

An Examination of Determinants That Affect the Health-Service Systems and Health Status of People in the Greater Mekong Subregion

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Abstract

Background: One means of better understanding the variations in health systems among the four greater Mekong subregion (GMS) countries is to determine how the overall health environment influences the area's health-service systems and health status.

Objectives: The study examined the determinants that affect the health-service systems and health status of the Thai, Lao, Vietnamese, and Cambodian people in the GMS countries, as well as the determinants that best predict health-service-system quality and health status.

Patients and Methods: The sample groups consisted of 320 - 402 clients and 30 - 69 healthcare providers recruited from three hospitals with similar topographies to those in the respective countries. The sample sizes depended on the number of hospital beds and people in the study areas. The questionnaires included assessments of the perceptions of health-service-system quality and health status, as well as the affecting determinants; the analyses included descriptive statistics, Pearson product-moment correlation, and stepwise multiple regression.

Results: The major findings included the following: first, for the clients' perceptions, only the internal determinant that reflected the strengths and weaknesses of the hospital environment was shown to be a strong predictor of health-service-system quality of the GMS countries. Second, for both the clients' and providers' perceptions, we found no common determinant that could predict the health status of GMS people, although we did find a few similar and different determinants. Societal and cultural values affected health-service-system quality and the health status of Vietnamese people, as well the health status of the Lao people, while trade and investment only had an impact on the health-status perception of Lao clients. In addition, medical information and technology affected the health-service systems of Thailand and Vietnam, as well as the health status of the people of Thailand and Laos; the living and working environment influenced the health status of the people of Thailand and Vietnam. The strengths and weaknesses of the hospital also affected the health status of the people of Vietnam and Cambodia.

Conclusions: These findings may be used for further knowledge development and for various practical applications. Our findings recommend that a comprehensive and system-wide review of health-policy planning and strategic settings should be conducted in accordance with those particular factors to improve the health-service systems and health status of the GMS countries.

Keywords: Determinants, Health-Service Systems, Health Status, Greater Mekong Subregion

1. Background

The association of Southeast Asian nations (ASEAN) community focuses on security in the region and promotes the well-being, economic prosperity, and social solidarity of member nations via three pillars: the ASEAN socio-cultural community, the ASEAN economic community, and the ASEAN political-security community. The signing of the Bangkok declaration (or ASEAN declaration) in 1967 provided one of the first official agreements to promote economic, social, cultural, scientific, agricultural, industrial, and transportation-related cooperation among the four ASEAN member countries in the greater Mekong

subregion, or GMS (1): Thailand, the Lao people's democratic republic, the socialist republic of Vietnam, and the kingdom of Cambodia (henceforth simply Thailand, Laos, Vietnam, and Cambodia).

The development and improvement of health-service systems and the health status of a nation's population can contribute to socioeconomic improvements and the productivity of the country (2, 3). Because the impacts of the health-service systems and health status not only change over time but also tend to vary between regional contexts, a study of the determinants that affect the health-service systems and health status of the people in the GMS is es-

essential for the development of these factors in this region. The results of the study may serve as a benchmark for the GMS countries to determine further guidelines for health-service system development and health promotion for the people of the GMS.

One means of achieving a better understanding of these factors is to determine how the overall health environment influences health-service systems and general health status. Although many previous studies have determined the influence of social support, the living/working environment, and other environments on health outcomes (4-6), few studies have been conducted on the relationships and factors that predict the quality of the health-service systems and health status of the people in the GMS countries. Such a study may therefore be useful, especially in the context of Thailand. These determinants include various external determinants, in terms of social and cultural values, trade and investment, medical information and technology, and living/working environments; and internal determinants, which consist of the strengths and weaknesses of individual hospitals. These determinants are commonly used to conduct environmental analyses of healthcare organizations and systems (7). The findings would provide essential information for appropriate policy planning and strategy setting for the sustainable development of the health-service systems and health status of the people in the GMS.

2. Objectives

This study examines (i) the correlation between the perception of external/internal determinants and health-service systems and health status, and (ii) the determinants that best predict the quality of health-service systems and individuals' health status in Thailand, Laos, Vietnam, and Cambodia.

3. Patients and Methods

The findings reported here were collected from a larger series of studies conducted in 2011 - 2014 that investigated the health-service systems, health status, and affecting factors among the Thai, Lao, Vietnamese, and Cambodian people. Those findings included self-reported health status among Thai, Lao, Vietnamese, and Cambodian clients and healthcare providers, and how the perceptions of and attitudes toward various factors relate to health-service systems and individuals' health status. Those factors included: 1) social and cultural values; 2) trade and investment, particularly related to entering the ASEAN community; 3) medical information and technology; 4) the liv-

ing/working environment; and 5) the strengths and weaknesses of the hospital system. The factors that affect health-service systems and health status were divided into two categories: perceptions of the internal hospital environment and perceptions of the external hospital environment. The internal environment included the strengths and weaknesses inside the hospital system itself, while the external environment included the attitudes and perceptions of social/cultural values, trade/investment, medical information/technology, and the living/working environment.

3.1. Samples

The study samples included groups of clients and healthcare providers from two to three local hospitals that were selected with similar topographies to the populations of Thailand, Laos, Vietnam, and Cambodia. The sample size was determined by using Yamane's tabulation (8, 9), with a power analysis of not less than 0.80 and an effect size of 0.14 at the $\alpha = 0.05$ level (10, 11). The participants were selected using multi-stage random sampling and quota sampling, depending on the number of hospital beds and people in the study areas (Table 1). The clients were samples with an appropriate health condition from the out-patient and in-patient wards, while the healthcare providers included doctors, dentists, nurses, and others. The actual participants consisted of 320 - 402 clients and 60 - 69 providers from each country (except for Cambodia, where 30 providers were recruited).

The participants were asked about their perceptions in each part of the questionnaire after being informed about the purposes of the study, including their rights related to participation in the project. In Thailand, informed consent (including information on human rights and the content of the research) was obtained from all participants; in the three other countries, the samples agreed to participate of their own accord after listening to and understanding all of the information provided by the co-researcher in each country.

The study protocol, which conforms with the ethical guidelines set out for this series of studies, was approved for human subjects by the human research ethics committee of Thammasat university, Thailand. In the other countries, our request for permission to pursue data collection was approved by the relevant ministries of public health and foreign affairs.

3.2. Questionnaires

Participants were provided with socio-demographic questionnaires and questionnaires with a five-point Likert scale for responses about their health status and their

Table 1. Multi-Stage Sampling Procedure and Sample Size in the Study Areas

Province	Stratified Sampling			Quota Sampling		
	Population(n)	Hospital	Hospital beds (n)	Sample (n)	Client (n)	Provider (n)
Thailand						
Pathumthani	956,300	Thammasat	617	150	130	20
Angthong	284,800	Angthong	326	92	82	10
Ubon Ratcha-thani	1,803,700	Sappasitthiprasong	1,000	220	190	30
Laos						
Vientiane	726,000	Mahosot	450	192	162	30
Champasak	575,600	Champasak	250	120	108	12
Savannakhet	721,500	Savannakhet	145	150	132	18
Vietnam						
Hue	950,000	Hue Central	2,030	240	193	47
Danang	900,000	Danang	850	160	138	22
Cambodia						
Phnom Penh	2,301,725	Calmette	250	230	211	19
Siem Reap	171,800	Siem Reap Provincial	200	120	109	11

perceptions and attitudes toward the affecting determinants, including external and internal environmental factors. The clients were also given additional health-service-system questionnaires. All of the questionnaires were translated into each country's respective official language.

As described in the previous study (12), the independent variables consisted of the perceptions of the external and internal environmental factors that affect health status and health-service systems, while the dependent variable related to the participants' self-reported health status. The question contents for the independent variable in the questionnaires were based on Swayne et al.'s (7) theoretical framework. The external environmental questionnaires included their perceptions and attitudes about trade and investment (five questions), societal and cultural values (six questions), medical information and technology (six questions), and living and working environment (five questions); the internal environmental questionnaires included the strengths and weaknesses of the hospital system (eleven questions). As described in a previous study (13), the dependent variable included partici-

pants' perceptions of health status related to health conditions, human functions, and overall well-being (twenty questions). The other dependent variable included the clients' perceptions of the health-service systems in terms of health-service-system access, service quality and safety, and confidence in the service and its management (seventeen questions).

The participants responded to the question by choosing answers from a five-point Likert scale, ranging from excellent or strongly agree (score of 5) to poor or strongly disagree (score of 1) related to health status or environmental factors, respectively. The choices ranged from 5 to 1 for the positive statements and the reverse for the negative statements. The average scores for the determinants were graded as excellent or strongly agree (4.50 - 5.00), good or agree (3.50 - 4.49), neutral or uncertain (2.50 - 3.49), bad or disagree (1.50 - 2.49), and worst or strongly disagree (1.00 - 1.49), respectively.

3.3. Validity and Reliability of the Instruments

Content validity was determined by five experts involved in the area of health-service systems; the experts had an agreement level of ≥ 80 percent. Item analysis was conducted via the contrast-group approach, with a T-value ≥ 2.0 . The reliability test revealed a Cronbach's alpha coefficient of 0.92, 0.89, and 0.94 for the environmental factors, health status, and health-service systems, respectively (14, 15).

3.4. Data Analysis

Analyses were conducted using SPSS for descriptive and multivariate statistics, including Pearson product-moment correlation and stepwise multiple regression. The Pearson product-moment correlation was used for checking our assumptions, which were comprised of the multicollinearity among the predicting factors and the correlation between the dependent variable and the predicting factors. The stepwise multiple regression analysis was used for creating the predicting equations; this technique was able to obtain parsimonious predicting equations by selecting the significant variables in the equations (16). Prediction equations were then formulated. The multicollinearity analyses revealed < 0.70 , thus indicating that the correlation among the independent variables was not an issue.

4. Results

4.1. Socio-Demographic Data

The descriptive analyses for the socio-demographic data among (i) the clients and (ii) the healthcare providers in each country are shown in Table 2, respectively.

4.1.1. Clients

4.1.1.1. Thailand

Of the 402 client participants, 58.7 percent were male and 41.3 percent were female; 43.3 percent were in the 20 - 40 years range; 96.5 percent had had some form of education at different levels, including primary school (34.3 percent), secondary school/high school vocational certificate/diploma (28.6 percent), or a bachelor's degree or higher (33.6 percent). Fifty-six percent were married. Nearly two-fifths (39.6 percent) were employees or agriculturists. Fifty-eight percent had a household income of more than US\$156 per month. Just under seven-tenths (68.9 percent) noted that they could easily access the health services of their local hospitals. In terms of coverage, 40.7 percent opted for government-provided universal health coverage, while 12.4 percent had to pay for healthcare themselves. The vast majority (99.3 percent) preferred to use

conventional medicine, and 73.1 percent chose a service from the general hospital. The participants stated that the functional aspects of the health-service systems that should be improved included healthcare staff (24.6 percent), medical staff (21.9 percent), and health-service access (21.1 percent).

4.1.1.2. Laos

Of the 402 clients, 52.7 percent were male and 47.3 percent were female; 57 percent were 20 - 40 years of age. Two-thirds (66.4 percent) were educated: at the primary-school (28.1 percent), secondary school/high vocational certificate/diploma (34.3 percent), or bachelor's degree or higher levels (4.0 percent). Forty-six percent were married. Just over half (52.5 percent) were employees/agriculturists, and 82.3 percent had a household income of less than US\$156 per month. Nearly two-thirds (63.7 percent) could easily access hospital health services, and 52.5 percent paid for healthcare themselves. Nearly all (99.3 percent) preferred to use conventional medicine, and 75.9 percent chose the services of general hospitals. The participants' opinions of the aspects of the health-service systems that should be improved included medical staff (28.1 percent) and medical instruments/devices (20.9 percent).

4.1.1.3. Vietnam

Of the 331 clients, 48.0 percent were male and 52.0 percent were female; 59.5 percent were 20 - 40 years of age. Almost all (99.1 percent) had been educated: at the primary-school (26.6 percent), secondary school/high vocational certificate/diploma (25.4 percent), or bachelor's degree or higher levels (47.1 percent). Roughly two-thirds (64.7 percent) were married; 45.9 percent were employees/agriculturists. Nearly two-thirds (64 percent) had a household income of less than US\$156 per month, whereas a third (33.8 percent) earned US\$156 - \$312 per month. Around four-fifths (81.9 percent) could easily access hospital health services. Just under two-fifths (38.4 percent) used government-provided universal health coverage, while 22.7 percent had to pay themselves. Most (98.5 percent) preferred to use conventional medicine, and 67.6 percent chose the services of general hospitals. The opinions of the aspects of health-service systems that should be improved included healthcare staff (24.5 percent), medical staff (17.5 percent), and medical instruments/devices (17.5 percent).

4.1.1.4. Cambodia

Of the 320 Cambodian clients, 83.8 percent were male and 16.2 percent were female; 79.1 percent were 40 - 60 years of age. Almost all (96.2 percent) were educated: at the primary school (83.4 percent), secondary school/high

vocational certificate/diploma (10.0 percent), or bachelor's degree or higher levels (2.8 percent). The majority (84.1 percent) were married; 58.4 percent worked as employees/agriculturists. Nearly four-fifths (78.1 percent) had a household income ranging from US\$156 to \$468 per month, whereas 21.9 percent earned less than US\$156 per month. Only 3.8 percent could easily access health services at local hospitals, and 95.3 percent paid for healthcare themselves. Almost all (96.6 percent) preferred to use conventional medicine, and 93.1 percent chose the services of general hospitals. Their opinions about the aspects of the health-service systems that should be improved included medical instruments/devices (55.6 percent), healthcare staff (19.4 percent), and medical costs (13.8 percent).

4.1.2. Providers

4.1.2.1. Thailand

Of the 60 providers, 28.3 percent were male and 71.7 percent were female. Fifty percent were 20 - 40 years of age. Most of the participants were nurses (35.0 percent) or assistant nurses (35.0 percent). The most common educational backgrounds were diploma/bachelor's degree or higher (81.7 percent). Nearly four-fifths (77.6 percent) earned US\$312 - \$936 or more per month.

4.1.2.2. Laos

Of the 60 providers, 23.3 percent were male and 76.7 percent were female. Nearly half (49.3 percent) were in the 40 - 60 years of age range. Most of the participants were nurses (48.3 percent) or assistant nurses (36.7 percent). The most common educational backgrounds were diploma/bachelor's degree or higher (71.6 percent); 96.7 percent earned less than US\$312 per month.

4.1.2.3. Vietnam

Of the 69 providers, 42.0 percent were male and 58.0 percent were female; 63.8 percent were in the 20 - 40 years of age range. Most of the participants were nurses (29.1 percent) or assistant nurses (24.6 percent). The most common educational background was diploma/bachelor's degree or higher (73.9 percent). Just over half (52.2 percent) had an income ranging from US\$312 - \$936 per month.

4.1.2.4. Cambodia

Of the 30 Cambodian providers, 33.3 percent were male and 66.7 percent were female; 56.7 percent were in the 20 - 40 years of age range. Most of the participants were nurses (26.7 percent) or assistant nurses (46.7 percent). The most common educational backgrounds were senior high school (96.7 percent) and diploma/bachelor's degree (3.3 percent). Most (93.3 percent) earned less than US\$312 per month.

4.2. Prediction of Health-Service-System Quality and Health Status

A stepwise multiple regression analysis of the clients' perceptions of (i) the quality of the health-service system and (ii) health status, as well as (iii) the healthcare providers' perception of the health status in each country, demonstrated the following.

4.2.1. Clients' Perceptions of Health-Service-System Quality: Predictions From the Variables

Various factors were significantly related to the clients' perceptions of the quality of their health-service systems (Table 4), as follows.

4.2.1.1. Thailand

The attitudes about the internal determinants and medical information and technology could significantly predict health-service-system quality at 15.7 percent (R^2 change = 0.157, β = 0.328) and 3.9 percent (R^2 change = 0.039, β = 0.209), respectively. Both determinants could synergistically predict health-service-system quality at 19.6 percent (R^2 = 0.196), with a statistical significance of $P < 0.001$.

4.2.1.2. Laos

The internal determinants were the only factors that could significantly predict health-service-system quality, at 13.1 percent (R^2 = 0.131, $P < 0.001$).

4.2.1.3. Vietnam

Three factors were related to health-service-systems quality, two of which were external determinants, including societal/cultural values and medical information/technology; these could predict health-service-system quality, at 12.8 percent (R^2 change = 0.128, β = 0.251) and 1.5 percent (R^2 change = 0.015, β = 0.139), respectively. The third factor was the internal determinants that could predict health-service-system quality, at 2.9 percent (R^2 change = 0.029, β = 0.147). All of the determinants could synergistically predict health-service-system quality, at 17.2 percent (R^2 = 0.172), with a statistical significance of $P < 0.001$.

4.2.1.4. Cambodia

Internal determinants were the only factors that could significantly predict health-service-system quality, at 59.2 percent (R^2 = 0.592, $P < 0.001$).

4.2.2. Clients' Perceptions of Health-Status Prediction From the Variables

The factors significantly related to the clients' perception of health status (Table 5) were as follows.

4.2.2.1. Thailand

Medical information and technology, and the living and working environment, could predict health status, at 4.0 percent (R^2 change = 0.040, β = 0.182) and 3.3 percent (R^2 change = 0.033, β = 0.181), respectively. Both determinants could synergistically predict health status, at 7.3 percent (R^2 = 0.073), with a statistical significance of $P < 0.001$.

4.2.2.2. Laos

Medical information and technology, and trade and investment, could all predict health status, at 15.1 percent (R^2 change = 0.151, β = 0.325) and 1.0 percent (R^2 change = 0.010, β = 0.118), respectively. Both determinants were co-effective in significantly predicting health status, at 16.1 percent (R^2 = 0.161, $P < 0.001$).

4.2.2.3. Vietnam

Internal determinants, and societal and cultural values, could predict health status, at 10.3 percent (R^2 change = 0.103, β = 0.272) and 1.2 percent (R^2 change = 0.012, β = 0.121), respectively. These determinants could synergistically predict health status, at 11.5 percent (R^2 = 0.115), with a statistical significance of $P < 0.001$.

4.2.2.4. Cambodia

Internal determinants were the only factors that could significantly predict health status, at 67.9 percent (R^2 = 0.679, $P < 0.001$).

4.2.3. Healthcare Providers' Perceptions of Health Status: Predictions From the Variables

The factors that significantly related to the healthcare providers' perception of health status (Table 6) were as follows.

4.2.3.1. Thailand

The living/working environment was the only factor that could significantly predict health status, at 11.0 percent (R^2 = 0.110, $P < 0.01$).

4.2.3.2. Laos

Societal/cultural values, and medical information/technology, could both predict health status, at 15.0 percent (R^2 change = 0.150, β = 0.390) and 7.1 percent (R^2 change = 0.071, β = 0.226), respectively. Both determinants could synergistically predict health status, at 22.1 percent (R^2 = 0.221), with a statistical significance of $P < 0.001$.

4.2.3.3. Vietnam

The living/working environment was the only determinant that could significantly predict health status, at 8.2 percent (R^2 = 0.082, $P < 0.05$).

4.2.3.4. Cambodia

None of the factors significantly related to the healthcare providers' health status.

5. Discussion

5.1. Comparison of Socio-Demographic Factors

Our comparison of the socio-demographic factors among the groups of clients and healthcare providers in Thailand, Laos, Vietnam, and Cambodia revealed several similarities and differences overall, as follows.

5.1.1. Clients

In terms of gender, more participants were males (83.8 percent) in Cambodia compared to other countries (range: 48.0 - 58.7 percent). Most of the participants (43.3 - 59.5 percent) were between 20 - 40 years of age, except in Cambodia, where just under four-fifths (79.1 percent) were older, ranging between 40 - 60 years. Non-educated clients (33.6 percent) were found to be more prevalent in Laos, and a lower education level was also found in Cambodia (83.4 percent). Most participants were employees. The lowest household incomes (earning less than US\$156) were found among Lao clients (82.3 percent). Most of the participants (63.7 - 81.9 percent) could easily access health services at hospitals, except for Cambodian clients (3.8 percent). Most Thai and Vietnamese clients opted for the government-provided universal health coverage, while almost all of the Cambodian clients (95.3 percent) paid their own healthcare expenses. Most participants had similar opinions about the aspects of the health-service system that should be improved, including medical/healthcare staff and medical instruments/devices.

5.1.2. Healthcare Providers

We found few differences in the overall socio-demographic data. It appears that providers in Lao and Cambodia had smaller household incomes than those in Thailand and Vietnam.

5.2. Determinants That Best Predict Health-Service Systems and Health Status

5.2.1. Determinants That Best Predict Health-Service-System Quality and Health Status: Clients' Attitudes and Perceptions

5.2.1.1. Thailand

The findings suggested that the participants' beliefs about better health-service systems included improving

hospitals' strengths/weaknesses and medical information/technology. The strengths and weaknesses of the hospital in the study included medical staff and equipment, budget, service quality, and hospital administration and management. These factors were functional aspects that affected health-service-system quality and healthcare organizations. Medical information/technology was considered to be essential for applying health services and for increasing the capacity of service delivery and the development of health-service systems. In other words, advances in medical information and technology may be a strategic tool of the health-service industry that will ultimately increase competition, which may lead to significant changes in the socio-cultural environment of the healthcare and health-service systems of a given country. The findings of related studies conducted in other countries have shown that the availability and usage of medical information and technological advances directly affects living and health standards (17, 18).

The best predictors of the health status of Thai clients included medical information/technology and the living/working environment, as shown in a previous study (11). In addition, our study also revealed that medical information/technology is a predictor for both health-service-system quality and health status among the perceptions of Thai clients.

5.2.1.2. Laos

Different determinants affected the perceptions of Lao clients about health-service-system quality and health status. The clients believed that the strengths and weaknesses of the hospital affected their health-service systems, and that the functional aspects of hospitals' strengths and weaknesses should be improved.

Medical information and technology, and trade and investment, were the best predictors of the health status of Lao clients; trade and investment was another predictor that differed from the opinions of the Thai clients. Trade and investment included questions about the impact of economic and investment policy (and the development of industry) on health-service-system quality and health access. In terms of functional aspects, the availability of medical information/technology and trade/investment were found to affect hospitals' and services' strengths and weaknesses, which then resulted in impacts on health status. These findings are related to Jaikamwong et al.'s study, which revealed that 30 percent of the clients who visited border-community hospitals in the upper-northern part of Thailand were from Laos (19).

5.2.1.3. Vietnam

Societal and cultural values, the internal determinant, and medical information and technology synergistically predicted health-service systems. This could be explained by the fact that Vietnam experienced a change in its socio-culture and in its economy and health-service systems during the country's developmental period, especially in its urban areas; however, the country's health-service systems could not support the high volume of clients who migrated in increasing numbers from rural to urban areas for work in companies and factories.

The determinants that best predicted the health status of Vietnamese clients were the internal determinants and societal/cultural values. Our study also revealed that hospitals' strengths/weaknesses and general societal/cultural values were co-predictors of both health-service-system quality and health status.

5.2.1.4. Cambodia

The only similar determinant that best predicted both health-service-system quality and health status were the internal determinants, which may mean that Cambodian clients believed that hospitals' strengths and weaknesses affected the quality of health-service systems and health status. This finding is consistent with Arunanondchai et al.'s study, which reported that most Cambodian patients who sought treatment abroad chose hospitals in Thailand or Singapore (20).

5.2.2. Determinants that best predict health status about healthcare providers' attitudes and perceptions

5.2.2.1. Thailand

The best predictor of the providers' health status was the living and working environment, as shown in a previous study (13). Our finding was similar to the Thai clients' perception, although we did find a difference in the attitudes and perceptions of health status between the Thai clients and providers vis-a-vis medical information and technology. It is possible that because Thai providers with higher education and greater opportunity may easily access and make use of medical information and technology, this determinant was not an issue that would affect their health status.

5.2.2.2. Laos

Societal/cultural values and medical information/technology were the two factors that synergistically predicted the providers' health status, whereas medical information/technology and trade/investment could predict the clients' health status. This might have been because the lower-income Lao clients were more concerned about their economic condition, whereas the Lao

providers believed that the change and development of societal and cultural values had a greater impact on health status. Many studies have revealed that the most important success factor related to the health and well-being of Laos includes the lifestyle and culture of the community: for example, herbal usage and traditional treatments using simple technology available to the community (21-23). Modernization and globalization, however, have resulted in changes in society and culture. Today, Lao people's lives are more complicated than they were in the past, with various new cultural dimensions influencing their lifestyles (24, 25).

5.2.2.3. Vietnam

The living and working environment was the best predictor for providers' health status, while internal determinants and societal/cultural values could best predict clients' health status. This predictor of health status was similar to the Thai providers' attitudes and perceptions, which could be explained by the fact that providers in Thailand and Vietnam with higher education and a greater understanding of the healthcare system and greater opportunity can easily access healthcare-service systems for their health; they also know that the living and working environment can affect their health status.

5.2.2.4. Cambodia

We found no apparent variable to predict the providers' health status; this result might have been affected by the small number of providers ($n = 30$) in the Cambodian sample.

5.2.3. Stepwise Multiple Regression Analysis Results

The results of the stepwise multiple regression analysis showed a few similarities and differences in the perceptions of health-service-system quality and health-status prediction from the particular variables in these four countries. Although the determinants could significantly predict health-service-system quality and health status, in the regression model in this study, the determinants did not produce a powerful R^2 in the overall range from 0.040 - 0.679. This may have been caused by the broad content in the questionnaires and variations in the attitudes and perceptions among the participants; this facet of the study requires further particular and comprehensive study.

In conclusion, the different and similar determinants with various levels of impact on health-service-system quality and health status were as follows:

Societal and cultural values affected health-service-system quality and the health status of the people of Vietnam and Laos.

Trade and investment affected health status in the perception of the Lao clients only.

Medical information and technology were seen to affect health-service-system quality and health status in some of these countries, such as the impacts on the health-service systems of Thailand and Vietnam and the health status of the people of Thailand and Laos.

The living and working environment seemed to affect the health status of people in Thailand and Vietnam.

Hospitals' strengths and weaknesses were shown to have a prominent impact on the health-service systems of all four countries; they also had an effect on the health status of the people of Vietnam and Cambodia.

In order to achieve the socially and environmentally sustainable development of the GMS nations' healthcare sectors, it is necessary to identify and highlight the impact of relevant (and variable) issues on the procurement of healthcare policies and strategic settings related to the health-service systems and health status in one's own country. Because this study did have a few limitations, including the fact that the samples only represented participants from a few local hospitals in each country, we recommend that further studies and comprehensive system-wide reviews should be conducted in order to determine the relevant determinants in greater detail and with greater specification; such studies should represent entire countries, rather than selections in each country.

Table 2. Socio-Demographic Data on the Clients Classified by Gender, Age, Education Level, Marital Status, Occupation, Household Income, Access to Health Services, Payment of Medical Services, and Healthcare Sought, as well as the Aspects of the Health-Service Systems That Need Improvement

Socio-Demographics	Number of Subjects (%)			
	Thailand (n = 402)	Laos (n = 402)	Vietnam (n = 331)	Cambodia (n = 320)
Gender				
Male	236 (58.7)	212 (52.7)	159 (48.0)	268 (83.8)
Female	166 (41.3)	190 (47.3)	172 (52.0)	52 (16.2)
Age, y				
20 - 40	174 (43.3)	229 (57.0)	197 (59.5)	67 (20.9)
41 - 60	166 (41.3)	142 (35.3)	93 (28.1)	253 (79.1)
>61	62 (15.4)	31 (7.7)	41 (12.4)	-
Education Level				
None	14 (3.5)	135 (33.6)	3 (0.9)	12 (3.8)
Primary school	138 (34.3)	113 (28.1)	88 (26.6)	267 (83.4)
Sec. school/vocational cert/diploma	115 (28.6)	138 (34.3)	84 (25.4)	32 (10.0)
Bachelor's degree or higher	135 (33.6)	16 (4.0)	156 (47.1)	9 (2.8)
Marital status				
Single	126 (31.3)	186 (46.3)	104 (31.4)	40 (12.5)
Married	225 (56.0)	185 (46.0)	214 (64.7)	269 (84.1)
Divorced/separated	51 (12.7)	31 (7.7)	13 (3.9)	11 (3.4)
Occupation				
Civil servant/public enterprise worker	81 (20.1)	86 (21.4)	76 (23.0)	18 (5.6)
Employee/agriculturist	159 (39.6)	211 (52.5)	152 (45.9)	187 (58.4)
Entrepreneur	99 (24.6)	79 (19.6)	52 (15.7)	115 (36.0)
Retired/unemployed	63 (15.7)	26 (6.5)	51 (15.4)	-
Household income per month (US\$)				
< 156	169 (42.0)	331 (82.3)	212 (64.1)	70 (21.9)
156 - 468	122 (30.4)	68 (16.9)	112 (33.8)	250 (78.1)
468 - 936	46 (11.4)	2 (0.5)	7 (2.1)	-
936 - 1,560	42 (10.5)	1 (0.3)	-	-
> 1,560	23 (5.7)	-	-	-
Access to health services				
Convenient	277 (68.9)	256 (63.7)	271 (81.9)	12 (3.8)
Inconvenient	125 (31.1)	146 (36.3)	60 (18.1)	308 (96.2)
Medical service payment method				
Out-of-pocket	50 (12.4)	211 (52.5)	75 (22.7)	305 (95.3)
Social Security Scheme (SSS)	79 (19.7)	118 (29.4)	106 (32.0)	12 (3.8)
Private health insurance	15 (3.7)	29 (7.2)	19 (5.7)	3 (0.9)
Universal health-care coverage schemes (US)	164 (40.8)	39 (9.7)	127 (38.4)	-
Civil servant and public enterprise workers medical benefit schemes (CSMBSS)	94 (23.4)	5 (1.2)	4 (1.2)	-
Healthcare sought				
Traditional medicine	3 (0.7)	3 (0.7)	5 (1.5)	11 (3.4)
Conventional medicine	399 (99.3)	399 (99.3)	326 (98.5)	309 (96.6)
Clinics	26 (6.5)	51 (12.7)	16 (4.8)	11 (3.4)
Primary-care unit	45 (11.2)	-	37 (11.2)	-
General hospital	294 (73.1)	305 (75.9)	220 (66.5)	298 (93.1)
Specialized hospital	34 (8.5)	43 (10.7)	53 (16.0)	-
Aspects of health-service systems that need improvement				
Health-service access	85 (21.2)	60 (14.9)	44 (13.3)	17 (5.3)
Medical staff	88 (21.9)	113 (28.1)	58 (17.5)	6 (1.9)
Healthcare staff	99 (24.6)	57 (14.2)	81 (24.5)	62 (19.4)
Medical instruments/devices	43 (10.7)	84 (20.9)	58 (17.5)	178 (55.6)
Quality of service	62 (15.4)	59 (14.7)	47 (14.2)	13 (4.1)
Medical cost	25 (6.2)	29 (7.2)	43 (13.0)	44 (13.7)

Table 3. Socio-Demographic Data on the Healthcare Providers Classified by Gender, Age, Occupation, Educational Level, and Household Income

Socio-Demographics	Number of Subjects (%)			
	Thailand (n = 60)	Laos (n = 60)	Vietnam (n = 69)	Cambodia (n = 30)
Gender				
Male	17 (28.3)	14 (23.3)	29 (42.0)	10 (33.3)
Female	43 (71.7)	46 (76.7)	40 (58.0)	20 (66.7)
Age, y				
20 - 40	30 (50.0)	30 (50.0)	44 (63.8)	17 (56.7)
41 - 60	29 (48.3)	29 (48.3)	24 (34.8)	12 (40.0)
61+	1 (1.7)	1 (1.7)	1 (1.4)	1 (3.3)
Occupation				
Doctor/dentist	6 (10.0)	5 (8.3)	15 (21.7)	3 (10.0)
Nurse	21 (35.0)	29 (48.3)	20 (29.1)	8 (26.7)
Pharmacist	2 (3.3)	2 (3.3)	6 (8.7)	3 (10.0)
Medical technologist or physical therapist	10 (16.7)	2 (3.3)	11 (15.9)	2 (6.7)
Assistant nurse or other	21 (35.0)	22 (36.7)	17 (24.6)	14 (46.7)
Educational level				
High school	11 (18.3)	17 (28.4)	18 (26.1)	1 (3.3)
Diploma and bachelor's degree	39 (65.0)	41 (68.3)	35 (50.7)	29 (96.7)
Master's degree or PhD	10 (16.7)	2 (3.3)	16 (23.2)	-
Household income per month (US\$)				
< 312	13 (22.4)	58 (96.7)	33 (47.8)	28 (93.3)
312 - 936	29 (50.0)	2 (3.3)	36 (52.2)	2 (6.7)
> 936 - 1,560	8 (13.8)	-	-	-
> 1,560	8 (13.8)	-	-	-

Table 4. Stepwise Multiple Regression Analysis of the Clients' Perceptions of Health-Service-System Quality: Predictions From Particular Variables^a

Variables	R	R ²	R ² Change	S.E. est	F	B	Beta	t	a
Thailand (n = 402)									
				3.512					27.023
Internal determinant	0.396	0.157	0.157		74.256 ^b	0.450	0.328	6.926 ^b	
Medical information and tech	0.442	0.196	0.039		48.542 ^b	0.729	0.209	4.406 ^b	
Laos (n = 402)									
				1.565					63.273
Internal determinant	0.362	0.131	0.131		60.288 ^b	0.394	0.362	7.765 ^b	
Vietnam (n = 331)									
				4.157					27.505
Societal and cultural values	0.357	0.128	0.128		48.082 ^b	0.939	0.251	4.430 ^b	
Internal determinant	0.396	0.157	0.029		30.431 ^b	0.483	0.147	2.350 ^c	
Medical information and tech.	0.414	0.172	0.015		22.584 ^b	0.192	0.139	2.443 ^c	
Cambodia (n = 320)									
				5.259					12.352
Internal determinant	0.769	0.592	0.592		91.077 ^b	1.172	0.742	14.900 ^b	

^a Clients' perceptions of health-service-system quality: Thailand, $Y = 27.023 + 0.450$ (Internal determinant) + 0.729 (Medical information and technology), $Z^2 = 0.328$ (Internal determinant) + 0.209 (Medical information and technology); Laos, $Y = 63.273 + 0.394$ (Internal determinant), $Z^2 = 0.362$ (Internal determinant); Vietnam, $Y = 27.505 + 0.939$ (Societal and cultural values) + 0.483 (Internal determinant) + 0.192 (medical information and technology); $Z^2 = 0.251$ (Societal and cultural values) + 0.147 (Internal determinant) + 0.139 (medical information and technology); Cambodia, $Y = 12.352 + 1.172$ (Internal determinant), $Z^2 = 0.742$ (Internal determinant).

^b $P < 0.001$.

^c $P < 0.05$.

Table 5. Stepwise Multiple Regression Analysis of the Clients' Perceptions of Health Status: Prediction From Particular Variables^a

Variables	R	R ²	R ² Change	S.E. est	F	B	Beta	t	a
Thailand (n = 402)				4.057					50.549
Medical information and tech	0.200	0.040	0.040		16.744 ^b	0.622	0.182	3.746 ^b	
Living and working environment	0.270	0.073	0.033		15.643 ^b	0.579	0.181	3.741 ^b	
Laos (n = 402)				3.072					82.066
Medical information and tech	0.388	0.151	0.151		71.030 ^b	0.926	0.325	6.012 ^b	
Trade and investment	0.401	0.161	0.010		38.240 ^b	0.430	0.118	2.186 ^b	
Vietnam (n = 331)				3.715					36.184
Internal determinant	0.320	0.103	0.103		37.623 ^b	0.374	0.272	4.793 ^b	
Societal and cultural values	0.339	0.115	0.012		21.293 ^b	0.451	0.121	2.134 ^c	
Cambodia (n = 320)				2.991					23.466
Internal determinant	0.824	0.679	0.679		132.573 ^b	0.720	0.711	16.087 ^b	

^a Clients' perception of health status: Thailand, $Y' = 50.549 + 0.622(\text{medical information and technology}) + 0.579(\text{living and working environment})$; $Z' = 0.182(\text{medical information and technology}) + 0.181(\text{living and working environment})$; Laos, $Y' = 82.066 + 0.926(\text{medical information and technology}) + 0.430(\text{trade and investment})$; $Z' = 0.325(\text{medical information and technology}) + 0.118(\text{trade and investment})$; Vietnam, $Y' = 36.184 + 0.374(\text{internal determinant}) + 0.451(\text{Societal and cultural values})$; $Z' = 0.272(\text{internal determinant}) + 0.121(\text{societal and cultural values})$; Cambodia, $Y' = 23.466 + 0.720(\text{internal determinant})$; $Z' = 0.711(\text{internal determinant})$.

^b $P < 0.001$.

^c $P < 0.05$.

Table 6. Stepwise Multiple Regression Analysis of the Providers' Perceptions of Health Status: Predictions From Particular Variables (Excludes Cambodia)^a

Variables	R	R ²	R ² Change	S.E. est	F	B	Beta	t	a
Thailand (n = 60)				6.147					59.548
Living and working environment	0.332	0.110	0.110		7.166 ^b	0.922	0.332	0.677 ^b	
Laos (n = 60)				27.714					94.212
Society and cultural values	0.388	0.150	0.150		10.258 ^b	3.702	0.390	3.332 ^b	
Medical information and tech.	0.470	0.221	0.071		8.096 ^c	2.224	0.266	2.278 ^d	
Vietnam (n = 69)				3.248					53.797
Living and working environment	0.286	0.082	0.082		5.987 ^d	0.516	0.286	2.447 ^c	

^a Providers' perception of health status: Thailand, $Y' = 59.548 + 0.922(\text{living and working environment})$; $Z' = 0.332(\text{living and working environment})$; Laos, $Y' = 94.212 + 3.702(\text{societal and cultural values}) + 2.224(\text{medical information and technology})$; $Z' = 0.390(\text{societal and cultural values}) + 0.266(\text{medical information and technology})$; Vietnam, $Y' = 53.797 + 0.516(\text{living and working environment})$; $Z' = 0.286(\text{living and working environment})$.

^b $P < 0.01$.

^c $P < 0.001$.

^d $P < 0.05$.

Footnotes

Authors' Contribution: The corresponding author developed the original idea and the protocol, abstracted and analyzed the data, and wrote the manuscript. The other authors helped collect data and write some parts of discussions.

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