Research article

Career choices of Pharmacy and Pharm D undergraduates: attitudes and preferences

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ABSTRACT

Background: The remarkably increasing number of graduated pharmacists necessitates exploring the current Pharmacy and Pharm D students' future career choices in order to help the health policy makers to enhance effective health and education workforce planning.
Objective: To identify Pharmacy and Pharm D undergraduates' attitudes and preferences toward different career choices and the factors that influence their career choice.
Methods: Across sectional study using the online survey web Question Pro was conducted on undergraduate Pharmacy and Pharm D students through the fall semester of the academic year 2019/2020 at four Colleges of Pharmacy in Jordan. In addition to demographics, the survey evaluated students' attitudes toward different career choices, career choices preferences and how different factors could influence this choice. Mann Whitney U test, Chi-square test, Friedman test, Wilcoxon and Multivariable linear regression were applied to analyze the data.
Results: A total of 354 undergraduate Pharmacy and Pharm D students completed the survey. Medical coverage and insurance was the most important variable affecting the students' career choice. The total sample favorite career choice was Academic and Research Centers (mean = 2.57), followed by Pharmaceutical companies (mean = 2.38), Hospital Pharmacy (mean = 2.36), Industry (mean = 1.79), and lastly Retail or Community Pharmacy (mean = 1.78). Males were significantly more tended to have a higher favorability scores for the Pharmaceutical Companies career choice than females. PharmD students had a significantly more favorable attitudes towards Hospital Pharmacy than Pharmacy students, who had a significantly more favorable attitude towards Retail or Community Pharmacy and Industry than Pharm D students.
Conclusion: The current study provides baseline data necessary to formulate strategies in the educational institutions by incorporating different programs and lectures to expand the capabilities of pharmacy students to meet the requirements of different market sectors and change their mindset about the different pharmacy sectors.

1. Introduction

Pharmacy education in Jordan has started since 1979. To practice as a pharmacist in Jordan, it requires completion of 160 credit hours in the 5-year Bachelor of Science in Pharmacy [B-pharm], or 219 credit hours in the 6-year Doctor of Pharmacy program (pharm-D) [1], which covers more courses in clinical pharmacy and therapeutics. Pharm-D program is offered only by two public Universities in Jordan. Both programs require a completion of 1440 h of professional training [2]. Pharmacy education in Jordan has undergone a significant improvement with regard to curricula contents. Pharmaceutical care-oriented courses' proportion in pharmacy programs in Jordan was 20% in 2008 in public

and private schools and increased to 50% in 2016. However, the curricula of Pharmacy programs in Jordan still lack courses related to administrative and socio-behavioral aspects of Pharmacy. By 2008, specialized clinical Pharmacy programs were developed at King Hussein Cancer Center and Royal Medical Services, University hospitals, some Ministry of Health hospitals and some leading private hospitals. Nevertheless, there are many other hospitals which still lacking the clinical pharmacy services and pharmaceutical care units which could decrease the ability to absorb the large number of pharm D graduates. However, this issue is expected to be solved in the near future as a new law has been enacted in Jordan to oblige hospitals to hire more clinical pharmacists [3].

Statistics show that the majority of the graduated pharmacists (91%) work in the private sectors including community pharmacies, companies, hospitals, cosmetics and medical supplies companies. The remaining pharmacists work in public sector which includes Ministry of Health, Royal Medical Services, University hospitals and other public sectors [4].

According to the Jordan Pharmacists Association (JPA), there are more than 22667 pharmacists (14565 females) in the country. Although the community pharmacy is the most accessible primary health care facility in Jordan, the role of pharmacists is not fully activated and there is a lack of implementation of the patient-centered pharmaceutical care services at this setting [2].

Hospital pharmacists represent small proportion of the overall pharmacists in Jordan [1], and the majority of them may not have the necessary skills and training to work in such setting [5]. Pharmaceutical industry is another sector which has grown remarkably over the past four decades. Currently, there are sixteen pharmaceutical industries where about 80% of pharmaceutical production is exported to over sixty global markets [6], making the pharmaceutical industry a key contributor to Jordan's economy [7]. The booming of the industry could strengthen the economy in the country which may increase the salaries of the pharmacists who work in pharmaceutical industry. For example, the highest paying manufacturing sector in the United States is pharmaceutical manufacturing [7], and as salaries one of the important influencing factors for career choice among pharmacy students [8], pharmacy industry can be of the attractive sectors for pharmacists. Pharmacists can also work in research and development, quality control, regulatory affairs, or sales and marketing in local pharmaceutical companies or multinational ones. Notably, high percentage of graduated pharmacists are attracted toward sales and marketing jobs due to the relatively high salaries and other allowance benefits [2].

Studies conducted in different countries reported different career preferences. A study conducted in a private university in Jordan reported that pharmacy students preferred working at hospital pharmacy, community pharmacy and as medical representatives [9]. Another study conducted in Saudi Arabia showed that hospital pharmacy followed by academia and research centers were the most preferred career choices [8]. In Jordan, there are over seven thousand undergraduate pharmacy students in all Jordanian universities, which is considered an alarming number of potential graduates and suggests that the supply of new pharmacists will very likely exceed the domestic demand [5]. Therefore, it's essential to evaluate pharmacy students' attitudes and preferences toward different pharmaceutical sectors as a baseline data to formulate strategies in the educational institutions in order to cooperate different programs and lectures to expand the capabilities of pharmacy students to meet the requirements of different sectors and change their mindset about the different pharmacy sectors.

Findings of the present studinstrumenty, in addition to future studies involving education and work sectors, may help to ensure the necessity for the balance between supply and demand and avoiding disproportionate distribution of pharmacist professionals across the practice areas. This is the first study which enrolled students in both B-pharm and PharmD programs from four governmental and private universities in Jordan to evaluate their career preferences and motivators.

2. Methods

A cross-sectional study design using the online open survey web Question Pro was conducted from February through April, 2020 during the fall semester of the academic year 2019/2020. To produce a representative sample, the questionnaire was distributed via official Facebook groups of four governmental and private Pharmacy colleges located in different Jordanian governorates. The students were from all education levels. The required sample size was calculated using Kish formula with 95% confidence level and 6% confidence interval for the current 7000 Pharmacy students in Jordanian universities according to Jordan

Pharmacists Association. Results of the formula showed that the minimum required sample size is 262 students [10].

A literature review of relevant published studies identified some studies and survey instruments which have been used to assess the importance of general job consideration on pharmacy students' choice, factors affecting their choices and their attitude toward different pharmacy sectors. The used questionnaire was adapted from Alhomoud et al [8] instrument which was adapted from extensive literature review of previously published articles. Alhomoud questionnaire was validated by conducting face, reproducibility and content validity. Several modifications were conducted to summarize the questionnaire while retaining the same essential information. Primarily, instead of asking the same questions for each sector repeatedly (ie. 1. I see myself having a fulfilling career in Hospital pharmacy, 2. I see myself having a fulfilling career in Retail or community pharmacy, etc) with responses of Agree, Neutral, and Disagree, we modified the questions to allow for multiple answers for each question (I see myself having a fulfilling career in this area of pharmacy; Hospital pharmacy/Retail or Community Pharmacy/Academic and research centers/Pharmaceutical Companies/Industry). In addition, similar statements were omitted. This summarized the questionnaire by replacing 45 questions with 5 questions only. Three pharmacy practitioners and academics were invited to ensure the content and face validity. Then the validated instrument was piloted on ten randomly chosen pharmacy students to perform any amendments if needed.

The survey began with a short paragraph which informed the students that their participation is voluntary and they will not have an incentive for completing the questionnaire. The paragraph also described the study objective and confirmed that the survey findings will be utilized for research purposes. To ensure the accuracy and completeness of the data, the web survey form was set to allow submission after fully completing the survey. The questionnaire is composed from four sections of close ended questions. First section described demographic characteristics of the participants, second section is composed of fifteen questions about the importance of general job considerations on B-pharm and Pharm D students' choice, third section is composed of seven questions about factors influencing students' career choices, and the last section evaluated pharmacy students' attitudes and opinions regarding different pharmacy sectors. The second and third sections questions were of 3-point Likert type with the following responses (1: Low importance, 2: Neutral, 3: High importance). The questions in the fourth section were of multiple answer type as the students could choose more than one sector. The study received ethical approval from the institutional review board at King Abdullah University Hospital and an informed consent was obtained from all the study participants.

2.1. Statistical analysis

Data were analyzed using SPSS version 25. Categorical data were presented as frequencies and percentages, while continuous data were presented as means and standard deviation (SD). From the multiple answers questions that evaluated favorable/unfavorable aspects of pharmacy sectors, dummy variables were created for each sector for each question (sector dummy variables) with the options of Yes if the sector was chosen in the multiple answer question and No if not. Mann Whitney U test was applied to assess the differences between the two sexes, the two study programs, and age groups and the degree of importance of each factor influencing the career choice. Chi-squared test (χ^2) was applied to evaluate the association between sex, program and the participants' attitudes toward different statements about each pharmacy sector (sector dummy variables). Due to cultural effects on sex behavior, sex was included in the analysis models. For example, in Jordan, the burden of families' financial support mainly relies on males; therefore, financial incentives could be of higher importance for males. To evaluate if the answers of sector dummy variables were significantly different from 50% in the total sample, binomial one sample test was conducted with 0.5 probabilities (compared observed binary probability to

hypothesized 0.5). Favorability scores were computed out of the sum of sector dummy variables. One point was granted for Yes in favorable questions and one point was granted for No in unfavorable questions. Friedman test and Wilcoxon were applied to evaluate the significant differences between each sector score mean. The students were divided into the beginning stages of university (1–3 in B-pharm, and 1–4 year in PharmD), and the end stages of university that included the students in the last two years of their study. t-test was conducted to evaluate the differences in favorability scores of each sector between different sample subgroups including age, sex, and program, university stage. Multivariable linear regression model (method = enter) was composed to assess the association of sex, study program, and age with favorability scores of each sector. The favorability scores were treated as dependent variables whereas sex, age, and study program were treated as independent variables. Durbin-Watson was applied to assess the independence of errors, Variance inflation factor (VIF) and tolerance were evaluated to check for multicollinearity. Plots of standardized predicted values and standardized residuals were formulated to evaluate homoscedasticity and normality of errors.

3. Results

A total of 354 students with undergraduate degrees in pharmacy (35%) and doctor of pharmacy (65%) participated in the study. Almost half of the participants were at the 5th year of studying and about fifth of them were at the 4th year level. Most of the participants were females (83.3%) and within the 22–30 age range (66.4%), as shown in Table 1.

The means and standard deviations for the questions evaluating the factors associated with career choices in the survey are displayed for the total sample and for each gender in Table 2. Medical coverage and insurance factor had the highest mean for both genders (Female: 2.87, Male: 2.76) indicating that this factor has the greatest influence on career choice. On the other hand, the influence of friends factor had the lowest mean for both genders (Female: 1.95, Male: 1.93), signifying that this is the least important factor between all the studied factors. Moreover, statistically significant differences were found between genders in allowances (e.g., housing and education allowances), workload, and experience of working, which were all higher in females (p-values <0.001).

In addition, factors that influence career choice were also evaluated for each program (B-pharm vs. PharmD). The results indicated that the only factor which was significantly different between the two programs (B-pharm vs. PharmD) was experience of working (mean: 2.69 vs. 2.59 respectively, p = 0.015). The most important reported factor for the participants in both programs was Medical coverage and insurance factor (B-pharm: 2.83, PharmD: 2.86).

The study also indicated that between the two age groups (the younger age group: <22 years, and the older age group: ≥22 years) significant differences were found in the following factors: work environment, reputation of organization, communication skills, flexible work schedules, and workload as the participants who were in the younger group considered these factors of more importance than the participants in the older group (p-value<0.05).

Table 3 shows the attitude and opinions of pharmacy students toward different pharmacy sectors. Significantly less percentages of the students agreed that Retail or Community Pharmacy, Industry and Pharmaceutical companies are fulfilling careers, could give learning and development opportunities, and have job prospects. On the other hand, significantly more students agreed that Hospital Pharmacy is a fulfilling career and Academic and Research Centers can give learning and development opportunities. The Hospital Pharmacy was the only sector in which more participants significantly agreed that it requires a heavy workload. Regarding the difference of attitudes between the two students' programs, the percent of PharmD students who chose Hospital Pharmacy as a fulfilling and financially rewarding career, which has a high workload, could give learning and development opportunities, and have job prospects was significantly higher than B-pharm students. Moreover, the percentage of B-pharm students who agreed that Retail or Community Pharmacy is a fulfilling career and has job prospects was significantly higher than PharmD students. Significantly more B-pharm students agreed that Industry and Pharmaceutical companies are fulfilling and financially rewarding careers, despite the heavy workload. Significantly more males agreed that Pharmaceutical companies is a fulfilling and financially rewarding career, that creates learning and development opportunities, has a job prospect, but needs a high workload. Females' percentage was only significantly higher than males in the agreement of Hospital Pharmacy as a fulfilling career.

The means of favorable attitude scores toward different pharmacy sectors were ranked as following: the highest mean was for Academic Research and Centers (2.57), followed by Pharmaceutical companies (2.38), Hospital Pharmacy (2.36), and Industry (1.79). Friedman test indicated that there were significant differences in the favorability means. Table 4 shows the difference in the favorability scores in different sector. The Academic and Research Centers mean was significantly higher than the means of Retail or Community Pharmacy and Industry. Retail or Community Pharmacy mean was significantly lower than the means of Hospital Pharmacy and Pharmaceutical companies.

Figure 1 represent the favorability scores for each sector of B-pharm and PharmD students in the beginning and the end stages of their study. No significant differences were found in the favorability scores between the two groups.

t-test results are shown in Table 5. Females had significantly higher favorability score for Hospital Pharmacy, while males had significantly higher favorability scores for Industry. B-pharm students had significantly higher favorability scores for Retail or Community Pharmacy, Pharmaceutical Companies and Industry. On the other hand, PharmD student had significantly higher scores for Hospital Pharmacy sector.

Table 6 shows the results of linear regression with different predictors associated with favorability score for each sector. The only significant association between the mean and sex was found in Pharmaceutical companies sector, as being a male increased the mean of this sector. Regarding the differences between the two programs, being a PharmD student significantly increased the means of Hospital Pharmacy and significantly decreased the means of Retail or Community Pharmacy and Industry compared to B-pharm student.

4. Discussion

Evaluating students' attitudes toward different career sectors and variables associated with it is the first step to make a future balance between students' orientation and the available job vacancies. Findings regarding pharmacy undergraduates' career preferences in the literature

Table 1. Demographics of the study sample.

Variable		Frequency (%)
Age	<22 years	119 (33.6)
	22–30 years	235 (66.4)
Sex	Female	295 (83.3
	Male	59 (16.7)
Marital Status	Divorced	1 (0.3)
	Married	11 (3.1)
	Single	342 (96.6)
Program	B-Pharm undergrad (Pharmacy)	124 (35)
	PharmD undergrad (Doctor of Pharmacy)	230 (65)
Academic Year	1st	14 (4)
	2nd	19 (5.4)
	3rd	57 (16.1)
	4th	78 (22)
	5th	157 (44.4)
	6th	29 (8.2)

Table 2. The influence of different factors on pharmacy students' career choice and the difference in the importance of each factor between the two sexes.

	Mean (SD)	Sex		
		Female Mean (SD)	Male Mean (SD)	P-value
The number of leaves such as the annual leave, the sick	2.44 (0.55)	2.47 (0.55)	2.29 (0.56)	0.02*
Allowances (e.g. housing and education allowances)	2.62 (0.53)	2.66 (0.51)	2.42 (0.59)	0.00**
Transportations	2.63 (0.55)	2.62 (0.56)	2.64 (0.52)	0.80
Benefits (e.g. overtime and annual bonus)	2.68 (0.51)	2.69 (0.51)	2.64 (0.52)	0.52
Salary	2.74 (0.47)	2.75 (0.47)	2.73 (0.49)	0.80
Opportunities to move up a job ladder	2.78 (0.47)	2.79 (0.45)	2.71 (0.56)	0.22
Traveling for work or pleasure	2.51 (0.64)	2.54 (0.62)	2.37 (0.72)	0.07
Medical coverage and insurance	2.85 (0.40)	2.87 (0.39)	2.76 (0.47)	0.07
Geographic location	2.49 (0.59)	2.52 (0.58)	2.39 (0.64)	0.14
Work Environment	2.79 (0.44)	2.81 (0.42)	2.68 (0.51)	0.03*
Reputation of organization	2.64 (0.53)	2.65 (0.52)	2.58 (0.56)	0.30
Specialty reputation and job title	2.54 (0.56)	2.56 (0.55)	2.42 (0.62)	0.09
Advancement opportunities in pharmacy skills and knowledge	2.79 (0.44)	2.81 (0.42)	2.68 (0.54)	0.03*
Communication skills	2.71 (0.51)	2.73 (0.49)	2.59 (0.59)	0.06
Flexible work schedule	2.61 (0.56)	2.62 (0.55)	2.58 (0.59)	0.58
Workload (Hours of working)	2.51 (0.59)	2.56 (0.56)	2.27 (0.69)	0.00**
On-call schedule	2.21 (0.58)	2.24 (0.57)	2.07 (0.58)	0.04*
Personal interest	2.71 (0.49)	2.73 (0.48)	2.64 (0.55)	0.23
Influence of family	2.30 (0.68)	2.33 (0.68)	2.14 (0.68)	0.47
Influence of friends	1.95 (0.72)	1.95 (0.73)	1.93 (0.69)	0.87
Influence of faculty member	2.27 (0.69)	2.29 (0.68)	2.14 (0.89)	0.11
Course content in your program	2.62 (0.55)	2.63 (0.55)	2.59 (0.56)	0.64
Experience of working	2.69 (0.55)	2.73 (0.52)	2.49 (0.65)	0.00**

*Significant difference between the compared groups at p-value <0.05, **Significant difference between the compared groups at p-value <0.001.

is controversial [8, 11]. Pharmacy undergraduates in the present study clearly preferred academic and research centers, while retail or community pharmacy was the least desired choice.

4.1. Factors influencing career choice

The most important factor affecting the students' career choice was the medical coverage and insurance, followed by the work environment and advancement opportunities in pharmacy skills and knowledge. Work environment and advancement were also reported as significant contributors in many studies [12, 13]. However, the order of the importance of factors were not similar in different studies; while the most important factors reported in a Saudi study [8] were salary, job promotions and job opening, personal interest was reported as the most important factor by a Pakistani study [14]. PharmD students had a significantly higher mean in considering work experience as an important factor in their career choice compared to pharmacy students; this difference was not found in the previously mentioned Saudi study [8]. In comparison between the two sexes, significant differences were found in the degree of importance of many factors, as factors like the number of leaves, the allowance, work schedule, work environment, and workload were significantly more important to females. In line with these results, a study conducted at Samford university reported that flexible work scheduling was more important to females than males [15]. This may be explained by the need of females to be available for their families.

Although the students' economic status (SES) was not evaluated in this study, it's worth to mention that economic status as an influencing factor of career choice decision is well-reported in studies conducted in various parts of the world. People with low SES tend to have a short-term view on career planning, tend to aspire for careers that are considered lower in prestige, believe that they could not or did not need to pursue further education, and have a higher level of negative beliefs toward different career choices. Educators can play a major role in this

aspect by improving students' perception of the importance of long-term planning, make the students aware of scholarship opportunities, and correct the misconceptions about the influence of economic status on career paths.

4.2. Attitudes and opinions of pharmacy students toward different pharmacy sectors

Most of the students considered Hospital Pharmacy as a fulfilling career with heavy workload, which is the same result reported in Alhomoud et al. study [8]. In contrast, the most reported sector by the present study participants' that offers a learning and development opportunities and a job prospect was Academic & Research Centers, while at Alhomoud et al. study [8], Hospital Pharmacy was the mostly reported one. Unlike Alhomoud et al. study [8] which reported that Academic & Research Centers is the highest financially rewarding sector, the present study reported Pharmaceutical companies as the highest rewarding sector.

4.3. Preferred career choices

Results of the favorability scores for the different pharmacy sectors indicated that the most preferred sectors were Academic & Research Centers, followed by Pharmaceutical companies. These results contradict the results of earlier studies in Jordan [9], Nigeria [11], India [16], and Australia [17] that reported community pharmacy or hospital pharmacy as the most favored career choices [9]. The positive attitudes of pharmacy students toward Academic & Research Centers were also reported by an Australian study [18] that evaluated the factors influencing pharmacy students' attitudes towards pharmacy practice research. Therefore, pharmacy educators should emphasize on perceptual expansion and encourage their students not to confine their choices on the classic and the familiar pharmacy career choices. This would help to offer a labor market with more variety to pharmacists. The least preferred career

Table 3. Attitudes toward different pharmacy sectors in the total sample, in each sex, and in each program.

Favorability/ Favourability questions	Pharmacy sector	Total sample	Sex		Study program	
			Female	Male	B-pharm	PharmD
			Frequency (%)			
I see myself having a fulfilling career in this area of pharmacy	Academic and Research Centers	180 (50.8)	153 (51.9)	27 (45.8)	62 (50)	118 (51.3)
	Hospital pharmacy	212 (59.9)†	186 (63.1)*	26 (44.1)	52 (41.9)	160 (69.6)**
	Retail or community pharmacy	84 (23.7)†	69 (23.4)	15 (25.4)	37 (29.8)	47 (20.4)*
	Pharmaceutical Companies	153 (43.2)†	117 (39.7)	36 (61)**	66 (53.2)**	87 (37.8)
	Industries	87 (24.6)†	67 (22.7)	20 (33.9)	44 (35.5)**	43 (18.7)
I see myself having a financially rewarding career in this area of pharmacy	Academic and Research Centers	145 (41)†	124 (42)	21 (35.6)	48 (38.7)	97 (42.2)
	Hospital pharmacy	141 (39.8)†	122 (41.4)	19 (32.2)	33 (26.6)	108 (47.0)**
	Retail or community pharmacy	77 (21.8)†	64 (21.7)	13 (22.0)	32 (25.8)	45 (19.6)
	Pharmaceutical Companies	174 (49.2)	134 (45.4)	40 (67.8)**	73 (58.9)*	101 (43.9)
	Industries	96 (27.1)†	75 (25.4)	21 (35.6)	44 (35.5)*	52 (22.6)
I see myself working under pressure and having a heavy workload in this area of pharmacy	Academic and Research Centers	150 (42.4)†	123 (41.7)	23 (39)	50 (40.3)	96 (41.7)
	Hospital pharmacy	194 (54.8)	170 (57.6)*	24 (40.7)	53 (42.7)	141 (61.3)**
	Retail or community pharmacy	81 (22.9)†	65 (22.0)	16 (27.1)	31 (25.0)	50 (21.7)
	Pharmaceutical Companies	143 (40.4)†	101 (34.2)	30 (50.8)*	56 (45.2)*	75 (32.6)
	Industries	132 (37.3)†	83 (28.1)	22 (37.3)	46 (37.1)*	59 (25.7)
I see myself having opportunities for learning and development in this field	Academic and Research Centers	211 (59.6)†	176 (59.7)	35 (59.3)	69 (55.6)	142 (61.7)
	Hospital pharmacy	164 (46.3)	142 (48.1)	22 (37.3)	39 (31.5)	125 (54.3)**
	Retail or community pharmacy	100 (28.2)†	82 (27.8)	18 (30.5)	38 (30.6)	62 (27.0)
	Pharmaceutical Companies	140 (39.5)†	109 (36.9)	31 (52.5)*	51 (41.1)	89 (38.7)
	Industries	105 (29.7)†	82 (27.8)	23 (39)	44 (35.5)	61 (26.5)
A career in this area of pharmacy has a job prospect	Academic and Research Centers	167 (47.2)	141 (47.8)	26 (44.1)	55 (44.4)	112 (48.7)
	Hospital pharmacy	159 (44.9)	134 (45.4)	25 (42.4)	40 (32.3)	119 (51.7)**
	Retail or community pharmacy	95 (26.8)†	78 (26.4)	17 (28.8)	46 (37.1)**	49 (21.3)
	Pharmaceutical Companies	152 (42.9)†	118 (40)	34 (57.6)*	64 (51.6)*	88 (38.3)
	Industries	95 (26.8)†	74 (25.1)	21 (35.6)	37 (29.8)	58 (25.2)

†Binomial test results compared to hypothesized 0.5, significant at p-value <0.05.
*Significant difference between the compared groups at p-value <0.05, **Significant difference between the compared groups at p-value <0.001.

Table 4. Differences in means of favorability scores of different pharmacy sectors.

	Hospital Pharmacy	Retail or Community Pharmacy	Pharmaceutical Companies	Industry
Academic and Research Centers	0.21	0.80*	0.19	0.79*
Hospital Pharmacy		0.58*	-0.02	0.58*
Retail or Community Pharmacy			-0.60*	-0.01
Pharmaceutical Companies				0.59*

*Significant difference between the sectors scores at p-value <0.001.

sector for the students in this study was Retail or community Pharmacy, which is the opposite result of a Malaysian study [19] where Industry was the least favored career choice. The negative attitude toward Retail or Community Pharmacy was also observed in a Saudi study [20]; this implies that there are perceived problems about this sector and the awareness of the importance of this sector's role must be increased. Both sex and program influenced favorability scores of the different pharmacy sectors, as males were significantly more tended to have a higher favorability scores for the Pharmaceutical Companies than females. In this study, no significant differences were found between the two sexes regarding the favorability scores of Academic & Research Centers or Hospital Pharmacy. These results are contradictory to the results of a Jordanian study [9] which found that a significantly higher proportion of females prefered to work in academia or hospital settings. Moreover, a Turkish study found that males' tendency to choose community pharmacy was higher than that of females who preferred the hospital pharmacy sector [21]. However, the results of a South African study were consistent with our results as no significant differences in career preferences were found between the two sexes regarding their preference of

Industry or Academic and Research centers sectors [22]. Program difference was predictor for students' attitudes toward Hospital Pharmacy sector, which was more favorable to PharmD students when compared to B-pharm students, which is consistent with Alhomoud et al. study finding [8].

In conclusion, pharmacy colleges and their curricula should not downplay the significance of all of the other aspects of pharmacy and focus mainly on clinical pharmacy subjects. As a result, knowledge of the basic pharmaceutical sciences is highly important not only forth education at pharmacy colleges, but also for pharmaceutical research, which constitutes an integral aspect of biomedical sciences. Thus, Pharmacy colleges should acknowledge the need to strengthen and upgrade the pharmacy curriculum to produce competent pharmacist workforce which is able to meet the growing demands of the market.

4.4. Limitations

One of the study limitations is that the study was web-based survey which may subjects the results to selection bias as only those with
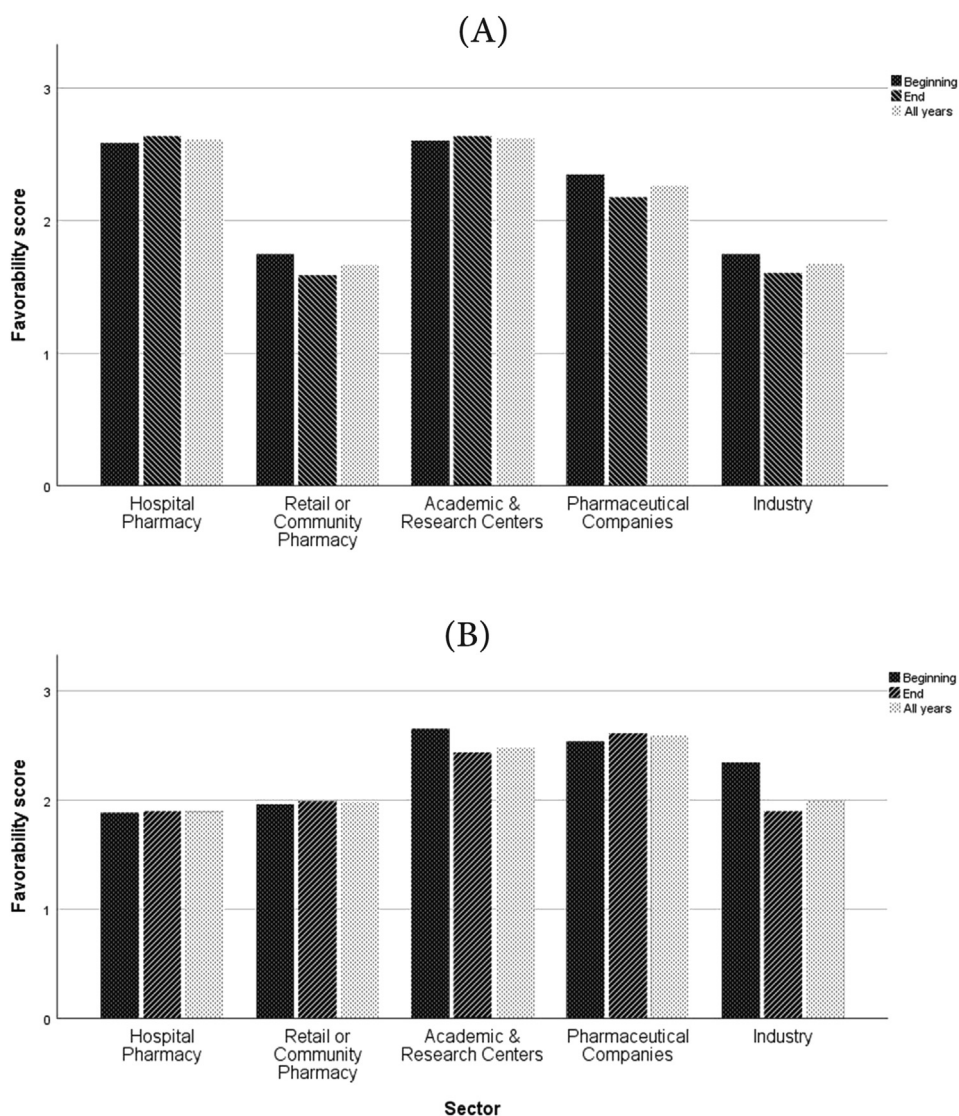
Figure 1. A: Career choices selected by Pharm D students at the beginning (first four years) and at the end (last two years). B: Career choices selected Pharmacy students at the beginning (first three years) and at the end (last two years).

Table 5. t-test indicating differences between favorability score in different sample subgroups.

	Academic & Research Centers	Hospital Pharmacy	Retail or Community Pharmacy	Pharmaceutical companies	Industry
Age					
<22	2.57	2.45	1.66	2.35	1.94
22–30	2.75	2.32	1.83	2.39	1.71
Sex					
Female	2.60	2.40	1.77	2.28	1.73*
Male	2.46	2.15*	1.80	2.88	2.07
Program					
B-pharm	2.48	1.90**	1.98	2.60	1.99
PharmD	2.62	2.61	1.67*	2.26*	1.67*

*Significant difference between the compared groups at p-value <0.05, **Significant difference between the compared groups at p-value <0.001.

Internet access could fill the survey. However, the percent of Internet users in Jordan is 67% of the total population, and it's expected to be higher among university students, particularly with the implementation of distance learning. Another limitation is that the study results were based on self-report, which may lead to social desirability bias.

4.5. Future research

This study is the first part of three parts project that aims to evaluate the interaction between the three pillars of pharmacy workforce; students' attitudes, market demand, and educational system.

Table 6. Linear regression of different predictors associated with favorability score for each sector.

Variable	Career choice	B (p-value)	Confidence interval of 95%	
			Lower	Upper
Sex *(Males compared to females)*	Academic and Research Centers	-0.12 (0.56)	-0.52	0.28
	Hospital Pharmacy	-0.14 (0.50)	-0.53	0.26
	Retail or Community Pharmacy	-0.02 (89)	-0.34	0.30
	Pharmaceutical companies	0.56 (0.01)*	0.17	0.94
	Industry	0.28 (0.09)	-0.06	0.61
Program *(PharmD compared to B-pharm)*	Academic and Research Centers	0.13 (0.43)	-0.19	0.44
	Hospital Pharmacy	0.70 (<0.001)*	0.39	1.01
	Retail or Community Pharmacy	-0.31 (0.01)*	-0.56	-0.06
	Pharmaceutical companies	-0.28 (0.07)	-0.58	0.02
	Industry	-0.30 (0.02)*	-0.56	0.03
Age	Academic and Research Centers	0.01 (0.97)	-0.31	0.32
	Hospital Pharmacy	-0.10 (0.54)	-0.41	0.21
	Retail or Community Pharmacy	0.15 (0.23)	-0.10	0.41
	Pharmaceutical companies	0.04 (0.79)	-0.26	0.34
	Industry	-0.24 (0.07)	-0.50	0.02

*Significant at p-value <0.05.

The findings of the three studies could help in the formulation of different recommendations to the educational system by integrating courses that covers different topics and expanding the students' mindsets about different career choices, in addition to equipping them with the skills required to be competitive in different sectors in the market. Recommendation could also be made for the legislation system to absorb fresh B-pharm/PharmD graduates; a good example is the law that was previously mentioned which commits hospitals to hire a PharmD graduate for each fifty beds in the hospital setting.

5. Conclusion

Pharmacy curricula should address the numerous available work areas for pharmacy undergraduate and inform students of all of the available opportunities in the labor market. Pharmacy educators should equip their students with training programs which provide the graduate pharmacists with the necessary information and skills which enable the graduate to work in different sectors effectively and produce a competent pharmacist workforce which is able to meet the growing demands of the market.

Declarations

Author contribution statement

Anan S. Jarab: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

Walid Al-Qerem: Analyzed and interpreted the data; Wrote the paper.

Tareq L. Mukattash: Performed the experiments; Analyzed and interpreted the data.

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The authors are unable or have chosen not to specify which data has been used.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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