

# Attitudes and Perceptions of Pharmacists About Home care pharmacy services in Saudi Arabia

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## ABSTRACT

**Objectives:** To explore the attitudes and perceptions of pharmacists about home care pharmacy services in Saudi Arabia. **Methods:** The study analyzed a cross-sectional survey that discussed the attitudes and perceptions of pharmacists about home care pharmacy services in Saudi Arabia. The survey consisted of respondents' demographic information about pharmacist's perception of home healthcare pharmacy services, barriers, which factors may discourage the implementation of home care pharmacy services, and recommendations/suggestions for facilitating the implementation of home healthcare pharmacy services. The 5-point Likert response scale system was used with closed-ended questions. The survey was validated through the revision of expert reviewers and pilot testing. Besides, various tests of reliability, McDonald's  $\alpha$ , Cronbach alpha, Gutmann's  $\lambda_2$ , and Gutmann's  $\lambda_6$  were done with the study. Furthermore, the data analysis of the attitudes and perceptions of pharmacists about home care pharmacy services 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. **Results:** A total number of 393 pharmacists responded to the questionnaire. Of them, more than three-quarters responded from the Central region (303 (77.10%)), with statistically significant differences between the provinces ( $p=0.000$ ). Males responded less than females (195 (49.74%)) versus 197 (50.26%)), with statistically non-significant differences between them ( $p=0.920$ ). Most of the responders were in the age group of 24-35 years (267 (67.94%)) and 36-45 years (121 (30.79%)), with statistically significant differences between all age groups ( $p=0.000$ ). The average score of perception of pharmacists about home healthcare pharmacy services was (4.33). The element "Electronic prescribing in home healthcare pharmacy has a positive outcome to patients" obtained the highest score (4.45). The aspect "The off-labeling system in home healthcare pharmacy should be implemented to protect the healthcare providers from any liability" (4.44). The responders who agreed that they should be authorized and responsible for providing home healthcare pharmacy services to the patient was a pharmacist (4.30), clinical pharmacist (4.27), and Pharmacy technician (4.26), with statistically significant difference between the responses ( $p<0.000$ ). The average score for "barriers might prevent home healthcare pharmacy services implementation" was (4.33). The score for the element "Fear of legal liability" was (4.52), the aspect "Limited number of pharmacists who are specialized in geriatric patients when needed" was (4.46), and the element "Unaware of the need and importance of home healthcare pharmacy services" was (4.46). **Conclusion:** The attitudes and perceptions of pharmacists about home care pharmacy services are acceptable. All obstacles preventing home care pharmacy services should be removed. Standardized home care pharmacy services are highly recommended in Saudi Arabia.

**Keywords:** Attitudes, Perceptions, Pharmacists, Home care, pharmacy services, Saudi Arabia.

## INTRODUCTION

Strategies with the new Saudi Vision 2030 and health care strategic planning encourage ambulatory care services.<sup>[1,2]</sup> That includes ambulatory care clinics or primary care facilities and home healthcare services. The new pharmacy practice model within vision 2030 emphasized the exact directions of pharmacy for ambulatory care services at government and private healthcare organizations<sup>[3]</sup> Those facilities cost less than critical or acute care services.<sup>[4]</sup> The inclusion of pharmacy services, with a focus on home healthcare, may improve patient outcomes while reducing additional costs to the healthcare system.<sup>[5-8]</sup> As a result, it is necessary to investigate the pharmacist's attitudes and perceptions of

home health care services and the barriers that prevent home care pharmacy improvements. A few studies on home care pharmacy services have been conducted in local or Gulf or Arabic countries.<sup>[4-16]</sup> Cross-sectional research aims to demonstrate the pharmacist's perception of home care pharmacy services in Saudi Arabia.

## METHODS

The study analyzed a cross-sectional survey that discussed the attitudes and perceptions of pharmacists about home care pharmacy services 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-pharmacist or students, non-completed, non-qualified surveys will be excluded from the study. The survey consisted of respondents' demographic information about pharmacist's perception of home healthcare pharmacy services, and barriers, which factors may Discourage the implementation of home care pharmacy services, and recommendations/suggestions for facilitating the implementation of home healthcare pharmacy services, and recommendations/suggestions for facilitating the implementation of home healthcare pharmacy services.<sup>[4-16]</sup> The 5-point Likert response scale system was used with closed-ended questions. According to the previous litterateur 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%.<sup>[17-19]</sup> The response rate required for the calculated sample size was at least 60-70 % and above.<sup>[19-20]</sup> 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  $\omega$ , Cronbach alpha, Gutmann's  $\lambda_2$ , and Gutmann's  $\lambda_6$  were done with the study. The data analysis of attitudes and perceptions of pharmacists about home care pharmacy services 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, and correlation analysis. Besides, inferential analysis of factors affecting pharmacist's perception of home healthcare pharmacy services and pharmacist's perception of some barriers might prevent home care pharmacy services implementation with the linear regression. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided the reporting of the current study.<sup>[21,22]</sup>

## RESULTS

A total number of 393 pharmacists responded to the questionnaire. Of them, more than three-quarters responded from the Central region (303 (77.10%)), with statistically significant differences between the provinces ( $p=0.000$ ). Most of the responders were from Pharmaceutical Companies (69 (17.56%)), University Hospitals (56 (14.25%)), Community

Pharmacy (54 (13.74%)), and Private Hospital (53 (13.49%)), with statistically significant difference between working sites ( $p=0.000$ ). Males responded less than females (195 (49.74%)) versus 197 (50.26%)), with statistically non-significant differences between them ( $p=0.920$ ). Most of the responders were in the age group of 24-35 years (267 (67.94%)) and 36-45 years (121 (30.79%)), with statistically significant differences between all age groups ( $p=0.000$ ). Most responders held Pharm D (334 (84.99%)). Most of the pharmacists were staff pharmacists (367 (94.34%)), with statistically significant differences between all levels ( $p=0.000$ ). Most pharmacists had a work experience of 4-6 years (185 (47.07%)), 1-3 years (72 (18.32%)), and 7-9 years (71 (18.07%)), with a statistically significant difference between years of experience ( $p=0.000$ ). Most pharmacists had worked at Drug Information )239 ((60.81%)), inpatient pharmacy (78 ((53.94%)), and Inventory control (147 ((37.40%)). There was a medium negative correlation between age (years) and gender based on Kendall's tau\_b (0.397) and Spearman's rho (0.400) correlation coefficients, with a statistically significant difference between the two factors ( $p<0.000$ ) (Tables 1 and 2).

The average score of perception of pharmacists about home healthcare pharmacy services was (4.33). The element "Electronic prescribing in home healthcare pharmacy has a positive outcome to patients" obtained the highest score (4.45). The aspect "The off-labeling system in home healthcare pharmacy should be implemented to protect the healthcare providers from any liability" (4.44). In contrast, the lowest score was obtained for the element "The home healthcare pharmacy elements are under-implemented in the healthcare institution (hospitals)" (4.18). The score of the component "In your institution, home healthcare pharmacy policy and procedures are well-implemented" was (4.20), with a statistically significant difference between the responses ( $p<0.000$ ). All aspects of the perception of pharmacists about home care pharmacy were statistically significant between responses ( $p<0.000$ ) (Table 3). The responders agreed that they should be authorized and responsible for providing home healthcare pharmacy services to the patients as a pharmacist (4.30), clinical pharmacist (4.27), and Pharmacy technician (4.26), with a statistically significant difference between the responses ( $p<0.000$ ). All responses about aspects of perception of home healthcare pharmacy services responsibilities were statistically significant ( $p<0.000$ ) (Table 4). The average score for the element "barriers might prevent home healthcare pharmacy services implementation" was (4.36). The score for the

component "Fear of legal liability" was (4.52), the element "Limited number of pharmacists who are specialized in geriatric patients when needed" was (4.46), and the element "Unaware of the need and importance of home healthcare pharmacy services" was (4.46). In contrast, low scores were obtained for the elements "Limited healthcare providers' knowledge about home healthcare pharmacy services" (4.22) and "Concern that providing home healthcare pharmacy services will generate extra work" (4.25). Besides, the elements "Uncertainty about the association between type of patients (geriatrics, handicapped, ..) and home healthcare pharmacy" (4.27) and "The home healthcare pharmacy services are too trivial to implement" was (4.27) with statistically significant difference between the responses ( $p<0.000$ ). All responses about aspects of perception of factors that affected barriers might prevent home healthcare pharmacy services implementation were statistically significant ( $p<0.000$ ) (Table 5). The score for single-test reliability analysis of McDonald's  $\omega$  was 0.958, Cronbach's  $\alpha$  was 0.956, Gutmann's  $\lambda_2$  0.960, Gutmann's  $\lambda_6$  was 0.989, and Greater Lower Bound was 0.996 with statistically significant ( $p<0.05$ ).

## Factors affecting the pharmacist's perception of home healthcare pharmacy services

Factors affecting the perception were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests. *Pharmacist's perception of home healthcare pharmacy services. That includes location, worksite, age (years), gender, experiences, and position, besides the number of home healthcare prescriptions and home care patients. There are statistically significant differences between all regions ( $p=0.000$ ), with the highest score (4.4690) in the central area. Eleven worksites affected the *pharmacist's perception of home healthcare pharmacy services*. The MOH-primary care center and Military hospitals showed the highest scores (4.7429) and (4.5278), respectively, affecting the *pharmacist's perception of home healthcare pharmacy services* with a statistically significant difference between working sites ( $p=0.000$ ) with significance among all sites. There are non-statically significant differences between males and females affected the *pharmacist's perception of home healthcare pharmacy services* ( $p=0.483$ ). The age of the responders affected the *pharmacist's perception of home healthcare pharmacy services* with a statistically significant at all age groups ( $p=0.073$ ), and there is non-statistically significant between all age groups*

Nationality	Response Count	Response Percent	p-value (X2)	
Central area	303	77.10%	0.000	
North area	27	6.87%		
South area	32	8.14%		
East area	18	4.58%		
West area	13	3.31%		
Answered question	393			
Skipped question	0			
Site of work	Response Count	Response Percent	p-value (X2)	
Ministry of Health Primary Hospital	32	8.14%	0.000	
Military hospital	36	9.16%		
National Guard Hospital	2	0.51%		
Security Force Hospital	3	0.76%		
University Hospital	56	14.25%		
Ministry of Health Primary Care Center	44	11.20%		
Private Hospital	53	13.49%		
Private Ambulatory Care Clinic	20	5.09%		
Private Primary Healthcare Center	24	6.11%		
Community Pharmacy	54	13.74%		
Pharmaceutical Company	69	17.56%		
Answered question	393			
Skipped question	0			
Gender	Response Count	Response Percent		
Male	195	49.74%		0.920
Female	197	50.26%		
Answered question	392			
Skipped question	1			
Age	Response Count	Response Percent		
24–35	267	67.94%	0.000	
36–45	121	30.79%		
46–55	4	1.02%		
> 55	1	0.25%		
Answered question	393			
Skipped question	0			

Pharmacist Qualifications	Response Count	Response Percent	p-value (X2)
Diploma in Pharmacy	3	0.76%	
Bachelor's in pharmacy	21	5.34%	
Master	41	10.43%	
Doctor of Pharmacy (Pharm D)	334	84.99%	
Doctor of Philosophy (Ph.D.)	3	0.76%	
Postgraduate Year One (PGY1)	30	7.63%	
Postgraduate Year Two (PGY2)	40	10.18%	
Postgraduate Year Three (PGY3)	31	7.89%	
Fellowship	1	0.25%	
Answered question	393		
Skipped question	0		
Position Held	Response Count	Response Percent	
Director of Pharmacy	5	1.29%	0.000
Assistant Director of Pharmacy	4	1.03%	
Supervisor	13	3.34%	
Pharmacy staff	367	94.34%	
Answered question	389		
Skipped question	4		
Years of experience in a pharmacy career	Response Count	Response Percent	
< 1	9	2.29%	0.000
1-3	72	18.32%	
4-6	185	47.07%	
7-9	71	18.07%	
> 9	56	14.25%	
Answered question	393		
Skipped question	0		
The practice area	Response Count	Response Percent	
Inpatient Pharmacy	212	53.94%	
Outpatient Pharmacy	67	17.05%	
Satellite Pharmacy	2	0.51%	
Narcotics and Controlled	98	24.94%	
Extemporaneous Preparation	118	30.03%	
Clinical Pharmacy	99	25.19%	
Inventory Control	147	37.40%	
Drug Information	239	60.81%	
IV admixture	67	17.05%	
Community pharmacy	48	12.21%	
Pharmaceutical companies	163	41.48%	
Health education	1	0.25%	
Answered question	393		
Skipped question	0		

Table 3: The pharmacist's perception of some items for home healthcare pharmacy services?

No	Item	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Weighted Average	p-value (X2)
1	The periodic training program for pharmacy and healthcare staff about home healthcare pharmacy services is mandatory	1.27%	1.02%	4	4.33%	17	187	47.58%	0.000
2	All healthcare providers are familiar with home healthcare pharmacy practice	1.79%	1.53%	6	2.55%	10	175	44.64%	0.000
3	In the future, all healthcare providers must consult pharmacists on home healthcare services	0.25%	2.04%	8	5.85%	23	212	53.94%	0.000
4	In your institution, home healthcare pharmacy policy and procedures are well-implemented	0.76%	1.78%	7	16.79%	66	150	38.17%	0.000
5	Home healthcare pharmacy services can be led to positive changes	1.02%	0.76%	3	10.94%	43	170	43.26%	0.000
6	The home healthcare pharmacy elements are under-implemented in the healthcare institution (hospitals)	1.29%	2.58%	10	13.18%	51	164	42.38%	0.000
7	I believe that residency in a home healthcare pharmacy is necessary to be specialized in the care of geriatric patients	1.28%	1.02%	4	8.42%	33	185	47.19%	0.000
8	I believe that continuing education should include the geriatric pharmacy	1.27%	1.53%	6	8.65%	34	164	41.73%	0.000
9	Electronic prescribing in home healthcare pharmacy services has a positive outcome for patients	0.76%	1.02%	4	3.82%	15	162	41.22%	0.000
10	The off-labeling system in home healthcare pharmacy services should be implemented to protect the healthcare providers from any liability	1.28%	0.26%	1	5.87%	23	152	38.78%	0.000
11	The health insurance does not cover most of the geriatric pharmacy services in the clinical practice	1.02%	0.00%	0	7.40%	29	159	40.56%	0.000
12	I think there is under-working staff in home healthcare pharmacy services in the healthcare institutions	2.05%	0.26%	1	11.51%	45	145	37.08%	0.000
13	The home healthcare pharmacy elements are under-implemented in the community pharmacy	1.02%	1.02%	4	7.67%	30	173	44.25%	0.000
14	Home healthcare pharmacy services Decrease the healthcare cost (prescription medication cost and hospitalization and ER visits related to medications) among patients	1.02%	0.51%	2	2.81%	11	195	49.74%	0.000
15	The home healthcare pharmacy service is optimizing the effectiveness and safety of medications prescribed for patients	0.51%	1.02%	4	3.57%	14	186	47.45%	0.000
16	Home healthcare pharmacy services are Improving patients' satisfaction and health outcomes clinically and economically	0.77%	0.77%	3	3.83%	15	180	45.92%	0.000
	<b>Answered</b>						<b>393</b>		
	<b>Skipped</b>						<b>0</b>		

**Table 4: The authorized and responsible for providing home healthcare pharmacy services to the patients.**

No	Item	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Weighted Average	p-value (X2)			
1	Doctors	0.77%	1.79%	6.89%	27	56.89%	223	33.67%	132	392	4.21	0.000
2	Clinical Pharmacist	1.27%	0.25%	8.40%	33	49.87%	196	40.20%	158	393	4.27	0.000
3	Pharmacist	1.53%	0.51%	7.14%	28	48.47%	190	42.35%	166	392	4.30	0.000
4	Nurses	0.76%	2.80%	10.43%	41	45.04%	177	40.97%	161	393	4.23	0.000
5	Pharmacy technicians	1.27%	2.54%	11.20%	44	38.93%	153	46.06%	181	393	4.26	0.000
6	Caregiver	3.57%	3.06%	13.27%	52	33.42%	131	46.68%	183	392	4.17	0.000
	<b>Answered</b>									<b>393</b>		
	<b>Skipped</b>									<b>0</b>		

**Table 5: The barriers that might prevent home healthcare pharmacy services implementation.**

No	Item	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Total	Weighted Average	p-value (X2)			
1	Limited healthcare providers' knowledge of home healthcare pharmacy services	0.77%	1.79%	14.32%	56	41.18%	161	41.94%	164	391	4.22	0.000
2	Uncertainty about the association between the type of patients (geriatrics, handicapped, ...) and home healthcare pharmacy	0.51%	1.53%	17.60%	69	31.12%	122	49.23%	193	392	4.27	0.000
3	The home healthcare pharmacy services are too trivial to implement	1.53%	0.77%	18.16%	71	28.13%	110	51.41%	201	391	4.27	0.000
4	Concern that providing home healthcare pharmacy services will generate extra work	1.79%	4.59%	9.69%	38	34.95%	137	48.98%	192	392	4.25	0.000
5	A limited number of pharmacists who are specialized in geriatric patients when needed	0.77%	1.53%	2.04%	8	42.60%	167	53.06%	208	392	4.46	0.000
6	Lack of confidence in discussing the home healthcare pharmacy services with the prescriber.	1.53%	0.51%	2.81%	11	45.27%	177	49.87%	195	391	4.41	0.000
7	Limited/lack of home healthcare patient information in the medical record	0.77%	1.53%	4.34%	17	38.52%	151	54.85%	215	392	4.45	0.000
8	Limited time spent with home healthcare patients and consequently wrote the report	0.51%	1.79%	8.16%	32	34.44%	135	55.10%	216	392	4.42	0.000
9	Unaware of the existence of a national home healthcare pharmacy services	0.77%	2.04%	11.48%	45	28.32%	111	57.40%	225	392	4.4	0.000
10	Fear of legal liability	0.51%	3.32%	2.30%	9	31.63%	124	62.24%	244	392	4.52	0.000
11	Unaware of the need and importance of home healthcare pharmacy services	0.54%	1.61%	5.90%	22	35.12%	131	56.84%	212	373	4.46	0.000
12	The home healthcare pharmacy services are optional and not paid	1.02%	1.02%	4.86%	19	41.69%	163	51.41%	201	391	4.41	0.000
13	Home healthcare patients do not know about the availability of geriatric pharmacy services	0.51%	1.53%	10.71%	42	36.73%	144	50.51%	198	392	4.35	0.000
14	Insufficient staffing or physical space to provide geriatric pharmacy services	1.79%	1.28%	8.67%	34	36.22%	142	52.04%	204	392	4.35	0.000
15	Insufficient or Lack of periodic training programs provided for medical staff about geriatric pharmacy services	0.51%	1.02%	12.02%	47	29.67%	116	56.78%	222	391	4.41	0.000
16	The negative consequences are associated with home healthcare pharmacy services	1.02%	2.81%	13.78%	54	25.26%	99	57.14%	224	392	4.35	0.000
17	The home healthcare pharmacy services were not appropriately taught during the School of Pharmacy	0.51%	4.08%	11.73%	46	32.65%	128	51.02%	200	392	4.3	0.000
18	Most healthcare insurance does not include the home healthcare pharmacy services	2.56%	1.79%	14.83%	58	25.32%	99	55.50%	217	391	4.29	0.000
	<b>Answered</b>									<b>392</b>		
	<b>Skipped</b>									<b>1</b>		

( $p>0.05$ ). Five levels of work experience affected the *pharmacist's perception of home healthcare pharmacy services*. The lowest score (3.4792) was obtained for those with work experience of less than one year, with a statistically significant difference between all levels ( $p=0.000$ ). Four levels of the position affected the perception of pharmacists, with the highest score (4.3903) obtained for the pharmacy staff, with a statistically significant difference between all levels ( $p=0.000$ ). The number of home care prescriptions affected *pharmacist's perceptions about home healthcare pharmacy services*. The pharmacist did not know the number of prescriptions, or they could not specify it obtained the lowest scores (3.4250) with a statistically significant difference ( $p=0.000$ ). The number of home care patients affected pharmacist's perception of *home healthcare pharmacy services*. The group of 19-21 patients daily obtained the highest scores (4.6127) with a statistically significant difference ( $p=0.000$ ).

The relationship between the pharmacist's perception of home healthcare pharmacy services and factors. That includes location, worksite, age (years), gender, experiences, and position, besides the number of home healthcare prescriptions and home care patients. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an explanatory variable. There was a medium relationship ( $R=0.493$  with  $p=0.000$ ) between the pharmacist's perception of home healthcare pharmacy services and its factors. Five out of eight were non-significant differences ( $p>0.05$ ). However, multiple regression analysis confirmed that two factors (i.e., locations, Position Held) explained 27.3% and 30.4%, respectively, of the negative relationship to the variation in perception, with a statistically significant difference ( $p=0.000$ ) and ( $p=0.000$ ). Besides, one factor (the number of home care patients) explained 17.4 % of the positive relationship to the variation in perception, with a statistically significant difference ( $p=0.020$ ). The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with a variance inflation factor (VIF) of 1.073, 1.123, and 2.832, respectively less than three or five as a sufficient number of VIF (Table 6).<sup>[23-25]</sup>

### Factors affecting the pharmacist's perception about authorized and responsible for home healthcare pharmacy services

Factors affecting the perception were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests.

*Pharmacist's perception about the authorized and responsible for the home care pharmacy services* includes location, worksite, age (years), gender, experiences, position held, homecare prescription, and the number of home care patients. Five locations affected the knowledge of pharmacists about high-risk medication. There are statistically significant differences between all regions ( $p=0.000$ ), with the highest score (4.3675) in the central area. Eleven worksites affected the *pharmacist's perception about authorized and responsible home healthcare pharmacy services*. The private ambulatory care clinics showed the lowest scores (3.3333) that affected the *pharmacist's perception about authorized and responsible home healthcare pharmacy services* with a statistically significant difference between working sites ( $p=0.000$ ) with significance among all sites. There are non-statically significant differences between males and females that affected the pharmacist's perception about *authorized and responsible home healthcare pharmacy services* ( $p=0.062$ ). The age of the responders affected the *perception of authorized and accountable home healthcare pharmacy services* with a statistically significant difference between all age groups ( $p=0.044$ ), and there was a non-statically significant difference among all age levels ( $p>0.05$ ). Five levels of work experience affected the *perception about authorized and responsible home healthcare pharmacy services*. The lowest score (3.1667) was obtained for those with work experience of less than one year, with a statistically significant difference between all levels ( $p=0.000$ ). Four levels of the position affected the perception of pharmacists, with the highest score (4.2718) obtained for the pharmacy staff, with a statistically significant difference between all levels ( $p=0.000$ ). The number of home care prescriptions affected the *perception of an authorized and responsible home healthcare pharmacy*. The number of prescriptions (6-10) daily obtained the lowest scores (3.6635) with a statistically significant difference ( $p=0.000$ ). The number of home care patients affected the perception of an authorized and responsible *home healthcare pharmacy*. The group of 4-6 patients daily obtained the lowest scores (3.3611) with a statistically significant difference ( $p=0.000$ ).

The relationship between the pharmacist's perception about an authorized and responsible for home healthcare pharmacy services and factors such as location, worksite, age (years), gender, years of experience, position held, number of homecare prescriptions, and number of homecare patients. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an explanatory variable. There was a medium relationship ( $R=0.522$  with  $p=0.000$ ) between

the pharmacist's perception about authorized and responsible home healthcare pharmacy services and its factors. Three out of eight were non-significant differences ( $p>0.05$ ). However, multiple regression analysis confirmed that two factors (i.e., locations and experiences) explained 27.6 % and 35.4%, respectively, of the negative relationship to the variation in perception, with a statistically significant difference ( $p=0.000$ ) and ( $p=0.000$ ).

The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with the working site factor with a variance inflation factor (VIF) of 1.249 and 1.453, respectively, less than three or five as an adequate number of VIF.<sup>[20-22]</sup> Besides, three factors (Worksite, Position held, and number of homecare prescriptions) explained 11.0 %, 18.6%, and 20.9% of the positive relationship to the variation in perception, with a statistically significant difference ( $p=0.016$ ), ( $p=0.000$ ), and ( $p=0.005$ ), respectively. The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with a variance inflation factor (VIF) of 1.073, 1.123, and 2.832, respectively less than three or five as a sufficient number of VIF (Table 7).<sup>[23-25]</sup>

### Factors affecting the pharmacist's perception about some barriers might prevent home healthcare pharmacy services implementation

Factors affecting the perception were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests. *Pharmacist's perception about some barriers that might prevent home healthcare pharmacy services implementation* includes location, worksite, age (years), gender, experiences, position held, number of homecare prescription, and number of homecare patients. There are statistically significant differences between all regions ( $p=0.000$ ), with the highest score (4.5157) in the central area. Eleven worksites affected the perception of barriers preventing home care pharmacy implementations. University hospitals and private hospitals showed the highest scores (4.8056) and (4.7600), respectively, affecting the *Pharmacist's perception of some barriers that might prevent home healthcare pharmacy services implementation* with a statistically significant difference between working sites ( $p=0.000$ ) with a statistically significant among all sites. Females (4.5200) were affected more than males (4.2219) by *Pharmacist's perception that some barriers might prevent home healthcare pharmacy services implementation*

Table 6: Multiple regression of Factors with the Perception of home healthcare pharmacy services.

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 (Constant)	.493 <sup>b</sup>	.243	15.200	.000 <sup>b</sup>	2.793	.343			8.139	.000	2.118	3.468		
Location					-.147	.027			-5.456	.000	-.200	-.094	.801	1.249
Site of work					.008	.008			.962	.336	-.008	.024	.932	1.073
Age (years)					-.036	.059			-.622	.534	-.152	.079	.713	1.403
Pharmacist gender					-.043	.061			-.708	.479	-.163	.077	.689	1.451
Years of experience in a pharmacy career					.000	.031			-.009	.993	-.061	.061	.688	1.453
Position Held					.429	.067			6.416	.000	.297	.560	.890	1.123
Number homecare prescription					-.023	.022			-1.037	.300	-.067	.021	.353	2.832
Number homecare patients					.050	.021			2.330	.020	.008	.092	.358	2.796

a. Dependent Variable: Perception of home healthcare pharmacy services, Predictors: (Constant), Location, Age (years), Pharmacist gender, Position Held, and Years of Experience at pharmacy career, No homecare prescription, and No homecare patients.

Model	B	Bias	Bootstrap for Coefficients			
			Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
1 (Constant)	2.793	-.015	.424	.001	1.947	3.652
Location	-.147	2.209E-05	.028	.001	-.205	-.097
Site of work	.008	.000	.009	.352	-.008	.025
Age (years)	-.036	.003	.054	.488	-.135	.084
Pharmacist gender	-.043	-.004	.060	.486	-.165	.065
Years of experience in a pharmacy career	.000	.000	.030	.988	-.060	.061
Position Held	.429	.005	.081	.001	.271	.604
Number homecare prescription	-.023	9.663E-05	.019	.214	-.061	.013
Number homecare patients	.050	-.001	.018	.009	.011	.085

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

with statistically significant between them ( $p=0.000$ ). The age of the responders did not affect the *Pharmacist's perception of some barriers that might prevent home healthcare pharmacy services implementation* with non-statistically significant differences between all age groups ( $p=0.070$ ). Five levels of work experience affected the *Pharmacist's perception of some barriers that might prevent home healthcare pharmacy services implementation*. The lowest score (3.5606) was obtained for those with work experience of less than one year, with a statistically significant difference between all levels ( $p=0.000$ ). Four levels of the position affected the perception of pharmacists, with the highest score (4.4196) obtained for the pharmacy staff, with a statistically significant difference between all levels ( $p=0.000$ ). The number of home care prescriptions affected *Pharmacist's perception of some barriers that might prevent home healthcare pharmacy services implementation*. The number of prescriptions was (0) daily and obtained the lowest scores (3.4870) with a statistically significant difference ( $p=0.000$ ). The number of home care patients affected *Pharmacist's perception that some barriers might prevent home healthcare pharmacy services implementation*. The group of (0) patients daily obtained the lowest scores (3.4158) with a statistically significant difference ( $p=0.000$ ).

The relationship between the pharmacist's perception about some barriers that might prevent home healthcare pharmacy services implementation and factors such as location, worksite, age (years), gender, years of experience, position held, number of home care prescriptions, and number of home care patients. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an explanatory variable. There was a medium relationship ( $R=0.533$  with  $p=0.000$ ) between the barriers that might prevent home healthcare pharmacy services implementation and its factors. Five out of eight were non-significant differences ( $p>0.05$ ). However, multiple regression analysis confirmed that one factor (i.e., locations) explained 31.3 % of the negative relationship to the variation in perception, with a statistically significant difference ( $p=0.000$ ). Besides, two factors (experiences and position held) explained 18.2 % and 19.9% of the positive relationship to the variation in perception, with a statistically significant difference ( $p=0.001$ ) and ( $p=0.000$ ), respectively. The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with a variance inflation factor (VIF) of 1.249, 1.453, and 1.124, respectively less than three or five as an adequate number of VIF (Table 8).<sup>[23-25]</sup>

## DISCUSSION

Home healthcare services have expanded over the past years.<sup>[26,27]</sup> It started with a simple team of physicians with few physical assessments and diagnosis services and nursing care to various activities such as laboratories test, respiratory therapy, home oral medication delivery, Intravenous infusion therapy, enteral and parenteral nutrition support, and vaccination programs. Home care services are expanding day by day.<sup>[27]</sup> Those services are based on the healthcare strategies of the Ministry of Health and Saudi Vision 2030.<sup>[1,2]</sup> There are various methods of medication dispensing. Sometimes there is a unique pharmacy at the home healthcare center at healthcare organizations responsible for medication distribution, or the hospital pharmacy dispenses the medications to patients through home care nurses responsible for taking care of drugs and deliver to the patients at each visit. Some healthcare institutions used to distribute the medicines through Saudi managed care pharmacy system and, on behalf of community pharmacies, dispensed medications called (Wasfaty) system.<sup>[28,29]</sup> Those medications are allocated to cancer, Alzheimer's, bedridden patients, and other chronic illnesses. Complete home care pharmaceutical care is not unified for all hospitals.<sup>[30]</sup> The wide distribution of medicines was essential to the covid-19 pandemic period.<sup>[31]</sup> The dispensary of home care pharmacy might be affected by the pharmacist's attitudes toward home care pharmacy services, the responsibility of home care pharmacy jobs, or some barriers preventing home care pharmacy improvement and implementation in practice. The current cross-sectional study with various types of pharmacist's locations, working sites, different age levels, experiences, and positions might reflect the reality of pharmacist society, similar to the previous study.<sup>[9]</sup> The survey was distributed to the pharmacy with validation and high single-test reliability results, which was better than the previous study.<sup>[9]</sup>

The finding showed the average score of pharmacist's perception of home care pharmacy services was appropriate. Most pharmacists believe that electronic prescribing of home care pharmacy services is highly suggested. That's excellent advice and should include all medication through the patient's profile with an official national application of MOH called the «Sehhaty» Platform.<sup>[32]</sup> Besides, the pharmacist agreed that off-labeled medicine dispensing to home care patients is highly demanding. That's related to rarely found drug therapy reviews or follow-up in the home care pharmacy, which might lead to potential drug-related problems. Most pharmacists believe that home care pharmacy exists but disagree that its policy

and procedures were well implemented. That's related to the absent unified system of home care pharmacy. Some points of perception highly agreed with most pharmacists, such as periodic training in home care pharmacy, the establishment of the geriatric residency program, full coverage of medications by Health insurance system, home care provided by community pharmacies, and medication safety guidelines for home care pharmacy. All those suggestions are beneficial to improve home care patient clinical and economic outcomes. Thus, there is no previous investigation to compare with the current findings.

Various factors might have affected the pharmacist's perception of home care pharmacy. For instance, the location and work sites, such as the central region, MOH primary care, and military hospital, might allow some pharmacists to provide home care pharmacy services. The new graduate pharmacist had low perception because they did not teach during pharmacy school and were not involved in home care pharmacy services after graduation. On the other hand, the pharmacy staff had a high perception because they commonly involve in the drug distribution for home care patients. The number of patients and their prescriptions might increase the pharmacist's perception of home care pharmacy because they can see the practice and role of pharmacists within home care pharmacy services. The most dependable factors that might have affected the perception of home care pharmacy service were the number of patients might have affected the positive perception, and pharmacy position might affect the negative perception. The lower-position pharmacists have a high perception of home care pharmacy services due to their experiences in practice. Thus, there is no previous investigation to compare with the current findings.

The finding showed that all pharmacists believed that pharmacists or pharmacy technicians should be responsible for home care pharmacy, not physicians or nurses. That's a related comprehensive system of pharmaceutical care emphasizing the long list of medications that can be distributed to home care patients. The pharmacy staff is familiar with the pharmacy practice system and regulations. Various factors might have affected perceptions of home care pharmacy responsibilities; such locations are because home care service providers are available in the central region. In contrast, the private ambulatory care clinic had lowered perception because it might not provide home health care services. The young generation of pharmacists working as pharmacy staff had a good perception of home care responsibilities because they are operating and observing



Table 7: Multiple regression of Factors with the Perception of authorization and responsible for providing home healthcare pharmacy services to the patients.

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 (Constant)	.522 <sup>b</sup>	.272	17.675	.000 <sup>b</sup>	3.317	.402			8.257	.000	2.527	4.107		
Location					-.178	.032			-5.637	.000	-.240	-.116	.801	1.249
Site of work					.023	.010			2.420	.016	.004	.042	.932	1.073
Age (years)					.061	.069			.893	.373	-.074	.196	.713	1.403
Pharmacist gender					-.034	.071			-.471	.638	-.174	.107	.689	1.451
Years of experience in a pharmacy career					-.243	.036			-6.690	.000	-.314	-.172	.688	1.453
Position Held					.313	.078			3.997	.000	.159	.467	.890	1.123
Number homecare prescription					.074	.026			2.832	.005	.023	.126	.353	2.832
Number homecare patients					.040	.025			1.597	.111	-.009	.090	.358	2.796

a. Dependent Variable: Perception of authorization and responsible for providing home healthcare pharmacy services to the patients, Predictors: (Constant), Location, Age (years), Pharmacist gender, Position Held, and Years of Experience at pharmacy career, No homecare prescription, and No homecare patients

Model	Bootstrap for Coefficients					
	B	Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
1 (Constant)	3.317	.025	.678	.001	1.841	4.595
Location	-.178	-.004	.044	.001	-.274	-.102
Site of work	.023	.000	.012	.045	.001	.045
Age (years)	.061	.005	.080	.458	-.086	.223
Pharmacist gender	-.034	-.001	.084	.691	-.202	.137
Years of experience in a pharmacy career	-.243	-.010	.047	.001	-.351	-.160
Position Held	.313	-.001	.153	.036	.018	.631
Number homecare prescription	.074	.002	.034	.028	.011	.142
Number homecare patients	.040	.001	.034	.260	-.024	.109

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

Table 8: Multiple regression of Factors with the Perception of barriers might prevent home healthcare pharmacy services implementation.

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 (Constant)	.533 <sup>b</sup>	.284	18.678	.000 <sup>b</sup>	3.336	.360			9.277	.000	2.629	4.043		
Location					-.182	.028			-6.431	.000	-.237	-.126	.801	1.249
Site of work					-.007	.009			-.838	.402	-.024	.010	.933	1.071
Age (years)					-.066	.061			-1.081	.280	-.187	.054	.713	1.402
Pharmacist gender					.164	.064			2.568	.011	.038	.290	.690	1.450
Years of experience in a pharmacy career					.113	.033			3.464	.001	.049	.177	.688	1.453
Position Held					.302	.070			4.306	.000	.164	.439	.890	1.124
Number homecare prescription					-.045	.023			-1.928	.055	-.091	.001	.353	2.835
Number homecare patients					-.026	.023			-1.159	.247	-.070	.018	.358	2.797

a. Dependent Variable: Perception of barriers that might prevent home healthcare pharmacy services implementation, Predictors: (Constant), Location, Age (years), Pharmacist gender, Position Held, and Years of Experience at pharmacy career, No homecare prescription, and No homecare patients

Model	Bootstrap for Coefficients					
	B	Bias	Std. Error	Sig. (2-tailed)	95% Confidence Interval	
					Lower	Upper
1 (Constant)	3.336	-.002	.554	.001	2.114	4.343
Location	-.182	-.003	.037	.001	-.261	-.114
Site of work	-.007	-.001	.011	.497	-.030	.014
Age (years)	-.066	.007	.071	.349	-.197	.089
Pharmacist gender	.164	-.003	.067	.016	.038	.291
Years of experience in a pharmacy career	.113	.001	.033	.006	.050	.179
Position Held	.302	.005	.115	.007	.099	.548
Number homecare prescription	-.045	.000	.019	.021	-.082	-.006
Number homecare patients	-.026	-.002	.022	.236	-.075	.013

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

all obstacles with home care pharmacy and what's the best responsible leader of the home care pharmacy. The number of patients and medication prescribing affect the responsible perception because they choose the appropriate leader for the drug distribution system to prevent drug-related errors and increase home care patient satisfaction. The most dependable factors affecting the responsibility increase perception of home care pharmacy were the working site, position, and the number of home care prescriptions. That's expected, as discussed above. In contrast, the limited experience might affect negative perceptions of home care pharmacy services, and that's expected because there is no working at the home care services. Thus, there is no previous investigation to compare with the current findings.

The findings showed that most of the responders agreed with barriers to prevention of the home care pharmacy services with a high perception score. Most pharmacists believed that fear of legal liability, a limited number of pharmacists providing the services, and unawareness of the demand for home care pharmacy services are significant obstacles to implementing the home care pharmacy. That's related to unclear home care pharmacy regulations and the pharmacist's role. Besides, education and training are absent for a home care pharmacy, and a shortage of pharmacists. Generally, the number of pharmacy staff, including destructive pharmacists or clinical pharmacists and pharmacy technicians, is in high demand now and in the future. Some pharmacist believes that home care pharmacy might generate extra work or insufficient knowledge of home care pharmacy services. That's expected because the reimbursement system for pharmacies does not exist locally.<sup>[33]</sup> The pharmacist will suffer from the high workload if it increases without reimbursement payments in the pharmacy practice. Other barriers should be considered, such as the lack of home care patient's profiles similar to the previous study.<sup>[9]</sup> That will be resolved with the new system of national application «Sehhaty» Platform.<sup>[32]</sup> Besides, additional barriers that needed to be fixed, such as home care pharmacy, were not discussed thoroughly during pharmacy school. All pharmacy colleges should involve the home pharmacy practice topics for students. In addition, the limited time spent with patients during visiting and unawareness of existing home care pharmacy facilities was similar to the previous study.<sup>[9]</sup> If there are general home care regulations or policies and procedures, pharmacy services will resolve them.

Various factors might have affected the perceived barriers to home care pharmacy. For example, the location and working site, if they comprehensively services of home healthcare, will discover barriers related to home care pharmacy. Besides, high years of experience in a lower position as a staff pharmacy, which mainly practices home care pharmacy, can observe obstacles. Similarly, low numbers of patients or prescriptions do not affect all barriers to implementing home care pharmacy services. Therefore, the most dependable factors that might watch the barriers preventing home care pharmacy were high experience and lower position because they practice home care pharmacy. Thus, there is no previous investigation to compare with the current findings.

### Limitations

Even though the current cross-sectional design explores various information about pharmacist perception and preventive barriers to home care pharmacy implementation, it concerns several points. The study did not use randomized sampling techniques and thus contained various demographic differences and unequal representation from each pharmacy sector. Future research with a randomized sampling method is warranted.

### CONCLUSION

The pharmacist's perception of home care pharmacy service was appropriate. The pharmacist believed that electronic prescriptions and off-labeled indications should be implemented. The pharmacist agreed that the full responsibility of home care pharmacy service is the pharmacist, not other healthcare providers. The most significant barriers toward pharmacy and preventing home care pharmacy services were shortages of pharmacists specialized in geriatrics pharmacy and the absence of official home care pharmacy-related regulations. Besides, unawareness of the demand for home care pharmaceutical care services. Various factors affecting the pharmacist's perception of home care pharmacy practice and related barriers were locations, working sites, experiences, positions, and the number of home care patients and associated medications. All preventive barriers to home care pharmacy implementation should be removed. Future investigation into home care pharmacy practice is suggested to follow up the improvement of home care pharmaceutical care in Saudi Arabia.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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### 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

**MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **SPSS:** Statistical Package of Social Sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology statement.

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