

An exploratory factor analysis of core competencies of public health professionals at primary care service level in Northeastern Thailand

SAGE Open Medicine

Volume 8: 1–9

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DOI: 10.1177/2050312120940531

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Abstract

Background: Public health professionals play a significant role in primary care services in Thailand. Although efforts are being taken to establish professional standards it has neither been outlined nor been officially announced. There is a lack of understanding of what is a suitable set of core competencies for a public health professional.

Objectives: This study aimed to explore the core competencies of public health professionals at the primary care service level in Thailand.

Methods: A quantitative survey using a questionnaire was conducted in 862 public health professionals in the northeast of Thailand. Exploratory factor analysis was applied to develop a tool to test the competencies of public health professionals.

Results: The results revealed core competencies in the following five main proficiencies: (1) public health administration and laws; (2) disease prevention and control; (3) social and environmental determinant of health and health research; (4) health promotion and community; and (5) basic medical care, screening, and diagnosis. In addition, the five core competencies included 50 items suitable for this sample. These factors accounted for 71.90% of the variance.

Conclusion: In conclusion, this study's finding provides significant recommendations to policymakers to improve and initiate a new policy or a standard guideline for public health education and human resource for health production and management in Thailand.

Keywords

Public health education, health professional, core competency, primary health care

Date received: 3 October 2019; accepted: 17 June 2020

Introduction

For over four decades now, competencies and competency models have become an inseparable part of human resource management and have been widely used as a means for increasing personal and organizational efficiencies. Competencies include the collection of success factors necessary for achieving significant results in a specific job or work role in a particular organization. Competency refers to the intellectual, managerial, social, and emotional competency.¹ Competency models are effective measurement tools that help employees to agree on a common language and comprehend what is understood by superior performance. Klemm defined competency as an underlying characteristic of a person which results in effective and/or superior performance of

the job.² In 2006, Caupin Gilles et al. defined competency as a collection of knowledge, personal attitudes, skills, and relevant experiences needed to be successful in a certain function.³

During the past decade, many countries have renewed their interest in the performance of health care systems, the

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competence of health care practitioners, and improvement in quality. In Asia, the World Health Organization Regional Office for South-East Asia (SEARO) recognizes that there are few public health professionals in positions of power and there is an over-medicalization of the health system both in the public and private sectors.⁴ Many health care organizations have proposed standards of competence in their fields, but the acceptance of a unique definition for all professionals is difficult. There is no agreed definition of professional competence in health care activities that encompasses all essential areas of practice. There is a lack of consistency in the terminology regarding competence and the use of the term. The assessment of competence is nevertheless an important factor in developing an ambitious policy of continuous quality improvement in health care.⁵

The competence of public health professionals is a major determinant of provider performance as represented by conformance to various clinical, non-clinical, and interpersonal standards. Measuring competence is essential for determining the ability and readiness of health workers to provide quality services. The low- and middle-income countries seeking to achieve universal health coverage face human resource constraints. These countries encounter a human resource crisis in the health sector in the form of education and training capacities, and it is difficult to narrow the gap between the demands for health workers ability to supply.⁶ Therefore this research is based on the definition by Caupin Gilles et al., where competency such as knowledge, skill, and attitude of public health professionals are needed for superior performance in public health area of primary health care service.

In Thailand, the main health workforce is divided into the following five groups: (1) doctors, (2) dentists, (3) pharmacists, (4) nurses, and (5) public health professionals. The role of a public health professional is improving in the health development and health services, which has received increased attention in recent years. In primary health care services, namely health-promoting hospitals, the positions that have important roles in the work are public health professionals and nurses. The health-promoting hospital has only one public health professional and one nurse. The role of a public health professional works on scholarly activities, epidemiology, environmental health, health education, and behavior, which in turn divide into seven parts including service, academic, communication, support the health service team, develop potential a health support worker, analysis the health trend, and networking.⁷ The number of health-promoting hospitals are 9863 in Thailand and 3482 in Northeastern Thailand. In 2018, the number of public health professionals nationwide were 65,491 people and among them 23,355 work in Northeastern Thailand.⁸

Thailand is planning to produce and develop public health professionals continuously, especially those in primary health care services. In Thailand, strategy for 20 years (public health) determined to develop one in four people to be

excellent in developing the public health area of Thailand, especially producing and developing the health workforces.⁹ Currently, these are the developments of social emphasis on expertise and professionalism in the health workforce to try to develop public health professionalism. This was announced in the Professional Act of Public Health in Thailand in 2013.¹⁰ However, the Office of the Civil Service Commission is determined to set and formulate specification for qualification of work position.¹¹ Although there are efforts to create professional standards these have neither been outlined nor been officially announced. There is a lack of understanding of what the competency, especially the skills of a public health professional, should be.

The objective of this study is to explore the core competencies of public health professional in primary care services in Northeastern Thailand, which is to develop the tool to test the competence of public health professionals.

Materials and methods

Study design and setting

This research is a quantitative cross-sectional survey. The sample survey was conducted by public health professionals in primary health care services from health-promoting hospitals in Northeastern Thailand (20 provinces). A questionnaire survey collected data during October–December 2017.

Sample size and sampling

In Thailand, the population of public health professionals in primary health care services is 65,491 and in Northeastern Thailand it was 23,355. The sample size was calculated based on Krejcie and Morgan formula¹² and the sample size contained 382 respondents. This research collected double the data size of samples, designed for collecting 45 samples per province (20 provinces in Northeastern Thailand) and a total of 900 cases planned for collecting data. This survey had a response rate of 95.78% (862 respondents).

Data collection

The quota sample survey was conducted in Northeastern Thailand to select 900 cases by selecting 45 cases per province. Using a simple random sampling to select cases with a simple procedure of unequal probability sampling without replacement, we selected one public health professional as a representative per a health-promoting hospital. Data were collected by sending a self-questionnaire by post and returned to the researcher. Finally, there are 862 respondents.

The questions were developed from the literature review and synthetic review approach from the conceptual framework in the previous topics from six sources. The comparison of competencies of public health professionals demonstrates the different standpoints concern in the competencies. The

standpoints were classified into two groups: Group 1 educational institutions constituting (1) The Council on Linkages Between Academia and Public Health Practice¹³ and Group 2 consisted of the following public health organizations: (1) World Health Organization (WHO) Regional Office for the Western Pacific,¹⁴ (2) WHO Regional Office for Europe,¹⁵ (3) Centers for Disease Control and Prevention (CDC),¹⁶ (4) The Professional Act of Public Health in Thailand,¹⁰ and Ministry of Public Health, Thailand.⁷ The above-mentioned core competencies are shown in Table 1. We synthesize and categorize the data to develop a framework for study and the present appropriate competencies of public health professional framework were found to have six domains and 50 items including the following: (1) epidemiology and surveillance (seven items); (2) health promotion and control (seven items); (3) public health administration and health system (17 items); (4) disease diagnoses and basic treatment (six items); (5) biostatistics and public health research (seven items); and (6) social determinant of health, environmental health, and occupational health and safety (six items).

The questionnaire was tested for content validity by five experts, with the straightness of 0.845 and tested for reliability using 50 tools, with the Cronbach's alpha coefficient equal to 0.992.

The final version of the questionnaire was divided into the following two parts: Part 1, general characteristics data, includes sex, age, education, work experience, and workplace; and Part 2 includes competencies of public health professionals in Thailand using the 50 items to support the seven aspects, namely epidemiology and surveillance, health promotion and control, public health administration and health system, disease diagnoses and basic treatment, biostatistics and public health research, environmental health and occupational health and safety, and social determinant of health and population (refer "Supplemental material").

Data analysis

Descriptive statistics were used to analyze the general characteristics of the data. An exploratory factor analysis (EFA) using the principal component method was performed on the intercorrelations among the mean scores of the competency items. To extract the number of factors, the authors submitted the original 50 items. A principal component factor analysis using Varimax rotation was completed to investigate the skill competencies of public health professionals. The value of Kaiser–Meyer–Olkin (KMO) was 0.983 and Bartlett's Test of Sphericity was found to be significant. The analyzed factor loading shows the variance defined by the variable on that particular factor. The software used for data analyses was SPSS Statistics version 18.0.

Ethical consideration

The study was approved by the Mahasarakham University Ethics Committee for Research Involving Human Subjects

(053/2017). The written informed consent was obtained from all study participants.

Results

General characteristics

Among the 862 public health professionals, as public health practitioners, 582 (67.50%) were females, and 280 (32.50%) were males. Ages ranged from 21 to 59 years, with an average age of 37.72 years (SD=10.833). The majority of the sample (83.60%) had a bachelor's degree in public health. The work experience for more than 20 years was 31.19%, all work in health-promoting hospitals as a primary health care service in Northeastern Thailand, with work distributed in 20 provinces as shown in Table 2.

EFA

Following an examination of eigenvalues and the Scree plot produced by SPSS, a five-factor solution emerged initially. There are 50 items included for the skill competencies of a public health professional. Data analysis used EFA. The suitability analyzed by KMO is 0.983 and Bartlett's Test of Sphericity was found to be significant.

Eigenvalues of 59.32, 5.10, 3.08, 2.30, and 2.11 were observed for the five factors. The analysis reveals five factors accounting for 71.90% of the variance. The first factor, which included 18 items, accounted for 22.76% of the variance. The second factor, which included 12 items, accounted for 18.29% of the variance. The third, fourth, and fifth factors, which included 12, 5, and 3 items, accounted for 15.29%, 8.88% and 6.68% of the variance, respectively, as shown in Table 3.

Table 4 shows each item's loading on the five extracted factors. As noted earlier, items with factor loadings below .450 were eliminated from the model based on a priori stipulations informed by previous psychometric research.¹⁷ The first factor that emerged contained 18 items and is named as "Public health administration and laws." As noted in Table 4, items S14–S31 were loaded on factor 1. Factor loadings ranged with a high of .76 on item S24 ("Health workforce status evaluation") and factor loadings ranged with a low of .50 on item S14 ("Planning strategies, activities, and projects in health education"). These items included issue-related health workforce (items S24–S28), health finance (item S29), health management (items S23, S30, S31), health policy and law (items S16, S17, S19), and health care service administration (items S14, S15, S18, S20, S21, S22, S27). Each of these items refers to the skill competency of public health professionals related to public health administration and laws.

The second factor, disease prevention and control, included the following 12 items: S1–S8 and S10–S13. Factor loadings ranged with a high of .788 on item S5 ("disease outbreaks investigation") and factor loadings ranged with a

Table 1. Comparison of core competencies of the public health professional.

The council on linkages between academia and public health practice	WHO regional office for the Western Pacific	WHO regional office for Europe	Centers for disease control and prevention	The professional act of public health in Thailand	Ministry of public health, Thailand
1. Analytical/Assessment skills	1. Health situation monitoring and analysis	1. Surveillance of population health and well-being	1. Monitor health status to identify and solve community health problems	1. Support health education and consultation to health promotion, disease prevention, health control, basic treatment, and rehabilitation for patient	1. Public health service delivery Management
2. Policy Development/Program planning skills	2. Epidemiological surveillance/disease prevention and control	2. Monitoring and response to health hazards and emergencies	2. Diagnose and investigate health problems and health hazards in the community	2. Apply sciences to practicing for occupational health and environmental health to controlling health risk factors	2. Technology and research
3. Communication skills	3. Development of policies and planning in public health	3. Health protection, including environmental, occupational and food safety and others	3. Inform, educate, and empower people about health issues	3. Diagnosis and assessing the health to basic treatment for patients	3. Communication and public relation
4. Cultural competency skills	4. Strategic management of health systems and services for population health gain	4. Health promotion, including action to address social determinants and health inequity	4. Mobilize community partnerships to identify and solve health problems	4. Supporting to health service	4. Supporting health service
5. Community dimensions of practice skills	5. Regulation and enforcement to protect public health	5. Disease prevention, including early detection of illness	5. Develop policies and plans that support individual and community health efforts	5. Inform health education	5. Inform health education
6. Public health sciences skills	6. Human resources development and planning in public health	6. Assuring governance for health	6. Enforce laws and regulations that protect health and ensure safety	6. Development and data management	6. Development and data management
7. Financial planning	7. Health promotion, social participation and empowerment	7. Assuring a competent public health workforce	7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable	7. Coordinating and empowerment in community	7. Coordinating and empowerment in community
8. Leadership and systems thinking skills	8. Ensuring the quality of personal and population-based health services	8. Assuring organizational structures and financing	8. Assure a competent public and personal healthcare workforce		
	9. Research, development and implementation of innovative public health solutions	9. Information, communication and social mobilization for health	9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services		
		10. Advancing public health research to inform policy and practice	10. Research for new insights and innovative solutions to health problems		

WHO: World Health Organization.

Table 2. Demographic characteristics.

Demographic characteristics	Number (N=862)	Percentage
Sex		
Male	280	32.50
Female	582	67.50
Age (years); mean = 37.72, SD = 10.833, Min = 21, Max = 59		
Education status		
Bachelor degree	720	83.60
Master degree	137	15.90
Doctoral degree	5	0.60
Work experience		
Less than 5 years	183	21.10
5–10 years	244	28.30
11–20 years	160	18.60
More than 20 years	275	31.90
Respondents in health promoting hospitals of Northeastern Thailand		
Khonkaen province	45	5.22
Roi-et province	42	4.87
Mahasarakham province	45	5.22
Kalasin province	42	4.87
Udonthani province	42	4.87
Sakonkakhon province	43	4.99
Loei province	44	5.10
Nongbaulumphu province	42	4.87
Nong kai province	42	4.87
Bueng Kan province	43	4.99
Nakhonpanom province	41	4.76
Nakhon rachasrima province	45	4.87
Buriram province	42	4.99
Chaiyaphoom province	41	4.76
Surin province	45	5.22
Ubonrachathani province	44	5.10
Srisaket province	45	5.22
Yasothon province	44	5.10
Amnat Charoen province	42	4.87
Mukdaharn province	43	4.99

Table 3. Factors, eigenvalue, percentage of variance, accumulative percentage of variance, and number of items.

Factor	Eigenvalue	Percentage of variance	Accumulative percentage of variance	Number of items
1	59.32	22.76	22.76	18
2	5.10	18.29	41.05	12
3	3.08	15.29	56.34	12
4	2.30	8.88	65.22	5
5	2.11	6.68	71.90	3

low of .476 on item S8 (“health information and health communication”). These items were about epidemiology, disease prevention, disease control and surveillance, and disease prevention and disease control (items S1–S8, S10–S13).

The third factor, social and environmental determinants of health and health research, included 12 items. Factor loadings ranged with a high of .705 on item S47 (“Control of

environmental hazards and pollution”) and factor loadings ranged with a low of .481 on item S39 (“Accessing and sharing health information”). The third factor included items S39–S50. Each of these items refer to the skill competency of public health professionals related to environmental health, occupational health and safety, health risk control, and health research and innovation.

Table 4. Initial EFA factor loadings (N=862).

Items	Components	Factor loading					Communality
		1	2	3	4	5	
S24	Health workforce status evaluation	.765	.216	.216	.129	.216	.742
S25	Health workforce monitoring	.762	.212	.272	.076	.167	.733
S28	Health workforce quality development	.755	.245	.304	.121	.153	.762
S29	Health financing management	.746	.211	.330	.131	.183	.762
S30	Health risk factors management	.730	.259	.309	.167	.197	.761
S26	Health professional education support	.727	.253	.284	.157	.164	.724
S19	Public health laws and regulations announcement	.689	.248	.325	.182	.139	.694
S17	Public health laws support	.672	.316	.324	.140	.088	.683
S23	Health services problems elimination	.653	.293	.256	.268	.152	.673
S31	Health projects management	.650	.283	.272	.240	.244	.694
S18	Public health promotion and preventions development and evaluation	.650	.373	.241	.265	.156	.705
S22	Closing the disparity in health service	.625	.323	.241	.265	.156	.647
S21	Health service system evaluation	.571	.293	.311	.340	.204	.666
S16	Public health policy development	.567	.204	.242	.200	.150	.484
S27	Empowering community participation in health care	.547	.359	.272	.337	.236	.671
S20	Health indicators development and monitoring	.539	.356	.277	.313	.155	.616
S15	Public health services assessment	.505	.367	.297	.194	.277	.593
S14	Planning strategies, activities, and projects in health education	.500	.472	.244	.335	.136	.663
S5	Disease outbreaks investigation	.271	.788	.259	.145	.150	.805
S3	Monitoring and surveillance of communicable and non-communicable disease	.245	.773	.257	.155	.160	.794
S6	Health risk assessment	.301	.767	.253	.154	.160	.793
S7	Surveillance and disease prevention system development	.287	.753	.282	.149	.170	.780
S1	Disease outbreaks control	.252	.746	.295	.157	.182	.766
S2	Health problems analysis	.314	.715	.256	.173	.155	.729
S4	Monitoring of non-communicable diseases and environmental risk factors affecting health	.305	.704	.267	.179	.211	.736
S11	Disease prevention	.294	.610	.184	.460	.140	.723
S13	Disease prevention and control training	.306	.595	.222	.357	.274	.699
S10	Disease prevention activities in the community	.257	.574	.164	.559	.097	.744
S12	Preparedness and response to public health (emergencies)	.373	.530	.209	.366	.222	.647
S8	Health information and health communication	.441	.476	.228	.356	.083	.606
S47	Control of environmental hazards and pollution	.349	.330	.705	.048	.225	.781
S49	Risk factors evaluation in the workplace	.403	.284	.690	.061	.217	.770
S48	Health problems identification in the workplace	.381	.320	.685	.077	.230	.776
S46	Environmental quality monitoring	.315	.366	.679	.097	.275	.778
S45	Preventing illness in the workplace and environment	.323	.361	.663	.211	.198	.758
S50	Socioeconomic and health risk factors analysis	.448	.238	.643	.130	.169	.716
S44	Health innovation development	.415	.267	.638	.342	.114	.781
S42	Ethics in public health research	.377	.223	.633	.401	.099	.764
S43	Health information system improvement	.412	.236	.630	.364	.104	.766
S41	Organizing a healthcare research network	.434	.234	.521	.393	.100	.745
S40	Public health researches development	.415	.213	.564	.432	.079	.728
S39	Accessing and sharing health information	.327	.295	.481	.444	.237	.678
S9	Health promotion	.274	.542	.137	.597	.085	.752
S36	Cooperate with other organizations to support health initiatives in the community	.169	.378	.253	.561	.409	.718
S37	Health situation evaluation	.274	.375	.355	.477	.380	.714
S35	Basic medical rehabilitation	.297	.297	.275	.477	.446	.679
S38	Health information management	.376	.303	.398	.458	.317	.702
S34	Basic medical care	.300	.278	.238	.199	.723	.786
S33	Basic health screening	.342	.287	.235	.167	.717	.797
S32	Basic medical diagnosis	.389	.339	.295	.108	.550	.667

The fourth factor, group of health promotion and community, included five items. The factor included items S9 and S35–S38. Factor loadings ranged with a high of .597 on item S9 (“Health promotion”) and factor loadings ranged with a low of .458 on item S38 (“Health information management”). Each of these items refers to the skill competency of public health professionals related to health promotion such as health promotion in a community (items S9 and S36), rehabilitation of health (item S35), and health information management (items S37 and S38).

The last factor, basic medical care, screening, and diagnosis, included three items. The fifth factor included items S32–S34. Factor loadings ranged with a high of .723 on item S34 (“Basic medical care”) and factor loadings ranged with a low of .550 on item S32 (“Basic medical diagnosis”) as shown in Table 4.

Discussion

This study examined the core competencies of public health professionals in primary care services in Northeastern Thailand. The results are all the more important, given the dearth of public health professional studies in Thailand. Likewise, the results offer support that develops the tool for the test of competence of public health professionals in Thailand. Our data suggested five main subjects: (1) public health administration and laws; (2) disease prevention and control; (3) social and environmental determinant of health and health research; (4) health promotion and community; and (5) basic medical care, screening, and diagnosis.

The first capacity (public health administration and laws) revealed competencies of public health administration and laws and management, including health workforce, health financing, health services, health policy and laws, health product. Previous studies have had similar findings to the Council of Dean of Public Health Education Institute of Thailand that has divided the competencies of public health administration¹⁸ for undergraduate students of the public health program in Thailand. While a study by Buakam et al.,¹⁹ does not include administrative and legal into the same groups but are divided into four groups including the following: group 1 (public health administration); group 2 (policy development); group 3 (public health laws); and group 4 (health system service). A study by Mohd-Shamsudin et al.,²⁰ named a group of assessment, planning, and evaluation into a single group of competencies, in primary care managers in Southern Thailand, as managerial group.

The second core competency (disease prevention and control) deals with the expertise of epidemiology, surveillance, disease investigation, disease prevention, and disease control. The health prevention and control group in the Professional Act of Public Health in Thailand 2013¹⁰ shows that public health professionals have the main function to disease prevention and control and similarly the office of the Civil Service Commission Thailand specified the qualification for

a work position in disease prevention and control for public health professionals in Thailand.¹¹ Likewise, a study by Vukovic et al.,²¹ explored competencies required to perform in public health in employers of public health professionals which revealed that Essential Public Health Operations (EPHO) 5 disease prevention is one from 10 of EPHO.

The third core capacity (social and environmental determinant of health and health research) relates health protection and health risk control from various factors including environmental, occupational, social determinant involving public health research and health innovation development. The health protection competencies are important, likewise study by Kristen et al., proposed competencies and domains regarding the domain of social and environmental determinants of health of global health competencies for medical and nursing students that focused on the understanding that social, economic, and environmental factors are important determinants of health and that health is more than just the absence of disease.²² The aspect of public health research, a study of Van Der Putten et al.²³ revealed the competency of basic research designs and methods in the basic public health science skills domain of public health staffs in Thailand.

The fourth core competency (health promotion and community) appeared to focus on items that are providing health promotion, health evaluation, cooperate with other organizations to support health initiatives in the community, and health information management. The health promotion competency is EPHO 6—Health promotion of EPHO for public health employees in European countries.²¹ In accordant with this factor, a study by Poulton and McCammon²⁴ showed that working with communities is one of the three dimensions of public health competency in public health nursing and similarly Peluso et al.²⁵ found that community competencies is one of the general and local core competencies for global health. While, a study by Gillam et al.²⁶ proposed core public health curriculum aims within the undergraduate medical degree around the faculty of public health domains, in which using health information is one of the public health skill.

Finally, in the fifth core competency (basic medical care, screening, and diagnosis) each of these items refer to basic medical care, basic health screening, and basic medical diagnosis. The Professional Act of Public Health in Thailand 2013¹⁰ requires that public health professionals have a duty to diagnose and provide basic medical care for the patient in primary health care. Following the Guideline for Primary Care Cluster, the public health professionals in health service team in Thailand have specified a role to provide and support basic medical care, basic health screening, and basic medical diagnosis.⁷

However, these five capacities does not match the proposed six domains by conceptual framework, nor did the six domains combine to create five core competencies (i.e., items within domains loaded on different factors). Moreover, only two items loaded on two factors including item S39 (accessing and sharing health information) loaded on factor

3 (.481) and factor 4 (.444) and item S35 (medical care and rehabilitation) loaded on factor 4 (.477) and factor 5 (.446). That demonstrated these factors are not distinct. Our study explored which core competency would be appropriate for the public health professional in Thailand.

Although in academic institutions in many countries, there is a widespread study of the performance of public health professionals. In Thailand, in terms of the development of competencies of public health professionals, there are still limitations and the status is in the initial stage only. Per recommendations for EFAs, the large sample size is a major strength, likely to produce a stable and replicable factor structure. Also, participants were public health professional, diverse provinces from Northeastern Thailand. The next steps utilize the identified five core competencies as a tool for public health professionals' development.

Concerning the limitations of the study, data collection was conducted only in Northern Thailand and may still not be a good representative of all the public health professionals of Thailand. The next step will expand this study to overall area. However, previously, Thailand has not been researched regarding the core competencies of public health professionals. In addition to this study, there are a few items of competencies which should develop for better in further study.

Conclusion

The research found five core competencies and 50 items. The core proficiencies from this research provide an excellent framework for the research in the future such as which core competencies can be synthesized from the analysis by EFA based on the workers' opinions. These clear connections to practice move public health professionals closer to valid competency based on population need and consistent with the actual work.

Lessons for practice includes the following: (1) to provide information for policymakers about the competency of public health professionals and propose policy options to produce public health professionals in Thailand, (2) to reflect the development of public health professionals in terms of the development of work potential and education management guideline, and (3) to recommend policymakers regarding the domain of competency in training and practice for developing public health professionals in Thailand in the future.

Acknowledgements

The authors are very appreciative and grateful for the support received from the Faculty of Public Health, Mahasarakham University, which provided a useful recommendation, instruction, and guidelines to the research.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Ethical approval for this study was obtained from the Mahasarakham University Ethics Committee for Research Involving Human Subject BOARD (053/2017).

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Informed consent

The written informed consent was obtained from all subjects before the study.

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Supplemental material

Supplemental material for this article is available online.

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