RESEARCH ARTICLE

Hospital pharmacists' education, career paths, and continuous education: A cross-sectional survey in Batna, Algeria

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Abstract

Background: This cross-sectional survey aimed to evaluate the perspectives of 61 hospital pharmacists in Batna, Algeria, regarding education, career choices, and continuous education (CE). **Methods:** Convenience sampling was employed to select pharmacists working in public health hospitals within the Wilaya of Batna. Data were collected using a structured questionnaire administered through Google Forms between December 20, 2023, and March 20, 2024. The questionnaire covered demographics, reasons for choosing the pharmacy profession, perceived relevance of university studies to current job, satisfaction with career trajectory, and engagement in CE. **Results:** The study found that 73.8% of respondents were female, with a mean age of 37.74 years and an average of 10.34±3.38 years of work experience. The most influential factor in choosing pharmacy was valuing a respectable job (3.69±1.51). Regarding education relevance, respondents rated their university studies to their current job with a moderate mean score of 2.97±1.16, with the fifth and fourth years emerging as the most relevant years of study to their current job (3.25±1.36 and 3.11±1.31, respectively). Factors influencing job selection included work environment, location of work, and level of responsibility. Over 50% had either not engaged in any CE or had done so more than a year ago, while barriers preventing engagement in CE included the lack of national protocols and personal time. **Conclusion:** It is urgent to improve the alignment between pharmacy education and job roles and implement CE activities through a national protocol. Additionally, targeted strategies are warranted to enhance job satisfaction and retention among hospital pharmacists in Algeria.

Introduction

The pharmacy profession globally has experienced dynamic evolution in recent years, driven by changes in healthcare systems, advancements in pharmaceutical sciences, and evolving patient care needs (Martini *et al.,* 2024). Pharmacists in many countries have transitioned from traditional roles centred around medication dispensing to more clinical functions, contributing to patient management, therapeutic decision-making, and public health initiatives (Doloresco *et al.,* 2009; Newman *et al.,* 2019). This expanded scope of practice necessitates a robust foundation in pharmacy curricula, alongside ongoing professional development to address ever-evolving healthcare demands (Meilianti *et al.,* 2022).

In 2011, Algeria replaced the state's diploma of pharmacist (5 years) with the Doctor of Pharmacy degree (6 years), introducing a new curriculum structured to prepare graduates for diverse career paths. The curriculum includes foundational sciences in the first two years, pharmaceutical sciences in the third and fifth years, clinical biology in the fourth year, and a final year of internships across various sectors, including hospitals, community pharmacies, and industry. This change opened career opportunities in hospital pharmacy, community practice, academia, and the pharmaceutical industry. Admission to the pharmacy programme is

contingent upon the baccalaureate (BAC) exam results, with a minimum required score of over 16/20. Students submit a preference sheet containing 10 choices to the ministry, and they are assigned to their most preferred major at the national level based on the availability of pedagogical seats and their ranking from the BAC exam results. In 2018, Algeria introduced postgraduate education in clinical and hospital pharmacy for the first time, with new graduates expected to be assigned to hospital wards to implement patient-centred services.

The landscape of hospital pharmacy in Algeria has evolved in recent years. Algerian regulations stipulate that the primary responsibilities of hospital pharmacists include overseeing pharmaceutical inventory, producing hospital preparations in accordance with good manufacturing practices, and determining the drug formulary in collaboration with medical professionals (Algerian Health Ministry, 1994). A report on demographic and health trends (2000–2014) by the Algerian Ministry of Health highlights an increase in the number of hospital pharmacists, leading to an expansion in their roles (Direction de la Population, 2014). These roles now include patient-centred activities such as individualised daily dispensing, medication reconciliation, prescription validation, drug therapy optimisation, patient counselling and education, pharmacovigilance, outpatient dispensing, clinical trials, and assessment of professional practices (Guérin *et al.*, 2014). Despite these advancements, the role of hospital pharmacists remains less defined compared to global standards, often limited to dispensing and inventory management, with minimal involvement in clinical decision-making and direct patient care (Bragazzi *et al.,* 2020).

Continuous education (CE) refers to structured educational activities aimed at maintaining and enhancing pharmacists' competencies, with formats ranging from live events like workshops to distance learning through online courses and printed materials (Accreditation Council for Pharmacy Education, 2017). Continuing Professional Development (CPD) is a broader, self-directed approach focusing on lifelong learning and applying new skills in practice and includes CE as part of its framework. While the pharmacy profession shifted towards CPD in the 1990s in countries like Canada and the UK, many pharmacists still prefer traditional CE due to its structured nature and specific learning outcomes (Austin *et al.,* 2005).

Globally, CE and CPD regulations vary: in France and the US, CE credits are mandatory for license renewal, while the UK and Canada mandate CPD. In the Middle East, Jordan, Iran, and Lebanon require mandatory CE (Mohamed Ibrahim, 2012; Sacre *et al*., 2019). Iran

implemented it in 1991, requiring 25 hours annually for license renewal, while Lebanon started applying it in 2014, mandating 15 CE hours per year (live and online). In the Gulf region, Saudi Arabia and the UAE have mandatory CE systems, with the UAE requiring 20 CE hours annually since 2009 (Mohamed Ibrahim, 2012).

In contrast, and to the best of the authors' knowledge, Algeria does not have an established CE or CPD system for pharmacists. This lack of a formal framework hinders the continuous professional development of pharmacists, affecting their ability to keep up with evolving healthcare standards and practices.

This study aimed to examine the current landscape of pharmacy education, career choices, and CE activities among hospital pharmacists in Batna, Algeria, by assessing the relevance of pharmacy curricula to current job roles, exploring factors influencing career choices and satisfaction levels, investigating barriers and facilitators of engaging in CE activities, and examining the preferred fields of work and their alignment with initial career aspirations.

By addressing these aspects, the study seeks to contribute to optimising pharmacy curricula and workforce development in Algeria, ensuring that pharmacists are better equipped to fulfil their potential in diverse healthcare settings.

Methods

Study design

The study employed a cross-sectional design to gather data from hospital pharmacists in Batna, Algeria. A structured questionnaire comprising five sections was developed to collect data on participants' education, career choices, and continuous development based on published instruments (Noble *et al.,* 2014; Yousif *et al.,* 2014; Nathan *et al.,* 2017; Alhaddad, 2018; James *et al.,* 2018; Alhomoud *et al.,* 2019; Aldosari *et al.,* 2020; Alshehri *et al.,* 2021; AlMuhaissen *et al.,* 2023; Cameron *et al.,* 2023), as shown in Table I. The study was developed according to the CROSS checklist (Sharma *et al.,* 2021). A structured questionnaire consisting of 24 questions was used to collect data across five main sections; the questionnaire was delivered in English and French. The first section, comprising 11 questions, gathered demographic information, such as age, gender, marital status, educational background, work experience, and preferred language of learning. The second section included three questions focused on understanding the reasons behind choosing pharmacy as a career. The third section, with four questions, evaluated the relevance of university studies to current

job roles, allowing participants to rate the impact of different years of their pharmacy studies on their professional responsibilities. The fourth section contained five questions addressing career trajectory and engagement in continuous education (CE) activities, as well as the barriers faced in accessing CE. The final section provided an open-ended space for participants to suggest improvements for hospital pharmacy practice and education in Algeria.

Table I: Survey sections and number of questions

Sections	Nb. of questions
Section 1: Demographics	11 questions
Section 2: Reasons for Choosing Pharmacy	3 questions
Section 3: Relevance of University Studies	4 questions
Section 4: Career Trajectory and Continuous Education (CE)	5 questions
Section 5: Suggestions for improvement	

Data collection methods

The questionnaire was electronically administered via Google Forms to the email addresses of hospital pharmacists employed in the public sector within the Wilaya of Batna. These email addresses were obtained from the Department of Pharmacy at the University of Batna 2. A follow-up email was sent two weeks after the initial email to encourage participation. Prior to the main survey, a pretest involving five participants was conducted to ensure the validity and reliability of the questionnaire. These participants were subsequently excluded from the final survey.

Sample characteristics

The study population consisted of hospital pharmacists in Batna, Algeria, who were selected using convenience sampling. Inclusion criteria required participants to be employed at public health hospitals in the Wilaya of Batna and hold a pharmacist qualification. Exclusion criteria included individuals not employed in Batna and those lacking pharmacist credentials. The survey was conducted over a period of three months from 20 December 2023 to 20 March 2024.

Ethical considerations

Ethics approval was obtained from the scientific committee of the Department of Pharmacy at the University of Batna 2 (number 20/CS/DP/FM/2023). Informed consent was obtained from all participants, and measures were implemented to ensure participant anonymity and confidentiality.

Statistical analysis

The statistical analysis was conducted using IBM SPSS software version 27.0. Since all questions were mandatory, no missing data were reported. A significance level of $p \leq 0.05$ was deemed statistically significant. The validity and reliability of the survey instruments were assessed during pretesting using Cronbach's alpha with a cut-off of 0.7. Additionally, frequencies, cross-tabulations with chi-square tests, and Pearson correlation coefficients were computed to assess various relationships within the data. The Citation Number (CN) signifies the count of respondents who proposed specific suggestions to enhance the field of hospital pharmacy. We calculated the relative frequency of citation (RFC) by dividing the citation frequency (FC) by the total number of respondents (N) in the study. This calculation followed the formula: RFC = FC/N (Djerrou *et al.,* 2022; Taibi *et al.*, 2021). The RFC index varies between "0," indicating no mention of a suggestion, to "1," indicating that all respondents referenced the suggestion.

Results

Respondent characteristics

Based on the data collected from 61 hospital pharmacists in Batna, Algeria, as shown in Table II.

Table II: Respondents' characteristics

	Mean	Std. deviation
Age	37.74	1.62
High school BAC score	14.1	0.67
Pharmacy score	12	1.32
Years of work experience	10.34	3.38
	Frequency	**Percent**
Gender		
Female	45	73.8
Male	16	26.2
Total	**61**	**100**
Marital status		
Divorced	3	4.9
Married	43	70.5
Single	15	24.6
Total	**61**	**100**
Preferred language of learning		
Arabic	8	13.1
English	6	9.8
French	47	77
Total	**61**	**100**

The average age of the respondents was 37.74±1.62 years. The mean BAC score was 14.10±0.67, and the mean pharmacy score was 12.00±1.32. Pharmacists reported an average of 10.34±3.38 years of work experience. The gender distribution was 73.8% female and 26.2% male. Marital status was 70.5% married, 24.6% single, and 4.9% divorced. The preferred language of learning was 77% French, 13.1% Arabic, and 9.8% English.

Factors influencing career choices of hospital pharmacists

When asked whether pharmacy was their first choice when enrolling at the university, 86.9% of respondents ranked pharmacy as their first choice, while 8.2% chose it as their second and 4.9% as their third choice. Table III presents the descriptive statistics for various factors influencing the career choices of the surveyed hospital pharmacists. The table reports a Cronbach's alpha value of 0.89. Participants rated each factor on a Likert scale from 1 to 5, with higher scores indicating greater importance or influence on their career decisions. Among the factors considered, the respondents rated "*Respectable job,*" "*A job with important knowledge,*" and "*Ability to run a pharmacy business*" as the top three most influential factors, with mean scores of 3.69±1.51, 3.38±1.48, and 3.38±1.56, respectively. Factors related to external advice received relatively lower mean scores.

Table III: Factors influencing career choices of hospital pharmacists

	N	Minimum	Maximum	Mean	Std. deviation
Respectable job	61	1	5	3.69	1.51
A job with important knowledge	61	1	5	3.38	1.48
Ability to run a pharmacy business	61	1	5	3.38	1.56
Desire to work in the healthcare sector	61	1	5	3.33	1.46
Desire to improve people's health and well-being	61	1	5	3.20	1.54
High school grades	61	1	5	3.20	1.49
Good job opportunities	61	1	5	3.16	1.45
Advice from a family member	61	1	5	3.10	1.44
High salary after graduation	61	1	5	2.87	1.51
Advice from a pharmacist	61	1	5	2.54	1.44
Self-directed career advice from a search on the internet	61	1	5	2.41	1.30
Previous pharmacy work experience	61	1	5	2.30	1.41
Flexible work hours	61	1	5	2.25	1.35
Advice from a friend	61	1	5	2.16	1.20
Advice received while attending a university event	61	1	5	2.07	1.06
Advice from a university faculty member	61	1	5	2.00	1.18
Advice from a schoolteacher	61	1	4	1.84	0.93

Cronbach's alpha: 0.897

Relevance of university studies to current job

Table IV presents the descriptive statistics for hospital pharmacists' perceptions of the relevance of their university studies to their current jobs in Batna, Algeria. Participants rated the relevance of their university studies on a Likert scale from 1 to 5, with higher scores indicating greater relevance to their current job. The findings indicate that hospital pharmacists perceive their university studies as moderately relevant to their current job, with an overall mean score of 2.97±1.16. Studies undertaken during the fifth year received the highest mean score of 3.25±1.36. Similarly, studies undertaken during the fourth year also garnered a relatively high mean score of 3.11±1.31. In contrast, studies undertaken during the earlier years of pharmacy education received lower mean scores, indicating that pharmacists perceive these foundational years as less directly relevant to their current job.

Table IV: Relevance of university studies to current job

	N	Minimum	Maximum	Mean	Std. Deviation
Studies undertaken during the fifth year	61	1	5	3.25	1.36
Studies undertaken during the fourth year	61	1	5	3.11	1.31
Overall studies of pharmacy	61	1	5	2.97	1.16
Studies undertaken during the sixth year	61	1	5	2.95	1.43
Studies undertaken during the third year	61	1	5	2.72	1.29
Studies undertaken during the second year	61	1	5	1.92	1.10
Studies undertaken during the first year	61	1	5	1.84	1.18

Cronbach's alpha: 0.87

Evolution of preferred field of work

Table V examines the evolution of preferred future fields of work among hospital pharmacists in Batna, Algeria, comparing their preferences as students to their current preferences if given the chance to change now.

Table V: Choice of field of work: Student view *vs* future change

Questions	Percentage
What was your preferred future field of work when you were a student?	
Community pharmacy (Independent)	57.40%
University teacher or professor	18.00%
Analysis laboratory	9.80%
Clinical pharmacist in a hospital	3.30%
Hospital pharmacy	3.30%
Researcher	3.30%
Medical representative	1.60%
Regulatory affairs and drug registration	1.60%
Work outside Algeria	1.60%
What is your preferred field of work if you have the chance to change now?	
Community pharmacy (Independent)	52.50%
University teacher or professor	11.50%
Work outside Algeria	9.80%
Not applicable	8.20%
Analysis laboratory	6.60%
Pharmaceutical industry	3.30%
Clinical pharmacist in a hospital	3.30%
Researcher	1.60%
Regulatory affairs and drug registration	1.60%
Policy maker	1.60%

When surveyed about their preferred future field of work as students, the majority of hospital pharmacists expressed a preference for working in community pharmacy (Independent), with 35 respondents accounting for 57.40% of the total sample. Furthermore, a notable proportion of students indicated an interest in academic roles, with 11 respondents (18.00%) expressing a preference for becoming university teachers or professors. The third preferred future field of work was the analysis laboratory.

In comparison, when asked about their current preferred field of work if given the chance to change now, hospital pharmacists indicated a shift in preferences. While the majority still expressed a desire to work in community pharmacy (Independent), the number of respondents decreased to 32 (52.50%). A noteworthy change in the preference was observed regarding the desire to work outside Algeria, which moved up in rank compared to preferences as students. Six respondents (9.80%) indicated a preference for working outside Algeria, representing a shift in career aspirations among hospital pharmacists.

Factors influencing job selection and career satisfaction among hospital pharmacists

The importance of various factors contributing to job selection among hospital pharmacists in Batna, Algeria, was assessed, and results are presented in Table VI.

The reliability of the survey instrument was assessed using Cronbach's alpha, which yielded a value of 0.90. Overall, work environment was rated as the most critical factor, with a mean score of 3.72±1.45, followed closely by work location, which had a mean score of 3.62±1.42. The level of responsibility and flexibility of the work schedule were also deemed essential, with mean scores of 3.54±1.24 and 3.52±1.38, respectively. Additionally, factors such as the number of work hours per week (3.44±1.40), salary and benefits (3.39±1.59), and the number of holidays per week (3.23±1.41) were considered moderately important in contributing to job selection among hospital pharmacists.

Table VI: Factors influencing job selection and career satisfaction

	N	Minimum	Maximum	Mean	Std. deviation
Work environment	61	1	5	3.72	1.45
Location of the work	61	1	5	3.62	1.42
Level of responsibility	61	1	5	3.54	1.24
Flexibility of the work schedule	61	1	5	3.52	1.38
Number of Work hours per week	61	1	5	3.44	1.40
Salary and benefits (bonus package, health insurance, …)	61	1	5	3.39	1.59
Number of holidays per week	61	1	5	3.23	1.41
How satisfied are you with your current career trajectory on a scale of 1 to 5? (1 - Very dissatisfied, 5 - Very satisfied)	61	1	5	2.39	0.97

Cronbach's alpha: 0.9

Participation in CE activities

The most common type of CE activity was attending a conference, with 37.7% participation overall, significantly higher among females (40.0%) compared to males (31.3%) (Table VII). Workshops were attended by 8.2% of respondents, with a marked gender difference: 25.0% of males attended workshops versus only 2.2% of females. A notable proportion (31.1%) did not participate in any CE activity, with similar rates for both genders. Online courses were taken by 13.1% of participants, while reading journal articles was reported by 9.8%, predominantly by females (13.3%).

Table VII: Type and time of the undertaken Continuous Education (CE) activity

Type of CE	%	Male %	Female %
Attending a conference	37.7	31.3	40.0*
Attending a workshop	8.2	25.0*	2.2
Not applicable	31.1	31.1	31.3
Online courses	13.1	12.5	13.3
Reading a journal article	9.8	0.0	13.3*

Time of the last undertaken Continuous Education (CE) activity	
1–6 months	14.8
6 months–1 year	8.2
More than 1 year	13.1
None	39.3
Within 1 month	24.6

*Pearson Chi-Square: 0.043

The majority of respondents (39.3%) had not engaged in any CE activity, while 24.6% participated within the last month. Comparatively, 14.8% attended CE activities in the past 1–6 months, and fewer (8.2%) in the past 6 months to 1 year. 13.1% reported attending more than a year ago (Table VII).

Barriers to CE activities among pharmacists

The survey data revealed a spectrum of barriers hindering pharmacists' participation in CE activities, as shown in Figure 1.

The lack of a national protocol for assessing pharmacists' knowledge emerged as the most commonly cited barrier. Significant proportions of pharmacists reported a lack of personal time and difficulties in taking leave from work as prominent barriers. Challenges related to resource availability, including access to updated resources, scientific databases, and relevant literature, pose significant barriers to engaging in CE activities. Moreover, concerns regarding the quality and relevance of CE workshops underscore the importance of ensuring that CE offerings align with pharmacists' professional needs and expectations. Cost considerations and the perceived lack of motivation represented additional barriers that may hinder pharmacists' participation in CE activities.
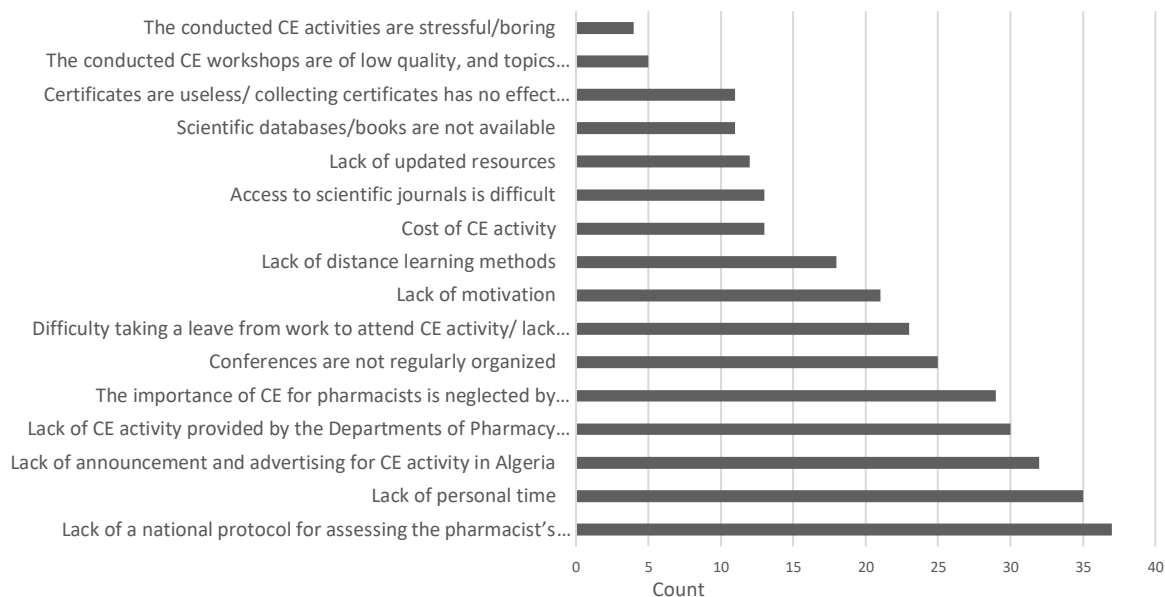
Figure 1: Barriers preventing hospital pharmacists from Continuing Education (CE) activities

Suggestions for advancing hospital pharmacy

The analysis of respondents' suggestions displayed in Table VIII reveals a nuanced perspective on improving the field of hospital pharmacy. CE emerged as a top priority, with an RFC of 0.44, indicating that nearly half of the respondents emphasised its importance for ongoing learning and professional development. Practical training in real-world settings was also deemed crucial, albeit to a lesser extent, with an RFC of 0.16, signifying moderate support. Suggestions for specialised modules during Pharm.D. studies indicated a desire for a more tailored curriculum, as reflected by an RFC of 0.08. Concerns about workforce sustainability prompted a call to reduce the number of pharmacy students, echoed by an RFC of 0.04.

Table VIII: Suggestions for improving hospital pharmacy

Suggestions	CN	RFC
Continuous education (CE)	27	0.44
Practical training in the real world	10	0.16
Specialised modules during PharmD studies	5	0.08
Reduce number of Pharmacy students	3	0.04

CN: Citation Number; RFC: relative frequency of citation

Discussion

The data gathered from 61 hospital pharmacists in Batna, Algeria, provide significant insights into this cohort's demographics and professional characteristics. The average age of 37.74±1.62 years suggests a relatively experienced group, while the high educational attainment (mean BAC score of 14.10±0.67) reflects the academic excellence of these professionals. The mean pharmacy score of 12.00±1.32 underscores their professional competence.

With an average of 10.34±3.38 years of work experience, the pharmacists surveyed possess a substantial range of professional experiences. The gender distribution shows a higher proportion of female pharmacists (73.8%), which was similar to the proportion of female students in pharmacy colleges in the United States (Anderson *et al.*, 2008) and other Arab countries (Yousif *et al.*, 2014; Alshehri *et al.*, 2021; Modipa & Dambisya, 2008). Marital status data revealed that most respondents were married, with a smaller proportion being single or divorced.

The preferred language for learning predominantly French (77%) indicates the participants' linguistic preferences and educational background, suggesting that most professional and educational materials might need to be provided in French to be more effective. The notable minority preferences for Arabic and English also suggest some linguistic diversity, which should be considered in designing educational and training

programmes to accommodate all language groups within this professional community.

Factors influencing career choices of hospital pharmacists

The data from Table III reveals significant insights into the factors influencing the career choices of hospital pharmacists in Batna. The high Cronbach's alpha value of 0.89 underscores the reliability of the factors measured in the survey. A notable 86.9% of respondents indicated pharmacy as their first choice, the highest percentage reported in comparison with previous studies conducted in Sudan (79.3%) (Yousif *et al.,* 2014), the United States (53%) (Anderson *et al.,* 2008), South Africa (52.3%) (Truter, 2009), Saudi Arabia (41.55%) (Alshehri *et al.,* 2021), and Jordan (39%) (Modipa & Dambisya, 2008). This solid preference underscores the importance of recognising and enhancing the role and impact of pharmacists in the community, as it reflects a high level of commitment and interest in the profession.

The prioritisation of factors such as "Respectable job," "A job with important knowledge," and "Ability to run a pharmacy business" suggests that professional reputation, knowledge acquisition, and entrepreneurial opportunities are the most influential considerations for hospital pharmacists in their career decision-making process. The first factor for choosing the pharmacy profession is similar to results found in Sudan (Yousif *et al.,* 2014), Saudi Arabia (Alshehri *et al.,* 2021), and the United States (Anderson *et al.,* 2008).

Conversely, the lower mean scores for factors related to external advice indicate that these elements have a lesser impact on the career choices of the surveyed pharmacists. This information could be critical for developing targeted strategies to attract and retain talent within the hospital pharmacy sector.

Relevance of university studies to current job

The findings suggest that while hospital pharmacists in Batna recognise some degree of relevance between their university studies and their current job roles, there may also be opportunities to enhance the alignment between academic education and job responsibilities to better meet the evolving needs of the profession. These results underscore the importance of continuous professional development and tailored training programmes to ensure that pharmacists are well-equipped to excel in their current job roles and contribute effectively to public health practice.

Evolution of preferred field of work

These findings provide valuable insights into the career aspirations and preferences of pharmacy students in Batna, Algeria. Understanding the preferred future fields of work among pharmacy students can inform educational and professional development initiatives aimed at preparing students for their desired career paths and aligning curriculum offerings with the evolving needs of the pharmacy profession. Additionally, exploring the factors influencing students' career preferences can help educational institutions and healthcare organisations develop targeted recruitment and retention strategies to attract and retain talent within various sectors of the pharmacy workforce. This can ultimately contribute to a diverse and skilled pharmacy workforce capable of meeting the healthcare needs of the local community and beyond in Batna, Algeria.

Factors influencing job selection and career satisfaction among hospital pharmacists

This study explored the factors influencing job selection among hospital pharmacists, highlighting that the work environment was assigned the highest priority. Similar to findings in Jordan (AlMuhaissen *et al.,* 2023), Saudi pharmacists prioritised career advancement and job mobility (Alhomoud *et al.,* 2019). In the USA, pharmacists emphasised opportunities for professional growth in their desired settings (Sweet *et al.,* 2015), while South African pharmacists cited community services and the desire to repay their sponsors as primary reasons for preferring government hospitals (Modipa & Dambisya, 2008).

Participants were asked to rate their satisfaction with their current career trajectory on a Likert scale from 1 to 5. The mean score for career trajectory satisfaction was 2.39±0.97, suggesting a moderate level of satisfaction among respondents. Overall, these findings provide valuable insights into the factors influencing job selection and career satisfaction among hospital pharmacists in Batna, Algeria. Understanding the importance of these factors can inform recruitment strategies, workplace policies, and professional development initiatives aimed at enhancing pharmacist job satisfaction and retention within the healthcare workforce.

Participation in CE activities

A detailed examination of the types of CE activities reveals nuanced differences in participation patterns between female and male pharmacists. The gender differences in attending a conference, workshop and journal article participation were statistically significant

(Pearson Chi-Square = 0.043). These results are similar to other findings in the UK (Mottram *et al.,* 2002) and Kuwait (Aldosari *et al.,* 2020). Female pharmacists exhibited a higher propensity for attending conferences, reflecting their proactive approach towards networking opportunities and staying updated with the latest industry trends. In contrast, male pharmacists demonstrated a greater inclination towards attending workshops. A higher percentage of male pharmacists (25.0%) reported attending workshops compared to only 2.2% of female pharmacists, suggesting a preference for hands-on learning experiences. Interestingly, a substantial proportion of both female and male pharmacists (31.1% and 31.3%, respectively) reported that CE activities were not applicable to them. The prevalence of attending conferences as the most common CE activity highlights the significance of face-to-face interactions and knowledge exchange within the pharmacy community.

The distribution of pharmacists' most recent CE activities revealed a significant need for continuous learning opportunities. While many participated in CE within the past year, over half had either not engaged in any CE or had done so more than a year ago. This is notably higher compared to under 10% in the UK (Mottram *et al.,* 2002) and less than 30% in Kuwait (Aldosari *et al.,* 2020). These results highlight the critical importance of fostering a culture of lifelong learning and providing accessible and relevant professional development opportunities for all pharmacists in Algeria.

Addressing gender disparities in CE and professional development is crucial for fostering a diverse and inclusive pharmacy workforce. Strategies to enhance engagement and mitigate barriers to participation should be tailored to meet the specific needs and preferences of female and male pharmacists. These may include mentorship programmes, flexible learning formats, financial support for attending conferences, and promoting the value of continuous learning in career advancement.

Moreover, initiatives aimed at diversifying CE offerings, such as incorporating interactive workshops, webinars, and online courses, can cater to a broader spectrum of learning styles and preferences. Additionally, fostering a supportive organisational culture that values and prioritises CE as an integral part of professional growth is essential for cultivating a learning-oriented environment within pharmacy practice settings.

Barriers to undertaking CE activities among pharmacists

In the current study, the lack of a national protocol emerged as the top-ranked barrier to CE activities, differing from findings in other countries (Aldosari *et al.,* 2020). The second-ranked barriers were a lack of personal time and insufficient advertising for CE activities. Similar to our findings, researchers in various countries have also reported time constraints and lack of motivation as significant obstacles to pharmacists' participation in CE activities (Marriott *et al.,* 2007; Poudel *et al.,* 2017; Sacre *et al.,* 2019; Aldosari *et al.,* 2020).

To address these barriers, strategies may include advocating for the establishment of a mandatory national protocol for assessing pharmacists' knowledge and accrediting CE activities (Mottram *et al.,* 2002; Marriott *et al.,* 2007). Additionally, enhancing communication and advertising efforts, facilitating flexible learning arrangements, strengthening institutional support and collaboration, and exploring financial support mechanisms and incentives could be effective.

Respondents' suggestions for advancing hospital pharmacy

Addressing the suggestions mentioned in Table VIII through targeted interventions can enhance the quality of pharmacy education and practice, benefiting both practitioners and patients. Prioritising CE and practical training, incorporating specialised modules into pharmacy curricula, and considering workforce sustainability concerns can lead to a more effective and sustainable hospital pharmacy workforce.

Limitations

This study has several limitations. First, the survey was self-administered, which means that the accuracy of the responses cannot be verified, and there is a potential for response bias. Participants may have interpreted questions differently or provided socially desirable answers. Second, the use of convenience sampling from a single geographical region, Batna, Algeria, may limit the representativeness of the findings. This sampling method may not capture the perspectives of hospital pharmacists from other regions of the country, which could affect the generalisability of the results to the broader Algerian context. Additionally, the cross-sectional design of the study only provides a snapshot of pharmacists' experiences and does not account for changes over time, which could offer a more dynamic understanding of their professional development and career paths. Future studies should consider employing random sampling and including multiple regions to enhance the external validity of the findings.

Conclusion

This study provides insights into the educational background, career choices, and continuous education of hospital pharmacists in Batna, Algeria. The findings reveal a moderate alignment between pharmacy education and current job roles, indicating a need to refine academic curricula to better prepare pharmacists for practical responsibilities in the healthcare sector. Factors influencing career choices include the desire for a respectable job, acquiring essential knowledge, and the potential for entrepreneurship. Challenges, such as the absence of a national protocol for CE activities and inadequate institutional support, hinder professional growth and job satisfaction. The preferred fields of work have shifted over time, with many pharmacists now expressing a desire to work outside Algeria, highlighting potential issues in workforce retention. Addressing these barriers by enhancing CE opportunities and aligning educational programmes with the evolving needs of the profession is crucial for optimising the contributions of pharmacists to the healthcare system. This study underscores the importance of strategic workforce planning and targeted educational reforms to support the professional aspirations and satisfaction of hospital pharmacists in Algeria.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgement

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