findings from this study were expected to inform health policy and evaluate whether the current system effectively ensures access to quality obstetric care for migrant populations, particularly in times of public health crisis.

To promote equitable access to obstetric care for all pregnant women in Thailand, regardless of nationality, this study aimed to determine changes in obstetric admissions among migrants and assess potential factors influencing obstetric inpatient visits during the COVID-19 pandemic.

Methods

Study Design and Site

This study was an ecological time-series cross-sectional data analysis using secondary data relating to obstetric admission numbers from five regions including Greater Bangkok, North, Northeast, Central, and South. Greater Bangkok included six provinces: Bangkok, Nakhon Pathom, Nonthaburi, Pathum Thani, Samut Prakan, and Samut Sakhon.

Study Population

This study's population included migrants from Cambodia, Laos, Myanmar, and Vietnam, who are often referred to as CLMV migrants. These migrants are often employed in construction, agriculture, and fisheries sectors. The Thai government public insurance policy primarily targets CLMV migrants.[6]

Operational Definitions

This study defined the pre-COVID-19 period as the year 2019 and the COVID-19 period as 2020–2022. To handle the time variable during the COVID-19 period, this study employed two distinct approaches in its analyses: 1) managing the time variable at yearly intervals, and 2) managing it at six-monthly intervals. Then this study assessed if the results were still robust given this change.

Variable and Measurements

Outcome variables included: 1) incidence number of obstetric inpatient care among insured female migrants; 2) incidence number of obstetric inpatient care among uninsured female immigrants; and 3) admission rate of obstetric inpatients among insured migrants (number of obstetric admissions by insured inpatient migrants divided by all insured migrants in a province). Independent variables were: 1) the cumulative incidence number of COVID-19 cases in a particular quarter (per 1,000 persons); 2) the cumulative incidence number of COVID-19 cases in the previous quarter (per 1,000 persons); 3) the number of hospital beds in a province (per 1,000 beds); 4) regions; and 5) yearly or six-monthly time-periods.

Data Collection

The data were collected between August and September 2023 from 1) Health Data Centre, Office of Permanent Secretary, Ministry of Public Health (MOPH); 2) Foreign Workers Administration Office, Department of Employment, Ministry of Labor (MOL); 3) Division of Epidemiology, Department of Disease Control, MOPH; 4) Health Administration Division, Office of Permanent Secretary, MOPH; and 5) Office of the National Economic and Social Development Council, Office of the Prime Minister. All relevant data from these sources were transferred to an Excel format, checked for completeness, and then imported into Stata.

Statistical Analysis

The analysis unit of this study was provincial-quarter record. Each row of the record in the Excel format contained the number of visits and value of the relevant independent variables in each province in a particular quarter. This study applied two statistical analysis techniques. First, descriptive analysis was used to explore: 1) the number of insured migrants; 2) the number of visits made by insured migrants; and 3) the number of visits made by uninsured migrants. Second, this study used random-effects negative binomial regression to account for the over-dispersion nature of the outcome variables. Since there was no

official information on the number of existing uninsured immigrants, this study omitted the admission rate for uninsured immigrants, but focused on the admission number instead. The main findings were demonstrated in the form of incidence rate ratio (IRR) and 95% confidence interval (CI). Stata 17 (serial number: 401709350741) was used for all statistical analyses.[7] Also, RStudio 2024.9.0.375 and QGIS 3.32.0, were used to visualize the data.

Results

A total of 296,344 migrant inpatient admissions for obstetric practices occurred during 2019–2022. Migrants who were obstetric inpatients before the pandemic made 55,248 admission visits in 2019. Inpatient visits during the pandemic era fluctuated, decreasing from 82,892 in 2020 to 77,232 in 2021 and then rising to 80,972 in 2022.

Table 1 provides a regional perspective where Central and Greater Bangkok saw the largest migrant inpatient visits for obstetric care in Thailand, and the Northeast encountered the fewest visits. In Greater Bangkok, the percentage of migrant inpatient visits in obstetric units decreased from approximately 22.7% in 2019 to approximately 21% in 2020 and 2021, then increased to approximately 23.0% in 2022. The percentage of migrants in obstetric inpatient units in the Central and the South increased from 31.4% and 16.7% in 2019 to 35.0% and 17.6% in 2022, respectively. The percentage of visits in the Northeast showed a downward trend, decreasing from 12.6% in 2019 to approximately 8.0% in 2022.

In Greater Bangkok, the proportion of visits made by insured migrants decreased from 23.3% in 2019 to 20.6% in 2020 and then increased to 21.2% in 2021 and 24.2% in 2022. Similarly, the percentage of visits among uninsured migrants in Greater Bangkok declined from 22.4% in 2019 to approximately 21% in 2020 and 2021 before rising to 22.1% in 2022.

The percentage of visits of insured migrants in the North fell from 13.7% in 2019 to 12.6% in 2021, before climbing to 14.2% in 2022. Meanwhile, the proportion of visits made by uninsured migrants remained at 17–18% throughout the study.

In the South, the percentage of visits to obstetric care by insured migrants showed a gradual decline from 2019 to 2022, decreasing from 26.8% in 2019 to 22.4% in 2022. In contrast, the percentage of visits made by uninsured migrants increased from 12.6% in 2019 to 14.7% in 2022. The percentage of obstetric care visits made by insured immigrants in the Northeast rose from 8.3% in 2019 to 8.8% in 2020. After that, it decreased to 5.7% in 2022. Meanwhile, the percentage of visits made by uninsured migrants decreased from 14.2% in 2019 to 9.4% in 2022.

Table 1. Percentage of visits of migrant obstetric inpatients (all migrants, insured migrants, and uninsured migrants) by five regions in Thailand, between 2019 and 2022)

Year	Type of migrant	Quarter	%				
			GB	N	NE	C	S
2019	**All migrants**	1	21.71	16.53	13.07	31.84	16.86
		2	23.36	15.89	12.19	31.62	16.93
		3	22.62	17.08	13.06	30.98	16.26
		4	22.96	17.30	11.95	31.16	16.63
		Total	**22.67**	**16.72**	**12.56**	**31.39**	**16.66**
	Insured migrants	1	24.24	14.00	8.14	25.89	27.73
		2	23.10	13.51	8.65	27.52	27.23
		3	22.61	14.10	8.23	27.94	27.13
		4	23.31	13.20	8.25	29.71	25.53
		Total	**23.30**	**13.68**	**8.32**	**27.86**	**26.85**
	Uninsured migrants	1	20.77	17.46	14.89	34.05	12.82
		2	23.47	16.87	13.65	33.32	12.69
		3	22.62	18.24	14.93	32.15	12.06
		4	22.81	19.02	13.51	31.77	12.89
		Total	**22.41**	**17.93**	**14.24**	**32.79**	**12.62**

GB: Greater Bangkok. N: North. NE: Northeast. C: Central. S: South.

Table 1. Percentage of visits of migrant obstetric inpatients (all migrants, insured migrants, and uninsured migrants) by five regions in Thailand, between 2019 and 2022) (cont.)

Year	Type of migrant	Quarter	%				
			GB	N	NE	C	S
2020	**All migrants**	1	18.55	17.00	12.01	34.14	18.30
		2	20.88	15.84	8.21	36.75	18.32
		3	22.94	16.12	8.34	34.89	17.71
		4	21.23	15.60	9.39	35.27	18.51
		Total	**20.98**	**16.11**	**9.44**	**35.26**	**18.21**
	Insured migrants	1	18.87	13.06	10.29	30.74	27.04
		2	21.57	12.43	7.28	31.41	27.32
		3	23.44	13.27	8.57	30.33	24.38
		4	18.61	11.93	9.29	35.06	25.12
		Total	**20.60**	**12.65**	**8.85**	**31.98**	**25.92**
	Uninsured migrants	1	18.37	19.18	12.97	36.01	13.47
		2	20.50	17.75	8.73	39.74	13.28
		3	22.68	17.55	8.22	37.17	14.37
		4	22.64	17.58	9.44	35.39	14.94
		Total	**21.18**	**17.98**	**9.75**	**37.03**	**14.07**
2021	**All migrants**	1	20.85	15.81	8.25	36.99	18.09
		2	22.33	14.10	7.88	37.73	17.96
		3	20.55	15.43	9.23	35.73	19.06
		4	20.18	16.67	8.44	37.08	17.63
		Total	**21.00**	**15.54**	**8.38**	**37.00**	**18.09**
	Insured migrants	1	17.71	14.52	7.15	35.22	25.40
		2	20.51	12.37	7.26	36.19	23.66
		3	23.97	12.80	6.73	33.70	22.81
		4	22.96	11.10	7.25	33.98	24.72
		Total	**21.20**	**12.57**	**7.14**	**34.82**	**24.27**
	Uninsured migrants	1	22.67	16.56	8.89	38.02	13.85
		2	23.37	15.08	8.23	38.61	14.71
		3	18.57	16.96	10.67	36.91	16.89
		4	18.47	20.09	9.17	38.99	13.28
		Total	**20.88**	**17.28**	**9.11**	**38.28**	**14.45**
2022	**All migrants**	1	21.26	16.90	8.15	35.84	17.84
		2	22.13	17.32	7.60	35.10	17.85
		3	24.26	15.17	8.04	35.05	17.48
		4	23.82	16.80	8.13	33.96	17.30
		Total	**22.91**	**16.52**	**7.98**	**34.98**	**17.61**
	Insured migrants	1	22.57	13.52	6.19	33.26	24.45
		2	22.19	14.02	5.88	34.06	23.85
		3	26.93	12.30	5.55	34.58	20.65
		4	24.85	16.82	5.07	32.20	21.07
		Total	**24.23**	**14.18**	**5.66**	**33.51**	**22.42**
	Uninsured migrants	1	20.47	18.97	9.34	37.42	13.81
		2	22.09	19.22	8.59	35.70	14.40
		3	22.62	16.94	9.58	35.34	15.52
		4	23.17	16.78	10.04	35.07	14.93
		Total	**22.11**	**17.94**	**9.40**	**35.87**	**14.68**

GB: Greater Bangkok. N: North. NE: Northeast. C: Central. S: South.

Figure 1 and Figure 2 present the number of admissions of insured and uninsured migrants, respectively between 2019 and 2022. In 2019, the number of insured and uninsured migrants admitted in obstetric units ranged approximately between 2,000 and 3,000, which was lower than during the COVID-19 pandemic period.

The highest number of admissions of insured migrants receiving obstetric care was in Samut Sakhon—a province in Greater Bangkok—both pre-COVID-19 and during COVID-19. In contrast, in 2019, the highest number of admissions of uninsured migrants was found in Chiang Mai—a province known for tourism and industry in the North. Chonburi, which is situated in Central, and Samut Prakan, a province in Greater Bangkok, had the highest admission number of uninsured migrants in 2020–2021 and 2022, respectively.

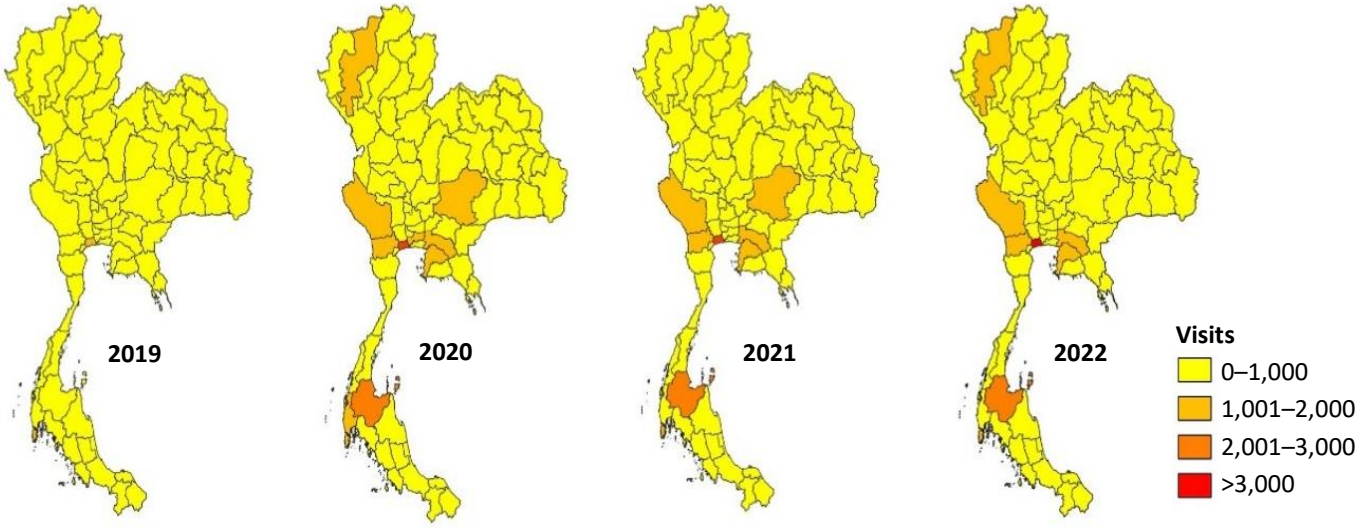

Figure 1. Number of obstetric visits made by insured migrants in Thailand, 2019–2022

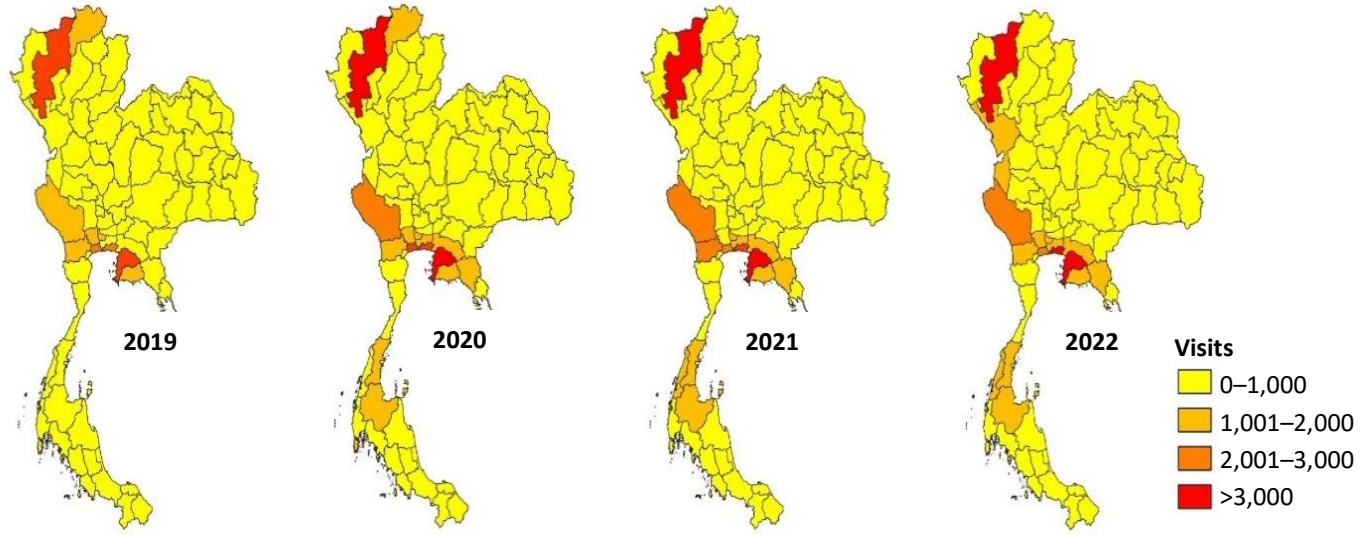

Figure 2. Number of obstetric visits made by uninsured migrants in Thailand, 2019–2022

Table 2 presents the IRR of the admission volume of insured and uninsured migrants, and the IRR of the admission rate of insured migrants at yearly intervals. In the Northeast, the number of obstetric care visits made by insured migrants was significantly lower than in Greater Bangkok (IRR 0.46, 95% CI 0.31–0.69). During the COVID-19 pandemic (2020–2022) the incidence of visits made by insured migrants was higher than before the pandemic: in 2022 IRR 1.80, 95% CI 1.66–1.95.

Regarding the number of admissions of uninsured migrants, with every 1,000-hospital-bed increase, a slight decrease in the incidence of the number of visits was observed (IRR 0.94, 95% CI 0.91–0.96). Geography-wise, the number of visits in the North and Northeast were fewer than in Greater Bangkok. In contrast, the incidence number of admissions of uninsured migrants in 2022 was approximately 24% higher than in 2019 (IRR 1.24, 95% CI 1.16–1.31).

For the obstetric admission rate of insured migrants, with every 1,000-hospital-bed increase, the admission rate decreased by approximately 8% (IRR 0.92, 95% CI 0.89–0.95). The rate in the Northeast was approximately 12.5 times the rate in Greater Bangkok (95% CI 8.79–17.89). Greater Bangkok saw the lowest admission rate compared with other regions. The rate during the COVID-19 pandemic was double the rate in the pre-COVID-19 era. For instance, the year 2022 showed an IRR of 2.17 (95% CI 2.03–2.32), considering year 2019 as a baseline. The lagged incidence of COVID-19 cases in the preceding quarter did not show a clear associational direction with the admission rate in the following quarter.

Table 2. Factors associated with obstetric admission numbers and admission rates in 2019–2022 in Thailand using time periods at yearly intervals

Predictor variables	Outcomes variables								
	Number of obstetric inpatient admissions by insured migrants			Number of obstetric inpatient admissions by uninsured migrants			Admission rate of obstetric inpatients by insured migrants		
	IRR	*P*-value	95% CI	IRR	*P*-value	95% CI	IRR	*P*-value	95% CI
Increased incidence number of COVID-19 in the present quarter (1,000 persons)	1.00	≤0.001	0.99–1.00	1.00	0.02	0.99–1.00	1.00	≤0.001	0.99–1.00
Increased incidence number of COVID-19 in the previous quarter (1,000 persons)	1.00	0.09	1.00–1.00	1.00	0.01	1.00–1.00	1.00	≤0.001	1.00–1.01
Number of hospital beds (1,000 beds)	1.02	0.09	1.00–1.05	0.94	≤0.001	0.91–0.96	0.92	≤0.001	0.89–0.95
Region (vs Greater Bangkok)									
North	0.80	0.27	0.53–1.20	0.37	≤0.001	0.25–0.55	8.47	≤0.001	5.98–12.00
Northeast	0.46	≤0.001	0.31–0.69	0.51	≤0.001	0.34–0.75	12.54	≤0.001	8.79–17.89
Central	0.95	0.80	0.64–1.41	0.75	0.17	0.50–1.13	5.11	≤0.001	3.60–7.24
South	1.44	0.11	0.93–2.23	0.67	0.06	0.44–1.02	7.95	≤0.001	5.54–11.41
Time-periods (vs 2019)									
2020	1.76	≤0.001	1.63–1.90	1.38	≤0.001	1.30–1.46	1.95	≤0.001	1.83–2.09
2021	1.66	≤0.001	1.52–1.80	1.22	≤0.001	1.15–1.30	2.05	≤0.001	1.91–2.20
2022	1.80	≤0.001	1.66–1.95	1.24	≤0.001	1.16–1.31	2.17	≤0.001	2.03–2.32

IRR: incidence rate ratio. CI: confidence interval. vs: versus.

Table 3 presents the IRR of the admission volume of insured and uninsured migrants, and the IRR of admission rate of insured migrants using time periods of a six-month interval. After replacing the semi-annual periods with an annual period, this study found that IRR for incidence number of COVID-19 in the present quarter, incidence number of COVID-19 in the previous quarter, number of hospital beds, and geographical regions, were similar to the findings in Table 2. For example, a unit increase of 1,000 hospital beds was associated with a slight decrease in the incidence of visits for insured migrants (IRR 0.91, 95% CI 0.88–0.94). Regarding regional variables, the Northeast showed a significantly lower IRR of admission number of insured migrants (IRR 0.45, 95% CI 0.30–0.67) and uninsured migrants (IRR 0.47, 95% CI 0.32–0.69) compared to the Great Bangkok. The North also showed a significantly lower IRR of admission number of uninsured migrants (IRR 0.35, 95% CI 0.23–0.52). Regarding the admission rate of insured migrants, Greater Bangkok saw the lowest admission rate compared with other regions. The IRRs of the admission numbers of insured migrants in the first and second quarters of 2019 were significantly lower than in other periods, except for the third and fourth quarters of 2019. The IRR for other independent variables remained the same as that presented in the prior analysis using annual time period.

Table 3. Factors associated with obstetric admission numbers and admission rates in 2019–2022 in Thailand using time periods at six-month intervals

Predictor variables	Outcomes variables								
	Number of obstetric inpatient admissions by insured migrants			Number of obstetric inpatient admissions by uninsured migrants			Admission rate of obstetric inpatients by insured migrants		
	IRR	*P*-value	95% CI	IRR	*P*-value	95% CI	IRR	*P*-value	95% CI
Increased incidence number of COVID-19 in the present quarter (1,000 persons)	1.00	≤0.001	0.99–1.00	1.00	0.17	1.00–1.00	1.00	0.01	0.99–1.00
Increased incidence number of COVID-19 in the previous quarter (1,000 persons)	1.00	0.04	1.00–1.00	1.00	≤0.001	1.00–1.00	1.00	≤0.001	1.00–1.01
Number of hospital beds (1,000 beds)	1.02	0.22	0.99–1.04	0.93	≤0.001	0.91–0.96	0.91	≤0.001	0.88–0.94
Region (vs Greater Bangkok)									
North	0.79	0.26	0.53–1.19	0.35	≤0.001	0.23–0.52	8.48	≤0.001	5.98–12.03
Northeast	0.45	≤0.001	0.30–0.67	0.47	≤0.001	0.32–0.69	12.59	≤0.001	8.81–17.98
Central	0.93	0.73	0.62–1.39	0.70	0.09	0.47–1.06	5.22	≤0.001	3.67–7.41
South	1.39	0.14	0.90–2.16	0.66	0.06	0.43–1.01	7.82	≤0.001	5.44–11.23
Time-periods (vs 2019 (quarters 1–2))									
2019 (quarters 3–4)	1.05	0.41	0.93–1.19	1.06	0.15	0.98–1.16	0.95	0.28	0.85–1.05
2020 (quarters 1–2)	1.72	≤0.001	1.54–1.92	1.34	≤0.001	1.24–1.46	1.77	≤0.001	1.61–1.94
2020 (quarters 3–4)	1.90	≤0.001	1.70–2.11	1.51	≤0.001	1.40–1.63	2.05	≤0.001	1.87–2.25
2021 (quarters 1–2)	1.81	≤0.001	1.62–2.02	1.31	≤0.001	1.20–1.42	2.16	≤0.001	1.97–2.37
2021 (quarters 3–4)	1.57	≤0.001	1.39–1.76	1.18	≤0.001	1.08–1.29	1.79	≤0.001	1.62–1.99
2022 (quarters 1–2)	1.77	≤0.001	1.58–1.99	1.20	≤0.001	1.10–1.31	2.08	≤0.001	1.87–2.31
2022 (quarters 3–4)	1.89	≤0.001	1.70–2.11	1.31	≤0.001	1.21–1.42	2.07	≤0.001	1.89–2.27

IRR: incidence rate ratio. CI: confidence interval. vs: versus.

Discussion

Overall, this study found that the hospital admission patterns for obstetric care for insured and uninsured migrants were not affected by COVID-19 in Thailand. This is unlike other global areas where certain types of care declined.[8,9] This study found a significant increase in the number of obstetric admissions of insured and uninsured migrants during the COVID-19 pandemic. This could reflect the resilience of Thailand's public health and social service initiatives that enabled it to accommodate obstetric care regardless of the severity of the pandemic.[10] On the other hand, it could also be due to the nature of obstetric conditions that always need urgent care.

During the COVID-19 pandemic, the Thai Government implemented prevention and control measures that affected travelling or migration, such as city lockdowns and travel bans.[11] There was also a strict travelling ban on land transport along the border. This might be a reason why the number of migrants' obstetric visits increased during the pandemic, as they could not return to their home country for obstetric care. Another possible explanation is that private care facilities might have limited obstetric services to create space for a surge in COVID-19 cases. This was in response to the classification of COVID-19 as a 'dangerous communicable disease', which allowed people to access healthcare for COVID-19 in both public and private facilities.[12]

In terms of geography, Central and Greater Bangkok saw the largest migrant inpatient visits for obstetric care in Thailand, while the Northeast encountered the fewest visits. Samut Sakhon, a province in Greater Bangkok, had the highest number of insured migrants admitted to the obstetric unit compared to other provinces nationwide. It is a major industrial area where both Thai and migrant workers are concentrated. In 2022, there were 259,567 migrant workers in Samut Sakhon, with approximately 90% (237,195) who were from Myanmar.[13] In contrast, in the South of Thailand, the percentage of visits of migrant obstetric inpatients decreased gradually between 2019 and 2022. This could be because the South was not the main area where CLMV migrants lived and worked.

Before the pandemic, the highest number of uninsured migrants was found in Chiang Mai, a tourist and industrialized city near Myanmar (approximately 130 kilometers from Muang Chiang Mai District to the closest border). However, during the pandemic, the highest admission numbers of uninsured migrants were in Chonburi and Samut Prakan. A possible reason for this is that many industries closed during the pandemic, and the number of employees who lost their jobs increased sharply.[14,15] Therefore, many migrant employees lost their health benefits and became uninsured migrants. According to a survey during the pandemic, almost one-fifth of respondents lost their jobs.[16] Although that survey collected data from Thais, inevitably, migrants were also affected by this.

Additionally, a large number of private healthcare facilities were not effectively connected to MOPH healthcare facilities, particularly super-tertiary hospitals which are health facilities ≥500-bed capacity.[10] This means it was also possible that some insured migrants in Greater Bangkok utilized services at private facilities, but whose records were not included in our data.

The number of hospital beds reflects healthcare resources. For every 1,000-bed increase in hospital capacity, the admission rate decreased by approximately 8%. This finding might be because hospital bed numbers likely reflect health resources in a province. Provinces with large cities usually have super-tertiary hospitals. During the COVID-19 period, these provinces had more availability of resources (both from public and private sectors) to accommodate the surge of COVID-19 cases. Thus, public hospital admission was not the only option for migrants, leading to a below-one IRR in the admission rate.

This study has both strengths and limitations. One of the study's strengths was the use of nationwide routine service data that spans from the pre-COVID-19 period across the entire COVID-19 period. The use of random-effects negative binomial regression, which helped account for spatiotemporal variance, was another key strength. The first limitation was the use of an ecological study design, which entailed ecological fallacy, i.e., the natural relationship explored at an individual level may not necessarily reflect the relationship at the group level to which those individuals belong. Secondly, this study lacked data on access to private healthcare facilities. This made it difficult to determine the true magnitude of hospitalization among migrants, especially in large cities where private institutions play a major role. However, as the objective of this study was to examine changes in obstetric admissions over time linked to specific variables, this limitation might not compromise the validity of this study's findings. Third, the insurance status of migrants is not always static. Theoretically, all immigrants who have applied for work permits are required to enroll with public insurance. However, there is no perfect alignment between documented status (e.g., possession of a work permit) and insurance coverage in real-world settings, and the validity date of the work permit and the insurance expiration date in practice do not always match together. Conversely, some migrants who held legitimate work permits might have let their insurance lapse. This measurement error can be viewed as a misclassification bias that potentially caused our estimates to be more conservative (moving towards the null), but at the same time, it can be also seen as a potential area for improvement for the nation's health information system.

Conclusion

The number of obstetric care visits among insured and uninsured migrants increased during the COVID-19 pandemic relative to the pre-COVID-19 era. Greater Bangkok saw the least increase of obstetric admissions of insured migrants compared with other regions. The severity of the outbreak, as reflected by the incidence of COVID-19 cases, as well as its lagged value, showed a small degree of association with obstetric admission amongst both insured and uninsured migrants. Further studies focusing on the health-seeking behavior of migrant individuals could address the limitation of ecological fallacy. Research that compares obstetric care behavior between Thai nationals and migrants would be of value. Government policies to ensure access to obstetric services in both normal and pandemic situations should be maintained.

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Author Contributions

Nisachol Cetthakrikul: Formal analysis, supervision, writing—original draft, writing—review & editing. **Boonyasit Ngamvirojcharoen:** Formal analysis and writing—original draft, **Natnicha Manaboriboon:** Formal analysis, writing—original draft. **Saruttaya Wongsuwanphon:** Conceptualization, formal analysis, writing—original draft. **Rapeepong Suphanchaimat:** Conceptualization, writing—review & editing, supervision. All authors have read and agreed to the published version of the manuscript.

Ethical Approval

This study was conducted as part of the function of the International Health Policy Program, Ministry of Public Health (MOPH), which aims to monitor the performance of the Thai healthcare system. Therefore, ethics clearance was not necessary. However, personal information in the datasets was kept anonymous. The findings were presented only for academic purposes. No personal information was disclosed.

Informed Consent

Not applicable.

Data Availability

Not applicable.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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Declaration of Generative AI and AI-assisted Technologies in the Writing Process

None was used.

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