

## Research Article



## Knowledge and Perception about Epidemiology among Pharmacy Students

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### ABSTRACT

The objective of the experiment is to assess knowledge and perception of senior pharmacy students' towards Epidemiology at four public and four private universities in Karachi, Pakistan. A self-administered, prevalidated questionnaire with close ended items containing multiple-choice responses and 5-point Likert scale statements was administered to the Pharmacy students of eight different institutes (July 2013 to December 2013). Students were enrolled following informed consent and knowledge of the purpose of the study. The mean score for knowledge of 800 pharmacy students about epidemiology was  $355 \pm 130$ . Epidemiology knowledge of female students (Mean Score= $258 \pm 93$ ) was more than male students (Mean Score= $95 \pm 38$ ). Overall no significant difference in the knowledge of epidemiology was observed among 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> year students. Mean scores of epidemiology knowledge across 8 Pharmacy institutes was different (Mean Score=  $24 \pm 18-64 \pm 26$ ). Pharmacy students showed positive attitude and perception towards epidemiology. Pakistani pharmacy students of both public and private universities have moderate knowledge of epidemiology. To improve learning of pharmacy students intensive training based on epidemiological practices should be conducted. Students should be trained in the designing and implementation of protocols for evaluation of practice-related problems; therefore, they would be capable to meet the changing health demands of the general public.

**Keywords:** Pharmacy students, epidemiology, knowledge, perceptions.

### INTRODUCTION

Epidemiology is the science of public health. Public health deals with the disease prevention, health promotion and life prolongation of the human population. Its aims to provide healthy environment for general public. It differs from clinical medicine as focuses on prevention of disease in entire population whereas clinical medicine emphasis on treatment of individual patients.<sup>1</sup> Therefore epidemiology is the study of the distribution and determinants of health-related events or states (including disease) as categorized by persons, place and time in definite populations, in order to control the health problems and disease by applying this knowledge.<sup>2,3</sup> Epidemiology is related to the research outcomes. It is based on clinical research principles and methods including statistical analysis<sup>4,5</sup> thus, also considered as basic science in medicine<sup>6</sup> and applied branch of statistics.<sup>3</sup>

The role of pharmacist is nowadays expanding from traditional product-oriented towards the patient-oriented.<sup>7,8</sup> Pharmacists identify risk and health problems in the community by participating in health screening and generate awareness of health problems and prevention of disease by participating in health campaigns. Community pharmacists are also willing to participate in a practice based research.<sup>9</sup> Therefore, for the development of critical appraisal skills in pharmacist epidemiological practices and research must be conducted during pharm-

D studies<sup>10,11</sup> which also encourage pharmacy students to pursue their carrier in community pharmacy and clinical research.<sup>12</sup> The purpose of this study was to evaluate the knowledge and perceptions of pharmacy students towards epidemiology at private and public universities in Karachi, Pakistan.

### MATERIALS AND METHODS

A cross sectional study was conducted on Pharmacy students of eight different institutes of Karachi, Pakistan. A semi-structured, self-administered questionnaire consisting of close ended items, devised from similar studies, were designed to measure the student's knowledge and perceptions towards epidemiology.

Pharmacy students were contacted by the permission of the respective faculty deans/student advisor of each university. A questionnaire comprised of three sections was used. The first part contained five questions regarding student's base line characteristics like gender, age, marital status, current professional year and institute.

The second part of questionnaire included ten items for the measurement of the knowledge about "epidemiology". The questions were specific and related to epidemiology, its causes, factors, prevention and role of pharmacist in epidemiological diseases based on the books on epidemiology. Students were asked to choose the correct and most appropriate answer from multiple-choice responses. In this type of questionnaire partial



knowledge or a lucky guess resulted in correct answer. Therefore “I don’t know” option was also included to reduce guessing that is often associated with the multiple-choice responses and to improve the reliability of answers. Score of 1 was given for each correct answer and score of 0 was given for each wrong answer. “I don’t know” option was also considered as wrong answer and score of 0 was given. Total scores were calculated according to formula scoring.<sup>13,14</sup>

The third section included 12 items designed to evaluate the Pharmacy student’s perceptions towards epidemiology. The questions were framed into a Likert-scale 5-point format (1 = strongly disagree, 2 = disagree, 3 = no difference, 4 = agree and 5 = strongly agree). These statements were designed from the similar studies.<sup>15</sup>

The study was conducted on undergraduate Pharmacy students (N=800). The sampling frame included Pharmacy students of 3<sup>rd</sup> to 5<sup>th</sup> professional year of four private and four public sector general universities of Karachi, Pakistan because the concept of epidemiology is first introduced in third year according to curriculum through the course on community pharmacy. 100 students from each university were enrolled for the study. The time frame for the study was six months from July 2013 to December 2013. Assessment forms were filled anonymously by the students with informed consent and knowledge about the purpose of the study.

The clarity and relevance of the items included in the questionnaire were evaluated by two pharmacy teachers with experience in epidemiological research studies. Furthermore, the reliability and variability of the revised questionnaire was pre-tested by administering it to a sample of 35 students. Pre-testing results were not considered in the final analysis. Cronbach’s alpha was calculated to determine the consistency of questionnaire and the value was 0.79. Results were expressed in counts and percentages.

## RESULTS

Participants of the study were 800 under graduate Pharmacy students, 100 from each institute of Pharmacy. The mean age of the Pharmacy students were 23± 2.5 years. The minimum and maximum ages were 19 and 26 years respectively. About 27.88% were male and 72.13% were females. 86.75% were singles and 13.25% were married. Among 800 students, 28.38% 3<sup>rd</sup> year students, 38.25% 4<sup>th</sup> year students and 33.38% 5<sup>th</sup> year students. The demographic details of the under graduate Pharmacy students are given in Table 1.

The knowledge of the Pharmacy students were assessed by asking 10 questions pertaining to the knowledge of epidemiology, its scope, factors, causes, prevention and control of epidemiological diseases and the role of pharmacist in diseases prevention and epidemiological research. It was observed that 50% under graduate Pharmacy students had correct knowledge of epidemiology. 58.88% students believed that term

epidemiology includes only communicable diseases. 62.13% students thought that epidemiological studies provide the data essential to the planning, implementation & evaluation of services for the prevention, control & treatment of disease & to the setting up priorities among those services. 68.63% participants had a good knowledge of the factors responsible for the spread of epidemiological diseases. They believed that epidemiological diseases were distributed through environmental, host, biological, chemical, physical and mechanical factors. However, only 37.5% Pharmacy students could recognize the populations that are at greater risk of epidemics. Around 66% participants were aware of the major causes of epidemiological diseases which are spreading in third world countries like poverty, frequent natural disaster, and unavailability of medical facilities. About 76.88% Pharmacy students said that they knew the methods for the prevention and control of epidemiological diseases, whereas, only 48.13% participants had awareness about the role of pharmacist in disease prevention. 46.75% students had knowledge regarding the role of pharmacist in epidemiological research and 58.5% students knew the reasons for the lack of interest of pharmacist in epidemiological research in Pakistan. Descriptive results are presented in Table 2. The mean knowledge scores of Pharmacy students for epidemiology were 355±130.

**Table 1:** General baseline characteristics of Pharmacy student

Characteristics	Frequency	
	N	%
<b>Gender</b>		
Male	223	27.88
Female	577	72.13
<b>Age (years)</b>		
>20	39	4.88
20-25	598	74.75
<25	163	20.38
<b>Marital Status</b>		
Single	694	86.75
Married	106	13.25
<b>Professional Year</b>		
3 <sup>rd</sup> Year	227	28.38
4 <sup>th</sup> Year	306	38.25
5 <sup>th</sup> Year	267	33.38
<b>Type of University</b>		
Public	400	50.00
Private	400	50.00

Female Pharmacy student’s knowledge (mean score = 258±93) was higher as compare to male Pharmacy students (mean score = 95±38) as shown in Table 3. The



knowledge of 4<sup>th</sup> year Pharmacy students (mean score = 138±43) was more as compared to 3<sup>rd</sup> year (mean score = 119±36) and 5<sup>th</sup> year Pharmacy students (mean score = 112±49) but the difference was not significant. The mean score of Pharmacy students of private sector universities (191±70) was more than the Public sector universities (164±69). Difference in the mean score of epidemiology knowledge current university attended was observed

(Table 4). The mean score of epidemiology knowledge of different universities was private university 1>public university 7>public university 6>private university 4>private university 2>public university 8>private university 3>public university 5. Universities one to four belonged to private sector whereas, universities five to eight were public sector.

**Table 2:** Pharmacy students' knowledge of Epidemiology

Items	Correct		Incorrect		Don't Know		Scores
	N	%	N	%	N	%	N
Epidemiology definition	406	50.75	383	47.88	11	1.38	308
Causes of epidemiological diseases	317	39.63	471	58.88	12	1.50	196
Scope of epidemiological studies	497	62.13	274	34.25	29	3.63	421
Factors for epidemiological diseases	549	68.63	237	29.63	14	1.75	486
Populations that are at greater risk of epidemics	300	37.50	471	58.88	29	3.63	175
Causes of epidemiological diseases in third world countries	528	66.00	251	31.38	21	2.63	460
Prevention & control of epidemiological diseases	615	76.88	170	21.25	15	1.88	569
Role of Pharmacist in disease prevention	385	48.13	377	47.13	38	4.75	281
Role of pharmacist in epidemiological research	374	46.75	401	50.13	25	3.13	268
Reason for lack of interest of pharmacists in epidemiological research in Pakistan?	468	58.50	314	39.25	18	2.25	385
Mean Scores	355±130						

**Table 3:** Correct Epidemiology knowledge of pharmacy students according to gender, professional year and type of university

Items	Male		Female		3 <sup>rd</sup> Year		4 <sup>th</sup> Year		5 <sup>th</sup> Year		Private		Public	
	C	S	C	S	C	S	C	S	C	S	C	S	C	S
	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Epidemiology definition	91	58	316	251	123	117	136	94	117	80	226	183	180	125
Causes of epidemiological diseases	83	48	230	143	93	87	137	95	100	58	161	101	156	95
Scope of epidemiological studies	146	127	353	297	150	144	183	152	166	141	292	265	205	156
Factors for epidemiological diseases	148	129	398	353	160	156	197	170	188	168	293	266	256	220
Populations that are at greater risk of epidemics	80	44	219	130	69	61	135	92	94	51	146	83	154	93
Causes of epidemiological diseases in third world countries	141	121	378	328	143	140	200	174	174	151	272	240	256	220
Prevention & control of epidemiological diseases	165	151	448	416	177	175	238	221	202	186	301	276	314	293
Role of pharmacist in epidemiological research	105	76	272	196	87	81	152	114	130	96	186	133	188	135
Role of Pharmacist in disease prevention	112	84	273	197	123	118	153	115	102	61	232	190	153	91
Reason for lack of interest of pharmacists in epidemiological research in Pakistan?	134	112	328	266	119	115	185	155	158	131	220	175	248	210
Mean Scores (MS)	95 ± 38		258 ± 93		119 ± 36		138 ± 43		112 ± 49		191 ± 70		164 ± 69	

**Table 4:** Epidemiology knowledge of pharmacy students according to current university attended

Items	Private Universities				Public Universities			
	Uni 1	Uni 2	Uni 3	Uni 4	Uni 5	Uni 6	Uni 7	Uni 8
	Scores	Scores	Scores	Scores	Scores	Scores	Scores	Scores
	N	N	N	N	N	N	N	N
Epidemiology definition	96	30	6	50	51	36	33	5
Causes of epidemiological diseases	49	13	10	30	19	23	38	17
Scope of epidemiological studies	81	58	51	75	6	55	53	44
Factors for epidemiological diseases	88	69	54	56	16	74	74	56
Populations that are at greater risk of epidemics	20	24	16	23	6	38	21	28
Causes of epidemiological diseases in third world countries	70	59	63	49	28	68	68	58
Prevention & control of epidemiological diseases	86	64	69	58	55	84	85	69
Role of pharmacist in epidemiological research	33	40	29	31	19	44	46	27
Role of Pharmacist in disease prevention	73	34	41	43	9	18	45	21
Reason for lack of interest of pharmacists in epidemiological research in Pakistan?	43	54	30	49	31	54	70	55
Mean Scores	64 ± 26	45 ± 19	37 ± 22	46 ± 15	24 ± 18	49 ± 22	53 ± 20	38 ± 21

Questionnaire contains twelve attitude statements regarding epidemiology to which Pharmacy students could either, strongly agree or agree, be neutral, or disagree or strongly disagree. Pharmacy students' attitude toward epidemiology is presented in Table 5.

**Table 5:** Perception about Epidemiology among Pharmacy students

Items	SD		D		ND		A		SA		S
	N	%	N	%	N	%	N	%	N	%	
Knowledge about epidemiology is important for Pharmacy student.	20	2.50	24	3.00	149	18.63	490	61.25	117	14.63	3.83
Epidemiology should be included as a major subject in pharmacy curriculum.	17	2.13	17	2.13	142	17.75	505	63.13	119	14.88	3.87
I believe that the topic of epidemiology is well covered in my pharmacy education	28	3.50	119	14.88	406	50.75	225	28.13	22	2.75	3.12
I do not have any idea that how to perform epidemiological practices in Pakistan	128	16.00	374	46.75	187	23.38	96	12.00	15	1.88	2.37
Pharmacy students can perform epidemiological practices during their clerkship	20	2.50	108	13.50	218	27.25	357	44.63	97	12.13	3.5
Epidemiological practices should be made compulsory for pharmacists.	9	1.13	25	3.13	172	21.50	395	49.38	199	24.88	3.94
Epidemiological researches have no true impact on control of diseases	231	28.88	371	46.38	117	14.63	64	8.00	17	2.13	2.08
Reporting of known epidemiological diseases makes no significant contribution to the health of society.	235	29.38	360	45.00	115	14.38	76	9.50	14	1.75	2.09
With my present knowledge, I am very well prepared for epidemiological research in my future practice.	35	4.38	116	14.50	360	45.00	252	31.50	37	4.63	3.18
Pharmacist is the most important healthcare professionals for epidemiology	4	0.50	4	0.50	55	6.88	345	43.13	392	49.00	4.4
Pharmacists are able to advise their patients about commonly occurring epidemiological diseases.	7	0.88	19	2.38	91	11.38	441	55.13	242	30.25	4.12
Epidemiological approaches hold promise for treatment of symptoms conditions and/or diseases.	17	2.13	38	4.75	136	17.00	391	48.88	218	27.25	3.94

\*SD=Strongly Disagree, D=Disagree, ND=No Difference, A=Agree, SA=Strongly Agree, S=Scores





61.25% students agreed that knowledge of epidemiology is important for Pharmacists ( $S=3.83$ ). 78% students believed that the topic of epidemiology should be included as a major subject in Pharmacy curriculum ( $S=3.87$ ).

Approximately 30.88% students either agreed or strongly agreed that the subject of epidemiology is well-covered in their university whereas, half of the students (50.75%) indicated no difference ( $S=3.12$ ). Only 13.88% pharmacy students indicated that they did not have any idea that how to perform epidemiological practices ( $S=2.37$ ).

When asked about their capability to perform epidemiological practices during their clerkship, more than half of the students (56.75%) either agreed or strongly agreed that they were capable of performing epidemiological practices ( $S=3.5$ ). About 74.25% students agreed or strongly agreed that epidemiological practices must be compulsory for pharmacists ( $S=3.94$ ). 75.25% respondents disagreed or strongly disagreed that the epidemiological researches have no true impact on control of diseases ( $S=2.08$ ). Students were asked whether reporting of known epidemiological diseases makes no significant contribution to the health of society. About 74.38% students strongly disagreed or disagreed and around 9.5% agreed with this statement ( $S=2.09$ ). Only 36.13% pharmacy students believed that they were well prepared for future epidemiological research ( $S=3.18$ ) in view of their current knowledge. Almost all students (92.13%) considered pharmacist as the most important healthcare professionals for epidemiology ( $S=4.4$ ). 85.38% students believed that pharmacist were able to advise their patients about commonly occurring epidemiological diseases ( $S=4.12$ ).

Students were asked whether epidemiological approaches hold promise for treatment of symptoms conditions and/or diseases. 76.13% students agreed, whereas 17% indicated no difference with this statement ( $S=3.94$ ).

## DISCUSSION

In present work results of the study in Pakistan that evaluates the pharmacy student's awareness and perception towards epidemiology was reported. There are eight Universities (four public and four private) in Karachi, which offered Pharmacy education. All the eight universities were selected for the study. Pharmacy Council Pakistan designed the curriculum for undergraduate Pharmacy students which introduced the topic of epidemiology in third year through the course on community pharmacy.<sup>16</sup> Therefore, this study was conducted on third, fourth and final year Pharmacy students. In order to minimize biased response hundred students were selected from each university thus, the total sample size was eight hundred. Results of the present study indicated deficiency in knowledge of Pharmacy students towards epidemiology. Pharmacy students were moderately knowledgeable about

epidemiology. Similar results were also observed by Butt and Khan (2008), who determined the knowledge of epidemiology and statistics amongst faculty teachers and trainees in Pakistan.<sup>17</sup> In order to prepare them adequately for epidemiological practices in their future professional career, it would be beneficial to implement case-discussion teaching and encourage Pharmacy students to perform epidemiological practices during their clerkship, as a result they would be able to guide their patients about causes, symptoms and treatment of epidemiological diseases and proved themselves as better healthcare practitioners. Marantz (2003) reported that implementation of case-discussion teaching for epidemiology and biostatistics courses in Albert Einstein College of Medicine results in favorable outcomes.<sup>18</sup>

In present study female participants were more than male indicating greater enrollment of female students in pharmacy education of Karachi, Pakistan.<sup>19</sup> Results showed that knowledge and awareness of female students (Mean Score= $258\pm 93$ ) were higher than male students (Mean Score= $95\pm 38$ ). The total mean score of epidemiology knowledge according to the current university attended was different. This difference could be explained by the variation in hospital clerkship of the students where they were trained for epidemiological practices and diversity in the course of epidemiology of the university. These differences can be overcome by designing and implementing comprehensive epidemiology courses, and intensive hospital training based on epidemiological practices. Pharmacy students preferred hospital and community practices which they experienced during their clerkship.<sup>20,21</sup> These practices enhanced confidence of students and raised understanding of patient care and inter professional work.<sup>22</sup>

Pakistani pharmacy students showed positive attitude and perception towards importance of epidemiology because it is related to disease and its occurrence in a certain population. More than fifty percent students agreed that the knowledge of epidemiology is important for pharmacist, therefore this topic should be included as a major course in curriculum. Similar perception was also observed for medical students by Ahmad (2009), who reported Epidemiology is the most relevant module in MBBS curriculum.<sup>23</sup> Researchers, from Malaysia reported positive perception of medical students towards epidemiology because these students believed that epidemiology is beneficial for their career as it is related to real health issues.<sup>24</sup>

## CONCLUSION

Pharmacy students of Karachi, Pakistan have moderate knowledge about epidemiology. They lack in understanding of the causes and prevention of epidemiological diseases. However, they showed positive attitude and perception towards epidemiology. It is an important subject in the pharmacy curriculum which is associated with the public health care. Understanding of



students was limited by short duration of course which may forbid comprehensive explanation and insufficient practical exercises. To improve learning of pharmacy students about the communication, solution of health problems, behavior sciences, information management and technology undergraduate curriculum should be reviewed and revised and intensive training based on epidemiological practices should be conducted. Students should be trained in the designing and implementation of protocols for evaluation of practice-related problems, therefore, they would be capable to meet the changing health demands of the general public.

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