

Preparations for Saudi Pharmacist Licensure Examination

Yousef Ahmed Alomi*, 

BSc. Pharm, MSc. Clin Pharm, BCPS, BCNSP, DiBA, CDE, Critical Care Clinical Pharmacists, TPN Clinical Pharmacist, Freelancer Business Planner, Content Editor, and Data Analyst, Riyadh, SAUDI ARABIA.

Nahed Rashid Alyami,

BSc, Mphil, BCPS, BCCCP, CPHQ Head of Clinical Pharmacy Unit, ID and ICU Senior Clinical Pharmacist, Jubail General Hospital, Jubail, SAUDI ARABIA.

Amani Abdullah Bahdailah

BSc, Pharm D, Msc. Clin Pharm, Pharmaceutical Care Services, King Abdullah Bin Abdulaziz University Hospital, Riyadh, SAUDI ARABIA.

Seham Abed Almeahdi, Pharm D

Security Forces Hospital, Makkah, SAUDI ARABIA.

Juman Alsaab, Pharm D

Ministry of Health, Riyadh, SAUDI ARABIA.

Shumukh Saleh Al Thubaiti,

Pharm D, College of Pharmacy, Taif University, Taif, SAUDI ARABIA.

Raghad Abdullah Ali Alghamdi

Pharm D, College of Pharmacy, Taif University, Taif, SAUDI ARABIA.

Correspondence:

Dr. Yousef Ahmed Alomi, BSc. Pharm, MSc. Clin Pharm, BCPS, BCNSP, DiBA, CDE, Critical Care Clinical Pharmacists, TPN Clinical Pharmacist, Freelancer Business Planner, Content Editor and Data Analyst, Riyadh 11392, Riyadh, Saudi Arabia.

Phone no: +966504417712

E-mail: yalomi@gmail.com

Received: 08-03-2022;

Accepted: 15-08-2022.

Copyright: © the author(s), publisher and licensee Pharmacology, Toxicology and Biomedical Reports. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License

Access this article online



www.ptbreports.org

DOI:
10.5530/PTB.2022.8.17

ABSTRACT

Objectives: The preparation tools and resources used for licensure examinations in the pharmacy practice are crucial to entry-level pharmacist's skills for licensures exam. It was a cross-sectional descriptive study aimed at demonstrating the preparation methodology for passing the Saudi Pharmacist Licensure Exam (SPLE) in the Kingdom of Saudi Arabia (KSA), focusing on the preparation tools, resources, and barriers of pharmacy workers. **Methods:** The data for this study was collected through a self-electronic survey and analyzed using the survey monkey systems and the statistical package of social sciences (SPSS). The study used a sample size of 701 participants statistically calculated with a 95% CI, 1.96 z score, and 5% margin error. **Results:** The study found medium scores (M=3.31, p=.000) in the preparation tools to SPLE with highly used Multiple Choice Questions (MCQ) in pharmacy practice and review of healthcare professionals' law. In contrast, Non-pharmacy board license exams stimulating undergraduate examinations, Anxiety about the test, and Lack of preparation were the most significant barriers preventing the entry-level pharmacist's licensure examinations. In addition, gender and material status affected SPLE preparation tools, resources, and obstacles to perceptions. **Conclusion:** The analysis concluded that the current licensure examination (SPLE) preparation tool was self-preparations and used resources. There are no standardized entry-level licensure examination tools or resources, necessitating targeted changes in undergraduate schools to introduce preparation tools that measure entry-level pass Pharmacist Licensure Exam very efficiently.

Keywords: Pharmacist, Perceptions, Competency, Pharmacy, Licensure, Exam, Saudi Arabia.

INTRODUCTION

The need for pharmaceutical services is rising in Saudi Arabia due to its expanding population and steadily increasing medical facilities. This change has necessitated the demand for adequate pharmacists in the healthcare and pharmaceutical labor markets, resulting in the growth of new pharmacy colleges. Pharmacy colleges have increased by approximately 67% since 2005-2014, equally resulting in an increase of pharmacy graduates by 87% (2006-2019).¹ The increase in graduate pharmacists calls for the development and establishment of standard licensure policies and guidelines, such as the Saudi Pharmacist Licensure Exam (SPLE), to increase the quality of drug products and the safety of the people. Numerous medical errors and adverse events have been recorded due to negligence or inadequacy of the appropriate qualifications, threatening patients' safety and well-being.²

The Saudi Commission for Health Specialties (SCFHS), responsible for developing and implementing strict regulations to evaluate and standardize the qualification of healthcare practitioners, developed the SPLE in 2019 to assess the readiness and capability of pharmacy graduates as they transfer to the practical pharmacy world and labor market.³ The verified and harmonized exam includes 300 multiple-choice questions measuring the graduate pharmacists' knowledge in four primary areas: "Basic Biomedical, Pharmaceutical, Social/Behavioral/Administrative, and Clinical Sciences".⁴ Graduates can take this exam four times yearly,

but if they pass, they can retake it annually to improve their scores. The set pass score is 56%, equivalent to scoring 536 questions out of 800.⁴ Research studies have shown the minimal implementation of the SPLE exam in pharmacy schools and colleges. For example, according to a recent study, only 28 pharmacy colleges in Saudi Arabia have begun using the exam guide and creating preparation courses for their graduates.³ Nonetheless, there have been inconsistencies in results and passing rates among students since early 2019, when the first group of pharmacist graduates prepared and undertook the SPLE exam. In a cross-sectional study by Alhifany et al. (2020), 84% of 105 graduates passed the SPLE in 2020. Success indicators and performance predictors were associated with a participant's age and Grade Point Average (GPA). Male participants with higher pharmacology and therapeutic GPA scores provided the highest SPLE scores.³

Alghamdi et al.¹ indicated that the passing rate for the class of 2020 was higher than the class of 2019 and was associated with predictors such as the establishment year of the college, type of institution, and gender. However, unlike Alhifany et al.³ this study discovered female applicants scored higher and had higher passing rates than male applicants. Sales et al.⁵ confirm that females scored more highly than male students. However, unlike those that performed positively in pharmacology and therapeutic courses, this study found clinical sciences had the highest SPLE score.

Few studies^{1,3,5} have been conducted on this subject, necessitating further research on the performance predictors of SPLE, as well as evaluating the effectiveness of this program. These studies recommend further research using diverse predictors other than age, gender, graduation time, GPA, students' tools to improve their SPLE performance and success rates, and preparedness barriers. Therefore, this study aimed to research the preparedness of pharmacist students to undertake SPLE and predictors of their passing rate, focusing on the tools and resources they use and potential barriers to passing the exam. Conducting this research would contribute to the limited knowledge in line with low SPLE implementation and passing rates among pharmacy colleges. SPLE is a relatively new research area, having been implemented in 2019, and this scarcity is associated with the unique experience with the exam.¹ This study's findings will provide theoretical, empirical, and practice value to pharmacy students and colleges. Researchers can test the current study's hypotheses in future studies to support or challenge them. Pharmacy students and pharmacist will understand the most effective tools and resources while revising for the exam. Also, instructors or pharmacy colleges will understand the most critical resources to provide for students. Students can also understand potential barriers, devising effective strategies to mitigate them and improve passing rates. The guiding objectives included: Identifying tools used to prepare for SPLE and influencing factors, Outlining resources used to prepare for SPLE and influencing factors, and Determining barriers to passing SPLE and influencing factors.

METHODS

The study analyzed a cross-sectional survey that discussed the Pharmacist preparations for Saudi Pharmacist Licensure Exam in Saudi Arabia. It self-reported an electronic survey of the pharmacist, including pharmacists from internship to consultant, pharmacist specialties, and Saudi Arabia. All non-pharmacists or students and non-completed surveys will be excluded from the study. The survey consisted of respondents' demographic information about pharmacists and Tools to Prepare for Saudi Pharmacist Licensure Exam, The Resources used for Saudi Pharmacist Licensure Exam, and The Barriers Preventing Passing Saudi Pharmacist Licensure Exam. The 5-point Likert response scale system was used with closed-ended questions. According to the previous literature with an unlimited population size, the sample was calculated as a cross-sectional study, with a confidence level of 95% with a z score of 1.96 and a margin of error of 5%, a population percentage of 50%, and drop-out rate 10%. As a result, the sample size will equal 380-420 with a power of study of 80%.⁶⁻⁸ The response rate required for the calculated sample size was at least 60-70 % and above.^{8,9} The survey was distributed through social media of Whatsapp applications and Telegram groups of pharmacists. The reminder message had been sent every 1-2 weeks. The survey was validated through the revision of expert reviewers and pilot testing. Besides, various tests of the reliability of McDonald's ω , Cronbach alpha, Gutmann's λ_2 , and Gutmann's λ_6 were done with the study. The data analysis of the Pharmacist preparations for the Saudi Pharmacist Licensure Exam in Saudi Arabia. It is done through the survey monkey system. Besides, the statistical package of social sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel sheet version 16. It included a description and frequency analysis, good of fitness analysis, correlation analysis. Beside, inferential analysis of factors affecting preparation Tools for Saudi Pharmacist Licensure Exam, associated Barriers Preventing Passing the Licensure Exam. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided the reporting of the current study.^{10,11}

RESULTS

A total number of 701 pharmacists responded to the questionnaire. Of them, more than one-third responded from the Eastern region (268 (38.23%)) and one Quarter responded from the southern region (185 (26.39%)), and one-fifth responded from the western region (147 (20.97%)), with statistically significant differences between the provinces ($p=0.000$). Most of the responders were from National Guard Hospitals (145 (20.68%)), Security Forces Hospitals (108 (15.41%)), and Ministry of Health (MOH) hospitals (99 (14.12%)), with a statistically significant difference between working sites ($p=0.000$). The majority of hospitals with a capacity of 301-400 beds (151 (21.54%)) and 201-300 beds (150 (21.40%)). Males responded more than females (140 (59.32%)) versus 96 (40.68%), with statistically significant differences between all levels ($p=0.001$). Based on material status, most of the responders were divorced 129 (29.72%), single 124 (28.57%), and married 116 (26.73%), with statistically significant differences between nationalities ($p=0.000$). Most of the responders were in the age group of 41-50 years (222 (31.68%)) and 51-60 years (206 (29.39%)), with statistically significant differences between all age groups ($p=0.000$). Most of the pharmacists were staff pharmacists (175 (46.05%)) and pharmacy supervisors (92 (24.21%)), with statistically significant differences between all levels ($p=0.000$). Most of the responders held Pharm D (132 (28.45%)), Postgraduate Year two PGY2 (80 (14.87%)), Postgraduate Year one PGY1 (69 (14.87%)), and Doctor of Philosophy in Pharmacy (65 (14.01%)). Most pharmacists had a work experience of 4-6 years (170 (41.16%)) and >6 years (97 (23.49%)), with a statistically significant difference between years of experience ($p=0.000$). Most of pharmacists works at outpatient pharmacy (86 ((21.66%)), and narcotics and controlled medications (78 ((19.65%)). Most pharmacists graduated with a GPA of good (161 ((41.82%)) and very good (116 ((30.13%)) and work with a monthly salary of 12,000 - 14,000 SR (123 ((37.05%)) with statistically significant differences between all levels ($p=0.000$). The majority of pharmacists admitted to the Saudi License Exam 3 times (218 ((31.10%)) and two times (189 ((26.96%)) with statistically significant differences between all levels ($p=0.000$). There was a medium positive correlation between age (years) and years of experience based on Kendall's tau_b (0.414) and Spearman's rho (0.485) correlation coefficients, with a statistically significant difference between the two factors ($p<0.001$). There was a medium positive correlation between the site of work and the current position held based on Kendall's tau_b (0.457) and Spearman's rho (0.610), with a statistically significant difference between the two factors ($p<0.001$) (Tables 1 and 2).

There was a medium positive correlation between age (years) and years of experience in a pharmacy career based on Kendall's tau_b (0.482) and Spearman's rho (0.567) correlation coefficients, with a statistically significant difference between them ($p<0.000$). There was a medium positive correlation between age (years) and Monthly income based on Kendall's tau_b (0.406) and Spearman's rho (0.483) correlation coefficients, with a statistically significant difference between them ($p<0.001$). There was a medium positive correlation between age (years) and material status based on Kendall's tau_b (0.390) and Spearman's rho (0.471) correlation coefficients, with a statistically significant difference between them ($p<0.001$). There was a medium positive correlation between material status and Years of experience based on Kendall's tau_b (0.406) and Spearman's rho (0.476) correlation coefficients, with a statistically significant difference between them ($p<0.001$). There was a medium positive correlation between Years of experience and current positions based on Kendall's tau_b (0.370) and Spearman's rho (0.430) correlation coefficients, with a statistically significant difference between them ($p<0.001$). There was a medium positive correlation between Years of experience and monthly income based on Kendall's tau_b (0.480)

Table 1: Demographic, social information.

Nationality	Response Count	Response Percent	p-value (X2)
Central area	40	5.71%	0.000
North area	61	8.70%	
South area	185	26.39%	
East area	268	38.23%	
West area	147	20.97%	
Answered question	701		
Skipped question	0		
Site of work	Response Count	Response Percent	p-value (X2)
MOH Hospitals	55	7.85%	0.000
Military hospitals	99	14.12%	
National Gaurd Hospital	145	20.68%	
Security forces hospitals	108	15.41%	
University Hospital	78	11.13%	
MOH primary care centers	65	9.27%	
Private hospitals	38	5.42%	
Private ambulatory care clinics	17	2.43%	
Private primary healthcare center	10	1.43%	
Community pharmacy	31	4.42%	
Pharmaceutical companies	20	2.85%	
College of Pharmacy (Academia)	14	2.00%	
King Faisal Specialist Hospitals and Research Center	7	1.00%	
Intern	5	0.71%	
Non-employment	9	1.28%	
Answered question	701		
Skipped question	0		
No. of Licensed Beds	Response Count	Response Percent	p-value (X2)
1-50	29	4.14%	0.000
51-100	49	6.99%	
101-200	81	11.55%	
201-300	150	21.40%	
301-400	151	21.54%	
401-500	105	14.98%	
501-600	37	5.28%	
> 600	23	3.28%	
Medical City	22	3.14%	
Non-applicable	54	7.70%	
Answered question	701		
Skipped question	0		
Gender	Response Count	Response Percent	p-value (X2)
Male	140	59.32%	0.000
Female	96	40.68%	
Answered question	236		
Skipped question	465		

continued...

Marital status	Response Count	Response Percent	p-value (X2)
Single	124	28.57%	0.000
Married	116	26.73%	
Divorce	129	29.72%	
Widowed	65	14.98%	
Answered question	434		
Skipped question	267		
Age	Response Count	Response Percent	p-value (X2)
24-30 years	109	15.55%	0.000
31-40	126	17.97%	
41-50	222	31.67%	
51-60	206	29.39%	
> 60	38	5.42%	
Answered question	701		

Table 2: Demographic, pharmacy career information.

Pharmacist Qualifications	Response Count	Response Percent	p-value (X2)
Bachelor's in pharmacy	59	12.72%	0.000
Master	40	8.62%	
Doctor of Pharmacy (Pharm D)	132	28.45%	
Doctor of Philosophy (Ph.D.)	65	14.01%	
Postgraduate Year One (PGY1)	69	14.87%	
Postgraduate Year Two (PGY2)	80	17.24%	
Postgraduate Year Three (PGY3)	40	8.62%	
Fellowship	18	3.88%	
Answered question	464		
Skipped question	237		
GPA scores	Response Count	Response Percent	p-value (X2)
Excellent	52	13.51%	0.000
Very good	116	30.13%	
Good	161	41.82%	
Acceptance	56	14.55%	
Answered question	385		
Skipped question	316		
Position Held	Response Count	Response Percent	p-value (X2)
Director of Pharmacy	14	3.68%	0.000
Assistant Director of Pharmacy	41	10.79%	
Supervisor	92	24.21%	
Pharmacy staff	175	46.05%	
Pharmacist intern	52	13.68%	
Non-employment	6	1.58%	
Answered question	380		
Skipped question	321		

continued...

Years of experience as a pharmacist career	Response Count	Response Percent	p-value (X2)
Less than one year	71	17.19%	0.000
1-3	75	18.16%	
4-6	170	41.16%	
>6	97	23.49%	
Answered question	413		
Skipped question	288		
The practice area	Response Count	Response Percent	p-value (X2)
Inpatient Pharmacy	61	15.37%	0.000
Outpatient Pharmacy	86	21.66%	
Satellite Pharmacy	53	13.35%	
Narcotics and Controlled	78	19.65%	
Extemporaneous Preparation	54	13.60%	
Clinical Pharmacy	68	17.13%	
Inventory Control	29	7.30%	
Drug Information	24	6.05%	
IV admixture	33	8.31%	
Community pharmacy	46	11.59%	
Pharmaceutical companies	30	7.56%	
Health insurance company	0	0.00%	
Un-employment	7	1.76%	
Answered question	397		
Skipped question	304		
Monthly income	Response Count	Response Percent	p-value (X2)
6,000-8,000 SR	63	18.98%	0.000
9,000-11,000 SR	41	12.35%	
12,000-14,000 SR	123	37.05%	
15,000-17,000 SR	75	22.59%	
18,000-20,000 SR	23	6.93%	
> 20,000 SR	7	2.11%	
Answered question	332		
Skipped question	369		
The number of times to enter the exam	Response Count	Response Percent	p-value (X2)
1	141	20.11%	0.000
2	189	26.96%	
3	218	31.10%	
>3	153	21.83%	
Answered question	701		
Skipped question	0		

and Spearman's rho (0.552) correlation coefficients, with a statistically significant difference between them ($p < 0.001$) (Tables 1 and 2).

The average score for pharmacist's tools to prepare for the Saudi Pharmacist License Exam was (3.31). The element "Practice MCQ in pharmacy practice" (3.48) and the element "review of healthcare professionals law" obtained the highest scores. In contrast, the lowest score was obtained

for the element "attend groups discussion for pharmacy board" (3.22), and the score for the component "read comprehensive pharmacy review book" was (3.23), with a statistically significant difference between the responses ($p < 0.001$). All aspects of pharmacist's tools to prepare for the Saudi Pharmacist License Exam ($p < 0.05$) (Table 3). The resources used most to prepare for the Saudi Pharmacist License Exam were the pharmacy licensing exam practice test 118 (25.88%) and ASHP PharmPrep case-based board review. It is followed by a reference guide for the pharmacy licensing exam - questions and answers 98 (21.49%) and a reference guide of pharmaceutical calculations 97 (21.27%) (Table 4).

The average score for the "Barriers prevent passing the Saudi pharmacist license exam" was (3.20). The highest score for the element "Non-pharmacy board license exam stimulating undergraduate examinations" was (3.58). The score for the component "Anxiety" was (3.46), and for "Lack of preparation," it was (3.36). In contrast, low scores were obtained for the elements "there is no association between pharmacy board license exam and benefits" (2.90), "short time for answering the questions" (3.03), and "being pressured by family members to take pharmacy board exam despite unpreparedness" (3.03), with statistically significant difference between the responses ($p < 0.001$). All responses about aspects of Barriers preventing passing the Saudi pharmacist license exam were statistically significant ($p < 0.001$) (Table 5). The score for single-test reliability analysis of McDonald's ω was 0.884, Cronbach's α was 0.883, Gutmann's λ_2 , 0.886, Gutmann's λ_6 was 0.899, and Greater Lower Bound was 0.939.

Factors affecting the Tools to Prepare for Saudi Pharmacist Licensure Exam

Factors affecting the tools to prepare for the Saudi Pharmacist License Exam (SPLE) were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests. The factors that might affect tools to prepare for the Saudi Pharmacist License Exam include location, worksite, number of bed capacity, gender, material status, age, GPA, years of experience, current position, monthly income, and number of SPLE admissions. Four locations affected the perception of pharmacists about SPLE. The central region showed the highest scores (3.9203), with statistically significant differences between regions ($p = 0.000$). Fifteen worksites affected the perception of tools to prepare for the Saudi Pharmacist License Exam. The working site affected the factors of passing SPLE with a statistically significant difference between working sites ($p = 0.000$) with a score (3.5792) by MOH hospitals higher than MOH primary care centers (3.0480) ($p = 0.029$) and National Guard Hospitals ((3.0748) ($p = 0.01$). Based on the number of beds in healthcare institutions, non-hospital responders scored the highest (3.6176) with a statistically significant difference ($p = 0.000$).

The gender female score (3.5243) was higher than the male (3.2548), with statistically significant affected factors passing the SPLE ($p = 0.028$). The single material status showed the highest score (3.6434) of preparation tools with a statistically significant difference ($p = 0.000$). The age of the responders affected the perception of SPLE. Pharmacists aged 24-30 years showed the highest score (3.7470), with a statistically significant difference between all age groups ($p = 0.000$). The GPA grade might affect the factors passing the SPLE. The excellent grade scored the lowest (2.9893) with a statistically significant difference ($p = 0.000$). Four levels of work experience affected the perception of tools to prepare for the Saudi Pharmacist License Exam. The highest score (3.7920) was obtained for those with work experience of less than one year, with a statistically significant difference between all levels ($p = 0.000$). Six levels of the position affected the preparation tools, the SPLE with the highest score (3.7432) by pharmacy intern with a statistically significant difference between all levels ($p = 0.000$). The monthly income affected the

Table 3: The Tools to Prepare for Saudi Pharmacist Licensure Exam.

		Strongly disagree		Disagree		Uncertain		Agree		Strongly agree		Total	Weighted Average	p-value (X2)
1.	Review pharmacotherapy books	12.70%	39	15.31%	47	22.15%	68	31.92%	98	17.92%	55	307	3.27	0.000
2.	Review ASHP statements and guidelines	10.84%	35	16.10%	52	23.84%	77	35.91%	116	13.31%	43	323	3.25	0.000
3.	Review of healthcare professionals practice law	7.24%	22	16.45%	50	21.71%	66	39.80%	121	14.80%	45	304	3.38	0.000
4.	Review narcotics and control medications law	8.19%	24	17.41%	51	24.91%	73	31.40%	92	18.09%	53	293	3.34	0.000
5.	Practice MCQ in pharmacy practice	7.29%	21	14.58%	42	25.00%	72	29.51%	85	23.61%	68	288	3.48	0.000
6.	Attend preparatory course for pharmacy license board	9.03%	27	15.72%	47	25.42%	76	30.43%	91	19.40%	58	299	3.35	0.000
7.	Attend group discussions for the pharmacy board	11.72%	34	17.24%	50	25.52%	74	27.93%	81	17.59%	51	290	3.22	0.000
8.	Read the Comprehensive Pharmacy Review book	9.68%	27	18.28%	51	25.81%	72	31.54%	88	14.70%	41	279	3.23	0.000
9.	Read Reference Guide for Pharmacy Licensing of Exam	10.36%	29	16.07%	45	22.14%	62	31.07%	87	20.36%	57	280	3.35	0.000
	Answered											403		
	Skipped											298		

Table 4: The Resources used for Saudi Pharmacist Licensure Exam.

		Responses	
1.	Pre-NAPLEX online offered by NABP	67	14.69%
2.	Comprehensive Pharmacy Review	86	18.86%
3.	Kaplan NAPLEX	87	19.08%
4.	Appleton and Lange's Review of Pharmacy	80	17.54%
5.	APhA's Complete Review for Pharmacy	89	19.52%
6.	Appleton and Lange's Quick Review Pharmacy	92	20.18%
7.	ASHP's PharmPrep Case-Based Board Review	100	21.93%
8.	Indiana Pharmacist's Alliance 2004 NAPLEX	91	19.96%
9.	Reference Guide for Pharmaceutical Calculations	97	21.27%
10.	Pharmacy Licensing Exam Practice Tests (CD by Manan Shroff)	118	25.88%
11.	MPJE State Pharmacy Law Exam (CD by Manan Shroff)	93	20.39%
12.	Reference Guide for Pharmacy Licensing Exam - Theory	92	20.18%
13.	Reference Guide for Pharmacy Licensing Exam - Questions and Answers	98	21.49%
14.	Applied therapeutics by Khoda Kimple	59	12.94%
15.	Pharmacotherapy A pathophysiologic approach by Joseph Dipiro	79	17.32%
16.	1000 Multi-Choice Questions for Prometric examination	91	19.96%
17.	ASHP practice guidelines	51	11.18%
18.	The preparatory course of Pharmacotherapy board exam material	58	12.72%
19.	Saudi Pharmacy Law	70	15.35%
20.	Other (please specify)	17	3.73%
	Answered	456	
	Skipped	245	

perception of SPLE. The high salary score of 6,000-8,000 SR (3.5874) affected the preparation factors for SPLE with a statistically significant difference ($p=0.000$). The number of SPLE admissions might affect the perception. The one-time admissions had the highest score (3.6226) with a statistically significant difference ($p=0.000$).

The relationship between preparation for the SPLE and factors affecting it include location, worksite, number of bed capacity, gender, material status, age, GPA, years of experience, current position, monthly income, and number of SPLE admissions. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an explanatory variable. There was a medium relationship ($R=0.494$ with $p=0.000$) between the preparation factors for SPLE and the factors involving it. Nine out of eleven were non-significant differences ($p>0.05$). However, multiple regression analysis confirmed that two factors (i.e., gender and material status) explained 14.5% of the positive relationship to the variation in preparation tools and 17.9% negative relationships to variation in preparation tools for SPLE, respectively, with a statistically significant difference ($p=0.038$) and ($p=0.038$) respectively. The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with the current position factor with variance inflation factor (VIF) of 1.111 and 1.691, respectively, less than three or five as a sufficient number of VIF (Table 6).¹²⁻¹⁴

Factors affecting the Barriers Prevent Passing Saudi Pharmacist Licensure Exam

Factors affecting the barriers preventing passing the Saudi Pharmacist License Exam (SPLE) were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests. The factors that might affect barriers preventing passing the Saudi Pharmacist License Exam include location, worksite, number of bed capacity, gender, material status, age, GPA, years of experience, current position, monthly income, and number of SPLE admissions. Five locations affected the barrier preventing the SPLE with statistically significant differences between regions ($p=0.016$) with any significant difference among all five areas. Fifteen worksites affected

Table 5: The Barriers Prevent Passing Saudi Pharmacist Licensure Exam.

		Strongly disagree		Disagree		Uncertain		Agree		Strongly agree		Total	Weighted Average	p-value (X2)
1.	The is no association between the Pharmacy board license exam and benefits	11.64%	39	25.37%	85	32.84%	110	21.19%	71	8.96%	30	335	2.9	0.000
2.	Concern that the Pharmacy board license exam will generate extra work	10.92%	39	22.69%	81	28.01%	100	25.49%	91	12.89%	46	357	3.07	0.000
3.	A limited number of preparatory courses for the pharmacy board exam	10.23%	35	18.42%	63	24.85%	85	35.09%	120	11.40%	39	342	3.19	0.000
4.	Unaware of the need and importance of the Pharmacy board license exam	9.94%	32	20.19%	65	27.95%	90	31.37%	101	10.56%	34	322	3.12	0.000
5.	Insufficient staffing to enroll in the Pharmacy board license exam	9.90%	30	20.46%	62	28.05%	85	29.70%	90	11.88%	36	303	3.13	0.000
6.	The Pharmacy board license exam was not appropriately taught during my studying years at the School of Pharmacy	10.74%	32	18.12%	54	23.49%	70	33.89%	101	13.76%	41	298	3.22	0.000
7.	Healthcare organizations do not financially cover most Pharmacy board license exams	13.24%	38	13.24%	38	28.92%	83	29.97%	86	14.63%	42	287	3.2	0.000
8.	Too many questions	7.47%	21	19.93%	56	29.18%	82	24.20%	68	19.22%	54	281	3.28	0.000
9.	Short time for answering questions	13.96%	37	19.25%	51	29.81%	79	24.15%	64	12.83%	34	265	3.03	0.000
10.	The college of pharmacy did not prepare the student for the exam	12.73%	35	21.82%	60	20.73%	57	27.27%	75	17.45%	48	275	3.15	0.000
11.	Difficult exam questions	9.33%	25	19.78%	53	27.24%	73	26.87%	72	16.79%	45	268	3.22	0.000
12.	Physical uneasiness	8.02%	21	22.14%	58	32.44%	85	26.72%	70	10.69%	28	262	3.1	0.000
13.	Anxiety	6.40%	16	12.40%	31	26.80%	67	37.60%	94	16.80%	42	250	3.46	0.000
14.	Depressed due to unexpected experiences	7.17%	19	15.47%	41	24.53%	65	35.47%	94	17.36%	46	265	3.4	0.000
15.	Lacks preparation	9.29%	25	14.13%	38	26.39%	71	31.23%	84	18.96%	51	269	3.36	0.000
16.	Being pressured by family members to take the pharmacy board exam despite unpreparedness	14.02%	37	19.32%	51	26.52%	70	30.30%	80	9.85%	26	264	3.03	0.000
17.	Non - Pharmacy board license exam simulating undergraduate examinations	5.72%	21	16.62%	61	23.71%	87	21.53%	79	32.43%	119	367	3.58	0.000
19.	The school of pharmacy or practice does not cover some topics in the Pharmacy board license exam	8.50%	35	18.69%	77	28.88%	119	29.13%	120	14.81%	61	412	3.23	0.000
Answered												557		
Skipped												144		

the perception of barriers preventing passing the Saudi Pharmacist License Exam. The working site affected the factors of passing SPLE with a statistically significant difference between working sites ($p=0.001$) without any significant difference among all operational sites. Based on the number of beds capacity healthcare institutions, it does not affect the barrier preventing passing SPLE with the non-significant difference ($p=0.164$)

The gender female score (3.3439) was higher than the male (3.1462), with a statistically significant affected barrier preventing passing the SPLE ($p=0.008$). The single material status showed the highest score (3.3627) of Barriers preventing passing the exam with a statistically significant difference ($p=0.002$). The age of the responders affected the barrier preventing passing the SPLE. Pharmacists aged 31-40 showed the

lowest score (3.0660), with a statistically significant difference between all age groups ($p=0.000$). The GPA grade did not affect the barriers to passing SPLE with a non-statistically significant difference ($p=0.063$). Four levels of work experience affected the barriers preventing passing the SPLE. The highest score (3.4521) was obtained for those with work experience of less than one year, with a statistically significant difference between all levels ($p=0.000$). Six levels of the position held affected the preparation tools the SPLE with the highest score (4.0409) and (3.3369) by non-employment and pharmacy intern, respectively, with a statistically significant difference between all levels ($p=0.000$). The monthly income affected the barrier preventing passing the SPLE. The level of high salary score of salary 15,000-17,000 SR (3.1216) and salary level of 12,000-14,000 SR (3.1600) affected the barrier preventing the

Table 6: Multiple regression of Factors with Tools to Prepare for Saudi Pharmacist Licensure Exam.

Model	R	R Square	F	Sig.	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
					B	Std. Error	Beta				Lower Bound	Upper Bound	Tolerance	VIF
1	.494 ^b	.244	5.139	.000 ^b	4.181	0.442		9.464	0.000	3.309	5.052			
					-0.048	0.043	-0.078	-1.124	0.263	-0.133	0.036	0.894	1.118	
					0.006	0.015	0.030	0.413	0.680	-0.023	0.036	0.825	1.213	
					0.011	0.019	0.041	0.590	0.556	-0.026	0.048	0.880	1.137	
					0.236	0.113	0.145	2.087	0.038	0.013	0.460	0.900	1.111	
					-0.152	0.072	-0.179	-2.094	0.038	-0.295	-0.009	0.591	1.691	
					-0.073	0.070	-0.101	-1.043	0.299	-0.210	0.065	0.458	2.184	
					-0.123	0.069	-0.133	-1.775	0.078	-0.260	0.014	0.765	1.307	
					0.016	0.089	0.021	0.175	0.861	-0.161	0.192	0.304	3.290	
					0.013	0.058	0.017	0.226	0.821	-0.102	0.128	0.740	1.351	
					-0.031	0.060	-0.047	-0.522	0.602	-0.150	0.087	0.528	1.894	
					-0.103	0.059	-0.138	-1.758	0.081	-0.219	0.013	0.697	1.434	

a. Dependent Variable: pharmacist perception of SPLE, Predictors: (Constant), Location, Site of work, No of beds, Gender, Material status, Age (years), GPA, Years of experiences at pharmacy career, Position Held, Monthly income, and No of SPLE admissions

Model	B	Std. Error	Sig.	95% Confidence Interval	
				Lower	Upper
1	4.181	.516	.001	3.104	5.143
	-.048	.039	.215	-.125	.031
	.006	.016	.726	-.024	.039
	.011	.022	.614	-.031	.059
	.236	.116	.043	.018	.467
	-.152	.062	.015	-.275	-.038
	-.073	.056	.198	-.182	.037
	-.123	.064	.069	-.251	.007
	.016	.089	.876	-.156	.191
	.013	.060	.815	-.095	.142
	-.031	.060	.580	-.136	.094
	-.103	.061	.084	-.220	.012

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

SPLE with a statistically significant difference ($p=0.008$). The number of SPLE admissions did not affect the barrier preventing passing the SPLE with a non-statistically significant difference ($p=0.432$).

The relationship between the barriers preventing passing the SPLE and factors affecting it include location, worksite, number of bed capacity, gender, material status, age, GPA, years of experience, current position, monthly income, and number of SPLE admissions. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an expletory variable. There was a medium relationship ($R=0.371$ with $p=0.004$) between the barrier preventing passing for SPLE and factors involving it. Nine out of eleven were non-significant differences ($p>0.05$). However, multiple regression analysis confirmed that two factors (i.e., gender and material status) explained 21.1% of the positive relationship to the variation in Barriers and 18 % of negative relationships to variation in Barriers preventing passing the SPLE, with a statistically significant difference ($p=0.004$) and ($p=0.044$) respectively. The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with the current position factor with variance inflation factor (VIF) of 1.118 and 1.643, respectively, less than three or five as a good number of VIF (Table 7).¹²⁻¹⁴

DISCUSSION

From the analyzed results of the current study, pharmacists in the Kingdom of Saudi Arabia (KSA) used various tools and resources to pass the Saudi Pharmacist Licensure Examination (SPLE). However, it might be multiple explicit barriers preventing the passing of SPLE. The current study used a convenient sampling method and an appropriate number of the involved pharmacist. The distribution samples were not equal, and that's expected because of the sampling method. Most pharmacists have lived in the Southern area and were female, which is acceptable because the research team members who lived in the southern region were female gender. The results showed variations in age levels, pharmacist qualifications, positions, experiences, practice areas, monthly income, GPS score during pharmacy school, and the number of SPLE admissions. That has advantages and disadvantages at the same time. The advantage of various characteristics of sample representation of the entire society. In contrast, they carry the burdens with the non-equal sample. The demographic data showed the correlation between age and years of experience, position, marital status, and monthly income. That's expected because, with higher age, the pharmacist gets more experience, gets married, and brings additional benefits of salary.

Tools and Resources to Prepare for Saudi Pharmacist Licensure Exam

This cross-sectional survey sought to investigate predictors of passing SPLE among pharmacists, focusing on the tools and resources they used to prepare for the exam and potential barriers. The roles of pharmacists keep evolving and expanding beyond compounding and dispensing medication. These roles have expanded to provide patient-centered care, face-to-face clinical reviews with patients, community pharmacy services, and supporting clinical governance.^{15,16} Therefore, assessments such as SPLE evaluate graduate pharmacists in these diverse roles, including the four main content areas that align with providing clinical reviews, dispensing drugs, promoting pharmaceutical services, and strengthening effective clinical governance. As students prepare for SPLE, numerous tools are required to influence their performance and passing rates.

This study found that most students used the "Practice MCQ in pharmacy practice and review of healthcare professional law" tools to prepare for the exam. The high use of multiple-choice questions as primary revision tools

is plausible as SPLE is a multiple-choice exam with 300 questions.⁴ Using practice multiple choice questions creates a familiarity with how SPLE exams are set, preparing students to understand the layout of questions. Moreover, these practice MCQs help student practice answering many inquiries within a pre-timed period to eliminate barriers such as having too many questions to respond to within a short time.¹⁷ MCQs are highly adopted and utilized in learning institutions and licensure examinations to objectively assess the knowledge and understanding of pharmacists, facilitating deep learning.¹⁸ Among students, practice MCQs are helpful as a revision tool, as students can self-assess their learning processes. Since these exercises provide feedback, pharmacist students can quickly identify their strengths and weaknesses, identifying content areas they need further study and focus on.¹⁹

The pharmacists highly reviewed healthcare professional law, which aligns with the numerous changes the pharmacy profession and practice in Saudi Arabia has undergone. In addition, rules and regulations facilitating the practice in various healthcare settings have been updated to meet the increasing demand for pharmaceutical services.²⁰ Therefore, pharmacists must be updated on the most recent laws guiding the practice, considering it is a content area of assessment. Twenty percent of the SPLE test focuses on social, behavioral, and administrative sciences, where questions on pharmacy law and regulatory affairs are tested.⁴ Tools moderately used included attending a preparatory course on the pharmacy license board, reading reference guides for the pharmacy licensing exam, reviewing narcotics and control medications law, reviewing pharmacotherapy books, and American Society Health-System Pharmacists (ASHP) statements and guidelines. Pharmacotherapy books are essential to promote the pharmacist's understanding of treating illnesses using medications, considering SCFHS envisions to minimize related medical errors since pharmacy practice is shifting towards providing patient-oriented care rather than focusing on drug manufacturing and sale.³

In addition to the tools incorporated, pharmacists highly use resources such as the pharmacy licensing exam practice tests Compact Disc (CD) by Manan Shroff, ASHP's PharmPrep case-based board review, reference guide for Pharmacy licensing exam- questions and answers, and reference guide for pharmaceutical calculations to prepare for their examination. Shroff's guide provides targeted practice tests that align with SPLE content areas such as pharmaceutical care's social, behavioral, and administrative aspects. These guides, mainly the questions and answers guides, present an opportunity for pharmacists to remember facts and topics they read and methodologies they used to calculate some pharmaceutical sums, increasing their confidence to complete the SPLE tests and reducing their anxiety. These guides strengthen the revision and preparedness of students before undertaking the main examination, as they create a familiarity with potential problems and ways to solve them.⁵ This practice and guidance allow pharmacists to conduct deep learning to solve the problem by searching for appropriate answers using primary resources. Pharmacist students taking the SPLE test for the first time benefit from these tools and resources as they provide helpful experiences in understanding the nature of SPLE test questions.

Numerous factors influence the success and passing rates of SPLE among pharmacist students. As identified in this study, access to appropriate tools and resources affects students' passing rates. In addition, this access is equally affected by factors such as a student's location (Central, North, South, East, and West), working site (hospitals or care clinics), gender, marital status, and age. Besides, the work experience, positions (directors, assistants, supervisors, staff, and interns), GPA grade, number of times for admission, and monthly income. Based on the results, being a single female student aged 24-30 years, located in central Saudi Arabia, and earning a high monthly income was associated with better access to SPLE revision tools and resources, which equally influenced

Table 7: Multiple regression of Factors with the Barriers Prevent Passing Saudi Pharmacist Licensure Exam.

Model	R	R Square	F	Sig.	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
					B	Std. Error	Beta	Lower Bound			Upper Bound	Tolerance	VIF	
1	.371 ^b	.138	2.612	.004 ^b	2.432	0.342			7.113	0.000	1.757	3.106		
					0.024	0.033	0.053		0.716	0.475	-0.042	0.089	0.890	1.123
					0.022	0.012	0.149		1.934	0.055	0.000	0.045	0.812	1.231
					0.009	0.014	0.048		0.643	0.521	-0.019	0.038	0.866	1.155
					0.251	0.087	0.211		2.882	0.004	0.079	0.423	0.894	1.118
					-0.112	0.055	-0.180		-2.024	0.044	-0.221	-0.003	0.609	1.643
					-0.044	0.054	-0.085		-0.825	0.410	-0.151	0.062	0.451	2.216
					0.006	0.052	0.009		0.113	0.910	-0.097	0.109	0.780	1.283
					0.052	0.068	0.096		0.774	0.440	-0.081	0.186	0.310	3.230
					0.070	0.044	0.130		1.617	0.108	-0.016	0.156	0.743	1.345
					0.050	0.047	0.102		1.070	0.286	-0.042	0.142	0.526	1.902
					-0.010	0.044	-0.018		-0.222	0.824	-0.097	0.077	0.698	1.432

a. Dependent Variable: pharmacist perception of SPLC, Predictors: (Constant), Location, Site of work, No of beds, Gender, Material status, Age (years), GPA, Years of experiences at pharmacy career, Position Held, Monthly income, and No of SPLC admissions

Model	B	Bootstrap for Coefficients				
		Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
1	2.432	-.012	.333	.001	1.735	3.088
	.024	.001	.033	.480	-.041	.090
	.022	-.001	.012	.062	-.002	.044
	.009	.001	.019	.614	-.027	.052
	2.51	.003	.086	.003	.096	.425
	-.112	.000	.044	.006	-.209	-.033
	-.044	.004	.043	.299	-.127	.045
	.006	-.003	.044	.882	-.090	.090
	.052	.003	.063	.380	-.068	.186
	.070	.000	.040	.079	-.008	.154
	.050	-.001	.043	.255	-.038	.129
	-.010	-.001	.041	.796	-.097	.067

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

their passing rates ($p=.007$). These findings are consistent with the current study in that factors affecting access to tools and resources and passing SPLE tests include age, gender, marital status, position held, and working sites. Juggling between work, personal life, and education can be difficult, compromising work productivity, personal life presence, and reading, revising, and passing licensure exams. In this study, most respondents (98%) worked in hospitals (MOH, Military, National Guard, Security Forces, University, and private hospitals), primary care centers, ambulatory care clinics, community pharmacies, pharmaceutical companies, and pharmacy colleges. The rest (2%) were interns or unemployed. Among these respondents, one-third of the sample were divorced, married, single, and with low divorced percentages. Those characteristics of personal life might have affected SPLE preparations either positively or negatively.

Regarding age, most participants were 31-60 years (81.03%), meaning they had families and stable employment status. In NAPLEX tests, older students will likely have a lower GPA than younger students and struggle academically.²¹ Regarding positions held, students in executive and non-executive positions may have numerous work-related responsibilities and workload that affects their preparedness and academic performance, including passing the SPLE tests. Students working more than 16 hr are likely to perform poorly and indicate lower academic performance than those working fewer hours.^{22,23} Okogbaa *et al.*²³ found a strong and negative correlation between working hours and academic performance, whereby as the working hours increased, academic performance reduced. However, it was not found in the current study. Finally, income is essential in passing SPLE exams or accessing necessary tools and resources. These predictors show how balancing working, family life, and education can be challenging, mainly among older students affecting their passing rate.

Barriers Preventing Passing the Saudi Pharmacist Licensure Exam

The passing rates of SPLE tests since its implementation in 2019 have been inconsistent, showing elevating student scores and performances. In 2019, the pass rate was 95%, while in 2020, it increased to 98%, a 3% increment.¹ The increasing passing rates and figures can be attributed to expanded revision tools and resources that pharmacists can use to enhance their comprehension of the nature of SPLE tests and the knowledge required to pass the examination. Nonetheless, studies have not established potential barriers and influencing predictors of passing SPLE. This study found that the primary obstacles to passing the test had non-pharmacy board licensing exam simulating the tests, test-related anxiety, depression, and insufficient preparation, among pharmacists. Other prevalent barriers included too many questions, difficult exam questions, and topics not covered or insufficiently taught in pharmacy class.

This study found the most significant barrier to passing SPLE tests as the presence of non-pharmacy board license exam simulating undergraduate examinations ($M=3.58, p=.000$). Pharmacists taught by non-pharmacists (pharmacy technicians) may have low exposure to provide appropriate skills and knowledge when in practice. Skill development and first-hand understanding of the pharmacy practice are significant among pharmacy students, not just knowledge.²⁴ Similarly, simulating licensure exams among pharmacists can be limiting and challenging for students and non-pharmacist instructors. Pharmacy education aims to give students the knowledge and abilities they need to provide high-quality pharmacy services and medication. The focus of health professions education is evolving from information literacy to skill development and knowledge implementation.²⁵

In addition, assessments and licensure exams such as SPLE monitor the quality of education, skills, knowledge, and qualifications students

acquire as they graduate to practice.³ However, for some pharmacists, these exams can be a source of worry, thus the emotional responses of anxiety. Studies show the prevalence of text anxiety mainly among first-time attempters, indicating that some students view exams as threatening before, during, or after the test. Test anxiety is associated with depression, stress, and unpreparedness. If students are not adequately prepared to undertake the exam, they will develop text anxiety and fear they may not pass or attain the desired pass score. Text anxiety can also arise when students find many questions with limited time, equally affecting their passing rates.²⁶ Spivey *et al.*²¹ outlined a similar pattern, investigating barriers and performance influencing factors to passing NAPLEX. Students undertaking pharmacy mathematics tests presented high test-related anxiety and stress, showing that some topics could induce related anxiety. Depression of unexpected experiences was another integral barrier that pharmacist students indicated affecting the passing rate of SPLE. Spivey *et al.* (2020) found that depression was associated with balancing many tasks and obligations in one's personal life, such as being a parent/guardian, spouse, or employee.²¹

This study also found that some licensure exams were not covered or adequately taught by the school while studying as pharmacy students. Omitted topics during learning limit students' preparedness when exams target these topics. Poorly taught topics result in students' minimal understanding, increasing their failure rate as they lack the appropriate comprehension to approach and answer the topic-related exam questions. Teaching impacts how easily students can study and prepare for exams significantly. Teaching introduces complicated concepts and increases awareness, making it easier for students to appraise and review SPLE readiness.²⁷ Improved readiness enhances the quality of students taking exams and reduces test anxiety or stress associated with unpreparedness. This study had two limitations. Primarily, this cross-sectional survey does not provide a cause-and-effect relationship. A cause-and-effect relationship shows how one thing happens due to something else.²⁸ This study investigated tools and resources used by pharmacists, barriers impeding the passing rates of the SPLE test, and demographic factors affecting passing. The investigation was carried out simultaneously and together, thus providing temporal causation.

Nonetheless, ascertaining these relationships require experimental designs. Experimenting on this topic, focusing on a more extended period, such as two years, can confirm these barriers and hypotheses. First, experimental methods can explain the obstacles, answering why using non-pharmacists simulating and disseminating exams among pharmacist students can adversely affect the student's passing rates. Secondly, a potential bias in a cross-sectional study is recall bias, where participants remember information differently based on their outcome status, not accurately remembering previous events and experiences.^{28,29} The survey responses could have been biased; nonetheless, future studies can conduct experimental studies to ascertain this study's findings.

The implication of this study's results indicates that factors such as age, gender, marital status, position held, and working sites might influence passing the SPLE test due to not being well prepared. These factors interact, causing adverse or positive influences, and determining barriers or motivating factors to pass the licensure exam. These predicting factors influence the ability of pharmacists to access the necessary tools and resources to prepare for the test and shape the barriers a student may experience. These results align with previous studies increasing the validity and reliability of the study. Pharmacy schools can use these results to implement strategies to prevent or mitigate identified barriers creating a favorable learning environment to increase academic performance among students. For example, having non-pharmacy licensing boards administering exams can be mitigated by providing a pharmacy background to non-pharmacy faculty or ensuring that all faculty members have a pharmacy background. In addition, students and

learning institutions can adopt multiple-choice practice questions and pharmacy guides as the most effective and helpful tools and resources to prepare for SPLE exams.

The current study had comprehensive results that impacted the pharmacist and educational center to prepare for SPLE. However, it had various limitations. For example, what included using non-randomized sampling techniques, including different levels of demographic information, was non-representative of all types of pharmacists. Besides, it was a cross-sectional investigation and temporary results and could change in the future. Therefore, periodic future studies with a randomized sampling method are warranted.

CONCLUSION

The results of this study can be generalized and applied in diverse settings and locations, such as universities and pharmacy colleges that provide SPLE tests among pharmacist students. This study targeted pharmacist students in the central, north, south, east, and west of Saudi Arabia, working in various healthcare facilities, occupational positions, and practice areas. Nonetheless, not all learning institutions have implemented standardized preparation tools for the licensure exams, providing an opportunity to reproduce this study or generalize the findings in these learning institutions. In addition, future researchers can conduct a similar survey in diverse universities implementing SPLE preparation tests.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

Consent for publications

Informed consent was obtained from all the participants

Ethical Approval


This research was exempted from research and ethical committee or an institutional review board (IRB) approval.

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html>

ABBREVIATIONS

M: Mean or Average; **SPLE:** Saudi Pharmacist Licensure Examination; **MCQ:** Multiple Choice Questions; **SCFHS:** Saudi Commission for Health Specialties; **MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **CBAHI:** Saudi Center for Accreditation of healthcare institutions; **SPSS:** Statistical Package of Social Sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology statement; **USA:** United State of America; **GPS:** UK: United Kingdom; **GPA:** Grade Point Average; **ASHP:** American Society Health-System Pharmacists; **CD:** Compact Disc.

ORCID ID

Yousef Ahmed Alomi  <https://orcid.org/0000-0003-1381-628X>

REFERENCES

- Alghamdi WA, Almeleebia TM, Orayj KM. Comparison of Saudi Pharmacist Licensure Examination (SPLE) Pass Rates by Institution and Applicant Characteristics. *Healthcare*. 2022;10(10):1865.
- Ali Fathi TH, Miraj SA. Impact of knowledge, attitude and practice on medication errors and safety improvement in pharmacy Departments of King Saud University Medical City Riyadh Saudi Arabia. *Biomed Pharmacol J*. 2021;14(2):803-13.
- Alhifany AA, Almalki FA, Alatawi YM, Basindowh LA, Almajnoni SS, Elrggal ME, *et al.* Association between graduates' factors and success rate on the Saudi Pharmacist Licensure Examination: A single-Institution cross-sectional cohort study. *Saudi Pharm J*. 2020.
- Saudi Commission for Health Specialties, Health. Saudi Pharmacist Licensure Examination (SPLE). 2019.
- Sales I, Alwhaibi AM, Aljaded RI, Alzaidi RF, Shahba A, Almuqbil M, *et al.* A comprehensive review program to prepare pharmacy students for the Saudi Pharmacist Licensure Examination (SPLE). *Saudi Pharm J [Internet]*. 2022;(xxxx). Available from: <https://doi.org/10.1016/j.jsps.2022.07.017>
- Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Vol. 35, *Indian Journal of Psychological Medicine*. 2013;121-6.
- Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. *Gastroenterol Hepatol from Bed to Bench*. 2013;6(1):14-7.
- G Ezhumalai. How big a sample do I need require. *Ann SBV*. 2017;6(1):39-41.
- Johnson TP, Wislar JS. Response rates and nonresponse errors in surveys [Internet]. Vol. 307, *JAMA - Journal of the American Medical Association*. 2012;1805-6. Available from: http://www.aapor.org/Standard_Definitions2.htm.
- Erik Von Elm, Douglas G. Altman, Matthias Egger, Stuart J. Pocock, Peter C. Gøtzsche JPV. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. *PLoS Med [Internet]*. 2007;4(10):1623-7. Available from: <http://www.epidem.com/>
- Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies [Internet]. Vol. 370, *www.thelancet.com*. 2007. Available from: www.plosmedicine.org
- Liao D, Valliant R. Variance inflation factors in the analysis of complex survey data. *Surv Methodol*. 2012;38(1):53-62.
- Akinwande MO, Dikko HG, Samson A. Variance Inflation Factor: As a Condition for the Inclusion of Suppressor Variable(s) in Regression Analysis. *Open J Stat*. 2015;05(07):754-67.
- Thompson CG, Kim RS, Aloe AM, Becker BJ. Extracting the Variance Inflation Factor and Other Multicollinearity Diagnostics from Typical Regression Results. *Basic Appl Soc Psych*. 2017;39(2):81-90.
- Kristina SA, Wijoyo Y. Assessment of pharmacy students' clinical skills using objective structured clinical examination (OSCE): A literature review. *Syst Rev Pharm*. 2019;10(1):55-60.
- Tait P, Chakraborty A, Tieman J. The Roles and Responsibilities of Community Pharmacists Supporting Older People with Palliative Care Needs: A Rapid Review of the Literature. *Pharmacy*. 2020;8(3):143.
- Ngo SNT. Can multiple choice questions assess application of knowledge in pharmaceutical science teaching? *Pharm Educ*. 2018;18(1):202-6.
- Moore S, Nguyen HA, Stamper J. Examining the Effects of Student Participation and Performance on the Quality of Learnersourcing Multiple-Choice Questions. *L@S 2021 - Proc 8th ACM Conf Learn @ Scale*. 2021;209-20.
- Grainger R, Dai W, Osborne E, Kenwright D. Medical students create multiple-choice questions for learning in pathology education: A pilot study. *BMC Med Educ*. 2018;18(1):1-8.
- Almaghaslah D, Al-Haqan A, Al-jedai A, Alsayari A. Adopting global tools for the advancement of pharmacy practice and workforce in Saudi Arabia. *Saudi Pharm J [Internet]*. 2022;30(7):954-63. Available from: <https://doi.org/10.1016/j.jsps.2022.05.007>
- Beranova-Giorgianni S. Connecting non-pharmacist faculty to pharmacy practice. *Curr Pharm Teach Learn [Internet]*. 2018;10(5):546-8. Available from: <http://dx.doi.org/10.1016/j.cptl.2018.02.006>
- Lyons KM, Brock TP, Malone DT, Freihat L, White PJ. Predictors of pharmacy student performance on written and clinical examinations in a flipped classroom curriculum. *Am J Pharm Educ*. 2020;84(12):1627-36.
- AlKandari NY. Student's Anxiety Experiences in Higher Education Institutions. In: *Anxiety Disorders - The New Achievements [Internet]*. 2020;137-44. Available from: <https://www.intechopen.com/books/advanced-biometric-technologies/liveness-detection-in-biometrics>
- Spivey CA, Chisholm-Burns MA, Johnson JL. Factors associated with student pharmacists' academic progression and performance on the national licensure examination. *Am J Pharm Educ*. 2020;84(2):269-76.
- Barnett MJ, Lindfelt T, Doroudgar S, Chan E, Ip EJ. Pharmacy-faculty work-life balance and career satisfaction: Comparison of national survey results from 2012 and 2018. *Explore Res Clin Soc Pharm [Internet]*. 2022;5:100112. Available from: <https://doi.org/10.1016/j.rcsop.2022.100112>
- Okogbaa J, Allen RE, Sarpong DF. Time spent at work and its impact on the academic performance of pharmacy students. *Int J Environ Res Public Health*. 2020;17(2):1-13.
- Huang Z, Zhang X, Wu L, Hu P, Huang Y, Pan X, *et al.* Progress on Pharmaceutical Sciences/Pharmacy Postgraduate Education: A Bibliometric Perspective. *J Pharm Innov [Internet]*. 2022;(0123456789). Available from: <https://doi.org/10.1007/s12247-021-09611-z>
- Wang X, Cheng Z. Cross-Sectional Studies: Strengths, Weaknesses, and Recommendations. *Chest [Internet]*. 2020;158(1):S65-71. Available from: <https://doi.org/10.1016/j.chest.2020.03.012>
- Jager KJ, Tripepi G, Chesnaye NC, Dekker FW, Zoccali C, Stel VS. Where to look for the most frequent biases? *Nephrology*. 2020;25(6):435-41.