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A systems approach to the perceptions of the integration of public health into pharmacy practice: A qualitative study

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ABSTRACT

Background: Pharmacists, as health professionals, are ideally positioned to support the health and wellbeing of populations, in addition to their role of providing individualised health care.
Objective: The aim of this study was to explore current opinion on the contribution of pharmacists to public health and how this may be enhanced to positively impact public health indicators.
Methods: A total of 24 pharmacists from Australia, United Kingdom, Canada and the United States of America, and Australian public health professionals and consumers participated in semi-structured interviews between January and October 2021. Interpretive thematic analysis was applied with coding of transcripts using the constant comparison method. Themes were developed and named in accordance with Bronfenbrenner's ecological theory of development.
Results: Pharmacists contribute to public health and have important roles in health education and illness prevention services. Strong enablers in community pharmacy include trust by consumers and ease of accessibility to pharmacists. Pharmacists are viewed as leaders in communities and contribute to the health system broadly in areas such as medication policy and public health organisations.
Participants suggested that pharmacist contributions to public health are often unrecognized by the pharmacy profession, health professionals and consumers, and could be developed to allow effective contributions. Strategies to improve pharmacist contributions included clarifying public health-related terminology, increased development of pharmacy roles and reform for community pharmacies to participate in health prevention and promotion services. Integration of public health in pharmacy education, professional development, and recognition of pharmacy roles across all system levels were also identified as important.
Conclusions: The study indicated that pharmacists currently contribute to the improvement of public health. However, development strategies are required for this to be more effective in integrating public health approaches into their professional practice to be recognized for their public health-related roles.

1. Introduction

Public health in pharmacy practice is defined as "the application of pharmaceutical knowledge, skills and resources to the science and art of preventing disease, prolonging life, promoting, protecting and improving health for all through organized efforts of society".[1] Pharmaceutical public health has been described as micro or macro services, with micro services defined as those directed toward individuals, but which require public health skills and will ultimately impact public health indicators.[2] An example of a micro level service is patient-centred health promotion services for chronic diseases such as diabetes. Macro services are aimed at influencing health broadly across populations[2] and include activities such as policy development, advocacy or research and evaluation.

Pharmacists are ideally positioned to provide care to patients, but also contribute to public health. Over the last two decades, there has been increasing recognition of the role that pharmacists may play in contributing to public health.[3–5] Preventive health services, such as weight management, delivered through community pharmacy improve individual health outcomes,[6] while from a population perspective, the introduction of vaccination by pharmacists has improved overall influenza vaccination rates.[7] Public health concepts such as equity, integration of services and sustainability feature strongly in the global pharmacy development goals published by the International Pharmaceutical Federation (FIP) in 2020.[8]

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It has been recognized that support may be needed for pharmacists to contribute their full potential and positively impact population health indicators.[6,9,10] Recent literature suggests that structural barriers such as community pharmacy resourcing and limited facilitation of interprofessional practice[11,12] curtails pharmacy involvement with public health, even though pharmacists are currently more willing and confident to participate in public health-focused activities.[12] Integration of public health competencies with pharmacy standards has occurred in some countries,[13,14] but not Australia, contributing to the profession being unaware of its public health role.[12] The aim of this study was to explore current opinion on how pharmacists contribute to public health and the strategies required for further development of their roles in public health-focused activities. This will contribute to the Australian project but also afford learnings for the global pharmacy community.

2. Methods

A grounded theory approach[15,16] was used; it was underpinned by the philosophical stance of pragmatism.[17,18] Grounded theory is a methodology of interpreting data[16] that is consistent with finding answers for social action and change.[19] The principles of grounded theory,[16,19] including the breadth of initial interviews and an inductive approach and use of constant comparison for analysis, aligned with the aims of the study and facilitated the development of a conceptual framework to guide future public health-focused practice in pharmacy.

Data were collected through 24 semi-structured qualitative interviews with pharmacists, public health professionals and consumers from January to October 2021. Conduct of the study was approved by the James Cook University Human Research Ethics Committee (H8258). Reporting of the study followed the consolidated criteria for reporting qualitative research (COREQ) checklist.[20] The principal investigator is a pharmacist trained in public health, with experience in clinical pharmacy, academia, and primary health program management. Other investigators bring pharmacy, public health and medical education, qualitative research and pharmacy practice research expertise to the study.

Bronfenbrenner's ecological theory of human development[21] was used to understand the context in which the pharmacy profession operates and its impact on the development of pharmacists and pharmacy services. Bronfenbrenner's system levels have been used in studies in health to explain influences of context.[22,23] In the 1970s, Urie Bronfenbrenner proposed that the development of individuals was influenced by the environment and systems in which they operate.[21] Bronfenbrenner describes four interrelating systems; the microsystem being the structure in which the individual most often operates, with the mesosystem, exosystem and macrosystem being interconnected, but having a less direct interaction with an individual.[21] The theory was later developed to incorporate the influence of time (chronosystem) on an individual and subsequently, an individual's role in their own development, resulting in the description of the PPCT model (process, person, context, and time) where these four components influence the individual's development.[24] The context element of this model is the most relevant to this study and will be used to present and consolidate the findings.

The system levels according to Bronfenbrenner[21] are applied to this study within the context of systems influencing the pharmacy profession. The microsystem is the environment in which most pharmacists work daily, with the primary aim being the delivery of services to individuals. The mesosystem is identified as the networks or systems with which the microsystems interact, while the exosystem describes structures which exert indirect impact on practising pharmacists such as pharmacy research. The macrosystem is understood as the system which directly influences the pharmacy profession. Table 1 describes the system levels and outlines examples in the pharmacy profession.

Table 1
System levels (Bronfenbrenner's ecological theory) applied to pharmacy practice.

System Level	Definition/Explanation	Examples
Microsystem	Pharmacy setting where a pharmacist engages in professional practice, providing services to individuals	Hospital pharmacy, community pharmacy, consultant pharmacy
Mesosystem	Surrounding microsystems and the interrelations with the pharmacy microsystem that are necessary for the operation of pharmacy practice	General practice and other health services, pharmacy professional organisations (training), university pharmacy schools
Exosystem	Systems of social structures in which the pharmacy microsystem doesn't routinely reside, but by which it is influenced	Local community structures and systems, health care peak bodies, research institutions
Macrosystem	Overarching institutional systems that determine the culture and subculture of pharmacy practice	Federal or state government legislation or regulations, funding structures and systems, pharmacy professional organisations (governance and policy)
Chronosystem	Historical period through which societal change and development influences the microsystem	COVID-19 impact on society and professions, development of pharmacy profession

2.1. Recruitment and data collection

A combination of purposive and snowball sampling[25] was used to recruit participants. Potential participants were identified by the investigators from within pharmacy practice, pharmacy academia and public health academic fields through published literature or professional networks. Participation was sought from professionals with interests in public health and pharmacy integration in English-speaking countries where work on the integration of public health approaches to pharmacy practice has been progressed. Potential participants who indicated interest were asked to forward details of the study to colleagues to assist in further recruitment. A small sample of consumers was recruited to give their perspective on pharmacy services. Consumer recruitment was completed through invitation to consumers volunteering with the College of Medicine and Dentistry, James Cook University.

An interview guide was developed to encompass themes identified by a scoping literature review previously conducted by the investigators.[26] Questions centred around gathering views on the contribution of pharmacists to public health, barriers and enablers and the competencies needed (Appendix 1). A one-page summary of the literature review[26] (see Appendix 2) was distributed to participants prior to their interview to provide background information.

A pilot interview was conducted with a pharmacist to gain feedback on the relevance and suitability of questions and the length and flow of the interview, with no changes required. Interviews were conducted by the principal investigator(RW) via the Zoom® videoconferencing software or by telephone and lasted between 15 and 57 min. Participant consent for the interview was obtained and the interview recorded. RecordanyVid®, a third-party software, was used to record audio without video. Recordings of interviews were transcribed verbatim by the principal investigator, with the assistance of F4transkript software®. A copy was sent to all participants to confirm the transcript was an accurate record of the interview and give opportunity for inclusion or removal of comments from data analysis.

2.2. Data analysis

The process of data analysis was guided by grounded theory methodology.[15,16] Interpretive thematic analysis was used to find common patterns of meaning,[25] with analysis commencing in the transcribing process allowing the development of deep familiarity with the data. Transcripts were analysed using NVivo software® and initial codes were generated inductively using the constant comparison method. Memoing

of ideas was conducted throughout the analysis.[16] Secondary coding was developed and emerging themes were checked for reliability by a second investigator(KC). Advanced coding and ongoing development of themes was discussed regularly throughout analysis by the investigating team and subsequently combined and named, in accordance with Bronfenbrenner's theory.[21] Recruitment and sampling was continued until saturation of major generated themes and sub-themes occurred.[16]

3. Results

Participant characteristics are outlined in Table 2. Most participants were pharmacists from Australia from professional settings including community pharmacy, academia, professional pharmacy organisations and hospital pharmacy. Of the 20 participants identified as pharmacists, all had indicated an interest in public health-focused practice with seven having completed postgraduate public health qualifications and six employed in public health policy roles. Results from the thematic analysis were organized into two major areas, the first being how pharmacists currently contribute to public health, with the second area on how contribution may be further developed. Results are presented within the framework of Bronfenbrenner's system levels to understand the influences on pharmacy practice and inform future development. Themes and additional supporting quotes from the interviews are presented in Table 3.

3.1. Contributions of pharmacists to public health

Participants discussed their opinions of how pharmacists contribute to public health. This was considered in terms of their contributions and roles, according to Bronfenbrenner's system levels.[21]

3.1.1. Microsystem (patient services)

A dominant theme was the recognition of the role pharmacists have in health education, promotion, and illness prevention to individual patients.

Major enablers included the accessibility of community pharmacists to consumers and the high level of trust in the profession, facilitating illness prevention and health promotion and education to be delivered by a trained health professional. Regular visits to pharmacies for prescription supply contributes to the development of rapport and relationships with consumers that fosters conversation and understanding of broad impacts on health. Potential for public health-focused work was mentioned in settings other than community pharmacy.

> *"They [community pharmacists] see so much of the public – probably more than any other health professional in total……. there's opportunistic interaction with the public …and I think the other strength is they get to know their regular clients. … They are seeing people that they often get to know; they can really understand that social context of their clients' lives." P24 (Public health professional, Australia).*

Table 2
Participant characteristics.

Characteristics of participants		N
Country of current practice or residence (24)	Australia	16
	Canada	5
	England	2
	USA	1
Profession or title (24)	Pharmacist	20
	Public Health Professional	2
	Consumer	2
Primary professional setting (22)	Community	5
	Hospital	1
	Professional organisation	2
	Public health organisation	6
	Academia	6
	Student	1
	Research	1

3.1.2. Mesosystem (pharmacy practice supporting systems)

Contributions by pharmacists at the mesosystem level were discussed by a small number of participants and centred around two main aspects. One area was the contribution by pharmacists to activities aimed at health service improvement with examples in hospital or general practice settings e.g. improvements in antimicrobial use through hospital policy development. A second aspect discussed was pharmacists' collaboration with other professionals, with participants mainly using examples of referral to general practitioners.

> *"What really is interesting to me is looking at the health profile of the population that a GP practice pharmacist might be working with …. and tailoring their work to meet the population needs of the practice." P29 (Pharmacist, Australia).*

3.1.3. Exosystem (social systems)

Pharmacist contribution at the exosystem level focused on the role of pharmacists in the community and within the health system working at a local or regional population level. Participants discussed the leadership of pharmacists in times of disaster, as well as the contributions to the health system as advocates for the profession and consumer health needs.

> *"Community pharmacists often you know, are very active in stepping up e.g. in bushfires, they just build on, they have those networks, they know who the right people are" P13 (Pharmacist, Australia).*

> *"The other important role I think that pharmacists play is sitting on committees e.g., PHNs where they can be a really strong voice for their profession and their communities, and that advocacy role becomes really really important." P24 (Public health professional, Australia).*

3.1.4. Macrosystem (institutional systems)

Discussion of pharmacist contribution at the macrosystem system level explored roles in publicly funded agencies and the macrosystem influence on the development of the pharmacy profession. Participants identified pharmacists as working in roles at the macrosystem level and influencing policy and system-wide interventions. Another aspect discussed was the development of the pharmacy profession over recent years. Many participants observed that the pharmacy profession was changing and progressing with some initiatives occurring from macro system influences e.g., legislative changes allowing pharmacists to vaccinate.

> *"We have pharmacists working in the health department, in roles at TGA and other agencies." P13 (Pharmacist, Australia).*

3.1.5. Chronosystem (historical period of societal change)

Chronosystem level changes, particularly the effects of the COVID-19 pandemic and resultant impacts on the roles of pharmacists, were discussed by many participants.

> *"I think that immunisation is a really big thing that has bought pharmacy to the forefront a little in what services pharmacy can perform." P15 (Pharmacist, Australia).*

> *"The global scale ……and prolonged nature of this pandemic has altered pharmacist's roles. COVID has changed it and made it more visible." P23 (Pharmacist, Canada).*

3.2. Development of public health contribution

The second area of interview results was centred around how barriers and challenges might be addressed to develop the role of the pharmacist

Table 3
Themes and sub-themes.

Area	System level	Theme	Sub-themes	Additional supporting quotes
Contribution of pharmacists	Microsystem	Health education, promotion, and illness prevention in community pharmacies Public-health focused work in other pharmacy settings	• Accessibility to consumers • Trust and rapport in relationships between pharmacists and consumers	*"Pharmacists are well placed to deal with public health and promote health" P19 (Pharmacist, Australia)*
	Mesosystem	Health service-wide activity e.g., hospital, general practice Interprofessional collaboration		*"The role would be….. to flag how they could access supports, so maybe referrals to the GP or the nurse navigator." P29 (Pharmacist, Australia)*
	Exosystem	Leaders in communities		*"Pharmacists are leaders and perceived as leaders in the community so in times of uncertainty, people look for leadership …so pharmacists fit very well within that role." P28 (Public health professional, Australia)*
		Regional roles in stakeholder organisations		
	Macrosystem	Roles in publicly-funded agencies at policy level	• Research • Policy • Health information	*"If you look at clinical pharmacy and … the development in community pharmacy over the past couple of decades, I think they've [changes to profession] been very significant, and I feel that it's a really logical progression that more and more pharmacists would develop an interest in at least for part of their time focusing on population health." P14 (Medical doctor, previously pharmacist, Australia)*
	Chronosystem	Effects of disasters on progression of pharmacy roles		
Development of public health-focused pharmacy practice	Mesosystem	Education and training	• Undergraduate pharmacy training • Continuing professional development and inclusion of resources and tools • Relevant postgraduate education	*"I see it amongst my colleagues, amongst other universities really understanding that the application of knowledge to patients and societies has really been* *"There's obviously a huge gap there that increasing education needs to address because there's probably not very many pharmacists that have, or even think they have a public health role." P16 (Pharmacist, Australia)* *"I finished public health [postgraduate degree], but then I thought – well, what am I going to do?.....I actually don't know where I'm going with this because it's [the topic of public health] is so big. …. Where am I going to start to focus?" P20 (Pharmacist, Australia)* *"Social determinants of health ……I remember thinking it's such a big part of public health work and community work and we did not touch on that in pharmacy … in my experience … it might have changed now." P12 (Pharmacist, Australia)* *"In the intern year …. you have to do a public health presentation or public health project… and this is the first time you actually come to something like that and when I assess these, it feels like it's missing. It's missing the key things in there* e.g.*, evaluation." P20 (Pharmacist, Australia)* *"We would just need a bit of a refresher or something to bring it [public health knowledge and skills] to the forefront of …pharmacists' minds…it's more drilled into us at University for quality use of medicines and that aspect of pharmacy* versus *zooming out a little and thinking about the community as a whole."P15 (Pharmacist, Australia)* *"I think they [pharmacists] need to have a concept of how it [public health] maps to their immediate scope of practice." P16 (Pharmacist, Australia)* *"For me if there was an existing program that I could…enrol or join that helped step it, step it through what I needed to do, that would be a good place to start." P15 (Pharmacist, Australia)*
		Support for interprofessional practice and inclusion of pharmacists in health system teams		
	Exosystem	Evidence and research Information and data	• Evidence of public health impact • Pharmacy data systems and linkage • Incorporation of community needs	*"I think pharmacists have an ideal opportunity to collect data – to improve our understanding of public health issues at a community level – so making sure they have the systems in place that can then perhaps talk to other systems." P24 (Public health professional, Australia)* *"Knowing what are the social determinants of health in a specific [geographic] area is critical for building impact for interventions." P18 (Pharmacist, Australia)*
	Macrosystem	Definitions and terminology of public health-focused activity in pharmacy practice		*"I think that it's good [the contribution to public health] but it's sort of unintentional and also unknown." P16 (Pharmacist, Australia)* *"I think I feel like a lot of health professionals feel after some time in the role, that there's things that keep on coming up again and again and again for individuals and health problems that recycle." P14 (Pharmacist, Australia)* *"……. before I studied public health, I was a little fuzzy on what public health was" P 29 (Pharmacist, Australia)* *"When we talk about population health and public health, sometimes those terms seem a little abstract." P21 (Pharmacist, Canada)* *"I believe that pharmacists have been contributing to public health, but we don't necessarily speak the language, or we still want to call it medicines optimisation – we still want to call it medicines management and so we're not showing that we're critically involved in public health." P22 (Pharmacist, UK)* *"It [not understanding what public health is] explains a lot why pharmacists don't actually do much proactively in terms of public health because they don't know what to do, or it just doesn't fit with their identity as a pharmacist." P23 (Pharmacist, Canada)*

Table 3 (*continued*)

Area	System level	Theme	Sub-themes	Additional supporting quotes
				"[Community pharmacy] is commissioned to deliver these services and it's called public health." P22 (Pharmacist, UK) *"I'm so glad I did the degree [Master of Public Health] but when it comes to an actual job position or working… it's… hard to know where someone fits. I finished public health and thought – Well, what am I going to do? And I thought – good question because I don't actually know where I'm going to go with this." P20 (Pharmacist, Australia)*
		Regulation, structure, and remuneration of community pharmacy Pharmacist roles at all system levels		
		Professional advocacy		*"I always feel the worst PR people are pharmacists – we don't do a good job selling ourselves or forcing ourselves into situations and people don't understand what pharmacists can really offer." P21 (Pharmacist, Canada)*

in public health. This area was discussed particularly in relation to pharmacist contributions being unrecognized and underutilized.

3.2.1. Unrecognized and underutilized contributions

A recurring theme discussed by participants was that the contribution of pharmacists to public health was often unrecognized and provided without awareness of potential impact on the health of individuals and the community. There was discussion that the profession is underutilized for this purpose and could potentially contribute more to health outcomes by expanding their roles at all system levels.

> *"We're in a perfect ideal location to be ……. proactive in this [contribution to public health] - and it's a completely missed opportunity." P23 (Pharmacist, Canada).*

Although health promotion and illness prevention activities were recognized by participants as an important role of pharmacists, some participants felt that there is limited evidence of this happening in practice.

> *"I thought pharmacists would have a really big role in health promotion because they deal with the public all day, every day……[however] when I graduated and worked in community pharmacy…, I was actually quite surprised how little health promotion and disease prevention was actually occurring in pharmacies." P29 (Pharmacist, Australia).*

Conversations revolved around strategies to enhance the contributions of pharmacists and included a wide range of personal to system level factors. Participants felt that there needed to be multi-faceted support to enable pharmacists to contribute meaningfully to public health.

3.2.2. Macrosystem (institutional systems)

Discussion by participants on macrosystem influences on pharmacist contribution centred on how policy and legislation affected the structure of pharmacy, but additionally touched on elements of the culture of the pharmacy profession in respect to public health.

3.2.2.1. Definition and language of public health applied to pharmacy practice. A recurring theme throughout the interviews was the explicit and implicit expression around the lack of understanding of the term 'public health' by pharmacists, what it entails and consequently, how it applies to pharmacy practice. Throughout interviews, participants asked to clarify if topics were included in public health or what was meant by terms of public health concepts e.g., health equity. Other factors contributing to lack of understanding included the breadth of the public health field and the language differences between the pharmacy and public health professions.

> *"I think perhaps that pharmacists don't have a good understanding of what public health actually is" P19 (Pharmacist, Australia).*

The importance of finding clear definitions around pharmacist involvement and roles in public health to promote clarity of how pharmacy and public health may fit together was discussed.

> *"The first thing to do is to define to the profession what public health is." P16 (Pharmacist, Australia).*

3.2.2.2. Policy, regulation, and the structure of the profession. Policy and regulation and its influence on the current structure of the pharmacy profession were recognized as essential considerations in development of a public health role. This was discussed in relation to community pharmacy where challenges such as remuneration tied to dispensing or unique services, time demands and support from employers or the whole pharmacy team were cited.

> *"Community pharmacists are already being asked to do a lot for not much money…. I think it can be hard to then ask more for that role. There has to be some kind of structural changes …. to support them to be taking on different roles." P12 (Pharmacist, Australia).*

The need for consideration of pharmacy roles at all system levels was also discussed. Pharmacist participants working in public health organisations were powerful advocates for the recognition of pharmacists working in meso, exo or macro roles and the need for expansion of pharmacist career paths at these system levels.

> *"People who are not expert in pharmacy are taking the decision… you know, when you could have a pharmacist with expertise in public health to inform all those policies." P31 (Pharmacist, UK).*

3.2.2.3. Professional advocacy. While public health may not be recognized well within the profession, participants also discussed that there was poor recognition from the community of the pharmacist's role in health, apart from medication supply. Participants alluded to poor promotion of pharmacy roles to other health professionals, within the health system and in the community, both from pharmacy professional bodies and individual pharmacists. Consumer participants reported positive experiences of contact with pharmacists for medication-related services but had not used public health-focused services such as health screening, vaccination or illness prevention.

> *"I think really our role in public health could be enhanced if our perception in the community was enhanced …. We need to promote ourselves better to be accepted … to be active in the public health space." P18 (Pharmacist, Australia).*

3.2.3. Exosystem (social systems)

In relation to exosystem influences, participants discussed the importance of having robust evidence on the contribution of pharmacists and the importance of data and information for all future health services. Robust outcome evidence is lacking and required to show the contributions of pharmacy to public health-focused interventions and ensure financial support from policy makers.

The collection, use and analysis of health information and data from pharmacy services is essential to show effectiveness and will increase in importance in the future. The limitations of pharmacists' focus on medication supply and the resultant pharmacy electronic management systems may mean that there is loss of meaningful health data at pharmacy, community and public health levels. Additionally, health data and information assist pharmacists to consider the socioeconomic determinants of health in their practice and respond to the needs of communities.

"We can do public health promotions but if we can't demonstrate impact, then it's very hard to get policy makers to invest and see the value." P18 (Pharmacist, Australia).

3.2.4. Mesosystem (pharmacy practice supporting systems)

3.2.4.1. Education and training. Concepts around pharmacy training and ongoing professional education were discussed by most participants. It was identified that, although the traditional role of pharmacists as the medication expert is aimed at the individual patient level, competency, training, and accreditation standards have moved to encourage learning within the context of society and systems. However, while it was recognized that standards are changing, many participants felt that currently pharmacists don't have an awareness of the potential impact of the pharmacist role on the health of people and the community.

Many participants reflected on their own pharmacy education and training. Several expressed that their undergraduate education contained elements of public health, although this was not reinforced throughout the progression of the course nor applied well to pharmacy practice. Others felt their education did not allow them to understand public health yet recognized that course content may have changed since their graduation. Understanding of the socio-ecological model of health was felt by some participants to be fundamental to widening a pharmacist's view to facilitate appropriate responses to health inequities in professional practice.

"I think these things [public health concepts around the socio-ecological model e.g., health inequities] are thought of as aftereffects – whereas it needs to be integrated into every aspect of learning e.g. like for diabetes care, lower socioeconomic status leads to poorer nutrition leads to more diabetes – it's kinda like always an aside rather than thinking this is one of the main issues." P21 (Pharmacist, Canada).

Participants discussed the importance of the inclusion of public health knowledge into continuing professional development. It was felt that it was important to remind pharmacists of concepts that had been learnt in undergraduate education so that they consider professional practice from a population health viewpoint. The need for practical resources, tools and strategies to support implementation of public health-focused programs was discussed, as well as the need for competency standards to clarify how public health-focused activity can be achieved in professional practice. Participants also discussed the need for postgraduate public health training to be relevant to pharmacy practice.

"I think it's important for all these non-clinical topics to be included in……. ongoing professional development." P12 (Pharmacist, Australia).

3.2.4.2. Interprofessional practice. A small number of participants mentioned that increasing interprofessional practice was important to progress contributions in population health, but that barriers existed such as models to support remuneration.

"We really need to break the silos cos it's easier to get into our professional identity, it's easy to get into our tribes and once the impetus of working together such as in disasters…we just gravitate back to our natural role again." P28 (Public health professional, Australia).

3.2.5. Personal characteristics influencing pharmacist development

Some participants identified that personal characteristics and interests of pharmacists may influence their decision and capacity to contribute to public health focused activity. Factors identified included personal professional interests of pharmacists, the individual's view of their professional identity and role, and the development of a professional career.

"Pharmacists see themselves as separate to public health." P20 (Pharmacist, Australia).

The development of a pharmacist throughout their career was identified as a progression from the supply of services to individuals to an appreciation of their role in the health system, community, and society.

"It's natural for people I think, as they develop in their careers – what are the things driving these health problems … and having a population health focus … will develop and mature over time" P14 (Pharmacist, Australia).

4. Discussion

This study aimed to identify perceptions on how pharmacists contribute to the health of populations. Using data obtained from semi-structured interviews, results are reported using the framework of Bronfenbrenner's ecological theory of human development.[21] Pharmacists are recognized as contributors to public health; however, improved effectiveness and impact on the health system from pharmacists' services may require strategies for incorporation of public health approaches into pharmacy practice at all system levels. Recurring themes identified included the development of definitions and the language of public health in pharmacy and support for incorporation of public health-focused services to individuals. The integration of public health principles in the education and professional development of pharmacists underpins and supports other strategies. Advocacy for the role of pharmacists within and outside the profession to stakeholders and the development of pharmacist roles at exo and macro system levels are seen as important. Themes for improving effectiveness and impact, according to Bronfenbrenner's system levels, are depicted in Fig. 1.

A prominent theme was lack of clarity around the term 'public health 'and how it might apply to pharmacy practice. This finding aligns with previous research, which has shown a lack of understanding and awareness by Australian pharmacists of their roles in public health.[12] The issue of definition, terminology and language is important as a basis for creating shared understanding. In some countries such as the UK, the term pharmaceutical public health is understood; however, it is recognized that terminology and language may need to be adapted according to the traditions, definitions, and policies of individual countries.[27]

To assist in consistency of terminology, reference to public health foundational information applied to pharmacy practice and the context of each country is warranted. An example would be the use of The Global Charter for the Public's Health[28] to provide a basis for a common understanding and language of public health. Clarity within the profession will assist in engagement outside of the pharmacy discipline with policy makers, legislators, other health professionals and consumers.

The education and training of pharmacists was a dominant theme and is consistent with previous literature identifying that further training in public health-focused services is required.[9] It was recognized that there is now greater emphasis on ensuring that the technical and

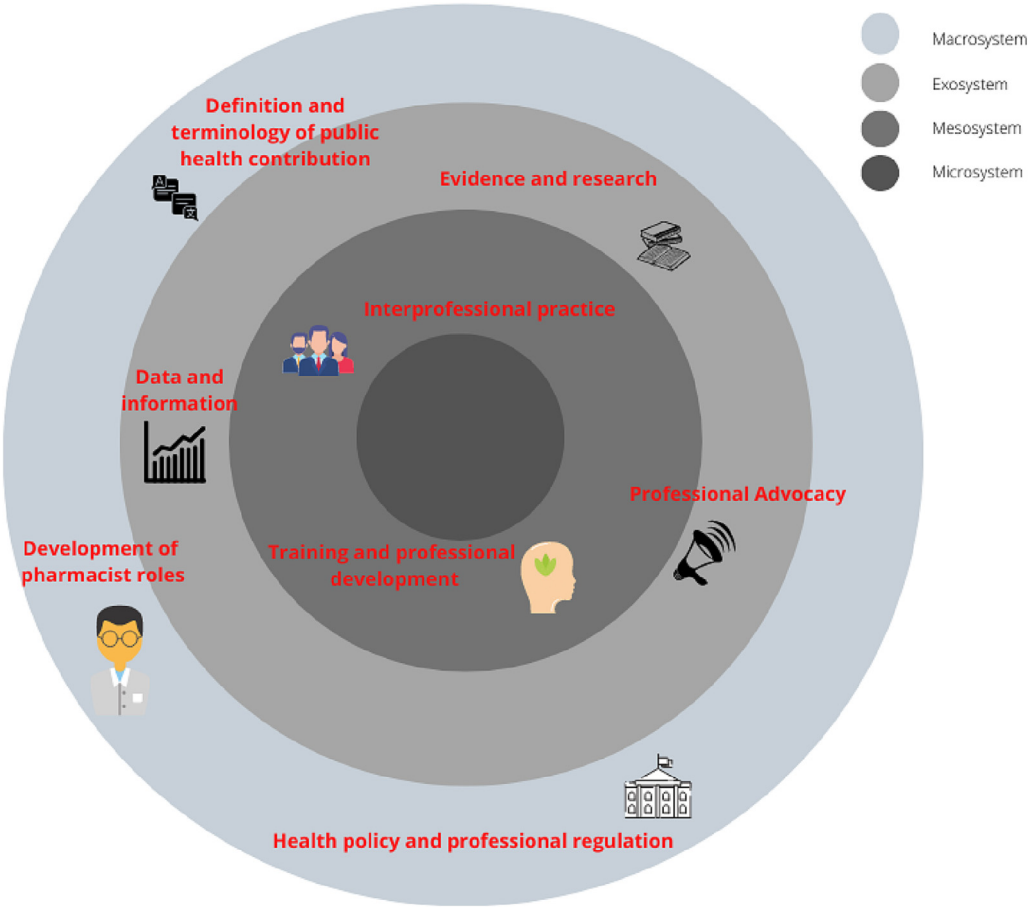

Fig. 1. Development of public health in pharmacy practice.

scientific skills of pharmacists respond to the needs of society and communities. However, public health principles, skills and resources need to be integrated into university curricula and professional development, with clear competency standards to guide practice to ensure impact on public health indicators.

The results of this study focused primarily on the microsystem level where pharmacists provide individual health services, with most attention centred on community pharmacy. This is not an unexpected finding, considering that this is the setting in which most pharmacists are employed,[29] and health promotion and disease prevention have historically been considered as the areas in which pharmacists contribute to public health outcomes.[30] However, the results indicate that there may be many missed opportunities in the community pharmacy setting. Representation by pharmacists at exo and macro system levels also need to be developed to ensure pharmacy is represented at policy levels and there is recognition and career path structure for pharmacists in these settings.

The importance of increasing awareness of how the pharmacy profession may contribute to public health was highlighted. Awareness raising opportunities exist through education and continuing professional development, including interprofessional opportunities. Advocacy external to the profession should highlight the important enablers for increasing preventive health strategies in community pharmacies, including the relationship of community pharmacists with consumers and the strengthening of pharmacist roles post-COVID-19.[31,32]

The need for advocacy around the pharmacy role was also highlighted through the omission of significant discussion on the integration of pharmacy across the health care system and in interprofessional strategies. This is concerning as literature has recognized that the integration of pharmacy into primary health care may be a limiting factor for the development of the profession.[33] Where collaboration with other health professionals was mentioned in interviews, the primary professional relationships discussed were with medical or nursing disciplines. Working across professional and sectoral boundaries is a key facilitator of improving public health; however, the difficulty of engagement across disciplines of community health professionals has been previously recognized.[34] Finding practical methods of interprofessional or multidisciplinary practice and integration into health care teams is vital.[35]

Use of Bronfenbrenner's theory of personal development allowed the identification of where system improvements might be focused to allow pharmacy services to develop an impact on public health. In alignment with the theory, results in the domain of the current contribution of pharmacists were focused on the microsystem level and identified the strengths and weaknesses of how pharmacists currently practice. When considering how improvements might be made however, the focus was on how the meso, exo and macro systems could be influenced to impact the development of public health in pharmacy. Although the early iterations of Bronfenbrenner's theory were used predominantly in this study, the concepts of personal characteristics and individual development of pharmacists also became apparent. Overall, the identification of opportunities of how public health approaches in pharmacy may be developed at specific system levels provides a baseline for the development of strategies. Given the interrelation of systems according to Bronfenbrenner's theory, the importance of working across all system levels to support increased effectiveness in public health-focused pharmacy services is essential.

This study was a robust qualitative study that showed alignment and consistency with previous literature.[11,36,37] Quality and rigour of the grounded theory approach[16] was demonstrated through congruence of

the methodology with the research question, the process of data collection and analysis and the investigators' expertise and skills. A strength of the study was the use of the theoretical perspective by Bronfenbrenner, allowing alignment of results for lucidity of future recommendations. Participants with strong interests in public health contributed to the recognition of needed developments in the pharmacy profession, but may have limited the breadth of opinion due to self-selection bias. Although a one-page summary of a literature review[26] was provided to participants prior to interviews, a definition of public health and pharmacy was not given, and this allowed for broad discussions according to each participant's interests.

A limitation of the study was that interviews were conducted over a period of ten months during which time changes in the attitudes of participants may have occurred. Comments on the impact of the COVID-19 pandemic were expected, due to the conduct of the study over 2021 at the time of peak COVID-19 infections for many countries. A further limitation is that participants were from a small range of English-speaking high-income countries, which may have narrowed the perspectives.

5. Conclusion

The study suggests that multifaceted development strategies are required for pharmacists to be more effective in positively impacting public health indicators. To facilitate pharmacists to optimise microsystem service delivery, strategies for development are identified at macro, exo and meso system levels. Clarity on required competencies to ensure pharmacists consider how public health approaches can be included in professional practice is required.

Overall, the recognition of pharmacists in their core role as medication experts is apparent at the microsystem level of individual services and is increasing at the mesosystem level. However, increased acknowledgement, evidence, and support for pharmacist involvement in illness prevention and health promotion services and for roles at other system levels would appear to be warranted. This study provides a renewed call for the development of multisystem strategies to improve the inclusion of public health principles into pharmacy practice.

CRediT authorship contribution statement

Robin Warren: Conceptualization, Methodology, Formal analysis, Writing – original draft, Visualization. **Louise Young:** Validation, Writing – review & editing, Supervision. **Karen Carlisle:** Validation, Writing – review & editing, Supervision. **Ian Heslop:** Validation, Writing – review & editing, Supervision. **Beverley Glass:** Validation, Writing – review & editing, Supervision.

Declaration of Competing Interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rcsop.2023.100279.

References

1. Walker R. Pharmaceutical public health: the end of pharmaceutical care? Pharm J 2000;264(340–341):340.
2. Jesson J, Bissell P. Public health and pharmacy: a critical review. Crit Public Health 2006;16:159–169. https://doi.org/10.1080/09581590600825812.
3. Public Health England. *Pharmacy: A Way Forward for Public Health. Opportunities for action through pharmacy for public health.* London: Public Health England. 2017.
4. American Public Health Association. The Role of the Pharmacist in Public Health. Vol. 2018. American Public Health Association. 2006. https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/07/13/05/the-role-of-the-pharmacist-in-public-health. [Accessed 07/05/23].
5. Anderson C, Blenkinsopp A, Armstrong M. Pharmacists' perceptions regarding their contribution to improving the public's health: a systematic review of the United Kingdom and international literature 1990-2001. Int J Pharm Pract 2003;11:111–120. https://doi.org/10.1016/j.ypmed.2019.04.003.
6. Thomson K, Hillier-Brown F, Walton N, Bilaj M, Bambra C, Todd A. The effects of community pharmacy-delivered public health interventions on population health and health inequalities: a review of reviews. Prev Med 2019;124:98-109.
7. Spinks J, Bettington E, Downes M, Nissen L, Wheeler A. Does policy change to allow pharmacist provision of influenza vaccination increase population uptake? A systematic review. Aust Health Rev 2020;44:582–589. https://doi.org/10.1071/AH19196.
8. International Pharmaceutical Federation. The FIP Development Goals: Transforming global pharmacy. https://www.fip.org/file/4793 2020. Accessed 07/05/23.
9. Agomo C, Udoh A, Kpokiri E, Osuku-Opio J. Community pharmacists' contribution to public health: assessing the global evidence base. Pharm J Clin Pharm 2018;10(4). https://doi.org/10.1211/CP.2018.20204556.
10. Wenger LM, Rosenthal M, Sharpe JP, Waite N. Confronting inequities: a scoping review of the literature on pharmacist practice and health-related disparities. Res Soc Admin Pharm 2016;12:175–217. https://doi.org/10.1016/j.sapharm.2015.05.011.
11. Strand MA, DiPietro Mager NA, Hall L, Martin SL, Sarpong DF. Pharmacy contributions to improved population health: expanding the public health roundtable. Prev Chronic Dis 2020;17, 200530. https://doi.org/10.5888/pcd17.200350.
12. Hope DL, Day G, Clements J, Hattingh HL. Australian community pharmacists' perceptions of public health before the COVID-19 pandemic. Int J Pharm Pract 2021;29:291–295. https://doi.org/10.1093/ijpp/riaa010.
13. Bryson S, Cox C, Davison H, et al. *Professional Standards for Public Health Practice for Pharmacy.* United Kingdom: Royal Pharmaceutical Society. 2014.
14. Covvey JR, Conry JM, Bullock KC, et al. *Public Health and the CAPE 2013 Educational Outcomes: Inclusion, Pedagogical Considerations and Assessments.* American Association of Colleges of Pharmacy Public Health Special Interest Group. 2016. https://www.aacp.org/sites/default/files/2017-10/PublicHealthSIGCAPEpaper.pdf; [Accessed 07/05/23].
15. Timonen V, Foley G, Conlon C. Challenges when using grounded theory: a pragmatic introduction to doing GT research. Int J Qual Methods 2018;17:1-10. https://doi.org/10.1177/1609406918758086.
16. Chun Tie Y, Birks M, Francis K. Grounded theory research: a design framework for novice researchers. SAGE Open Med 2019;7:1–8. https://doi.org/10.1177/2050312118822927.
17. Cresswell JW. *Qualitative Inquiry and Research Design - Choosing among Five Approaches. 3 ed.* Thousand Oaks, California: SAGE Publications. 2013.
18. Morgan DL. Pragmatism as a paradigm for social research. Qual Inq 2014;20:1045–1053. https://doi.org/10.1177/1077800413513733.
19. Bryant A, Chamaz K, eds. The SAGE Handbook of Current Developments in Grounded Theory. London: SAGE Publications; 2019.
20. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care 2007;19:349–357. https://doi.org/10.1093/intqhc/mzm042.
21. Bronfenbrenner U. Toward an experimental ecology of human development. Am Psychol 1977;32:513–531. https://doi.org/10.1037/0003-066X.32.7.513.
22. Eriksson M, Ghazinour M, Hammarstrom A. Different uses of Bronfenbrenner's ecological theory in public mental health research: what is their value for guiding public health mental health policy and practice? Soc Theory Health 2018;16:414–433. https://doi.org/10.1057/s41285-018-0065-6.
23. Shen G, Fois R, Nissen L, Saini B. Course experiences, satisfaction and career intent of final year pre-registration Australian pharmacy students. Pharm Pract 2014;12:392.
24. Rosa EM, Tudge J. Urie Bronfenbrenner's theory of human development: its evolution from ecology to bioecology. J Fam Theory Rev 2013;5:243–258. https://doi.org/10.1111/jftr.12022.
25. Liamputtong P. *Qualitative Research Methods. 5 ed.* Docklands, Victoria: Oxford University Press. 2020.
26. Warren R, Young L, Carlisle K, Heslop I, Glass B. Public health competencies for pharmacists: a scoping review. Pharm Educ 2021;21:731–758. https://doi.org/10.46542/pe.2021.211.731758.
27. Jackson JK, Caliph S, Lee JK, Chui WK. Comparative assessment of competency frameworks for pharmacists in the Western Pacific region including the potential for a regional framework. Int J Pharm Pract 2021;29:192–195. https://doi.org/10.1093/ijpp/riaa005.
28. World Federation of Public Health Associations. A Global Charter for the Public's Health. https://www.phaa.net.au/documents/item/1876; 2016. Accessed 07/05/23.
29. Australian Government Department of Health. Allied Health Factsheet - Pharmacists 2019. Canberra: Commonwealth of Australia; https://hwd.health.gov.au/resources/publications/factsheet-alld-pharmacists-2019.pdf; 2020. [Accessed 07/05/23].
30. Anderson S. Community pharmacy and public health in Great Britain, 1936 to 2006: how a phoenix rose from the ashes. J Epidemiol Com Health 2007;61:844–848.
31. Cadogan CA, Hughes CM. On the frontline against COVID-19: community pharmacists' contribution during a public health crisis. Res Soc Admin Pharm 2021;17:2032–2035. https://doi.org/10.1016/j.sapharm.2020.03.015.
32. Watson KE, Schindel TJ, Barsoum ME, Kung JY. COVID the catalyst for evolving professional role identity? A scoping review of global pharmacists' roles and services as a response to the COVID-19 pandemic. Pharmacy 2021;9:99. https://doi.org/10.3390/pharmacy9020099.
33. Dineen-Griffin S, Benrimoj SI, Garcia-Cardenas V. Primary health care policy and vision for community pharmacy and pharmacists in Australia. Pharm Pract (1886–3655) 2020;18:1967. https://doi.org/10.18549/PharmPract.2020.2.1967.

34. Reeves S, Pelone F, Harrison R, Goldman J, Zwarenstein M. Interprofessional collaboration to improve professional practice and healthcare outcomes (review). Cochrane Database Syst Rev 2017. https://doi.org/10.1002/14651858.CD000072.pub3.
35. Taylor SM, Culic A, Harris S, Senini R, Stephenson R, Glass BD. Bridging allied health professional roles to improve patient outcomes in rural and remote Australia: a descriptive qualitative study. J Multidiscip Health 2022;15:541–551. https://doi.org/10.2147/JMDH.S360654.
36. Strand MA, Tellers J, Patterson A, Ross A, Palombi L. The achievement of public health services in pharmacy practice: a literature review. Res Soc Adm Pharm 2016;12:247–256. https://doi.org/10.1016/j.sapharm.2015.06.004.
37. Agomo CO, Ogunleye J, Portlock J. Strategies enhancing the public health role of community pharmacists: a qualitative study. J Pharm Health Serv Res 2016;7:97-104. https://doi.org/10.1111/jphs.12131.