Nutrition Counselling in Pharmacy Practice in Australia

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Statement of Originality

This is to certify that the content of this thesis is my own work. This thesis has not been submitted for any other degree or purpose.

I certify that the intellectual content of this thesis is the product of my own work, and that all assistance received in preparing this thesis and all sources have been acknowledged.

Samar Elsayed

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Author Attribution Statement

The statistical results documented in Table 3-4 Univariable and multivariable binary logistic regression of factors associated with the frequency of dietary advice (N=107) and Table 3-5 Univariable and multivariable binary logistic regression of factors associated with the frequency of VMS advice (N=107) were based on the statistical analysis performed by Professor Ines Krass, Diane Ibrahim and A/Professor Ingrid C. Gelissen.

DISSEMINATION OF RESEARCH

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Signature

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Artificial Intelligence

During the preparation of the thesis the author used QuillBot (https://quillbot.com/) for the purposes of grammar checking, sentence restructuring, spelling checks, and summarising online reports.

The author confirms that where text was modified by generative AI, the content was reviewed for possible errors, inaccuracies, and bias. The author takes full responsibility for the submitted thesis and ensures the work is their own and has used generative AI within the parameters of University of Sydney generative AI guide.

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Abstract

Background

Poor nutrition is considered the underlying cause of various chronic non-communicable preventable diseases such as type 2 diabetes and cardiovascular disease. These diseases impose a significant economic burden on Australian healthcare expenditure. Pharmacists are important members of the healthcare system and are highly accessible to patients. Counselling patients on medicines as well as lifestyle including nutrition, is part of their primary role in pharmacy practice. Pharmacists can play a prominent role in the provision of nutritional counselling, However, there are limited studies in Australia on the extent of nutritional counselling in pharmacy practice, including pharmacists' attitude and confidence in this area.

Objective

The aims of the study were to investigate the attitudes, current practices and confidence of registered Australian pharmacists with regards to nutritional counselling including diet and vitamin and mineral supplements (VMS).

Method

A mixed method approach was adopted for this cross-sectional study, Australian registered pharmacists were recruited via social media, professional networks and through passive snowballing, and invited to partake in an anonymous online survey using Recap (Research Electronic Data Capture) online software. The survey comprised of 62 items that were designed to investigate participants' current attitudes,

confidence and practices regarding dietary and VMS counselling. In addition, their confidence in the provision of dietary counselling on nineteen specific medical topics was assessed, questions included about the sufficiency of nutritional education received. In addition, semi-structure interviews were performed on Zoom to explore more in-depth participants' professional experiences in nutritional counselling. The survey data were analysed using SPSS software. The interviews transcripts were de-identified and coded for thematic analysis using NVIVO software.

Results

A total of 107 participants pharmacists successfully completed the survey, with 89% of the participants being female and 68% predominantly working as community pharmacists. 45% of the participants reported providing dietary advice daily or every 2-3 days. The most frequently counselled topics were type 2 diabetes, weight management and GORD. For VMS, 66% of participants provided counselling daily or every 2-3 days. Pregnancy, pre-conceptual care and osteoporosis were the most frequently counselled topics. Participants pharmacists overall reported positive attitude toward nutritional counselling, with the majority indicating they considered the provision of nutrition counselling as part of their professional role. The overall participants' confidence in providing dietary counselling was somewhat confident. Some of the medical conditions for which participant pharmacists commonly provided dietary counselling, such as inflammatory bowel disease, received the lowest confidence score.

Univariable analyses showed that older age group, more years of pharmacy experience, higher confidence and attitude score were associated with more frequency of dietary counselling. Multivariate analyses showed that the frequency of dietary counselling provision was significantly associated with confidence in providing such counselling. 80% of participants reported that education on nutrition in pharmacy curricula was insufficient, and 67% reported that nutrition should be incorporated as a core subject in pharmacy education. Semi-structured interviews were conducted with 21 participants. Four main themes were identified including attitude to nutritional counselling, counselling behaviour, patient factors and barriers to nutritional counselling. Insufficiency of nutrition education leading to low confidence, as well as time constraints were highlighted as main barriers to nutritional counselling.

Conclusion

Australian pharmacists expressed positive attitudes and willingness towards nutritional counselling and indicated that there is a potential for pharmacists to engage in nutritional counselling. However, lack of adequate nutritional education impacted their level of confidence, thus improving confidence through better pharmacy nutrition education may improve the provision of nutritional counselling to improve patients' health outcomes.

Keywords

Dietary counselling, vitamin and mineral supplements counselling, nutritional education, pharmacy practice, community pharmacists, mixed method, thematic analysis.

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List of Abbreviations

AACP	American Association of Colleges of Pharmacy
ACPE	Accreditation Council for Pharmacy Education
AHPRA	Australian Health Practitioner Regulation Agency
AIHW	Australian Institute of Health and Welfare
BP	Blood Pressure
B-Pharm	Bachelor of Pharmacy
CI	Confidence Interval
CPD	Continuing Professional Development
CVD	Cardiovascular Disease
FIP	International Pharmaceutical Federation
GORD	Gastro-Oesophageal Reflux Disease
GP	General Practitioner
HMR	Home Medicine Review
IBD	Inflammatory Bowel Disease
IBS	Irritable Bowel Syndrome
MHW	Mental Health and Wellbeing
NCD	Non-Communicable Disease
NSW	New South Wales
OTC	Over The Counter
PharmD	Doctor of Pharmacy
PBS	Pharmaceutical Benefits Scheme
PIS	Participant Information Statement
PSA	Pharmaceutical Society of Australia
QLD	Queensland
RPBS	Repatriation Pharmaceutical Benefits Scheme
SD	Standard Deviation

SPSS	Statistical Package for the Social Science
TFA	Trans-Fatty Acid
UK	United Kingdom
US	United State
VIC	Victoria
VMS	Vitamins and Mineral Supplements
WHO	World Health Organization

Chapter 1 - Introduction

1.1 Nutrition and Health

According to the World Health Organization (WHO), healthy nutrition is considered as an integral part of human health and development from infancy through old age [2, 3]. Nutrition is a crucial modifiable factor that influences the development of chronic non-communicable diseases (NCDs) such as cardiovascular diseases and type 2 diabetes, for which evidence demonstrates that altering dietary patterns impacts the prevention and treatment of such diseases [4-9]. Inadequate dietary practices have detrimental impacts on a global scale, as research reveals that poor nutrition contributes to one in five deaths worldwide [6].

1.2 Impact of Unhealthy Diets in Australia

In Australia, poor dietary habits were shown to be responsible for one in seven deaths across the country [6]. The rise in unhealthy dietary patterns characterized by consumption of high calorie-dense foods that are high in saturated and trans-fatty acid (TFA), refined sugars, and salt have played a significant role in the increase in chronic NCDs such as obesity, cardiovascular disease (CVD) and type 2 diabetes [10]. These NCDs present serious consequences on individuals' well-being, through poor quality of life and increased disability. Additionally, these diseases impose substantial social and economic burdens to the country [11]. The Australian Institute of Health and Welfare (AIHW) latest report from 2024, revealed that among the highest contributing factors for the Australian diseases burden was dietary risk (4.3%) [12]. This reflects the

significant implications of poor dietary choices on Australian public health. Consequently, The Australian National Chronic Disease Strategy perceives nutrition as a critical factor in both the prevention and management of chronic NCDs [13].

1.2.1 Disease Burden of Overweight

In Australia, being overweight or obese is considered the second leading risk factor after tobacco use for elevating poor health and premature mortality [12]. In 2024, being overweight accounted for 8.3% of the total disease burden within the Australian population [12]. Evidence highlighted a strong correlation between overweight and the development of 30 different diseases including cardiovascular diseases, type 2 diabetes and some cancers [14].

1.2.2 Type 2 Diabetes Disease Burden

In addition, type 2 diabetes presents a substantial burden on the public health system in Australia as it contributes to 2.2% of the overall disease burden [15]. A previous epidemiological study in 2019 analysed the global burden disease from 204 countries, reported a correlation between poor dietary pattern and the significant increase in type 2 diabetes prevalence between 1990-2019 [16]. Moreover, another study reported a significant association between type 2 diabetes and weight gain during adulthood [17] and indeed showed that remission from type 2 diabetes was achievable for a wide range of individuals. The treatment strategy focused on weight loss through the engagement in structured evidence-based weight management programs [17]. This treatment strategy can be effectively delivered within routine primary care

settings by non-specialist community healthcare professionals [17], such as pharmacists.

1.2.3 Cardiovascular Disease Burden

Another common chronic NCD, cardiovascular disease (CVD) which presents a significant public health concern in Australia, as it is contributing to 12% of the overall disease burden in 2024 [18]. Some other key factors such as dietary risks, high cholesterol levels, and overweight were identified as primary contributors to this burden [18]. A previous comprehensive systemic review and meta-analysis demonstrated probable etiological effect of specific food and nutrients on cardiometabolic disease [8]. Similarly, another study concluded that adherence to healthy dietary pattern was consistently associated with lower risk of CVD [7]. Data from 2022–2023 highlighted the significant economic impact of cardiovascular diseases, with the medications used in the treatment of cardiovascular conditions accounted for 33% of all Pharmaceutical Benefit Scheme (PBS) and Repatriation Pharmaceutical Benefits Scheme (RPBS) prescriptions and 7.4% of the total allocated expenditure in the Australian health system [19].

1.3 Guide to a Healthy Diet

Similar to other countries around the globe, Australia has strategies in place to address poor dietary patterns. These include the establishment of dietary guidelines [10] as well as a National Preventive Health strategy, both aimed at increasing the awareness and access to information about healthy diet to help improve the overall health of the

Australian population [20]. The target of these strategies include increasing fruits and vegetables intake, reducing salt and trans-fatty acid (TFA) consumption, in addition to minimizing the consumption of discretionary food to less than 20% of total energy consumption by 2030 [10]. Despite these efforts, the adherence to these recommendations continues to pose a significant challenge. Notably, approximately half of the Australian adult population consumes twice the recommended daily intake of discretionary foods [10, 21]. This emphasizes the significant difference between established guidelines and the actual dietary practices, which highlight the necessity of ongoing efforts and strategies to enhance the awareness of the role of diet in health within the Australian community.

1.4 Vitamin and Mineral Supplements Usage

Studies conducted in 2017 and 2022 reported that 47.8% and 45% of Australians respectively used vitamin and mineral supplements (VMS) across a 12-month period [22, 23]. This is consistent with VMS use in other countries, for example a US government report indicated that approximately one-third of adults and one-quarter of children and teenagers in the US consume vitamin and mineral supplements regularly [24]. The popularity of VMS usage has been attributed to several factors including increased marketing and popular belief that they are safe and harmless for self-selection [25]. However, despite the health benefits of some supplements, e.g., folic acid during pregnancy to prevent birth defects and specific vitamins and minerals to treat deficiencies that have been clinically diagnosed, inappropriate use of some

supplements have been associated with adverse events [24-26]. For instance, excessive intake of vitamin A during pregnancy resulted in an increased risk of birth defects and excessive consumption of iron supplements was the primary cause of poisoning in young children [24, 26]. Moreover, the simultaneous consumption of VMS along with other medications may result in drug-supplement interactions, such as folic acid supplements can affect the pharmacokinetics and pharmacodynamics of methotrexate medication during treatment of psoriasis [27]. Unfortunately, consumer information leaflets are not readily available for VMS [25]. The essential safety elements of VMS depend upon a number of factors such as understanding the indications for use, appropriate dose and duration of use, and risks associated with misuse.

1.5 Nutrition Knowledge in Australia

1.5.1 Impact of Good Nutrition Knowledge on Dietary Choices

Access to good and reliable nutritional knowledge about diet and VMS plays a pivotal role in influencing individuals' nutritional behaviours and food choices. For instance, a study investigated the relationship between nutritional knowledge, dietary patterns and lifestyle factors with blood pressure (BP) in a cohort of Australian individuals [28]. The study concluded that individuals with normal blood pressure, had better nutritional knowledge, adhered to a healthier dietary pattern and lifestyle compared to those with high blood pressure [28]. This study underscores the necessity for healthcare professionals to prioritize strategies and interventions that advocate for

healthy dietary habits and physical activity among the public to prevent and manage hypertension in Australia [28]. Furthermore, another Australian study explored the percentage of Australians adhering to a healthy diet (Mediterranean diet) and the correlation between this adherence and the development of chronic NCDs, through secondary analysis of data gathered from the National Nutrition and Physical Activity Survey (NNPAS) completed by the Australian Bureau of Statistics (ABS) from 2011 to 2013 [29]. This study revealed that educated participants with higher education attainment were more likely to adhere to healthy diet, which was associated with lower risk of dyslipidaemia and hypertension [29].

1.5.2 Source of Nutritional Knowledge

Primary and allied healthcare providers are well positioned to provide patients with nutritional education including General Practitioners (GP), however prior studies reported that time constraints and insufficient nutritional knowledge are posing significant obstacles to actively engage in the provision of nutritional care [30-32]. The best source of nutritional information that a patient can receive is via a consultation with an accredited dietitian. Unfortunately, there is uneven distribution of the dietetic workforce across the different states in Australia [33] with a shortage of accredited dietitians especially in rural and regional locations with lower socioeconomic status where there is the highest demand for dietary counselling [33]. Research highlights that these communities experience widespread unhealthy lifestyle behaviour, including inadequate nutrition, increased death rate and prevalence of NCDs that are

closely linked to modifiable risk factors [34, 35]. In addition, there is a wide gap between the Medicare-subsidy and the actual expenses which is considered an important barrier for the Australian population from seeking tailored and professional nutritional advice from dietitians or nutritionists [36].

Consequently, Australians most frequently rely on searching the internet and social media as sources for nutritional knowledge [37-39]. The widespread utilisation of the Internet as a primary source of nutritional information has surged since 2004 [39]. The WHO has indicated that the online environments can impact dietary behaviours through offering services and information [40]. However, the unreliability and inaccuracy of the quality of the internet information with the absence of regulations on the internet content, facilitate the widespread of false and biased nutritional information [41, 42]. Consequently, the general population may be exposed to incorrect or misleading nutritional information [43].

1.6 Pharmacists in the Australian Community

Considering the lack of access to reliable and evidence-based nutritional advice for all consumers, there is an unmet need in this area of health promotion. Pharmacists are in a unique position to contribute to public health promotion to reduce risk factors for chronic diseases through engaging in the provision of dietary and VMS counselling [44]. Pharmacists are perceived by the public as being among the most trusted and readily accessible healthcare professionals in the community [45, 46]. Pharmacists' roles in the community have evolved and extended from the traditional role, which was

focused around the dispensing and management of medications, to be involved in patient-centred behaviour change interventions that enhance the prevention and management of chronic health disorders [44, 47-49]. The majority of the Australian population are satisfied with the expanding pharmacists’ scope of practice and support increasing their role in the community to provide nutritional counselling and guidance services beyond their traditional roles [46].

1.6.1 Impact of Pharmacists’ Health Interventions

Pharmacists' interventions have been shown to have significant impact on public health enhancement, and they can serve as an effective strategy for preventing and mitigating NCDs. A previous systematic literature review focused on analysing pharmacists' interventions concerning weight management, type 2 diabetes, cardiovascular diseases, and health education, including health counselling and nutritional education [50], concluded that these interventions led to clinically significant improvements in patients' HbA1c, cholesterol, and hypertension controls and prevention [50]. Moreover, an Australian study examined the role of community pharmacists in delivering diabetes medication assistance service for (n=387) patients with type 2 diabetes concluded that community pharmacists were valuable yet underutilised resources [51]. This study highlighted that providing pharmacists with adequate levels of knowledge as well as training in diabetes care and behavioural strategies modification, including nutritional knowledge, resulted in favourable health outcomes [51]. These outcomes included a high proportion of the participants that lost

weight while 90% of participants reported improvement in their knowledge about diabetes self-management [51].

1.6.2 Community Pharmacists

Pharmacists in general and especially community pharmacists are the most easily accessible healthcare provider due to the broad geographical distribution of pharmacies, especially in rural and remote communities where there is a widespread presence of unhealthy lifestyle behaviour and a shortage of health services [49]. These combined factors increase reliance on rural pharmacies and pharmacists [49]. Additionally, many pharmacies have extended opening hours with no appointment needed for consultations. A previous report indicated that Australians on average visit a pharmacy at least three times more often than their general practitioners (18 vs 5.6 times per year) [52]. The Pharmacy Guild of Australia recognizes pharmacies as health hubs for the community and considers them as fundamental parts of the Australian healthcare system to support the provision of low cost services to patients including health promotion initiatives [53].

1.6.3 Pharmacists' Nutritional Competency

Internationally, there have been some evaluations of the nutritional education included in pharmacy curricula which have identified a number of gaps in this area [54-56]. Studies conducted in Ireland and the United Kingdom (UK), concluded that nutrition education in pharmacy curricula was insufficient [54, 55]. Moreover, another recent study conducted in Ireland reported that although pharmacists were willing to

engage in the provision of nutritional care, they lacked adequate nutritional knowledge [56]. This last study also showed that pharmacists were willing to partake in further nutrition education programs to enhance their knowledge and expertise that will benefit their patients [56]. Additionally, a cross-country study involving pharmacists from nine countries indicated that pharmacists possessed positive attitudes to engage in VMS counselling; however, insufficient knowledge and education regarding the adverse effects and interactions of these supplements impeded them from supporting their patients [57]. This is concerning due to the prevalent use of these supplements and the health risk from misuse. Similarly, insufficient nutrition care knowledge in terms of diet and VMS were revealed among community pharmacists in Egypt [58]. This study recommended the improvement of nutritional education and resources for pharmacists to strengthen their confidence and expertise [58]. Finally, accreditation bodies such as the US Accreditation Council for Pharmacy Education (ACPE) and the American Association of Colleges of Pharmacy (AACP) recommended improvement of health promotion and disease prevention education in pharmacy education [59].

In Australia, there are limited studies that have examined the competencies and the involvement of Australian pharmacists in nutritional care. A previous Australian research study, which focused on final-year pharmacists in training as well as pharmacy interns, revealed a lack of confidence in this area [60], in line with international studies mentioned above. Similarly, another study conducted by Mirkazemi et al. [61] focused on assessing pharmacists' nutritional knowledge and evaluating the impact of short

course to fill this gap in nutritional knowledge, reported that almost all participant pharmacists agreed that pharmacists have the capacity to substantially reduce illness burden via nutrition counselling, nevertheless only 34.5% of the participants indicated that they voluntarily offer nutrition advice. This study highlighted the necessity for the enhancement of pharmacists' nutrition knowledge.

1.7 Aim of the Research in this Thesis

The overarching aims of this research were to investigate the current attitudes, confidence and practices of Australian registered pharmacists in terms of counselling their patients on nutrition. In this study nutrition counselling was separated into dietary counselling and VMS counselling with the exclusion of complementary medicine containing herbs.

The main objectives of this study are to:

- Explore pharmacists' attitudes toward dietary and VMS counselling and their confidence in providing this type of counselling including sufficiency of training.
- Investigate the frequency which patients do seek dietary and VMS advice from pharmacists and common medical topics they seek advice on.
- Identify factors associated with the frequency of nutritional counselling provision, including barriers.

The results of this study will help introduce changes in educational offerings for practicing pharmacists and students training in the future. This will equip them to

deliver effective nutrition health promotion service with enhanced professional confidence.

1.8 Thesis Overview

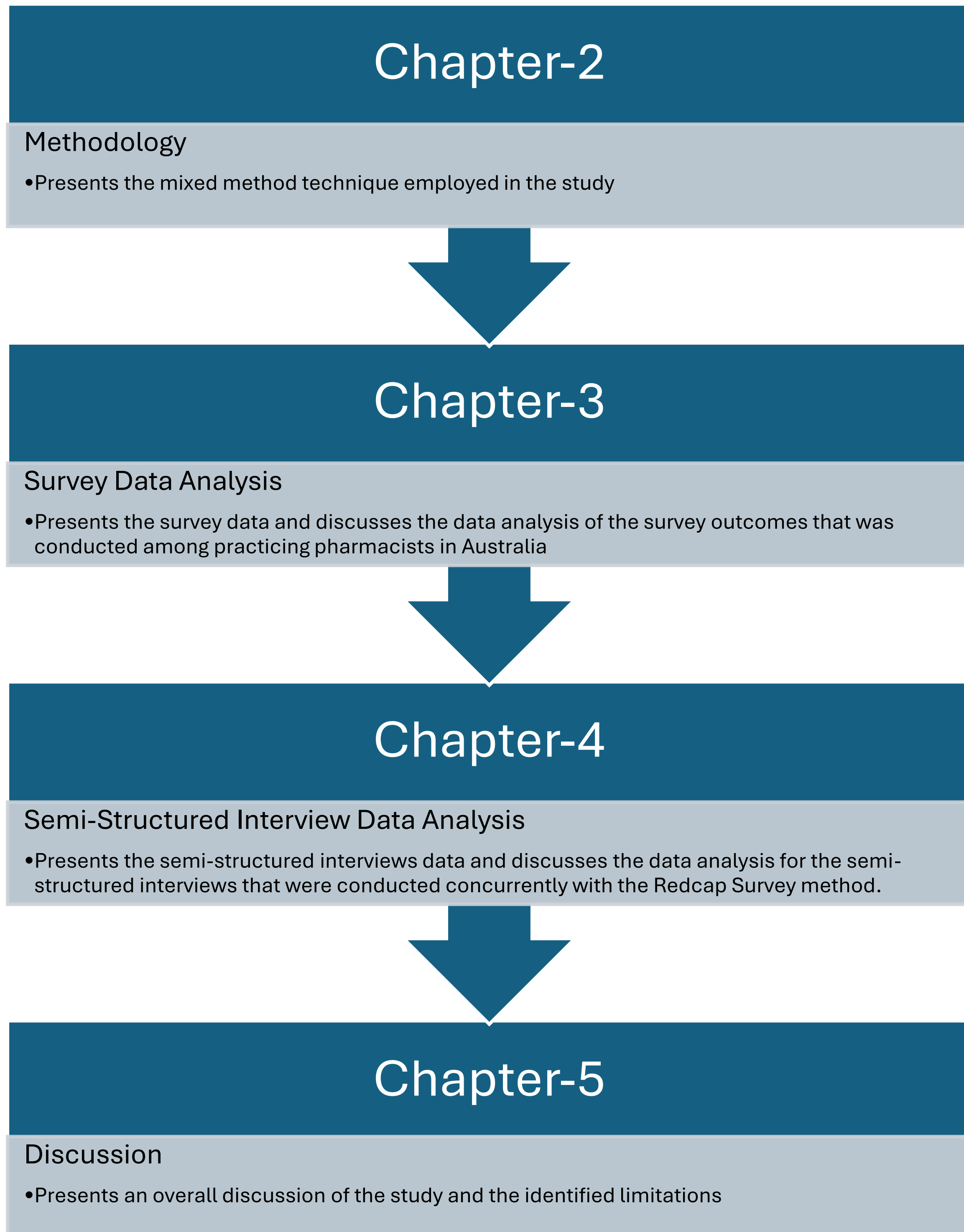

Figure 1.1 Thesis Flow

Chapter 2 – Methodology

This chapter presents the methods adopted for our research to achieve the aims and objectives outlined in Chapter 1.

2.1 Study Design

A mixed method technique was utilised for this research [62]. A quantitative cross-sectional online survey was first employed, followed by qualitative semi-structured interviews to gain deeper insights and validate results [63].

This study was granted ethics approval from the University of Sydney Human Research Ethics Committee (HREC), approval number 2023/022.

2.2 Sample and Recruitment

The target population for this research were registered pharmacists practicing in Australia. Participants for the survey were recruited via multiple avenues. Firstly, through email, using publicly available email addresses of staff members of the University of Sydney School of Pharmacy that were practicing registered pharmacists. Secondly, an advertisement for the study was posted in the School of Pharmacy online newsletter and on four social media Facebook groups that were pharmacy related (see Appendix 1). The advertisement comprised a brief description of the study, the participant information statement (PIS; see Appendix 2) and a URL link to the survey. Finally, passive snowballing technique was adopted in which potential participants were invited to share the email and/or survey link with their colleagues [64, 65].

An invitation for a semi-structured interview was included at the end of the online survey. Participants who were interested in participating in an interview to share their experiences about nutritional counselling were asked to leave their name and email address. Interested participants received an email from the research team, including the participant information statement (PIS; see Appendix 3) and an invitation for a Zoom interview. One reminder email was sent two weeks later to those who had not responded to the initial invitation. Upon confirmation of interest, a suitable time for a Zoom interview was negotiated.

2.3 Survey Design and Content

An anonymous 62-items, cross-sectional, self-administered survey was developed and distributed via REDCap (Research Electronic Data Capture v13.4.10) (see Appendix 4). REDCap is a secure web-based platform created to facilitate data collection for research studies [66]. The survey was adapted and modified from previously published research on nutrition counselling in pharmacy practice, which included items representing constructs that were derived from previously published surveys [60]. Irrelevant sections of the original survey were eliminated or modified to align with the current objectives, specifically targeting practicing registered pharmacists rather than pharmacy students and interns. The survey consisted of five sections with multiple response modes. Questions on nutrition were divided into those related to diet and those related to VMS. Section one consisted of six questions that collected the demographic characteristics of the participants including pharmacy training, years and

type of professional experience. Section two comprised of twenty-five questions that investigated self-reported nutrition counselling behaviour. Questions in this section focused on the current frequency of counselling on diet and VMS over the past six months of work (on a 5-point scale from "*never*" to "*once a day*"). This section also investigated which conditions patients were more commonly seeking dietary and VMS advice from pharmacists. It included a list of nineteen common medical conditions and topics, followed by an open text box for participants to add topics missing from the list. Moreover, two questions were incorporated to assess the future intention of the participants to engage in dietary and VMS counselling. Section three included ten questions which addressed attitudes to nutrition counselling in pharmacy practice. A five-point Likert scale ranged from 1= "strongly disagree" to 5= "strongly agree" were used to gauge participants' attitude. Section four investigated the respondents' confidence in dietary counselling for the same nineteen medical conditions (on a 5-point Likert-type scaled from 1= "*not confident*" to 5= "*very confident*"). The last section enquired about pharmacists' perception regarding the inclusion of general nutrition in the pharmacy curriculum, and whether the nutritional education they received in their pharmacy training was sufficient. At the end of the survey, participants were invited to register their interest in participating in the semi-structure interview. In addition, they were able to indicate their interest in entering a draw for five gift certificates each valued $50.

The preliminary survey instrument was piloted by three academic staff members and two pharmacists. Some questions were reworded for clarity, terminology was clarified to prevent ambiguous phrasing, the survey sequence was revised to improve the logical flow, and the duration of the survey was adjusted so that the time indicated on the PIS was realistic. The estimated average time to complete the survey was calculated to be between 5-6 minutes and the feedback on the survey was integrated into the final version.

2.5 Interview Guide Development

The semi-structured interview guide (*see Appendix-7*) was developed to explore the participants' experiences, attitude and confidence toward nutritional counselling, and the challenges that impede them from offering such counselling as well as resources used in practice. The interview guide employed open-ended questions to explore the participants' experience and utilised probing technique questions to have a deeper understanding of participants' experiences [65, 67]. A pilot test was conducted in a training interview by members of the research team (S.E, J.H, J.P, I.G), of which three had previous experience in conducting semi-structure interviews (J.H, J.P, I.G).

2.6 Interview Procedure

All semi-structured interviews were conducted and recorded via Zoom software (version 5.16.5). Two members of the research team (S.E, I.G) conducted the first nine semi-structure interviews together to align their interview styles, all subsequent interviews were conducted by one of the two team members. The interviewer started

by outlining the objectives of the overall research and informing the participants about estimated interview duration of approximately (20-30 minutes). Interviews were stopped after reaching data saturation which is the point when no new themes or information is received from the participants [65]. Interview participants were offered a $50 online gift card as a remuneration for their time and participation.

After all interviews were completed, the Zoom video and audio recording were downloaded. The video recordings were immediately deleted while the audio recordings were initially transcribed using the Office 365 Word transcription function. Subsequently, the transcripts were manually cleaned by two members of the research team and de-identified in the process.

Chapter 3 – Survey Data

This chapter presents the survey data and discusses the data analysis of the survey outcomes that was conducted among registered practicing pharmacists in Australia. The objectives of the survey, as previously mentioned in chapter 2, were to explore the frequency with which pharmacists engage in nutritional counselling as well as their attitudes and confidence in offering this type of counselling. Additionally, the survey aimed to explore the common medical topics for which patients seek nutritional advice on and to investigate whether Australian pharmacists feel sufficiently equipped to address these inquires.

3.1 Statistical Data Analysis

The data was exported from REDcap to Excel. Next, data were entered into IBM - SPSS version 29 for statistical analysis. Descriptive analysis was conducted for all variables. Several variables were subsequently dichotomized for statistical analysis as following:

Old variable	**Dichotomized new categories**
Participants age	• Less than 41 years of age • Aged 41 or over
Years of pharmacy experience	• Less than 11 years • 11 years and more

Participants frequency of counselling	• Once a week or less • More than once a week
Area of pharmacy practice	• Hospital • Community
Likelihood of dietary and VMS counselling	• Likely • Not Sure • Unlikely

Diet counselling confidence score, attitude scores, and a VMS counselling attitude score were calculated using summative scores weighted by the number of the items in each scale which were computed for each respondent. The reliability of the confidence and attitude scales was tested with Cronbach's alpha.

Univariate and multivariate logistic regression were then performed to identify variables that were associated with providing advice on diet and VMS. The explanatory variables tested included gender, age group, years of professional experience in pharmacy, type of pharmacy experience (community vs hospital), location of pharmacy training (domestic or overseas), degree qualifications (such as undergraduate or postgraduate degrees), diet counselling confidence score, diet counselling attitude score, and VMS counselling attitude score. Missing data were reported for any variable if they exceeded 5%. The variables that were significant in the univariate analysis were

further analysed using a multivariable model. The model fit was tested using the Hosmer–Lemeshow statistic. The significance was determined by $p<0.05$.

3.2 Results

The online surveys were completed between April – July 2023. A total of 114 surveys were submitted, of which 7 were excluded due to incomplete responses, leaving 107 as the total number included in the results.

3.2.1 Demographic Characteristics

Table 3-1 illustrates the demographic characteristics of the participants. The majority of participants were female as illustrated in (Figure 3-1), with diversity of age groups and professional experiences as shown in (Figure 3-2) and (Figure 3-3).

Table 3-1 Demographic characteristics of survey participants (N=107)

Variable	**Categories**	**Number of responses** n (%)
Gender	Female	**95** (89)
	Male	**12** (11)
	Non-binary	-
	Prefer not to say	-
Age group (years)	21 - 25	**7** (7)
	26 - 30	**20** (19)
	31 - 40	**38** (36)
	41 - 50	**27** (25)
	51 - 60	**11** (10)
	> 61	**4** (4)
	Prefer not to say	**-**

Variable	**Categories**	**Number of responses** n (%)
Pharmacy qualification	Bachelor of Pharmacy	**77** (72)
	Master of Pharmacy	**22** (21)
	Doctor of Pharmacy	**3** (3)
	Other	**5** (5)
Location pharmacy training	Australia	**95** (89)
	Elsewhere	**12** (11)
Years of professional experience as registered pharmacists	< 1 year	**1** (1)
	1 – 5 years	**32** (30)
	6 – 10 years	**17** (16)
	11 – 20 years	**33** (31)
	21 – 30 years	**12** (11)
	> 30 years	**12** (11)
Predominant pharmacy work experience	Community Pharmacy	**73** (68)
	Hospital Pharmacy	**17** (16)
	Industry	-
	Specialist Pharmacy areas*	**9** (8)
	Other**	**8** (8)

* Examples mentioned in the survey question were Aged Care, General Practice clinics, poisons, Medication Review, and consultant pharmacist.,

** 'Other' provided participants the option to list their experience. Those listed were Policy & Education/Regulation, Academic/Research, compounding, or a combination of experiences.

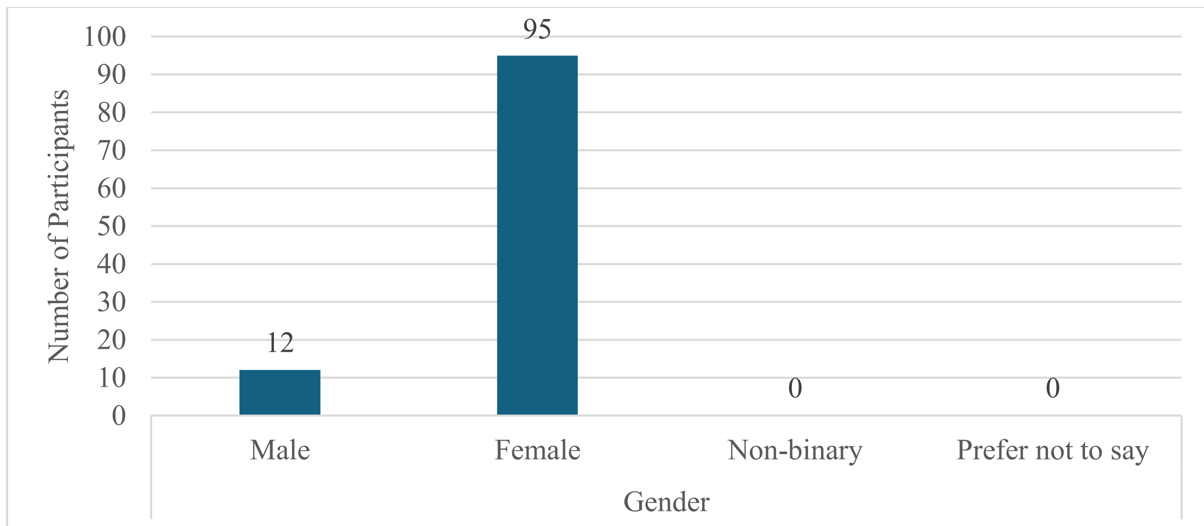

Figure 3-1 Distribution of Participants' Gender

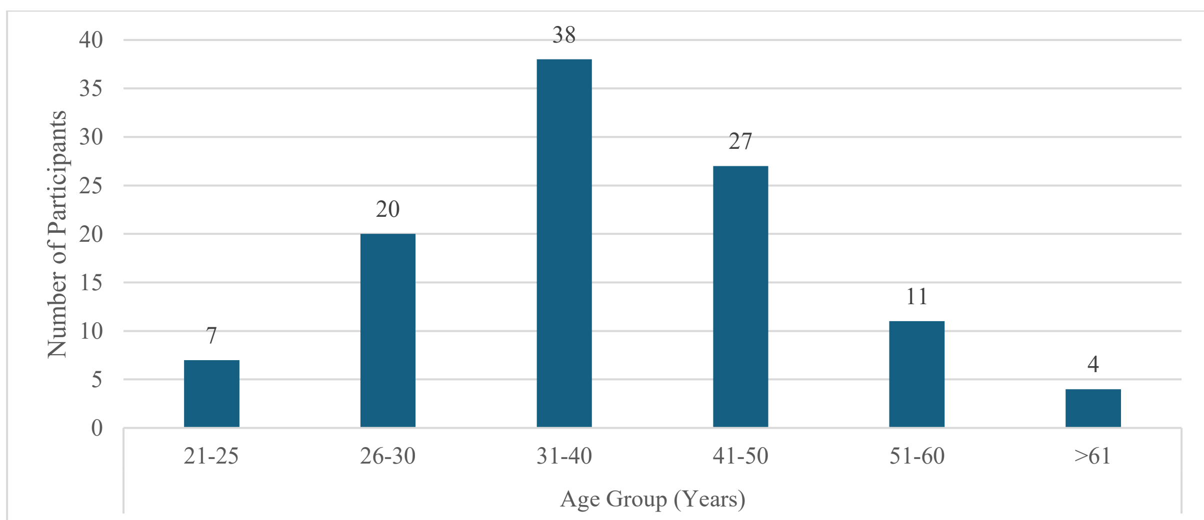

Figure 3-2 Distribution of Participants' Age Groups

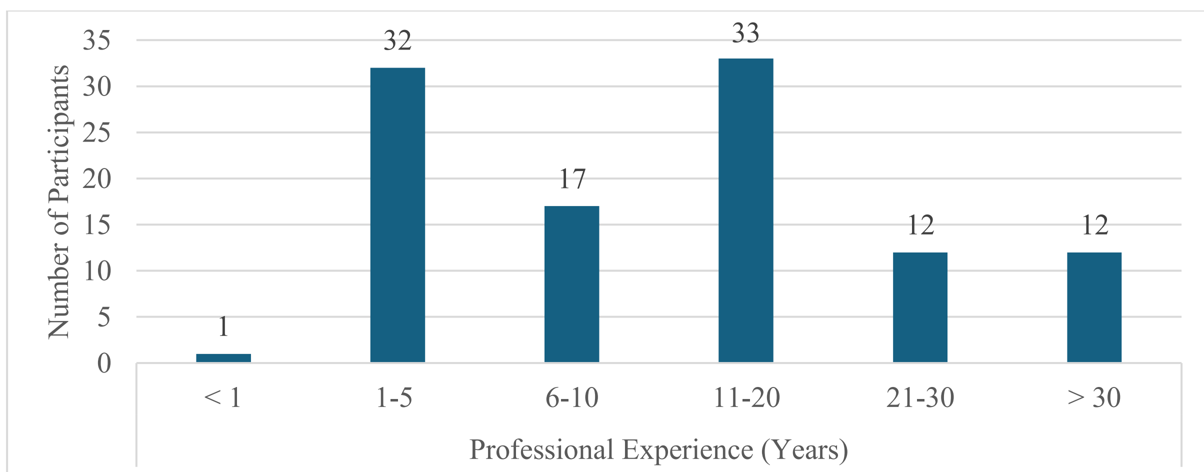

Figure 3-3 Distribution of Participants' Years of Professional Experience

When participants were asked to describe the type of their professional experience, the majority (68% or n =73) indicated they had predominantly worked as a community pharmacist, followed by hospital pharmacists (16% or n= 17), as shown in Table 3-1, and a smaller proportion reported other specialists areas.

3.2.2 Self-reported Nutrition Counselling Behaviour

3.2.2.1 Frequency of Nutritional Counselling

The first section of the survey inquired about the frequency of which participants provided dietary and VMS advice to their patients over the past six months, which is demonstrated in Figure 3-4.

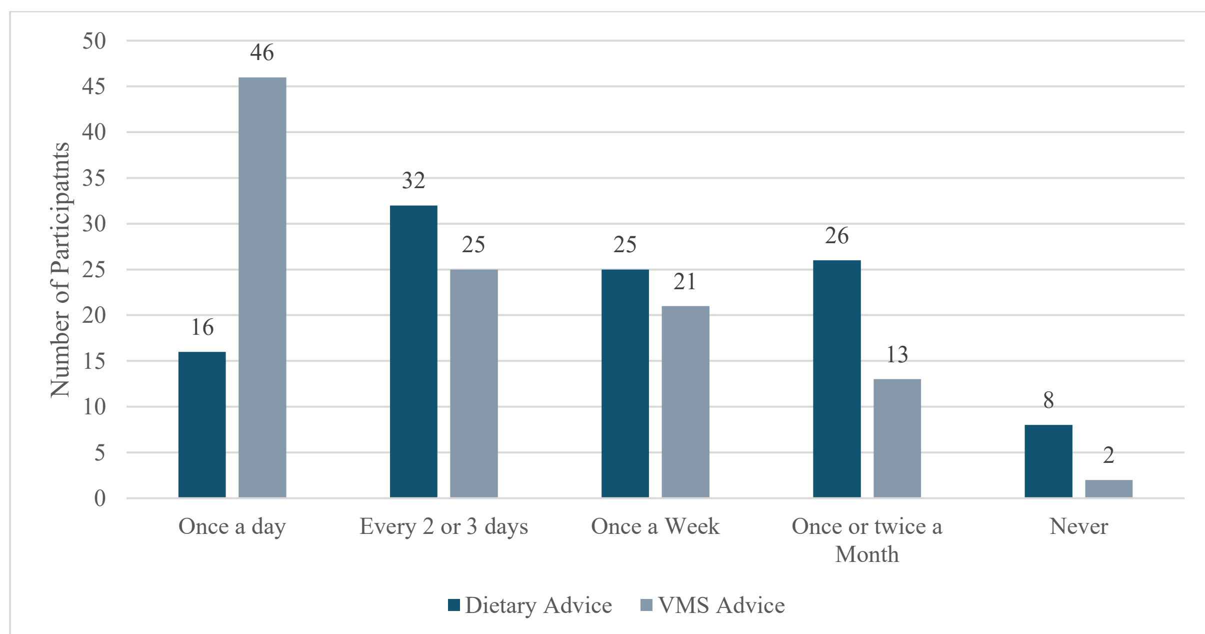

Figure 3-4 Frequency of dietary & VMS counselling advice provided by participants (N=107)

Participants were also asked to report on the counselling behaviour of their pharmacy colleagues or preceptors, 10% (or n=11) of participants stated that their colleagues or preceptors provide dietary advice once a day, while 31% (or n=33) of participants stated that they have never seen their colleagues engage in dietary counselling. However, for VMS counselling, 34% (or n=36) reported that their colleagues or preceptors provide VMS counselling on a daily basis, while 17% (or n=18) reported never seeing them providing this type of counselling.

3.2.2.2 Future Nutritional Counselling Behaviour

Upon asking participants about their intention to provide dietary and VMS counselling to their patients in the next month, the majority reported a likelihood of participating in this type of counselling, as shown in Figure 3-5.

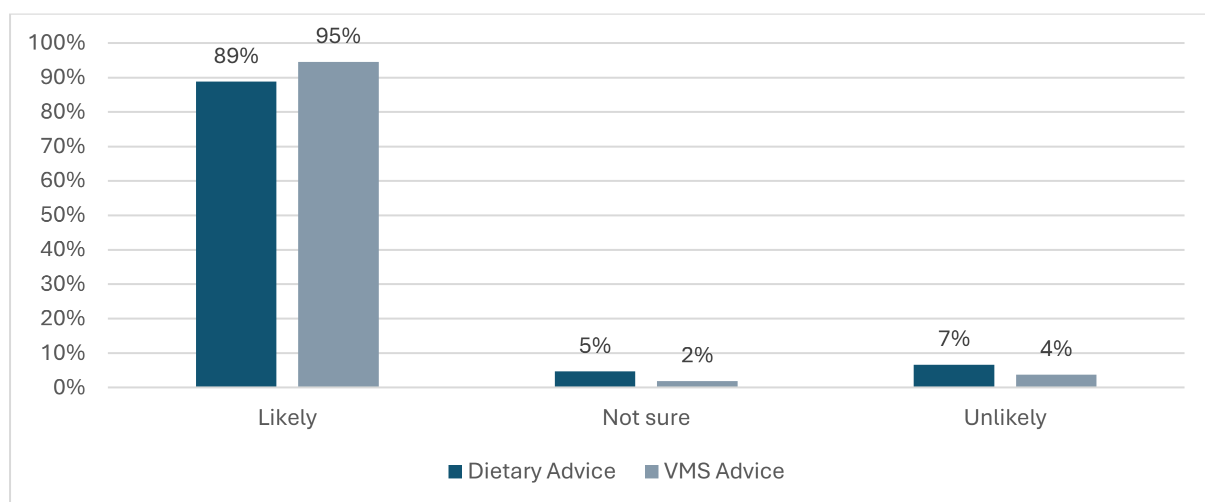

Figure 3-5 Future Planning to Provide Dietary and VMS Counselling

* Please note that for data analysis, responses about future likelihood of dietary and VMS counselling were dichotomized into Likely (extremely likely, very likely, likely) vs Not sure vs Unlikely (extremely unlikely, very unlikely, unlikely).

3.2.2.3 Common Nutrition Related Topics

The survey included a list of 19 common medical conditions and topics for which participants were asked to indicate whether patients were actively seeking dietary and/or VMS advice for. Results are illustrated in Figure 3-6.

The results show that Gastro-Oesophageal reflux disease (GORD) (n=83), Type-2 diabetes mellitus (n=86) and weight management (n=89) were reported most frequently as common topic areas for dietary advice. On the other hand, pregnancy (n=99), pre-conceptual care (n=91), and osteoporosis (n=91) were most frequently reported as topic areas for VMS advice. These may suggest that participants focus on providing dietary counselling for chronic diseases, and VMS counselling as a preventive measure to enhance health outcomes. Cancer was clearly the topic area that participants reported the least frequent for both counselling areas. This may be in part because cancer represents a specialist disease area for which patients are usually under the case of medical specialists.

Moreover, participants listed frailty, and wound healing as common topics for nutritional advice in an open text option for listing medical conditions/topics that were not included in our survey.

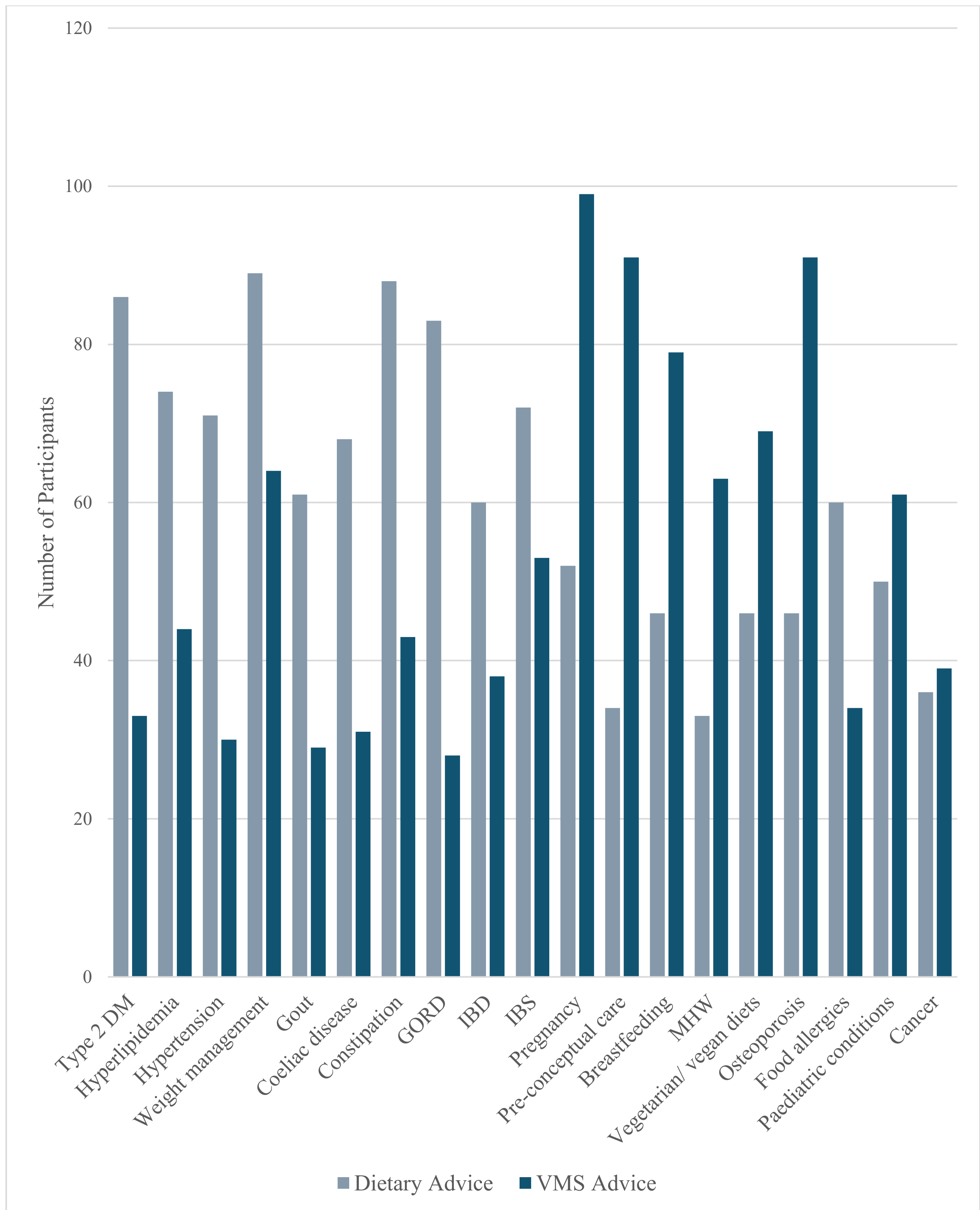

Figure 3-6 Common Medical topics for dietary and VMS Counselling

3.2.3 Attitude toward Nutritional Counselling

The means attitude scores toward dietary and VMS counselling are illustrated in Table 3-2. The results showed that on average over the participant group, there was strong to somewhat agreement with all the statements listed, indicating an overall positive attitude towards nutritional counselling by participants. The statement "Patients would value a pharmacist providing advice about …" scored the highest for both diet and VMS advice. The reliability of the measures expressed by Cronbach's alpha indicate high to moderate internal consistency within items of dietary and VMS counselling variables respectively.

Table 3-2 Participants attitudes scores toward dietary and VMS counselling

Statements on dietary counselling	**Mean score * (n=107)**	**SD**	**Cronbach's alpha**
Patients would value a pharmacist providing advice about diet	4.38	0.77	**0.83**
Counselling about diet is an effective use of a pharmacists' professional time	4.18	1.01	
Pharmacists have an obligation to improve the health of patients by discussing diet with them	4.22	0.95	
All pharmacists should counsel patients with non-communicable diseases about the preventative role of diet in disease onset, progression and management	4.34	0.82	
It is not worth the time for pharmacists to counsel patients with poor dietary patterns about their diet**	4.16	0.98	
Counselling about diet should be part of routine care by all pharmacists	4.11	1.07	
Statements on VMS counselling	**Mean score * (n=107)**	**SD**	**Cronbach's alpha**
Patients would value a pharmacist providing advice about vitamin and mineral supplements	4.76	0.51	**0.63**
Counselling about vitamin and mineral supplements is an effective use of a pharmacists' professional time	4.43	0.69	
Pharmacists have an obligation to improve the health of patients by discussing vitamin and mineral supplements with them	4.33	0.86	
Counselling about vitamin and mineral supplements should be part of routine care by all pharmacists	4.11	0.91	

***** 5 = strongly agree; 4 = somewhat agree; 3 = neutral/no opinion; 2 = somewhat disagree; 1 = strongly disagree.

****** Negatively worded question for which the score was reversed.

3.2.4 Confidence in Dietary Counselling

Table 3-3, demonstrates the means confidence scores for dietary counselling over the nineteen medical conditions, which were the same as those reported in Figure 3-6. The results show that participants reported the highest confidence scores for frequently counselled conditions such as constipation and weight management. However, some of the conditions for which participants commonly provided dietary counselling received the lowest confidence score, such as inflammatory bowel disease receiving a score of 2.79.

The overall mean confidence score was 3.38 (SD=0.82). This indicates that participants on average were "*somewhat confident*" to provide dietary counselling to their patients.

The Cronbach's alpha for the 19 items measured confidence variable was 0.93. This indicate high internal consistency, however it is slightly higher than the accepted range (0.7-0.9) which indicate item redundancy may exist [68]. This means the scale could be refined in future studies.

Table 3-3 Reported confidence (as confidence score) in dietary counselling on various conditions

Condition	Confidence Score*	Condition	Confidence Score
Constipation (2) **	4.14	Preconceptual care	3.38
GORD	4.12	Vegetarian / Vegan diets	3.18
Weight Management	4.09	Mental Health (1)	3.09
Type II Diabetes	3.91	Irritable Bowel Syndrome	3.07
Hyperlipidemia (1)	3.91	Coeliac Disease (1)	3.04
Hypertension (1)	3.91	Food allergies (5)	2.98
Osteoporosis (1)	3.80	Inflammatory Bowel Disease	2.79
Pregnancy	3.64	Pediatric Conditions (4)	2.71
Gout (1)	3.61	Cancer (7)	2.29
Breastfeeding (1)	3.46		

* Confidence score represents the average response of participants that had indicated “I am not confident” = 1; “I am slightly confident” = 2; “I am somewhat confident” = 3; “I am confident” = 4; “I am very confident” = 5.

** Numbers between brackets for individual conditions represents the number out of 107 participants that had chosen “unsure”, upon which their response was not included in the confidence score calculation.

3.2.5 Factors Associated with the Provision of Nutrition Counselling

For dietary counselling, the univariable analysis showed that age group, years of professional experience in pharmacy, pharmacy experience (community vs hospital), attitude and confidence scores were all associated with the frequency of the provision of dietary counselling, as illustrated in Table 3-4. Hence, older pharmacists with prolonged experience in community pharmacy, with positive attitudes and increased confidence were more likely to counsel on diet (Table 3-4). However, in the multivariable model, confidence in providing dietary counselling was the only

explanatory variable associated with frequency of advice provision, with an odd ratio of >3.

Table 3-4 Univariable and multivariable binary logistic regression of factors associated with the frequency of dietary advice (N=107)

	Univariable			**Multivariable***		
Variables	**Odds Ratio**	**95% CI**		**Odds Ratio**	**95% CI**	
Mean attitude diet score	**2.69**	1.39	5.21	1.90	0.89	4.09
Mean confidence score	**3.17**	1.78	5.65	**3.18**	1.66	6.10
Age • 41 years or more • < 41 years	**2.69**	1.21	5.97	1.78	0.57	5.50
Years of Pharmacy Experience • ≥ 11 years • < 11 years	**1.58**	1.16	2.14	1.14	0.37	3.51
Pharmacy Experience • Community • Vs Hospital	**5.07**	1.34	19.1	3.49	0.85	14.30

* Multivariable model -Hosmer Lemeshow (Goodness of fit); Chi Square 8.82; df 8;p= 0.60); Nagelkerke R square = 0.20

For VMS counselling, the univariable analysis showed that pharmacy experience and dietary counselling confidence scores were factors associated with the frequency of VMS counselling, as shown in Table 3-5. Pharmacists working in community pharmacy were more likely to frequently counsel on VMS, and those who were confident in dietary counselling were likely to counsel on VMS (Table 3-5)

Table 3-5 Univariable and multivariable binary logistic regression of factors associated with the frequency of VMS advice (N=107)

	Univariable			**Multivariable***		
Variables	**Odds Ratio**	**95% CI**		**Odds Ratio**	**95% CI**	
Mean attitude VMS score	1.03	0.85	1.26			
Mean confidence score	**2.30**	1..22	4.00	**1.94**	1.63	3.68
Age • ≤ 40 years vs • 41 years or more	1.46	0.63	3.38	NS		
Years of Pharmacy Experience • < 11 years vs • ≥ 11 years	1.22	0.55	2.72	NS		
Pharmacy experience • Community • Vs Hospital	**5.21**	1.60	16.03	**4.13**	1.30	13.15

*Multivariable model -Hosmer Lemeshow (Goodness of fit); Chi Square 10.07; df 8;p= 0.26); Nagelkerke R square = 0.26

3.2.5 Nutritional Training in Pharmacy Education

When participants were asked if they thought they had received sufficient education on general nutrition throughout their pharmacy degree program, only 20% (n=21) affirmed positively as demonstrated in Figure 3-7.

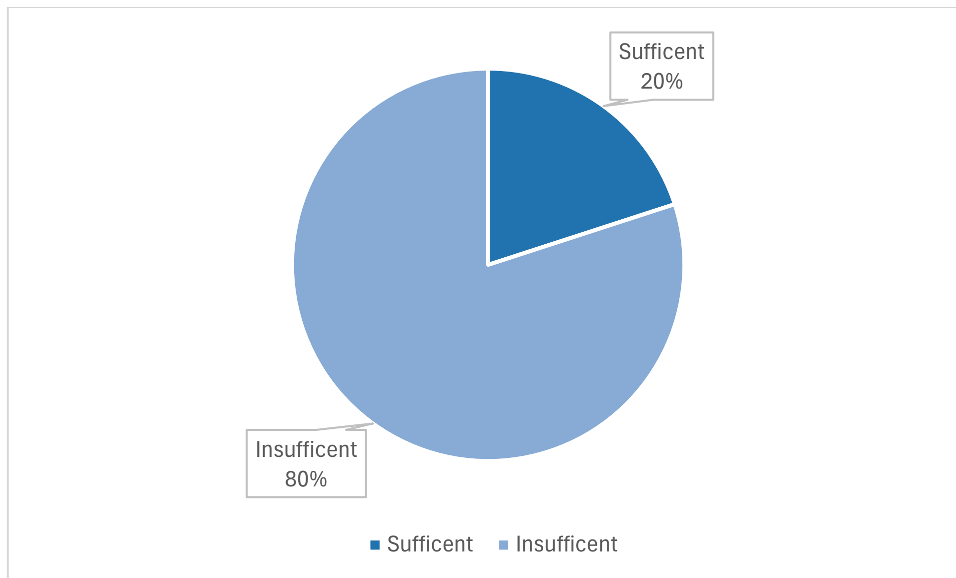

Figure 3-7 Sufficiency of Nutrition Education in Pharmacy Programs

Furthermore, the majority of participants 67% (or n=72) suggested that nutritional education should be incorporated as a core subject in pharmacy education, which indicates that pharmacists perceived the relevance of nutrition in pharmacy practice and their professional pharmacy career.

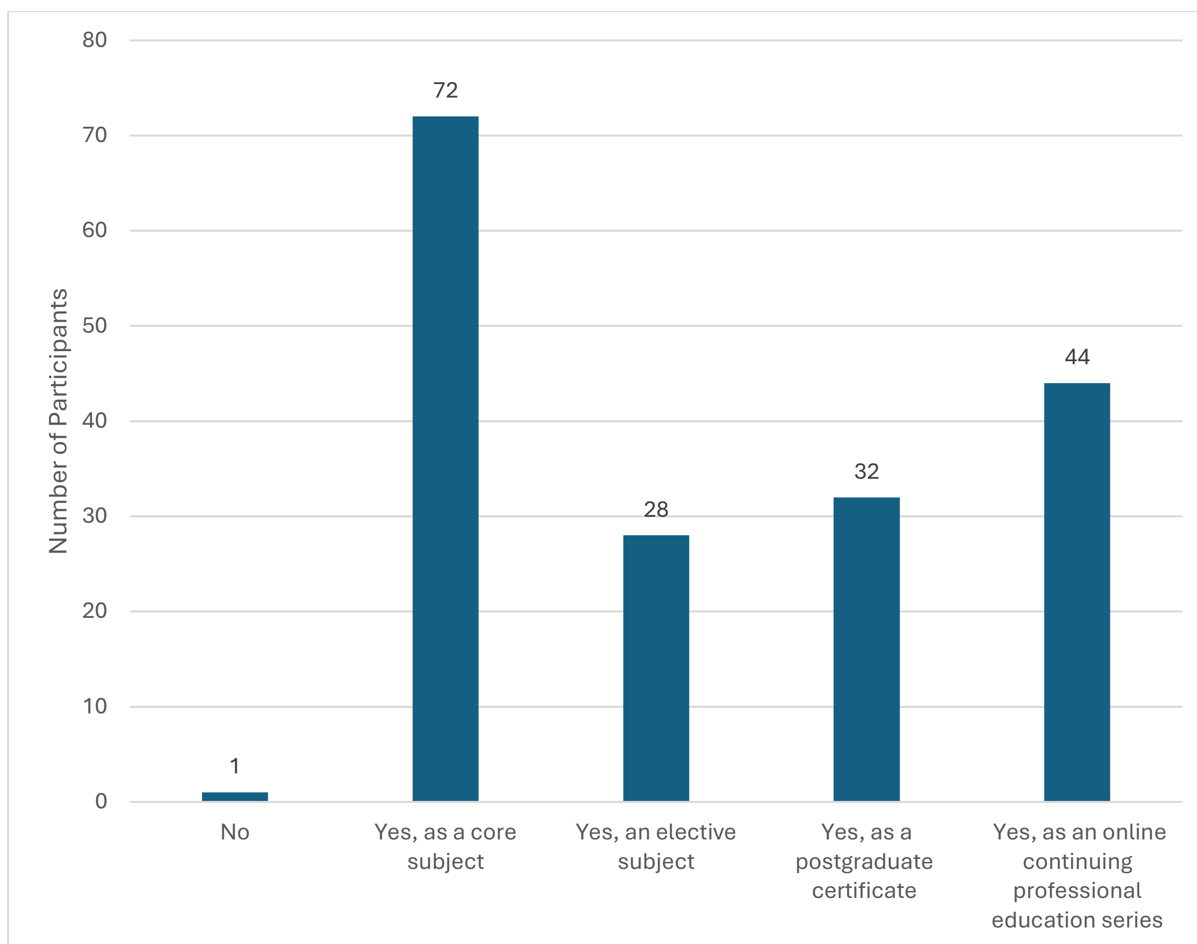

Figure 3-8 Inclusion of Nutrition Education in Pharmacy Program

* More than one Option had been selected

3.3 Discussion

The survey results indicated that participants expressed a positive attitude towards dietary and VMS counselling. In addition, participants were frequently consulted by patients for dietary advice, while VMS counselling was provided even more frequently than dietary advice. Confidence with regards to dietary counselling varied over the common topics while participants reported an insufficiency in nutritional education offerings in their pharmacy training, and they believed that nutritional courses should be incorporated into the pharmacy program as a core subject.

The first key finding of the survey was that the majority of the participants acknowledged the importance of a healthy diet as a preventive measure against the development of chronic NCDs, which aligns with WHO nutrition report that highlights the critical role of nutrition on onset of NCDs, immune system and longevity [2]. Moreover, participants agreed that pharmacists should educate patients about healthy dietary habits. This is consistent with another Australian study [61] that explored pharmacists' nutrition knowledge by utilising a questionnaire that was administrated to 258 practicing pharmacists. The study showed that the majority of participants (i.e. 96%) agreed that pharmacists can contribute to reduce the burden chronic disease through nutrition education [61]. This is in agreement with our study, demonstrating that Australian pharmacists' attitudes to the role of nutrition education in chronic disease prevention are in line with the recommendation of the WHO [3].

Additionally, participants perceived dietary counselling to be within their scope of practice. This attitude has been reported in other international studies [56, 58, 69, 70]. For example, Belachew et al. [70] interviewed 100 community pharmacists in Ethiopia, and reported that more than one third of the respondents acknowledged the importance of good nutrition to prevent chronic NCDs while more than half of the participants believed that nutritional counselling was part of pharmacists' professional role. Medhat et al. [58], recruited a total of 368 pharmacists in Egypt to participate in a study utilising a survey methodology, and reported that the majority of Egyptian pharmacists considered nutritional counselling part of their duties. Similarly, a study

conducted in Ireland concluded that 70% of the total participants (n=557) believed that providing nutrition and dietary advice was fully within their professional scope [56]. This indicates that pharmacists worldwide believe that advocating for healthy dietary habits falls within their scope of practice.

Our survey made a point of distinguishing between counselling on diet versus counselling on VMS as these were seen as two distinct areas of interest. This study revealed that the majority of the participants agreed that counselling on VMS lies in their scope of practice to ensure the safe and appropriate use of these supplements. This is consistent with a large international study including 2,810 pharmacists from nine countries [57]. This study reported that 83% of the participants agreed that VMS counselling should be part of pharmacy practice [57]. This reflects a global consensus on the important role of pharmacists in providing VMS counselling to patients to ensure the safety and the appropriate use of these supplements.

Another key finding of the survey was that participants were frequently offering dietary counselling while expressing strong confidence for counselling on chronic non-communicable medical conditions such as those associated with cardiovascular diseases (hypertension and hypercholesterolemia) and type 2 diabetes. Medications to treat these conditions are frequently listed in the top 50 medications in terms of volumes of prescriptions in Australia [71].

This indicates that pharmacists will frequently interact with patients when dispensing these medications, creating frequent opportunities to engage in dietary counselling.

For hyperlipidaemia, hypertension and type 2 diabetes, lifestyle management including dietary change is considered first line therapy [72] and may therefore have received more attention in pharmacy curricula when compared to less frequent conditions such as those where pharmacists indicated less confidence such as IBD, food allergies and mental health.

One of the main barriers identified in our survey was the lack of adequate foundational education in general nutrition during pharmacy training. This aligns with the Australian study by Mirkazemi et al. [61] which revealed that close to two-thirds of participants pharmacists reported having poor to average nutritional knowledge, and the frequent utilisation of the internet before providing nutritional advice to patients. Additionally, 98% of the participants indicated that their nutritional knowledge was in need of improvement [61]. Our findings resonate with other international studies [58, 69, 73]. For example, Medhat et al. reported that despite the positive attitude toward nutritional counselling among Egyptian pharmacists, lack of adequate nutritional training and knowledge were the primary obstacles [58]. Douglas et al. revealed that 80% of the participants pharmacists in North-Ireland considered their nutrition education in their undergraduate and professional level insufficient and they were not confident in their nutritional knowledge [69]. Moreover, Syed-Abdul et al. indicated that 80% of pharmacy students participants in the US were not receiving sufficient nutrition education during their training as it was not a prerequisite for the pharmacy degree [73]. This may reflect the gap in nutritional knowledge, expertise and training

that limits the full potential of pharmacists globally. A large proportion of our survey respondents reported that nutritional education should be integrated in the pharmacy degree which is in agreement with other studies that provided evidence that nutrition education incorporated in undergraduate pharmacy curricula was found to enhance pharmacists' knowledge in terms of nutrition care and ability to identify diet- disease relationship [74, 75].

3.4 Conclusion

The survey results have given valuable insights into the current attitudes, confidence and practice of Australian pharmacist toward the provision of nutritional counselling. The study results showed an overall positive attitude and willingness to partake in dietary and VMS counselling. Lack of sufficient nutritional education during pharmacy degree program was highlighted which may form a barrier to the provision of nutritional counselling. More in-depth investigations may be valuable to elucidate the nature of barriers and the rationale for any hesitancy.

Chapter 4 - Semi-Structured Interviews Data

This chapter presents the semi-structured interviews' data and discusses the data analysis for the semi-structured interviews that were conducted concurrently with the REDcap Survey method, detailed in Chapter 3. The aim of the semi-structured interviews was to delve deeper into participants' professional nutritional counselling experience to explore their attitudes toward nutrition counselling as well as factors that had impacts on their counselling behaviours. A further aim was to identify common medical topics that patients were frequently seeking nutritional advice from pharmacists. Lastly, the interviews aimed to explore which nutritional resources pharmacists rely on for their nutritional counselling.

4.1 Data Analysis

Interviews were conducted between May and August 2023. After completion of the interviews, the Zoom audio files were downloaded and transcribed using the Microsoft Word Transcription tool (version 2407) while the video files were discarded. The transcripts were further cleaned and de-identified by two of the research teams (S.E, I.G) by checking the transcripts against the original recording. Next, the transcripts were uploaded into NVIVO Software (version 14.23.2) for thematic analysis [76]. Thematic analysis was adopted as it is characterized by its adaptability and accessibility, which enabled profound focusing on the data [77]. Thematic analysis was performed according to the guidelines by Braun and Clarke [78]. The six phases were implemented, which include first familiarization with the content of the data. Secondly,

the generation of initial codes from the data. This was followed by categorization of the codes to develop the potential themes, reviewing of potential themes against coded data and the entire dataset. Finally, the identification and naming of themes and sub-themes were executed to provide a coherent overall story about the data [78]. Additionally, content analysis was applied for two questions in the interviews [79]. The objective of these targeted questions were to identify the common medical conditions that were frequently discussed in the pharmacy and the resources that participants rely on, where codes were extracted from participants' own words [79]. Two researchers (S.E, I.G) independently conducted thematic analysis and content analysis to ensure reliability and credibility of the analysis[77]. Codes and themes emerged from the data were discussed with a third researcher (J.H) after which consensus was reached by the research team.

4.2 Results

4.2.1 Participants Characteristics

A total of 57 registered pharmacists expressed their interest in participating in the semi-structured interviews and were invited via email in batches of 4-6 invitees. Participants that responded were offered time for a Zoom interview. After interviewing 21 participants, data saturation was reached, and no further interviews were performed [65]. Consistent with the survey results, the majority of the interview participants were female, while the predominant age group was between 31-40 years with three participants representing older age group (illustrated in Table 4-1). In

addition, a variety of professional experiences were reported by participants, including specialist areas such as consultant pharmacists and diabetic educators. Furthermore, more than half of the participants (57%, n=12) had pursued additional academic qualifications, some of these qualifications were directly related to nutrition (2 of 21 participants) and the other qualifications included minimal nutrition content. See Table 4-1.

Table 4-1 Demographic characteristics of the interviewed participants (N=21)

Variables	**Categories**	**Number (%)**
Gender		
	Female	18 (86%)
	Male	3(14%)
Age (Years)		
	26-30	6(29%)
	31-40	9(43%)
	40-50	3(14%)
	51-60	1(5%)
	> 60	2(10%)
Pharmacy Qualification		
	Bachelor of Pharmacy	17(81%)
	Master of Pharmacy	4(19%)
State/territory where initial pharmacy qualification was awarded		
	Australian Capital Territory	2

Variables	Categories	Number (%)
	New South Wales	7
	Victoria	2
	South Australia	3
	Western Australia	1
	Tasmania	1
	Overseas	4
Professional Experience Field as a registered pharmacist*		
	Community Pharmacist	17
	Hospital Pharmacist	11
	Accredited Medication Review Pharmacist	6
	Age Care Pharmacist	2
	Diabetes Educator	2
	Academia	3
	Clinical Trials Pharmacist	1
	Alcohol and Drug Advisory Pharmacist	1
	General Practice Pharmacist	1
	NPS Medicine Wise Facilitator	2
	Administrative & Government Pharmacist	1
Additional Academic Qualification		
	Medication Review Accreditation	6
	Certificate IV in Nutrition	1

Variables	Categories	Number (%)
	Graduate Certificate in Diabetes Education	2
	Bachelor of Nutrition	1
	Master of Public Health	2

* Participants were able to respond with multiple answers or no answer

4.2.2 Themes

After analysing the interview data, four main themes and fifteen subthemes were identified which included pharmacists' attitude to nutritional counselling, pharmacists' nutritional counselling behaviour, barriers to nutritional counselling and patients' factor, as illustrated in Figure 4-1. For a more comprehensive list of quotes please refer to Appendix 6.

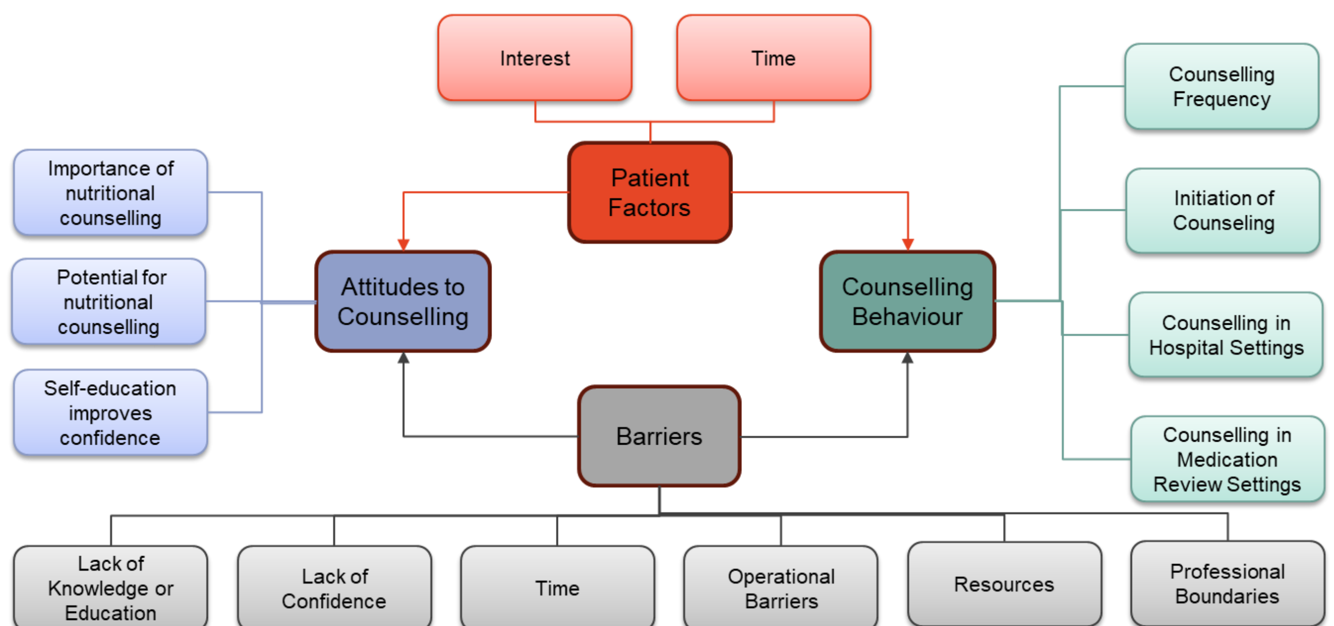

Figure 4-1 Summary of Themes and Sub-themes

4.2.2.1 Theme 1 Attitudes to Counselling

Overall participants demonstrated positive attitudes toward nutritional counselling by recognizing and emphasizing the importance of healthy nutrition and dietary counselling, in conjunction with medication counselling to ensure comprehensive care for patients. They considered healthy lifestyle and diet to be fundamental to primary prevention and treatment of various chronic medical conditions, including mental health.

> *"We make it a rule to start talking about nutrition, especially because we know as pharmacists that nothing can work as long as you don't fix your lifestyle and diet."* [P7]
>
> *"It's a holistic approach so with medications, especially those who will be affected by their diet and nutritional intake a lot, it would be a good approach to even implement that idea in the everyday conversation." [P14]*
>
> *"I just think that nutrition is probably the basis of so many of our diseases" [p6]*
>
> *"I think it was something I know that I always thought was really, important. I've always been an advocate for primary prevention and when you are a primary prevention person, your nutrition and lifestyle change, you know, become part of that kind, of you, know counselling framework." [P8]*
>
> *"I think we tend to focus on medications generally, whereas nutrition also plays a part in the general health and wellbeing." [P13]*
>
> *"I think it's extraordinarily important in mental health that their nutritional needs are being met." [P6]*

In contrast to the broader positive attitudes among participants, negative attitudes towards nutrition counselling were infrequently reported by a minority of the participants.

> *"I am the pharmacist in charge; I'm not employed as a nutritionist." [P4]*

Furthermore, participants highlighted the potential for pharmacists to provide nutritional counselling due to their frequent interaction with patients. Moreover, participants credentialled to perform home medicine reviews (HMRs) emphasized the additional potential for nutrition counselling in this setting as pharmacists have sufficient time with patients.

> *"There is huge potential, massive potential to provide dietary education to patients in the home setting, doing the home medication review." [P15]*
>
> *"I probably get more opportunity now to do that as, when you're doing home medication reviews. So, to find now there's much more scope if you're sitting and just talking to one person for an hour about their medicine, you do start to talk about nutrition." [P20]*
>
> *"I think we are at a very good position to do, especially with during medication reviews. We do have the time to talk to the patient about their nutrition." [P5]*

An important factor reported by participants was the accessibility of pharmacists especially in areas where access to medical doctors was limited.

> *"Pharmacies are the first port of call that many people go to, they hear something on social media or on the news, or they're talking about it with their friends or family, and they simply want to know more." [P2]*

“I think it would be important cause we pharmacists, especially community facing pharmacists, we are constantly in touch with patients all the time and if and I know that they like to ask us questions.” [P7]

“… And I think a lot of people do come into the community pharmacy as their first port of call because where I live it’s a month wait to get in to see a doctor at the moment, so people, that’s their first stop. They’ll come to the pharmacy”. [P11]

Moreover, participants’ positive attitudes were reflected in their motivation to enhance their nutrition knowledge through self-education. These attitudes were derived from their intention to sustain their own health and a commitment to provide adequate nutrition counselling to their patients.

“The majority of my education or my understanding from nutrition has been workplace training and kind of ongoing education and continuing like CPD kind of things, but also probably my experience as a person who wants to be healthy as well. So, I've probably done self-education around nutrition quite a bit as well.” [P3]

“I just did a Certificate IV in Nutrition to kind of be able to at least talk a little bit more about diet because I felt like at Uni, we didn't really get a lot, just really basic stuff.” [P4]

“Well for me, I feel like the experience and the knowledge I have when it comes to nutritional counselling is quite basic. I mean, when I started working as a consultant pharmacist, I got to learn a little bit more about nutrition and especially for the older people.” [P13]

4.2.2.2 Theme 2 Counselling Behaviour

Most participants indicated that they were keen to provide nutrition counselling to their patients on regular basis, especially for more elderly patients.

> *"I would say, maybe if I see hundred patients a day, there would be 10 who would ask for nutrition in general." [P7]*
>
> *"Probably the frequency would be at least once or twice a day I would say in a normal day. And that's not only in the community pharmacy setting but, in the drug, and alcohol setting as well." [P12]*
>
> *"I won't say it's on a daily basis, but it's fairly regular" [P14]*
>
> *"We have to do that quite a lot, especially because the population that we have at the pharmacy is the older population because we have two big, aged care homes around our area" [P7]*
>
> *"Probably at least once a day" [P11]*

When participants were asked about who initiated conversation about nutrition, they indicated that it involved both the pharmacist and the patients, however it was the pharmacists who most frequently commenced the discussion.

> *"I think some of it was me initiating it and some of it was them initiating it so, it's, you can start talking about nutrition and diet and you can get an idea from their feedback whether they're interested in learning more or not." [P6]*
>
> *"A mixture of both, I would say. So, if I'm handing out antibiotics, this is just an example. I always use it as an opener to ask about their gut health and everything." [P11]*
>
> *"I think from my experience, all conversations, majority of conversations with the patients are initiated by the patient. So, they will go up to the pharmacist or*

ask for a pharmacist and say they've got a question about vitamin or nutrition." [P17]

"It becomes necessary in certain cases where you need to take the initiative because it's the core issues for them and it's not necessarily relating to dispensing and medication". [P12]

Upon enquiring on the frequency of nutrition counselling in other specific pharmacy settings, hospital pharmacists indicated that they were not involved in nutritional counselling on regular basis as they were more focused on patients' medication reconciliation and counselling on medications. Participants additionally reported that dietitians were readily available in hospitals and seen as experts in nutritional counselling. However, one participant stated that in their experience, in regional setting, there were shortage in diabetes educators which led to hospital pharmacists providing more nutritional counselling to patients.

"I only have about 20 minutes to sort out someone's medication history and reconciliation and ongoing during this day, the focus is on high-risk medications, not so much risk assessment for their nutrition status. Working in any hospital, my experience has been that there's always been a dietitian involved with their care, and I think there's a blanket referral for a few things there." [P2]

"We have dietitians *on site so we can refer patients to nutrition or dietitians whilst they're here." [P3]*

"I guess when you're on like a general ward, you have the dietitians there as well, so you can call them if you need support. And I didn't even mention diabetes. That was in a hospital setting like, there's not too many diabetes

educators, so you're often the next point of call, particularly in regional areas." [P8]

In terms of other pharmacists' specialization areas, participants reported that in HMR settings, pharmacists had more opportunities to engage in comprehensive discussion about nutrition with their patients. They considered the provision of dietary and VMS counselling within their professional scope of practice.

"Within regard to nutrition, always when I go for a medication review, one of the things that I ask is how is your nutrition? Do you have a balanced diet? Are there any supplements?" [P5]

"So, I talk a lot, and I try to give detailed information of what they should be eating. So, I do spend a lot at, first I find out in detail what they're having for breakfast, lunch and dinner." [P9]

"I probably get more opportunity now to do that as, when you're doing home medication reviews. So, to find now there's much more scope if you're sitting and just talking to one person for an hour about their medicine, you do start to talk about nutrition." [P20]

4.2.2.3 Theme 3 Barriers

Participants identified several barriers that limited the scope and depth of their nutritional counselling. The main barrier highlighted by the majority of the participants was the lack of adequate nutritional knowledge, which participants attributed to limited nutrition education provided during pharmacy training.

"I believe it's just the lack of knowledge." [P1]

"Definitely education, I would say I'm one of those people who if I have half information, I don't give it out." [P7]

> *“We're not really provided that from an undergraduate pharmacy perspective I wouldn’t think…., I don't think it came from pharmacy schools specifically.” [P10]*

> *“I think definitely a lack of education” [P16]*

Consequently, some participants stated that their confidence in the provision of nutritional counselling were impacted by the lack of nutrition education and knowledge. This was in line with the survey results discussed in chapter 3.

> *“I guess I haven't had the background or the education myself to confidently put forward any kind of evidence or messaging that might support them even better than I was, I think, yeah”. [P12]*

> *“I don’t really feel very confident actually in specific nutrition advice” [P20]*

Moreover, participants highlighted other significant barriers that were impeding pharmacists from the provision of nutritional counselling at full potential including time constraint, workload and staffing issues, with the time factor particularly noted in large chain pharmacies. On the other hand, a few participants mentioned that the demand for drug dispensing in local small pharmacies where considerably lower, therefore, pharmacists had more time and hence opportunities to engage in nutritional counselling. In general, understaffing and reliance on a sole pharmacist to manage all the activity in the pharmacy were considered additional factors that exacerbate the issue of limited time.

> *“I don’t have time and because I’m the pharmacist in charge…” [P4]*

> *"I definitely think pharmacist have a very good role, but I know time can be a problem for like community pharmacist because they don't really have the time." [P5].*

> *"I work at another pharmacy where I'm the only person in the pharmacy so that's more challenging there to give the information there because I'm on my own." [P9]*

> *"The main thing is the workplace and the lack of inadequate staffing, I guess." [P13]*

> *"Workload is I think, it's a universal issue in the community pharmacies."* [P14]

> *"You've got the bigger chain pharmacies doing a lot, a lot more scripts, so obviously we wouldn't have that much time to sort of focus on things….., in the small independent pharmacies because the script count is way more less, So, you've got a bit more time". [P19]*

Additionally, participants mentioned the lack of reliable evidence-based resources focused on nutrition as an additional barrier.

> *"Once there are more resources for me to learn from or it's easier to follow, and you'll definitely get better." [P1]*

> *"People like me we are happy with the time bit. But having some more resources in our hands and you know, maybe more evidence-based resources, I would say or having like fact sheets and that we can take along and just you know provide it to them." [P5]*

> *"I don't have any resources. If I do need to find something, I normally just do a quick search in Google and normally I can identify a good source." [P14]*

Finally, respondents highlighted that they were cautious about overstepping professional boundaries, i.e. the scope of pharmacy practice as seen by their patients and other healthcare professionals.

> *"Another would be over, the fear of overstepping professional boundaries." [P12]*
>
> *"So, one of the things I find when doing medication reviews is that I need to be very careful about not overstepping my mark and staying within the boundaries of what people are happy to hear from me and not pushing too much information on them at any one time." [P18]*

4.2.2.4 Theme 4 Patients Factors

Participants mentioned some patient-related factors that impacted nutritional counselling behaviour, such as patients' time and level of interest. Patients' time constraints were reported to affect counselling behaviour, particularly among patients living in fast-paced busy communities. Additionally, patients newly diagnosed with chronic medical condition were mentioned as particularly open to receiving nutrition advice. Participants also indicated that variability in patients' perceptions may rely on the demographics of the patient population as well as the geographical location of the pharmacy.

> *"I think those who had just been diagnosed for the first time, often it was like, 'Oh I need to change something, diet might be some part of that', so they don't necessarily want to fix everything with the tablet"* [P6]
>
> *"So, I worked in a kind of hybrid CBD area so time constraints kind of come from the number of people in the store and also the amount of time that they have to give to me because they will often be in their own lunch break or they've*

already seen a doctor and they've got to jet back off to work or picking up the kids." [P8]

"Some people are very keen to talk about it and some people might feel 'No that's ok' and then go. So normally you feel that's the vibe." [P14]

4.2.3 Common Topics and Resources

One of the questions that was posed to the participants in the interviews was focused on identifying common nutritional topics pharmacists frequently discussed with their patients. Topics ranged broadly from common conditions such as hypercholesterolemia, diabetes to more specialist areas such as phenylketonuria and atopic dermatitis, as illustrated in Table 4-2.

Table 4-2 Interview- Common Nutritional Topics in Pharmacy

Medical Conditions	**Participants**
Gout	P1, P9, P10
Hypercholesterolemia	P5, P6, P7, P11, P13, P16, P15
Type 2 Diabetes	P3, P8, P13, P16, P21
Hypertension	P6, P11
Weight Management	P8, P9, P13, P15, P21
Coeliac Disease	P9
Constipation	P3, P9, P11
Pregnancy	P1, P9
Diarrhea	P9, P11
Mental Health	P6, P8, P9, P13
Paediatric Conditions	P9, P13, P19, P20
Osteoporosis	P5, P8, P10, P14, P17
Migraine	P15

Medical Conditions	Participants
Sleep Apnoea	P12
Atopic Dermatitis	P2
Acne	P2
Gastroesophageal Reflux Disease	P15
Dry Mouth	P15
Anemia	P1, P10, P17
Cramps	P5, P14
Diabetic Ketoacidosis	P8
Probiotic & Prebiotic	P11
Warfarin Dietary Advice	P7, P21
Phenylketonuria	P2
Vitamin B12 Deficiency	P5

Additionally, participants were asked to identify nutritional resources they rely on. Table 4-3 illustrates the list of nutritional information resources that was quoted by participants.

Table 4-3 Nutritional Information Resources for pharmacists

Resources	Participants
Australian Diabetes Educator Association	P3, P6, P8, P13, P16, P18,
Australian Dietary Guidelines	P11, P12
Australian Journal of Pharmacy	P1, P2
Australian Medicine Handbook	P1, P2
Australian Pharmaceutical Formulary	P1, P2
Australian Rheumatology Association	P18, P21

Resources	**Participants**
Australian Prescriber	P1, P2
Cardiac Society of Australia	P6
Diabetes Australia	P4, P6, P12, P13, P16, P18
The Heart Foundation	P3, P6, P8, P13, P16, P18,
Healthy Bones Australia	P18
Hospitals Dietary Fact Sheets	P5, P18
NPS Medicine Wise	P12
Pharmaceutical Society of Australia	P9, P18, P19
Stroke Foundation	P7

4.3 Discussion

Results from the semi-structured interviews provided some interesting findings and a deeper insight into participants professional experiences regarding nutritional counselling in pharmacy practice. Participants pharmacists recognized the importance of nutrition as a preventive approach against the onset and progression of chronic NCDs. Additionally, they perceived the significant impact of the provision of nutritional counselling alongside medicine counselling to their patients and they frequently attempt to utilise every opportunity to provide nutritional counselling. However, they also identified significant barriers for more frequent implementation of this sort of counselling. These barriers include minimal self-perceived nutritional knowledge, time constraints, and other operational barriers such as workload and absence of reliable nutritional resources.

The first key finding from the interviews was that participants demonstrated proactivity and initiative in the provision of nutritional advice especially upon dispensing new prescriptions. This suggests that Australian pharmacists recognize the crucial role of nutritional counselling in conjunction with medications management to treat some chronic conditions that they frequently counsel on, such as diabetes, hypercholesterolemia, hypertension, weight management and gout. This corresponds with the finding from a systematic review that investigated the role of community pharmacy in mitigating primary CVD risk factors [80]. The review found that pharmacist-led interventions produced significant benefits in diabetes and high blood pressure management [80]. These interventions included patient education and life style modification, including diet [80]. Moreover, a Spanish study reported the benefit of community pharmacists' interventions in both the reversal and the prevention of cardiovascular disease in obese patients [81]. These studies demonstrate that pharmacists can make a positive contribution to the first line treatment of some chronic conditions.

Another key finding is the limitation of nutritional knowledge that participants mentioned as a main barrier which negatively impacts their confidence in nutritional counselling. This lack of knowledge was attributed to the insufficiency of nutrition education throughout their pharmacy degree program. This finding is consistent with a study by Mirkazemi et al. [61], where 98% of participants pharmacists reported limited nutritional knowledge, and the lack of formal training or post-graduate

nutrition education were recognised as barriers. The interviews further highlighted that pharmacists sought ways to enhance their knowledge through further professional development offerings or additional qualifications which resulted in greater confidence. For instance, accredited participants pharmacists reported dedicating more time to nutritional counselling during their HMR. This is consistent with Kelly et al. study who investigated self-reported nutrition competencies of pharmacists in Ireland and concluded that nutrition education was positively correlated with a greater score in knowledge and confidence in counselling towards nutrition care, while 52% (n=293) of the participant pharmacists reported that further nutrition education was needed to support their role in nutritional counselling [56]. Thus, improving confidence through better nutrition education in pharmacy curricula or professional development opportunities could consequently improve the provision of nutritional counselling among Australian pharmacists.

Four of the twenty-one participants pharmacists reported that patients frequently seek nutritional advice on paediatric related conditions. However, according to our survey results pharmacists possessed limited confidence in their ability to provide dietary counselling in this specialist area. This is a concern as adequate nutrition in children is important for promoting healthy growth and development and can have a profound influence on long-term health outcomes, including immunological function and the prevention of chronic disease [82]. A similar growing area where good nutrition has been highlighted as important is in mental health in late childhood [83].

Pharmacists may be able to contribute to these areas provided that specialist nutrition education is included in curricula or offered as post-graduate educational offerings.

Despite the favourable perception toward nutritional counselling, time constraints and workload have been reported as other significant barriers, especially in community pharmacy. These results were congruent with previous literature [56, 58, 84, 85], for example Kelly et al., identified lack of time and renumeration as barriers to the provision of nutrition counselling [56]. Gregorio et al., who studied pharmacists' perception on nutritional counselling of nutritional supplements in Portugal, concluded that time constraints and insufficient practical professional training were the main obstacles for effective nutritional counselling [85].

A small minority of the participants pharmacists believed that the provision of nutritional counselling fell beyond their scope of practice. This may be explained by lacking expertise or personal perception, as according to the Pharmaceutical Society of Australia (PSA) core competency framework, an Australian pharmacist is expected to possess the competence to frequently engage in lifestyle counselling to enhance therapeutic outcomes[86].

Participants pharmacists highlighted that the absence of reliable and up-to-date nutritional resources provided another barrier to effective counselling which were consistent with other literatures [56, 58, 61, 70, 87, 88]. For example a recent qualitative study conducted in Ireland investigated the role of primary health care in delivering nutrition care, included 14 pharmacists, identified the scarcity of reliable

and evidence-based nutritional resources as a critical barrier for effective nutritional counselling [88]. Furthermore, several other reports emphasized the necessity for unbiased, non-commercial nutrition education materials suitable for patients' distribution, reporting that most available materials were product driven which raise ethical concern [56, 89]. Participants in our study indicated that they rely on the internet, pharmaceutical professional magazines, as well as Australian health organization websites such as the Heart Foundation. This aligns with study by Mirkazemi et al. in which the majority of the participants (68%) reported depending on the internet followed by pharmacy journals for nutrition information [61]. While the health organizations that our participants rely on and that cover the more prevalent disease categories do have resources available in a variety of different languages (e.g. Heart Foundation and Diabetes Australia), others, such as Healthy Bones Australia (used by pharmacists for osteoporosis resources) and the Australian Rheumatology Association (used for gout) only provide resources in English (current at the time when this thesis was written). The latest Australian census, performed in 2021, indicated that 872.206 Australian spoke English "*not well or not at all* ". This represent 3.4% of the total population and 4.7% living in capital cities [90]. This indicates that Pharmacists in Australia and globally would benefit from having easily accessible, evidence-based and trustworthy nutrition resources in multiple languages available to use during counselling and share with patients.

A number of patient factors that affected pharmacists' nutrition counselling behaviour, including patients' time, were identified. Our study however did not investigate consumers' attitudes towards pharmacists' provision of nutrition counselling. A study carried out in the US aimed to investigate pharmacist counselling on nutrition from a consumer's perspective [91], and concluded that some consumers (33%) thought that pharmacists would not be able to provide nutrition counselling due to lack of time and were not considered a reliable source of nutrition knowledge [91]. Additionally, other studies identified lack of patients' awareness about pharmacists' professional experience in nutritional counselling as a barrier to effective counselling [58, 70, 84]. Considering the expanding role of community pharmacists in public health-related topics including lifestyle counselling, thought also needs to be given to consumer education in this space.

Although pharmacists are the most easily accessible healthcare professionals to patients, it is well accepted that the best providers of nutritional therapy are qualified dietitians [92]. Participants in this study recognized the importance of interprofessional collaboration with dietitians predominantly in the hospital setting. A previous study in Australia demonstrated a successful collaboration between rural community pharmacists partnered with dietitians to initiate a healthy lifestyle program for young adult (<50 years) [93]. This initiative resulted in significant reduction in adults' bodyweight, waist circumference and improvement in their dietary habit and physical activity [93]. Another example representing a successful intervention of a community

pharmacist and a dietitian was in a hypertension-focused program in the US [94]. This program led to improvement of participants' knowledge of hypertension as well as medicine compliance [94]. These studies proved that pharmacists, when supported with adequate training and reliable nutrition resources (from dietitians), can significantly impact patients' health. The latest data available on the Australian dietetics workforce indicated that there were only 5360 registered dietitians in 2017 [33]. Furthermore, this report further indicated that there is high concentration of dietitians in affluent urban areas while they are underrepresented in more rural and remote areas. Thus, well-equipped pharmacists can mitigate the unavailability of dietitian for patients, especially in rural areas.

4.4 Conclusion

The interviews demonstrated that participants acknowledged the importance of nutrition and nutritional counselling in preventing as well as controlling the deterioration of chronic diseases, which was consistent with the survey results. The participants' positive attitude toward nutritional counselling is reflected in their behaviour as they showed interest in continuously improving their nutritional knowledge to boost their confidence in counselling. The majority of pharmacists were keen to frequently and consistently initiate conversations around nutrition with patients. However Australian pharmacists encounter several obstacles that impact their counselling behaviour regarding nutrition counselling. The most common barriers reported by participants were the absence of strong foundational nutritional

knowledge during pre-graduate studies and the limitation of post graduate nutritional courses, in addition to the scarcity of reliable up-to-date sources of information that pharmacists can rely on. Furthermore, workload, time constraints and limited patients' awareness of pharmacists' professional capabilities regarding nutrition were barriers from engaging in nutritional counselling at their full potential. Addressing these barriers could improve the integration as well as the frequency and quality of nutritional counselling in pharmacy practice.

Chapter 5 – Discussion

This study aimed to describe the attitudes and the behaviours of nutrition counselling by Australian registered practicing pharmacists. The participants were drawn from a variety of states and territories in Australia and were well distributed amongst age categories (Figure 3-2), representing diverse age groups, years of professional experience and periods they took their pre-registration education (Figure 3-3). In addition, both survey and interview participants included pharmacists with both community and hospital experience as well as further specializations such as HMR consultant pharmacists and aged-care pharmacists. When compared to the latest workforce data reported by the Pharmacy board of Australia [95] and the Australian Pharmacy Guild report [96], the participants were well representative of the Australian pharmacy workforce. However, females were more represented in this study cohort (i.e. 89%) (Figure 3-1) compared to the Australian Pharmacy workforce (i.e. 64%), which may indicate that Australian female pharmacists are interested in the topic area and more enthusiastic to communicate with their patients about the importance of nutrition and provide holistic care. Hence any efforts to improve and strength nutrition counselling will have the greatest reach and impact if they are accessible and relevant to Australian female pharmacists. This larger female representation was also observed in a study conducted in Ireland on pharmacists' nutrition competencies, with the study population of females reported as 74% compared to 65% female representation of pharmacists countrywide [56].

This study further revealed that Australian pharmacists have a positive attitude and confidence toward the provision of nutritional counselling on a wide variety of topics, including chronic conditions such as hypercholesterolemia, which is the top condition requiring medication management in Australia in terms of volumes of dispensed prescriptions [71]. A previous study in Australia concluded that a brief consultation between pharmacists and patients at risk of cardiovascular disease resulted in positive dietary modification in 30% of participants [97] indicating that nutrition counselling by pharmacists that are confident in delivering nutrition counselling can have an impact on the patients nutrition practices.

Additionally, study participants reported great potential for pharmacists to provide nutritional advice to patients alongside medication counselling due to their frequent interactions with patients and accessibility when other healthcare professionals may be scarce. This was particularly the case for community pharmacists as well as those qualified to perform HMR’s. On the contrary, hospital pharmacists were more likely to delegate the provision of nutritional counselling to hospital dietitians, identifying professional barriers and making use of their available expertise. Altogether, this study demonstrated that community and specialist pharmacists are willing to make a positive contribution to patients‘ dietary habits for conditions where dietary change is part of first-line treatment. Evidence showed that these contributions by pharmacists can have several forms like lifestyle modification including providing healthy eating

advice and health education, as well as referring patient to appropriate nutritionist specialist and reinforcing dietary messages from other health care provider [98].

This study identified barriers that imped participants from engaging in nutritional counselling, including pharmacists' lack of time and knowledge, with frequency of counselling associated with the level of confidence in providing such counselling. This study revealed that confidence in providing counselling about diet varied over the topics included in our survey, for example IBD was a frequent topic where counselling about diet was needed, but participants rated a low confidence score in this area. Identifying such topics is important for pharmacy education providers to improve education offerings. Both the survey and interviews identified the limited nutrition education in pharmacy curricula. A recent Australian study, focusing on the nutrition knowledge of practicing pharmacists in Australia similarly shared pharmacists' positive attitudes towards nutrition education, however they found that there were insufficient levels of education in nutrition, with an inconsistent provision of nutrition education amongst course offerings [61]. This indicates that the fundamental barriers identified in the earlier study remain unresolved. Improving education in nutrition-related topics, either as part of pharmacy courses or postgraduate offerings such as Continued Professional Development (CPD), can boost confidence and remove this important barrier for providing such counselling. Similar programs that have shown positive effects are, for example, in the provision of counselling by pharmacists on

pharmacogenomics or cannabidiol-based medicines, where a CPD-type course improved confidence and competency [99, 100].

In addition to improving education, the provision of easily accessible and evidence-based resources that pharmacists can share with patients would provide more opportunity to share information with patients that do not require a long consultation. The study participants reported utilising some resources. However not all of these are patient-centred, available in languages other than English or are suitable for patients with a range of dietary preferences. Universities and professional associations could perhaps play a bigger role in the future to facilitate access to suitable resources on nutrition that pharmacists can use during counselling sessions with patients,

Additionally, Australian community pharmacies employ many pharmacy technicians who support pharmacists with dispensing, performing customer service duties and providing medical advice to patients [96]. This additional workforce, which is approximately one third of the registered pharmacists workforce, could also be utilised to provide patients with evidence-based nutrition resources when pharmacists do not have the time to provide nutrition counselling including advice about VMS for patients [101].

The results reported in our study are not exclusive to the pharmacy profession. A survey completed by 181 Australian practice nurses similarly reported that a large proportion of participants believed that dietary counselling was important for the patients with chronic diseases under their care [102]. Similarly, a lack of time was

reported as one of the most significant barriers while further education in nutrition was highlighted as being of value to improve counselling behaviour [102]. A systematic review on attitudes of primary healthcare providers worldwide also identified similar barriers in medical professionals and nurses [87]. A lack of time is a barrier that would require a review of renumeration and staffing for all primary healthcare providers. Alternatively, improved access to community-based dietitians, who are indeed the most qualified providers of nutrition advice, may be a more practical option. In Australia and other countries, access to dietitians is impeded by economic and geographic barriers [33]. Another model that maybe of interest has been implemented in Japan, where dietitians are incorporated into Health Support Pharmacies that offer nursing and dietetics services to patients visiting such pharmacies [103]. Such models of integrated holistic healthcare involving inter-professional collaborations would provide another model to assure patients get access to evidence based nutrition counselling.

Limitations

The study cohort was self-selected and self-reported, hence pharmacists who were interested in the study topic opted to participate, thus the results may be biased. In addition, the study only represented a small proportion of all registered practicing pharmacists in Australia, which were estimated to be 35,185 around the time that the study data were collected [104], consequently the results of this study cannot be generalised. This study did have good representation amongst age group, including

older pharmacists, which improved the validity of the results. Another limitation to be considered is that this study relied on the internet for accessing the survey and participating in the semi-structured interview. Therefore, pharmacists who did not have reliable internet access (e.g. those practicing in remote parts of Australia) or who did not engage in social media (e.g. older pharmacists) may have been excluded or under-represented in this study. Future studies could use other means of recruitment such as advertising the study during pharmacy professional conferences.

Conclusion

Our study indicated that pharmacists practicing in Australia reported having positive attitudes toward providing nutrition counselling to patients. They frequently provide nutritional counselling, including dietary and VMS counselling, to patients on a variety of topics. Pharmacists reported various levels of confidence over topics, while overall confidence was associated with the provision of dietary counselling. Improving confidence through better and more consistent inclusion of nutrition education in pharmacy curricula or CPD offerings may lead to better provision of this important aspect of lifestyle counselling that will benefit patient outcomes. Additionally, more efforts are needed from the government and pharmacy organisations to mitigate barriers impeding Australian pharmacists from practicing at their full potential such as supportive policies and reimbursement system for nutrition related counselling, prioritise nutrition education for pharmacists and promote interprofessional

collaboration between healthcare provider, in addition to public health campaigns to educate consumers on the value of pharmacists’ nutrition advice.

Future research should focus on long-term tracking the impact of enhanced nutrition education on pharmacists’ confidence and counselling behaviour, and measure how improving pharmacist-led nutrition counselling affect the clinical outcomes of NCDs in Australia.

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Appendices

Appendix – 1 – Facebook (www.facebook.com) Social Media Advertisement

NUTRITION COUNSELLING IN PHARMACY PRACTICE IN AUSTRALIA

Are you a registered pharmacist practicing in Australia ?
Do you have an interest in general nutrition ?
Would you like to contribute towards pharmacy research ?

Researchers from the School of Pharmacy, University of Sydney, are conducting a study, investigating what pharmacists are currently providing to their patients in terms of general nutrition counselling. The results from this study will help us design educational programs for upskilling pharmacists in general nutrition so they will be better equipped to help their patients.

Please click this secure link to find out more and access an anonymous online survey on a secure platform (https://redcap.sydney.edu.au/surveys/?s=J9TFEDMJKFM4KYTT). Completion of our survey gives you the option to go into a draw for a number of gift certificates in appreciation of your time. If you require more information first, please feel free to email A/Prof Ingrid Gelissen. (Ingrid.Gelissen@sydney.edu.au)

Please share this survey with your pharmacy colleagues !

Appendix – 2 - Participant Information Statement - REDCap Survey Participants

HREC Approval No.: [2023/022]

Research Study: Nutrition Counselling in Pharmacy Practice

A/Prof Ingrid Gelissen (Responsible Researcher)

School of Pharmacy, Faculty of Medicine and Health Phone: +61 2 8627 0357 | Email: ingrid.gelissen@sydney.edu.au

Mrs Samar Elsayed (MPhil student) | Email: sels3926@uni.sydney.edu.au

1. What is this study about?

We are conducting a research study aimed at investigating what pharmacists are currently providing to patients in terms of counselling on general nutrition. This study will inform us what additional training registered pharmacists require in general nutrition in future to better counsel their patients.

Taking part in this study is voluntary. Please read this sheet carefully and ask questions about anything that you don't understand or want to know more about.

2. Who is running the study?

The study is being carried out by the following researchers:

- Associate Professor Ingrid Gelissen, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.
- Dr Joanna Harnett, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.
- Dr Jessica Pace, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.

- Mrs Samar Elsayed, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.

Samar is conducting this study as the basis for the degree of Master of Philosophy at The University of Sydney.

3. Who can take part in the study?

We are seeking pharmacists that are registered and practising in Australia to complete an online survey. You are welcome to tell others about this study and encourage you to forward the study information (such as the social media advertisement or the flyer, depending on how you received this information sheet) to other pharmacists registered and practising in Australia.

4. What will the study involve for me?

If you decide to take part in this study, you will be asked to complete an anonymous online survey on a secure University online platform called REDCap (where you downloaded this PIS from). You will be asked a limited number of demographic questions (e.g. your age category, gender and where you received your training) as well as questions around what general nutrition information you are currently providing to your patients. We anticipate that this will only take 5-6 minutes of your time.

5. Can I withdraw once I've started?

Being in this study is completely voluntary and you do not have to take part. Your decision will not affect your current or future relationship with the researchers or anyone else at The University of Sydney.

If you decide to start the survey and then change your mind, you can withdraw by closing your browser. None of your entries will be retained until you submit the survey. By submitting your survey, you consent to take part in the study. Once submitted, your responses cannot be withdrawn. This is because they are anonymous, and we will not be able to tell which one yours is.

6. Are there any risks or costs?

Aside from giving up your time, we do not expect that there will be any risks or costs associated with taking part in this study.

7. Are there any benefits?

You will not receive any direct benefits from being in the study. However, in order to thank you for your time, you will be invited to add your name and email address at the end of the survey to go into a draw for five gift certificates (each valued at $50). If you opt in to go into the draw, your name and email address will be stored safely on a university approved data store until the draw has been completed and will be deleted immediately afterwards.

8. What will happen to information that is collected?

By providing your consent (i.e. submission of survey), you are agreeing for us to collect information about you for the purpose of this study. Any information you provide to us will be stored securely and we will not disclose identifiable information as your responses will be anonymous. We are planning for the study findings to be published. Findings of the study will also be included in Samar Elsayed's Master of Philosophy thesis. You will not be individually identifiable in these publications as the survey is anonymous.

9. Will I be told the results of the study?

You have a right to receive feedback about the overall results of this study. This feedback will be in the form of a brief lay summary. At the end of the survey, there is an option for you to leave your email address if you would like to receive this summary.

10. What if I would like further information?

When you have read this information, the following researcher/s will be available to discuss it with you further and answer any questions you may have via email:

- A/Prof Ingrid Gelissen (Ingrid.gelissen@sydney.edu.au)
- Mrs Samar Elsayed (sels3926@uni.sydney.edu.au)

11. What if I have a complaint or any concerns?

The ethical aspects of this study have been approved by the Human Research Ethics Committee (HREC) of The University of Sydney [Approval number: 2023/022] according to the *National Statement on Ethical Conduct in Human Research (2007).*

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the University:

Human Ethics Manager

human.ethics@sydney.edu.au

+61 2 8627 8176

This information sheet is for you to keep

Appendix – 3 - Participant Information Statement - Semi-Structured Interview Participants

Research Study: Nutrition Counselling in Pharmacy Practice

A/Prof Ingrid Gelissen (Responsible Researcher)

School of Pharmacy, Faculty of Medicine and Health
Phone: +61 2 8627 0357 | Email: ingrid.gelissen@sydney.edu.au

Mrs Samar Elsayed (M Phil student) | Email: sels3926@uni.sydney.edu.au

1. What is this study about?

We are conducting a research study aimed at investigating what pharmacists are currently providing to patients in terms of counselling on general nutrition. This study will inform us what additional training registered pharmacists require in general nutrition in future to better counsel their patients.

Taking part in this study is voluntary. Please read this sheet carefully and ask questions about anything that you don’t understand or want to know more about.

2. Who is running the study?

The study is being carried out by the following researchers:

Associate Professor Ingrid Gelissen, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.

- Dr Joanna Harnett, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.
- Dr Jessica Pace, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.
- Mrs Samar Elsayed, School of Pharmacy, Faculty of Medicine and Health, University of Sydney.

Samar is conducting this study as the basis for the degree of Master of Philosophy at The University of Sydney.

3. Who can take part in the study?

We are seeking pharmacists that are registered and practising in Australia to participate in a semi-structured interview. You are welcome to tell others about this study and encourage you to forward this participant information statement with our contact details to other pharmacists registered and practising in Australia that may be interested in participating in our research.

4. What will the study involve for me?

If you decide to take part in this study, you will be invited to partake in a semi-structured interview with a member of our research team. The interview will take place via ZOOM at a time that suits you and will be recorded. You will be asked a number of demographic questions (e.g. your age category, gender and where you received your training) as well as questions around what general nutrition information you are currently providing to your patients. We will also ask you questions around your thoughts on further training opportunities for pharmacists in general nutrition. We anticipate that this interview will take no more than 20 minutes of your time.

5. Can I withdraw once I've started?

Being in this study is completely voluntary and you do not have to take part. Your decision will not affect your current or future relationship with the researchers or anyone else at The University of Sydney.

If you decide to start the interview and then change your mind, you can stop the interview at any time, and we will not collect any more information from you. You can choose whether your responses up to that point be included or excluded from the research by notifying the researchers. You may also refuse to answer any questions during the interview that you do not wish to answer. Once the interview has been completed, your responses will be de-identified (i.e. your responses will be linked to a

Participant number). Once the data has been analysed, we cannot withdraw your responses anymore.

6. Are there any risks or costs?

Aside from giving up your time, we do not expect that there will be any risks or costs associated with taking part in this study.

7. Are there any benefits?

You will not receive any direct benefits from being in the study. However, in order to thank you for your time, you will be invited to be included into a draw for five gift certificates (each valued at $50). If you opt in to go into the draw, your name and email address will be stored safely on a university approved data store until the draw has been completed and will be deleted immediately afterwards.

8. What will happen to information that is collected?

By providing your consent (which will be recorded prior to the start of the interview), you are agreeing for us to collect information about you for the purpose of this study. Any information you provide to us will be stored securely. We are planning for the study findings to be published. You will not be individually identifiable in these publications as the interview responses will be de-identified.

9. Will I be told the results of the study?

You have a right to receive feedback about the overall results of this study. This feedback will be in the form of a brief lay summary. At the end of the interview, there is an option for you to indicate whether you would like to receive such a summary via email once available.

10. What if I would like further information?

When you have read this information, the following researcher/s will be available to discuss it with you further and answer any questions you may have via email:

- A/Prof Ingrid Gelissen (Ingrid.gelissen@sydney.edu.au)

- Mrs Samar Elsayed (sels3926@uni.sydney.edu.au)

11. What if I have a complaint or any concerns?

The ethical aspects of this study have been approved by the Human Research Ethics Committee (HREC) of The University of Sydney [Approval number: 2023/022] according to the National Statement on Ethical Conduct in Human Research (2007).

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the University:

Human Ethics Manager

human.ethics@sydney.edu.au

+61 2 8627 8176

This information sheet is for you to keep

Appendix – 4 – REDCap Survey - Nutritional Counselling in Pharmacy Practice in Australia

Prior to completing the survey, please confirm you have read the **Participant Information Statement** provided (*note for review: PIS will be the landing page of Redcap survey and can be downloaded for participants to keep*) and that you agree to your anonymous responses being used for the purposes described.

Yes I have read the PIS	
No I have not read the PIS	

(if No is ticked, exit Redcap survey)

Definitions used in this study context

Within the context of this study, nutritional counselling refers to providing advice about diet (what people eat) and/or vitamin and mineral supplements (not including other types of complementary medicines such as herbal products).

Section 1. General information about you

1. Are you:

Male	
Female	
Non-binary	
Prefer not to say	

2. What Pharmacy degree **qualification** did you complete?

Bachelor of Pharmacy	
Master of Pharmacy	
Pharm D	
Other (please specify)	………………………….(open text option)

3. Where did you undertake your Pharmacy **training**?

Australia	
Elsewhere (please specify)	………………………. (open text option)

4. What **age** group do you belong to?

21-25 years	
26-30 years	
31-40 years	
41-50 years	
51-60 years	
>60 years	
Prefer not to say	

5. How many years of professional experience as a registered pharmacist (including as an intern) do you have? This may include part-time work.

< 1 year	
1-5 years	
6-10 years	
11-20 years	
21-30 years	
> 30 years	

6. What would best represent your **overall** professional pharmacy experience?

Community pharmacist	
Hospital pharmacist	
Industry Pharmacist	
I have predominantly worked in a specialist pharmacy area (examples include aged care, GP clinic, poisons, medication review, consultant pharmacist, etc)	(if chosen, an open text box opens to ask which specialty area)
If you have experience in multiple pharmacy specialisations or none listed above, please elaborate what represents your work experience best	(if chosen, an open text box opens to ask which area)

Section 2. Current behaviour in practice

The following questions relate to what you have experiencing during your pharmacy work during the past year (unless otherwise specified), whether it is in community, hospital or other settings. Please note the questions are separated into **advice about diet alone** or **advice about vitamin and mineral supplements**.

1. How often in the past year (on average) have you?

	Once a day	**Every 2 or 3 days**	**Once a week**	**Once or twice a month**	**Never**
Provided **dietary** advice to patients?					
Seen your pharmacy colleagues or preceptors provide **dietary** advice to patients?					
Provided advice about **vitamin and mineral supplements**?					
Seen your pharmacy colleagues or preceptors provide advice about **vitamin and mineral supplements**?					

2. What in **your opinion** are the most common nutrition related topics that patients are seeking advice on? You may choose/tick as many as apply or add conditions/specialty areas that you think should be included in this question

Condition / specialty area	**Dietary advice**	**Vitamin and mineral supplements**
Type 2 diabetes		
Dyslipidemia		
Hypertension		
Weight management		
Gout		
Coeliac disease		
Constipation		
Gastroesophageal reflux disease		
Inflammatory bowel disease		
Irritable bowel syndrome		
Mental health and wellbeing		
Pregnancy		
Breastfeeding		
Pre-conceptual care		
Vegetarian/vegan diets		
Osteoporosis		
Food allergies		
Paediatric conditions		
Cancer		

Other (please specify) ___________________________ (this box should have the option to add more topics)		

3. In the next month, how likely is it that you will give **dietary advice** while working as a pharmacist?

   1 – extremely likely
   2 – very likely
   3 – likely
   4 – not sure
   5 - unlikely
   6 – very unlikely
   7 - extremely unlikely

4. In the next month, how likely is it that you will give advice about **vitamin and mineral supplements** while working as a pharmacist?

   1 – extremely likely
   2 – very likely
   3 – likely
   4 – not sure
   5 - unlikely
   6 – very unlikely
   7 - extremely unlikely

Section 3 – Attitudes towards nutrition counselling in pharmacy practice

Please rate your opinions on the following statements

	Strongly agree	Somewhat agree	Neutral/ no opinion	Somewhat disagree	Strongly disagree
Patients would value a pharmacist providing advice about **diet**					
Counselling about **diet** is an effective use of a pharmacists' professional time					
Pharmacists have an obligation to improve the health of patients by discussing **diet** with them					

All pharmacists should counsel patients with non-communicable diseases about the preventative role of **diet** in disease onset, progression and management					
It is **not** worth the time for pharmacists to counsel patients with poor dietary patterns about their diet					
Counselling about **diet** should be part of routine care by all pharmacists					
Patients would value a pharmacist providing advice about **vitamin and mineral supplements**					
Counselling about **vitamin and mineral supplements** is an effective use of a pharmacists' professional time					
Pharmacists have an obligation to improve the health of patients by discussing **vitamin and mineral supplements** with them					
Counselling about **vitamin and mineral supplements** should be part of routine care by all pharmacists					

Section 4 – Your confidence* in dietary counselling

This section relates to **dietary advice** only

How confident **do you feel** in providing **dietary advice/counselling** associated with the following conditions if asked by a patient? (*confidence in this context refers to your perception of having the knowledge and counselling skills required to provide general nutritional counselling)

Please choose one of the following ratings

Condition	1 I am not confident	2 I am slightly confident	3 I am somewhat confident	4 I am confident	5 I am very confident	6 Unsure
Type 2 diabetes						

Dyslipidemia						
Hypertension						
Obesity – weight management						
Gout						
Coeliac disease						
Constipation						
Gastroesophageal reflux disease						
Inflammatory bowel disease						
Irritable bowel syndrome						
Mental health and wellbeing						
Pregnancy						
Breastfeeding						
Pre-conceptual care						
Vegetarian/vegan diets						
Osteoporosis						
Food allergies						
Paediatric conditions						
Cancer						
Any conditions not mentioned (please insert condition) ………………… (this box should have the option to insert > one condition)						

Section 5. Your Pharmacy Education

1. Did you feel that your Pharmacy education included sufficient training on general nutrition? Yes/No

2. Do you think education in nutrition should be include in pharmacy education? (You may choose more than one yes option)

No	

Yes, as a core subject	
Yes, an elective subject	
Yes, as a postgraduate certificate	
Yes, as an online continuing professional education series	

Thank you for participating in this survey

Appendix – 5 - Themes and Subthemes with Supportive Quotes

1. Attitude to counselling

1.1. Importance of nutritional counselling

“We make it a rule to start talking about nutrition, especially because we know as pharmacists that nothing can work as long as you don't fix your lifestyle and diet.” [P7]

“It's a holistic approach so with medications, especially those who will be affected by their diet and nutritional intake a lot, it would be a good approach to even implement that idea in the everyday conversation.” [P14]

“Nutrition isn’t something that is apparently recognized as a scope for pharmacist, which is, I think, a bit bizarre, because if you’re doing medicine counselling, I think nutrition should come hand in hand.” [P7]

“I think we tend to focus on medications generally, whereas nutrition also plays a part in the general health and wellbeing.” [P13]

“I think it’s extraordinarily important in mental health that their nutritional needs are being met.” [P6]

“I think that it’s an area that’s lacking in training and it’s really important, especially when you look at what’s the number one killer in Australia and worldwide, that, a lot of them are lifestyle related and a lot can be done, you know diet things as well.” [P11]

“I do think it is important though. I think there’s a lot of young people getting heart disease and things early on and diabetes and they’re not going to live, they might live ‘till in their 30s, their 40s, and it’s a real, real problem and I think there needs to be more, yeah support for people in this area. And I think a lot of people do come into the community pharmacy as their first port of call because where I live it’s a month wait to get in to see a doctor at the moment, so people, that’s their first stop. They’ll come to the pharmacy.” [P11]

“I just think that nutrition is probably the basis of so many of our diseases and I'm going to be honest, a bit sick of giving tablets for something that they could fixed 10 years ago if they looked after themselves, but that's, you know, me, that's my

issue. But I think there's just such a gap in easy availability of information for people who don't have a lot of money" [P6]

I think it was something I know that I always thought was really, really important. I've always been an advocate for primary prevention and when you are a primary prevention person, your nutrition and lifestyle change, you know, become part of that kind, of you, know counselling framework." [P8]

"I think understanding the scope of the nutritional world I think, it's really important. We learn a lot about vitamins and vitamin companies and how to kind of navigate that from a professional point of view, but when you kind of get into the scope of nutrition, it just explodes with how much information and then like misleading information is kind of out there." [P8]

1.2. Potential for nutritional counselling

"Because we're so accessible and hopefully approachable, depending on the pharmacist, um then people do come for to ask for advice and you know they feel that they can't ask the doctor." [P6]

"Pharmacies are the first port of call that many people go to, they hear something on social media or on the news, or they're talking about it with their friends or family, and they simply want to know more." [P2]

"There is huge potential, massive potential to provide dietary education to patients in the home setting, doing the home medication review." [P15]

"It is something we can even try to implement it in the counselling, in the conversation." [P14]

"It's not something we do every day, but I do think it's primary care. There is a demand there." [P14]

"I think having nutrition as part of pharmacy just simply makes sense. You have products there, and you have your customers coming in wanting to know what they do or advise." [P2]

"You know we try to take opportunity as much as we can but in busy environment it's very it's very minimal to be honest. I think that's the main yeah, that's the main disadvantage in community." [P21]

"I felt like that was a part of my job beforehand anyway it's very basic like you know. Or, but if they do want to come and talk to me, then I'll have a sit down with

them and ask them, you know, 'What do you eat in a day?' and start talking about tweaks and things like that." [P4]

"In Pharmacies we do this service free of charge and always available to go into the community and we can maybe put that into their regular thing, like the health wise, I think that we are in a good position to do that." [P5]

"I think it would be important cause we pharmacists, especially community facing pharmacists, we are constantly in touch with patients all the time and if and I know that they like to ask us questions." [P7]

"I think we make room for nutrition counselling" [p8]

"So where a pharmacist is able to, I guess, support the messaging that may come from a dietitian would be very useful I think and for pharmacists to feel more confident in that area would be a really beneficial thing." [P12]

"If we bring more of that sort of education, you know, in, in general nutrition, what it does to you to our trainee health professionals, then there might be more of a chance that they pass it on to their patients over the years as well, so that's another thought that's really important, yeah." [P6]

1.3. Self-education improves confidence

"I just did a Certificate IV in Nutrition to kind of be able to at least talk a little bit more about diet because I felt like at Uni, we didn't really get a lot, just really basic stuff." [P4]

"I do have confidence, but I think because I do have some extra training in that area and it's like something that I'm very interested in. Whereas I think most pharmacists don't, they don't have the adequate training, and I think they're very interested in it." [P11]

"Well for me, I feel like the experience and the knowledge I have when it comes to nutritional counselling is quite basic. I mean, when I started working as a consultant pharmacist, I got to learn a little bit more about nutrition and especially for the older people." [P13]

"The majority of my education or my understanding from nutrition has been workplace training and kind of ongoing education and continuing like CPD kind of things, but also probably my experience as a person who wants to be healthy as well. So, I've probably done self-education around nutrition quite a bit as well." [P3]

"I have a general knowledge. So, if something that I'm very interested in or like, I ask customer to come back the next day and we can talk more about it, so I'll get more confident." [P1]

2. Counselling behaviours

2.1. Frequency of nutrition counselling

"*It can be from zero to three a shift, like, let's say in like an 8-hour shift." [P1]*

"Probably the frequency would be at least once or twice a day I would say in a normal day. And that's not only in the community pharmacy setting but, in the drug, and alcohol setting as well. [P12]

"I won't say it's on a daily base, but it's fairly regular." [P14]

"We have to do that quite a lot, especially because the population that we have at the pharmacy is the older population because we have two big, aged care homes around our area." [P7]

"Probably at least once a day." [P11]

"So yeah, we do find the opportunity to talk about that." [P13]

"I would say maybe if I see hundred patients a day, there would be 10 who would ask for nutrition in general." [P7]

"I can't recall my duties involving a lot of nutritional counselling while I worked in the hospital." [P13]

2.2. Counselling in hospital setting

"The beauty about working in a hospital is you have expert dietitians as well, and we wouldn't really want to step on their toes or they'll have a referral to that formal process, so we wouldn't pretend to talk about something that we're not as qualified to do." [P10]

"Working in any hospital, my experience has been that there's always been a dietitian involved with their care and I think there's a blanket referral for a few things there." [P2]

"We have dietitians on site so we can refer patients to nutrition or dietitians whilst they're here." [P3]

"In terms of nutritional advice, I find that the pharmacist in a hospital setting is kind of providing a basic, similar thing, a really basic interventions when dietetics and nutrition haven't been referred to." [P8]

"I guess when you're on like a general ward, you have the dietitians there as well, so you can call them if you need support. And I didn't even mention diabetes. That was in a hospital setting like, there's not too many diabetes educators, so you're often the next point of call, particularly in regional areas." [P8]

"I think nutrition is very poorly done in hospital. I don't think I remember too many conversations that I would have." [P6]

"I can't recall my duties involving a lot of nutritional counselling while I worked in the hospital like." [P13]

2.3. Counselling in medication review settings

"We talk about nutritional and also if I find patients with the type 2 diabetes, so that's, those are the sort of situation where we discuss about nutrition and what a healthy diet looks like for each individual." [P13]

"I am able to have quite long conversations when I do my medication reviews, you know they're usually about an hour. Which means I can cover things like that." [P18]

"I probably get more opportunity now to do that as, when you're doing home medication reviews. So to find now there's much more scope if you're sitting and just talking to one per person for an hour about their medicine, you do start to talk about nutrition." [P20]

"Within regard to nutrition, always when I go for a medication review, one of the things that I ask is you know, how is your nutrition? Do you have a balanced diet? Are there any supplements?" [P5]

"When we're doing HMR, you have to investigate every single sort of aspect of it, so nutrition will be definitely one thing because it, perhaps there's so many conditions, your thyroid disease, cardiovascular disease, obviously obesity is another growing problem. Like it, it ties into so many different conditions." [P19]

"I think we are at a very good position to do, especially with during medication reviews. We do have the time to talk to the patient about their nutrition." [P5]

"So, I talk a lot and I try to give detailed information of what they should be eating. So, I do spend a lot at, first I find out in detail what they're having for breakfast, lunch and dinner." [P9]

2.4. Initiation of counselling

"Mostly I initiate them." [p18]

"Most of the time it would be the patients kind of asking`, it tends to probably just flow from what patients are asking me, so if they're asking about general kind of information about weight loss or what can I do to improve so I tend to probably provide advice within the scope of where I feel comfortable from what the patients are asking me specifically." [P3]

"I think some of it was me initiating it and some of it was them initiating it so, it's you can start talking about nutrition and diet and you can get an idea from their feedback whether they're interested in learning more or not." [P6]

"I think from my experience, all conversations, majority of conversations with the patients are initiated by the patient. So, they will go up to the pharmacist or ask for a pharmacist and say they've got a question about vitamin or nutrition." [P17]

"Sometimes they do ask me all those questions and I have to get back or if there's any interactions I need to watch out and monitor for them." [P5]

"It becomes necessary in certain cases where you need to take the initiative because it's the core issues for them and it's not necessarily relating to dispensing and medication, but a patient just coming in seeking advice". [P12]

"Well honestly people do not ask a lot of questions about nutrition nowadays. All they want to do is come to the pharmacy and get the medicine. But then with, especially with new medications, I think it's, we make it a rule to start talking about nutrition" [P7]

"A mixture of both, I would say. So, if I'm handing out antibiotics, this is just an example. I always use it as an opener to ask about, you know, their gut health and everything." [P11]

3. Patient factors

3.1. Interest

"Some people are very keen to talk about it and some people might feel 'No that's ok' and then go. So normally you feel that's the vibe." [P14]

"So, one of the things I find when doing medication reviews is that I need to be very careful about not overstepping my mark and staying within the boundaries of what people are happy to hear from me and not pushing too much information on them at any one time." [P18]

"I think with, honestly with pharmacists, they don't really ask us a lot about nutrition. Most customers are just like you know, here's the medicine, you know, they were more about their medication or, you know, plus minus a supplement that you on it or whatever add-on you can do." [P4]

"I've sort of found out is, patients don't really want to, it depends on the demographics and the location that you're working in." [P19]

"Well honestly people do not ask a lot of questions about nutrition nowadays. All they want to do is come to the pharmacy and get the medicine." [P7]

3.2. Patients' Time

"So, I worked in a kind of hybrid CBD area so time constraints kind of come from the number of people in the store and also the number, the amount of time that they have to give to me because they will often be in their own lunch break or they've already seen a doctor and they've got to jet back off to work or picking up the kids." [P8]

"While in the bigger pharmacies, like a lot of the customers are short on time…" [P17].

4. Barriers

4.1. *Lack of education*

"I think definitely a lack of education" [P16]

"In particular I won't say I did get a qualification about nutritional values, it used to be embedded in general topics that a pharmacist studies, but it's never been specific." [P1]

"I think the training from pharmacy was probably not particularly good with that, but I am talking 20 years ago, so maybe better now." [P6]

“I think it could have done a bit better,” [P5]

“We didn’t have a lot of basically units about nutrition at all, and I think that’s a drawback”. [P21]

“We're not really provided that from an undergraduate pharmacy perspective I wouldn’t think.” [P10]

“I don't think it came from pharmacy schools specifically.” [P10]

“Well for me, I feel like the experience and the knowledge I have when it comes to nutritional counselling is quite basic. I mean, when I started working as a consultant pharmacist, I got to learn a little bit more about nutrition and especially for the older people.” [P13]

“I don't recall being taught much on nutrition or diet modifications in pharmacy school. Yeah, it can be, maybe even 2 lectures, 3 lectures would help, or it can be implemented in when we study certain groups of drugs.” [P14]

“Let's face it, that university degree is very basic.” [P15]

“We didn't use it in daily practice and something that we don't cover is like is the nutritional and the supplementation sort of sector. We've never been trained ever.” [P19]

“The majority of my education or my understanding from nutrition has been workplace training and kind of ongoing education and continuing like CPD kind of things, but also probably my experience as a person who wants to be healthy as well. So, I've probably done self-education around nutrition quite a bit as well.” [P3]

“Gosh, nearly anything to be honest, it was just, you know, I mean, there wasn’t really any modules on nutrition. There wasn’t really any class like any classes or topics that was, you know, the basics… less salt for hypertension. No nutrition courses or no nutrition subjects at all” [P4]

“I would say not as much as probably that should have been there. We've been given the basic outline of what a patient would require if they would be diagnosed with, let's say, a condition such as cardiac disease or something, but again, it would be very baseline, not very generic, not something too deeply involved.” [P7]

“I think it was such a big gap for me, I think it’s a really important area. And it’s so important just to general health, so really should be included in the pharmacy degree”. [P3]

"I don't think we did much at university. Just life experience." [P9]

"I felt like at Uni we didn't really get a lot, just really basic stuff" [P4].

"Number 2 I would say is the lack of training provided at the university level. Like I said, this is more like I said more specific to my time. [P19]

4.2. Time Constraints

"So definitely time, time constraints. I think, quite often I think there's a shortage it seems to be of a community pharmacist in Australia." [P11]

"So, I worked in a kind of hybrid CBD area so time constraints kind of come from the number of people in the store and also the number, the amount of time that they have to give to me." [P8]

"I've got to say in a busy pharmacy, you just don't get those opportunities, as many opportunities as you should." [P20]

"I don't have time. And because I'm the pharmacist in charge, I'm not employed as a nutritionist. [P4]

And then you can impart that knowledge at work, if we have time, its always the time. [P9]

"I probably don't use that as much now as I used to because of just time constraints in physically finding the right fact sheet and printing it out and getting it back to the patient when you've got other people waiting on scripts." [P6]

"Only because of lack of time and basically most of the time, the only thing they're waiting on to get out of that place is the medicine." [P6]

"Time, time to be able to do so and probably being confident in the current guidelines rather than what we learned." [P6]

"Time, time is a big one." [P18]

"You've got the bigger chain pharmacies doing a lot, a lot more scripts, so obviously we wouldn't have that much time to sort of focus on things." [P19]

"I mean, in the small independent pharmacies because the script count is way more less, it's like, it's probably like 20% or something like that of the big chain pharmacies. So, you've got a bit more time". [P19]

"It depends on the pharmacy, and it depends on the patient. Most of them would be happy to just wait to like finish and then like you know I got time for them". [P1]

"I don't always have the time to have a long consultation or even have a, have a consultation with those who are on regular medications but with those who dispense medication for the first time, when I normally always try to make time". [P14].

"Time, maybe in community pharmacy, not so much in the role I've got now. But we shouldn't blame time on everything, you know, like we can blame. 'Don't have time, don't have time'. [P15].

"I definitely think pharmacist have a very good role, but I know time can be a problem for like community pharmacist because they don't really have the time." [P5].

"For me we're not restricted by time when we go in, we have kind of liberal time to talk about all the aspects because for some roles, you know, people like me we are happy with the time bit." [P5].

"I guess where we're at and what time constraint we have, we have the time to explain and but then give people two or three things to just take away too." [P8].

"Other than time, resource, a separate thing I would say, resources and knowledge." [P10]

"I really only have about some 20 minutes to sort out someone's medication history and reconciliation and ongoing during this day, the focus is on high-risk medications, not so much risk assessment for their nutrition status." [P2]

4.3. Workplace, workload, and understaffing

"The main thing is the workplace and the lack of inadequate staffing, I guess." [P13]

"Just if the structure of the dispensary is set out so that a pharmacist is dispensing in the back and its assistants and interns that are handing out scripts, that's a big barrier that stops the pharmacists from a lot of counselling opportunities." [P17]

"The geographic location of the pharmacy and the demographic as well. So, like I said, if you're in a city so likewise, you're doing high volume scripts and then busy working people. And so and so really unlikely for that to sort of do that, but Western suburbs or more quieter suburbs or suburbs where the people are more

retired, semi-retired people or like family, you know moms and dads and that sort of stuff." [P19]

"Workload is I think, it's a universal issue in the community pharmacies." [P14]

"When I was a community pharmacist, I would have to say, I did not provide nutrition counselling. However, there were times with some of the smaller pharmacies where I was there more regularly. If I got to know the patients coming in, we may talk about it in a more general sense." [P15]

"You know we try to take opportunity as much as we can but in busy environment it's very it's very minimal to be honest." [P20]

"I work at another pharmacy where I'm the only person in the pharmacy so that's more challenging there to give the information there because I'm on my own." [P9]

4.4. Lack of knowledge

"I believe it's just the lack of knowledge." [P1]

"I think knowledge gaps as well." [P17]

"I did have one recently where the patient was quite worried about her diet because she'd had a recent pancreatitis. And she'd had some conflicting advice from nurses and dietitians, so she asked for my opinion as well, which I wasn't really able to, I like couldn't reliably help her out there, I didn't know much. I have since read a fair bit about what I could have said, but I didn't know much at the time." [P20]

"I felt like I didn't know enough to be providing this information, which is why I went and decided to do that course. Especially when it came to people with diabetes." [P4]

"Definitely education, I would say I'm one of those people who if I have half information, I don't give it out." [P7]

4.5. Lack of resources

"Other than time, resource, a separate thing I would say, resources and knowledge." [P10]

"I don't have any resources. If I do need to find something, I normally just do a quick search in Google and normally I can identify a good source." [P14]

"People like me we are happy with the time bit. But having some more resources in our hands and you know, maybe more evidence-based resources, I would say, or having like fact sheets and that we can take along and just you know provide it to them." [P5]

"If I had more um probably more resources in terms of initiating that conversation or you know why it is important or providing them that would be really a good thing for us, you know to go in there and add on." [P5]

"Once there are more resources for me to learn from or it's easier to follow, and you'll definitely get better." [P1]

"I guess I don't really know of a reliable resource where I could investigate these things. Even you know your magnesium took me a few years to work out the difference between magnesium doses and why cardiologists sometimes like a lot of magnesium but people for restless legs don't take quite so much. So, I guess just yeah, a resource." [P20]

"If there was, you know, some other resources that would be nice." [P5]

4.6. Lack of Confidence

"I guess I haven't had the background or the education myself to confidently put forward any kind of evidence or messaging that might support them even better than I was, I think, yeah". [P12]

"I don't think so because I'm not a dietician or a nutritionist, and I can only provide the basic ones." [P14]

"I did have one recently where the patient was quite worried about her diet because she'd had a recent pancreatitis. And she'd had some conflicting advice from nurses and dietitians, so she asked for my opinion as well, which I wasn't really able to, I like couldn't reliably help her out there, I didn't know much. I have since read a fair bit about what I could have said, but I didn't know much at the time." [P20]

"I don't really feel very confident actually in specific nutrition advice" [P20]

"I felt like I didn't know enough to be providing this information, which is why I went and decided to do that course. Especially when it came to people with diabetes" [P4]

4.7. Professional boundaries

"There's a lot of time pressure on all health professionals. Another would be over the fear of overstepping professional boundaries." [P12]

"So, one of the things I find when doing medication reviews is that I need to be very careful about not overstepping my mark and staying within the boundaries of what people are happy to hear from me and not pushing too much information on them at any one time." [P18]

Appendix – 6 – ASCEPT Annual Scientific Meeting Conference November/2023 Poster

Background

- World Health Organization recognizes diet as a major determinant of chronic disease [1].
- IN AUSTRALIA, dietary risk factors ranked as the third most significant contributors to ill health and premature mortality in 2018.
- DIETARY RISK FACTORS were linked to 16 diseases, contributing notably to the burden of coronary heart disease (50%), bowel cancer (26%), type 2 diabetes (26%), and stroke (26%) [2].
- COMMUNITY PHARMACISTS are well-positioned for implementing health promotion strategies for their patients, around 90% of the Australian population visits community pharmacies annually. [3]

Aims

TO investigate the current involvement and willingness of registered pharmacists in Australia to participate in nutritional counselling.

Methods

- An 80-item cross-sectional online survey was developed via Redcap platform from existing validated questionnaire. the survey was partially guided by Theory of planned behavior.
- The survey was divided into six sections including demographics, self-reported behavior, attitudes and confidence in nutritional counselling, and education received in nutrition.
- A semi-structured interviews were conducted with 21 participants using open-ended questions to delve deeper into the subject.

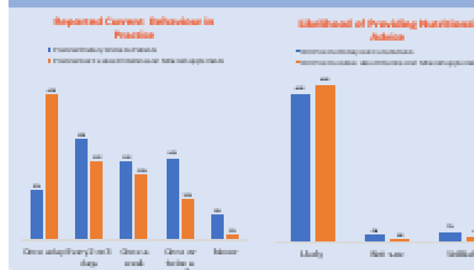
To learn more about this topic

Samar ElSayed and Gelissen IC - Currents in Pharmacy Teaching and Learning 14 (2022) 1411–1419

Results – Participants Characteristics

- A total of 107 registered pharmacists in Australia participated in the survey.
- 89% of the participants were female.
- 89% completed their pharmacy training in Australia.
- The age distribution: 6.5% - 21-25 years old, 18.7% - 26-30 years old, 35.5% - 31-40 years old, 25.2% - 41-50 years old, 10.3% - 51-61 years old, 3.7% >61 years.
- Experience varied, with 31% having 11-20 years of experience and 30% having 1-5 years of experience.
- The majority comprising 68% predominantly worked in community pharmacy.

Results – Nutrition Counselling in Practice



Disease Areas

- The prevalent topics patients seek dietary advice on include hypertension, type 2 diabetes, hyperlipidemia, gout, constipation and gastroesophageal reflux disease.
- The common topics patients ask for supplements advice are pregnancy, osteoporosis, breastfeeding and mental health.

Results – Attitudes towards Diet Counselling

- Nearly 90% of participants strongly/somewhat agreed that patients would value a pharmacist providing dietary advice.
- Approximately 80% of participants believe that counselling about diet is an obligation on pharmacist and should be part of their routine care.
- The mean attitude score for Diet Counselling was 1.76
- The mean attitude score for Vitamins Counselling was 1.59

1=strongly agree 2= somewhat agree 3=neutral 4= somewhat disagree 5= strongly disagree

Results – Confidence towards Diet Counselling & Education

- The reported level of confidence varied between the disease areas with constipation (M – *Mean* - 4.1), GORD (M 4.1), and weight management (M 4.1) scoring the highest. While inflammatory bowel disease (M 2.8), cancer (M 2.3) and paediatric (M 2.7) scoring the lowest.
- The overall mean confidence score of the listed diseases was 3.4
- 67% of participant think that nutrition education should be a core subject.

0=unsure,1=not confident,2=slightly confident,3=somewhat confident,4=confident,5=very confident

Conclusions

Australian pharmacists routinely engage in nutritional counselling for patients and exhibit a robust commitment to the significance of such counselling in enhancing patient health. Strengthening nutrition education will contribute to bolstering their confidence across various disease topics.

References

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2. Australian Institute of Health and Welfare (2020) Diet, AIHW, Australian Government.
3. Lim, S.B.L, Weight management in community pharmacy in Australia. 2016, The University of Sydney.

Acknowledgements

We thank our study participants for their time

Appendix – 7 – Semi-structure Interview guide

Nutritional counselling in pharmacy practice

Semi-structure Interview guide

(please note that this could change slightly depending upon outcomes of our RedCaP Survey)

Interviewer (which will be a member of the research team, most likely Mrs Samar Elsayed or A/Prof Ingrid Gelissen): Thank you for participating in this semi-structured interview. Are you ok with having video recorded together with audio or audio only?

Note: If participant indicates audio only, they will be instructed to turn their camera off.

Interviewer: We will now start recording this interview (recording to start) and I would like to start with recording your verbal consent to participate in this study. Please read out the following statement that I have copied for you in the chat, which now includes your de-identification marker (instruct your participant to identify themselves with a participant number e.g. P1):

"I, P1, consent to participating in this semi-structured interview and can confirm that I have been provided with and have read the Participant Information Statement. I consent to this interview being recorded for the purpose of transcribing. I understand that I can refuse to answer questions if I do wish so and can ask to stop the interview at any time".

Interviewer: Thank you for giving your consent to participate in this interview.

Could you please tell me your age and gender please if that is ok with you. Where did you complete your pharmacy training and what degree qualifications do you have? How many years have you been working altogether as a registered pharmacist? And unpacking your work experience, can you explain a bit further what type of pharmacy work you have predominantly undertaken? (e.g. community? hospital?).

During your pharmacy training, did you receive any training around general nutrition? (ask to elaborate on the extent of training)

Interviewer: The next set of questions are aimed at exploring what pharmacists are currently providing to their patients in terms of nutrition counselling. Within the context of this study, nutritional counselling refers to providing advice about diet (what people eat) and/or vitamin and mineral supplements (not including other types of complementary medicines such as herbal products).

How often do you consult with your patients about nutrition related issues? Can you give examples of these? Are these tagged onto questions about medications/medical issues or also stand-alone questions? What would you consider to be the most relevant disease topics/areas that these nutrition-related questions cover? What resources do you provide your patients with that are related to general nutrition? (this could include online resources). Do you initiate conversations around diet and nutrition yourself? If yes, can you give some examples of this? What would you consider are the biggest hurdles in providing effective nutrition counselling to patients in the pharmacy? Any other observations you would like to add?

Interviewer: The next set of questions are aimed at exploring attitudes and confidence of pharmacists in providing nutrition counselling to their patients.

(Please note that these questions again may be guided by outcomes from the RedCap survey. For example, if the survey indicates a particular disease topic that often leads to nutrition-related queries, this may be covered here)

Looking back on your answers to your previous question, how confident would you say you are in providing nutrition-related advice to patients? If not, what would be the reason? Do you believe this is a pharmacist's role and why/why not, particularly considering your time is not reimbursed? Do you believe you can provide effective advice on nutrition to patients? How do you see your role when compared to other health care professionals such as dieticians and GPs? Do you refer patients to other HCP's?

Interviewer: Any other issues that you think are important to add?

Close interview: "Thank you for your time, please let me know if you would like to receive feedback in the form of a summary after the study has been completed. If yes, we will keep your email address for this purpose."