

Characterizing the Competencies for Public Health Graduates in Australasia: Protocol for a Mixed-Methods Study

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Keywords

Competencies · Delphi · Mixed-methods approach · Public health · Workforce development

Abstract

Introduction: This study protocol aims to develop a validated competency framework to address the absence of a contemporary, Australasian-specific framework for public health graduates, aligning their education with workforce demands in an evolving public health landscape. **Methods:** A mixed-methods approach, combining qualitative and quantitative methods, will be used across three phases. Phase 1 will involve semi-structured interviews with public health experts, academics, and students to capture insights on essential competencies. In phase 2, a systematic

synthesis of competencies from existing frameworks will be conducted, triangulating these findings with interview data to develop a preliminary framework. Phase 3 will employ a modified Delphi process and Content Validity Index (CVI) to assess and refine the framework's content validity with Australasian public health experts. **Results:** Expected outcomes from the interviews and framework synthesis include a draft competency framework detailing core public health skills, knowledge, and attributes required to address contemporary challenges. The Delphi rounds are anticipated to confirm the framework's relevance, clarity, and importance, achieving strong content validity metrics. **Conclusions:** The resulting competency framework is expected to provide a validated structure for guiding public health education and workforce development within Australasia. By equipping graduates with competencies aligned with current and

future public health needs, this framework aims to enhance the region's capacity to address significant health challenges and disparities. Dissemination of findings across Council of Academic Public Health Institutions Australasia (CAPHIA) member institutions will support the integration of this framework into curricula, thereby informing public health education and workforce initiatives in Australasia.

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Caracterização das competências para graduados em saúde pública na Australásia: protocolo de um estudo de métodos mistos

Palavras-chave

Competências · Delphi · Métodos mistos · Saúde pública · Desenvolvimento da força de trabalho

Resumo

Introdução: Este protocolo de estudo tem como objetivo desenvolver um quadro de competências validado para suprir a ausência de uma estrutura contemporânea e específica da Australásia para graduados em saúde pública, alinhando a formação acadêmica às exigências do mercado de trabalho num cenário de saúde pública em constante transformação. **Métodos:** Será utilizada uma abordagem de métodos mistos, combinando técnicas qualitativas e quantitativas em três fases. A Fase 1 envolverá entrevistas semiestruturadas com especialistas em saúde pública, docentes e estudantes, para captar percepções sobre competências essenciais. Na Fase 2, será realizada uma síntese sistemática de competências a partir de quadros existentes, triangulando os dados com as entrevistas para elaborar uma proposta preliminar. A Fase 3 aplicará um processo Delphi modificado e o Índice de Validade de Conteúdo (IVC) para avaliar e aperfeiçoar a validade de conteúdo do quadro junto a especialistas em saúde pública da Australásia. **Resultados:** Espera-se que as entrevistas e a síntese das estruturas existentes resultem numa proposta de quadro de competências que detalhe habilidades, conhecimentos e atributos centrais para enfrentar desafios contemporâneos, incluindo saúde indígena e competências digitais. Prevê-se que as rodadas Delphi confirmem a relevância, clareza e importância do quadro, alcançando métricas robustas de validade de conteúdo. **Conclusões:** O quadro de competências resultante deverá fornecer uma estrutura validada para orientar a

formação em saúde pública e o desenvolvimento da força de trabalho na Australásia. Ao preparar graduados com competências alinhadas às necessidades atuais e futuras da saúde pública, o quadro pretende fortalecer a capacidade da região em enfrentar desafios e desigualdades significativas em saúde. A disseminação dos resultados entre as instituições membros da Council of Academic Public Health Institutions Australasia (CAPHIA) apoiará a integração deste quadro nos currículos, contribuindo para iniciativas de formação e desenvolvimento da força de trabalho em saúde pública na Australásia.

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Introduction

Understanding and defining professional competencies required by graduates of higher education degrees is critical to educational and workforce development [1]. Public health is central to promoting and protecting population health, preventing poor health, and responding to current and emergent health issues [2]. The effectiveness of public health action depends primarily on the competencies of professionals within the workforce [2]. These professional competencies, defined as knowledge, critical skills, and attributes, are necessary for individuals to make meaningful contributions to public health activities [2]. They also promote the development of competency-based education, ensuring the quality and consistency of curricula across academic programs [3]. However, a notable gap exists in Australasia and many countries globally in recognizing the specific skills and knowledge required by public health graduates (defined as graduates of a Bachelor of Public Health or similar degree, or Master of Public Health degree) to address existing and emergent public health challenges, including the health impact of climate change, increasing health inequities, racism, Indigenous health, digital health proficiency, and one health [4]. A comprehensive understanding and description of these competencies is important for informing educational programs and driving workforce development initiatives within this ever-evolving field.

Competency frameworks are essential for aligning education with practical needs within the public health sector [5]. For example, they inform the development of competency-based higher education courses by providing

a structured roadmap outlining the knowledge, critical skills, and attributes required for success in a particular field or profession [5]. Competency frameworks guide evidence-based curriculum design, ensuring educational programs align closely with the workforce's needs and industry demands [6]. By incorporating the competencies within frameworks into course objectives, learning outcomes, and assessment criteria, tertiary educators can tailor their instruction to equip students with the practical skills and theoretical knowledge necessary to excel in their chosen profession, ultimately enhancing higher education courses' relevance, quality, and effectiveness [6]. Competency frameworks, therefore, play an important role in bridging academic preparation and real-world application within the public health sector [5].

Globally, existing evidence has generated some knowledge regarding public health graduates' skills requirements and competency frameworks. Examples include the Core Competencies for Public Health in Canada [7], the United States Core Competencies for Public Health Professionals [8], the WHO-ASPHER Competency Framework for the Public Health Workforce in the European Region [9], the Public Health Competencies and Impact Variables for Low- and Middle-Income Countries [10], the Asia-Pacific Academic Consortium for Public Health Competency Framework [11], and the Core Competencies for Public Health: A Regional Framework for the Americas [11]. While each framework reflects unique conceptualizations tailored to specific sociopolitical contexts, they all share a common goal: to provide a tool for nurturing a knowledgeable and skilled public health workforce capable of effectively addressing complex public health challenges. However, their adaptation and applicability to other local contexts, including Australasia, remain to be determined.

The World Health Organization recently published (2024) the Global Competency and Outcomes Framework for the Essential Public Health Functions (EPHFs) [12]. This framework offers guidance and a reference set of competencies and educational outcomes designed to align public health education with employment needs, ensuring the development and maintenance of a workforce capable of delivering EPHFs. The framework has four key objectives: (i) to consolidate and build upon existing frameworks and resources to strengthen public health education programs; (ii) to define the practice activities required for delivering the 12 globally recognized EPHFs, encompassing the entire public health workforce; (iii) to provide a modular, foundational tool adaptable for guiding competency-based education ap-

proaches; and (iv) to support the alignment of education programs with employment across the lifelong learning continuum [12]. The framework emphasizes that this global competency guidance should be contextualized to fit specific country settings and public health priorities. When adapted, it can aid in designing and implementing competency-based education programs that align with the skills and competencies needed for public health employment in unique and diverse populations and jurisdictions [13].

Peak organizations representing universities in Australasia have identified and described competencies relevant to public health graduates. In 2009, the Council of Academic Public Health Institutions Australasia (CAPHIA) developed the Foundation Competencies for Master of Public Health Graduates in Australia (First Edition) [14]. This document established the fundamental competencies expected of graduates from Master of Public Health (MPH) programs in Australia. It guided academic institutions in shaping their MPH curriculum, facilitating collaboration, curriculum review, and course planning. In 2016, the second edition of this framework was introduced, emphasizing foundational practices for graduates while offering examples of specialist elements [15]. This edition supported generalist education and specialized training within the public health discipline. However, the rapid evolution of public health challenges since both publications supports the need for a comprehensive re-evaluation and validation of these competencies. For instance, the domains presented lack specificity on essential competencies such as data analytics proficiency, health systems leadership, and crisis management skills, which are critical for navigating the complex landscape of post-pandemic public health scenarios (e.g., COVID-19) [13]. The ongoing development and widespread adoption of digital health technologies also require a clear understanding of the specialized skills and knowledge needed for effective administration and management. Additionally, there is a noticeable gap in the inclusion of indigenous health content, which is essential for addressing health disparities and ensuring culturally appropriate public health responses. Further, both frameworks lack empirical validation, potentially limiting their effectiveness as guiding tools for curriculum development, workforce planning, and professional development initiatives.

This study protocol aims to develop a validated competency framework to address the absence of a contemporary, Australasian-specific framework for public health graduates, aligning their education with workforce demands in an evolving public health

landscape, that accommodates the dynamic nature of public health practice. This framework will describe the required competencies for public health graduates to navigate this evolving landscape effectively. To ground the inquiry in public health experts' knowledge and experiences, including practitioners, academics, and professional associations, this program of work will identify the competencies necessary for addressing present and future public health challenges. Subsequently, the preliminary competency framework will undergo evaluation for its acceptability and applicability among Australasian public health experts, employing a modified Delphi process. The study will contribute valuable insights to curriculum development, workforce planning initiatives, accreditation, and regulation of practice by addressing this knowledge gap. Ultimately, the goal was to equip public health professionals with the competencies to tackle current and emerging public health challenges effectively.

Methods

We aim to characterize the competencies (knowledge, critical skills, attributes) required by public health graduates to effectively contribute to the workforce and meet existing and emergent public health needs. Specifically, we will:

1. identify and synthesize competencies required by public health graduates to address current and future public health priorities;
2. develop a preliminary framework mapping graduate competencies that enable graduates to contribute effectively to Australasia's public health workforce;
3. establish validity of an Australasian competency framework for public health graduates.

Study Design

This mixed-methods study design combines qualitative and quantitative approaches to comprehensively understand the competencies required by public health graduates in New Zealand, Australia, Fiji, and Papua New Guinea. The study will be undertaken in three phases. Phase 1 involves semi-structured interviews with public health industry experts, academics, and public health students, using purposive and snowball sampling to gather diverse and relevant insights about contemporary public health competencies. This qualitative approach allows for in-depth exploration and open-ended discussions [16], capturing detailed descriptions of the competencies needed to address current and future public health challenges. Phase 2 involves a systematic frame-

work synthesis, identifying and extracting competencies from existing health and public health competency frameworks, and triangulating these with interview data to develop a preliminary competency framework. Finally, phase 3 will employ a modified Delphi process and Content Validity Index (CVI) to quantitatively assess and refine the framework's content validity through expert feedback. It is anticipated that the mixed-methods approach will leverage the strengths of both qualitative and quantitative methodologies to ensure a robust and comprehensive understanding of the competencies necessary for the public health workforce in Australasia.

Participant Recruitment

To be eligible for participation, participants must be (i) students (undergraduate or postgraduate) studying public health degrees or (ii) public health experts and recent public health graduates with relevant knowledge and experience in public health. Experts will include public health professionals (e.g., epidemiologists, environmental health professionals, public health physicians, and health promotion practitioners), educators and academics, representatives from professional associations (e.g., Public Health Association of Australia, Australian Health Promotion Association, and CAPHIA), and individuals working within public health organizations, government agencies, health service providers, and non-governmental community organizations. Participants will span multiple countries in Australasia (Australia, Fiji, Papua New Guinea, and New Zealand Aotearoa) and include First Nations/Indigenous participants within each location. Professionals not classified as public health experts working within public health organizations, government agencies, health service providers, and non-governmental community organizations; postgraduate and undergraduate students currently enrolled in a higher education institution outside Australasia; and participants under 18 will not be eligible for participation.

A stratified purposive sampling approach [17] will be adopted to recruit participants across jurisdictions within Australia, Papua New Guinea, New Zealand Aotearoa, and Fiji. Participants will be selected based on their representation of diverse public health organization types, areas of expertise, and professional roles to ensure broad perspectives are captured. The sampling strategy will prioritize a balance across different jurisdictions and expertise areas to further enhance the diversity of views. It will intentionally oversample Aboriginal and Torres Strait Islander participants in Australia to ensure their perspectives are appropriately represented. This sampling approach is anticipated to help mitigate potential

inclusion biases and contribute to a more comprehensive understanding of the sector. A list of eligible participants will be generated using the investigators' public health, academic, and industry networks and a comprehensive desk search. Social media (e.g., CAPHIA's LinkedIn page) will promote the research and invite interested individuals to contact the researchers. Participants will be emailed an invitation to take part in phases 1 and 3. A copy of the project consent form and information sheet will be provided.

Data Collection

Phase 1: semi-structured interviews ($n \sim 60$) with public health students and industry experts will be conducted. Semi-structured interviews will allow in-depth descriptions and open-ended discussions regarding the competencies required by public health graduates to effectively contribute to the workforce and meet existing and emerging public health needs. Specifically, participants will be asked about their experience and background in public health, the most pressing public health priorities and emerging challenges, the essential competencies graduates need to address current and future public health needs, and strategies to effectively identify and define these competencies. Where relevant, the interviewer will be selected based on the interviewee's preference, particularly for Australian Aboriginal and Torres Strait Islander participants, to ensure culturally appropriate engagement. This approach acknowledges the importance of positionality as insider/outsider theory may influence the interview dynamics, ensuring participants feel comfortable and understood. This consideration will extend to interviews conducted in Papua New Guinea and Fiji, where local context and preferences will guide interviewer selection.

Phase 2: competencies from existing public health and health professional competency frameworks will be identified and extracted. A search strategy will be developed to identify relevant frameworks, and a global search will then be conducted. The search strategy will use terms to capture key public health domains and competency frameworks. For example, "public health AND competenc* framework" or "public health" AND "competenc* framework" AND "health promotion" OR "community development". The search will be conducted in database such as MEDLINE Ovid, Scopus, Education Resources Information Centre (ERIC), and Web of Science. Competency frameworks will be excluded if they are not specific to public health, Australasia, peer reviewed, or in languages other than English.

Phase 3: approximately 150 participants, based on the experts identified in phase 1, will be invited to take part in the modified Delphi. The minimum required for each Delphi Round is estimated to be 50. The content validity of the preliminary framework will be evaluated using a two-round email-based modified Delphi process and a Content Validity Index (CVI) [18] with a group of public health experts in Australasia. In round 1, experts will be sent email invitations to participate. The invitation will include a link to the participant information sheet and consent form. Once consent is confirmed, participants will be directed to the e-Delphi questionnaire. Participants will be asked to rate each item and its response scale based on importance using a 5-point CVI scale where 1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = very important, and 5 = extremely important [18]. For example, participants will be asked to rate how important each competency is within each domain (domain indicated by square brackets). Following the question, a list of specific competencies relevant to the domain will be provided to enable participants to rate in terms of importance. For instance, how important are the following public health competencies about understanding the impact of the determinants of health, equity, and equality on the health outcomes of populations.

Through open dialogue boxes, experts will be asked to provide suggestions for item wording, domain name, and domain definition revisions and propose additional items for any missing experiential aspects relating to public health competencies. Demographic questions will include gender, year of birth, highest educational qualification, place of work, and current professional role. Participants will be given a 2-week window to complete round 1, after which the questionnaire will be closed. Reminder emails will be dispatched to participants on days 5 and 12 of the round 1 questionnaire if they have not participated.

Round 2 will commence 2 weeks after the conclusion of round 1. Experts will receive a second invitation via email, asking them to rate the revised items in terms of clarity, relevance, and importance using the 4-point CVI scale and propose item revisions. A 2-week timeframe will be allotted for experts to complete the round 2 questionnaire, after which the questionnaire will be closed. As per round 1, reminder emails will be sent to participants on days 5 and 12.

Data Analysis

Phase 1: following the interviews, 8 independent researchers will undertake abductive thematic analysis incorporating coding derived from existing public health

competency frameworks (identified in phase 2) and inductively identified themes. To identify major and minor themes, the following steps will be taken: (i) handwritten memos will be collated immediately after each interview to ensure a reflexive stance is maintained concerning the research context, participants, and documents under study; (ii) familiarization through careful and repeated reading of transcripts and research memos, noting emergent themes; (iii) each participant will be emailed a copy of their transcribed interview to ensure the investigators' records correspond with the participants' accounts; (iv) open coding in which codes will be created based on identified themes and these codes will be assigned to specific sections of transcripts; and (v) data display using matrices including summary tables [19]. After all researchers have independently analyzed the data, a process of verification will be undertaken via discussion between researchers. A summary of participants' characteristics, for example, type of participant (student, expertise area, academic) and length of time in the public health sector, will be reported. Quotes will be attributed using pseudonyms and type of participant.

Phase 2: following the extraction of competencies from pre-existing frameworks by two researchers, a framework synthesis will guide the analysis and triangulation of the interview data. Framework synthesis starts deductively from pre-set aims and objectives – to extract and synthesize findings [20]. This approach will involve immersing in the raw data from the in-depth interviews by re-reading interview transcripts and reviewing recurrent themes. Once a link between themes is determined, public health graduates' skills, knowledge, and attributes will be grouped under overarching competency domains. These domains will form the preliminary framework, including individual competencies and competency descriptors. The output of this second phase will be a preliminary competency framework – a synthesis of new and existing competencies relevant to the public health workforce (including students and new graduates). This preliminary framework will be tested in phase 3.

Phase 3: Content Validity Index (CVI) will be used as a verified approach for evaluating content validity. The CVI comprises two computed components: the item-level CVI (I-CVI) and the scale-level CVI (S-CVI) [18]. To calculate the I-CVI, the number of Delphi panel experts assigning a “very important” or “extremely important” rating to each item will be divided by the total number of experts, resulting in values ranging from 0 to 1.18. An I-CVI surpassing 0.79 will deem the item

important, while values between 0.70 and 0.79 will indicate the need for item revisions; I-CVI values below 0.70 will warrant item elimination [18]. Likewise, the S-CVI will be determined based on the count of items within a tool that attain a “very important” or “extremely important” rating. To measure the S-CVI, the Universal Agreement (UA) among experts (S-CVI/UA) will be used. The S-CVI/UA involves summing all items with an I-CVI of 1 and dividing by the total number of items, with an S-CVI/UA of ≥ 0.8 denoting excellent content validity [18].

The demographic and Delphi survey data will be analyzed descriptively using Microsoft Excel. Expert responses to the item-level CVI (I-CVI) scales will be binary coded as 0 for “not, slightly or moderately important” and 1 for “highly important.” An I-CVI score will then be computed for each item, representing the proportion of experts scoring 1 out of the total number of experts in the round 1 sample. Items meeting a score of ≥ 0.80 for importance and without revision suggestions will be retained for the final version of the framework [18]. Items achieving scores of ≥ 0.80 for importance and clarity (with revision suggestions), or ≥ 0.80 for importance but < 0.80 for clarity, will undergo revision by the research team based on expert feedback and will subsequently be included in the round 2 questionnaire. Items obtaining scores of < 0.80 for importance, and clarity will be removed from the framework. The research team will also consider suggestions provided by experts concerning modifications to domain names, domain definitions, and missing items [18].

The round 2 questionnaire results analysis will adhere to the same methodology as in round 1. The research team will thoroughly review additional suggestions for item revisions before implementing further framework modifications. A scale-level CVI (S-CVI) score will also be calculated by averaging the I-CVI scores for all items included in the final framework. Delphi studies are typically carried out in two to three rounds with a deliberately selected panel of experts. In the current study, a third round of consultation will be administered if a few items achieve scores of ≥ 0.80 for importance and clarity. In this third round, data collection and analysis processes will replicate those of the previous rounds.

Dissemination Plan

Findings will be prepared for dissemination across CAPHIA member institutions, which represent 39 higher education providers in Australasia. Dissemination methods will include workshops and seminars,

presentations at conferences, including the annual CAPHIA learning and teaching forum, and infographics and visualizations designed to enhance understanding and accessibility of the research findings. This strategy will involve utilizing platforms like Twitter, LinkedIn, and ResearchGate to amplify the reach of research findings and engage with a diverse audience. Data will also be prepared for submission to appropriate peer-reviewed journals.

Patient and Public Involvement

This research project was designed without direct patient or public involvement in key aspects, such as determining research priorities, defining research questions, selecting outcome measures, and contributing to the study design. Recognizing that including patient and public perspectives can significantly enhance the relevance, quality, and applicability of research outcomes, their absence in this study may impact the comprehensiveness and relevance of our findings.

Discussion

The public health workforce is crucial to addressing current and emerging population health priorities [20]. Yet there is a lack of contemporary knowledge about the competencies and skills required for this critical cadre workforce in Australasia [2]. This study aims to develop a validated competency framework to address the absence of a contemporary, Australasian-specific framework for public health graduates, aligning their education with workforce demands in an evolving public health landscape, that accommodates the dynamic nature of public health practice. This framework will serve as a practical tool for educational organizations and regulatory and professional bodies by defining and describing the specific skills, behaviors, knowledge, attitudes, and experience needed by public health graduates. A key aspect of this framework is its potential to address significant health disparities, particularly in Aboriginal and Torres Strait Islander communities and First Nations people of New Zealand Aotearoa, where public health can play a vital role in closing the health gap. By equipping graduates with culturally competent skills and knowledge, this framework seeks to contribute to reducing these health inequities. Additionally, it could inform curriculum development, accreditation standards, regulation of the public health sector in Australasia, and workforce planning initiatives, ensuring that public health professionals are equipped with the

necessary competencies to effectively address current and emerging public health issues and priorities.

For established public health organizations and educational institutions across Australasia, an empirically based competency framework could be instrumental in identifying sector-wide upskilling needs and informing the development of targeted short courses and micro-credentials [21, 22]. This framework could help address gaps in public health training, especially for professionals without formal public health qualifications, while supporting professional development through accessible learning options. Highlighting these needs may further expose the potential role of such frameworks in guiding sector regulation and registration efforts. For recent graduates and current public health professionals, the framework could provide a valuable tool for self-reflection, enabling them to identify knowledge and skill gaps and guide their planning for future training and career progression opportunities.

By assisting in flagging personal and professional development needs, the framework offers a basis for strengthening professional development offerings across the industry. By identifying areas of weakness in the professional curriculum, the framework will inform revisions to pre-service and in-service curricula over time, ensuring they remain relevant and effective in preparing public health professionals for the demands of their field [23]. Additionally, the framework could serve as a foundation for overseeing the sector, aligning with WHO recommendations and supporting the accreditation of public health programs. This would enhance the consistency and quality of public health training and contribute to the broader professionalization and standardization of the field [13].

As with the majority of studies, the design of the current study has some limitations. First, purposive sampling will recruit interview participants representing various types of public health organizations, roles, and geographical jurisdictions. However, the researchers anticipate that not all participants will be available to interview due to scheduling or other issues, and therefore, equal representation across the eligible participant group may not be feasible or possible. A limitation of interviewing a participant group lacking diverse representation is the potential for biased results that do not accurately reflect the perspectives and knowledge of the broader population [24]. This may lead to incomplete or skewed insights and limit the applicability of the defined competencies to all institutions, professional organizations, and jurisdictions across Australasia. While acknowledging these limitations of representation and standpoint,

purposive sampling has been deliberately considered to ensure the representation of all types of public expertise in some form. Close attention will be paid to the positionality of each expert during analysis, which will include systematic triangulation of data from different experts. Nonetheless, the findings from the current study will constitute an important contribution to the field by delivering a starting point for mapping key competencies required by Australasian public health graduates.

While the modified Delphi process is a popular design used for research involving framework validation, some potential limitations within the proposed study are evident. First, the Delphi process is primarily based on expert opinions rather than empirical evidence. While these opinions can be valuable, they may not always align with objective facts or data [25]. This can limit the validity and reliability of the framework validation process, particularly if more empirical evidence is needed to support the experts' judgments [25]. A further potential limitation of the study design is that experts provide their input individually and anonymously. The Delphi process, therefore, lacks direct interaction among experts, which can restrict the opportunity for in-depth discussions, debates, and exchanging ideas [25]. Consequently, the method may not capture the full complexity of the research problem or allow for exploring alternative perspectives. While lacking direct interaction among experts and limiting opportunities for in-depth discussions, debates, and idea exchanges, the Delphi process offers distinct advantages that help offset these limitations [25]. The anonymity of participants reduces the influence of dominant voices, fostering more independent and unbiased responses. Additionally, the iterative nature of multiple rounds allows for the refinement of opinions over time, while the option to provide qualitative feedback offers nuanced insights that might otherwise be overlooked. These strengths contribute to a more balanced and comprehensive consensus, even without face-to-face interactions.

References

- 1 Chau H, Bana SH, Bouvier B, Frank MR. Connecting higher education to workplace activities and earnings. *PLoS One*. 2023; 18(3):e0282323. <https://doi.org/10.1371/journal.pone.0282323>
- 2 Caron RM, Noel K, Reed RN, Sibel J, Smith HJ. Health promotion, health protection, and disease prevention: challenges and opportunities in a dynamic landscape. *AJPM Focus*. 2024;3(1):100167. <https://doi.org/10.1016/j.focus.2023.100167>
- 3 Lewis LS, Rebesch LM, Hunt E. *Nursing Education Practice Update 2022: Competency-based education in nursing*. SAGE Open Nurs. 2022;8:23779608221140774. <https://doi.org/10.1177/23779608221140774>
- 4 Xu R, Yu P, Liu Y, Chen G, Yang Z, Zhang Y, et al. Climate change, environmental extremes, and human health in Australia: challenges, adaptation strategies, and policy gaps. *Lancet Reg Health West Pac*. 2023;40:100936. <https://doi.org/10.1016/j.lanwpc.2023.100936>
- 5 MacKay M, Ford C, Grant LE, Papadopoulos A, McWhirter JE. Developing competencies in public health: a scoping review of the literature on developing competency frameworks and student and workforce development. *Front Public Health*. 2024;12:1332412. <https://doi.org/10.3389/fpubh.2024.1332412>
- 6 Jackson D, Riebe L, Meek S, Ogilvie M, Kuilboer A, Murphy L, et al. Using an industry-aligned capabilities framework to effectively assess student performance in non-accredited work-integrated learning contexts. *Teach High Educ*. 2023;28(4):802–21. <https://doi.org/10.1080/13562517.2020.1863348>

Statement of Ethics

The James Cook University Human Research Ethics Committee (HREC) approved ethics on 26 June 2024. Ethics approval has also been sought from multiple institutions with which the other investigators are affiliated, including those in Papua New Guinea, Fiji, New Zealand Aotearoa, and Australia. The current project has been deemed “low risk” by the HREC; the only foreseeable risk is discomfort. With the purposeful inclusion of Aboriginal and Torres Strait Islander participants in Australia, additional information was provided to demonstrate how the project addresses the six core values of ethics for research with Aboriginal and Torres Strait Islander Peoples and communities. Integrity will be upheld throughout the research process, ensuring that all interactions with Aboriginal and Torres Strait Islander participants are non-judgmental and culturally sensitive. To facilitate this, the project will leverage the expertise of two chief investigators who champion the rights of Aboriginal and Torres Strait Islander communities nationwide.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author Contributions

Nathan Dawes and Melissa Graham led the development of the study design and protocol. All other authors contributed to reviewing and editing the manuscript and approved the final version for submission.

Data Availability Statement

No datasets were generated or analyzed during the current study.

- 7 Shephard R, Uy J, Otterman V, Betker C, Sandhu HS, Tjaden L, et al. The core competencies for public health in Canada: opportunities and recommendations for modernization. *J Public Health Manag Pract.* 2024;30(3):432–41. <https://doi.org/10.1097/PHH.0000000000001884>
- 8 US Centers for Disease Control and Prevention. Competencies for public health professionals [Internet]. Atlanta, GA: US Centers for Disease Control and Prevention; 2024. Available from: <https://www.cdc.gov/public-health-gateway/php/our-work/public-health-professionals-competencies.html>
- 9 World Health Organization. WHO-ASPHER competency framework for the public health workforce in the European Region. Copenhagen: WHO Regional Office for Europe; 2020.
- 10 Zwanikken PAC, Alexander L, Huong NT, Qian X, Valladares LM, Mohamed NA, et al. Validation of public health competencies and impact variables for low- and middle-income countries. *BMC Public Health.* 2014; 14:55. <https://doi.org/10.1186/1471-2458-14-55>
- 11 Karunathilake I, Liyanage C. Accreditation of public health education in the Asia-Pacific region. *Asia Pac J Public Health.* 2015;27(1): 38–44. <https://doi.org/10.1177/1010539514562024>
- 12 Suárez Conejero JE, Listovsky G, Magaña Valladares L, Duré MI, García Gutiérrez JF, van Olphen M. Core competencies for public health teaching: regional framework for the Americas. *Rev Panam Salud Publica.* 2023; 47:e137. <https://doi.org/10.26633/RPSP.2023.137>
- 13 World Health Organization. Global competency and outcomes framework for the essential public health functions. Geneva: World Health Organization; 2024.
- 14 Genat B, Robinson P, Parker E. Foundation competencies for master of public health graduates in Australia. Canberra: Australian Network of Academic Public Health Institutions (ANAPHI); 2009.
- 15 Somerset S, Robinson P, Kelsall H, editors. Foundation competencies for Master of Public Health graduates in Australia. 2nd ed. Canberra: Council of Academic Public Health Institutions Australasia (CAPIA); 2016.
- 16 Rana K, Poudel P, Chimoriya R. Qualitative methodology in translational health research: current practices and future directions. *Healthc.* 2023;11(19):2665. <https://doi.org/10.3390/healthcare11192665>
- 17 Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Ment Health.* 2015; 42(5):533–44. <https://doi.org/10.1007/s10488-013-0528-y>
- 18 Dawes N, Topp SM, Adegboye O. Validation of a national leadership framework to promote and protect quality residential aged care: protocol for a Delphi study. *BMJ Open.* 2024;14(7):e083107. <https://doi.org/10.1136/bmjopen-2023-083107>
- 19 Thompson J. A guide to abductive thematic analysis. *Qual Rep.* 2022;27(5):1410–21. <https://doi.org/10.46743/2160-3715/2022.5340>
- 20 Barnett-Page E, Thomas J. Methods for the synthesis of qualitative research: a critical review. *BMC Med Res Methodol.* 2009;9:59. <https://doi.org/10.1186/1471-2288-9-59>
- 21 Liang Z, Blackstock FC, Howard PF, Briggs DS, Leggat SG, Wollersheim D, et al. An evidence-based approach to understanding the competency development needs of the health service management workforce in Australia. *BMC Health Serv Res.* 2018;18(1): 976. <https://doi.org/10.1186/s12913-018-3760-z>
- 22 Coombe L, Severinsen CA, Robinson P. Mapping competency frameworks: implications for public health curricula design. *Aust N Z J Public Health.* 2022;46(5):564–71. <https://doi.org/10.1111/1753-6405.13253>
- 23 Mumbo HM, Kinaro JW. Assessment of quality and relevance of curricula development in health training institutions: a case study of Kenya. *Hum Resour Health.* 2015; 13:67. <https://doi.org/10.1186/s12960-015-0048-9>
- 24 Shea L, Pesa J, Geonnotti G, Powell V, Kahn C, Peters W. Improving diversity in study participation: patient perspectives on barriers, racial differences and the role of communities. *Health Expect.* 2022; 25(4):1979–87. <https://doi.org/10.1111/hex.13554>
- 25 Okoli C, Pawlowski SD. The Delphi method as a research tool: an example, design considerations and applications. *Technol Forecast Soc Change.* 2004;42(1):15–29. <https://doi.org/10.1016/j.im.2003.11.002>