

Assessing the Change in Career Choice of Doctor of Pharmacy Students from Second to Sixth Year and the Influencing Factors: A Biphasic Cross-Sectional Study from Saudi Arabia

ABSTRACT

Background: Students of Doctor of Pharmacy (PharmD) programs are presented with several career choices upon graduation. Most studies cross-sectionally evaluated pharmacy students' career interests, but no study has evaluated the changes throughout the PharmD program. The change in career interests of PharmD students was assessed from early to late in the program and the potential influencing factors.

Methods: The study took place at one of the largest colleges of pharmacy in Saudi Arabia, Faculty of Pharmacy, King Abdulaziz University, Jeddah. In this biphasic cross-sectional study, the responses were collected from 2 batches in 2 stages: the 2nd year (pre-phase) and the last year (internship; post-phase). The students were prompted to take the Pharmacist Pathway survey of the American Pharmacists Association. In the post-phase, the students were also asked about the factors that may have influenced the survey results.

Results: Of the 97 students who completed both phases of the study, only 29 (29.9%) had their career choice results in the post-phase matching their pre-phase results based on their overall responses. The most popular careers in the post-phase results were "clinical pharmacy specialist" (11.3%), "pharmaceutical company: sales and marketing" (11.3%), and "Academia: Clinical practice" (10.3%). A significant increase in the result "pharmaceutical company: sales and marketing" was observed from the pre- to the post-phase (1% vs. 11.3%; $P = .003$). The most influential factors for career choice were the internship year (86.6%), salary/financial incentives (39.2%), and previous graduates' experiences (35.1%).

Conclusion: These results can be used by decision-makers in pharmacy colleges to take measures, such as enhancing the training experience by allowing training in different pharmacy sectors and inviting previous graduates to share their experiences.

Keywords: Career choice, Doctor of Pharmacy, pharmacists, pharmacy, Saudi Arabia, students

INTRODUCTION



Doctor of Pharmacy (PharmD) programs aim to prepare pharmacists to be active members of the multidisciplinary medical team who participate in the treatment process and provide comprehensive medical therapy to patients. It was first developed in the United States in 1950 and then gained some global popularity, including in Saudi Arabia.^{1,2} The program structure includes 1 preparatory year (that involves medical English and basic sciences subjects, such as biology, chemistry, and medical physics), followed by 4 years of academic PharmD studies (that involve pharmaceutical sciences, pharmacotherapy courses, and social/behavioral/administrative subjects). These are followed by an internship for 1 academic year.² The internship year involves 8 to 10 rotations that are 4-5 weeks long. Rotations can involve training in clinical pharmacy, hospital pharmacy, community pharmacy, industrial pharmacy, and pharmaceutical companies. Over the past 2 decades, the number of pharmacy colleges in Saudi Arabia has grown significantly to 25 colleges, producing a large cohort of graduates annually to meet the evolving needs of the healthcare sector.² This growth aligns with the Saudi Vision 2030, which

What is already known on this topic?

- Numerous studies explored the career interests of pharmacy students, mostly during the end of their programs.
- Factors, such as training and listening to previous graduates, were reported to influence career choices of pharmacy students.

What this study adds on this topic?

- Students were surveyed for career choices early and late in the PharmD program.
- Only 29.9% of the students had matched results between the pre and the post-phase.
- A significant increase in the result "pharmaceutical company: sales and marketing" was observed from the pre- to the post-phase.
- Internship, financial incentive, and prior graduates' experience inspired the shift.

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emphasizes healthcare transformation and workforce localization. The expansion is not without challenges, including the alignment of educational outcomes with career opportunities and the management of graduate expectations. Globally, studies have highlighted similar challenges, such as the need for structured career guidance and internship programs to address mismatches between student aspirations and job market demands. For instance, a study conducted in the United States demonstrated how targeted career pathway seminars influenced pharmacy students' career decisions, reinforcing the importance of context-specific interventions in shaping career trajectories.³

Several previous studies focused on the career preferences of pharmacy students and their aspirations within the field.⁴⁻¹² These studies evaluated pharmacy students at different levels; though mostly were carried out on last-year students. Career aspirations varied among the studies based on the students' interests and the current situation in the respective countries. For example, the community pharmacy career path was often sought by pharmacy students in certain countries, whereas in others clinical jobs and careers associated with pharmaceutical companies were popular choices. One recent cross-sectional study from Saudi Arabia explored the career interests of PharmD interns in their last month of training from 25 colleges of pharmacy across the country and how various determinants influenced their choices.⁴ The study found that the internship experience and financial incentives influenced the career choice in clinical pharmacy and pharmaceutical companies, respectively. Another survey from the United States involving pharmacy students indicated that some factors, such as internships, residency seminars, as well as elective courses, may inform the preferred career option.³ Such studies enhance the understanding of pharmacy students' career interests and the motivations that drive them, which can help pharmacy college administrators, faculty members, and academic advisors create plans to guide the future career interests of current pharmacy students.

Examining the changes in career preferences over time can provide valuable insights and a better understanding that may help inform direct decision-makers in pharmacy colleges about interventions that could be made to foster the process of choosing the appropriate career paths for future pharmacists. Most of the studies in the existing literature that evaluated the career interests of pharmacy students in different study years were cross-sectional, and no study has evaluated the changes and evolution in pharmacy career interests longitudinally throughout the PharmD program. To address this gap, the present study aimed to prospectively assess the change in pharmacy career interests of PharmD students from early years to late years in the program and the corresponding factors that may have influenced the observed shift in interests.

MATERIAL AND METHODS

Study Design

It was hypothesized that the academic and experiential training components of the PharmD program may contribute to changes in career interests as students explore new professional pathways and different practice settings. In this biphasic cross-sectional study, responses from 2 batches of pharmacy students were collected in 2 stages: during the second year of the PharmD program (pre-phase) and during or after the last month of the internship year (6th year of the program) just prior to their formal graduation from the college (post-phase). This allowed the investigators to track changes in career interests over time. The survey was administered to pharmacy students of one of the largest colleges of pharmacy in Saudi Arabia, Faculty of Pharmacy, King Abdulaziz University, Jeddah and was distributed by directly sending the link to the students via WhatsApp. The first phase of data collection took place in 2018 and 2019, whereas the second phase took place in 2023 and 2024. Ethical approval was obtained from the Research Ethics Committee of *blinded for peer review* (reference no. PH-1443-49). Informed consent was obtained from all participants when they accessed the online survey.

Survey Instrument

An online questionnaire on Google Forms was utilized to collect data, which included 7 questions (available in the supplementary material [<https://osf.io/trc5g/files/e97x5>]). Each response was validated by collecting the students' university ID numbers to eliminate potential duplicate responses and to allow for matching of responses of the pre phase to those of the post phase of the study. To identify the students' career interests, the students were prompted to take the Pharmacist Pathway survey developed by the American Pharmacists Association (APhA) on their website (https://portal.pharmacist.com/pathway_survey). On the results page of the questionnaire, 2 sets of results are presented: one is based on overall responses, whereas the second is based on certain critical factors (i.e., the participants are asked to select 3-5 questions of the questionnaire that they thought are significant in their career choice decision making). The participants were then instructed to select their results from the questionnaire and asked if they thought that the result matched their interest. In the post phase of the study, the students were instructed to follow the same steps, but were also asked about the potential factors that may have influenced the result of the APhA survey, as well as their plan after the completion of the PharmD program with regards to postgraduate education or training or whether they would opt to change their career from pharmacy. A list of all the career profiles and their descriptions is available on the APhA website.¹³

Data Analysis

The responses were divided into 2 groups, pre and post groups. As all the data were categorical, they were

compared using the chi-square test or Fisher's exact test when the count was less than 5. A P value $< .05$ indicated a statistically significant difference between the 2 study phases. SPSS version 24.0 (IBM Corp., Armonk, NY, USA) was employed for data analysis.

Assuming that each pharmacy batch at *blinded for peer review* has approximately 150 students (300 students in 2 batches), a minimum total sample size of 73 students was needed to represent 2 pharmacy batches with a 95% confidence interval and 10% margin of error.

RESULTS

A total of 97 students completed the online survey both in the pre- and post-phases. Most of the participants were females ($n=64$; 66%). Table 1 shows the distribution of career pathway choices based on the overall survey responses. Among the 97 students, only 29 (29.9%) and 23 (23.7%) had their career choice results in the post-phase matching their results in the pre-phase based on their overall responses and on the critical factors, respectively. In terms of survey results, a significant increase in the interest in the career "pharmaceutical company: sales and marketing" was observed between the pre- and the post-phases (1% vs. 11.3%; $P=.003$). Another significant change was noted: the drop in the career choice of community pharmacist (4.1% vs. 0%; $P=.043$).

The majority of participants in the pre-phase were uncertain about whether their career pathway results from the survey (of all career categories as a whole) aligned with their interests, compared to a lower percentage in the post-phase (72.2% vs. 48.5%; $P=.003$) as shown in Table 2. Moreover, a higher percentage of participants in the post-phase believed that their results matched their interests (35.1%) compared to the pre-phase (19.6%). In the post phase, most of those who were unsure whether their results matched their interest or those who confirmed that their results did not match their interest selected clinical pharmacy specialist as their preferred career choice ($n=19/50$; 19.6%), followed by pharmaceutical company: sales and marketing ($n=10/50$; 10.3%). The remaining respondents selected other career pathways at lower rates ($\leq 6.2\%$).

Table 1 also presents the prevalence of different career pathway choices based on selected critical factors. A significant change was observed in the career of "pharmaceutical company: sales and marketing" between the pre and the post phases (1% vs. 12.4%; $P=.002$). With regard to postgraduate education and training, 41.2% opted to pursue clinical pharmacy residency, whereas 37.1% opted for master's/philosophy doctorate programs and 7.2% decided to change careers from pharmacy.

The median [IQR] number of influencing factors was 3 [2-3]. As shown in Figure 1, the most common factors that influenced pharmacy graduates' career choices were internship training (86.6%), salary/financial incentives

(39.2%), influence of previous graduates (35.1%), and influence of family or friends (22.7%). Some participants selected more than one factor, indicating that career decisions were often influenced by a combination of factors.

DISCUSSION

The expansion of pharmacy colleges in Saudi Arabia is anticipated to result in a larger pharmacy workforce. Selecting a career path is a crucial decision for pharmacy students, influenced by multiple factors. The present research revealed a significant change in career preferences among PharmD students from their initial year to the post-internship phase.

This study found a significant shift in career preferences among PharmD students from their first year to the post-training phase. Specifically, the proportion of students who chose a career in pharmaceutical sales and marketing increased from 1% to 12.4% ($P=.002$). This is probably because students at the college are exposed to courses pertaining to this subject in their senior years. They also get the opportunity to have one of their internship rotations at a pharmaceutical company.

Findings from the current study indicate that while many students entered the PharmD program uncertain about their career interests, there was a significant decrease in this uncertainty after the internship (72.2% vs. 48.5%; $P=.003$). This change suggests that the internship experience may enhance students' self-awareness regarding their career preferences, as 35.1% felt that their career outcomes aligned with their interests, compared with only 19.6% pre-internship. A study conducted in Saudi Arabia in 2023 also discovered a significant correlation between internship training and the choice of pursuing a career as a clinical pharmacist ($r=0.19$; $P=.0001$).⁴ These findings reinforce the idea that early exposure to practical experiences can significantly impact students' career paths.³ This is aligned with studies from Sudan and Lebanon, which have highlighted the impact of internships and financial incentives on career choices among pharmacy students.^{5,6} The substantial increase in interest in pharmaceutical careers can be attributed to the emphasis on internship experiences, which provided students with essential skills and insights into the industry. This is consistent with previous research that underscores the importance of internships as a critical factor in career decision-making, with 69.4% of participants identifying them as a major influencing factor.⁴

Notably, factors such as salary and financial incentives were highlighted by 39.2% of respondents, emphasizing the importance of economic considerations in career decision-making. This finding aligns with a study from the University of Khartoum, Sudan, which reported that 78% of pharmacy students identified salary as a major factor affecting their career choices.⁵ Additionally, research from Saudi Arabia indicated that financial incentives played a crucial role in selecting career paths within the pharmacy

Table 1. Distribution of Career Pathway Choices (n=97), n (%)

Career Category	Career	Based on the Overall Survey Responses			Based on Selected Critical Factors		
		Pre-phase	Post-phase	P	Pre-phase	Post-phase	P
Clinical pharmacy	Clinical pharmacy specialist	6 (6.2)	11 (11.3)	.204	13 (13.4)	12 (12.4)	.830
	Ambulatory care clinical pharmacist	7 (7.2)	5 (5.2)	.551	12 (12.4)	5 (5.2)	.076
	Specialty pharmacy	5 (5.2)	5 (5.2)	1	8 (8.2)	2 (2.1)	.051
	General clinical pharmacist	0	0	NA	0 (0)	0 (0)	NA
Academia	Academia: Clinical practice	12 (12.4)	10 (10.3)	.651	11 (11.3)	6 (6.2)	.204
	Academia: Pharmaceutical sciences	2 (2.1)	2 (2.1)	1	2 (2.1)	4 (4.1)	.407
	Academia: Economic, social, administrative sciences	1 (1)	2 (2.1)	1	3 (3.1)	4 (4.1)	.700
Pharmaceutical company and industry	Pharmaceutical company: Sales and marketing	1 (1)	11 (11.3)	.003	1 (1)	12 (12.4)	.002
	Pharmaceutical company: Product specialist	0 (0)	0 (0)	NA	0 (0)	0 (0)	NA
	Corporate management	1 (1)	1 (1)	1	1 (1)	2 (2.1)	.561
	Pharmaceutical industry: Research and development	2 (2.1)	2 (2.1)	1	3 (3.1)	5 (5.2)	.470
	Pharmaceutical industry: Medical liaison	1 (1)	1 (1)	1	2 (2.1)	4 (4.1)	.407
	Pharmaceutical company: Supply chain	0 (0)	0 (0)	NA	0 (0)	0 (0)	NA
Health-system pharmacy	Health-system pharmacy: Inpatient	2 (2.1)	2 (2.1)	1	3 (3.1)	2 (2.1)	.650
	Health-system pharmacy: Outpatient	9 (9.3)	7 (7.2)	.602	3 (3.1)	5 (5.2)	.470
	Health-system pharmacy: Drug information	1 (1)	1 (1)	1	2 (2.1)	2 (2.1)	1
	Health-system pharmacy: Compounding	2 (2.1)	4 (4.1)	.407	7 (7.2)	6 (6.2)	.774
	Long-term care	4 (4.1)	6 (6.2)	.516	3 (3.1)	0 (0)	.081
	Community health center	2 (2.1)	1 (1)	.561	2 (2.1)	6 (6.2)	.149
	Government/Federal pharmacy	1 (1)	2 (2.1)	.561	5 (5.2)	2 (2.1)	.248
	Managed care	1 (1)	0 (0)	.316	0 (0)	0 (0)	NA
Community pharmacy	Community pharmacy	4 (4.1)	0 (0)	.043	2 (2.1)	2 (2.1)	1
	Community pharmacy management	0 (0)	2 (2.1)	.155	1 (1)	1 (1)	1
Other	Office-based medication management	16 (16.5)	11 (11.3)	.300	1 (1)	5 (5.2)	.097
	Pharmacy benefit management	4 (4.1)	3 (3.1)	.700	1 (1)	3 (3.1)	.312
	Mail service	8 (8.2)	6 (6.2)	.579	0 (0)	0 (0)	NA
	Association management	3 (3.1)	1 (1)	.312	6 (6.2)	3 (3.1)	.306
	Home health care	2 (2.1)	1 (1)	.561	4 (4.1)	2 (2.1)	.407
	Contract research organization	0 (0)	0 (0)	NA	0 (0)	1 (1)	.316
	Nuclear pharmacy	0 (0)	0 (0)	NA	0 (0)	1 (1)	.316
	Pharmacy law/regulatory	0 (0)	0 (0)	NA	1 (1)	0 (0)	.316

NA, not applicable.

professions.⁷ A study by Jarab et al showed that pharmacy students' career choices were significantly influenced by medical coverage and insurance. Among the entire sample, Academic and Research Centers were the most favored career choice with a mean of 2.57, followed by pharmaceutical companies with a mean of 2.38.⁸ Moreover, a survey of pre-graduates' job considerations revealed that salary and advancement chances were very important variables in making a job decision. According to their survey, the least preferred pathway was community pharmacy; in contrast, hospital pharmacy was the most preferred career route.⁹ On the other hand, foreign studies from various countries showed community pharmacy as a highly sought-after profession in Nigeria, Syria, Malaysia, the United Kingdom, and the United States.^{10,11,14-16} Collectively, these findings

suggest that financial considerations are pivotal across various demographics, significantly influencing pharmacy students' career decisions.

A recently published study evaluated pharmacy graduates' career settings and how long it takes to change

Table 2. Response of Participants Regarding Whether their Survey Results Match their Actual Interests in the Pre-Phase and the Post-Phase (n=97): n (%), (P = .003)

Response	Pre-phase	Post-phase
Match	19 (19.6)	34 (35.1)
No match	8 (8.2)	16 (16.5)
Uncertain	70 (72.2)	47 (48.5)

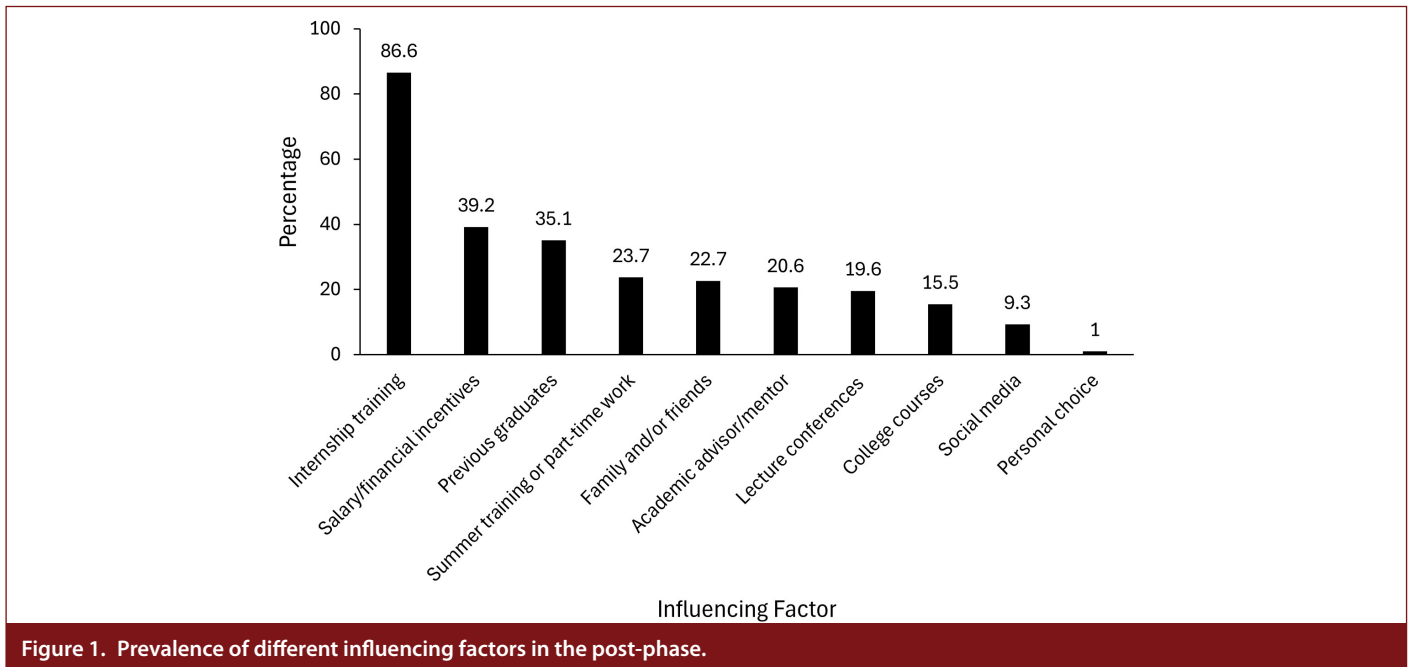


Figure 1. Prevalence of different influencing factors in the post-phase.

long-term career preferences. The authors found significant differences in career preferences between recent graduates who graduated within less than 5 years versus established pharmacists who graduated more than 5 years ago. The authors concluded that career preferences tend to solidify over time, with many pharmacists changing their primary practice setting around 7 years after graduation. Therefore, they recommended future workforce analyses be conducted 5 years after graduation for a more accurate understanding of long-term career choices.¹²

Overall, the present study represents the first biphasic large-scale exploration of changes in career path interests among PharmD students in Saudi Arabia, providing valuable insights into the factors that influence these shifts. Data from pre- and post-internship surveys indicate an evolution in students' career aspirations and underscore the importance of structured training experiences in shaping the future paths of pharmacy graduates. Moving forward, pharmacy educators and administrators should leverage these insights to develop targeted interventions that promote diverse career opportunities and enhance students' readiness for their future roles within the healthcare system.

As this is the first study exploring the changes in pharmacy career pathway interests of PharmD students from the early-to-late stages of their program at *blinded for peer review* and the factors influencing these shifts, it has a few limitations. Students who withdrew from the pharmacy college were excluded from the sample. Furthermore, some individuals did not respond, while a few declined to fill out the form. Obtaining contact information for some participants was a challenge, which may have limited the ability to reach the whole intended sample. Lastly, some of the career paths in the APhA survey results are not applicable

to Saudi Arabia, such as mail service and managed care. These limitations highlight potential gaps in capturing the full range of student experiences and preferences, which may have impacted the generalizability of the findings. Despite these challenges, this study still provides valuable insights into the evolving career interests of pharmacy students throughout the PharmD program. Future studies should focus on evaluating different interventions that may impact the career interests of pharmacy students.

CONCLUSION

This study evaluated the factors shaping changes in PharmD students' career interests as they progress through the program, where the internship year, salary and financial incentives, and the experience shared by previous graduates were the top influencing factors. As such, pharmacy curricula should incorporate structured and diverse experiential learning opportunities, such as internships, summer training, and discussion and exchange of questions with previous graduates and pharmacists from different sectors, to better align students' career aspirations with workforce needs. While academic mentors had a limited impact on career choice in this study, targeted career counseling and mentorship should be emphasized across all years of the PharmD program to improve their influence on students' career preferences and to prepare them for different roles in clinical and non-clinical settings. These recommendations may help enhance the process of choosing appropriate career paths for pharmacists in the future given the dynamic nature of the pharmacy profession. Additionally, future research should explore how early post-graduate employment experiences influence career stability and satisfaction, particularly in light of global shifts in healthcare roles and economic demands.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: This study was approved by Ethics Committee of Faculty of Pharmacy, King Abdulaziz University, (Approval No: PH-1443-49, Date: January 3, 2022).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

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