





RESEARCH ARTICLE

Transformation of the pharmacy profession in Pakistan: A mixed-method study based on FIP development goals

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Abstract

Background: The pharmacy profession is underdeveloped and unrecognised in low and middle-income countries. Recognising this, the International Pharmaceutical Federation (FIP) has published 21 development goals to develop the pharmacy profession. This mixed-method study was conducted to determine a priority-based hierarchy of the FIP development goals and identify the barriers to achieving these goals in Pakistan. **Methods:** A total of 400 and 15 pharmacists participated in the quantitative and qualitative parts of the study, respectively. **Results:** Overall, the pharmacy profession in Pakistan was not progressing at the pace required. The participants advocated prioritisation of the 'Practice' element to bridge the gap between the current situation and required progress. The main barriers to transformation were a lack of implementation of theoretical knowledge, training and internship programmes, and regulatory deficits in policy development and implementation. **Conclusion:** Mandatory government leadership and backing will be required to advance practice-related aspects and address intertwined barriers to professional development in the country.

Introduction

Pharmacy is a dynamic profession dedicated to patient wellbeing (Atif *et al.*, 2017; Atif & Malik, 2020; Atif *et al.*, 2020b). For a decade, the pharmacy profession has become a requisite to strengthen primary healthcare, ensure patient safety, and reduce healthcare costs (Malik, Ikram & Rafiq, 2019; Liu *et al.*, 2020; Nadeem, Samanta & Mustafa, 2020). In this regard, the World Health Organization (WHO), the International Pharmaceutical Federation (FIP), the European Society of Pharmacy, and the Canadian Pharmacist Association have provided the impetus to drive these transformations. However, low and-middle income countries (LMICs), including Pakistan, have not fully recognised the need to advance the pharmacy

profession despite the fast-growing demand for improved access to patient-centred care (Nguyen & Holmes, 2019; Atif & Malik, 2020; Liu *et al.*, 2020; Zheng *et al.*, 2020). The transformation from product-oriented to patient-oriented pharmacy services in these nations is unsatisfactory for several reasons (Vo *et al.*, 2013; Bhagavathula, Sarkar & Patel, 2014; Knoer, Eck & Lucas, 2016; Liu *et al.*, 2020). For example, the education and training of pharmacists have been impeded by limited academic capacity, non-existent early career training strategies, and the lack of competency development models (Vo *et al.*, 2013, Katoue & Schwinghammer, 2020; Shrestha, Shakya & Palaian, 2020). On the other hand, the advancement has been thwarted by the lack of specialist development protocols, non-existent continuing professional development strategies, and

derisory focus on advanced pharmacy services, such as medication safety, people-centred care, communicable disease management, antimicrobial stewardship, and digital health (Bhagavathula, Sarkar & Patel, 2014; Madiha & Yang, 2014; Knoer, Eck *et al.*, 2016; Nguyen & Holmes, 2019; Atif & Malik, 2020; Atif *et al.*, 2020b; Malik *et al.*, 2020; Nadeem, Samanta & Mustafa, 2020). Regarding professional standing and overall recognition of pharmacists in LMICs, lack of leadership, professional inequity, lack of collaboration with other healthcare professionals, lack of impactful research, and limited involvement of pharmacists in health policy development and implementation act as barriers (Malik, Ikram & Rafiq, 2019; Atif *et al.*, 2020b; Liu *et al.*, 2020; Zheng *et al.*, 2020).

Anticipating the barricades, the FIP has postulated a set of interlinked pharmacy development goals to transform the pharmacy profession in alignment with the United Nations Sustainable Development Goals (SDGs) (International Pharmaceutical Federation, 2021). Broadly, these goals emphasise progress in the pharmaceutical workforce, practice, and science. Based on these goals, LMICs need to generate local evidence on how they can overcome national challenges and achieve professional transformation in line with the developed world. The same is warranted in Pakistan, where the pharmacy profession has completed its seventy-third anniversary guided by the Pharmacy Act, 1967, and the Drug Regulatory Authority of Pakistan (DRAP) Act, 2012 (Malik, Ikram & Rafiq, 2019; Atif *et al.*, 2020b). Poor professional recognition at the governmental, healthcare professional, and patient levels, predominantly stemming from under-utilisation, indicates that pharmacists are still flying under the radar in the country. A plethora of academia, regulatory, and pharmacist-related factors are eroding the way for pharmacists to be accepted as “seven-star pharmacists” having well-versed expertise as caregivers, decision-makers, communicators, managers, leaders, life-long learners, and teachers (Hallit *et al.*, 2019). Against the status quo, there is a need to reflect and analyse how the pharmacy profession in Pakistan can be furthered in accordance with the FIP development goals. Therefore, this mixed-method study was conducted to determine the priority-based hierarchy, aiming to provide a roadmap to the transformation of the pharmacy profession in Pakistan. In addition, the perspective of pharmacists from all specialty areas was sought about the barriers to achieving pharmacy development goals in the local context, together with solutions to aid in the implementation. The findings of this study are expected to sensitise and guide the health sector, regulatory bodies, and national pharmacy organisations to transform the profession from a bleeding edge to a cutting edge.

Methods

Study setting

The study was conducted in Punjab, Pakistan, the most populous province of Pakistan, with a population of about 30,451,858. In Pakistan, there are an estimated 8102–10,000 employed pharmacists, the majority (55%) of whom are involved in the production of pharmaceuticals (Khan *et al.*, 2020). The approximate number of pharmacy graduates (employed and unemployed) in the Punjab Province is 22,000. This study included pharmacists who worked in academic and healthcare institutes, community pharmacies, pharmaceutical industries, regulatory departments, and drug testing laboratories. In addition, pharmacists working in the different divisions of the Drug Regulatory Authority of Pakistan, Islamabad, were approached for qualitative interviews.

Study design and selection of participants

A mixed-method design was used to achieve the study objectives. The quantitative portion was a descriptive cross-sectional study. The sampling of participants was undertaken using the stratified sampling method (Meng, 2013), which involves the division of a population based on shared attributes into smaller sub-groups known as strata (i.e., regulators, academicians, community pharmacists, hospital pharmacists, and industrial pharmacists). The required sample size was determined through the OpenEpi sample size calculator, with a 5% margin of error (M.E), a 95% confidence level, and an assumption of a 70% response rate (Sullivan, Dean & Soe, 2009). This calculation resulted in a sample size of 400 pharmacists (12 regulators, 23 teachers, 253 community pharmacists, 42 hospital pharmacists, and 70 industrial pharmacists). Verbal consent to participate in the study was obtained from each participant.

The qualitative part was based on in-depth, semi-structured interviews to explore pharmacists' views about the scope and recognition of the pharmacy profession in light of FIP goals. The pharmacists were selected through a mix of purposive and convenient sampling (Campbell *et al.*, 2020). In the first step, identified participants were purposively approached to ensure information richness and representation of the targeted population. In the second step, consenting participants were conveniently approached for interviews. A saturation point criterion was used to determine the sample size (Saunders *et al.*, 2018). Three additional interviews were undertaken to validate saturation in emerging themes. Consolidated Criteria for Reporting Qualitative Research (COREQ) was followed to present the findings of the qualitative part (Dossett, Kaji & Cochran, 2021).

In addition to the triangulation method, which involves the use of different methodologies to address the study aim, data source triangulation was performed for a comprehensive analysis (Tzagkarakis & Kritas, 2022). This technique consists of data collection from stakeholders of different sectors of the pharmacy profession in Pakistan (i.e., pharmaceutical regulators, teachers, community pharmacists, hospital pharmacists, and industrial pharmacists). Pharmacists with a minimum work experience of more than one year and past experience in different pharmacy settings were eligible to participate in the study to assure the quality, reliability, and trustworthiness of the data gathered (Anney, 2014).

Data collection and study tool

For the quantitative part, a structured close-ended data collection tool was designed based on FIP development goals (International Pharmaceutical Federation, 2021). The questionnaire was divided into two main parts. The first part was about sociodemographic details of the study participants, while the second part comprised the 21 FIP goals, each including three main elements (i.e., workforce, practice, and science). Three priority levels were defined, i.e., high (rank 1), medium (rank 2), and low (rank 3). The participants were requested to rank elements by priority in each goal based on Pakistan's pharmacy profession's needs. A pilot scale study was undertaken before starting the final data collection, which was done in July 2021.

For the qualitative part, a semi-structured interview schema was constructed for each stakeholder after reviewing the literature (Khan, 2011; Madiha & Yang, 2014; Atif *et al.*, 2017; Malik *et al.*, 2019; Atif *et al.*, 2020b; Malik *et al.*, 2020; Shamim, Rasheed & Babar, 2021) and considering the findings of the quantitative part of the study. The interview schema contained 11 key questions and several probes focused on different aspects of development goals deemed relevant by the participants. Academicians and industrial pharmacists were interviewed in August 2021, while government officials were interviewed in September 2021. All stakeholders were invited to participate in the study and provided with details about the study objectives through telephone calls. Based on their choice, the consenting pharmacists were provided with additional information either face-to-face or via electronic mail. All face-to-face interviews were conducted at places and times convenient for both interviewers and interviewees. Few participants were interviewed telephonically due to COVID-19.

In this study, face validity was conducted for both quantitative and qualitative questionnaires to ensure the feasibility, readability, consistency of style and

formatting, and clarity of the language (Taherdoost, 2016) and was facilitated by a total of five participants. The content validity of these questionnaires was ensured by an extensive literature review and then feedback from experts. A total of two experts were approached for this purpose. Lawshe's content validity ratio of 0.70 was deemed acceptable (Gilbert & Prion, 2016; Taherdoost, 2016).

Data analysis

Quantitative data were analysed using the Statistical Package for Social Sciences software (SPSS Statistics for Windows, version 20, IBM Corp., Armonk, NY, USA). Simple descriptive statistics were used to present the results of the quantitative part.

Qualitative data were analysed using the inductive thematic analysis approach (Kiger & Varpio, 2020). Interviews were undertaken in Urdu, the national language of Pakistan. The audio-recorded interviews were transcribed verbatim then transcripts were carefully translated into English. Of those, 20% were subjected to forward and backward translations to confirm the accuracy of translations (Atif *et al.*, 2019). The transcriptions were read carefully to get familiarised with the data and label the matching words, phrases, and sentences pointing towards the study objectives. Different initial codes were grouped into meaningful categories for data reduction and compilation. Initial coding was accompanied by focused coding. Subsequently, themes and categories were finalised after a recursive review of transcripts and codes. Explanatory quotations matching each category were chosen, and the results were written to produce the final report. In case of any conflict or disagreement during discussions, the final verdict was given by the supervisor (MAT).

Ethics approval

Written ethics approval was obtained from the Pharmacy Research Ethics Committee (PREC) at Islamia University, Bahawalpur. Verbal consent was obtained from all participants and approved by the PREC. The participants were encouraged to read the purpose of the study and the confidentiality statement before starting the interview. The names of the respondents were not disclosed in the study, and audio recordings were saved on a password-protected computer. The respondents were also free to skip any question or quit the interview at any time.

Results

Quantitative part

A total of 450 pharmacists were approached, and 400 agreed to participate in the study (response rate of 88.8%). The demographic characteristics of study participants are displayed in Table I.

A detailed description of priority elements within each goal is shown in Table II. "Workforce" was chosen as a priority element in goal 8 (43.5%), goal 13 (54.2%), and goal 17 (51.2%). "Practice" was taken as a lead element to transform goal 1 (50.2%), goal 5 (48.2%), goal 6 (52.5%), goal 9 (45.2%), goal 10 (55.2%), goal 11 (47.5%), goal 14 (43.5%), goal 15 (51%), goal 16 (50.5%), goal 18 (45.5%), and goal 20 (44.8%). "Science" was coined as a top priority element to advance goal 2 (47.7%), goal 3 (54%), goal 4 (55%), goal 7 (51.2%), goal 12 (52.2%), goal 19 (53.3%), and goal 21 (42.5%).

A detailed description of the prioritisation of elements within each goal based on various variables is given in Supplementary file 1.

Table I: Sociodemographic characteristics of the participants

Characteristics	Frequency n (%)
Gender	
Male	288 (72.0)
Female	112 (28.0)
Professional status	
Teacher	23 (5.8)
Industrial pharmacist	68 (17.0)
Hospital pharmacist	42 (10.5)
Community pharmacist	255 (63.8)
Regulatory pharmacist	12 (3.0)
Experience (Years)	
> 1	101 (25.3)
2-5	243 (60.8)
6-10	43 (10.8)
11-20	10 (2.5)
>21	3 (8.0)
Specialty	
No specialty	220 (55.0)
Pharmacology	45 (11.3)
Pharmaceutics	92 (23.0)
Pharmacy practice	27 (6.8)
Pharmacognosy	3 (8.0)
Pharmaceutical chemistry	13 (3.3)
Workplace organisation type	
Public	66 (16.5)
Private	334 (83.5)
Relevant international exposure	
No	379 (94.8)
Yes	21 (5.3)

Table II: Prioritisation of elements within each goal

Goals	Elements	1 st priority n (%)	2 nd priority n (%)	3 rd priority n (%)
Goal 1: Academic capacity	Workforce	142 (35.5)	155 (38.7)	103 (25.8)
	Practice	201 (50.2)	163 (40.8)	36 (9)
	Science	172 (43)	61 (15.2)	167 (41.8)
Goal 2: Early career training strategy	Workforce	153 (38.2)	156 (39)	91(22.8)
	Practice	185 (46.2)	155 (38.8)	60 (15)
	Science	191 (47.7)	56 (14)	153 (38.3)
Goal 3: Quality assurance	Workforce	161 (40.2)	84 (21)	155 (38.8)
	Practice	174 (43.5)	177 (44.3)	49 (12.2)
	Science	216 (54)	107 (26.8)	77 (19.2)
Goal 4: Advanced and specialist development	Workforce	180 (45)	100 (25)	120 (30)
	Practice	153 (38.2)	164 (41)	83 (20.8)
	Science	220 (55)	106 (26.5)	74 (18.5)
Goal 5: Competency development	Workforce	127 (31.7)	144 (36)	129 (32.3)
	Practice	193 (48.2)	140 (35)	67 (16.8)
	Science	170 (42.5)	114 (28.5)	116 (29)
Goal 6: Leadership development	Workforce	160 (40)	166 (41.5)	74 (18.5)
	Practice	210 (52.5)	154 (38.5)	36 (9)
	Science	139 (34.8)	54 (13.5)	207 (51.7)
Goal 7: Advancing integrated services	Workforce	155 (38.8)	107 (26.7)	138 (34.5)
	Practice	183 (45.8)	145 (36.2)	72 (18)
	Science	205 (51.2)	108 (27)	87 (21.8)

Goals	Elements	1 st priority n (%)	2 nd priority n (%)	3 rd priority n (%)
Goal 8: Working with others	Workforce	174 (43.5)	138 (34.5)	88 (22)
	Practice	154 (38.5)	203 (50.7)	43 (10.8)
	Science	157 (39.2)	73 (18.3)	170 (42.5)
Goal 9: Continuing professional development strategies	Workforce	180 (45)	86 (21.5)	134 (33.5)
	Practice	181 (45.2)	134 (33.5)	85 (21.3)
	Science	165 (41.2)	151 (37.8)	84 (21)
Goal 10: Equity and equality	Workforce	165 (41.2)	145 (36.3)	90 (22.5)
	Practice	221 (55.2)	97 (24.3)	82 (20.5)
	Science	126 (31.5)	147 (36.7)	127 (31.8)
Goal 11: Impacts and outcomes	Workforce	125 (31.2)	157 (39.3)	118 (29.5)
	Practice	190 (47.5)	169 (42.2)	41 (10.3)
	Science	184 (46)	95 (23.7)	121 (30.3)
Goal 12: Pharmacy intelligence	Workforce	144 (36)	166 (41.5)	90 (22.5)
	Practice	173 (43.2)	142 (35.5)	85 (21.3)
	Science	209 (52.2)	69 (17.3)	122 (30.5)
Goal 13: Policy development	Workforce	217 (54.2)	93 (23.3)	90 (22.5)
	Practice	157 (39.2)	157 (39.2)	86 (21.6)
	Science	146 (36.5)	116 (29)	138 (34.5)
Goal 14: Medicines expertise	Workforce	174 (43.5)	81 (20.2)	145 (36.3)
	Practice	214 (53.5)	128 (32)	58 (14.5)
	Science	157 (39.2)	135 (33.8)	108 (27)
Goal 15: People-centred care	Workforce	169 (42.3)	165 (41.2)	66 (16.5)
	Practice	204 (51)	111 (27.7)	85 (21.3)
	Science	118 (29.5)	115 (28.7)	167 (41.8)
Goal 16: Communicable diseases	Workforce	125 (32.2)	158 (39.5)	117 (29.2)
	Practice	202 (50.5)	126 (31.5)	72 (18)
	Science	171 (42.8)	94 (23.5)	135 (33.8)
Goal 17: Antimicrobial stewardship	Workforce	205 (51.2)	89 (22.3)	106 (26.5)
	Practice	202 (50.5)	114 (28.5)	84 (21)
	Science	149 (37.3)	138 (34.5)	113 (28.2)
Goal 18: Access to medicines, devices and services	Workforce	147 (36.8)	132 (33)	121 (30.2)
	Practice	182 (45.5)	154 (38.5)	64 (16)
	Science	178 (44.5)	96 (24)	128 (31.5)
Goal 19: Patient safety	Workforce	151 (37.8)	118 (29.5)	131 (32.8)
	Practice	179 (44.8)	155 (38.8)	66 (16.4)
	Science	213 (53.3)	74 (18.5)	113 (28.2)
Goal 20: Digital health	Workforce	130 (32.5)	150 (37.5)	120 (30)
	Practice	179 (44.8)	156 (39)	65 (16.2)
	Science	168 (42)	107 (26.7)	125 (31.3)
Goal 21: Sustainability in pharmacy	Workforce	167 (41.8)	136 (34)	97 (24.2)
	Practice	158 (39.5)	172 (43)	70 (17.5)
	Science	170 (42.5)	80 (20)	150 (37.5)

Qualitative part

Characteristics of the participants

A total of 21 pharmacists working in different sectors were approached, and 15 (10 male and 5 female) agreed to participate (refusal rate of 28%) in the study. The saturation point was reached after the thirteenth interview. However, two additional interviews have

been conducted to confirm that no new information can be retrieved from further interviews. Pharmacists working in academia (a; n=5), the pharmaceutical industry (i; n=5), and drug testing laboratories (r; n=5) were interviewed. The interview duration ranged from 18 to 44 minutes, with a mean duration of 31 minutes. The demographic characteristics of participants are provided in Table III.

Table III: Sociodemographic characteristics of the respondents

Respondents	Gender	Professional status	Experience (years)	Specialty	Interview duration (minutes)
Pharmacist 1a [†]	Male	Academician	3	Pharmacy practice	25
Pharmacist 2r [‡]	Female	Pharmacist in drug testing laboratory	2	Pharmacology	18
Pharmacist 3r [‡]	Female	Pharmacist in drug testing laboratory	5	Pharmaceutical chemistry	20
Pharmacist 4i [*]	Male	Industrial pharmacist	3	None	20
Pharmacist 5r [‡]	Male	Analyst pharmacist	11	Pharmacology	18
Pharmacist 6a [†]	Male	Teacher	6	Pharmaceutical biotechnology and bio-advancement	23
Pharmacist 7a [†]	Male	Academician	5	Pharmacology	19
Pharmacist 8i [*]	Female	Industrial pharmacist	4	Pharmaceutics	20
Pharmacist 9r [‡]	Male	Analyst pharmacist	5	Pharmacy practice	44
Pharmacist 10i [*]	Female	Industrial pharmacist	2	Pharmaceutics	23
Pharmacist 11a [†]	Male	Academician	3.5	Pharmaceutical chemistry	25
Pharmacist 12a [†]	Male	Academician	18	Pharmacognosy	20
Pharmacist 13r [‡]	Male	Deputy drug controller	18	Pharmaceutical chemistry	32
Pharmacist 14i [*]	Male	Industrial pharmacist	6	None	21
Pharmacist 15i [*]	Female	Industrial pharmacist	3	Pharmaceutics	20

Mean duration= 31 minutes (SD = 6.8); † - Academia, ‡ - Drug testing laboratories, * - Pharmaceutical industry

Three main themes were retrieved from the saturated pool of information, i.e., advancement of pharmacy in Pakistan, gaps or barriers to achieving goals, and recommendations for achieving goals. The themes were further subdivided into 17 subthemes and 51 categories.

Theme 1: Advancement of the pharmacy profession in Pakistan

When asked to describe the ongoing extent of progress, most respondents (13 out of 15) evinced that the pharmacy profession is advancing but not at the pace required to compete with the world. They went on to say that while the number of pharmacists was growing, their competencies and skills fell behind those of their counterparts in the developed world.

Theme 2: Gaps or barriers to achieving goals

Almost all respondents described some common gaps, such as the lack of practical knowledge and the focus of academia only on theoretical learning. They reported that the scarcity of funds, research, and laboratory facilities also played a significant role in the lack of

practical knowledge. Other major gaps described by the respondents were regulatory shortfalls and failure to enact policies. In addition, lack of training, competency, leadership, expertise, inter-and intra-professional collaboration, recruitment of pharmacists in public sectors, and outdated curricula were other common gaps/ barriers to achieving FIP development goals in Pakistan.

Theme 3: Recommendations for achieving goals

The majority of respondents (12 out of 15) advocated for policy development and implementation. They emphasised the urgent need for updating and revising drug laws and developing a proper path to implementing policies. Among the common recommendations were adequate training and internship programmes for fresh graduates and even final-year students. They anticipated that through training and internship, a competent and skilled workforce could be produced and would be able to compete internationally. Other common recommendations included applying theoretical knowledge through establishing affiliated hospitals, advancing pharmacy practice, increasing the number of

pharmacists in the public sector, improving knowledge through continuing professional development strategies, reviewing curricula, and developing leadership.

All themes, subthemes, and categories, together with supporting quotations, are outlined in Table IV. Tables V and VI provide in-depth details on the barriers and recommendations linked to each development goal.

Table IV: Themes, subthemes, categories, and exemplar quotations

Subtheme	Categories and subcategories	Quotations
Theme 1: Advancement of the pharmacy profession in Pakistan		
Pharmacist's opinion about the advancement of the pharmacy profession in Pakistan	<ul style="list-style-type: none"> Progressing but with low pace Not progressing accordingly Yes, it is progressing 	<p><i>"In Pakistan, pharmacy profession is progressing, but not at the rate that is required."</i> (Pharmacist 6a)</p> <p><i>"Our profession is standing nowhere in our country, hundreds of pharmacists graduate annually, but we aren't progressing accordingly."</i> (Pharmacist 10i)</p> <p><i>"Yes, it is definitely progressing, with new innovations and discoveries, particularly in the field of research and academia."</i> (Pharmacist 12a)</p>
Theme 2: Gaps or barriers to achieving goals		
Lack of practical knowledge and expertise	<ul style="list-style-type: none"> Our academia is theory oriented Lack of basic practical facilities Due to lack of expertise, professionals don't perform their duties well We don't have specialised personnel in our profession Pharmacists don't put efforts in pharmaceutical care plan due to poor implementation of patient safety programs Different factors contributing to poor competency Different pharmacy education system also contribute to poor competency 	<p><i>"In academia, we are more concerned with theoretical knowledge than the practical knowledge."</i> (Pharmacist 3r)</p> <p><i>"We do not provide our students with basic practical facilities. This disparity is exacerbated by a lack of funds, communication, and resources."</i> (Pharmacist 12a)</p> <p><i>"Due to lack of proper knowledge and confidence, pharmacists lack expertise, and that's the reason they don't perform their duties properly and people don't recognize and are aware of their importance in health care system."</i> (Pharmacist 8i)</p> <p><i>"Our country lacks opportunities for specialisation and advancement, so we don't have specialised pharmacists."</i> (Pharmacist 9r)</p> <p><i>"Pharmacists do not attempt to raise public awareness and do not even properly counsel patients."</i> (Pharmacist 15r)</p> <p><i>"We don't know about pharmacovigilance system in our country that's why we aren't playing our role in patient safety."</i> (Pharmacist 9r)</p> <p><i>"Lack of confidence, interactions, practical knowledge, and training are all factors that contribute to poor competency and quality."</i> (Pharmacist 2r)</p> <p><i>"Different pharmacy education systems in our country also contribute to poor competency and poor quality of pharmaceutical services."</i> (Pharmacist 11a)</p>
Lack of confidence	<ul style="list-style-type: none"> Pharmacy professionals don't consider themselves competent 	<p><i>Pharmacists do not believe that they are competent or skilled enough to deal with a variety of situations and to fulfill their role in ensuring patient safety."</i> (Pharmacist 5r)</p>
Lack of training and internship	<ul style="list-style-type: none"> We don't have training and internship programs 	<p><i>"Most of the pharmacists don't work properly in their professional life due to lack of proper trainings and internship during and after their graduation."</i> (Pharmacist 6a)</p>
Government/Regulatory deficit	<ul style="list-style-type: none"> Lack of funds for research Lack of sound policies Policies are not implemented and sustained Policies aren't updated 	<p><i>"The government does not allocate sufficient funds for research and laboratory facilities."</i> (Pharmacist 1a)</p> <p><i>"We don't have clear policies regarding our roles, duties, recruitment, training, surveillance and research sharing."</i> (Pharmacist 10i)</p> <p><i>"Policies are not sustained and their implementation is also negligible."</i> (Pharmacist 7a)</p> <p><i>"Our policies have not been updated or revised since long time. These are based on our old Drugs Law 1976."</i> (Pharmacist 9r)</p>
Lack of advancement in our profession	<ul style="list-style-type: none"> Lack of advancement in our system Lack of advancement in our curriculum and practices 	<p><i>"We don't have advancement or digitalization in our system; we're still using the old-fashioned basics."</i> (Pharmacist 6a)</p>

Subtheme	Categories and subcategories	Quotations
	<ul style="list-style-type: none"> No strategies for continuing professional development 	<p><i>"Until and unless integrated services are not advanced, our profession will not become advanced, and this is because of lack of advancement in our curriculum and practices."</i> (Pharmacist 8i)</p> <p><i>"We stop learning once we graduate and find no reason to continue our professional education, that's why we aren't moving towards advancement."</i> (Pharmacist 10i)</p>
Lack of leadership	<ul style="list-style-type: none"> Our teachers don't build leadership qualities in their students We don't have selfless leaders in our profession 	<p><i>"Our workforce, especially our teachers, doesn't polish and groom students to become leaders."</i> (Pharmacist 5r)</p> <p><i>"In our profession, we don't have good, iconic personalities as leaders, and our leaders don't pave the way for their juniors and subordinates."</i> (Pharmacist 8i)</p>
Lack of intra and interprofessional collaboration	<ul style="list-style-type: none"> Our professionals don't collaborate with other healthcare professionals Misguided approach 	<p><i>"Our profession is undervalued because pharmacists do not collaborate well with others, possibly due to a lack of internship and training."</i> (Pharmacist 14i)</p> <p><i>"We aren't ready to collaborate with others because we believe we're there to find flaws in other people's work; our students are misled, that's why they don't collaborate with others."</i> (Pharmacist 13r)</p>
Low recruitment of pharmacists in hospitals	<ul style="list-style-type: none"> Less number of pharmacists in our hospitals Inequality in our profession Female pharmacist have few opportunities 	<p><i>"We had a very low number of pharmacists in public sector hospitals, with only one pharmacist available for half a day per entire ward, that's the major cause why we do not play our role in patient safety."</i> (Pharmacist 7a)</p> <p><i>"Our professionals do not have the equal opportunities to develop, flourish, and excel in their abilities. In comparison to male pharmacists, female pharmacists have fewer opportunities. The same is true for pharmacist recruitment in rural areas."</i> (Pharmacist 10i)</p>
Theme 3: Recommendations for achieving goals		
Implementation of theoretical knowledge	<ul style="list-style-type: none"> There should be no difference between academic and professional life Funds should be allocated for paid clinical internships Educational institutes should be affiliated with hospitals, industries and drug testing laboratories 	<p><i>"It's important for us to bridge the gap between our academic and professional lives."</i> (Pharmacist 4i)</p> <p><i>"Government should allocate special funds for paid internships, clinical research and lab facilities."</i> (Pharmacist 1a)</p> <p><i>"There should be affiliated hospitals where pharmacy students gain practical experience."</i> (Pharmacist 10i)</p> <p><i>"We should give chance to our students to work with other professionals during their studies and get themselves trained by collaborating with some affiliated hospital, industry, drug testing laboratory."</i> (Pharmacist 15i)</p>
Improve the knowledge of our professionals through internships and training programs	<ul style="list-style-type: none"> Pharmacists should equip themselves with expert level knowledge and skills Online program should be availed to literate the workforce Improve our academic system Strictly follow guidelines for hospital and community pharmacy practice 	<p><i>"Pharmacist knowledge should be improved so that they have a firm grasp on every aspect of the drug and can be considered experts."</i> (Pharmacist 10i)</p> <p><i>"The World Health Organization is also introducing a number of online training programmes that we should take advantage of."</i> (Pharmacist 5r)</p> <p><i>"We should relieve some of the pressure on our students and work to improve our teaching and examination systems."</i> (Pharmacist 8i)</p> <p><i>"We should follow any private organization where pharmacists' roles are defined in accordance with international guidelines and they perform them properly in a good environment while interacting with other professionals. We should follow and implement these guidelines in our public sector hospitals."</i> (Pharmacist 9r)</p>
Policy development and implementation	<ul style="list-style-type: none"> Policies regarding internship and training Defined policies regarding duties and role of pharmacist Policies should be sustained Implementation of policies with defined targets 	<p><i>"Stakeholders should develop policies for a paid internship during graduation and at least one-year paid training programme for every pharmacist immediately after graduation."</i> (Pharmacist 2r)</p> <p><i>"Should establish clear policies regarding pharmacist roles and responsibilities in various domains, and everyone should be given an equal opportunity to perform."</i> (Pharmacist 10i)</p> <p><i>"Policies should be sustained for at least 5-10 years, and we should set some key performance indicators."</i> (Pharmacist 5r)</p>

Subtheme	Categories and subcategories	Quotations
	<ul style="list-style-type: none"> • Sound policies regarding continuing professional development • A sound funding policy to support competitive remuneration 	<p><i>"A proper path and structure for the development and implementation of pharmaceutical policies should be established, and policies should be strictly enforced in hospital and community settings."</i> (Pharmacist 14i)</p> <p><i>"The government should increase funds to advance the profession through provision of competitive remuneration, especially for community pharmacists."</i> (Pharmacist 3r)</p>
Shift towards advance pharmacy practice	<ul style="list-style-type: none"> • Time to adapt the advance technologies and services • New discipline should be introduced • Patient safety should be a focus • Train the workforce for pharmacovigilance program • Availability of tele-pharmacy and home-based pharmacy services • Advanced practices for pharmacist • Antimicrobial stewardship program should be launched • Train the workforce for pandemics 	<p><i>"Advancement in the profession is the need of hour particularly in our curriculum, research, services, products, technologies."</i> (Pharmacist 8i)</p> <p><i>"New subjects should be introduced in our professional curriculum."</i> (Pharmacist 12a)</p> <p><i>"Pharmacist should practice patient safety at hospital and community level by increasing their interaction with patients."</i> (Pharmacist 11a)</p> <p><i>"Pharmacist should be trained to work in pharmacovigilance and poison control centres."</i> (Pharmacist 9r)</p> <p><i>"We should digitally educate our pharmacists and introduce tele-pharmacy and home-based pharmacy services. Also, we should create a system in which patients, pharmacists, and physicians are all connected online to improve the quality of services."</i> (Pharmacist 6a)</p> <p><i>"Pharmacists should play their role in advanced pharmacy practices, such as, antimicrobial stewardship program, dose adjustment, monitoring of narrow therapeutic index drugs and drug interactions."</i> (Pharmacist 7a)</p> <p><i>"We can launch antimicrobial stewardship program for fourth and final year students and collaborate with primary and tertiary care hospitals."</i> (Pharmacist 7a)</p> <p><i>"Workforce should be trained to prove themselves during pandemics or outbreaks of any communicable disease, as well as to ensure patient safety"</i> (Pharmacist 11a)</p>
Increase the quantity of pharmacists across all fields	<ul style="list-style-type: none"> • Increase the quantity of workforce in academia, healthcare institutes and regulatory departments 	<p><i>"In Pakistan, teacher to student ratio is very low. This needs to be improved to inculcate skills in pharmacy students. At least, this should be parallel to academic workforce in other health related fields."</i> (Pharmacist 4a).</p> <p><i>"Increase the quantity of pharmacist in hospitals. Not only this will facilitate pharmacist to practice clinical roles and improve their expertise, but pharmacist-led patient safety and individualised patient care interventions will lead to better health outcomes and reduced healthcare cost."</i> (Pharmacist 13r).</p> <p><i>"We have shortage of regulatory level pharmacy workforce. More regulatory pharmacists should be employed to influence pharmaceutical policies as required, as well as to ensure regulatory vigilance with regard to both existing and new legislations."</i> (Pharmacist 9r).</p>
Syllabus should be revamped	<ul style="list-style-type: none"> • Curriculum should be revised • Focus should be towards practice improvement through additional training hours 	<p><i>"The Pakistan Pharmacy Council should revise the curriculum to meet international standards."</i> (Pharmacist 4i)</p> <p><i>"The syllabus should be revised and structured in an effective manner with additional training hours and pre-graduation internships to train and skill our students to deal with various problems and become good professionals."</i> (Pharmacist 5r)</p>
Competency development	<ul style="list-style-type: none"> • Through competency we can improve quality of our services 	<p><i>"Competency necessitates the use of certain tools and skills, which should be provided by organisations, particularly academic institutes, and skills should be developed through interaction with teachers, seniors, and other professionals; this is how you improve the quality of your services."</i> (Pharmacist 9r)</p> <p><i>"Competency development is a component of the quality assurance process. When you are trained and have skills, your syllabus improves, and your system is maintained, an avenue opens up for you, and you gain competency."</i> (Pharmacist 14i)</p>

Subtheme	Categories and subcategories	Quotations
Leadership development	<ul style="list-style-type: none"> Teachers should build leadership qualities in their students Leadership development is a linkage 	<p><i>"Teachers should groom and polish their students and leaders should become more selfless and guide their juniors and subordinates."</i> (Pharmacist12a)</p> <p><i>"Leadership development is very important because it is a linkage between two generations...everyone should get training from high professionals."</i> (Pharmacist 6a)</p>

Table V: Barriers to professional development with regard to each goal

FIP DGs	Government/ Regulatory deficit	Lack of practical knowledge and expertise	Lack of training and internship	Lack of intra professionals and inter professionals collaboration	Lack of leadership	Lack of advancement in the profession	Less recruitment of pharmacists in hospital	Lack of confidence
1. Academic capacity	B	B	B				B	
2. Early career training strategy		B	B					
3. Quality assurance		B						
4. Advanced and specialist development						B		
5. Competency development		B	B			B		
6. Leadership development	B				B		B	B
7. Advancing integrated services	B		B	B		B	B	
8. Working with others	B		B	B	B		B	B
9. Continuing professional development strategies								
10. Equity and equality				B			B	
11. Impact and outcomes				B	B	B	B	
12. Pharmacy intelligence	B					B		
13. Policy development	B		B	B	B			
14. Medicines expertise		B	B					B
15. People-centred care				B	B		B	B
16. Communicable diseases								
17. Antimicrobial stewardship	B		B				B	
18. Access to medicines, devices & services							B	
19. Patient safety		B				B	B	B

FIP DGs	Government/ Regulatory deficit	Lack of practical knowledge and expertise	Lack of training and internship	Lack of intra professionals and inter professionals collaboration	Lack of leadership	Lack of advancement in the profession	Less recruitment of pharmacists in hospital	Lack of confidence
20. Digital health						B	B	
21. Sustainability in pharmacy	B	B	B	B	B	B		

B = barrier

Table VI: Recommendations for professional development with regard to each goal

FIP DGs	Policy development and implementation	Improve the knowledge of the professionals through internships and training programmes	Implementing theoretical knowledge	Shift towards advance pharmacy practice	Leadership development	Increase the number of pharmacists	Competency development	Syllabus should be revamped
1. Academic capacity	R	R	R			R	R	R
2. Early career training strategy	R	R	R	R				
3. Quality assurance	R	R	R				R	R
4. Advanced and specialist development		R		R		R	R	R
5. Competency development		R	R	R			R	
6. Leadership development					R	R	R	
7. Advancing integrated services				R		R	R	R
8. Working with others	R	R	R	R	R	R		
9. Continuing professional development strategies	R	R		R				
10. Equity and equality	R				R	R		
11. Impact and outcomes	R			R		R		
12. Pharmacy intelligence	R	R		R			R	
13. Policy development	R	R		R	R			
14. Medicines expertise	R	R	R	R			R	R
15. People-centred care					R	R	R	R
16. Communicable diseases		R						
17. Antimicrobial stewardship	R	R	R			R	R	R
18. Access to medicines,	R		R			R		

FIP DGs	Policy development and implementation	Improve the knowledge of the professionals through internships and training programmes	Implementing theoretical knowledge	Shift towards advance pharmacy practice	Leadership development	Increase the number of pharmacists	Competency development	Syllabus should be revamped
devices & services								
19. Patient safety		R	R	R		R	R	R
20. Digital health				R				R
21. Sustainability in pharmacy	R	R		R		R		

R = recommendations

Discussion

To the best of the authors knowledge, this study is the first to present a path for aligning pharmacy in Pakistan with the revolutionary paradigm espoused by the FIP in the form of 21 development goals. The findings of this study revealed a derisory advancement of the profession in the country. The participants advocated the prioritisation of the practice element to bridge the gap between the current situation and the required progress. According to them, regulatory deficits, lack of practical knowledge, and inadequate training and internships were majorly refraining the pharmacy profession from excelling in Pakistan. Reflecting on these intertwined barriers, policy development and implementation, introducing defined training and internship programmes and applying theoretical knowledge were among several other workable recommendations to drive paradigm shifts and achieve development goals.

This study found that among all the elements, the practice element was deemed essential to achieve most (range 44.8% to 55.2%) of the goals, thereby highlighting the dire need of Pakistan for advanced pharmacy practice to achieve SDGs. Encouragingly, it also indicated that workforce and science-related aspects of most of these goals progressed considerably. Among the 11 goals requiring advancement in practice, most study participants (55.2%) prioritised the practice-related aspect of FIP Development Goal 10: equity and equality. Parallel to other health professions, equity and equality in pharmaceutical workforce development, training, and career opportunities are believed to help strengthen pharmacist expertise, which, in turn, would facilitate the delivery of quality pharmacy services across various settings (i.e., rural vs urban and private vs public settings), thereby enhancing the recognition and valuation of pharmacy services (Atif *et al.*, 2017; Atif *et al.*, 2019; Saeed *et al.*, 2019; Atif *et al.*, 2020a; Atif *et al.*, 2020b; Malik *et al.*, 2020).

et al., 2019; Saeed *et al.*, 2019; Atif *et al.*, 2020a; Atif *et al.*, 2020b; Malik *et al.*, 2020).

Further, 43.5% to 54.2% of the study participants highlighted that the impetus to encourage working with others, policy development, and antimicrobial stewardship in Pakistan required prioritising advancement in the workforce. Among these, policy development scored high (54.2%), which seems logical given the non-existent holistic workforce-related policies in the country. Imbalance in the policies related to defined services, remuneration models, and proof of competencies across different facets of pharmacy impact the delivery of professional services, suggesting that developing workforce competencies and increasing recruitment would influence pharmaceutical policies and subsequent professional advancement and recognition, which, in turn, would result in advancing the pharmacy profession guided by appropriate regulations.

According to the study participants, science was coined as a top priority element (range 42.5% to 55%) to advance a total of six goals. Among these goals, advanced and specialist development was the most frequently (55%) said to depend on prioritising advancement in science-related aspects. This finding is essential given Pakistan's lack of expertise and innovation in specialised pharmaceutical sciences (Atif & Malik, 2020; Atif *et al.*, 2020b; Malik *et al.*, 2020). In this regard, consideration should be given to the development of protocols, training and advanced mentoring, and collaboration between industry, hospital settings, and academia, alongside international exposure.

In the qualitative part of the study, pharmacy professionals described different types of barriers that hinder the achievement of pharmacy development goals, including the lack of practical knowledge, training, and internships, lack of advancement in technologies,

inadequate access to medicines and devices, poor expertise, and the low recruitment of pharmacy professionals in the public and private sectors. This finding corroborates those from Portugal, Qatar, and India (Basak, van Mil & Sathyanarayana, 2009; Khan, 2011; Brazinha & Fernandez-Llimos, 2014). This study also identified that lack of inter-and intra-professional collaborations, non-existent leadership, and lack of acknowledgment hindered the overall recognition and transformation of the face of the pharmacy profession in the country, in line with the situation depicted in the Nigerian and Indian studies, which reported that lack of collaboration and lack of role models were the main barriers to implementing advanced pharmaceutical care (Basak, van Mil & Sathyanarayana, 2009; Okonta, Okonta & Ofoegbu, 2012). Additionally, the results of this research showed that policies were obsolete and poorly enforced. These challenges were also reported in studies conducted in Lebanon and India (Basak, van Mil & Sathyanarayana, 2009; Alameddine *et al.*, 2020).

This study also explored recommendations and actions for achieving development goals in the country. According to participants, the most crucial step towards improving the profession was the development and implementation of pharmacy-related policies and guidelines, warranting collaborative efforts of pharmacists across all sectors, the Pharmacy Council of Pakistan, the Pakistan Pharmacists Association, the DRAP, and policy-makers.

Additionally, study participants advocated the application of theoretical knowledge through training and internship programmes. They elaborated that the teaching experience provides fresh graduates with valuable knowledge and skills in teaching applicable to the practitioner and academician (Wright, Brown *et al.* 2014). This recommendation was also highlighted in a study conducted at the University of Pittsburgh Medical Center (UPMC), where a four-year structured pharmacy internship programme gave students early experience in hospital pharmacy practice, resulting in efficacious training and retention of interns as pharmacists at the hospital (Skledar *et al.*, 2009). The participants in this study also stated that increased pharmacist and patient/public interaction leads to the acknowledgment and recognition of the profession and improved delivery of pharmaceutical care. The same action was repeatedly stressed in a previous Pakistani study showing that the limited interaction between pharmacists and the public resulted in the lack of recognition of the pharmacy profession (Madiha & Yang, 2014; Malik, Ikram & Rafiq, 2019; Atif & Malik 2020; Atif *et al.*, 2020b; Malik *et al.*, 2020; Nadeem, Samanta & Mustafa, 2020). Another relevant recommendation of the study participants included a stress-free environment for students and revamping the teaching and examination system.

Correspondingly, an Indian study highlighted the contribution of a friendly environment to improved learning and intellectual ability (Jishnu, Gilhotra & Mishra, 2011). In this study, continuing professional developmental strategies were also recognised as vital to driving the professional growth of the pharmacy profession in Pakistan. Likewise, the establishment of a realistic and relevant continuing professional development model was stressed by a multi-country study (Shamim, Rasheed & Babar, 2021). Another recommendation in this study was to give equal opportunity and a chance to every professional to grow and flourish. The same was suggested in a scoping review conducted in Australia concentrating on pharmacist recruitment and retention in rural and remote areas (Obamiro, Tesfaye & Barnett, 2020).

Limitations

This study successfully highlighted the importance of development goals, explored the priority element within each FIP development goal, and identified gaps/barriers to developing the pharmacy profession in Pakistan. However, it has a few limitations. Although pharmacists with great experience were involved, only those who worked in the Punjab Province of Pakistan were included. Moreover, though pharmacists with experience in multiple pharmacy-related domains, including hospital and community settings, were included, the perspective of those working as hospital and community pharmacists at the time of the study was not sought in the qualitative part. Therefore, it is strongly recommended that future research include practising pharmacists to provide insights into the situation in these settings and help policy-makers advance the clinical pharmacy practice. Moreover, some experts from the regulatory department participated through telephone calls due to COVID-19, thereby increasing the risk of compromised data richness, as facial expressions and other relevant observations could not be captured by voice. Nevertheless, the data collection method was deemed rational, considering the nature of the topic and the importance of the regulatory level perspective.

Conclusion

The pharmacy profession is progressing in Pakistan but not at the pace required. Among the three elements of each goal, the practice facet was the most prioritised to develop the pharmacy profession in the country. Participants conveyed gaps/barriers and recommendations (actions) to achieve professional development goals in Pakistan. The complex and

multiple gaps included regulatory shortfalls, lack of practical knowledge and expertise, lack of training and internship programmes for fresh graduates and undergraduate students, lack of intra and interprofessional collaboration, and lack of leadership. The three most suggested recommendations were policy development and implementations, training programmes, application of theoretical knowledge, and shift towards advanced pharmacy practice.

Conflict of interest

The authors declare no conflict of interest.

Source of funding

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Availability of data and materials

Anonymous interview transcripts will be shared upon receiving a reasonable request.

Author contributions

Conceptualiscenteration: MA, RB and IM; Data curation: RB; Formal analysis: RB, MA and IM; Methodology: MA, IM, RB, YW, WR, MK, NA and AA. Supervision: MA; Validation: MA; Visualization: IM and RB; Roles/Writing - original draft: MA, IM, RB YW, WR, MK, NA and AA; Writing - review & editing: MA, IM, RB YW, WR, MK, NA and AA.

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