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Access to healthcare services and factors associated with unmet needs among migrants in Phuket Province, Thailand, 2023: a cross-sectional mixed-method study

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Abstract

Background Phuket Province is a major tourist destination with a migrant workforce accounting for 10% of its population. Despite governmental efforts to adjust health insurance policies, migrants face healthcare access challenges. This study examines the current healthcare access situation and factors associated with unmet needs among migrants in Phuket Province.

Methods We used a cross-sectional mixed-methods approach, recruiting participants through snowball sampling from the Migrant Health Volunteer Network. Quantitative data were gathered using self-administered questionnaires, with unmet need defined as desired outpatient or recommended inpatient services not received at government hospitals. Multivariable logistic regression identified unmet need predictors, and we assessed the mediating effect of health insurance status. Qualitative data from three focus groups on healthcare access provided context and enriched the quantitative findings.

Results This study includes 296 migrants mainly from Myanmar. The overall unmet need prevalence was 14.86%, mainly attributed to having undocumented status (34.09%), affordability issues (20.45%), and language barriers (18.18%). Working in the fishery industry significantly increased unmet needs risk (aOR 2.68, 95% CI 1.08–6.62). Undocumented status contributed a marginal total effect of 4.86 (95% CI 1.62–14.54), with a natural indirect effect through uninsured status of only 1.16 (95% CI 0.88–1.52). Focus group participants used various medical resources, with insured individuals preferring hospital care, but faced obstacles due to undocumented status and language barriers.

Conclusion Valid legal documents, including work permits and visas, are crucial for healthcare access. Attention to fishery industry practices is needed. We recommend stakeholder discussions to streamline the process of obtaining and maintaining these documents for migrant workers. These improvements could enhance health insurance

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acquisition and ultimately improve healthcare affordability for this population. These insights could be applied to migrant workers in other urban and suburban area of Thailand regarding access to government healthcare facilities.

Keywords Healthcare access, Unmet need, Migrants, Thailand

Introduction

Healthcare access is a core healthcare system function with numerous concepts [1–3]. Levesque et al. conceptualized the interpretations from previous literature and described it as the possibility to identify healthcare needs, seek services, reach the resources, and obtain and be offered services appropriate to an individual's needs. To achieve this, a person needs five dimensions of abilities to access service, that is, 1.) the ability to perceive need, 2.) the ability to seek, 3.) the ability to reach, 4.) the ability to pay, and 5.) the ability to engage [4]. Disruption in one of these abilities may lead to an 'unmet need for healthcare,' an indicator used in the European Union Statistics on Income and Living Conditions survey (EU-SILC), in which people were asked if they felt they needed medical care but did not receive it in the past year and if so, what the reasons were [5]. Similar questions with varied needs and situations could be used to track service of interest and identify impediments [6].

Recent economic globalization has raised the demand for unskilled migrant laborers worldwide. International migrants comprised about 3.6% (281 million) of the global population in 2020 [7]. International organizations, such as the World Health Organization (WHO), the International Organization for Migration (IOM), and the International Labour Organization (ILO) defend these vulnerable people's human rights through legislation and agreements [8–11]. Despite these efforts, migrants face discrimination and health disparities, especially in accessing healthcare services [12].

The health of migrants is influenced by various factors, including their experiences and healthcare access in their country of origin, the migration process, the policies of the host nation, and living and working conditions. Additional factors that could restrict individuals' access to healthcare in the host country include but are not limited to, legal immigration status (i.e., an individual's status with regards to permission to live and work in the country), social and cultural disparities, differences in knowledge and beliefs, difficulty in identifying accessible healthcare options, a preference to postpone seeking care until returning to their home country, or constraints imposed by fixed working schedules [8, 13–15]. Migrants were already at higher risk for specific infectious diseases [16], and without access to adequate treatment, a transmissible period may be prolonged. In certain instances, challenges to the continuation of treatment and provision of long-term care might give rise to drug-resistant infection of tuberculosis, human immunodeficiency virus (HIV), or malaria [14]. Hence, it is important for migrants to be able to avail themselves of healthcare services to maintain their own well-being and safeguard the health of host communities.

In 2020, migrants constituted around 5% of the total population of Thailand [7]. Migrants contribute to a significant part of the country's economic progress, which has resulted in greater employment demand [17, 18]. This, along with relatively higher income prospects compared to their home countries, continues to draw immigrants from the surrounding nations [19]. Phuket Province, a popular tourist destination, is situated on the southern-west coast of Thailand in the Andaman Sea. This province has a context with unique demographic and economic characteristics including its reliance on tourism and specific migrant population composition. According to the Phuket Provincial Employment Office, there were 69,625 registered migrant workers in March 2023, which accounted for 10.2% (69,625/681,250) of the entire population. Myanmar migrant workers were the predominant nationality (85.61%, 59,604/69,625) [20].

To achieve universal health coverage, the Thai government implemented two health insurance initiatives available for migrants who are legally permitted to work: the Health Insurance Card Scheme (HICS) and the Social Security Scheme (SSS). To obtain or renew a health insurance card, migrants must present a visa and work permit, which are issued by different authorities and have different expiration dates. Previous studies indicate persistent disparities in healthcare access from factors such as immigration status, communication, and employer compliance [21, 22]. While public health insurance has become more widely available [23, 24], there is limited evidence of healthcare access abilities focused on migrants in tourist area.

This study seeks to fill that gap by exploring healthcare access among migrants in Phuket Province, providing insights into the specific challenges they face and offering a foundation for more targeted public health interventions. While the specific results may not be directly applicable to other regions, the study's methodology provides a valuable structure for examining similar issues. By employing a cross-sectional mixed-methods approach and using a patient-centered access to healthcare framework, this research offers a comprehensive analysis that can guide future studies in different contexts. The study objectives are to describe the current healthcare services access situation and identify the factors associated with unmet needs among migrants in Phuket Province.

Methods

Setting

Phuket Province comprises of Mueang, Talang, and Kathu Districts. The government healthcare infrastructure encompasses a provincial hospital in Mueang District, complemented by three district hospitals - one serving each district and twenty sub-district hospitals [see Additional file 1].

The study is part of the initiative "Migrant Health Volunteer Network (MHVN) on Disease Surveillance, Prevention, and Control of COVID-19 situation in the Southern Area Community, a pilot in Phuket Province", conducted by the Thai Ministry of Public Health Institute of Preventive Medicine and the United States Centers for Disease Control & Prevention, during March-July 2023. The initiative aims to strengthen the MHVN established in 2022 and to recruit more migrants to be part of this working group that mediates between the Thai public health sectors and migrant communities. This MHVN activity included training sessions on essential knowledge of respiratory tract infection, common sexually transmitted diseases, occupational injury, gastrointestinal diseases, and public health insurance utilization. Additionally, the onsite training participants were asked to participate in a questionnaire session on healthcare access, personal COVID-19 vaccination history, and immunization history of children in their families. Upon conclusion of the activities, participants were compensated for their time with 200 Thai Baht (USD 5.4), training completion certificates, instructional materials, condoms, face masks, and a lunchbox.

Evaluation design, study period, and participants

We performed a cross-sectional mixed-method survey in Phuket Province, Thailand during March-July 2023. Convenience and snowball sampling methods were used. World Vision, a leading non-government organization working with migrants in Phuket Province, informed key representatives of migrant communities in each district about MHVN recruitment. The inclusion criteria for the migrant health volunteers (MHV) were Cambodia, Laos PDR, Myanmar, and Vietnam (CLMV) migrants aged at least 18 years old and residing in Phuket Province for more than 3 months. There were no quota limits for the number of participants.

Qualitative study

We conducted three focus group interviews consisting of six male migrants, seven female migrants, and five volunteers from World Vision at the MHVN forum on March 5, 2023. We conveniently invited participants who were waiting for their training session to join the discussion group. The guided questions were developed based on Levesque et al.'s patient-centered access to healthcare conceptualized framework [4]. We explored five people's abilities to access healthcare which included the ability to perceive need (health beliefs, trust, and expectations), to seek (personal, social values, and culture), to reach (mobility and social support), to pay (barriers to obtaining and utilizing health insurance at the hospital), and to engage (adherence to treatment). We asked them to describe and discuss the current practice among themselves and stopped when no new theme was identified. Each round took approximately 30 min and there was no voice recording. We observed the participants discussed in Burmese and took notes from the translators. Data were analyzed by deductive coding with each theme following each component of the framework. The findings provided context and depth to the quantitative results, highlighting context, barriers and experiences, thereby informing our interpretation of the data.

Quantitative study

Questionnaire and data collection

The questionnaire was developed using the approach of the person's abilities to access healthcare according to Levesque et al.'s conceptualized framework [4]. Then, it was adjusted regarding the Thai Health Welfare Survey, findings from previous studies on healthcare access, and the experts' opinions. The questionnaire draft was reviewed by three senior public health experts before being modified and translated into English and Burmese, then by native speakers who worked in the public health field after the translation. We pretested the questionnaire among 22 MHVs, general migrants, and translators before the final revision. All translators attended the questionnaire training session before the activity. All participants provided written consent before the participation. The questionnaires were paper-based, with questions written in Burmese, English, and Thai language [see Additional file 2]. Every question contained the choice of 'Prefer not to answer'. The MHVN participants filled out the questionnaire by themselves while the main translators explained the questions one by one for the participants to follow through. Additional translators were on standby to provide ad hoc explanations. For responses written in the native languages, we consulted the translators for immediate interpretation and wrote notations next to the phrases.

Sample size

To identify the unmet need, we used a formula for prevalence estimation with a finite population [25, 26]. Given population (N) = 60,000, error (d) = 0.05, alpha = 0.05, and the proportion of unmet needs from previous studies being 0.16–0.32 [27, 28]. The sample sizes were 206–333 and 258–417 when accounted for 20% of participant refusals and non-response.

There were 524 MHVN participants, of which 140 (47.3%) joined the activity last year. We excluded 100 people who reported no desired health service in the past year and 128 who only reported the desire for required medical check-ups for work permission purposes. Finally, 296 people remained for this study.

Determinants

The demographic characteristics included sex, age, nationality, marital status, education, and chronic medical conditions. The migration related characteristics included whether the respondent held a work permit (a legal document issued by the Ministry of Labor that allows migrants to work in the country legitimately), a visa (a legal document issued by the Ministry of Foreign Affairs that allows migrants to stay in the country for a specified period), being undocumented (not currently owning a valid work permit and/or visa), district of residence in Phuket Province, number of people sharing the living space, years of stay, reasons for staying, employment status, occupation group, household monthly income, and remittance. The insurance-related variables included whether the respondent currently owned insurance, insurance type, whether people assisted in obtaining the insurance, source of information about insurance, knowledge, and attitude toward insurance utilization. The knowledge was assessed by ten true-or-false questions on the basic conditions and common misunderstandings. Each correct answer received one point. We interpreted adequate knowledge at ≥5 points and less as poor. For the perception, we assessed ten agree-or-disagree statements on the acquisition and utilization of public health insurance. We interpreted positive attitude at ≥5 points and less as negative. Variables exploring seeking and reaching behaviors included sources of treatment, sources of health information, the most influential person on hospital visits, the median time of traveling to the hospital, being able to visit the hospital by oneself, and persons assisting in visiting the hospital.

Reported unmet need was our primary outcome. In this study, we defined it as desired outpatient (subjective) or recommended inpatient (objective) services at the government hospital that a person did not receive in the past year. For the outpatient services, the participants were asked whether they had the desire to visit the government hospital, for what purpose, and whether they received the complete services. For inpatient services, participants were asked whether a doctor had informed them of the need for hospitalization and whether they were subsequently admitted to the government hospital. To account for cases where individuals were referred and evaluated by a new doctor, we asked whether they were discharged immediately as an outpatient. Notably, no participants selected this option, indicating that differing medical evaluations unlikely affected the admission in this study. The persons who did not receive outpatient services as desired or were not admitted as suggested were deemed as having unmet needs. Common reasons for unmet needs were also described.

Data analysis

All paper-based questionnaires of the MHVN project were input manually into Redcap. Access to the data was password-protected within the server's firewall. The raw data for this study was separately exported as a comma-separated value (.csv) file and was analyzed by STATA 16.0.

We used the Chi-square (X^2) test to compare categorical variables between migrants with and without unmet needs. For continuous variables, we used the Mann-Whitney U test to compare the median value between the two groups. The 'Prefer not to answer' choice was treated as missing data.

We conducted logistic regression to examine the associations between the unmet need and potential risk factors including characteristics (sex, age group, marital status, education, years of stay, employment status, occupation group, and legal status), health insurance-related variables (coverage status, knowledge of public health insurance, and source of health insurance information in the past year) and being able to travel to hospital by oneself. The variables with a p-value of less than 0.05 and health insurance coverage status were adjusted in multivariable analysis. We reported crude odds ratio (OR) and adjusted OR (aOR) with a 95% Confidence Interval (CI). A p-value of less than 0.05 was considered statistically significant. To assess the robustness of our analysis that might be affected by potential misinformation from the respondents, we treated those who reported 'prefer not to answer' in sensitive questions including employment status as unemployed, and those on work permit and visa status as undocumented. We then reanalyzed the data with univariable and multiple logistic regression.

From the previous literature and the descriptive study [22], we suspected that not owning valid legal residency and work documents including a work permit and a visa, or 'being undocumented', was a notable barrier to social security. This could ultimately hinder healthcare access despite having health insurance. Therefore, we performed the mediation analysis [29] to evaluate the impact of not having insurance or 'being uninsured' as a mediator between 'being undocumented' (exposure) and 'having unmet needs' (outcome). We used STATA's package, 'paramed' [30, 31], which conducted causal mediation analysis by employing parametric regression models. We reported estimated aOR in terms of marginal total effect (MTE), natural direct effect (NDE), and natural indirect effect (NIE) with a 95% CI. The MTE was interpreted as

the total effect of being undocumented to having unmet needs when accounted for the impact of being uninsured. The NIE was interpreted as the impact of being undocumented on unmet needs that was mediated specifically through being uninsured while the NDE served as the effect of being undocumented not mediated through uninsured status.

Results will be presented as follows: (1) Participants' characteristics; (2) Current situation on access to healthcare services by five abilities, integrating qualitative and quantitative data; (3) Unmet needs identified from quantitative data; (4) Analysis of factors associated with unmet needs.

Results

Demographic and migration related characteristics

From 296 questionnaires processed, the participants were almost equally distributed across both sexes, with a median age of 35 (P25-P75 = 27–42) years. Nearly all participants were of Myanmar origin. Approximately two-thirds were married. The majority had less than a high school education, while 8.45% had never attended school. Approximately 27.03% had chronic medical conditions, and the top four diseases were hypertension, diabetes mellitus, dyslipidemia, and heart disease (Table 1).

The majority held valid work permits (89.19%) and visas (92.91%). Those who lacked both or had only one (being undocumented) accounted for 7.77%, while 5.07% chose 'Prefer not to answer'. Most participants (81.08%) lived in Talang District of Phuket Province. Approximately half of them shared a living space with more than three individuals. The median length of stay in Thailand was 8 years (5–12). Most participants were currently employed, with the top three occupations being construction (29.05%), fishing (26.01%), and housework (9.12%). Additionally, 15.20% of participants reported being unemployed or selected 'Prefer not to answer'. Most (91.89%) received a monthly income of less than 15,000 baht, still, almost half of them (46.96%) could send remittances back to their home country (Table 2).

Table 1 Demographic characteristics of the participants

Variables	Total (*n* = 296), *n* (%)	Migrants with unmet need (*n* = 44), *n* (%)	Migrants without unmet need (*n* = 252), *n* (%)	*p*-value
Sex				0.213
Male	154 (52.03)	18 (40.91)	136 (53.97)	
Female	140 (47.30)	26 (59.09)	114 (45.24)	
Prefer not to answer	2 (0.68)	0 (0)	2 (0.79)	
Median age in years (P25-P75)	35.00 (27.00–42.00)	38.50 (27.50–42.50)	35.00 (27.00–42.00)	0.119
Age group in years				0.167
18–29	93 (31.42)	12 (27.27)	81 (32.14)	
30–39	103 (34.80)	12 (27.27)	91 (36.11)	
40–49	71 (23.99)	12 (27.27)	59 (23.41)	
≥ 50	29 (9.80)	8 (18.18)	21 (8.33)	
Prefer not to answer	0 (0)	0 (0)	0 (0)	
Nationality				0.909
Myanmar	289 (97.64)	43 (97.73)	246 (97.62)	
Others	6 (2.03)	1 (2.27)	5 (1.98)	
Prefer not to answer	1 (0.34)	0 (0)	1 (0.4)	
Marital status				0.743
Single/divorced/widow	95 (32.09)	15 (34.09)	80 (31.75)	
Married	198 (66.89)	29 (65.91)	169 (67.06)	
Prefer not to answer	3 (1.01)	0 (0)	3 (1.19)	
Education				0.823
No school	25 (8.45)	4 (9.09)	21 (8.33)	
Primary school	114 (38.51)	17 (38.64)	97 (38.49)	
Secondary school	112 (37.84)	14 (31.82)	98 (38.89)	
High school or above	39 (13.18)	8 (18.18)	31 (12.30)	
Prefer not to answer	6 (2.03)	1 (2.27)	5 (1.98)	
Chronic medical condition				0.212
Yes	80 (27.03)	16 (36.36)	64 (25.40)	
No	210 (70.95)	28 (63.64)	182 (72.22)	
Prefer not to answer	6 (2.03)	0 (0)	6 (2.38)	

Table 2 Migration related characteristics of the participants

Variables	Total (*n*=296), n (%)	Migrants with unmet need (*n*=44), n (%)	Migrants without unmet need (*n*=252), n (%)	*p*-value
Work permit status				0.012
Valid	264 (89.19)	34 (77.27)	230 (91.27)	
Expired	10 (3.38)	3 (6.82)	7 (2.78)	
No work permit	8 (2.70)	4 (9.09)	4 (1.59)	
Prefer not to answer	14 (4.73)	3 (6.82)	11 (4.37)	
Visa status				0.394
Valid	275 (92.91)	39 (88.64)	236 (93.65)	
Expired	9 (3.04)	2 (4.55)	7 (2.78)	
No visa	5 (1.69)	2 (4.55)	3 (1.19)	
Prefer not to answer	7 (2.36)	1 (2.27)	6 (2.38)	
Being undocumented				0.020
Yes	23 (7.77)	8 (18.18)	15 (5.95)	
No	258 (87.16)	34 (77.27)	224 (88.89)	
Prefer not to answer	15 (5.07)	2 (4.55)	13 (5.16)	
District of address in Phuket Province				<0.001
Mueang	20 (6.76)	9 (20.45)	11 (4.37)	
Talang	240 (81.08)	25 (56.82)	215 (85.32)	
Kathu	36 (12.16)	10 (22.73)	26 (10.32)	
Prefer not to answer	0 (0)	0 (0)	0 (0)	
Number of members who shared the living space				0.059
1-2	135 (45.61)	13 (29.55)	122 (48.41)	
≥ 3	147 (49.66)	29 (65.91)	118 (46.83)	
Prefer not to answer	14 (4.73)	2 (4.55)	12 (4.76)	
Median years of stay (P25-P75)	8.00 (5.00-12.00)	10.00 (8.00-15.00)	7.00 (4.00-11.00)	0.003
Years of stay				0.001
≤ 2	38 (12.84)	6 (13.64)	32 (12.70)	
2-9	129 (43.58)	7 (15.91)	122 (48.41)	
10-19	100 (33.78)	24 (54.55)	76 (30.16)	
≥ 20	29 (9.80)	7 (15.91)	22 (8.73)	
Prefer not to answer	0 (0)	0 (0)	0 (0)	
Reasons for staying				0.220
Employment	260 (87.84)	36 (81.82)	224 (88.89)	
Family/political/other	33 (11.15)	8 (18.18)	25 (9.92)	
Prefer not to answer	3 (1.01)	0 (0)	3 (1.19)	
Employment status				0.293
Full-time job	204 (68.92)	25 (56.82)	179 (71.03)	
Part-time-job	47 (15.88)	9 (20.45)	38 (15.08)	
Unemployed	40 (13.51)	9 (20.45)	31 (12.30)	
Prefer not to answer	5 (1.69)	1 (2.27)	4 (1.59)	
Occupation group				0.007
Construction	86 (29.05)	5 (11.36)	81 (32.14)	
Fishery	77 (26.01)	20 (45.45)	57 (22.62)	
Houseworker	27 (9.12)	4 (9.09)	23 (9.13)	
Restaurant	19 (6.42)	2 (4.55)	17 (6.75)	
Hotel/tourism	13 (4.39)	2 (4.55)	11 (4.37)	
Others	27 (9.12)	1 (2.94)	26 (10.32)	
Unemployed or Prefer not to answer	47 (15.88)	10 (22.73)	37 (14.68)	
Household monthly income				0.004
≤ 15,000	272 (91.89)	35 (79.55)	237 (94.05)	
> 15,000	17 (5.74)	7 (15.91)	10 (3.97)	
Prefer not to answer	7 (2.36)	2 (4.55)	5 (1.98)	
Remittance to the host countries				0.091

Table 2 (continued)

Variables	Total (*n*=296), n (%)	Migrants with unmet need (*n*=44), n (%)	Migrants without unmet need (*n*=252), n (%)	*p*-value
Yes	139 (46.96)	14 (31.82)	125 (49.60)	
No	66 (22.30)	13 (29.55)	53 (21.03)	
Prefer not to answer	91 (30.74)	17 (38.64)	74 (29.37)	

Current situation on access to healthcare services

Ability to perceive need

Participants described illness as an abnormal physical condition. Medicine should be taken when sick and modern medicine works well. They relatively trusted Thai government hospitals and preferred the provincial hospital as it had more resources for serious illnesses. Furthermore, participants mentioned that word of mouth played an important role in trust and expectation.

> *"Nowadays, everybody knows that sickness must be treated. It's not a karma or a mysterious phenomenon." – Female migrant volunteer 1.*
> *"When I was sick, I visited many places, but the condition only improved after I got treated at the provincial hospital. I would go to this hospital again if needed." – Male migrant 2.*
> *"People have been saying that the provincial hospital is the best. Even those who did not have insurance preferred the provincial hospital, but they would go for serious illness only since it was expensive." – Female migrant volunteer 4.*

Ability to seek

Participants considered timely treatment and hospital visits essential for addressing medical needs. Migrants primarily sought treatment from private clinics (44.26%), drugstores (40.88%), the provincial hospital (22.97%), and herbal use (17.57%). The main sources of health information and influences on hospital visits were friends, family members, and employers [see Additional file 3: Table 1]. Friends and employers often assisted in finding treatment or visiting the hospital. However, some women needed to seek permission from male family members before accessing healthcare.

> *"I know which herb to use for what illness, its benefits, and how to take it." – Male migrant 3.*
> *"I choose a drug with Burmese language first because I used to take it back home, and I can read about how to take it and what it can do." – Female migrant 1.*
> *"If I wanted to go to the hospital and my husband did not approve, I sneaked out during the day when he went to work." – Female migrant 4.*

Ability to reach

Those who are documented did not feel threatened when living in Thai communities. They felt comfortable living among the locals, though some who held illegal status were afraid to visit the hospital. The median duration of traveling time to the hospital was 30 minutes (20–50). Most (79.51%) were able to visit the hospital by themselves. If they need to travel the distance, most could use friends' or employer's vehicle. Friends and employers could give them health information and take them to the hospital. Most participants reported receiving assistance for hospital visits from friends/family members (63.79%) and employers (24.14%) [see Additional file 3: Table 1].

> *"We feel comfortable in the Thai community as we are both Buddhists. We joined ceremonies at the Thai temple and make merits regularly." – Female migrant 3.*
> *"Since I am currently illegal, I am afraid to go into the city or go to the hospital. I might meet the police." – Male migrant 3.*

Ability to pay

Approximately 80.41% own health insurance, the predominant scheme is the HICS (77.02%), followed by the SSS (19.57%), and others such as private insurance scheme (3.40%). The people who assisted in acquiring health insurance were mainly employers (57.87%) and brokers (36.17%). Most health service information was acquired mainly through television (68.92%), Facebook (57.43%), Line chatting application (31.76%), employers or team leaders (27.20%), and migrant health volunteers (26.69%). Participants had adequate knowledge and a positive attitude toward public health insurance. For knowledge, it was reflected by the median score of 7 (5-8.5) out of 10, and over 60% of the participants knew the essential conditions of health insurance. The lesser-known facts included the mandatory minimum medical service fee (49.32%) and the right to use dental services (37.50%) [see Additional file 3: Tables 2-4]. Participants agreed both the HICS and SSS were worth the fee. The barriers to owning insurance included having undocumented status, being unemployed, and employer non-compliance.

"There was a price for being and staying legally documented and owning an insurance scheme. If one was not fully legal, he could not apply for the insurance. If one was unemployed and did not have enough money, he could not renew it. If needed, they would borrow money from friends or pay the hospital's debt back later." – Female migrant volunteer 1.
"The SSS eligibility relies on the employer's compliance to apply and regularity to pay the fee for us. Not all employers are helping. In that case, we had to find a way to buy insurance at the hospital ourselves." – Male migrant 5.

Despite owning insurance, some did not want to visit the hospital due to the language barrier, lack of company, and long waiting times. Many chose to visit the clinic that was well-known among Myanmar migrants as that place always had stand-by translators, was friendly, treated the illness well, still opened after working hours, and had less waiting time, so they did not need to stop working. However, the price is high even though they offer various rates for the treatment. In the end, the provincial hospital was preferred in terms of lower prices (if one owned insurance) and more resources.

"The government hospital is great, but we have to leave work to spend all day there, and some may even have to pay for a company to help them translate and take them through the process in the hospital. It was charged by hours and very expensive." – Female migrant 2.

Ability to engage

Participants shared that they would like to revisit for the follow-up as the doctor ordered. They believed they could continue the appointment for a long follow-up period if there was an appointment document to show to the employer and that their conditions were getting better.

"I want to revisit for the full course of treatment as long as my employer allows me to leave work and the treatment works well."- Male migrant 4.

Unmet needs

The reported needs for outpatient services included visiting for new illnesses (57.09%), emergency condition (20.95%), dental care (11.49%), obstetric care (8.78%), and follow-up for known chronic medical conditions (7.77%) (Table 3). Approximately 14.86% (44/296) reported an unmet need for at least one of the services and 75.00% (33/44) of them were insured. Of 44 participants who reported unmet need, about one-third reasoned undocumented status as the key factor. Other factors include affordability issues, language barrier, and being uncertain about where to seek care. As for the need for inpatient care, approximately 39.53% (117/296) of the participants reported having an illness where doctors suggested hospitalization. About 9.40% (11/117) were not admitted as recommended, the reasons included illegal status (2), inability to travel to the hospital with inpatient service (2), and unaffordability (1).

Analysis of factors associated with unmet needs

Analytic study

In the univariate analysis, participants who had resided in Phuket Province for 2–9 years (OR 0.31, 95% CI 0.10–0.97) were less likely to report unmet needs, compared with those who stayed ≤ 2 years. While unmet needs among unemployed participants did not show a

Table 3 Reported need for OPD and IPD services of the participants

Variables	Total (*n*=296), n (%)	Migrants with unmet need (*n*=44), n (%)	Migrants without unmet need (*n*=252), n (%)	*p*-value
Type of OPD services needed (multiple choices)				
Visit for a new illness	169 (57.09)	26 (59.09)	143 (56.75)	0.772
Emergency condition	62 (20.95)	7 (15.91)	55 (21.83)	0.374
Dental care	34 (11.49)	3 (6.82)	31 (12.30)	0.293
Obstetrics	26 (8.78)	2 (4.55)	24 (9.52)	0.282
Follow-up for chronic medical conditions	23 (7.77)	3 (6.82)	20 (7.94)	0.798
Other	11 (3.72)	5 (11.36)	6 (2.38)	0.004
Need for IPD services				0.383
Yes	117 (39.53)	20 (45.45)	97 (38.49)	
No	179 (60.47)	24 (54.55)	155 (61.51)	
Being admitted as recommended (*n*=117)				<0.001
Yes	106 (90.60)	9 (45.00)	97 (100)	
No	11 (9.4)	11 (55.00)	0 (0)	

Table 4 Univariable and multivariable analysis to identify factor-associated with unmet needs

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
Sex (*n*=294)		
Male	Ref.	
Female	1.72 (0.90-3.30)	
Age group (*n*=296)		
18-29	Ref.	
30-39	0.89 (0.38-2.09)	
40-49	1.37 (0.58-3.27)	
≥ 50	2.57 (0.93-7.10)	
Marital status (*n*=293)		
Married	Ref.	
Unmarried	1.09 (0.55-2.15)	
Education (*n*=290)		
High school or above	Ref	
Secondary school or less	0.63 (0.27-1.48)	
Years of stay (*n*=296)		
≤ 2	Ref.	Ref.
2-9	0.31 (0.10-0.97)*	0.39 (0.09-1.60)
10-19	1.68 (0.63-4.51)	2.24 (0.67-7.56)
≥ 20	1.70 (0.50-5.74)	1.64 (0.34-7.89)
Employment status (*n*=291)		
Employed	Ref.	
Unemployed	1.65 (0.70-3.88)	
Occupation group (*n*=249)		
Other	Ref.	Ref.
Construction	0.53 (0.17-1.65)	0.87 (0.26-2.93)
Fishery	3.00 (1.27-7.08)*	2.68 (1.08-6.62)*
Being undocumented (*n*=281)		
No	Ref.	Ref.
Yes	3.51 (1.39-8.91)*	0.68 (0.15-3.17)
Health insurance (*n*=296)		
Yes	Ref.	Ref.
No	1.45 (0.69-3.08)	1.65 (0.60-4.59)
Knowledge of public health insurance (*n*=296)		
Adequate (≥ 5)	Ref	
Poor	1.12 (0.58-2.19)	
Source of health insurance information in the past year (*n*=296)		
Facebook/Line	Ref.	Ref.
Other	2.56 (1.33-4.91)**	1.62 (0.72-3.65)
Being able to travel to the hospital by oneself (*n*=283)		
Yes	Ref.	
No	1.88 (0.91-3.89)	

*P<0.05; **P<0.01

significant increase (OR 1.65, 95% CI 0.70–3.88), the odds of unmet needs were significantly higher for those in the fishery sector (OR 3.00, 95% CI 1.27–7.08) compared to other industries, exceptconstruction. Similarly, undocumented status (OR 3.51, 95% CI 1.39–8.91) showed an increase in unmet needs as compared to possessing a valid work permit and visa. Furthermore, participants who received health insurance information from other sources (OR 2.56, 95% CI 1.33–4.91) than Facebook or Line application also showed elevated unmet needs. In the subsequent multivariable analysis, these variables, alongside the health insurance variable, were considered. Among these, only involvement in the fishery sector (aOR 2.68, 95% CI 1.08–6.62) demonstrated a statistically significant increase in unmet needs (Table 4).

Table 5 Adjusted odds ratio for the association of being undocumented and unmet need with being uninsured as a potential mediator

Measures	Adjusted OR (95% CI)
Marginal total effect	4.86 (1.62–14.54)
Natural direct effect	4.19 (1.41–12.49)
Natural indirect effect	1.16 (0.88–1.52)

By treating those who reported 'prefer not to answer' for questions on work permit and visa statuses as undocumented, and employment status as unemployed, the statistical significance of most variables showed minimal change. The odds ratios for being unemployed and undocumented were 1.82 (95% CI 0.82–4.02) and 2.35 (95% CI 1.05–5.27), respectively, which were not far from those observed in the main analysis. The adjusted odds ratios also followed similar trends. Further details are provided in Additional file 4.

Mediation analysis

Mediation models suggested that being uninsured served as a partial mediator in the association between undocumented status and unmet needs when accounting for other confounding factors. The potential confounding factors included being female, education less than high school, not being able to travel to the hospital by oneself, not receiving health insurance information from social media platforms (Facebook and Line), and having poor knowledge of government health insurance utilization. The aOR for the marginal total effect of being undocumented on unmet needs was 4.86 (95% CI 1.62–14.54; Table 5). This effect could be deconstructed into a natural direct effect of 4.19 (95% CI 1.41–12.49) and a natural indirect effect of 1.16 (95% CI 0.88–1.52) through the pathway of being uninsured. When treating 'Prefer not to answer' as undocumented, the adjusted ORs for the MTE, NDE, and NIE were 3.08 (95% CI 1.24–7.70), 2.80 (95% CI 1.13–6.98), and 1.10 (95% CI 0.89–1.37), respectively.

Discussion

In this study, we described healthcare services access among migrants working in Phuket Province and identified the factors associated with the unmet need. Most participants were documented migrants (87.16%), while undocumented migrants made up 7.77%. Those who chose 'Prefer not to answer' accounted for 5.07%, a

proportion similar to that of undocumented migrants. In our analysis, these responses were treated as missing data, yielding similar trends to those observed when assuming 'Prefer not to answer' as undocumented. Our findings revealed that most participants expressed trust in and a preference for accessing healthcare at Thai government hospitals, where their health insurance coverage could be fully utilized. Despite having insurance, many initially turned to alternative resources such as herbal remedies, drugstores, and private clinics. This behavior was driven by various constraints, including their working hours, transportation, additional costs, and language barriers. The ability to seek and reach healthcare services was significantly influenced by the support of friends, family members, and employers. Having valid health insurance facilitated their ability to pay for services; however, this was contingent upon their employment and legal immigration status.

The prevalence of unmet needs in hospital services was reported at 14.9% which was substantially lower compared to other studies in Thailand. Kunpeuk et al. found a strong link between nationality and unmet needs, in which Cambodian and Vietnamese urban refugees and asylum seekers (URAS) reported unmet needs approximately two times higher (32.3%) than our study [32]. URAS in Bangkok were reported with 54.1% and 28.0% of unmet needs in outpatient and inpatient care [27]. This could be attributed to the more advanced age and lower proportion of insured URAS compared to our study. Furthermore, these individuals could be categorized as entirely undocumented, as there was no formal registration process or avenue for obtaining health insurance. The prevalence of unmet needs among migrants in other countries also varied depending on the population criteria, questionnaire methodology, and definitions or measurements of unmet needs. However, similar barriers persisted through lower socioeconomic status, precarious legal status, unaffordable fees, cultural differences, communication gaps, and unfamiliarity with the health system in the host country [12, 33–35].

Working in the fishery industry showed a larger degree of unmet needs. This could be attributed to the professional demands that make workers more susceptible to health risks. Migrant workers in the fishery business usually experience extended and demanding shifts, either offshore or in-land work [36, 37]. Some always spent their working and living conditions on crowded boats, or in port areas with their families, where maintaining adequate hygiene standards is often impractical [38]. This challenging environment is compounded by various occupational health hazards, including accidents at sea resulting from unpredictable events such as storms, slipping on decks, drowning, hypothermia, injury from handling aquatic life, physical fatigue, and, at times, physical and mental abuse [36, 37, 39–41]. Future studies exploring the current health issues, particularly those related to occupational hazards, among migrants in the fishery industry could pave the way for targeted health education initiatives aimed at mitigating their modifiable health risks.

In addition to the increased health risks of migrants in the fishery industry, they were known for their vulnerability to legal and financial status [36, 37, 42]. A study among fishery workers in four coastal provinces in Thailand reported more than half (55.3%) did not own identity documents and they also experienced issues such as unpaid or unfairly deducted wages [37], which render them vulnerable to police extortion and deportation. These challenges extend to general migrants, who encounter barriers to accessing social security benefits due to their undocumented status. Many lack valid visas and work permits, leading to potential unemployment or unofficial employment. As legal status and application fees are mandated for the insurance acquisition, this could largely impede their ability to reach and pay for hospital healthcare services.

Migrant workers' social security documents and insurance depended largely on their employer's paperwork initiation and continuous compliance with the regular renewal and payment process [43–46]. If employers fail to facilitate this process, migrants may find themselves unable to secure social security benefits, including social mobility to reach the healthcare services at hospitals. This point is confirmed by our findings in mediation analysis which suggests a large effect of being undocumented on unmet needs, combined with a smaller effect size via uninsured status. Even when assuming respondents who chose 'Prefer not to answer' as undocumented, the trend remained similar, though with a lower adjusted odds ratio, which may indicate some differences in characteristics. Given the current documentation procedures, future qualitative studies that delve into the employer's role in various industries should be conducted to explore the barriers they face in assisting and maintaining valid legal documents and insurance. The findings could lead to more inclusive and customized policy solutions to discuss among the representatives of migrants, employers, and labor officials.

Migrants who acquire health insurance information through channels outside of social networks including Facebook and Line, exhibit a roughly twofold increase in the risk of experiencing unmet needs. It could be assumed that they might receive less general health-related information through these sources too. This finding could support the promotion of health communication through social media. During the COVID-19 pandemic, migrants in Thailand faced barriers to accessing and understanding health information due to a lack of

literacy and language discrepancies [47]. The preference for social media over official sources may likely stem from lay accessibility and language familiarity [48]. However, misinformation might occur. A potential solution could be initiated by providing health information with tailored frequency, content, and linguistics to the receptive level of target migrants. Structured video productions with feedback monitoring are encouraged [49]. Collaboration between the MHVN and local public health sectors holds significant potential for engaging with migrants in their workplace and residential communities, utilizing both online and offline platforms. Particular outreach should be dedicated to those in the fishery industry.

Regarding generalizability, this study sheds light on several challenges faced by migrants in accessing healthcare, some of which may have broader applicability beyond Phuket Province. For instance, the importance of having valid legal documents and health insurance for accessing healthcare services holds significance in various contexts. Similarly, language barriers and affordability are common challenges that migrants face globally. These general insights suggest that improving legal documentation processes and enhancing language support services could benefit migrant populations in other regions as well. However, while these aspects are broadly applicable, specific interventions must consider local contexts. Phuket's tourism reliance and unique migrant demographics shape its healthcare access issues. Thus, caution is needed in applying our findings elsewhere. Further research should examine these principles in different settings and identify conditions affecting healthcare access for migrants.Limitations.

Our study offers a comprehensive analysis of healthcare access among migrants in a tourist province of Southern Thailand with an exploration of the quantified effect of legal and insured status. However, several limitations should be noted. First, the cross-sectional design limits our ability to draw causal inferences. Second, the non-probabilistic recruitment method may introduce sampling bias, as participants connected through migrant health volunteers might have higher healthcare awareness, education, and legal documentation, potentially leading to fewer reported unmet needs. Although we conducted the study within migrant communities to ensure broader participation, the findings may not fully represent the general migrant population. Additionally, the predominance of Myanmar-origin participants limits our ability to explore differences in practices or cultural factors across nationalities. Third, the reliance on self-reported data, without corroborating healthcare provider perspectives or medical records, limits the accuracy of reported healthcare utilization. Lastly, social desirability bias, particularly regarding sensitive information like work permits and visa status, may have led to an underestimation of undocumented migrants. To mitigate this, we ensured questionnaire anonymity and allowed participants to skip sensitive questions. For instance, in questions regarding documentation status, we observed a close proportion between the undocumented group (7.77%) and the 'Prefer not to answer' group (5.07%), suggesting that some participants may have chosen not to disclose their undocumented status.

Conclusion

Access to healthcare is vital for the well-being of migrants, both individually and as part of the host community. This study reveals that challenges to hospital services are attributed to many known factors such as working hours, transportation limitations, affordability constraints, and language barriers. Our findings also underscore the crucial role of possessing legal authorization documents, including a work permit and visa. These documents facilitate the acquisition of health insurance and engender a sense of security among migrants when accessing government hospitals. Future research into the impediments to timely renewal processes for work permits, visas, and health insurance, with a particular focus on employer perspectives, could catalyze necessary policy adjustments. Those who work in the fishery industry might experience higher unmet need due to the increased health risks and the offshore working nature. Utilizing social media platforms for disseminating health-related information could help mitigate the unmet need; however, specific outreach efforts should be tailored to the fishery sector.

Abbreviations

EU-SILC	European Union Statistics on Income and Living Conditions survey
WHO	World Health Organization
IOM	International Organization for Migration
ILO	International Labour Organization
HIV	Human immunodeficiency virus
HICS	Health Insurance Card Scheme
SSS	Social Security Scheme
MHVN	Migrant Health Volunteer Network
MHV	Migrant Health Volunteer
CLMV	Cambodia, Lao PDR, Myanmar, and Vietnam
OR	Odds ratio
aOR	adjusted odds ratio
95% CI	95% confidence interval
MTE	Marginal total effect
NDE	Natural direct effect
NIE	Natural indirect effect

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

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Authors' contributions
Conceptualization, SW, SC, BK, NW, and RS; Methodology, SW, SC, BK, NW, and RS; Validation, SC, BK, NW, and RS; Formal analysis, SW and RS; Investigation, SW, SC, BK, and NW; Resources, SC, BK, and NW; Data management, SW; Writing—Original draft, SW; Writing—review and editing, SW, SC, BK, NW, and RS. All authors have read and approved the final manuscript.

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Availability of data and materials
The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
This project obtained ethics approval from the Vachira Phuket Hospital Research Ethic Committee (Certificate of Approval No. 025B2021). The project was determined to not be human subjects research by the US CDC. Written consent was obtained from the participants. All respondents were assured that their participation was voluntary, and they had the right to withdraw from the survey at any time.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Publisher's Note

Addition file 1 Government healthcare facilities in Phuket province and their capacity

Hospital level (n)	Levels of care	OPD	IPD bed capacity	Emergency department
Provincial (1)	Tertiary	Full-time doctors	550	Yes
District (3)	Secondary	Full-time doctors	150	Yes
Sub-district (22)	Primary	Full-time nurses and doctors assigned on certain days of the week	N/A	N/A

Additional file 2: Questionnaire form

Survey of migrant workers in Phuket province about access to health services, health insurance utilization, and vaccine coverage COVID-19 vaccine.

Explanation

The purpose of this interview is to obtain information access to health services among migrant workers in Phuket to apply the study results to plan the development of the health service system for migrant workers to be more efficient.

1. This interview form is divided into 7 parts, 22 pages, consisting of:
   Part 1: General information of migrant workers.
   Part 2: Perceived health service need
   Part 3: Ability to seek, reach, and pay for health service at the hospital
   Part 4: Experience from using health services at the hospital
   Part 5: Knowledge, perception, and source of information on health insurance
   Part 6: Personal COVID-19 vaccination history
   Part 7**:** Vaccination histories of children less than 12 years old in your family
2. This interview form is for educational purposes only. Providing information will not affect your ability to get healthcare or your employment status. If you do not know the answer to a question, just indicate that you do not know. Your result will be recorded anonymously. Participation in this survey is voluntary.

Code_____
☐ 1. Muang ☐ 2. Kathu ☐ 3. Talang
☐ 1. New MHV ☐ 2. Known MHV

Part 1: General information

1.1 Gender
☐ 1. Male
☐ 2. Female ☐ 3. Prefer not to answer

1.2 Age..... Years old ☐ 1. Prefer not to answer

1.3 Nationality
☐ 1. Myanmar ☐ 2. Cambodian
☐ 3. Laotian ☐ 4. Vietnamese
☐ 5. Prefer not to answer

1.4 Marital Status
☐ 1. Single ☐ 2. Married
☐ 3. Widowed/Divorced/Separated ☐ 4. Prefer not to answer

1.5 Highest level of Education
☐ 1. Never attend school ☐ 2. Primary School
☐ 3. Middle School ☐ 4. High School/Vocational Certificate
☐ 5. Bachelor's Degree or upper ☐ 6. Prefer not to answer

1.6 Duration of living in Thailand……months……years

1.7 Reasons for staying in Thailand
☐ 1. Employment ☐ 2. Living with family
☐ 3. Political ☐ 4. Other ……
☐ 5. Prefer not to answer

1.8 Current employment status
☐ 1. Employed for wages full-time
☐ 2. Employed for wages part-time
☐ 3. Unemployed, looking for work (skip to Question 10)
☐ 4. Unemployed, not looking for work (skip to Question 10)
☐ 5. Prefer not to answer

1.9 Occupation
☐ 1. Construction workers
☐ 2. Fisheries and processing
☐ 3. Wholesale, retail shop, stall
☐ 4. Restaurant, drinks, pub/bar
☐ 5. Services sector e.g. hotel, tourism
☐ 6. Factory e.g. clothes, construction, metal, electronic
☐ 7. Garage, carwash, gas station
☐ 8. Recycle business/junk trading
☐ 9. Houseworker/general worker of a household
☐ 10. Agriculture (fruit, vegetable, rice), livestock, food processing, slaughterhouse
☐ 11. Foundation/NGO, school, coordinator related to the used of your language
☐ 12. Other (Specify) answer.....
☐ 13. Prefer not to answer

1.10 Number of family members who live with you in Thailand (include yourself) ……

☐ 1. 1 ☐ 2. 2 ☐ 3. 3 ☐ 4. 4 ☐ 5. More than 4

☐ 6. Prefer not to answer

1.11 Estimated household income per month (Baht)

☐ 1. Not more than 2,000 ☐ 2. 2,001 – 5,000

☐ 3. 5,001 – 10,000 ☐ 4. 10,001 – 15,000

☐ 5. More than 15,000 ☐ 6. No income

☐ 7. Prefer not to answer

1.12 Frequency of remittance per year .....

☐ 1. No remittance(Skip 1.16)

☐ 2. Prefer not to answer

1.13 Estimated amount of each remittance (Baht)

…….. ☐ 1. Prefer not to answer

1.14 Channel for money transaction to Myanmar

☐ 1. Middleman/underground banking ☐ 2. Money Transfer Agent

☐ 3. Bank ☐ 4. Friend

☐ 5. Other (Specify) ..... ☐ 6. Prefer not to answer

1.15 Transaction fee

☐ 1. **……** Baht

☐ 2. Prefer not to answer

1.16 Work permit in Thailand

☐ 1. Have a valid work permit

☐ 2. Have an expired work permit

☐ 3. Never have a work permit

☐ 4. Prefer not to answer

1.17 Visa to stay in Thailand

☐ 1. Have a valid visa

☐ 2. Have an expired visa

☐ 3. Never have a visa

☐ 4. Prefer not to answer

Part 2 Perceive health service need

2.1 Do you have any chronic medical condition that needs continuous treatment?
☐ 1. No (Skip to Question 2.3)
☐ 2. Yes

2.2 Your chronic medical conditions diagnosed by a doctor are: (more than 1 answer)
☐ 1. Diabetes
☐ 2. High blood pressure
☐ 3. Dyslipidemia
☐ 4. heart disease
☐ 5. Chronic kidney disease
☐ 6. Cancer
☐ 7. Lung disease
☐ 8. Bone and joint disease
☐ 9. Psychiatric disorder
☐ 10. Infectious disease e.g. tuberculosis
☐ 11 Other (Specify) to answer.....

2.3 In the past year, what were the types of health services that you desired at the government hospital? (you can choose more than 1 answer)
☐ 1. Follow-up for known underlying disease
☐ 2. Visit for new illness (outpatient)
☐ 3. Injury from accident or severe illness (emergency)
☐ 4. Dental care
☐ 5. Contraception, antenatal, or postnatal care
☐ 6. Health check-up for work permit
☐ 7. Other (specify).....

2.4 From the services you chose in 2.3, did you receive every service fully?
☐ 1. Yes, I used every service. (Skip to Question 2.8)
☐ 2. No, I did not use every service

2.5 If you had a service that you did not receive, write the number of that service from answer 2.3 .....

2.6 What were the reasons that you did not get the service? (Multiple choices)
☐ 1. I am worried about law punishment since I do not have visa/work permit or is expired
☐ 2. I did not know where to go
☐ 3. I did not want to go because I did not trust/not impress by the hospital or personnel
☐ 4. Family/partner/friends/your community does not allow you to go to the hospital
☐ 5. I could not stop working (The employer did not allow to leave/will not give the pay)
☐ 6. Not convenient for traveling/the health facility was too far
☐ 7. I did not have anyone to take me to the health facility
☐ 8. I cannot afford to pay for a transportation fee
☐ 9. I could not afford to pay for treatment
☐ 10. I could not communicate my need at the hospital due to the language barrier
☐ 11. Waiting time was too long
☐ 12. Other (specify) ……

2.7 From the answer in No. 2.6, please pick the most important reason (Write the number of the options) .....

2.8 In the past year, had you ever been sick that the doctor suggested admission at the government hospital?
☐ 1. (Skip to part 3)
☐ 2. Yes

2.9 Did you get admitted as the doctor recommended at the government hospital?

☐ 1. I got admitted (Skip to Part 3)

☐ 2. I did not get admitted

2.10 What were the reasons?

☐ 1. I am worried about law punishment since I do not have visa/work permit or is expired

☐ 2. I did not want to be admitted because I did not trust/not impress by the hospital or personnel

☐ 3. Family/partner/friends/your community does not allow you to be admitted at the hospital

☐ 4. I could not stop working (the employer did not allow to leave/will not give the pay)

☐ 5. In case you were referred) Not convenient for traveling/the hospital was too far

☐ 6. (In case you were referred) I did not have anyone to take me to the health facility

☐ 7. (In case you were referred) I cannot afford to pay for a transportation fee

☐ 8. (In case you were referred) The next hospital discharged/informed you that the beds were full

☐ 9. I could not afford to pay for treatment

☐ 10. Waiting time was too long

☐ 11. Others (specify).....

2.11 From the answer in No. 2.10 Please pick the top reason (Write the number of the options) .....

Part 3: Ability to seek, reach, and pay for health services at the hospital

3.1 In the past year, where did you mostly get treatment from when you are sick? (Multiple choices)
- ☐ 1. Herbal use
- ☐ 2. Medication from friend
- ☐ 3. Medication from workplace
- ☐ 4. Buy from drugstore
- ☐ 5. Go to private clinic
- ☐ 6. Sub-district health promoting hospitals
- ☐ 7. Community/General Hospital
- ☐ 8. Provincial Hospital
- ☐ 9. Private hospital
- ☐ 10. Other (Specify).....

3.2 Where do you get information about health or hospital service from? (Multiple choices)
- ☐ 1. Friends/Family members
- ☐ 2. Employers/Team leaders
- ☐ 3. Migrant Health Volunteers (MHVs)
- ☐ 4. Village Health Volunteers (VHVs)
- ☐ 5. District Administrative Organization staff/Community Leaders
- ☐ 6. Healthcare Workers
- ☐ 7. Internet
- ☐ 8. Other (Specify).....

3.3 When you want to visit the hospital, who most influences your decision?
- ☐ 1. Friends/Family members
- ☐ 2. Employers/Team leaders
- ☐ 3. Migrant Health Volunteers(MHVs)
- ☐ 4. Village Health Volunteers (VHVs)
- ☐ 5. District Administrative Organization staff/Community Leaders
- ☐ 6. Other (Specify).....

3.4 How long did you take to travel to the nearest public hospital? .....minute .....hour

3.5 Can you travel to the hospital by yourself?

☐ 1. Yes (Skip 3.7) ☐ 2. No

3.6 If one day you cannot travel to the hospital by yourself, who can you ask for help?
- ☐ 1. Friends/Family members
- ☐ 2. Employers/Team leaders
- ☐ 3. Migrant Health Volunteers (MHVs)
- ☐ 4. Village Health Volunteers (VHVs)
- ☐ 5. District Administrative Organization staff/Community Leaders
- ☐ 6. Hospital (ambulance)
- ☐ 7. Other (Specify).....

3.7 Do you know about public health insurance?

☐ 1. Yes ☐ 2. No

3.8 Do you have a public health insurance?

☐ 1. Yes ☐ 2. No (Skip to Part 4)

3.9 Your current health insurance type
- ☐ 1. Health Insurance Card Scheme
- ☐ 2. Social Security Scheme
- ☐ 3. Private health insurance
- ☐ 4. Other (Specify).....

3.10 The main person who assisted in acquiring the health insurance

☐ 1. Broker

☐ 2. Employer

☐ 3. Hospital

☐ 4. Other (Specify) ……

Part 4 Experience from using health services at the hospital

4.1 In the past year, how many times had you visited the hospital?
- ☐ 1. No, I have never been to hospital (Skip to Part 5)
- ☐ 2. Yes, I have been Times

4.2 The last time you visited the hospital, what was the type of health service that you need?
- ☐ 1. Follow-up for known underlying disease
- ☐ 2. Visit for new illness (outpatient)
- ☐ 3. Injury from accident or severe illness (emergency)
- ☐ 4. Dental care
- ☐ 5. Contraception, antenatal, or postnatal care
- ☐ 6. Health check-up for work permit
- ☐ 7. Other (specify) ……

4.3 In your last visit, which hospital did you visit first?
- ☐ 1. Sub-district health promoting hospitals
- ☐ 2. Community Hospital
- ☐ 3. Provincial Hospital
- ☐ 4. Private hospital
- ☐ 5. Other (Specify) ……

4.4 The reasons for choosing to visit that hospital as the first place (multiple choices)
- ☐ 1. I can use my health insurance.
- ☐ 2. I can afford the service fee/additional fee.
- ☐ 3. Easy to access, near home/work.
- ☐ 4. I don't have to wait in long queues fast service
- ☐ 5. Friendliness
- ☐ 6. Always available/open overtime
- ☐ 7. I trust in the doctor and the team
- ☐ 8. I trust in drug quality and medical equipment.
- ☐ 9. Other (Specify) ……

4.5 From the answer in No. 4.4, Please pick the top reason (Write the number of the options.)
.....

4.6 If in the future you get sick, do you intend to visit this hospital again?
- ☐ 1. I will go to this hospital again (Skip to Part 5)
- ☐ 2. I will not go there again

4.7 If you will not visit that hospital again, what are the reasons? (Multiple choices)
- ☐ 1. I cannot use my health insurance.
- ☐ 2. I cannot afford the service fee.
- ☐ 3. Difficult to access, far from home/work.
- ☐ 4. The waiting time is too long.
- ☐ 5. Unfriendliness
- ☐ 6. I cannot go during the opening hours of the hospital.
- ☐ 7. I do not trust the doctor and the team.
- ☐ 8. I do not trust in drug quality and medical equipment.
- ☐ 9. Other (Specify) ……

4.8 From the answer in No. 4.7 Please pick the top reason (Write the number of the options.)
.....

Part 5: Knowledge, perception, and source of information on health insurance

Statement	✓ True	✗ False	Not sure
5.1.1. The health insurance does not expire.			
5.1.2. I can get medical treatment at the same fee as Thai people.			
5.1.3. I can use the health insurance only if I go to my registered hospital.			
5.1.4. In case of emergency illnesses or accidents, I can use the right to medical treatment at a medical facility other than the registered permanent medical facility.			
5.1.5. If the treatments are not covered by the insurance, I don't have to pay myself.			
5.1.6. Using health insurance, women can get contraception or antenatal care.			
5.1.7. Using health insurance, I can consult with the personnel about screening for tuberculosis, hypertension, and diabetes.			
5.1.8. This insurance does not cover dental care.			
5.1.9. I can use this insurance at any private hospital or clinics.			
5.1.10. If the doctor gives a referral paper and tell me I need to get treatment from a larger public hospital, I can still use this insurance.			

5.2 Do you agree about these statements regarding Health Insurance Card and Social Security Scheme?

Statements	 Strongly disagree	 Disagree	 Agree	 Strongly agree
1. Owning health insurance is necessary for me.				
2. Health insurance is necessary even if I am healthy.				
3. I think health insurance fee is not too expensive.				
4. I think the process of obtaining health insurance is easy.				
5. I think using health insurance only at the registered hospital did not hinder my access to health services.				
6. I think the process of using health insurance at the hospital is easy.				
7. I think health insurance helps me afford the treatment.				
8. I think paying an additional fee from health insurance is acceptable.				
9. I think owning health insurance helps me receive better health services rather than not owning one.				
10. I want my friends/family to get the health insurance.				

5.3 In the past year, where did you receive information about migrant worker's health insurance? (More than 1 answer)

☐ 1. Television
☐ 2. Radio
☐ 3. Newspaper
☐ 4. Magazine
☐ 5. Facebook
☐ 6. Line Group
☐ 7. Websites
☐ 8. Leaflet/Poster
☐ 9. Friends/Family members
☐ 10. Employers/Team leaders
☐ 11. Migrant Health Volunteers (MHVs)
☐ 12. Village Health Volunteers (VHVs)
☐ 13. District Administrative Organization staff/Community Leaders
☐ 14. Healthcare worker at health promoting-hospital.
☐ 15. Healthcare worker at community or provincial hospital
☐ 16. Migrant Worker's Health Insurance Coordination Center.
☐ 17. Exhibitions / Activities at various events.
☐ 18. Other (Specify) ……

5.4 From the answer in No. 5.3, Which media/source is the one you prefer for in receiving information related to health insurance?.....

Part 6 Personal Covid-19 vaccination history

6.1 COVID-19 Have you ever received COVID-19 vaccination?

☐ 1. Yes ☐ 2. No (Skip to Question 6.6)

6.2 How many doses of COVID-19 vaccines did you receive?

☐ 1. One dose ☐ 2. Two doses

☐ 3. More than two doses (Skip to Part 7)

6.3 How many months has it been since your last vaccination?

☐ 1. Less than 3 months

☐ 2. 3-6 months

☐ 3. More than 6 months

6.4 Tradename of the first dose of COVID-19 Vaccination

☐ 1. Sinovac ☐ 2. Aztra Zeneca

☐ 3. Sinopharm ☐ 4. Pfizer

☐ 5.Other (Specify) ☐ 6. I do not know/I am not sure

.....

6.5 Tradename of the second dose of COVID-19 Vaccination

☐ 1. Sinovac ☐ 2. Aztra Zeneca

☐ 3. Sinopharm ☐ 4. Pfizer

☐ 5. Other (Specify) ☐ 6. I do not know/I am not sure

.....

6.6 If you have never received COVID-19 vaccine or received less than two doses, do you want to get the next one in Thailand?

☐ 1. Yes ☐ 2. No

☐ 3. I do not know/I am not sure

Part 7 Vaccination histories of children less than 12 years old in your family

7.1 Do you have children less than 12 years old in your household?

☐ 1. Yes

☐ 2. No (End the questionnaire)

7.2 Have the children ever received COVID-19 vaccination?

☐ 1. Yes

☐ 2. No (Skip to question 7.4)

7.3 How many doses of COVID-19 vaccination did they receive?

☐ 1. One dose

☐ 2. Two doses

7.4 Do you want them to get the COVID-19 vaccine in Thailand?

☐ 1. Yes

☐ 2. No

☐ 3. I do not know/ I am not sure

7.5 Do you take the children in your family to get the basic vaccines in Thailand?

☐ 1. Yes (End the questionnaire)

☐ 2. No

7.6 What were the reasons that you did not take the children to receive the vaccines?

☐ 1. I do not know children need to receive a set of basic vaccines.

☐ 2. I do not think children need to receive every dose of basic vaccines.

☐ 3. I do not think the vaccine would help preventing severe illnesses.

☐ 4. I am afraid of the side effect from the vaccines.

☐ 5. I do not trust the quality of vaccines in Thailand.

☐ 6. I do not think children need the vaccines since they passed the age that was set at first.

☐ 7. I do not know the place that provide basic vaccines for children.

☐ 8. I do not have the money for transportation, or the hospital is too far.

☐ 9. I do not have the money for hospital fee.

☐ 11. I do not trust/like the personnel at hospital.

☐ 12. Others (Specify).....

7.7 Do you want the children to receive basic vaccines in Thailand?

☐ 1. Yes ☐ 2. No

****

Additional File 3: Quantitative data on the ability to seek, reach, and pay

Table 1 Seeking and reaching healthcare behaviors of the participants

Variables (n)	Total, n (%)	Migrants with unmet need, n (%)	Migrants without unmet need, n (%)	p-value
Sources of treatment				
Herbal use	52 (17.57)	0 (0.00)	52 (20.63)	0.001
Drugs from friends	48 (16.22)	4 (9.09)	44 (17.46)	0.165
Drugs from workplace	40 (13.51)	7 (15.91)	33 (13.10)	0.614
Buying from drugstore	121 (40.88)	15 (34.09)	106 (42.06)	0.321
Private clinic	131 (44.26)	11 (25.00)	120 (47.62)	0.005
Subdistrict hospital	14 (4.73)	5 (11.36)	9 (3.57)	0.025
Community hospital	20 (6.76)	1 (2.27)	19 (7.54)	0.199
Provincial hospital	68 (22.97)	4 (9.09)	64 (25.04)	0.018
Private hospital	18 (6.08)	3 (6.82)	15 (5.95)	0.825
Sources of health information				
Friends/family	171 (57.77)	28 (63.64)	143 (56.75)	0.393
Employers	101 (34.12)	12 (27.27)	89 (35.32)	0.299
Migrant health volunteer	41 (13.85)	4 (9.09)	37 (14.68)	0.322
Thai village health volunteer	26 (8.78)	1 (2.27)	25 (9.92)	0.098
Community leaders	12 (4.05)	1 (2.27)	11 (4.37)	0.516
Healthcare worker	46 (15.54)	7 (15.91)	39 (15.48)	0.942
Internet	17 (5.74)	1 (2.27)	16 (6.35)	0.284
The most influential person on hospital visit (n=292)				0.019
Friends/family	136 (46.58)	17 (38.64)	119 (47.98)	
Employers	89 (30.48)	15 (34.09)	74 (29.84)	
Migrant health volunteer	31 (10.62)	2 (4.55)	29 (11.69)	
Village health volunteer	16 (5.48)	2 (4.55)	14 (5.65)	
Community leaders	12 (2.11)	4 (9.09)	8 (3.23)	
Others	8 (2.74)	4 (9.09)	4 (1.61)	
Median time to hospital (P25-P75) (minutes) (n=260)	30 (20-50)	20 (15-30)	30 (25-55)	<0.001
Being able to visit the hospital by oneself (n=283)				0.086
Yes	225 (79.51)	30 (69.77)	195 (81.25)	
No	58 (20.49)	13 (30.23)	45 (18.75)	
Persons assisting in visiting the hospital (n=58)				0.246
Friends/family	37 (63.79)	6 (46.15)	31 (68.89)	
Employers	14 (24.14)	4 (30.77)	10 (22.22)	
Other	7 (12.07)	3 (23.08)	4 (8.89)	

Table 2 Health insurance related information of the participants

Variables (n)	Total, n (%)	Migrants with unmet need, n (%)	Migrants without unmet need, n (%)	p-value
Owning health insurance (n=296)				0.328
Yes	238 (80.41)	33 (75.00)	205 (81.35)	
No	58 (19.59)	11 (25.00)	47 (18.65)	
Type of insurance (n=235)				<0.001
HICS	181 (77.02)	21 (63.64)	160 (79.21)	
SSS	46 (19.57)	7 (21.21)	39 (19.31)	
Other	8 (3.40)	5 (15.15)	3 (1.49)	
Persons assist in acquiring health insurance (n=235)				0.014
Broker	85 (36.17)	5 (15.15)	80 (39.60)	
Employer	136 (57.87)	24 (72.73)	112 (55.45)	
Other	14 (5.96)	4 (12.12)	10 (4.95)	
Source of health insurance information in the past year				
TV	204 (68.92)	29 (65.91)	175 (69.44)	0.640
Radio	33 (11.15)	4 (9.09)	29 (11.51)	0.638
Newspaper	26 (8.78)	4 (9.09)	22 (8.73)	0.938
Magazine	21 (7.09)	3 (6.82)	18 (7.14)	0.938
Facebook	170 (57.43)	16 (36.36)	154 (61.11)	0.002
Line group	94 (31.76)	3 (6.82)	91 (36.11)	<0.001
Leaflet/poster	46 (15.54)	2 (4.55)	44 (17.46)	0.029
Friends/family	45 (15.20)	3 (6.82)	42 (16.67)	0.093
Employers/ team leaders	82 (27.70)	13 (29.55)	69 (27.38)	0.767
Migrant Health volunteer	79 (26.69)	15 (34.09)	64 (25.40)	0.229
Thai village health volunteer	64 (21.62)	8 (18.18)	56 (22.22)	0.548
District organization staff/ community leaders	23 (7.77)	4 (9.09)	19 (7.54)	0.723
Healthcare workers at the subdistrict hospital	11 (3.72)	4 (9.09)	7 (2.78)	0.041
Healthcare workers at the community/provincial hospital	10 (3.38)	1 (2.27)	9 (3.57)	0.660
Migrant worker's health insurance coordination center	12 (4.05)	1 (2.27)	11 (4.37)	0.516
Exhibitions at events	36 (12.16)	3 (6.82)	33 (13.10)	0.240
Others	9 (3.04)	0 (0)	9 (3.57)	0.203
Knowledge of public health insurance (n=296)				0.734
Adequate (≥ 5)	195 (65.88)	28 (63.64)	167 (66.27)	
Poor	101 (34.12)	16 (36.36)	85 (33.73)	
Perception of public health insurance (n=296)				0.986
Positive (≥ 5)	276 (93.24)	41 (93.18)	235 (93.25)	
Negative	20 (6.76)	3 (6.82)	17 (6.75)	

Table 3 Knowledge of health insurance utilization of the participants

Topics	Total n, (%)	Correct answer (n, %)		p-value
		Migrants with unmet need, n (%)	Migrants without unmet need, n (%)	
Expiration	216 (72.97)	25 (56.82)	191 (75.79)	0.009
Minimum medical service fee	146 (49.32)	23 (52.27)	123 (48.81)	0.672
Validity at registered hospital	260 (87.84)	38 (86.36)	222 (88.10)	0.746
Validity at any hospital in case of emergency	185 (62.50)	31 (70.45)	154 (61.11)	0.238
Possibility of excess treatment fee	178 (60.14)	15 (34.09)	163 (64.68)	<0.001
Available service for contraception and antenatal care.	198 (66.89)	33 (75.00)	165 (65.48)	0.215
Available service for screening for tuberculosis, hypertension, and diabetes	223 (75.34)	37 (84.09)	186 (73.81)	0.144
Available service for dental care	111 (37.5)	14 (31.82)	97 (38.49)	0.399
Invalidity at the private hospitals and clinics	200 (67.57)	20 (45.45)	180 (71.43)	0.001
Coverage at the referred public hospital	197 (66.55)	31 (70.45)	166 (65.87)	0.552
Median points (P25-P75)	7 (5-8.5)	6.5 (5-8)	7 (5-9)	0.3748

Table 4 Attitude of health insurance utilization of the participants

Statements	Total, n (%)	Agree (n, %)		p-value
		Migrants with unmet need, n (%)	Migrants without unmet need, n (%)	
Owning health insurance is necessary for me.	276 (93.24)	40 (90.91)	236 (93.65)	0.504
Health insurance is necessary even if I am healthy.	281 (94.93)	37 (84.09)	244 (96.83)	<0.001
I think the health insurance fee is not too expensive.	208 (70.27)	34 (77.27)	174 (69.05)	0.271
I think the process of obtaining health insurance is easy	211 (71.28)	33 (75.00)	178 (70.63)	0.555
I think how I can use health insurance only at the registered hospital, did not hinder my access to health services.	246 (83.11)	35 (79.55)	211 (83.73)	0.494
I think the process of using health insurance at the hospital is easy.	223 (75.34)	31 (70.45)	192 (76.19)	0.415
I think health insurance helps me afford the treatment.	277 (93.58)	39 (88.64)	238 (94.44)	0.147
I think paying an essential additional fee from health insurance is acceptable.	176 (59.46)	28 (63.64)	148 (58.73)	0.541
I think owning health insurance helps me receive better health services rather than not owning one.	264 (89.19)	37 (84.09)	227 (90.08)	0.238
I want my friends/family to get the health insurance.	284 (95.95)	44 (100)	240 (95.24)	0.139
Mean points (min-max)	9 (7-9.5)	8 (7-10)	9 (7-9)	0.6093

Additional File 4: Evaluating the impact of treating "Prefer not to answer" responses as a non-preferable response

The following tables present the proportions of migrant-related characteristics and the results of regression analyses when treating respondents who selected 'Prefer not to answer' for sensitive questions regarding work permit, visa status, undocumented status, and employment status as 'No work permit,' 'No visa,' 'Being undocumented,' and 'Unemployed,' respectively. The results remained within a similar range as those in the main analysis.

Table 1 Documentation and employment status of participants

Variables	Total (n=296), n (%)	Migrants with unmet need (n=44), n (%)	Migrants without unmet need (n=252), n (%)	p-value
Work permit status				0.022
Valid	264 (89.19)	34 (77.27)	230 (91.27)	
Expired	10 (3.38)	3 (6.82)	7 (2.78)	
No work permit	22 (7.43)	7 (15.91)	15 (5.95)	
Visa status				0.482
Valid	275 (92.91)	39 (88.64)	236 (93.65)	
Expired	9 (3.04)	2 (4.55)	7 (2.78)	
No visa	12 (4.05)	3 (6.82)	9 (3.57)	
Being undocumented				0.034
Yes	38 (12.84)	10 (22.73)	28 (11.11)	
No	258 (87.16)	34 (77.27)	224 (88.89)	
Employment status				0.157
Full-time job	204 (68.92)	25 (56.82)	179 (71.03)	
Part-time-job	47 (15.88)	9 (20.45)	38 (15.08)	
Unemployed	45 (15.20)	10 (22.73)	35 (13.89)	

Table 2 Univariable and multivariable analysis to identify factor-associated with unmet needs

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
Sex (n=294)		
Male	Ref.	
Female	1.72 (0.90-3.30)	
Age group (n=296)		
18-29	Ref.	
30-39	0.89 (0.38-2.09)	
40-49	1.37 (0.58-3.27)	
≥ 50	2.57 (0.93-7.10)	
Marital status (n=293)		
Married	Ref.	
Unmarried	1.09 (0.55-2.15)	
Education (n=290)		
High school or above	Ref	
Secondary school or less	0.63 (0.27-1.48)	
Years of stay (n=296)		
≤ 2	Ref.	Ref.
2-9	0.31 (0.10-0.97)*	0.29 (0.08-1.13)
10-19	1.68 (0.63-4.51)	1.73 (0.56-5.36)
≥ 20	1.70 (0.50-5.74)	1.32 (0.29-6.01)
Employment status (n=296)		
Employed	Ref.	
Unemployed	1.82 (0.82-4.02)	
Occupation group (n=249)		
Other	Ref.	Ref.
Construction	0.53 (0.17-1.65)	0.95 (0.28-3.20)
Fishery	3.00 (1.27-7.08)*	2.98 (1.22-7.26)*
Being undocumented (n=296)		
No	Ref.	Ref.
Yes	2.35 (1.05-5.27)*	0.73 (0.20-2.65)
Health insurance (n=296)		
Yes	Ref.	Ref.
No	1.45 (0.69-3.08)	1.63 (0.60-4.44)
Knowledge of public health insurance (n=296)		
Adequate (≥ 5)	Ref	
Poor	1.12 (0.58-2.19)	
Source of health insurance information in the past year (n=296)		
Facebook/Line	Ref.	Ref.
Other	2.56 (1.33-4.91)**	1.66 (0.75-3.71)
Being able to travel to the hospital by oneself (n=283)		
Yes	Ref.	
No	1.88 (0.91-3.89)	

*P<0.05; **P<0.01

Table 3 Adjusted odds ratio for the association of being undocumented and unmet need with being uninsured as a potential mediator

Measures	Adjusted OR (95% CI)
Marginal total effect	3.08 (1.24 – 7.70)
Natural direct effect	2.80 (1.13 – 6.98)
Natural indirect effect	1.10 (0.89 – 1.37)