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Research Article

Mapping the Future Pharmacist: A National Cross-Sectional Study on Iraqi Students' Career Intentions and Influencing Factors

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Abstract

Background: The rapid expansion of pharmacy education in Iraq has produced a growing cohort of graduates with diverse career goals and motivations. Understanding the determinants of their career choices is critical for aligning educational outcomes with national healthcare workforce needs. ***Objective***: To explore the perspectives of pharmacy students regarding their future careers and to identify the major factors influencing their decision to pursue pharmacy education. ***Methods***: A cross-sectional, hybrid methods survey was conducted among 508 students from public and private pharmacy colleges across Iraq. A validated self-administered questionnaire collected data on demographics, influences on career choice, professional aspirations, and confidence levels regarding career readiness. ***Results***: Most respondents were female (65.7%), and the majority (84.8%) were enrolled in private colleges. The principal motivations for choosing pharmacy were an interest in healthcare (46.4%), family influence (35.6%), and job security (20.8%). Community and clinical pharmacy emerged as the most preferred career paths (26.2% each), followed by hospital pharmacy (17.1%). Work-life balance (47.4%) and salary expectations (37.4%) were the dominant factors affecting career choice. Furthermore, 40.9% of students intended to pursue postgraduate education immediately, and 44.3% planned to do so later, indicating a strong inclination toward continuous professional development. ***Conclusions***: Iraqi pharmacy students demonstrate a strong commitment to patient-oriented roles and lifelong learning yet face uncertainty about career preparedness and limited awareness of non-traditional pharmacy fields such as regulatory affairs. The findings suggest enhanced career counseling, experiential learning, and curriculum alignment to support well-informed career decisions and workforce sustainability.

Keywords: Iraq; Motivation; Pharmacy education; Student perceptions.

رسم خريطة مستقبل الصيدلي: دراسة وطنية مقطعية حول نوايا الطلاب العراقيين المهنية والعوامل المؤثرة

الخلاصة

الخلفية: التوسع السريع في تعليم الصيدلة في العراق أنتج دفعات متزايدة من الخريجين ذوي الأهداف والدوافع المهنية المتنوعة. فهم محددات اختياراتهم المهنية أمر بالغ الأهمية لمواءمة النتائج التعليمية مع احتياجات القوى العاملة الوطنية في الرعاية الصحية. **الهدف**: استكشاف وجهات نظر طلاب الصيدلة حول مستقبلهم المهني وتحديد العوامل الرئيسية التي تؤثر على قرارهم بمتابعة التعليم في الصيدلة. **الطرائق**: أجري مسح مقطعي وهجين بين 508 طلاب من كليات الصيدلة العامة والخاصة في جميع أنحاء العراق. جمع استبيان ذاتي التحقق من صحته، بيانات عن التركيبة السكانية، والتأثيرات على اختيار المسار المهني، والطموحات المهنية، ومستويات الثقة في الجاهزية المهنية. **النتائج**: كان معظم المشاركين من الإناث (65.7٪)، والأغلبية (84.8٪) مسجلين في كليات خاصة. كانت الدوافع الرئيسية لاختيار الصيدلة هي الاهتمام بالرعاية الصحية (46.4٪)، وتأثير الأسرة (35.6٪)، وأمان الوظائف (20.8٪). برزت الصيدلة المجتمعية والسريرية كأكثر المسارات المهنية المفضلة (26.2٪ لكل منهما)، تليها صيدلة المستشفيات (17.1٪). كان توازن العمل والحياة (47.4٪) وتوقعات الرواتب (37.4٪) من العوامل الرئيسية التي تؤثر على اختيار المسار المهني. علاوة على ذلك، كان 40.9٪ من الطلاب يرغبون بمتابعة التعليم العالي فورا، و44.3٪ خططوا للقيام بذلك لاحقا، مما يدل على ميل قوي نحو التطوير المهني المستمر. **الاستنتاجات**: يظهر طلاب الصيدلة العراقيين التزاما قويا بالأدوار الموجهة للمريض والتعلم مدى الحياة، ومع ذلك يواجهون حالة من عدم اليقين بشأن الاستعداد المهني والوعي المحدود بمجالات الصيدلة غير التقليدية مثل الشؤون التنظيمية. تشير النتائج إلى تعزيز الإرشاد المهني، والتعلم التجريبي، وتوافق المناهج لدعم اتخاذ قرارات مهنية مستنيرة واستدامة القوى العاملة.

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INTRODUCTION

The pharmacy profession has significantly changed over the years, allowing it to effectively and securely meet society's health needs [1,2]. Pharmaceutical sciences are central to improving healthcare, driving the creation of new treatments and boosting the effectiveness of existing ones [3]. The global expansion of pharmacy practice has substantially transformed the pharmacist's role in society [4]. What was once a profession focused mainly on compounding and dispensing medications has evolved into a patient-centered clinical practice dedicated to providing medication information and ensuring safe and effective therapy [4,5]. This shift was formally reinforced in 1997 when the World Health Organization introduced the "seven-star pharmacist" concept, defining the modern pharmacist as a caregiver, decision-maker, communicator, manager, teacher, lifelong learner, and leader within the healthcare system [5]. In addition to these clinically oriented responsibilities, the diversification of the pharmaceutical sector has created a wide range of career opportunities beyond traditional practice. Pharmacists now play key roles in the pharmaceutical company, particularly in marketing and sales, where they may serve as medical representatives, supervisors, product managers, and in various other strategic and managerial positions [6,7].

These roles highlight the expanding professional landscape and the growing demand for pharmacists' scientific expertise across multiple sectors of the healthcare and pharmaceutical markets. Iraq has experienced a growing demand for pharmacy education in both public and private colleges, leading to a rapid expansion in the number of private pharmacy colleges and a marked increase in the pharmacist workforce [8]. Beyond increasing workforce size, improving the distribution of pharmacists across different pharmaceutical sectors is essential for enhancing human resource efficiency and ensuring equitable employment. As the future workforce, pharmacy students' career preferences play a pivotal upstream role in shaping the distribution of pharmaceutical professionals once they enter the job market [9]. Pharmacy students' career choices are shaped by multiple influences, commonly grouped into intrinsic motivations, extrinsic incentives, interpersonal factors, and students' awareness of their own professional abilities. Yet, notable regional differences exist. Research indicates that students from Asian backgrounds, for example, African American and Syrian students, often place greater emphasis on financial rewards and social status [10,11]. Variations in healthcare systems and labor markets also contribute to these differences. For example, in China, community pharmacists typically receive lower salaries and hold less social prestige compared to hospital pharmacists, a disparity that can significantly influence students' preferred career paths [9]. In Ireland, a study conducted at the School of Pharmacy, University College Cork, showed that most students were inclined toward community pharmacy, with industry and hospital pharmacy following, and that two-thirds overall preferred patient-facing careers. Interest in science, interest in healthcare, and the desire to help others were central motivations, while experiential placements played a decisive role in shaping career direction [12]. A previous study in Iraq examined only fourth and fifth-year pharmacy students and found that most students preferred clinical roles, particularly hospital and community pharmacy, with fewer choosing industry or regulatory sectors [13]. However, the pharmacy landscape in Iraq has changed substantially since then. The rapid expansion of private pharmacy colleges, the significant increase in graduate numbers, delays in central governmental recruitment of pharmacists into hospitals due to budget constraints, and the statement by the Iraqi Pharmacists Syndicate on 7 June 2021, which announced that pharmacy graduates would have no employment and no longer be members of the Pharmacists' Syndicate after 2024, further amplified uncertainty and potentially altered students' career decision-making [14,15]. These major shifts emphasize the necessity of updated evidence. Unlike the earlier study, which focused solely on senior students, the present research includes all academic years, providing a more comprehensive understanding of how career intentions evolve throughout pharmacy education and how recent workforce challenges may be influencing students' future career choices.

METHODS

Study design and participants

A cross-sectional, hybrid-methods survey was conducted between November 2024 and February 2025 among 508 students from public and private pharmacy colleges across Iraq. Data were recruited using a random sampling method. Any student who declined to participate in the study was excluded. For the face-to-face component, participants were informed about the study purpose, procedures, and confidentiality measures, and those who agreed signed a written informed consent form before completing the questionnaire in the researcher's presence. For the online component, participants reviewed an electronic information sheet and indicated their voluntary agreement by providing online/verbal consent prior to completing the questionnaire. Participation was anonymous, and no names or identifying information was recorded.

Measurement tools

A validated self-administered questionnaire from a previous study was used [13]. The survey incorporated a mix of open-ended and close-ended questions designed to capture demographic characteristics, previous exposure to pharmacy practice, and students' motivations and future career intentions. The instrument was divided into four thematic parts, each of which looked at these areas in a different way. It began by gathering essential demographic information such as age, gender, year of study, marital status, and any prior experience in pharmacy settings. It then examined the reasons behind choosing pharmacy as a field of study, including whether it represented the participants' first academic preference, using simple yes/no responses. The survey further explored students anticipated professional trajectories by asking them to identify the pharmacy practice area they would prefer to pursue after graduation from a predefined set of options. Finally, it investigated the key career attributes that students consider important when envisioning their future roles within the profession.

Ethical consideration

This study adhered to the principles of the Declaration of Helsinki and received ethical approval from the Scientific and Research Ethics Committee in the College of Pharmacy, Al-Rafidain University.

Statistical analysis

Data collected was analyzed using SPSS, and the chi-square test was used to test the significance of the association between variables of categories. Differences were considered statistically significant when the p-value was less than 0.05.

RESULTS

As shown in Table 1, a total of 508 pharmacy students responded to this survey about career aspirations and confidence among them.

Table 1: Demographic data for the participants

Variable	Category	n(%)
Age (years)	18–20	186(36.6)
	21–22	215(42.3)
	23 and above	107(21.1)
Gender	Male	174(34.3)
	Female	334(65.7)
Study year	1st	6(1.2)
	2nd	147(28.9)
	3rd	71(14)
	4th	153(30.1)
	5th	131(25.8)
University	Private	444(87.4)
	Government	64(12.6)

Demographic data revealed that 334 (65.7%) of them are female and the rest are males, which constitutes 34.3% of the participants. About 36% (186 participants) were 18–20 years old, while about 42.3% (215 participants) were 21–22 years old and about 17% were 23 years and above. Most of the participants studied at private pharmacy colleges (n=444, 87.4%). Furthermore, most of the participants were in their second, fourth, and fifth years of study at the pharmacy college, accounting for about 29%, 30%, and 26%, respectively. In addition, 27% of them had 85–90% grades in their high school, and only 2.7% had higher than 95% grades. Demographic data are illustrated in Table 1. As regards the responses of pharmacy students to questions about their choice of pharmacy, most of the participants (about 70%) had a passion for enrolling in pharmacy college. While about 28% of participants reported that their interest in healthcare studies motivated them to enroll in pharmacy, approximately 21% indicated that family influence affected their decision to attend the College of Pharmacy, and around 8% expressed interest in financial incentives. In contrast, about 67% of participants considered enrolling in other studies before joining pharmacy college. Table 2 illustrates the responses of pharmacy students to choose this field of study. Regarding the perspective of future careers, most students (209; 41.1%) expressed a desire to pursue further studies immediately after graduation, while 225 (44.3%) of participants might consider it in the future. Only 74 students (14.6%) reported no interest in continuing their education beyond the pharmacy degree. This pattern was broadly consistent across all academic years, and statistical analysis revealed no significant association between the year of study and postgraduate study intentions. When it came to confidence in securing a job after graduation, a statistically significant association was found between the year of study and students' confidence levels (p= 0.049).

Table 2: Participants' responses for choosing pharmacy study

Question	Response	n(%)	
What influenced your decision to pursue a degree in pharmacy?	Interest in healthcare	237(28.15)	
	Job security	182(12.59)	
	Family influence	106(21.62)	
	Financial incentives	69(8.19)	
	Personal Experience with Medications	87(10.33)	
	Career Opportunities	83(9.86)	
Which field of study you may consider if not choosing pharmacy	Medicine	222(41.19)	
	Engineering	64(11.87)	
	Dentistry	61(11.32)	
	Biochemical science	17(3.15)	
	Other	175(32.47)	
Passion grade about enrolling in Pharmacy education		Female n(%)	Male n(%)
	Very poor	17(3.35)	10(1.97)
	Poor	14(2.76)	10(1.97)
	Neutral	60(11.81)	40(7.87)
	Good	91(17.91)	58(11.42)
	Very good	152(29.92)	56(11.02)

Among second-year students, a notably higher proportion reported feeling "very confident" (39 students, 7.68% of all respondents), while fourth-year students—who stand closest to entering the actual job market—showed a markedly larger concentration in the "neutral" category (63 students, 12.4%). This shift is worth pausing on: as students advance through their studies and gain a clearer picture of the challenging employment landscape—particularly in light of Iraq's well-documented workforce saturation in pharmacy—their early optimism appears to temper into a more cautious, realistic outlook. Senior students are not discouraged; they are simply more informed. Regarding academic preparation, more than half of all respondents (52.56%) felt that their education was preparing them "well" for their future careers, and a further 25.79% rated preparation as "very good." Only a small minority (3.54%) considered their preparation poor, which is an encouraging reflection on the quality of pharmacy education being delivered. However, it is worth noting that approximately 10.24% of the participants rated their preparation as "fair," suggesting there remains room to strengthen the alignment between academic training and the practical demands of professional pharmacy work. When asked about their primary career goal after graduation, clinical pharmacy (26.45%) and community pharmacy (27.82%) emerged as the two most favored paths, together attracting more than half of all respondents. Hospital pharmacy followed at 18.2%, while research and academia (12.55%) and the pharmaceutical industry (11.51%) attracted smaller but meaningful proportions. Regulatory affairs were the least preferred option, chosen by only 7 students (1.46%) — a finding

that may reflect limited awareness of this career pathway among students rather than a genuine lack of interest. Table 3 summarizes how the participants perceived their future career trajectories, spanning their intentions for postgraduate study, their confidence in securing employment, their satisfaction with current academic preparation, and their primary career goals after graduation.

Table 3: Participant responses to the perspective of future careers

Question	Response	Stage	n(%)
Do you plan to pursue further studies after completing your pharmacy degree?	Yes, immediately after graduation	1st	1(0.2)
		2nd	65(12.8)
		3rd	28(5.51)
		4th	68(13.39)
		5th	47(9.25)
	May be in the future	1st	3(0.59)
		2nd	54(10.63)
		3rd	32(6.3)
		4th	68(13.39)
		5th	68(13.39)
	No willing	1st	2(0.39)
		2nd	28(5.51)
		3rd	11(2.17)
		4th	17(3.35)
		5th	16(3.1)
How confident are you about securing a job in your chosen field after graduation?	Very confident	1st	2(0.39)
		2nd	39(7.68)
		3rd	15(2.95)
		4th	20(3.94)
		5th	26(5.12)
	Confident	1st	0(0.0)
		2nd	34(6.69)
		3rd	14(2.76)
		4th	39(7.68)
		5th	30(5.91
	Neutral	1st	1(0.2)
		2nd	35(6.89)
		3rd	25(4.92)
		4th	63(12.4)
		5th	52(10.24)
	Not very confident	1st	3(0.59)
		2nd	29(5.71)
		3rd	15(2.95)
		4th	24(4.72)
		5th	17(3.35)
	Not confident at all	1st	0(0.0)
		2nd	10(1.97)
		3rd	2(0.39)
		4th	7(1.38)
		5th	6(1.18)
How well do you think your current education is preparing you for your future career?	Excellent	—	40(7.8)
	Very Good	—	131(25.79)
	Good	—	267(52.56)
	Fair	—	52(10.24)
	Poor	—	18(3.54)
What is your primary career goal after graduation?	Clinical Pharmacy	—	136(26.45)
	Community Pharmacy	—	133(27.82)
	Hospital Pharmacy	—	87(18.2)
	Pharmaceutical industry	—	55(11.51)
	Research and Academia	—	60(12.55)
	Regulatory affairs	—	7(1.46)

As regards the factors that most shape their career decisions, participant students painted a clear and relatable picture of their professional priorities. Work-life balance emerged as the most frequently cited concern, selected by nearly half of all respondents (242 students; 47.6%), followed by salary expectations (191; 37.6%) and job stability (161; 31.7%). Job satisfaction (27.6%) and opportunities for advancement (21.1%) occupied the middle ground, while geographic location (18.5%) and mentorship and guidance (10.4%) were cited less commonly but were still important. Salary expectations showed one of the most significant factors when compared with students' grades, in which first- and fifth-year students cited salary as a concern at a rate of 66.7% and 51.1%, respectively. In addition, opportunities for advancement followed a similarly revealing significant relationship when compared with year of study, in which no first-year students selected this factor, yet by fourth and fifth year, roughly one in four to one in three students had come to value it (26.8% and 32.1%, respectively). This gradual awakening likely reflects a growing professional identity—students who once primarily focused on completing their degree now begin to seriously consider the long-term implications of that degree. Furthermore, geographic location also showed a significant association with academic year (p= 0.0002), with fifth-year students citing it at a rate more than twice that of their fourth-year peers (30.5% vs. 10.5%), while job satisfaction emerged as a factor that students appeared to increasingly internalize with experience (p= 0.004). Only 16.9% of third-year students prioritized it, compared to 30.1% of fourth-year and 38.2% of fifth-year students. In contrast, work-life balance and job stability—despite being the second and third most commonly cited factors overall—showed no significant variation with year of study (p= 0.241 and p= 0.140, respectively). These

appear to be stable, enduring concerns that students carry with them from the moment they enter pharmacy school, regardless of how far along they are in their training. Figure 1 shows the percentage of students versus factors influencing their career choice.

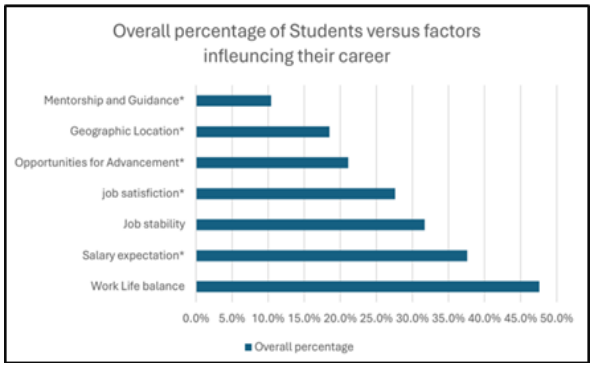

Figure 1: Percentages of important factors influencing participants' career. Asterisks (*) denote statistically significant association with year of study ($p< 0.05$) by chi-square test.

DISCUSSION

The shifting landscape of global pharmacy education has heavily emphasized patient-centered competencies, a trend that is clearly reflected in the career aspirations of Iraqi pharmacy students in this study. Our findings demonstrate that clinical pharmacy (26.45%) and community pharmacy (27.82%) represent the most favored post-graduation pathways, collectively capturing more than half of the cohort. This prominent inclination toward patient-facing and clinical domains mirrors the patterns observed in a study conducted in Jordan by Mukattash *et al*., who reported that most respondents expressed a desire to pursue careers as clinical pharmacists [16]. This trend is expected, given the recent advancements in pharmacy education and practice, which have encouraged pharmacists to embrace a more patient-centered approach that is clearly embodied in the field of clinical pharmacy [17]. The inclination toward clinical roles may also reflect an implicit attempt by some students to practice pharmacy in a manner that resembles the medical profession, particularly among those who did not have the opportunity to pursue medical school [18]. Furthermore, our results indicate that hospital pharmacy attracted a substantial 18.2% of respondents. This strong preference for clinical and hospital sectors lends further support to the argument that regional educational reforms have successfully instilled a clinical mindset among undergraduates. This phenomenon is independently contextualized by regional data, such as the Qatari study by El-Hajj *et al*., which demonstrated that pharmacy students possessed overwhelmingly positive attitudes toward pharmaceutical care, emphasizing that continuous institutional efforts must be exerted to overcome their perceived operational barriers [19]. Similarly, this clinical drive is strongly reinforced by findings from Saudi Arabia by Alhomoud *et al*., who reported that hospital pharmacies were the single most preferred area of future practice among their undergraduate cohort, thereby validating a broad Gulf and Middle Eastern movement toward institutional clinical roles [20]. This high interest in clinical and hospital pharmacy shows that students are choosing this path out of real passion, not just for job security. Today, getting a government job in Iraq is very difficult due to budget limits and a huge number of graduates that exceeds what the Ministry of Health actually needs [21,22]. Therefore, choosing these fields despite this employment uncertainty proves that students are truly motivated by patient care, rather than the old expectation of guaranteed government hiring. Conversely, the pharmaceutical industry (11.51%), research and academia (12.55%), and regulatory affairs (1.46%) were much less popular among Iraqi students. The very low interest in regulatory affairs matches recent findings in Sudan by Alhemadey *et al*., who reported that final-year students rated regulatory affairs as the most unfamiliar career (69.6%) among pharmacy options, despite seeing other sectors as attractive or prestigious [23]. Similarly, a recent study in Jordan by Ayyash *et al*. showed that knowledge about regulatory affairs was inadequate among both pharmacy students and pharmacists, with about half of them unaware of what regulatory personnel actually do [24]. Surveys in other countries also confirm that students and academics are generally less knowledgeable about regulatory affairs compared to professionals working in the pharmaceutical industry [25,26]. This global and regional gap is mainly due to a lack of academic training and practical placements in industrial settings within Iraqi colleges. This curriculum gap is very similar to the challenges noted by Abu-Gharbieh *et al*. in the United Arab Emirates among final-year pharmacy students. Their results showed that 47% of the students did not see a connection between what they studied and the reality of pharmacy practice. Furthermore, after graduation, 60% of them stated that their experiential training did not meet their expectations [27]. This strongly indicates that university lessons can become disconnected from the realities of corporate and practical applications. Furthermore, interest in the pharmaceutical industry remains small (11.51%). This low interest persists even though there are new national efforts to support local medicine factories and make pharmacy students aware of the important role of pharmacists in drug manufacturing [28]. This low interest in industry and regulatory paths highlights a significant problem: while the number of graduates is growing fast, their career goals are still concentrated in traditional areas, creating a mismatch with what the Iraqi drug market actually needs. To address this issue, the Iraqi Pharmacists Syndicate recently launched a professional higher diploma program in industrial pharmacy, run in partnership with several reputable universities [29]. Regarding workforce confidence, a significant link was found between the students' academic year and how confident they feel about getting a job ($p= 0.049$). While early-stage students (second-year) were very optimistic, with 7.68% feeling "very confident," senior students (fourth- and fifth-year) were mostly "neutral" or "not confident." This drop in optimism reflects the

tough job market in Iraq today and is very similar to what happens in other countries with too many graduates and too few jobs, like Sudan and Egypt, where early optimism turns into realism as graduation approaches [30,31]. This downward trend in confidence is a direct result of recent policy changes in Iraq, including an announcement by the Iraqi Pharmacists Syndicate on 7 June 2021 that graduates after 2024 would no longer receive automatic membership or guaranteed government jobs. This matches findings by Kiran et al. in Turkey, where sudden changes in government job quotas quickly caused career anxiety and pragmatic thinking among final-year pharmacy students [32]. This realistic thinking is also clear when looking at what drives students' career choices. Work-life balance was the top priority for nearly half of the students (47.6%), followed by salary expectations (37.6%) and job stability (31.7%). While work-life balance and job stability were constant concerns across all years, salary expectations and opportunities for promotion changed significantly as students advanced. Salary expectations were highest among fifth-year students (51.1%), and interest in career promotion grew from 0% in the first year to 32.1% by the fifth year. This change is very similar to findings from University College Cork in Ireland, where practical training and approaching graduation shifted students' focus from abstract ideas to real economic needs [33]. The high priority given to work-life balance in our study aligns with modern trends across the Middle East. Recent studies among Jordanian and Saudi pharmacy graduates have identified work-life balance as a top career driver [34,35]. This is especially relevant given the high percentage of females entering the profession, matching our study where females made up 65.7% of the sample. Additionally, the significant jump in geographic location as a priority for fifth-year students compared to fourth-year students (30.5% vs. 10.5%, p= 0.0002) supports this finding. Research from Jordan and Shiyanbola *et al*. in developing countries shows that female pharmacy graduates prioritize staying close to their families and having a stable home life over high-stress or distant jobs [36]. As female graduates in Iraq prepare to enter a volatile job market, finding a local, accessible job that offers satisfactory pay and fits family expectations becomes a necessity, driving the future workforce toward highly localized career choices.

Study Limitations

The current study captures associations at a single time point and cannot establish causal relationships. The participants were predominantly from private universities (87.4%) and female (65.7%), which may limit generalizability to other contexts. Several outcomes such as career goals, confidence, and study intentions are self-reported and may not predict actual future behavior. Furthermore, several important variables such as socioeconomic status, family background, and clinical exposure hours were not included in the analysis.

Conclusion

Iraqi pharmacy students demonstrate a strong commitment to patient-oriented roles and lifelong learning yet face uncertainty about career preparedness and limited awareness of non-traditional pharmacy fields such as regulatory affairs. The findings suggest enhanced career counseling, experiential learning, and curriculum alignment to support well-informed career decisions and workforce sustainability.

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Conflict of interests

The authors declared no conflict of interest.

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Data sharing statement

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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