



Pharmacy in Australia: Measuring Employment, Labour Decisions and Activity - the PAMELA survey

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Foreword

Pharmacists are an integral part of the health workforce but despite this, there is limited research related to pharmacist job satisfaction, roles and remuneration. This information is vital in order to improve recruitment and retention of pharmacists. The last three years have demonstrated the incredible contribution pharmacists can have on the health system and health care delivery in Australia. With an exponential rise in health care needs of Australians, the demand on pharmacist delivered services and the unlocking of pharmacist's capability in expanding in areas such as immunisation and prescribing has as seen increasing pressure on the workforce. This has not only highlighted that drastic action is needed to increase current workforce capacity and capability, but also to build latent capacity to support surge workforce in the event of future natural disasters and pandemics.

There is an interdependence between pharmacy and other primary care health workforces. As the most accessible healthcare professionals, pharmacists often experience a significantly increased workload when there are staffing shortages in other healthcare sectors. The General Practitioner Workforce Report 2019 (Deloitte, 2019) forecast a 37.5% increase in the demand for GP services between 2019 and 2030 (139.8 million increasing to 192.1 million) and thus, a resulting shortfall of 9,298 GPs over the next ten years. However, this figure is likely to be a conservative estimate. This shortfall will likely disproportionately affect rural and remote areas which already face unique challenges in relation to the health workforce (Deloitte, 2019).

One strategy to address unmet population health needs is to ensure the pharmacy and allied health workforces are working to their full scope of practice and to consider extended scope of practice as necessary. Although there is already some evidence to suggest there are more roles available than pharmacists to fill them (Australian Government, 2021). With pharmacist roles currently unfilled, an increasing need for pharmacists over time, shortfalls in other areas of the primary health workforce and reported low levels of job satisfaction among existing pharmacists, interns and pharmacy students (Chapman et al., 2020), there are serious concerns related to the future availability of pharmacists.

Data collected as part of the PAMELA study identified that there are vastly different levels of job satisfaction for pharmacists dependent on the sectors and locations in which they work. This research needs to be expanded to better understand the challenges faced by today's pharmacists and resulting knowledge used to improve job satisfaction, recruitment and retention of the pharmacy workforce. PSA acknowledges that there are still many unknowns regarding the experiences of the current workforce and seeks to fill these gaps in knowledge. Pharmacists have so far been absent from government workforce strategies and research and PSA is willing to work with the government to rectify this.

It is imperative that insight is gained into the key issues affecting the current pharmacy workforce to ensure continued pharmacist access for all Australians both now and in the future.

Pharmacy workforce planning recommendations

PSA understands that there are significant pressures on the whole pharmacy workforce which have only escalated and increased during the Covid-19 pandemic. PSA are deeply committed to identifying ways in which this pressure can be alleviated from the pharmacy workforce and to improving workplace conditions for pharmacists in all sectors. The only way this can be done is to gather information about the unique challenges experienced by the whole of pharmacy workforce and to use this knowledge to build a better future in pharmacy.

- 1. Develop a trusted national resource producing key evidence to help ensure the sustainability of the pharmacist workforce**
 - 1.1 Expand and build on the PAMELA project to include longitudinal survey of the pharmacy workforce
 - 1.2 Establish research projects focusing on the contemporary pharmacy workforce in Australia capturing data related to influences on labour force choices
 - 1.3 Allow survey data collected by AHPRA to be published and linked to an individual to obtain data on attrition and pharmacist career movement
- 2. Develop a pharmacy focused workforce strategy**
 - 2.1 Fund the development of a workforce strategy to support workforce planning and design in alignment with other health professions to identify future requirements, education, and staffing challenges
- 3. Build the pharmacy workforce capability**
 - 3.1 Identify key areas where primary health workforce shortfalls may occur in the future
 - 3.2 Fund education programs to expand pharmacist scope of practice to counteract future primary healthcare workforce challenges
- 4. Increase focus on collecting feedback from the pharmacy workforce**
 - 4.1 Establish a system to obtain feedback from pharmacists relating to education systems and competency standards
 - 4.2 Fund the dissemination of feedback and information to educational institutions and government bodies

Introduction

Good research requires reliable and sufficient data. However, high-quality data to understand the contemporary pharmacy workforce has not been available in Australia. The current pharmacist registration data collected annually at the time pharmacists renew their registration are cross-sectional and include a limited number of demographic variables such as age, gender, principal place of practice (which states or territories) and type of registration. There is little available information to understand key issues in the current pharmacy workforce such as labour activities, job satisfaction and employment preferences. For example, income, as one of the key variables that may have a significant impact on the level of job satisfaction is not collected. Insufficient data makes it hard to examine the dynamics of the Pharmacy Workforce and therefore to advocate for evidence-based policies that support a vibrant pharmacy workforce in Australia.

As the peak body representing all pharmacists in Australia, The Pharmaceutical Society of Australia (PSA), recognises the need for evidence-based workforce strategies that support pharmacists and their labour force choices throughout their career. As such, the PSA endorsed and supported the collection of the PAMELA survey (Thai et al., 2023b), wave 1, to assess the feasibility, acceptability and value of pharmacists participating in a longitudinal workforce study. The PAMELA dataset is being made available in a deidentified format to researchers and other workforce agencies to ensure the full benefit of the information collected can be used by the profession.

PAMELA was inspired by the-Medicine in Australia: Balancing Employment and Life (MABEL) longitudinal survey of Australian doctors, which collected 11 waves of data on the medical workforce, producing an invaluable data asset for researchers and policy makers alike (Joyce et al., 2010). As well as a set of core data variables collected in each wave, MABEL also collected data on policy-relevant questions in singles waves, including doctor's employment preferences (Li et al., 2014; Scott et al., 2013; Sivey et al., 2012). The PAMELA wave 1 survey similarly includes a purpose designed preference study, known as a discrete choice experiment (DCE), to understand some of the key drivers of pharmacists' labour force decisions.

The PSA and PAMELA research team designed the survey to provide the basis of an ongoing longitudinal survey of the pharmacy workforce. Key relevant factors that have a significant influence on the current and future dynamics of the Pharmacy Workforce were collected in this survey. This report details the development of the PAMELA survey wave 1 and is designed to be used as a compendium to the PAMELA data asset (Thai et al., 2023b). It also outlines key findings of the wave 1 survey in the Results Section, including the representativeness of respondents.

Additional publications using the PAMELA data asset can be found elsewhere (Thai et al., 2023a).

Methods

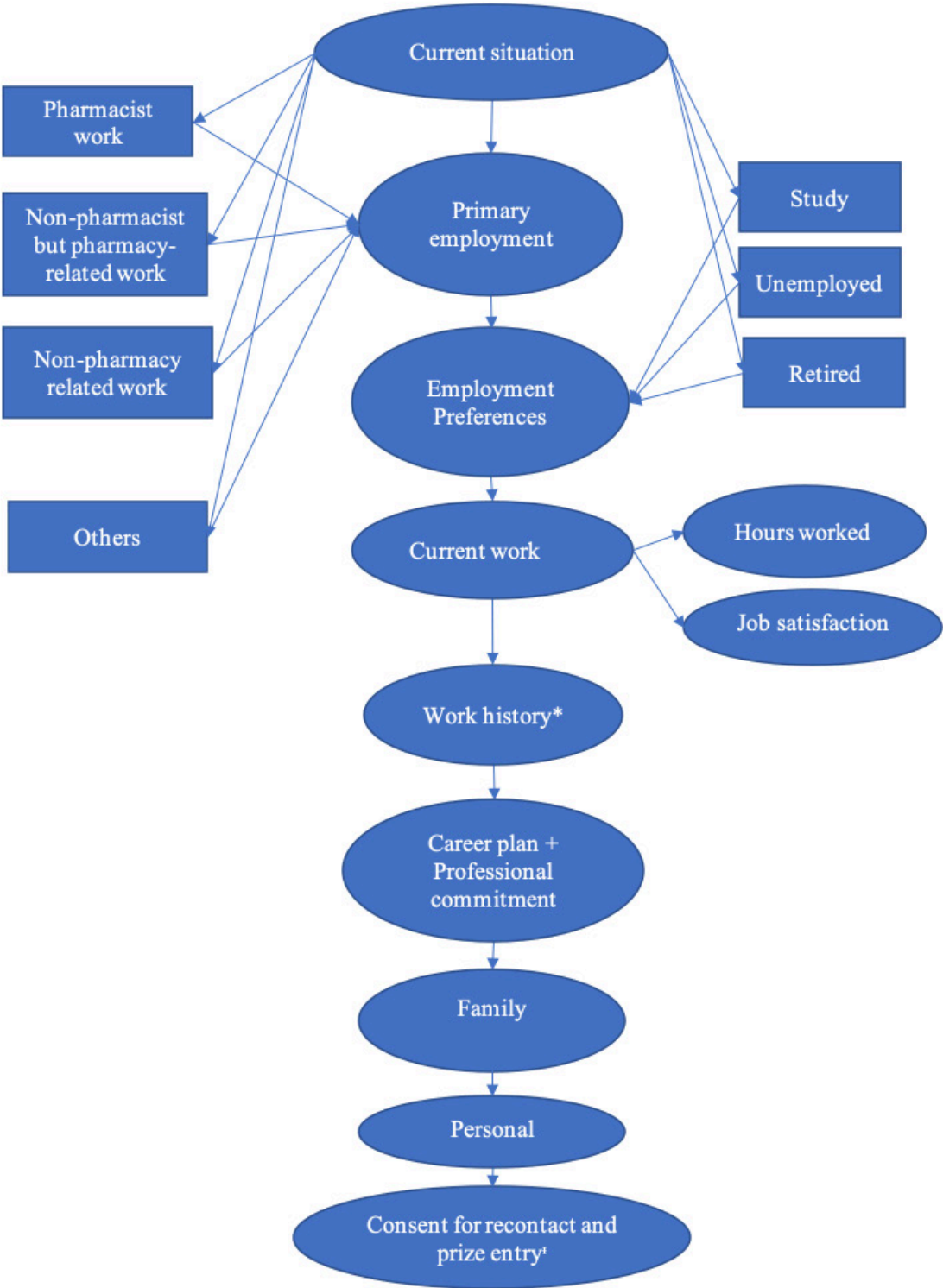
Questionnaire development and structure

PAMELA was designed by the PAMELA research team in conjunction with PSA and other relevant stakeholder groups. Candidate questions were identified following a comprehensive literature review (Thai, 2021; Chapter 2 Thai, Thao Thi Hong (2021)) and through stakeholder engagement. Other surveys which have a similar purpose in exploring the health workforce such as the Medicine in Australia: Balancing Employment and Life (MABEL from the University of Melbourne) and the National Pharmacists Workforce Survey (Midwest Pharmacy Workforce Research Consortium) were used as references. Suggestions from the Heads of pharmacy schools, and pharmacy degree holders themselves were incorporated into the survey design. The study was approved by the Ethical Review Committee of Griffith University (GU Ref No: 2017/881) and Monash University (MU Ref No: 11845).

Figure 1 presents the structure of the PAMELA questionnaire, which has eight sections. The survey begins with the *"Participants Information and Consent Form"* which provides information about the study, financial incentives and instructions on how to complete the questionnaire (See Appendix A for the details). Consent for respondents to participate was obtained before proceeding the questionnaire.

The first section about respondents' current job situation is for screening purpose to redirect them to the following appropriate sections. Respondents who currently have a job will be asked the second section about the characteristics of their current primary job. These characteristics match with the attribute levels presented in the third section- *"Employment preferences"*. Respondents who do not work are directed to the third section. The *"Employment preferences"* section includes discrete choice experiment (DCEs) questions exploring the employment preferences and trade-offs for different types of jobs which are described by five characteristics: role, flexible work schedule, career opportunities, geographic location and annual salary. Following the DCE questions, some debriefing questions were also included to tease out more information about their

Figure 1 Survey structure. *only for respondents not currently practising as a pharmacist; †optional section



preferences and their choice outcomes in the experiments.

The next section focuses on respondents' primary employment such as job satisfaction, job history, career plan and professional commitment. Job satisfaction was measured based on the short-form Warr-Cool-Wall job satisfaction questionnaire, previously validated in the Australian medical professional (Hills et al., 2012). We measure overall job satisfaction using the single item "Taking everything into consideration, how do you feel about your current employment?" Responses were based on a five-point Likert-style rating ranging from 1= "very dissatisfied" to 5= "very satisfied". The last two sections collected information on family and individual characteristics.

At the end of the survey, consent for recontact in one year's time and financial incentives was obtained. If agreed, respondents were redirected to a separate survey to collect their email address for recontact and/or incentive payment. This compartmentalisation of data separates personally identifiable information (i.e. the email addresses) from the main survey. Additionally, respondent internet protocol (IP) addresses were deleted from the incentive database to remove the possibility of data linking by recipients (i.e. researchers) of both data files. Respondent IP addresses were recorded as pseudo-IP addresses in the main survey to prevent respondent IP tracking but still support the data checks. This process ensures the confidentiality of respondents as aligned with Ethics. For the details of the PAMELA questionnaire, please see Appendix A.

Respondents were able to move forward and backward during the survey. They could also save the survey for later use if they could not complete the survey in one attempt.

Pre-test study

The survey was pre-tested in two stages to ensure a relevant, concise and understandable final survey. The first stage focused on the DCE choice tasks in terms of issues of cognitive burden, and interpretation and wording of alternatives, attributes and levels. The think-aloud technique was used with four pharmacists to obtain more insights about respondents' trade-off among alternatives and attributes, their understanding and ranking of attributes. Refinements were made before testing with the subsequent respondents. An online debriefing DCE questionnaire was also distributed to a subgroup of five pharmacists in which respondents were asked to complete eight DCE choice scenarios and a debriefing questionnaire about their understanding, complexity, non-attribute attendance and confusions of alternatives, attributes and levels, and suggestions for improvement. Suggestions regarding wording were incorporated before undertaking the second stage.

The second stage involved distribution of the whole online survey questionnaire to a subgroup (n=15) of the study population. Ten respondents provided detailed feedback regarding the survey length, wording and suggestions of additional questions. One in-depth interview was conducted to gain more detailed feedback. The online survey was reviewed by the heads of pharmacy schools to ensure the policy relevance of the survey. Suggestions on wording and content of the general questions were also incorporated.

Survey administration

Strategies to increase the response rate

Table 1 summarises a number of strategies implemented in the main data collection according to the previous evidence on increasing the response rate for electronic questionnaires (Dillman, 2009; Edwards et al., 2009). Dillman (2009) recommended multiple contacts including a first invitation and then reminders to approach respondents. In addition to adopting this approach, multiple promotions of the survey were optimised on different channels of recruitment such as invitation emails from different institutions and media coverage. Financial incentives (prize draw of 5 vouchers of AUD200) and personalization questionnaire were also incorporated as recommended by Dillman (2009) and Edwards et al. (2009). As sponsorship of the survey was recommended to increase response rates (Dillman, 2009), endorsements from the PSA, the Society of Hospital Pharmacists of Australia and some Pharmacy schools were obtained. These institutions also distributed the survey on our behalf which should serve as a good indicator of the importance of the survey to respondents. Using multimodal distribution methods (i.e. use both mail and email) may increase the response rate (Yun & Trumbo, 2000). However, given limited resources, the mailing approach was not available at the time.

The email content was carefully designed including a picture, having a white background, personalised salutation and personalised questionnaire, a statement from the PSA president or Heads of Pharmacy School, a deadline to response and an offer of survey results as recommended by (Edwards et al., 2009). A simple email header was used and the word "survey" was avoided (Edwards et al., 2009). Even though Edwards et al. (2009) provided evidence that pre-notification emails could increase the response rate, they could not be done due to the tight schedule from the PSA or due to attrition concerns from Pharmacy schools' alumni database. Table 1 summarises the methods used to increase response rates.

Table 1: Methods used to increase the response rates

Recommendation	Source of evidence	Incorporated in the data collection
Multiple contacts including a first invitation and then reminders	(Dillman, 2009)	Yes
Sponsorship of the survey	(Dillman, 2009; Edwards et al., 2009)	Yes
Multimode (i.e. use both mail and email)	(Yun & Trumbo, 2000)	No due to limited resources
Pre-notification emails	(Edwards et al., 2009)	No due to the tight timing and Schools' denial
Financial incentives	(Edwards et al., 2009)	Yes
Personalization questionnaire	(Edwards et al., 2009)	Yes
A picture	(Edwards et al., 2009)	Yes
Having white background	(Edwards et al., 2009)	Yes
Including a statement that others had responded	(Edwards et al., 2009)	Yes
A deadline to response	(Edwards et al., 2009)	Yes
An offer of survey results	(Edwards et al., 2009)	Yes
Using a simple header	(Edwards et al., 2009)	Yes
Avoid the word "survey" in the email header	(Edwards et al., 2009)	Yes
Avoid a male signature	(Edwards et al., 2009)	No due to institutions' choice

The invitation emails

The final version of the invitation email included:

- An email header *"Having your say on the Future of the Pharmacy Workforce"*
- A picture having the name of the survey and logos of the PSA and three host universities
- Personalise salutation
- The content promotes motivation for pharmacy graduates to complete the survey
- A quote from the president of the PSA or the Head of Pharmacy School depending on Schools' choice
- A link to directly access the survey
- A deadline of two weeks was specified.
- Financial incentives (prize draw of 5 vouchers of AUD200) were used to increase the response rate.
- An offer of survey results.
- For the details of the email content, please see the Appendix B.

Recruitment channels

Different channels used to recruit respondents includes:

1. The membership database of the Pharmaceutical Society of Australia (PSA)
2. The membership database of the Society of Hospital Pharmacists of Australia (SHPA)
3. The alumni databases of Australian pharmacy schools (Monash, Queensland University of Technology, Griffith University)
4. The social media platforms (Twitter, Facebook, LinkedIn) of PSA, SHPA, pharmacy schools and the accounts of the home institutions and researchers
5. The subscriber database of the Australian Journal of Pharmacy. The survey was linked directly to a banner on AJP e-newsletters sent to subscribers' email address every day for 20 days from 6th November to 26th November 2019. In additions, two posts were run online to promote the survey.
6. A media page to provide information about the study was available on the official website of Griffith university ("PAMELA Survey Pharmacy in Australia: Measuring Employment, Labour decisions, and Activity 2019,")
7. Community pharmacies whose emails were listed on the Yellow Pages website (<https://www.yellowpages.com.au/>)
8. A snowballing approach in which respondents forwarded the invitation emails among their network

Please see Appendix B for the details of the content of invitation emails and advertisement.

For recruitment channels (1), (2), (3), the invitation process was conducted by the person-in-charge of the database in each of institutions. Invitation to participate was sent to email addresses listed in the membership or alumni databases. We do not have direct access to respondents' contact details from these channels, however, the wording of the invitation emails and media posts was provided to participating institutions as references.

For recruitment channels (4), (5) and (6), the survey link was incorporated in social media posts and media websites. For recruitment channel (7), we sent the invitation emails to our pharmacy networks and requested the respondents to forward the invitation further. A single anonymous generic web link was provided to each partner to allow us to trace back the source of respondents except only one link was used for channels (2), (4), (6), (7) and (8). These channels except (2) are publicly available and thus, it is not useful to use different links for each of them.

DCE choice task presentation

This survey is self-reported; thus the responses depend on respondents' understanding and interpretation of the questions asked. As such, some attempts have been made to increase the consistency in the interpretation of the DCE questions across respondents. Pop-up definitions and examples were provided as much as possible to assist respondents' understanding. Figure 2 shows an example of pop-up definitions.

The DCE questions with six alternatives which were presented horizontally were not readable on mobile phones. This was an obstacle to data collection given that many community pharmacies have shared work-computers and that the use of mobile phones to read emails and newspaper is common. In the pilot study, pharmacists noted this as a limitation to participation. Recognizing this key obstacle, the DCE question with six alternatives were changed to vertical presentation as the standard scroll feed. Examples of the DCE questions presented on non-mobile phone device in Figure 3 and presented on mobile phones in Figure 4.

Another concern in the DCE literature is the potential position bias involving a systematic preference for an alternative based on its position (Campbell & Erdem, 2015; Norman et al., 2016). This potentially introduces a bias for one alternative over another (e.g. preference for extreme left or right or top and bottom). To address this concern, the order of six alternatives of the DCE questions was randomised at the respondent level (i.e. each respondent was allocated one order of alternative across three choice questions). Figure 5 shows a different order of alternatives compared to Figure 3.

Data management

The questionnaire was built on the online platform-SurveyEngine (<https://surveyengine.com/>). Data were collected from respondents who responded to an invitation email to participate or clicked through the survey link on social media or the online advertisement to participate. The online survey platform recorded all responses, both finished and unfinished in an electronic database.

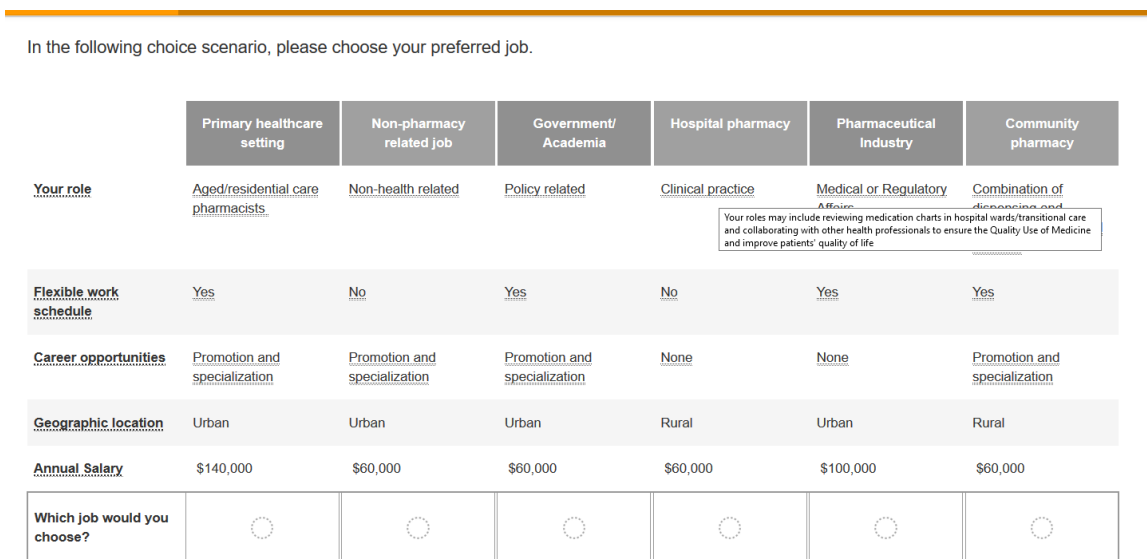
Standard data checks were conducted to ensure data quality. Pseudo-IP addresses were used to identify individuals re-entering the survey multiple times. To err on the side of caution, responses from the same pseudo-IP addresses were excluded.

Timelines of the data collection process

Pilot test

The pilot started with Griffith School of Pharmacy and Pharmacology on 9th July 2019. The survey link was distributed to 777 alumni by email by the administrators. Inclusion criteria were graduation with a Bachelor of Pharmacy between 2006 and 2017. Approximately three weeks after the initial invitation, a reminder email was sent to those yet to respond.

Figure 2: Example of pop-up definitions



Main data collection

Different recruitment channels were used at a different time due to the different timing of their acceptance to participate or our contact (in case of AJP and community pharmacies). Table 2 summarises the timelines that each recruitment channel was used.

Approximately two weeks after the first invitation, QUT and Monash universities sent a reminder to their alumni. The PSA did not send a reminder to their members due to their tight schedule of communication.

Figure 3: Example of the original presentation of DCE questions on non-mobile devices (desktops, laptops, tablets)

	Hospital pharmacy	Community pharmacy	Primary healthcare setting	Pharmaceutical Industry	Government/ Academia	Non-pharmacy related job
Your role	<u>Clinical practice</u>	<u>Combination of dispensing and providing professional services</u>	<u>Aged/residential care pharmacists</u>	<u>Medical or Regulatory Affairs</u>	<u>Policy related</u>	<u>Non-health related</u>
Flexible work schedule	No	Yes	Yes	Yes	Yes	No
Career progression	Limited	Sufficient	Sufficient	Limited	Sufficient	Sufficient
Geographic location	Rural	Rural	Urban	Urban	Urban	Urban
Annual Salary	\$60,000	\$60,000	\$140,000	\$100,000	\$60,000	\$60,000
Which job would you choose?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Compare your choice with your current job and indicate which one you prefer?

Select only one answer

My choice above	My current job
<input checked="" type="radio"/>	<input type="radio"/>

Table 2: Timelines of the main data collection

Date	Recruitment channels used	Respondent approach
19/10/2019	PSA	PSA's member emails and social media posts on their LinkedIn account and Facebook group.
28/10/2019	Monash University	Alumni's emails
31/10/2019	QUT	Alumni's emails
6/11/2019	AJP	The first post aired
6/11-26-11/2019	AJP	E-news letters sent to subscribers' email
29/10-19/11/2019	Community pharmacies	Invitation emails
13/11/2019	Mobile version of the survey introduced	Announcement on the social media platform of the PSA and researchers
14/11/2019	SHPA	E-news letter sent to members
19/11/2019	AJP	Second post aired
30/01/2021	UQ	The second post aired

Notes:

1. PSA: Pharmaceutical Society of Australia
2. AJP: Australian Journal of Pharmacy
3. QUT: Queensland University of Technology
4. SHPA: Society of Hospital Pharmacists of Australia
5. UQ: University of Queensland

Figure 4: Example of the presentation of DCE questions on mobile phones

Non-pharmacy related job

- Role: Non-health related
- Fixed work schedule
- No career opportunities
- Remote posting
- \$100,000 p.a.

Hospital pharmacy

- Role: Education/Clinical research
- Flexible work schedule
- No career opportunities
- Urban posting
- \$100,000 p.a.

Community pharmacy

- Role: Combination of dispensing and providing professional services
- Flexible work schedule
- No career opportunities
- Urban posting
- \$140,000 p.a.

Primary healthcare setting

- Role: General practice pharmacist
- Flexible work schedule
- No career opportunities
- Remote posting
- \$100,000 p.a.

Government/ Academia

- Role: Research or Teaching
- Flexible work schedule
- No career opportunities
- Urban posting
- \$60,000 p.a.

Pharmaceutical Industry

- Role: Research and Development
- Flexible work schedule
- No career opportunities
- Urban posting
- \$100,000 p.a.

Compare your chosen job to your current job and indicate which one you prefer?

Select only one answer

My choice above

My current job

Figure 5: An example of randomising the order of alternatives

In the following choice scenario, please choose your preferred job.

	Pharmaceutical Industry	Hospital pharmacy	Primary healthcare setting	Non-pharmacy related job	Community pharmacy	Government/ Academia
Your role	Sales or Marketing	Medicine distribution/dispensing	General practice pharmacist	Health-related	Mainly dispensing	Policy related
Flexible work schedule	Yes	No	No	No	No	No
Career opportunities	None	None	Promotion and specialisation	None	None	None
Geographic location	Urban	Rural	Remote	Urban	Remote	Rural
Annual Salary	\$220,000	\$100,000	\$140,000	\$60,000	\$100,000	\$100,000
Which job would you choose?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Sampling frame

Our population of interest are pharmacy graduates from all Australian academic institutions regardless of whether or not they currently work as a pharmacist (in a job that requires an Australian Health Practitioner Regulation Agency (AHPRA) pharmacist registration). Inclusion criteria are graduating from a school of Pharmacy, either with a Bachelor or a Master of Pharmacy and working in Australia.

The most recent estimate of the total pharmacy workforce obtained from the Pharmacy Board of Australia when pharmacists renew their annual registration (June 2019) was

31,955 registered pharmacists (Pharmacy Board of Australia, 2019). Of them, 29,034 pharmacists hold practising registration and 1,116 hold non-practising registration. 1,789 intern pharmacy students hold provisional registration and 16 people who are taking postgraduate study hold limited registration. Even though this registration data does not include people who have left the profession (i.e. forgo their registration), some key characteristics of this data were used for checking the representativeness of the sample conditioning on keeping registration. These characteristics are age, gender, states/territories, type of registration.

Results

Participant demographics

Standard data checking processes were conducted to exclude responses whose have not read the “Participant Information form”; non-consent; complete and/or incomplete responses from the same IP addresses. This resulted in 982 useable responses with at least one question answered. Of these, 654 (0.64%) are complete responses while the rest 157 (19.35%) are incomplete. Of complete responses, 79.24% agreed to do another survey in one year’s time and provided their email address. About 80.92% agreed to enter the prize draw to have a chance to win one of five vouchers worth AUD200 (Table 3).

As a result, a total of 982 responses were used for the data analysis in this thesis.

Sources of respondents

The PSA, SHPA and three pharmacy schools-Monash, Griffith and Queensland University of Technology consented to the invitation to participating in the PAMELA survey.

Table 4 summarises the number and percentages of respondents from each channel of recruitment. The largest source of respondents comes from the combined social media post/snowballing, invitation emails from SHPA and the second campaign on AJP. The second largest source is invitation emails to members of the PSA.

Response rate

Multiple channels were used to recruit respondents; thus, some respondents may have seen the invitation to participate several times. For example, one may be a member of the PSA, the SHPA and have a subscription to the Australian Journal of Pharmacy and their University alumni database. Then one person may receive at least four invitations to participate in the survey. The multiple approaches make the denominator of the sampling frame unknown, thus, the response rate cannot be calculated accurately and reported in this study.

However, responses rates were calculated for each source of respondents conditioning on the information availability of the denominators (Table 4).

Table 3: Overview of responses

	N (%)
Complete responses	
Yes	657 (66.90%)
No	325 (33.10%)
Total	982 (100.00%)
Consent for recontact	N
Yes	521 (79.18%)
No	137 (20.82%)
Total	658 (100.00%)
Prize draw enter	
Yes	531 (80.70%)
No	127 (19.30%)
Total	658 (100.00%)

Notes:

1. N: number of observations

2. Useable responses have at least one question answered.

Response bias

In survey research, a potential bias can arise from the differences between respondents and non-respondents. This bias may distort the estimated results and affect the generalizability and the external validity of the study. As such, the representativeness of the sample was assessed based on some key variables including age, gender, principal place of work, employment setting conditioning on having APHRA registration.

The most recent estimate of the total pharmacy workforce in Australia suggests that there were 31,955 pharmacists in June 2019. This data is from the registration survey undertaken by the Pharmacy Board of Australia which collects information from pharmacists at the time of their annual registration renewal. Thus, this data does not capture information about pharmacy graduates who have left the profession (i.e. do not keep registration). The latest report based on the most recent registration data only includes information about age groups, gender, number of registrations per states/territories and number of pharmacy graduates by types of registration. This information was used to assess the representativeness of the sample. As our sample also collects information on individuals who do not have a current pharmacy registration, the comparison was done based on the sample of 634 individuals having a registration (i.e. exclude those having no registration and missing values).

Table 4: Summary of numbers and percentages of respondents from each recruitment channel

Source	Completed (N (%))	Incomplete (N (%))	Total (N (%))	Total invitations sent out	Response rates
Pilot test (Griffith)	22 (2.24%)	5 (0.51%)	27 (2.75%)	777	3.47
QUT	12 (1.22%)	4 (0.41%)	16 (1.63%)	350	4.57
AJP- first campaign	11 (1.12%)	11 (1.12%)	22 (2.24%)	NA	NA
Community pharmacies	11 (1.12%)	3 (0.31%)	14 (1.43%)	1015	1.4
Monash	48 (4.89%)	12 (1.22%)	60 (6.11%)	NA	0.00
UQ	39 (3.97%)	19 (1.93%)	58 (5.91%)	NA	NA
PSA	188 (19.14%)	66 (6.72%)	254 (25.87%)	10,000	2.54
Combined	326 (33.20%)	205 (20.88%)	531 (54.07%)	NA	NA
Total	657 (66.90%)	325 (33.10%)	982 (100.00%)	NA	NA

Notes: QUT: Queensland University of Technology; AJP: Australian Journal of Pharmacy;

PSA: Pharmaceutical Society of Australia; N: number of observations

Combined: responses from Social media, snowballing, AJP-second campaign and the Society of Hospital Pharmacists of Australia;

Figure 6: Distribution of respondents and the population by age

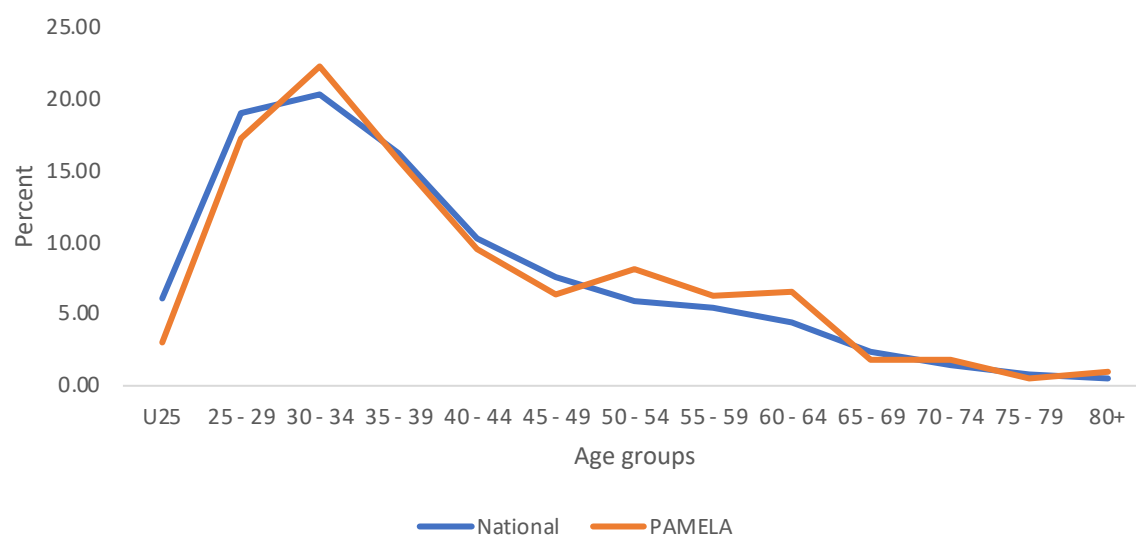


Figure 6 shows that our sample is generally representative in terms of age, however it is slightly under-representative of the younger groups of pharmacy graduates with a significant difference for those aged under 25 years. The biggest and most significant under-representation is of the 40-44 age groups. Our sample is slightly over-representative of older age groups with the difference for age group 55-59 being statistically significant (See Table 3 for detail)

Table 5: Comparisons of respondents with the 2019 population in terms of gender, types of registration, age groups and principal place of working

	National (N=31,955)		PAMELA respondents (N=634)		Difference in proportions
	Number	%	Number	%	
Gender					
Male	11,883	37.19	225	36.47	-0.72
Female	20,072	62.81	392	63.53	0.72
Missing + Prefer not to say			17		
Type of registration with APHRA					
Practicing Registration	29,034	90.86	592	93.38	2.52 **
Provisional Registration	1,789	5.60	28	4.42	-1.18
Limited Registration	16	0.05	0	0.00	-0.05 ***
Non-practicing Registration	1,116	3.49	14	2.21	-1.28 **
I don't currently have an AHPRA registration	NA	NA	36	NA ¹	
States/Territories					
ACT	625	1.96	17	2.68	0.72
NSW	9637	30.16	121	19.09	-11.07 ***
NT	267	0.84	11	1.74	0.90 *
QLD	6349	19.87	209	32.97	13.10 ***
SA	2235	6.99	35	5.52	-1.47
TAS	784	2.45	20	3.15	0.70
VIC	8116	25.40	161	25.39	-0.01
WA	3346	10.47	52	8.2	-2.27 **
No PPP	596	1.87	8	1.26	-0.61
Age groups					
U25	1,926	6.03	19	3.03	-3.00 ***
25 - 29	6,058	18.96	108	17.2	-1.76
30 - 34	6,474	20.26	140	22.29	2.03
35 - 39	5,182	16.22	99	15.76	-0.46
40 - 44	3,276	10.25	60	9.55	-0.70
45 - 49	2,421	7.58	40	6.37	-1.21
50 - 54	1,867	5.84	51	8.12	2.28 **
55 - 59	1,733	5.42	39	6.21	0.79
60 - 64	1,409	4.41	41	6.53	2.12 **
65 - 69	756	2.37	11	1.75	-0.62
70 - 74	461	1.44	11	1.75	0.31
75 - 79	233	0.73	3	0.48	-0.25
80+	159	0.50	6	0.96	0.46

Notes:

1. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.0001$. two-proportion z-test

2. NA: Not applicable

3. No PPP: Principal Place of Practice

4.¹excluded from the comparison

Females were slightly over-represented by 0.17% in our sample, but the difference is not statistically significant. As our sampling frame includes pharmacy degree holders who have left the profession, we have 36 of respondents who do not hold AHPRA registration. Excluding these respondents, respondents with practising registration are significantly over-represented while ones with other types of registrations are significantly under-represented except ones with provisional registration (Table 5).

Figure 7 shows that our sample are over-representative of pharmacy graduates from five out of eight states and territories, including two regional states-Northern Territory and Tasmania. The over-representation of pharmacy graduates being significant in Queensland was anticipated as two universities located in these two states supported the data collection. The biggest under-representation of pharmacy graduates is in New South Wales with the difference of 8.9%.

A further representativeness assessment was also based on the registration data of pharmacists with general/limited registration who are employed (24,609 in 2017) (Australian Government, 2017). Age, hours worked, primary work setting and initial qualification were used to assess the sample conditioning on having a registration and being employed.

Compared to the data in 2017 on the registered pharmacists having general/limited registration and being employed, our sample is significantly under-representative of community pharmacists by 12.34%. This is anticipated because the timing of data collection is inconvenient for them given the busy dispensing end-of-year period. The number of people who have principal role as a clinician is significantly under-represented by 12.44% while the number of people having second job is significantly over-represented by 20.11%. The number of pharmacy graduates having Australian initial qualification is over-represented by 7.91%. Females are insignificantly over-representative when compared to the 2017 employed population (1.56%). Our sample is slightly older than the 2017 population with the average age being 41 and about 66% people aged under 44. The number of hours worked is quite

similar being 35.97 and 35.7 hours per week for our sample and the 2017 population, respectively. In our sample, females work longer hour than in the population.

Job satisfaction

Figure 8 demonstrates the average overall job satisfaction across employment sectors. While respondents working in the pharmaceutical industry reported the highest level of job satisfaction, community pharmacists were least satisfied with their job. Table 7 shows the distributions of overall job satisfactions across employment sectors. Only 10.43% of hospital pharmacist are not satisfied with their jobs while almost 38% community pharmacists are dissatisfied. Most pharmacists (86%) working in primary healthcare settings are satisfied with their jobs.

Figure 9 shows the average overall job satisfaction across states/territories in Australia. While all states and territories have high job satisfaction level (all above 3.2), pharmacy degree holders in ACT have the highest level of job satisfaction. Pharmacy degree holders in Western Australia reported the lowest job satisfaction. Table 8 reported the detailed distributions of job satisfaction level across states/territories. A majority of pharmacy degree holders in ACT, Victoria and South Australia (>85%) are not dissatisfied with their job. Whist, more pharmacy degree holders reported lower job satisfaction in Western Australia, Victoria, Queensland and New South Wales.

Table 9 reports the mean overall job satisfaction by employment sector and states/territories. Interestingly, community pharmacists reported the lowest job satisfaction in all states/territories except in South Australia and Tasmania where pharmacists working in primary healthcare settings and hospital pharmacists, respectively are least dissatisfied. Among all hospital pharmacists, those working in ACT and Northern Territories reported the highest job satisfaction. Community pharmacists in South Australia and pharmacists working in Primary Healthcare settings in ACT are the most satisfied among the same kinds.

Figure 7: Distribution of respondents and the population by States/Territories

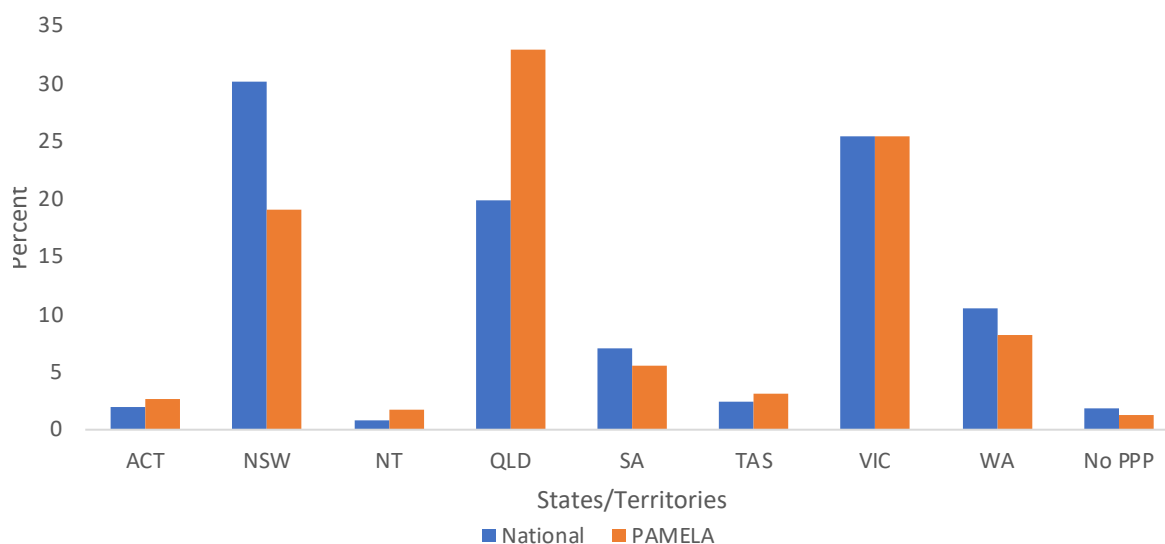


Table 6: Comparisons of respondent characteristics with the 2017 population of pharmacy graduates having general/limited registration and being employed.

	National (N=24,609)		PAMELA respondents (N=569)		Difference in proportions
	Number	%	Number	%	
Primary Work Setting					
Hospital pharmacy	5,266	21.4	148	26.01	-4.61 **
Community pharmacy	15,922	64.7	284	49.91	14.79 ***
Primary healthcare settings	NA	NA	25	4.39	
Pharmaceutical industry	NA	NA	26	4.57	
Government or Academia	NA	NA	51	8.96	
Non-pharmacy related	NA	NA	13	2.28	
Employment					
Principal role as a clinician (patient care)	21,656	88	457	80	7.68 ***
Second job	3,052	12.4	177	31.11	-18.71 ***
Age	39.3		41.11		
44 years and under		70.5		66.96	3.54 *
Hours worked	35.7		35.83		
Female	33.6		34.47		
Male	39.1		38.33		
Initial Qualification					
Australia	20,893	84.9	531	93.32	-8.42 ***
Overseas	2,978	12.1	38	6.68	5.42 ***
Gender					
Male	9,548	38.8	202	36.4	2.40
Female	15,061	61.2	353	63.6	-2.40

Notes:

1. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.0001$. two-proportion z-test

2. NA: Not applicable

3. No PPP: Principal Place of Practice

4. ¹excluded from the comparison

Figure 10 demonstrates the mean overall job satisfaction across age groups. Pharmacy degree holders aged less than 25 years are the least satisfied with their jobs while the 75-79 age group have the highest job satisfaction. Across age groups, there is a sharp drop of job satisfaction among those aged between 50-65 years.

Table 10 shows the mean overall job satisfaction by age groups and states/territories. Interestingly, among pharmacy degree holders aged less than 25 years, those in NSW have the highest job satisfaction while those in Victoria are the least satisfied. Across age groups, pharmacy degree holders aged 25-29 years are the least satisfied in NSW while those aged less than 25 years have the lowest job satisfaction in QLD, Tasmania, and Victoria.

Table 11 reports the mean job satisfaction by age groups and employment sectors. While hospital pharmacists were consistently satisfied with their job across age groups, hospital pharmacists aged 65-69 years are the least satisfied. Among community pharmacists, those aged less than 44 years have lower job satisfaction than those older than 44 years. Pharmacists working in primary healthcare settings consistently reported high job satisfaction except those aged less than 25 years and between 55-59 years. Among pharmacy degree holders aged less than 35 years, those working in community pharmacy and primary healthcare settings experience the lowest job satisfaction while those working in pharmaceutical industry and government/academia had higher job satisfaction.

Table 12 shows the distributions of job satisfaction dimensions - 37% of respondents were not satisfied with their pay, 34% were not satisfied with their career development opportunities, 27% were not satisfied with their hours of work, 25% were not

satisfied with opportunities to use their training and skills and 26% were not satisfied with the flexibility of working hours. Only 16% were not satisfied with the work itself.

Table 7: Distribution of overall job satisfaction across employment sectors

Overall job satisfaction	Hospital community (No (%))	Community Pharmacy (No (%))	Primary Healthcare Settings (No (%))	Pharmaceutical Industry (No (%))	Government/Academia (No (%))	Non-pharmacy related sector (No (%))	Total (No (%))
Very dissatisfied	2 (1.23)	34 (10.27)	1 (3.85)	0	1 (1.56)	1 (2.38)	39 (5.91)
Dissatisfied	15 (9.2)	87 (26.28)	3 (11.54)	0	5 (7.81)	2 (4.76)	112 (16.97)
Neutral	26 (15.95)	72 (21.75)	4 (15.38)	3 (8.82)	8 (12.5)	4 (9.52)	117 (17.73)
Satisfied	95 (58.28)	107 (32.33)	13 (50)	20 (58.82)	34 (53.13)	24 (57.14)	293 (44.39)
Very satisfied	25 (15.34)	31 (9.37)	5 (19.23)	11 (32.35)	16 (25)	11 (26.19)	99 (15)
Total	163 (100)	331 (100)	26 (100)	34 (100)	64 (100)	42 (100)	660 (100)

Table 8: Distribution of overall job satisfaction across states/territories

Overall job satisfaction	ACT (No (%))	NSW (No (%))	NT (No (%))	QLD (No (%))	SA (No (%))	TAS (No (%))	VIC (No (%))	WA (No (%))	No PPP (No (%))	Total (No (%))
Very dissatisfied	1 (5.56)	7 (5.98)	1 (11.11)	11 (5.39)	0	0	12 (7.55)	2 (3.92)	0	34 (5.5)
Dissatisfied	0	19 (16.24)	0	42 (20.59)	4 (12.12)	3 (15.79)	20 (12.58)	12 (23.53)	1 (12.5)	101 (16.34)
Neutral	4 (22.22)	25 (21.37)	1 (11.11)	33 (16.18)	8 (24.24)	4 (21.05)	19 (11.95)	10 (19.61)	4 (50)	108 (17.48)
Satisfied	7 (38.89)	44 (37.61)	7 (77.78)	86 (42.16)	19 (57.58)	7 (36.84)	83 (52.2)	24 (47.06)	1 (12.5)	278 (44.98)
Very satisfied	6 (33.33)	22 (18.8)	0	32 (15.69)	2 (6.06)	5 (26.32)	25 (15.72)	3 (5.88)	2 (25)	97 (15.7)
Total	18 (100)	117 (100)	9 (100)	204 (100)	33 (100)	19 (100)	159 (100)	51 (100)	8 (100)	618 (100)

Table 9: Mean overall job satisfaction by employment sectors and states/territories

Overall job satisfaction	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	No PPP	Total
Hospital community	4.00	3.91	4.00	3.98	3.50	2.00	3.67	3.47	3.00	3.79
Community Pharmacy	3.43	3.07	1.00	2.91	3.50	3.69	3.13	3.00	2.67	3.08
Primary Healthcare Settings	4.50	4.00	4.00	3.00	3.00	NA	4.17	NA	NA	3.64
Pharmaceutical Industry	NA	4.31	NA	4.33	NA	4.00	4.27	4.00	NA	4.28
Government/Academia	4.67	3.60	3.50	3.77	3.80	4.25	4.12	4.33	NA	3.92
Non-pharmacy related sector	4.00	4.50	4.00	3.88	4.00	NA	4.00	4.00	4.25	4.03
Total	3.94	3.47	3.56	3.41	3.58	3.74	3.56	3.27	3.50	3.49
Sample	618									

Note: Average overall job satisfaction; NA: No observations

Figure 8: Average overall job satisfaction across employment sectors

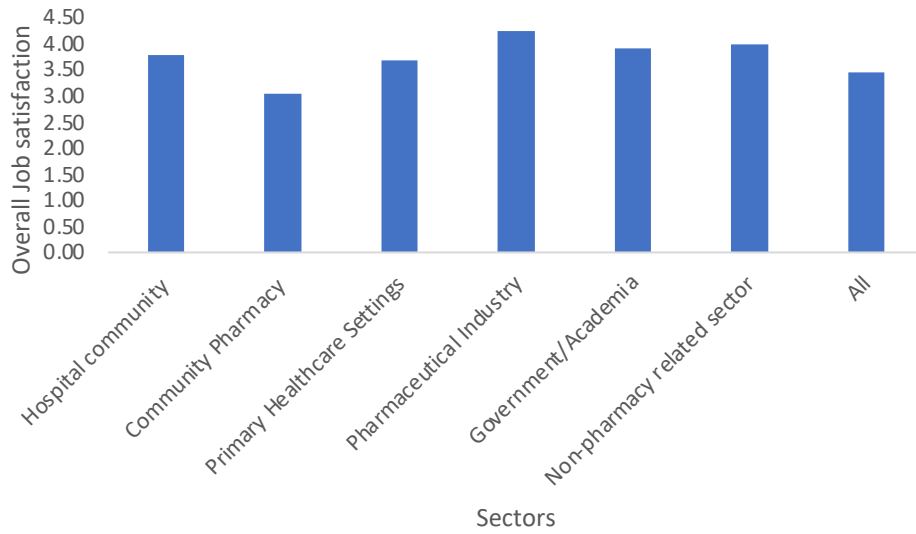


Figure 9: Mean overall job satisfaction across states/territories



Figure 10: Mean overall job satisfaction across age groups

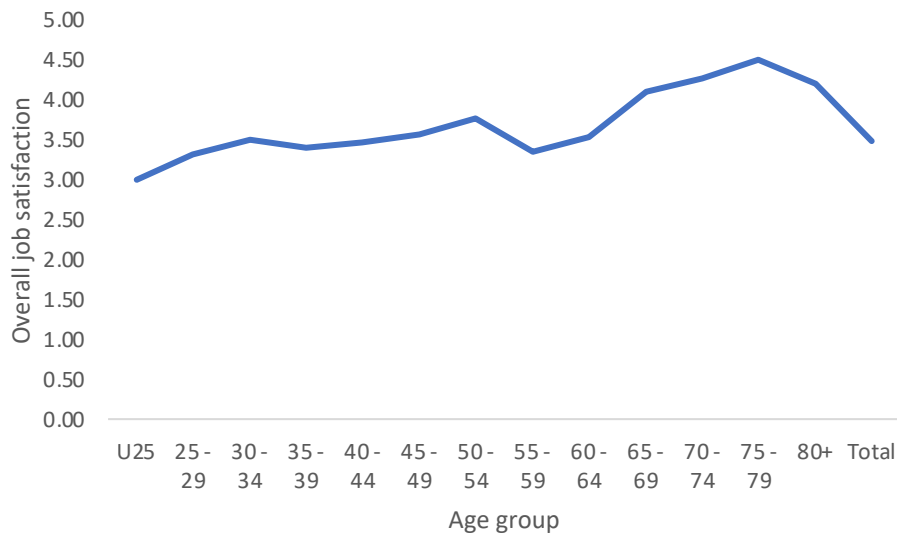


Table 10: Mean overall job satisfaction by age groups and states/territories

Overall job satisfaction	U25	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80+	Total
ACT	NA	3.50	5.00	4.00	3.33	3.67	4.00	NA	3	NA	NA	NA	5.00	3.88
NSW	4.33	2.94	3.36	2.93	3.20	4.10	4.00	3.00	3.50	4.25	4.50	4.00	4.00	3.46
NT	NA	NA	3.00	3.00	4.00	NA	4.00	NA	NA	4.00	NA	NA	NA	3.56
QLD	2.75	3.39	3.44	3.50	3.83	3.13	3.77	3.17	3.30	5.00	3.67	NA	NA	3.43
SA	NA	3.83	3.67	3.60	3.25	4.00	3.00	3.25	4.00	NA	NA	NA	NA	3.58
TAS	2	3.33	3.67	4.00	3.00	3.00	5.00	NA	5.00	4.00	NA	NA	NA	3.74
VIC	1	3.22	3.70	3.48	3.08	3.56	4.00	3.82	3.50	3.50	4.67	5.00	4.00	3.56
WA	4	3.60	3.00	2.89	3.75	4.00	2.67	3.50	3.67	4.00	4.00	NA	NA	3.30
No PPP	NA	3.33	3.00	5.00	NA	NA	NA	NA	3.50	NA	NA	NA	NA	3.50
Total	3	3.31	3.51	3.40	3.47	3.57	3.76	3.36	3.54	4.10	4.27	4.50	4.20	3.49
Sample	669													

Note: Average overall job satisfaction; NA: No observations

Table 11: Mean overall job satisfaction by age groups and employment sectors

Overall job satisfaction	U25	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80+	Total
Hospital community	4.00	3.70	3.79	3.89	3.69	3.67	4.08	4.33	3.50	3.00	4.00	NA	NA	3.81
Community Pharmacy	2.70	2.90	2.97	2.68	2.97	3.43	3.41	3.14	3.36	4.17	4.25	4.50	4.20	3.08
Primary Healthcare Settings	2.00	4.00	4.00	3.67	4.33	4.00	3.75	2.40	NA	4.00	5.00	NA	NA	3.64
Pharmaceutical Industry	5.00	4.25	4.00	4.17	5.00	4.67	4.67	NA	4.25	NA	NA	NA	NA	4.29
Government/ Academia	4.00	4.00	4.40	4.00	4.00	3.00	3.89	3.33	5.00	NA	4.00	NA	NA	3.88
Non-pharmacy related sector	NA	3.83	4.25	3.78	4.33	4.33	NA	4.25	3.60	4.50	NA	NA	NA	4.03
Total	3.00	3.30	3.51	3.40	3.47	3.57	3.76	3.36	3.54	4.10	4.27	4.50	4.20	3.49
Sample	607													

Note: Average overall job satisfaction; NA: No observations

Table 12: Reported job satisfaction dimensions

Job satisfaction	Very dissatisfied Mean (SD)	Dissatisfied Mean (SD)	Neutral Mean (SD)	Satisfied Mean (SD)	Very satisfied Mean (SD)
The work itself (what you do)	0.04 (0.19)	0.12 (0.32)	0.13 (0.33)	0.49 (0.50)	0.23 (0.42)
Your total pay	0.13 (0.34)	0.24 (0.43)	0.16 (0.37)	0.36 (0.48)	0.10 (0.30)
Opportunities to use your training and skills	0.07 (0.25)	0.18 (0.38)	0.16 (0.36)	0.42 (0.49)	0.18 (0.38)
Your hours of work	0.09 (0.29)	0.18 (0.39)	0.18 (0.38)	0.35 (0.48)	0.20 (0.40)
The flexibility available to balance work and non-work commitments	0.05 (0.21)	0.16 (0.37)	0.21 (0.41)	0.47 (0.50)	0.11 (0.32)
Your career development opportunities	0.12 (0.33)	0.22 (0.41)	0.25 (0.43)	0.29 (0.45)	0.13 (0.33)
Overall job satisfaction	0.06 (0.24)	0.17 (0.38)	0.18 (0.38)	0.44 (0.50)	0.15 (0.36)
Sample	661				

Note: Standard Deviation in parentheses

Career plan and Professional commitment

Table 13 reports the reported career plan of respondents. 23% intended not to practise as a pharmacist while 32% intended to work in pharmacy-related sectors. 26% planned to work in a different profession from pharmacy while 13% intended not to

work at all. Table 14 reports the level of professional commitment among respondents. 34% state they could choose to work in the pharmacy profession again, 31% states pharmacy is the ideal profession while 30% like the pharmacy profession too much to give up. Meanwhile, 29% are disappointed that they have entered the pharmacy profession and 43% would choose another profession if it paid the same.

Table 13: Reported career plan

	Very unlikely (Mean (SD))	Unlikely (Mean (SD))	Neutral (Mean (SD))	Likely (Mean (SD))	Very likely (Mean (SD))	Not applicable (Mean (SD))
Practising as a pharmacist (in hospital, community pharmacy or primary healthcare setting, etc.)	0.14 (0.35)	0.09 (0.29)	0.08 (0.27)	0.21 (0.41)	0.45 (0.50)	0.02 (0.15)
Working in pharmacy-related sectors (e.g. pharmaceutical industry, government or academia) but not practising as a pharmacist	0.31 (0.46)	0.22 (0.41)	0.13 (0.34)	0.17 (0.37)	0.15 (0.35)	0.03 (0.16)
Working in a different profession from pharmacy	0.34 (0.47)	0.23 (0.42)	0.15 (0.36)	0.11 (0.31)	0.15 (0.35)	0.03 (0.16)
Not working at all (due to retirement, returning to study, family commitment, etc.)	0.56 (0.50)	0.19 (0.39)	0.09 (0.29)	0.07 (0.25)	0.06 (0.24)	0.03 (0.18)
Sample	712					
Note: Standard Deviation in parentheses						

Table 14: Reported professional commitment

	Strongly disagree (Mean (SD))	Disagree (Mean (SD))	Neutral (Mean (SD))	Agree (Mean (SD))	Strongly agree (Mean (SD))	Not applicable (Mean (SD))
If I could do it all over again, I would still choose to work in the pharmacy profession.	0.25 (0.43)	0.25 (0.43)	0.15 (0.36)	0.19 (0.40)	0.15 (0.35)	0.01 (0.07)
For me, pharmacy is the ideal profession for my life's work.	0.21 (0.41)	0.25 (0.43)	0.22 (0.42)	0.20 (0.40)	0.11 (0.31)	0.00 (0.05)
I am disappointed that I ever entered the pharmacy profession.	0.16 (0.37)	0.30 (0.46)	0.22 (0.42)	0.14 (0.35)	0.15 (0.36)	0.02 (0.13)
I like this profession too much to give it up.	0.18 (0.38)	0.26 (0.44)	0.25 (0.43)	0.21 (0.41)	0.09 (0.29)	0.01 (0.12)
If I could go into a different profession, but which paid the same, I would probably do so.	0.11 (0.31)	0.24 (0.42)	0.21 (0.41)	0.22 (0.42)	0.21 (0.40)	0.02 (0.13)
Sample	710					
Note: Standard Deviation in parentheses						

Discussion

This report summarises the development and key findings of the PAMELA survey wave 1. Given minimal resources in terms of time, funding and labour, a sample of 824 pharmacy degree holders can be considered as a promising starting point to examine some key issues of the Australian Pharmacy Workforce. Overall, respondents were considered to be closely representative of the pharmacy workforce based on known characteristics.

A noticeable achievement of this data collection is that 80% of respondents agreed to participate in further research after completing the PAMELA survey. Approximately 521 email addresses were collected for further research. This shows that the PAMELA survey was well-received by respondents and that the content of the PAMELA questionnaire is good quality and of interest to respondents. Furthermore, of the 20% who do not agree to participate in further research, some are retired or working in a non-pharmacy profession, thus, further research on the pharmacy workforce will not be as relevant to them.

Multiple approaches to respondents were used in this study combining with the use of advertising and social media. Due to the inability to have only one panel database which has information of all respondents, one respondent in our study may receive the invitation email from several sources. Thus, the use of a verifiable key to access the survey could not be used. However, a set of collected variables such as IP address, response patterns, browser types, survey version, language setting, and time sequences could be used as a stand-in proxy for a single person. As such, the quality of responses in this study can be controlled to a certain degree. Selection bias is one potential limitation of this study. Pharmacy degree holders who chose to complete the survey may be more motivated than ones who did not. As such, this cohort of pharmacy degree holders is more likely to be the key drivers and advocates for any reform in the profession. The information collected from this group may not be representative of all pharmacy degree holders but it likely indicates the views of the most influential group of respondents on the future of the Australian Pharmacy Workforce.

In terms of the results of the reported job satisfaction of respondents, difference across pharmacy sectors were seen with respondents working in the pharmaceutical industry, government and hospital sectors reporting higher overall job satisfaction than those working in community pharmacy.

Differences across age groups were also seen, with those in older age groups reporting higher satisfaction than younger respondents; particularly the under 25-year-old age group. Further research is required to determine possible causal mechanisms for the variation in job satisfaction seen. Longitudinal PAMELA data collection is required for such an analysis.

The PSA is committed to supporting this further research into the Australian Pharmacy Workforce to better understand and foster enhanced participation in, and ongoing commitment to the pharmacy profession. PSA is particularly concerned about the wellbeing of the pharmacy workforce. As a result of the Covid—19 pandemic, there have been changes to the working conditions of many pharmacists, including staffing problems, constantly changing legislation, supply chain issues and medication shortages. These challenges have all placed extra pressure on pharmacists, further threatening the pharmacy workforce; a concept which must be acknowledged and planned for. The PSA is also committed to ensuring pharmacists are working to their full scope of practice, and that pharmacists' roles can grow and evolve to further alleviate the strain on primary healthcare providers. As mentioned previously, there is a significant shortfall predicted in other primary care workforces, such as GP services, with these shortfalls disproportionately affecting rural and remote areas (Pharmaceutical Society of Australia, 2019). Identifying the potential gaps in pharmaceutical services which may have the potential to absorb some of this predicted burden is imperative.

Thus, further investigation on other important issues such as career planning and professional commitment are undoubtedly needed to not only ensure the retention but also improve the well-being of the pharmacy workforce. Such research relies on a large, representative, and comprehensive dataset, ideally longitudinal, to track respondents over time and enable detection of causal effects of various factors within the current policy and employment environment on the participation, engagement and wellbeing of the pharmacy workforce.

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