

Pharmaceutical public health competencies for Thai pharmacists: A scoping review with expert consultation

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ABSTRACT

Background: Thai pharmacists' roles have increasingly shifted to a system-focused role in providing public health services. A competency framework in this area is essential to workforce development.

Objective: This study aimed to summarize and synthesize the literature on pharmaceutical public health competencies of Thai pharmacists.

Methods: The Scopus, MEDLINE, and Web of Science (Clarivate) databases were searched. The search criteria included "public health", "health promotion", "primary care", "community pharmacy", "pharmacy" and "pharmacist". Documents published in English and Thai between January 2011 and December 2020 were also examined. Unpublished documents were included. A 3-step inductive coding technique was used to develop the competency framework. To validate the findings, a 2-round, modified Delphi method was employed with 20 Thai pharmaceutical specialists between August 2022 and January 2023. The Scale-level Content Validity Index (S-CVI) was used to assess validity.

Results: The database search yielded 1429 articles. Fifty-seven articles were selected. The analysis identified 5 competency domains. The domains, along with their related competency elements and behavioral statements, were provided for expert assessment. The S-CVI scores in the first and second rounds were 0.78 and 0.93, respectively. The terminology and categories of competencies have been improved. This outcome resulted in a pharmaceutical public health competency framework for Thai pharmacists. The framework consists of 5 competency domains: 1) individual and family health promotion (3 competency elements with 10 behavioral statements), 2) community empowerment for well-being communities (6 competency elements with 23 behavioral statements), 3) information management and evidence-based practice (3 competency elements with 10 behavioral statements), 4) communication for health promotion (3 competency elements with 6 behavioral statements), and 5) pharmacoepidemiology and support for public health emergencies and epidemics (2 competency elements with 5 behavioral statements).

Conclusion: Pharmaceutical public health competencies for Thai pharmacists were developed through extensive literature review and expert consultation.

1. Introduction

Pharmacists have gradually transformed their professional practices from product-oriented roles centered around chemical science and the pharmaceutical industry to embrace patient-centered care approaches. Recently, pharmacy practice has shifted toward a more systemic approach that is public health oriented.¹ Moreover, dispensing, pharmacists provide additional services for medication therapy management, immunization, disease screening and consultations for behavioral

changes.¹ This role emerges from responses to universal health coverage (UHC) and commitment to primary healthcare for all policies. Several policies, including the adoption of Sustainable Development Goals (SDGs) Goal 3 by the United Nations General Assembly and the endorsement of the Astana Declaration by all World Health Organization (WHO) Member States in 2018, have underscored this vital priority.^{2,3} These concepts are consistent with public health paradigms that acknowledge the interconnectedness of individuals, groups and institutions in influencing and determining health outcomes.⁴⁻⁶ To keep

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up with these evolving healthcare trends, pharmacists must continuously refine their competencies to ensure their relevance and value in creating a healthy society.

Competency refers to the ability to perform a role effectively and efficiently. Typically, competencies are organized in clusters or domains that contain a range of behavioral skills.⁷ The International Pharmaceutical Federation (FIP) developed the Global Competency Framework (FIP-GbCF) in 2012. It serves as a mapping tool for the development of the pharmacy workforce worldwide. This framework identifies four essential competency domains: 1) pharmaceutical public health domain highlighting behaviors related to health promotion and emergency response, 2) pharmaceutical care domain focusing on services ensuring patients' access and quality use of medicines, 3) organization and management domain centered around workplace and supply chain management, and 4) professional/personal domain encompassing soft skills essential for professional development such as communication skills and interprofessional collaboration. This framework defines competencies that encompass knowledge, skills, attitudes, and behaviors essential for effective and sustained performance in pharmacy practice.^{8,9} Several countries, including Japan,¹⁰ Kuwait,¹¹ Indonesia,¹² Saudi Arabia,¹³ the Pacific Islands,¹⁴ South Africa,¹⁵ and Croatia¹⁶ have adopted and adapted the FIP-GbCF for use in their own pharmacy professional development frameworks.¹⁷

Thailand, an upper-middle income country in Southeast Asia with 71.8 million population, successfully implemented UHC in 2002. The current 13th National Economic and Social Development Plan (2023–2027) - “Enhancing Good Health for Thai People”- exemplifies this success by ensuring equitable access to quality healthcare services for all citizens.^{18–20} This achievement stemmed from the groundwork of the full national coverage of district hospitals in the 1990s and sub-district health centers in the 2000s, which was further strengthened by the extension of financial risk protection systems.²¹ The Ministry of Public Health (MOPH) plays a major role in the Thai healthcare system. It manages public-sector healthcare systems by enforcing policies and providing services through its network of public hospitals and health centers. Medical care, health promotion, illness prevention, and rehabilitation are provided at all levels: primary, secondary, and tertiary.²² Thai pharmacists are involved in drug management to ensure the availability and affordability of medications, thereby improving the health outcomes of UHC beneficiaries.

In Thailand, pharmacists are involved in all aspects of medicine access along the pharmaceutical supply chain including manufacturing, marketing, regulation, selection, distribution, and quality use.²³ Most pharmacists work in healthcare settings, with 33% working in public hospitals, 7% in private hospitals and 28% in drugstores. Outside of service settings, 16% work in the pharmaceutical industry, 4% in regulatory and consumer protection, and 3% in academia.^{22,23} Pharmacy departments in public hospitals provide a wide range of professional services including drug procurement and inventory, drug dispensing, drug preparation, pharmaceutical care, primary healthcare, and consumer protection for all health products in the community.²²

Primary health care services in Thailand are mainly provided at sub-district health centers, also known as primary care units, by a team of public health officers and nurses. They operate as networks of primary care units within the same district hospital. Healthcare professionals at district hospitals collaborate with teams in primary care units to ensure that quality primary care services are offered according to national and local policy. Pharmacists play an important role in Thai primary healthcare services by promoting the safe use of medicines and other health products for people in the community. In addition to managing drug supplies and ensuring quality medicine use in primary care units, they undertake interdisciplinary home visits, encourage self-care and herbal use, and provide various consumer health protection activities in the community.^{24–27} In drugstores, Thai community pharmacists have recently transitioned from the traditional tasks of dispensing drugs and patient counseling to public health-oriented practices. Such services

include drug therapy management, individual health promotion, disease screening, public health promotion, and consumer protection.²⁸ With the basics of the drug and health service system outlined above, more than one half of the pharmacists in Thailand are actively involved in community healthcare including community pharmacists and hospital pharmacists at community hospitals.^{29,30}

To ensure that Thai pharmacists are competent in providing a wide range of services, pharmacy graduates must take a national licensure examination after completing a 6-year pharmacy curriculum and earn at least 100 credits for continuing pharmaceutical education within five years.²² The Pharmacy Council of Thailand formally established competency standards (CSs) as guidelines for licensure examinations and templates for professional pharmacy development. Core CSs exist for all practitioners, and specialty CSs for those working in pharmaceutical care, industrial pharmacies, and pharmaceutical consumer protection. The core CSs include seven domains: professional ethics, teamwork and system management, communication and counseling, pharmaceutical products and quality control, drug selection and procurement, pharmaceutical care services, and health and public health systems.^{31–35} In the educational sector, pharmacy schools provide public health education to prepare Thai pharmacists to meet professional standards.^{36–39} Also, guidelines and educational training programs are maintained to pharmacists provide primary care services in their communities such as primary care pharmacists, and health consumer protection pharmacists.^{19,40–43} However, Thailand lacks an integrated transversal competency framework specifically developed for pharmacists working in public health systems, and the term, “pharmaceutical public health” is still undefined and needs further validation.³¹

Integrating public health perspectives in pharmacy competencies can enhance the value and expand public health service offerings. However, a strategic approach is needed to successfully integrate these approaches into professional practice, and recognition for pharmacists' public health roles is crucial.^{44,45} Related studies in other countries have explored tailoring the scope of pharmaceutical public health to specific contexts. For instance, the Royal Pharmaceutical Society's “Professional Standards for Public Health Practice in Pharmacy” provide guidelines and expectations for public health practice within the UK pharmacy profession.⁴⁶ Similarly, a recent scoping review by Warren et al. (2021) identified competencies, organized them into a matrix, and inductively coded themes to align public health competencies with pharmacy practice frameworks within the Australian context.⁴⁵ Other studies have developed role-specific competencies such as Pflieger et al. (2008),⁴⁷ who developed competencies for community pharmacies in Scotland using a consensus-based method, and identified varying levels of relevance for different public health competencies among Scottish community pharmacists.

A competency framework must be adapted according to the circumstances of a country.^{8,45,48} Existing pharmaceutical public health competencies from other countries may not seamlessly align with the distinctive Thai pharmacy profession context because of their work in the aforementioned communities and healthcare delivery systems. Therefore, contextualizing a competency framework is necessary.¹⁷ To address this knowledge gap and facilitate better understanding, a scoping review and expert consultation were used to develop a competency framework for Thai pharmaceutical public health.

2. Material and methods

This scoping review employed the Joanna Briggs Institute (JBI) manual for evidence synthesis and adhered to the PRISMA extension for Scoping Reviews (PRISMA-ScR) guidelines for reporting.^{49,50} The research proposal is registered at <https://osf.io> (registration code: EKCPY). This study was approved by the Research Ethics Committee of the Faculty of Pharmacy, Chiang Mai University (no. 036/2021/E; approved on December 15, 2021). The scope of this review includes the details listed below.

Review question: What are the competencies of pharmaceutical public health for Thai pharmacists?

Population: This scoping review included pharmaceutical public health competencies such as generic, sector- and role-related, and specialty-specific frameworks, as defined by Udoh et al.⁹

Concept: This scoping review investigates the concept of pharmaceutical public health competencies. These competencies involve the application of pharmaceutical knowledge, skills, and attitudes to prevent disease, promote health, and enhance the overall well-being of individuals and communities. This term refers to a pharmacist's ability to manage health beyond individual and family levels. Notably, it excluded responsibilities related to healthcare system management, policymaking, and broader environmental issues such as national or global structures.⁵¹ This scoping review focused specifically on "public health" and also extended to relevant areas such as "health promotion", "primary care", and "community-centered health care".

Context: This scoping review examines studies on pharmaceutical public health competencies in a variety of contexts such as primary health care and community pharmacy. These competencies are essential for entry-level pharmacists, particularly for those working in community settings. They represent the skills and knowledge required for pharmacists to effectively perform their duties.

2.1. Search strategy

This scoping review used a three-step search strategy. First, online databases including Scopus, MEDLINE, and Web of Science (Clarivate), were searched using MESH terms as "competency" OR "competence" AND "public health" OR "health promotion" OR "primary care" OR "community pharmacy" AND "pharmacy" OR "pharmacist". The titles, abstracts, and index words of the retrieved documents were examined. The publication search time frame was set between 2011 and 2020. This was selected because a picture of public-health-oriented services was presented to the pharmacy audience in 2010¹ and the American Society of Health-System Pharmacists issued an ASHP statement on the pharmacist's role in public health in 2007.⁵² Since then, research and services related to this trend including competency development, have been documented thoroughly. Second, additional records were gathered using the keywords and index terms found in the retrieved documents. Third, reference lists of the obtained documents were searched for additional relevant records. At this step, the documents included in the reference lists may have been published before 2011. Unpublished sources such as dissertations and theses, OpenGrey, websites of relevant organizations and conferences, e.g., the FIP-GbCF, and other grey literature, were used. Following the literature search, the collected documents were transferred to EndNoteX9, where duplicates were deleted. A PRISMA flow diagram was created to summarize the screening process and search results visually.

2.2. Inclusion criteria

- 1) Documents were published between January 1, 2011 and December 31, 2020, to capture research and services on pharmacy-based public health trends and ensure that they remain up-to-date by analyzing research trends in competency over a ten-year period.
- 2) Documents written in English or Thai are available in full text.
- 3) Documents provided information on pharmaceutical public-health-related competencies.

Pharmaceutical public health competencies include the knowledge, skills, attitudes, and behaviors involved in the use of pharmaceutical services to prevent diseases, promote health, and improve the overall well-being of individuals and communities. This review excluded competencies related to healthcare system management, policymaking, and broader environmental factors such as national or global structures. During the screening process, two researchers independently reviewed

the titles and abstracts [TA and SS]. Records that failed to meet the criteria or were inaccessible were excluded from the study.

2.3. Quality assessment of included documents

The quality of the included literature was evaluated using JBI's critical appraisal criteria.^{49,53} Levels of evidence for effectiveness are used to assess the quality of research studies and the strength of evidence provided for interventions such as quasi-experimental prospective controlled studies, pre-posttests or historic/retrospective control group studies, cross-sectional studies, and expert consensus studies. The levels of evidence for meaningfulness were employed in part of the qualitative research to evaluate the meaningfulness of the documents such as qualitative or mixed-methods synthesis, a single qualitative study, and expert opinions.

2.4. Data extraction

Following this search, documents that met the eligibility criteria were extracted for data analysis using Microsoft Excel. One reviewer [TA] extracted the data and another [SS] validated it. In case of disagreements between the two reviewers, a third reviewer [PS] was consulted, and the issue was resolved. The following are the key headings extracted from the search documents.

1. General information of the article: author(s), year of publication, title, language, term use for outcome, target country, target personnel, level of evidence (JBI),⁵³ sample sizes (if applicable), and terminology for this competency.
2. Outcomes and details: competency domains (broad categories of behaviors), competency elements (narrow categories of behaviors), and behavioral statements (observable behaviors associated with each competency element).

2.5. Data analysis and synthesis

STATA, Version 14, was used to generate descriptive statistics (frequencies and percentages) to analyze the research findings. Similar-meaning behavioral statements were consolidated in a single competency element and further categorized in a competency domain using thematic analysis. A competency framework was constructed in a hierarchical structure based on Whiddett's (2003) framework, consisting of competency domains, competency elements, and behavioral statements.⁵⁴

In this work, a three-step thematic analysis was used for data charting, as outlined by Thomas (2008).^{55,56} In the first analysis, researchers [TA] thoroughly examined each line of text to uncover relevant patterns using constructs identified in the FIP-GbCF⁸ as a priori coding. In the second analysis, descriptive themes were developed to capture the core of the data by summarizing the common elements. The data were analyzed primarily by two researchers [TA and SS]. During the qualitative synthesis stage, descriptive themes evolved from inductive analysis of the study findings and their relevance to the review questions.

To make the framework clear and noticeable to a larger audience, well-known public health theories or frameworks were used to guide coding and analysis. These frameworks include Pender's health promotion model,⁵⁷ Gibson's empowerment framework,⁵⁸ shared decision-making for the individual health promotion domain,⁵⁹ and the International Union for Health Promotion and Education (IUHPE) framework.⁶⁰ These frameworks were used in the analysis. This enabled researchers to customize the findings based on context and existing data. Third, analytical themes were developed by identifying the underlying patterns and linkages in the data, yielding more insightful and analytical themes. Themes were established based on agreement between the two researchers [TA and SS]. In cases of disagreement, issues were discussed

Table 1
Characteristics of experts (n = 20).

| Experts' characteristics | n (%) |
|---|-----------------------|
| Roles and responsibilities | |
| Primary care | 5 |
| Community pharmacy | 3 |
| Consumer protection and pharmaceutical public health | 3 |
| Regulation and registration | 1 |
| Marketing and distribution | 1 |
| Pharmaceutical manufacturing | 1 |
| Professional organization leaders and policymakers | 5 |
| University lecturer | 1 |
| Gender | |
| Male | 6 (30.00) |
| Female | 14 (70.00) |
| Age (years), mean ± SD (max, min) | 46.85 ± 9.88 (64, 29) |
| Years after BPharm graduate, mean ± SD (max, min) | 23.16 ± 10.41 (41, 4) |
| Years of experience in current field, median (IQR) (max, min) | 18.26 (10.02) (40, 4) |
| Bachelor's degree curriculum | |
| 5 years | 7 (35.00) |
| 6 years | 4 (20.00) |
| others | 9 (45.00) |
| Highest education level | |
| Bachelor's degree | 7 (35.00) |
| Master's degree | 8 (40.00) |
| Doctoral degree | 3 (15.00) |
| Board Certificate | 2 (10.00) |

and resolved with the assistance of a third researcher [PS].

2.6. Modified Delphi method with Thai pharmaceutical experts' consultation

The modified Delphi method was used to determine collective expert opinions. Similar to the traditional Delphi technique, this method engages in iterative rounds with selected experts to validate the framework

until consensus is reached. Using a four-level Likert scale (ranging from "very appropriate" to "inappropriate"), this review evaluated validity across three areas: 1) definition of the competency domains, 2) appropriateness of the classification of the competency elements and behavioral competencies, and 3) understandability of the words. Furthermore, the experts were asked to indicate whether the competencies fell into entry or advanced competency levels. An open-ended question was posed at the end of each item to provide additional comments and suggestions.

The approach addressed in this study aims to identify broad competencies that are not specific to any sector. These competencies are consistent with concepts proposed by Suwannaprom (2020)²³ and Chungsthiansap (2007).⁶¹ Thai pharmacists practice in all areas of medicine access; hence, the modified Delphi method includes 20 pharmacists with expertise in diverse components of the Thai pharmaceutical supply chain. These experts were chosen purposively based on their established knowledge of pharmacists' duties and competencies. They had at least three years of experience in their specialties. Snowball sampling was used to enroll participants across the Thai pharmaceutical supply chain, based on their varying degrees of engagement with the pharmaceutical public health competency framework.²³ The experts' characteristics are listed in Table 1.

Initially, experts were sent an email containing a participant information sheet, informed consent form, and validation assessment form. Experts independently reviewed and evaluated the competency framework and its elements for validity. They then provided feedback to the researchers via email. Inquiries were addressed via telephone. Notably, no direct communication was made among the panel members. The Scale-level Content Validity Index (S-CVI) and Item-level Content Validity Index (I-CVI) were calculated from the returned survey. To achieve the quality standards, the S-CVI and I-CVI values must exceed 0.8.⁶²⁻⁶⁴ The median and interquartile ranges were calculated using the STATA Program, Version 14. The statements were modified based on the experts' comments and suggestions. In the second round of surveys, the modified statements and validation assessment forms (Appendix A) were sent to experts again for assessment. The statistical findings of the

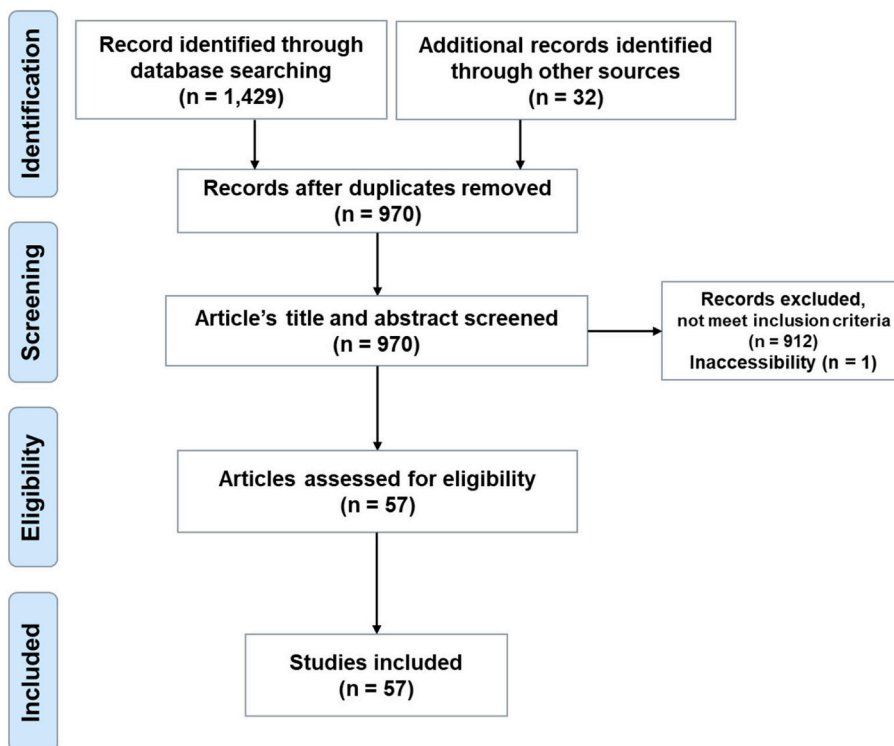


Fig. 1. PRISMA flow diagram shows the results of research search and selection.

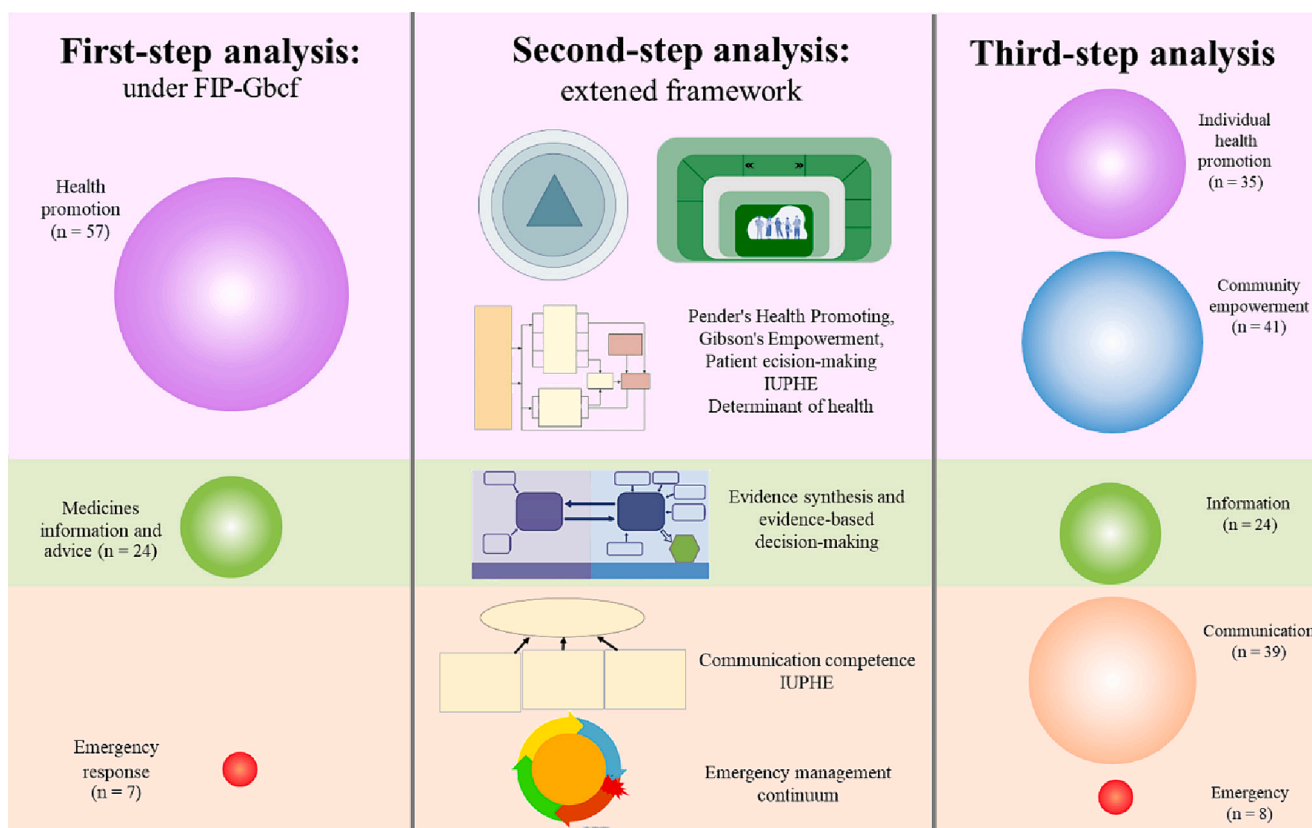


Fig. 2. Overall analysis and synthesis result.

first-round survey were shared with experts for their consideration. The modified Delphi method was repeated until the validity criteria were met with a maximum of three rounds.

3. Results

A comprehensive search yielded 1429 relevant documents. After further investigation, 31 relevant documents that met the inclusion criteria were included. After removing duplicates, a total of 969 documents remained. One document was excluded because of inaccessibility.⁶⁵ Ultimately, 57 documents met the inclusion criteria. A PRISMA flow diagram illustrating the search and selection processes is shown in Fig. 1.

3.1. Study characteristics

Appendix B summarizes the characteristics of the 57 included documents. The number of publications ranged from 2007 to 2021. Documents published between 2007 and 2010 were included as additional documents identified from the reference list of the initial set of documents obtained. Most documents originated in the US.^{66–74} Seven documents specifically addressed the Thai pharmacist competency framework,^{23,31,34,35,75–77} with four published in Thai.^{31,34,35,77} Documents have also been identified in Australia, Croatia, New Zealand, South Africa, Japan, the UK, and other countries. The most common study design was expert opinion ($n = 28$), followed by cross-sectional study design ($n = 13$). A focus on entry-level pharmacist competencies emerged within the identified frameworks. Additionally, some frameworks address sector-specific competencies, particularly those relevant to community pharmacies.

3.2. Topics of included papers

Twenty-two identified competency frameworks addressed pharmacists' public health competencies.^{8,10,14–16,31,34,68,78–90} Eleven of these frameworks explicitly used the term, “pharmaceutical public health”.^{8,10,14,16,34,68,81,83,85,87,88} Eleven others incorporated “health promotion” within their framework, with interchangeable terms like “population health” or “health promoter”.^{16,35,60,67,72,74,78,81,91–93} Notably, the FIP-GbCF, covering the pharmaceutical public health domain, has been translated and validated in several countries including Japan,¹⁰ Kuwait,¹¹ Indonesia,¹² Saudi Arabia,¹³ the Pacific Islands,¹⁴ South Africa,¹⁵ and Croatia.¹⁶

The scoping review initially focused on terms like “public health”, “health promotion”, “primary care”, and “community-centered health care.” Analyzing retrieved publications further expanded the search to include potentially related terms like “health promoter”, “population health”, “drug information advocacy”, “health education”, “primary healthcare service management”, “collaboration with a multidisciplinary team”, “communication”, “cultural competencies”, and “awareness of intercultural differences”.

Initially, 57 documents obtained from the scoping review were analyzed. The FIP-GbCF proposed the framework used for the initial analysis, which included three key areas: health promotion, medicine information and advice, and emergency response. Health promotion has been consistently mentioned in nearly all documents. In the second and third analyses, public health theories and concepts were used to guide coding. The final result was a comprehensive competency framework for pharmaceutical public health competency consisting of five key competency domains. Fig. 2 presents the results of this three-step analysis, where the domain size represents the number of documents mentioned. Appendix C details the included documents and the frequency with which each competency was represented.

After conducting a comprehensive scoping review including three

rounds of analysis and synthesis, the following five key competency domains emerged.

3.2.1. Individual health promotion

A scoping review revealed that the FIP-GbCF had a substantial impact on developing the pharmacy competency frameworks included in the study. Its public health domains, comprising emergency response, health promotion, and medicine information, cover both individual and community level activities. Nonetheless, certain frameworks concentrate primarily on health promotion, disregarding the distinction between individual and community-level competencies.^{5,20,90,94,95} This review addresses this gap by differentiating between two specific levels, individual and family, separate from the broader community level. This approach enhances the clarity of competency design and aligns with two distinct levels as per the Integrated Care for Chronic Conditions Framework (ICCC) and the WHO's determinants of health.^{5,96} Furthermore, it expanded upon the FIP-GbCF by incorporating an in-depth description of important behavioral theories. These include Pender's health-promoting model, Gibson's empowerment framework, and patient decision-making concepts, all of which provide health promotion for individual and family health.^{8,57-59} This concept frequently centers on providing guidance on healthy behaviors, disease prevention, and control, as well as analyzing individual health status and needs.

3.2.2. Community empowerment for health promotion

This competency domain has received significant attention, particularly in Thai pharmaceutical and health consumer protection literature.^{31,34} The majority of the content focuses on managing community drug-related issues, while considering a variety of environmental and contextual factors. Furthermore, some frameworks approach health promotion from a time-task perspective.⁶⁰ The IUHPE's core competencies and professional standards for health promotion provide a framework for health promotion practitioners and related professions.⁶⁰ Within the scope of pharmaceutical public health, this domain includes policy development, planning, implementation, program evaluation, and multidisciplinary collaboration.

3.2.3. Information and evidence-based practice

The importance of evidence synthesis and evidence-based decision-making has been echoed across many frameworks, notably those influenced by the FIP-GbCF.^{8,10-12,14-16,85,87,88,97,98} Emerging competencies within these frameworks such as health advocacy,^{15,60,86,99-102} health education,^{23,46,93,97,98,103,104} and health informatics,^{67,75,103} represent strategies and techniques for health guidance and support. The information and evidence-based practice domains comprise economic information, clinical outcome studies, and evidence reviews and syntheses. This is supported by the concepts of evidence synthesis and evidence-based decision-making.¹⁰⁵

3.2.4. Communication for health promotion

Communication competencies emphasizing effective communication in healthcare contexts are deemed essential in most documents. The need extended beyond basic ability; effective and appropriate communication required the consideration of sociolinguistic nuances, cultural awareness, and cross-cultural communication strategies. The FIP-GbCF and its influencing documents serve as valuable references in this regard, outlining culturally appropriate communication techniques.^{8,10-12,14-16,85,87,88,97,98} The IUHPE framework and communication competence emphasize the use of appropriate communication techniques and channels tailored to different target groups.^{60,106} Based on this theory, communication for health promotion comprises three domains: basic communication, communication strategies, and communication within different sociocultural contexts.

3.2.5. Emergency and epidemic response

This competency domain was identified as a key focus in the FIP-GbCF, Version 2 and has received significant attention in various publications issued between 2018 and 2020.^{8,10-12,14-16,85,87,88,97,98} During emergencies, pharmacy services are required to support multidisciplinary teams with medicine and medical supplies. The cyclical model of emergency and catastrophe management includes four separate phases: mitigation, preparedness, response and recovery. Its significance lies in promoting coordinated and effective planning, preparation, and reactions among emergency management practitioners.¹⁰⁷

3.3. Modified Delphi method with Thai pharmaceutical experts' consultation

The modified Delphi method was used to determine content validity. It was conducted between August 9, 2022 and January 5, 2023. Twenty pharmacists served as the expert reviewers. During the first round, the experts agreed on five proposed competency domains with 17 competency elements. However, the S-CVI score of 0.78 fell short of the desired threshold to ensure its validity. The comments and recommendations received from experts were used to refine the statements and their classifications. Therefore, a second round of expert consideration was conducted.

During the second round, experts re-evaluated the framework and revised the behavioral statements. In the second round, the modified Delphi method achieved content validity score of 0.93. Experts have suggested that many words remain ambiguous, potentially leading to differing interpretations. Therefore, adding footnotes was advised to ensure proper interpretation such as "stereotypes," "social measures," and "cultural differences," which are less common in the pharmaceutical field. The experts provided the following additional suggestions:

Individual health promotion domain: Experts have emphasized that family institution provides a significant influence on health behaviors in Thailand. This essential component is closely linked to personal health promotion. As a result, they recommended adding a "family level" competency, ensuring its contextual relevance to Thailand.

Community empowerment for the health promotion domain: Experts recommended expanding leadership competency to include project management and collaboration with the community and administration. Additionally, the replacement of the term "health promotion" with "well-being" was proposed due to its broader community focus.

Information and evidence-based practice domain: Experts recommended incorporating data quality assurance and deemed an "evidence-based approach" as the most suitable strategy for a comprehensive information system.

Communication for the health promotion domain: While there has not been a significant shift, the focus lies on integrating a novel communication channel with pharmacy services including telepharmacy, to enhance and facilitate better communication in an ever-evolving healthcare landscape.

Emergency and epidemic response domain: Competencies in this domain are required for two different roles of pharmacists. The first underscores the critical role of pharmacists in ensuring effective responses to support medicine and medical supplies during crises. The second role, pharmacoepidemiology, acknowledges the distinct competencies required to address unsafe drug incidents in the community. Pharmacists who function as pharmacoepidemiologists play an important role in protecting public health.

3.3.1. Pharmaceutical public health competency framework for Thai pharmacists

Pharmaceutical public health competency comprises the expected work behavior of pharmacists, as they apply pharmaceutical expertise to community health systems. This competency entails promoting

Table 2
Content validity index value after expert consensus.

| Competency elements and behavioral statements | I-CVI |
|---|-------|
| A: Individual and Family Health Promotion Domain | |
| A1: Assess individual health needs to design appropriate health promotion processes | |
| A1.1 Assess health literacy to design health promotion programs tailored to individual and family contexts | 1 |
| A1.2 Assess health needs by analyzing the individual context and identifying factors influencing health promotion, e.g., social, economic, cultural, and environmental | 0.90 |
| A1.3 Create personalized health promotion interventions tailored to individual and family contexts by synthesizing information obtained from the assessment of the relevant factors above | 0.85 |
| A2: Modify behavior and empower the potential for behavior change in health promotion | |
| A2.1 Motivate and empower individuals and families to adopt health-promotion behaviors through targeted information and support | 0.80 |
| A2.2 Provide advice and support for individuals and families to promote health and healthy lifestyles and prevent and control diseases | 0.80 |
| A2.3 Explore, solve problems, and provide advice to empower individuals to manage medication use and health products, and promote adherence, safety, rational drug use, and healthy lifestyles | 0.8 |
| A2.4 Empower and motivate health behavior change in individuals | 0.90 |
| A2.5 Promote and develop health literacy by facilitating access to accurate information on medicines and health products and promoting informed decision-making for individuals and families | 1 |
| A3: Encourage sustainable participation in health promotion of individuals and families | |
| A3.1 Foster collaboration among families, communities, multidisciplinary professionals, and relevant sectors for participatory healthcare. Maintain relationships and frequent communication to strengthen collaborative efforts. | 0.80 |
| A3.2 Design innovative collaborative health promotion initiatives based on people-centered approaches | 0.80 |
| B: Community Empowerment for Community Well-being | |
| B1: Analyze community's medicine and health situation | |
| B1.1 Gather information through open and respectful dialog and honestly listen to everyone's opinions to design community health promotion activities | 1 |
| B1.2 Analyze the interconnections of health determinants, e.g., economic, social, environmental, and cultural, using systematic thinking | 0.90 |
| B1.3 Analyze cultural factors and avoid stereotypes when analyzing factors impacting health, e.g., ethnic background, language, identity, values, beliefs, and norms of each group | 1 |
| B1.4 Collaborate with stakeholders and community networks to identify key community health issues | 0.95 |
| B2: Plan community health promotion activities | |
| B2.1 Share data and raise awareness about community health needs and problems through participation platforms | 1 |
| B2.2 Develop evidence-based, culturally appropriate, and policy-aligned community wellness programs | 0.90 |
| B2.3 Use systems thinking and problem-solving approaches in activity planning | 1 |
| B2.4 Design project plans aligning with community needs by using pharmacy and associated science knowledge and drug and health consumer protection concepts | 0.95 |
| B3: Implement health promoting activities according to the plan | |
| B3.1 Identify stakeholders, develop strategies, create operational plans, and carry out community health promotion work, e.g., disease prevention, health education, and healthy lifestyles | 0.90 |
| B3.2 Encourage community participation in activities related to promoting health and preventing adverse health hazards, e.g., risk management, consumer protection and surveillance of medicines and health products, and community enhancement of rational medication use | 0.95 |
| B3.3 Integrate health promotion in all policies by working with all sectors and encouraging multisectoral collaboration | 0.90 |
| B3.4 Develop and support the capacities of population, multidisciplinary, and related organizations for sustainable community health promotion efforts | 1 |
| B3.5 Adapt strategies to cultural differences and respond to unforeseen situations | 0.95 |
| B3.6 Maintain positive relationships with community health care networks and cultivate stakeholder co-ownership for long term project sustainability | 0.95 |
| B4: Evaluate community activities with standards for continuous improvement | |
| B4.1 Design a comprehensive quantitative and qualitative assessment relevant to community context, project objectives, and provincial and national indicators | 1 |
| B4.2 Design, plan, gather data, and systematically collect data from local databases to effectively evaluate and support research activity. | 1 |
| B4.3 Encourage stakeholder participation in evaluation and use findings for improvement | 0.95 |
| B4.4 Pro-actively monitor, surveille, analyze, and assess health status and health determinants to identify current public health needs and manage effectively | 1 |
| B5: Work with the community and manage the project to keep it on track | |
| B5.1 Apply appropriate management skills, e.g., motivation, negotiation, conflict resolution, and teamwork, to ensure project success | 0.95 |
| B5.2 Strategically promote public health activities for health promotion, prevention, and solving community health problems, e.g., multidisciplinary collaboration, community network synergies, being a change agent to promote health, and use of the social measures including applying and enforcing consumer protection laws | 0.85 |
| B6: Support health promotion in primary care pharmacies safely and reasonably | |
| B6.1 Encourage activities supporting health promotion and disease prevention in primary care settings, e.g., provision of medicines and vaccines for use in primary care services, preliminary health screening, vaccination and immunization, and family planning | 0.95 |
| B6.2 Promote self-care for simple illnesses, e.g., giving advice on self-assessment methods, symptom handling, health care, and basic medication | 0.95 |
| B6.3 Support continuity of care through referrals, discharge planning, and pharmaceutical home health care | 0.90 |
| C: Information Management and Evidence-based Practices | |
| C1: Manage and share pharmaceutical public health data for evidence-based decision-making | |
| C1.1 Recognize and use research sources, medical and pharmaceutical information, empirical data, and related evidence-based information for health promotion | 0.95 |
| C1.2 Review, evaluate, and organize data using proper health informatics practices and data quality standards | 0.95 |
| C1.3 Applying knowledge management using evidence-based advice to enhance health promotion | 0.85 |
| C1.4 Synthesize evidence and communicate findings to target groups using appropriate channels and language to support health promotion process and shared decision-making | 0.95 |
| C1.5 Comply with ethics standards and relevant laws, e.g., Code of Ethics for the Pharmacy Profession, the Personal Data Protection Act, respecting patient rights and autonomy to make decisions about their health and applying interpersonal medicine | 0.9 |
| C2: Conduct and use research | |
| C2.1 Conduct academic research to inform health directions for community health and possible solutions | 0.95 |
| C2.2 Develop, disseminate, and implement research initiatives linked to health promotion and pharmaceutical public health | 0.95 |
| C2.3 Develop a routine to research or action research to effectively solve problems and improve work processes | 0.95 |
| C3: Use pharmaco-economic information for effective decisions-making | |
| C3.1 Evaluate cost-effectiveness of health products and assess the appropriateness of medicine based on disease burden in a community | 0.90 |
| C3.2 Propose evidence-based initiatives and use information technology for data-driven decision-making | 0.90 |
| D: Communication for Health Promotion | |
| D1: Professional communication | |
| D1.1 Employ high-quality verbal and nonverbal communication skills and a trustworthy personality to support health promotion activities | 0.95 |
| D2: Use content and audience-appropriate communication strategies | |

(continued on next page)

Table 2 (continued)

| Competency elements and behavioral statements | I-CVI |
|---|-------|
| D2.1 Set goals and choose communication techniques based on the target group's needs and preferences | 0.95 |
| D2.2 Communicate using information technologies to support and increase communication channels and coverage such as electronic media, digital communication, social media, etc. | 0.95 |
| D2.3 Evaluate communication outcomes and compare the communication's objectives | 0.95 |
| D3: Communicate appropriately in context | |
| D3.1 Communicate appropriate content based on audience's context to build good relationships and engagement | 0.95 |
| D3.2 Adapt communication methods to each culture and deal with challenging communication situations such as conflict communication, patients with communication barriers, and cultural differences | 0.95 |
| E: Pharmacoepidemiology and support for public health emergencies and epidemics | |
| E1: Pharmacoepidemiology | |
| E1.1 Apply epidemiological study designs to monitor drug use, distribution, safety, and adverse reactions within the community. This encompasses pharmacovigilance activities and other safety-related assessments including investigations of inappropriate health products and community outbreaks. | 1 |
| E1.2 Establish systems for pro-actively responding to and preventing future emergencies or emerging challenges using pharmacoepidemiologic data | 1 |
| E2: Support the management of public health emergencies and epidemics | |
| E2.1 Prepare plans, support, and assist multidisciplinary teams in preparing plans to deal with emergencies and epidemics | 0.95 |
| E2.2 Support multidisciplinary responses to emergencies and epidemics based on pharmaceutical professional roles such as timely provision of essential emergency medicines and medical supplies according to the specific context | 0.95 |
| E2.3 Collaboratively deconstruct lessons and pro-actively prepare for future events using a consistent framework. This involves identifying trends, assessing risks, and integrating current ideas into continuous response strategies | 0.95 |

health^{8,108} and optimizing the benefits derived from medicines, health products, and health services across individuals, families, and communities, both in normal and emergency situations. Further competencies encompass addressing health determinants,⁵ creating health promotion environments tailored to specific community contexts, and ensuring safe and equitable access to medicines, products, and primary healthcare services. Ultimately, this competency empowers pharmacists to engage in pharmaceutical public health, thereby contributing to the overall strength and resilience of the community health system.

The pharmaceutical public health framework for Thai pharmacists comprises five competency domains. The competency elements and behavioral statements of the five key competency domains are listed in Table 2.

- 1) Individual and family health promotion, comprising three competency elements with ten behavioral statements.
- 2) Community empowerment for well-being, comprising six competency elements with 23 behavioral statements.
- 3) Information and evidence-based practice, comprising three competency elements with ten behavioral statements.
- 4) Communication for health promotion, comprising three competency elements with six behavioral statements.
- 5) Pharmacoepidemiology and support for public health emergencies and epidemics, comprising two competency elements with five behavioral statements.

4. Discussion

The FIP-GbCF was developed by the FIP to serve as a fundamental guide to develop the pharmacy workforce. This framework is intended to be adopted by the FIP's national members to suit their specific national contexts. Countries such as Japan, Kuwait, Indonesia, Saudi Arabia, South Africa, and Croatia have adopted and adapted the FIP-GbCF.^{10-16,85,88} FIP-GbCF Version 2 lists pharmaceutical public health as one of its designated domains. Its core competencies include emergency response, health promotion, and medicine information and advice.^{8,109}

In Thailand, the Pharmacy Council has established competency standards for pharmacy licensure examinations.^{31,33-35,77} However, competency standards lack specific coverage of pharmaceutical public health competencies. In response to this gap, Suwannaprom et al. (2020)

suggested a generic competency framework for Thai pharmacists aligned with the FIP-GbCF. It provides a more detailed and context-specific framework outlining the competencies that Thai pharmacists should possess.²³ The generic framework comprises five key competency domains: product focus, patient focus, community focus (equivalent to pharmaceutical public health), healthcare system focus, and personal competencies. The proposed generic competency framework was built primarily through qualitative interviews with professional leaders in the pharmaceutical supply chain. It only provides data for developing a verified competency framework; therefore, additional steps are required to build and validate the framework.²³ This review and expert consultation focused on the competencies necessary for pharmaceutical public health, which are essential given pharmacists' increased responsibilities in public health services. In addition, a modified Delphi method was employed. This method is typically used for framework validation.^{67,83,99,110-112} These two stages ensure that the competency framework is acceptable in Thailand's healthcare context and in professional pharmacy practice.

The results of this scoping review and expert consultation suggest a pharmaceutical public-health competency framework for Thai pharmacists. The framework is composed of five competency domains: individual and family health promotion, community empowerment for well-being, information and evidence-based practice, communication for health promotion, and pharmacoepidemiology and support for public health emergencies and epidemics. This is consistent with the current global health paradigm, which emphasizes health promotion, disease prevention, and cultivation of healthy lifestyles.^{4,45} This concept extends beyond the individualistic approach that is commonly linked to personal health. Instead, it acknowledges that personal well-being is inextricably related to communal dynamics.^{5,20,96} Importantly, the paradigm under consideration attempts to prevent diseases and health challenges in healthy populations rather than simply treating individuals with illnesses.

The Thai Pharmaceutical Public Health Competency Framework emphasizes community-level health promotion and information management.^{34,107} The framework's domains extend beyond health promotion and educational training, as previously proposed in the generic competency framework for Thai pharmacists.²³ Review and expert consultation processes have created specific domains essential for providing public health-oriented services in Thailand.

4.1. Individual and family health promotion: an expanding pharmaceutical care

Health promotion extends beyond conventional treatment and cure, aiming to foster holistic health and enhance overall quality of life. Within this competency domain, pharmacists play an important role in promoting health in addition to medication management, contributing to better health outcomes. Importantly, these individual health promotion competencies align with and connect to the core principles of pharmaceutical care.^{51,113,114}

4.2. Community empowerment for well-being: guardians of consumer health

Health promotion has long been the cornerstone of public health initiatives. The term, “well-being” is often used interchangeably with “health promotion” across countries.^{15,104,113,115} While “health promotion” has served us well, its primary concerns are disease prevention and risk reduction. In contrast, “well-being” suggests a broader perspective integrating physical, mental, emotional, and social aspects. Therefore, the term “well-being” is used in this framework.

Thai pharmacists play a pivotal role in the healthcare system. Beyond the conventional tasks of dispensing medications and clinical practice, they actively safeguard consumer health through consumer health protection and empowerment activities.^{34,42,116,117} They actively engage with the community to address inappropriate medication and health product use. This collaborative approach promotes seamless coordination among health care providers, benefiting patients at home and in the community. This community's emphasis aligns with the core tenets of the IUHPE's framework, highlighting time-task-based competencies including needs-based assessment, planning, implementation, evaluation, and research.^{19,60}

4.3. Information management and evidence-based practices

This involves actively staying informed of the latest research, clinical guidelines, and best practices. This competency underscores the need to provide accurate and appropriate information to enable informed medicine selection and use.¹⁰⁵ This competency aligns with the FIP-GbCF for medicine information and advice. By adhering to evidence-based principles, public health policies and initiatives, following evidence-based principles can become more precise, efficient, and effective.^{8,60,73,87,95}

Thailand requires a special level of information management competency. The Routine to Research (R2R) policy in Thailand encourages practitioners to apply research approaches to discover circumstances and solve problems in routine tasks.¹¹⁸ The information obtained by evidence synthesis aids in proper decision making, promotes continual quality improvement, and eventually improves community health outcomes.

4.4. Communication for health promotion

The IUHPE emphasizes the importance of communication in improving health. Their approach focuses on the strategic use of effective communication tactics and channels to advocate health promotion. Practitioners can enhance their influence by customizing communication tactics for diverse audiences.^{60,106} Although the FIP-GbCF places communication in the professional/personal domain, the study team separated it out in this review to emphasize its importance in health promotion and solving community issues.

4.5. Pharmacoepidemiology and support for public health emergencies and epidemics

The COVID-19 pandemic emphasized the importance of specific competencies for healthcare professionals in emergency preparedness and responses. The FIP-GbCF Version 2 explicitly addresses emergency response competencies. These competencies require an understanding of epidemiological principles and the ability to respond rapidly to changing situations.⁸ Pharmacists play an important role in supplying medicines and medical supplies to healthcare facilities during an epidemic as well as in safeguarding public health by reporting dangerous medication incidents in the community. Pharmacovigilance and other safety-related assessments are critical for ensuring community safety.¹⁹

This study aligns with ongoing discussions of public health and pharmacy practices.^{44,45} Rich landscapes of pharmaceutical public health competency-related studies cover diverse target groups and approaches. These range from sector- or role-specific frameworks tailored to distinct areas^{79,80,86,99,119} to generic frameworks applicable across various settings.^{45,84} However, this study's framework offers unique contributions compared with existing generic frameworks in terms of extensive scoping of review-related studies, followed by two rounds of the modified Delphi method with a wide range of Thai expert pharmacists. Other studies may rely solely on document reviews⁸⁴ or have fewer structured steps after the scoping review to verify the relevance of competencies to their country context.^{44,45} Using a method similar to that used in this study, Phithakham et al. (2024) created a generic competency framework for Thai pharmacists in drug system management that provided detailed behavioral statements.¹²⁰

The design of pharmaceutical public health competency frameworks varies among countries owing to distinct contexts and philosophies. Frameworks may cite the FIP-GbCF^{10-14,16,85} or adapt the FIP-GbCF.¹⁵ Some frameworks are based on general public health documents,^{82,91} whereas others categorize them according to specific knowledge areas^{84,121} or practical steps.^{60,66} The differences in the scoping review results between this study and the study conducted by Warren et al. (2021) in Australia^{44,45} show that the design and grouping of competencies may consider a variety of factors including existing competency frameworks, application purposes, and dominant health concepts.

The FIP emphasizes a needs-based educational approach, aligning pharmacists' competencies with the specific requirements of each country's health system. This ensures that graduates are well-prepared in real-world practice.⁴⁸ Bruno (2011) investigated the feasibility of a global pharmacy competency framework by surveying pharmacists worldwide to assess the relevance of the proposed competencies in practice. The study employed a four-point Likert scale questionnaire, with responses subsequently combined into dichotomous categories of “relevant” and “not relevant” for data analysis. The findings revealed a high average score (96.55%) for the relevance of pharmaceutical public health competencies to the practices of the surveyed pharmacists.⁸⁸ However, pharmacists' perceptions of competency alignment with practice vary across countries, reflecting the diverse needs of the workforce and the healthcare system. For instance, studies in Saudi Arabia,¹³ Kuwait,¹¹ and Japan¹⁰ have reported slightly lower average scores than the global average. Beyond national differences, research methods, e.g., scale levels and cut-off points used for assessment,^{11,88} ethnicity,¹³ work experience, job type, and workplace^{13,88} can also influence how pharmacists perceive the alignment of their competencies with practice demands.

A clear pharmaceutical public health competency framework is one of the possible effective strategies in the mesosystem such as education and training, to guide practice and impact public health indicators.⁴⁴ When the scope of practice expands, adjustments to training and

evaluation methods ensure consistency, as Pflieger et al. (2008) developed competencies for Scottish community pharmacists owing to a new public health service contract.⁴⁷ Thailand has recently implemented policies to enhance access to health services. Examples include collaborative policies with the National Health Security Office and Pharmacy Council of Thailand that promote qualified pharmacies to provide consultation and dispense medications for 16 common ailments,¹²² complimentary screening tests for noncommunicable diseases,¹²³ and a telepharmacy policy. Furthermore, the Ministry of Public Health has initiated a program allowing UHC patients to utilize their benefits at any participating facility nationwide.¹²⁴ These policies compel Thai pharmacists to take on additional obligations beyond traditional individualized clinical treatments to encompass a wider range of public health responsibilities. Consequently, a comprehensive framework incorporating these expanded roles is essential for Thai pharmacists.

4.6. Strengths and limitations

This study provides several important contributions, both for countries with a similar context of pharmacy practice as Thailand, and for other broader contexts. However, this study encountered notable limitations.

Strengths: First, it established the initial Thai Pharmaceutical Public Health Competency Framework with detailed behavioral statements. Second, it employed rigorous methods: a scoping review for a comprehensive literature search and a modified Delphi approach for expert consensus, ensuring the framework's relevance to the Thai context. Finally, the framework's specificity lies in separate domains for individual/family and community levels, and in explicitly defining community pharmacoepidemiology competencies. This comprehensive and contextually relevant framework paves the way for further research, curriculum development, and professional development, ultimately empowering Thai pharmacists to better address public health needs.

Limitations: First, the developed framework is context specific to Thailand. For example, owing to pharmacists' roles in consumer health protection and "routine-to-research" activities, community-level health promotion and information management are emphasized, whereas vaccination and immunization competencies are excluded due to legal constraints. Second, while scoping reviews aim to provide comprehensive results, they may introduce bias by favoring studies that align with research questions. Third, expert opinions obtained using the modified Delphi method may not always accurately reflect the practical experiences of working pharmacists. Therefore, further relevance testing in a larger and more diverse group of pharmacists is necessary to confirm their effectiveness and relevance in real-world settings. Lastly, online surveys offer accessibility and a broader reach but potentially compromise data richness and may neglect valuable insights from nonverbal cues during qualitative analysis.

Generalizability to other contexts: Although primarily designed for similar contexts of healthcare systems and pharmacist roles, this framework offers broader insights through findings beyond the FIP-GbCF identified during the scoping review, suggesting a universally applicable approach. This study suggests a two-step approach: conducting a scoping review followed by a modified Delphi method applying local expert feedback. This approach effectively generates context-specific competencies that are tailored to specific settings. In addition, incorporating experts from different segments of the pharmaceutical supply chain, regardless of their level of public health expertise, provides a broad range of perspectives. This addresses the integration in various pharmacy practices, leading to a more practical framework.

5. Conclusion

Pharmaceutical public health competencies are essential to enhance health promotion, facilitate effective community-based health projects, and improve the health and well-being of all populations. This study proposes a pharmaceutical public health competency framework for Thai pharmacists comprising five competency domains: individual and family health promotion, community empowerment for well-being, information management and evidence-based practice, communication for health promotion and pharmacoepidemiology, and emergency response and epidemics. Developing this competency framework involved a comprehensive scoping review across various pharmaceutical supply chain contexts, followed by rigorous content validity assessment using the modified Delphi method, seeking expert consensus in two rounds. This iterative process culminated in an enhanced S-CVI of 0.93, exceeding the recommended threshold. Expert feedback was incorporated, leading to a more refined framework.

These findings offer a valuable foundation for developing a comprehensive and contextually relevant pharmaceutical public health competency framework for the Thai pharmacy profession. The framework synthesizes international best practices along with competencies specific to the Thai context. Integrating these competencies in professional education will ensure that pharmacists have a clear understanding of their professional boundaries and will equip them to actively support community health and well-being.

While the scoping review and modified Delphi method represent crucial preliminary steps toward the piloting competency framework, further investigation is warranted. Verifying the relevance of each competency domain in diverse practice settings in collaboration with relevant stakeholders is critical to ensuring the suitability of the framework for real-world implementation. This verification process, coupled with ongoing refinement of practice-based evidence, will ultimately lead to developing a robust and impactful pharmaceutical public health competency framework for Thai pharmacists.

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CRediT authorship contribution statement

Thanayut Auimekhakul: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Siritree Suttajit:** Writing – review & editing, Validation, Methodology, Investigation, Data curation, Conceptualization. **Puckwipa Suwannaprom:** Writing – review & editing, Validation, Supervision, Methodology, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this study, the authors used Paperpal and QuillBot for grammatical checks and paraphrasing. After using these tools, the authors reviewed and edited the content as required and took full responsibility for the publication.

Declaration of competing interest

interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare that they have no known competing financial

Appendix A. Validation Assessment Form

Validation Assessment Form for the (draft) Pharmaceutical Public Health Competency Framework Consultation with Thai Pharmaceutical Experts (Round 2)

The purpose of this evaluation is to gather opinions and certify improvements and additions to competency elements and behavioral statements. These enhancements were based on expert recommendations. At this stage, we kindly request your input on the appropriateness of the following definitions of public health pharmacy competencies for Thai pharmacists across the supply chain. Please consider the extent to which each competency aligns with the desired level of appropriateness and rate each competency item on a scale of 1 to 4, where 4 indicates “very appropriate,” 3 indicates “moderately appropriate,” 2 indicates “slightly appropriate,” and 1 indicates “inappropriate.” If you cannot evaluate a competency, select “n/a.”

The competency framework is divided into two levels: **Entry-Level Competencies (0–3 years)** are essential for newly qualified pharmacists. **Advanced Level Competencies (more than three years)** are designed for experienced pharmacists, particularly those working within community health systems.

Feel free to provide further suggestions such as improving clarity and ease of understanding, in the space provided at the end of each competency element and behavioral statements. Your feedback has contributed to refining the overall competency framework.

Operative Definition

- Competency** refers to work behavior that enables pharmacists, particularly those engaged with communities and community health systems, to effectively address diverse challenges while adapting to specific contexts. These competencies encompass skills, knowledge, and attitudes, collectively known as **behavioral competencies**, which contribute to pharmacists' overall effectiveness and efficiency. They combine into competency groups such as health-promotion competencies.
- Competency framework** represents a structured grouping of competency elements and related behavioral statements that share similarities and close associations. This study focused on **pharmaceutical public health competency**, which is essential for pharmacists. Competency frameworks exist for other areas of pharmacy practice including products, patients, healthcare systems, and personal focus.

Validity Assessment of the Pharmaceutical Public Health Competency Framework Draft

Scale of appropriateness: 4 = very appropriate, 3 = moderately appropriate, 2 = slightly appropriate, 1 = inappropriate, n/a. = cannot evaluate.

| Definition of Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
|---|--------------------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------|-----------------------------------|
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| | | | | | | | | |
| Pharmaceutical public health competency comprises the expected work behavior of pharmacists, as they apply pharmaceutical expertise to community health systems. This competency entails promoting health and optimizing the benefits derived from medicines, health products, and health services across individuals, families, and communities, both in normal and emergency situations. Further competencies encompass addressing health determinants, creating health promotion environments tailored to specific community contexts, and ensuring safe and equitable access to medicines, products, and primary healthcare services. Ultimately, this competency empowers pharmacists to engage in pharmaceutical public health, thereby contributing to the overall strength and resilience of the community health system. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
| | | | | | | | | |
| A: Individual and Family Health Promotion Domain | | | | | | | | |
| A1: Assess individual health needs to design appropriate health promotion processes | | | | | | | | |
| A1.1 Assess health literacy to design health promotion programs tailored to individual and family contexts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| A1.2 Assess health needs by analyzing the individual context and identify factors influencing health promotion, e.g., social, economic, cultural, and environmental | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| A1.3 Create personalized health promotion interventions tailored to individual and family contexts by synthesizing information obtained from the assessment of the relevant factors above | | | | | | | | |

(continued on next page)

(continued)

| Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
|--|--------------------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------------|
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| A2: Modify behavior and empower the potential for behavior change in health promotion | | | | | | | | |
| A2.1 Motivate and empower individuals and families to adopt health-promotion behaviors through targeted information and support | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| A2.2 Provide advice and support for individuals and families to promote health and healthy lifestyles and prevent and control diseases | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| A2.3 Explore, solve problems, and provide advice to empower individuals to manage medication use and health products, and promote adherence, safety, rational drug use and healthy lifestyles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| A2.4 Empower and motivate health behavior change of individuals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| A2.5 Promote and develop health literacy by facilitating access to accurate information on medicines and health products and promoting informed decision-making for individual and family | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| A3: Encourage sustainable participation in health promotion of individuals and families | | | | | | | | |
| A3.1 Foster collaboration among families, communities, multidisciplinary professionals, and relevant sectors for participatory healthcare. Maintain relationships and frequent communication to strengthen collaborative efforts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| A3.2 Design innovative collaborative health promotion initiatives based on a people-centered approaches | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| B: Community Empowerment for Community Well-being | | | | | | | | |
| B1: Analyze community's medicine and health situation. | | | | | | | | |
| B1.1 Gather information through open and respectful dialog and honestly listen to everyone's opinions to design community health promotion activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B1.2 Analyze the interconnections of health determinants, e.g., economic, social, environmental and cultural using systematic thinking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B1.3 Analyze cultural factors and avoid stereotypes when analyzing factors impacting health, e.g., ethnic background, language, identity, values, beliefs and norms of each of each group | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B1.4 Collaborate with stakeholders and community networks to identify key community health issues | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B2: Plan community health promotion activities | | | | | | | | |
| B2.1 Share data and raise awareness about community health needs and problems through participation platforms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B2.2 Develop evidence-based, culturally appropriate, and policy-aligned community wellness programs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B2.3 Use systems thinking and problem-solving approaches in activity planning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B2.4 Design project plans aligning with community needs by using pharmacy and associated science knowledge and drug and health consumer protection concepts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B3: Implement health promoting activities according to the plan | | | | | | | | |
| B3.1 Identify stakeholders, develop strategies, create operational plans, and carry out community health promotion work, (e.g., disease prevention, health education, and healthy lifestyles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B3.2 Encourage community participation in activities related to promoting health and preventing adverse health hazards, e.g., risk management, consumer protection and surveillance of medicines and health products, and community enhancement of rational medication use | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B3.3 Integrate health promotion in all policies by working with all sectors and encourage multisectoral collaboration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B3.4 Develop and support capacities of population, multidisciplinary and related organizations for sustainable community health promotion efforts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B3.5 Adapt strategies to cultural differences and response to unforeseen situations | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B3.6 Maintain positive relationships with community health care networks, and cultivate stakeholder co-ownership for long term project sustainability | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B4: Evaluate community activities with standards for continuous improvement | | | | | | | | |
| B4.1 Design comprehensive quantitative and qualitative assessment relevant to community context, project objectives and provincial and national indicators | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B4.2 Design, plan, gather data and systematically collect data from local databases to effectively evaluate and support research activity. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B4.3 Encourage stakeholder participation in evaluation and use findings for improvement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B4.4 Pro-actively monitor, surveille, analyze, and assess health status and health determinants to identify current public health needs and manage effectively | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B5: Work with the community and manage the project to keep it on track | | | | | | | | |
| B5.1 Apply appropriate management skills, e.g., motivation, negotiation, conflict resolution and teamwork to ensure project success | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| B5.2 Strategically promote public health activities for health promotion, prevention and solving community health problems, e.g., multidisciplinary collaboration, community | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

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| Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
|--|--------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|----------------|-----------------------------------|
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| | | network synergies being a change agent to promote health, and use of social measures including applying and enforcing consumer protection laws | | | | | | |
| B6: Support health promotion in primary care pharmacies safely and reasonably | | | | | | | | |
| B6.1 Encourage activities supporting health promotion and disease prevention in primary care settings, e.g., provision of medicines and vaccines for use in primary care services, preliminary health screening, vaccination and immunization, and family planning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| B6.2 Promote self-care for simple illnesses, e.g., giving advice on self-assessment methods, symptom handling, health care and basic medication | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| B6.3 Support continuity of care through referrals, discharge planning and pharmaceutical home health | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

| Definition of Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
|---|--------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|----------------|-----------------------------------|
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| | | C: Information Management and Evidence-Based Practices | | | | | | |
| C1: Manage and share pharmaceutical public health data for evidence-based decision-making | | | | | | | | |
| C1.1 Recognize and use research sources, medical and pharmaceutical information, empirical data and related evidence-based information for health promotion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C1.2 Review, evaluate and organize data using proper health informatics practices and data quality standards | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C1.3 Applying knowledge management using evidence-based advice to enhance health promotion. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C1.4 Synthesize evidence and communicate findings to target groups using appropriate channels and language to support health promotion process and shared decision-making | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C1.5 Comply with ethics standards and relevant laws, e.g., Code of Ethics for the Pharmacy Profession, the Personal Data Protection Act, respecting patient rights and autonomy to make decisions about their health and applying interpersonal medicine. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C2: Conduct and use research | | | | | | | | |
| C2.1 Conduct academic research to inform health directions for community health and possible solutions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C2.2 Develop, disseminate and implement research initiatives linked to health promotion and pharmaceutical public health | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C2.3 Develop a routine to research or action research to effectively solve problems and improve work processes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C3: Use pharmaco-economic information for effective decisions-making | | | | | | | | |
| C3.1 Evaluate cost-effectiveness of health products and assess medicine use appropriateness based on disease burden in a community | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| C3.2 Propose evidence-based initiatives and use information technology for data-driven decision-making | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

| Definition of Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
|--|--------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|----------------|-----------------------------------|
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| | | D: Communication for Health Promotion | | | | | | |
| D1: Professional communication | | | | | | | | |
| D1.1 Employ high quality verbal and nonverbal communication skills and trustworthy personality to support health promotion activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| D2: Use content and audience-appropriate communication strategies | | | | | | | | |
| D2.1 Set goals and choose communication techniques based on the target group's needs and preferences | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| D2.2 Communicate using information technologies to support and increase communication channels and coverage such as electronic media, digital communication, social media, etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| D2.3 Evaluate communication outcomes and compare the communication's objectives | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| D3: Communicate appropriately in context | | | | | | | | |
| D3.1 Communicate appropriate content based on audience's context to build good relationships and engagement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| D3.2 Adapt communication methods to each culture and deal with challenging communication situations such as conflict communication, patients with communication barriers, and cultural differences | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

| Definition of Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
|---|--------------------------|--|--------------------------|--------------------------|--------------------------|--------------------------|----------------|-----------------------------------|
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| | | E: Pharmacoepidemiology and support for public health emergencies and epidemics | | | | | | |
| E1: Pharmacoepidemiology | | | | | | | | |
| E1.1 Apply epidemiological study designs to monitor drug use, distribution, safety, and adverse reactions within the community. This encompasses pharmacovigilance activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

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| Definition of Pharmaceutical Public Health Competencies | n/a | Is it an appropriate definition? | | | | Competency level | | Additional reasons or suggestions |
|--|--------------------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------------|
| | | 4 | 3 | 2 | 1 | Entry level | Advanced level | |
| and other safety-related assessments including investigations of inappropriate health products and community outbreaks | | | | | | | | |
| E1.2 Establish systems for pro-actively responding to and preventing future emergencies or emerging challenges using pharmaco-epidemiologic data | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| E2: Support the management of public health emergencies and epidemics | | | | | | | | |
| E2.1 Prepare plans, support and assist multidisciplinary teams in preparing plans to deal with emergencies and epidemics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| E2.2 Support multidisciplinary responses to emergencies and epidemics based on pharmaceutical professional roles such as timely provision of essential emergency medicines and medical supplies according to the specific context | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| E2.3 Collaboratively deconstruct lessons and pro-actively prepare for future events using a consistent framework. This involves identifying trends, assessing risks, and integrating current ideas into continuous response strategies | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Please answer the questionnaire and return it to the researchers via email within 15 days of receiving it.
Thank you for taking time to provide your valuable information and opinions.

Appendix B. Characteristic data for documents included in the study

| Pub year | Authors | Title | Language | Term used for outcome | Target country | Level of evidence (JBI) ⁸ | Sample sizes | Target personnel | Term used to refer to this competency |
|----------|--|---|----------|-----------------------|----------------|--------------------------------------|--------------|---|--|
| 2007 | The Competency Development and Evaluation Group (CoDEG) ¹⁰³ | GLF General Level Framework: A framework for pharmacist development in general pharmacy practice | English | Competency | UK | Expert opinion (M) | | General level pharmacists | |
| 2008 | Patterson B Y ⁶⁹ | An advanced pharmacy practice experience in public health | English | Ability | USA | Cross-sectional study (E) | 9 | Advanced pharmacy practice experience in public health Pharmacists | Advanced pharmacy practice |
| 2008 | Canadian Pharmacists Association ¹²⁵ | The vision for pharmacy optimal drug therapy outcomes for Canadians through patient-centered care | English | Role | Canada | Expert opinion (M) | | Pharmacists | |
| 2009 | The National Association of Pharmacy Regulatory Authorities ¹²⁶ | Model standards of practice for Canadian pharmacists | English | Standards of practice | Canada | Expert opinion (M) | | Pharmacists | |
| 2010 | Association of Faculties of Pharmacy of Canada ¹⁰¹ | Educational outcomes for first professional degree programs in pharmacy (entry-to-practice pharmacy programs) in Canada | English | Educational outcomes | Canada | Expert opinion (M) | | Entry or foundation level pharmacists | |
| 2010 | Canadian Interprofessional Health Collaborative ⁹⁵ | A National Interprofessional Competency Framework | English | Competency | Canada | Expert opinion (M) | | No matter their level of skill or the type of practice setting or context | |
| 2010 | Government of Singapore ¹²⁷ | Competency standards for Singapore pharmacists (March 2010) | English | Competency | Singapore | Expert opinion (M) | | Pharmacists | Provide primary healthcare |
| 2011 | Mestrovic A, et al. ⁹⁷ | Evaluation of Croatian community pharmacists' patients care competencies using the General Level Framework | English | Competency | Croatia | Cross-sectional study (E) | 100 | Community pharmacists | Medicine information and patient education |
| 2011 | Thai Pharmaceutical Council ⁷⁷ | The Pharmacy Council's competency guide on the criteria for professional competence for | Thai | Skills | Thailand | Expert opinion (M) | | Entry or foundation level pharmacists | Problems related to drug use among clients and communities |

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| Pub year | Authors | Title | Language | Term used for outcome | Target country | Level of evidence (JBI) ^a | Sample sizes | Target personnel | Term used to refer to this competency |
|----------|---|--|----------|-----------------------|--------------------------|--|--------------|---------------------------------------|--|
| 2011 | Bruno AF ⁸⁸ | pharmaceutical practitioners The feasibility, development, and validation of a global competency framework for pharmacy education | English | Competency | Global | Cross-sectional study (E) | 470 | Entry or foundation level pharmacists | Pharmaceutical public health competencies |
| 2011 | Thai Pharmaceutical Council ³⁵ | Pharmacy Council announcement no. 8/2011 standards for pharmacy practitioners in pharmaceutical care | Thai | Standards | Thailand | Expert opinion (M) | | Pharmaceutical care | Health promotion of individuals and communities |
| 2011 | College of Pharmacy, Qatar University ¹⁰⁴ | Professional competencies for Qatar pharmacists at entry to practice | English | Competency | Qatar | Expert opinion (M) | | Entry or foundation level pharmacists | |
| 2012 | Brown AN, et al. ¹⁴ | Validated competency framework for delivery of pharmacy services in Pacific-Island countries | English | Competency | Pacific-Island countries | Expert consensus (E) | 38 | Pharmacists | Pharmaceutical public health (population focus) |
| 2012 | Kennie-Kaulbach N, et al. ⁹⁹ | Pharmacist provision of primary health care: A modified Delphi validation of pharmacists' competencies | English | Competency | Canada | Expert consensus (E) | 10 | | Primary health care |
| 2012 | Mestrovic A, et al. ⁹⁸ | Individualized education and competency development of Croatian community pharmacists using the General Level Framework | English | Competency | Croatia | Pre- posttest or historic/ retrospective control group study (E) | 100 | Community pharmacists | Medicine information and patient education |
| 2012 | International Pharmaceutical Federation ³⁷ | A Global Competency Framework Version 1 | English | Competency | Global | Expert opinion (M) | | Entry or foundation level pharmacists | Pharmaceutical public health |
| 2012 | Thai Pharmaceutical Council ³¹ | Pharmacy Council announcement no. 18/2012 professional core competency of doctor of pharmacy program | Thai | Competency | Thailand | Expert opinion (M) | | Entry or foundation level pharmacists | Public health system |
| 2013 | Medina MS, et al. ⁷² | Center for the Advancement of Pharmacy Education 2013 educational outcomes | English | Educational outcomes | USA | Single qualitative study (M) | | Pharmacy graduates | Health and wellness (Promoter), Population-based care (Provider) |
| 2013 | The Pharmaceutical Society of Ireland ⁸⁹ | Core competency framework for pharmacists 2013 | English | Competency | Ireland | Expert opinion (M) | | Entry or foundation level pharmacists | Public health |
| 2014 | Agomo CO, et al. ⁷⁹ | An investigation of strategies enhancing the public health role of community pharmacists: A review of knowledge and information | English | Role | UK | Qualitative or mixed-methods synthesis (M) | 36 | Community pharmacists | Public health role of community pharmacists |
| 2014 | Sumpradit N, et al. ⁷⁵ | Comparison of self-reported professional competency across pharmacy education programs: A survey of Thai pharmacy graduates enrolled in the public service program | English | Competency | Thailand | Cross-sectional study (E) | 266 | Pharmacy graduates | |
| 2014 | Svetlana S, et al. ¹¹⁹ | Evaluation of competences at the community pharmacy settings | English | Competency | Serbia | Pre- posttest or historic/ retrospective control group study (E) | 32 | Community pharmacists | |

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| Pub year | Authors | Title | Language | Term used for outcome | Target country | Level of evidence (JBI) ^a | Sample sizes | Target personnel | Term used to refer to this competency |
|----------|---|---|----------|--|----------------|--|--------------|--|--|
| 2014 | Stupans I, et al. ¹²⁸ | Nationwide collaborative development of learning outcomes and exemplar standards for Australian pharmacy programmes | English | Learning outcomes and exemplar standards | Australia | Single qualitative study (M) | | Pharmacy graduates | |
| 2014 | National Association of Pharmacy Regulatory Authorities ⁹³ | Professional competencies for Canadian pharmacists at entry to practice | English | Competency | Canada | Expert opinion (M) | | Entry or foundation level pharmacists | Health promotion |
| 2014 | Royal Pharmaceutical Society ⁴⁶ | Professional standards for public health practice for pharmacy: For pharmacists and pharmacy teams working in England and Wales | English | Standards | UK | Expert opinion (M) | | Pharmacists | Public health practice for pharmacy |
| 2015 | Bradley H, et al. ⁸⁰ | Emerging roles and competencies of district and sub-district pharmacists: A case study from Cape Town | English | Competency | South Africa | Expert consensus (E) | 8 | District and subdistrict pharmacists | Health system/ public health |
| 2015 | Accreditation Council for Pharmacy Education ⁷⁰ | Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree | English | Standards and key elements | USA | Expert opinion (M) | | Pharmacy graduates | Social/ Administrative/ Behavioral Sciences |
| 2015 | The Pharmaceutical Society of Japan ⁹⁴ | Model core curriculum for pharmacy education (2015 version) | English | Competency | Japan | Expert opinion (M) | | Pharmacists | Provide primary healthcare |
| 2015 | Thai Pharmaceutical Council ⁵⁴ | Pharmacy Council announcement no. 20/ 2015 pharmacy competency standard in pharmaceutical and health consumer protection | Thai | Standards | Thailand | Expert opinion (M) | | Health consumer protection pharmacists | Pharmaceutical public health for consumer protection |
| 2015 | Pharmacy Council of New Zealand ⁹⁰ | Competence standards for the pharmacy profession | English | Competency | New Zealand | Expert opinion (M) | | Entry or foundation level pharmacists | Public healthcare |
| 2016 | Atkinson J, et al. ¹¹¹ | What is a pharmacist: Opinions of pharmacy department academics and community pharmacists on competences required for pharmacy practice | English | Competency | Europe | Cross-sectional study (E) | 499 | Pharmacists | Patient care competences: Patient education |
| 2016 | Mucalo I, et al. ¹⁶ | The development of the Croatian competency framework for pharmacists | English | Competency | Croatia | Cross-sectional study (E) | 26 | Pharmacists | Pharmaceutical public health - health promotion |
| 2016 | Stojkov S, et al. ⁹² | Assessment and self-assessment of the pharmacists' competencies using the Global Competency Framework (GbCF) in Serbia | English | Competency | Serbia | Cross-sectional study (E) | 123 | Pharmacists | Health promotion |
| 2016 | Strand M A, et al. ⁸⁴ | The achievement of public health services in pharmacy practice: A literature review | English | Public health services | – | Qualitative or mixed-methods synthesis (M) | 247 | Pharmacists | Public health |
| 2016 | UK Public Health Register ⁶⁰ | The IUHPE core competencies and professional standards for health promotion | English | Competency | Europe | Expert opinion (M) | | Related discipline | Health promotion |

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| Pub year | Authors | Title | Language | Term used for outcome | Target country | Level of evidence (JBI) ^a | Sample sizes | Target personnel | Term used to refer to this competency |
|----------|--|--|----------|---------------------------------|-------------------|---|--------------|---------------------------------------|---|
| 2016 | Pharmaceutical Society of Australia ¹¹⁵ | National competency standards framework for pharmacists in Australia | English | Competency | Australia | Expert opinion (M) | | Entry to advanced level | |
| 2016 | The Royal Dutch Pharmacists Association ¹⁰² | 2016 Pharmacist competency framework & domain-specific frame of reference for the Netherlands | English | Competency | The Netherlands | Expert opinion (M) | | Entry or foundation level pharmacists | Health advocacy and social responsibility |
| 2017 | Bullock K C ⁶⁶ | Development, implementation, and evaluation of a service learning series for pharmacy students using a public health tool | English | Public health essential service | USA | Cross-sectional study (E) | 19 | Pharmacy graduates | |
| 2017 | Saseen J J, et al. ⁷³ | ACCP clinical pharmacist competencies | English | Competency | USA | Expert opinion (M) | | Clinical pharmacists | Systems-based care and population health |
| 2017 | Pittenger A L, et al. ⁷⁴ | Report of the 2016–17 academic affairs standing committee: Entrustable professional activities implementation roadmap | English | Activities | USA | Expert opinion (M) | | Pharmacy graduates | Population health promoter |
| 2018 | Drzaic M, et al. ⁸¹ | Identifying self-assessed competencies and areas for improvement within community pharmacist-preceptors support during pre-registration training | English | Competency | Croatia | Cross-sectional study (E) | 223 | Community pharmacist-preceptors | Pharmaceutical public health - health promotion |
| 2018 | O'Connor S K, et al. ⁶⁸ | Influencing the future of rural-focused pharmacy education: Identifying factors pertinent to pharmacy practice in rural health environments | English | Skills | USA | Single qualitative study (M) | 15 | | Pharmaceutical public health |
| 2018 | Suttajit S, et al. ⁷⁶ | Are we on the right track? answers from a national survey of Thai graduates' perceptions during the transition to the 6-year PharmD program | English | Competency | Thailand | Cross-sectional study (E) | 1744 | Pharmacy graduates | Primary health care and consumer protection |
| 2018 | Udoh A, et al. ⁸⁵ | A survey of pharmacists' perception of foundation level competencies in African countries | English | Competency | African countries | Cross-sectional study (E) | 469 | Pharmacists | Pharmaceutical public health |
| 2018 | The South African Pharmacy Council ¹⁵ | 2018 Competency standards for pharmacists | English | Competency | South Africa | Expert opinion (M) | | Entry to advanced level | Public health |
| 2019 | Abdi A M, et al. ⁷⁸ | Preparing competent graduates for delivering pharmaceutical care: An experience from Northern Cyprus | English | Competency | Northern Cyprus | Quasi-experimental prospectively controlled study (E) | 81 | Clinical pharmacists | Promoting public health |
| 2019 | Anderson C ¹¹⁴ | Public health and health promotion in pharmacy practice | English | Competency | – | Expert opinion (M) | | Pharmacists | Health promotion |

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| Pub year | Authors | Title | Language | Term used for outcome | Target country | Level of evidence (JBI) ^a | Sample sizes | Target personnel | Term used to refer to this competency |
|----------|--|---|----------|-----------------------------------|-------------------------------|--------------------------------------|--------------|---------------------------------------|---|
| 2019 | Law M G, et al. ⁸² | Knowledge, attitudes and practice of final-year student pharmacists in public health in Namibia, Zambia and Zimbabwe: An exploratory survey | English | Knowledge, attitudes and practice | Namibia, Zambia, and Zimbabwe | Cross-sectional study (E) | 129 | Pharmacy graduates | Public health |
| 2019 | Westein M, et al. ¹⁰⁰ | Development of a postgraduate community pharmacist specialization program using CanMEDS competencies, and entrustable professional activities | English | Competency | The Netherlands | Single qualitative study (M) | | Postgraduate community pharmacist | Postgraduate community pharmacist |
| 2019 | National Association of Boards of Pharmacies ⁷¹ | Pharmacy Curriculum Outcomes Assessment (PCOA) guidelines. | English | Content areas | USA | Expert opinion (M) | | Schools and colleges of pharmacy | Social/behavioral/administrative sciences |
| 2020 | Arakawa N, et al. ¹⁰ | The development of a foundation-level pharmacy competency framework: An analysis of country-level applicability of the Global Competency Framework | English | Competency | Japan | Cross-sectional study (E) | 604 | Entry or foundation level pharmacists | Pharmaceutical public health |
| 2020 | Sacre H, et al. ⁸³ | Developing Core Competencies for Pharmacy Graduates: The Lebanese experience | English | Competency | Lebanon | Expert consensus (E) | 10 | Pharmacy graduates | Pharmaceutical public health |
| 2020 | Huyssteen M V, et al. ⁸⁶ | Continuous Professional Development for public sector pharmacists in South Africa: A case study of mapping competencies in a pharmacists' preceptor programme | English | Competency | South Africa | Single qualitative study (M) | 43 | Public sector pharmacists | Public health |
| 2020 | National Association of Boards of Pharmacy ¹²¹ | NAPLEX competency statements | English | Competency | North America | Expert opinion (M) | | Entry or foundation level pharmacists | Medication-use systems |
| 2020 | International Pharmaceutical Federation ³ | A Global Competency Framework Version 2 | English | Competency | Global | Expert opinion (M) | | Entry or foundation level pharmacists | Pharmaceutical public health competencies |
| 2020 | Suwannaprom P, et al. ²³ | Development of pharmacy competency framework for the changing demands of Thailand's pharmaceutical and health services | English | Competency | Thailand | Expert consensus (E) | 99 | Entry or foundation level pharmacists | Community focus |
| 2021 | Frenzel J E, et al. ⁶⁷ | A modified Delphi involving laboratory faculty to define essential skills for pharmacy graduates | English | Skills | USA | Expert consensus (E) | 15 | Pharmacy graduates | Population health promoter |

^a E is levels of evidence for effectiveness in therapy or intervention studies; M is levels of evidence for meaningfulness in qualitative studies.

Appendix C. Pharmaceutical public health competency statements in the included documents

| Pub year | Authors | Title | Health promotion (individual and family level) | Health promotion (community level) | Information and evidence-based practice | Communication for health promotion | Emergency and epidemic response |
|----------|---|--|--|------------------------------------|---|------------------------------------|---------------------------------|
| 2007 | The Competency Development and Evaluation Group (CoDEG)[103] | GLF General Level Framework: A framework for pharmacist development in general pharmacy practice | ● | | | | |
| 2008 | Patterson BY [69] | An advanced pharmacy practice experience in public health | | | | ● | |
| 2008 | Canadian Pharmacists Association [125] | The vision for pharmacy optimal drug therapy outcomes for Canadians through patient-centered care | | ● | | | |
| 2009 | The National Association of Pharmacy Regulatory Authorities [126] | Model standards of practice for Canadian pharmacists | ● | | ● | ● | |
| 2010 | Association of Faculties of Pharmacy of Canada [101] | Educational outcomes for first professional degree programs in pharmacy (entry-to-practice pharmacy programs) in Canada | ● | ● | | ● | |
| 2010 | Canadian Interprofessional Health Collaborative [95] | A National Interprofessional Competency Framework | ● | | ● | | |
| 2010 | Government of Singapore [127] | Competency standards for Singapore pharmacists (March 2010) | | ● | | ● | |
| 2011 | Mestrovic A, et al. [97] | Evaluation of Croatian community pharmacists' patient care competencies using the General Level Framework | | ● | ● | ● | |
| 2011 | Thai Pharmaceutical Council [77] | The Pharmacy Council's competency guide on the criteria for professional competence for pharmaceutical practitioners | ● | ● | ● | ● | |
| 2011 | Bruno AF [88] | The feasibility, development and validation of a global competency framework for pharmacy education | ● | ● | ● | ● | |
| 2011 | Thai Pharmaceutical Council [35] | Pharmacy Council announcement no. 8/2011 standards for pharmacy practitioners in pharmaceutical care | | ● | | | |
| 2011 | College of Pharmacy, Qatar University[104] | Professional competencies for Qatar pharmacists at entry to practice | ● | ● | | ● | |
| 2012 | Brown AN, et al. [14] | Validated competency framework for delivery of pharmacy services in a Pacific-Island countries | | ● | | ● | |
| 2012 | Kennie-Kaulbach N, et al. [99] | Pharmacist provision of primary health care: A modified Delphi validation of pharmacists' competencies | ● | ● | | ● | |
| 2012 | Mestrovic A, et al. [98] | Individualized education and competency development of Croatian community pharmacists using the General Level Framework | | ● | ● | ● | |
| 2012 | International Pharmaceutical Federation [87] | A Global Competency Framework Version 1 | ● | ● | ● | ● | |
| 2012 | Thai Pharmaceutical Council [31] | Pharmacy Council announcement no. 18/2012 professional core competency of doctor of pharmacy program | ● | ● | | | |
| 2013 | Medina MS, et al. [72] | Center for the Advancement of Pharmacy Education 2013 educational outcomes | ● | ● | ● | ● | |
| 2013 | The Pharmaceutical Society of Ireland [89] | Core competency framework for pharmacists 2013 | | ● | | ● | |
| 2014 | Agomo CO, et al.[79] | An investigation of strategies enhancing the public health role of community pharmacists: A review of knowledge and information | | | | ● | |
| 2014 | Sumpradit N, et al. [75] | Comparison of self-reported professional competency across pharmacy education programs: A survey of Thai pharmacy graduates enrolled in the public service program | | ● | | ● | |
| 2014 | Svetlana S, et al. [119] | Evaluation of competences at the community pharmacy settings | ● | ● | | | |
| 2014 | Stupans I, et al. [128] | Nationwide collaborative development of learning outcomes and exemplar standards for Australian pharmacy programmes | ● | ● | | ● | |
| 2014 | National Association of Pharmacy Regulatory Authorities [93] | Professional competencies for Canadian pharmacists at entry to practice | ● | ● | | ● | ● |
| 2017 | Royal Pharmaceutical Society [46] | Professional standards for public health practice for pharmacy: For pharmacists and pharmacy teams working in England and Wales | ● | ● | ● | ● | |
| 2015 | Bradley H, et al. [80] | Emerging roles and competencies of district and sub-district pharmacists: A case study from Cape Town | | ● | | ● | |
| 2015 | Accreditation Council for Pharmacy Education [70] | Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree | ● | ● | ● | ● | |
| 2015 | The Pharmaceutical Society of Japan [94] | Model core curriculum for pharmacy education (2015 version) | ● | ● | | | |
| 2015 | Thai Pharmaceutical Council [34] | Pharmacy Council announcement no. 20/2015 pharmacy competency standard in pharmaceutical and health consumer protection | | ● | | | |

| Pub year | Authors | Title | Health promotion (individual and family level) | Health promotion (community level) | Information and evidence-based practice | Communication for health promotion | Emergency and epidemic response |
|--------------|---|---|--|------------------------------------|---|------------------------------------|---------------------------------|
| 2015 | Pharmacy Council of New Zealand [90] | Competence standards for the pharmacy profession | ● | ● | ● | ● | |
| 2016 | Atkinson J, et al. [111] | What is a pharmacist: Opinions of pharmacy department academics and community pharmacists on competences required for pharmacy practice | ● | | | ● | |
| 2016 | Mucalo I, et al. [16] | The development of the Croatian competency framework for pharmacists | | ● | | ● | |
| 2016 | Stojkov S, et al. [92] | Assessment and self-assessment of the pharmacists' competencies using the Global Competency Framework (GbCF) in Serbia | ● | | | | |
| 2016 | Strand M A, et al. [84] | The achievement of public health services in pharmacy practice: A literature review | ● | ● | ● | | |
| 2016 | UK Public Health Register [60] | The IUHPE core competencies and professional standards for health promotion | | ● | ● | ● | |
| 2016 | Pharmaceutical Society of Australia [115] | National competency standards framework for pharmacists in Australia | ● | | ● | ● | |
| 2016 | The Royal Dutch Pharmacists Association [102] | 2016 Pharmacist competency framework & domain-specific frame of reference for the Netherlands | ● | ● | ● | ● | ● |
| 2017 | Bullock K C [66] | Development, implementation, and evaluation of a service learning series for pharmacy students using a public health tool | | ● | ● | ● | |
| 2017 | Saseen J J, et al. [73] | ACCP clinical pharmacist competencies | ● | ● | ● | | |
| 2017 | Pittenger A L, et al. [74] | Report of the 2016-17 academic affairs standing committee: Entrustable professional activities implementation roadmap | | ● | | | |
| 2018 | Drzagic M et al. [81] | Identifying self-assessed competencies and areas for improvement within community pharmacist-preceptors support during pre-registration training | ● | | | | |
| 2018 | O'Connor S K, et al. [68] | Influencing the future of rural-focused pharmacy education: Identifying factors pertinent to pharmacy practice in rural health environments | ● | | | ● | |
| 2018 | Suttajit S, et al. [76] | Are we on the right track? answers from a national survey of Thai graduates' perceptions during the transition to the 6-year PharmD program | | ● | | | |
| 2018 | Udoh A, et al. [85] | A survey of pharmacists' perception of foundation level competencies in African countries | ● | | ● | ● | |
| 2018 | The South African Pharmacy Council [15] | 2018 Competency standards for pharmacists | ● | ● | ● | | ● |
| 2019 | Abdi AM, et al. [78] | Preparing competent graduates for delivering pharmaceutical care: An experience from Northern Cyprus | | | | ● | |
| 2019 | Anderson C [114] | Public health and health promotion in pharmacy practice | ● | | | | ● |
| 2019 | Law MG, et al. [82] | Knowledge, attitudes and practice of final-year student pharmacists in public health in Namibia, Zambia and Zimbabwe: An exploratory survey | ● | ● | ● | ● | |
| 2019 | Westein M, et al. [100] | Development of a postgraduate community pharmacist specialization program using CanMEDS competencies, and entrustable professional activities | ● | | | ● | ● |
| 2019 | National Association of Boards of Pharmacies [71] | Pharmacy Curriculum Outcomes Assessment (PCOA) guidelines. | | ● | | | ● |
| 2020 | Arakawa N, et al. [10] | The development of a foundation-level pharmacy competency framework: An analysis of country-level applicability of the Global Competency Framework | ● | ● | | ● | |
| 2020 | Sacre H, et al. [83] | Developing Core Competencies for Pharmacy Graduates: The Lebanese experience | | ● | ● | ● | |
| 2020 | Huyssteen MV, et al. [86] | Continuous Professional Development for public sector pharmacists in South Africa: A case study of mapping competencies in a pharmacists' preceptor programme | ● | ● | ● | ● | ● |
| 2020 | National Association of Boards of Pharmacy [121] | NAPLEX competency statements | ● | | | | |
| 2020 | International Pharmaceutical Federation [8] | A Global Competency Framework Version 2 | ● | ● | ● | ● | ● |
| 2020 | Suwannaprom P, et al. [23] | Development of pharmacy competency framework for the changing demands of Thailand's pharmaceutical and health services | | ● | | ● | |
| 2021 | Frenzel JE, et al. [67] | A modified Delphi involving laboratory faculty to define essential skills for pharmacy graduates | | | ● | ● | |
| Total | | | 35 | 41 | 24 | 39 | 8 |

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