Pharmacy Technician Workforce in Saudi Arabia over Twelve Years (2006-2017)

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ABSTRACT

Objectives: To explore the workforce of pharmacy technician at Ministry of Health (MOH) institutions over the past twelve years (2006-2017) in the Kingdom of Saudi Arabia. **Methods:** It is a retrospective analysis of twelve years (2006-2017) of Ministry of Health pharmacy technician workforce at hospital practice. All data derived from the Ministry of Health Statistical Year Books and any missing appropriate information about pharmacy technician workforce, that's will be estimated through allied healthcare professional's data in each region including gender or nationality. It included pharmacy technician and exclude all types of pharmacists or clinical pharmacist's workforces at MOH hospital and Primary Health Care Centers (PHCs) settings. All calculations were based on MOH workforce standards of hospitals and PHCs. All calculation was done using Microsoft Excel version ten. **Results:** The total number of pharmacy technician in all sectors, hospitals, primary healthcare centers and medical affairs administration increased from 4,289 to 8,373 over twelve years to 1.96-fold increments (2006-2017). The number of Saudi pharmacy technician increased from 3,064 to 8,061 to 2.63-fold increments while non-Saudi pharmacy technician decreased from 1,225 to 312 to 3.92-fold reductions. The rate of pharmacy technician to pharmacist decreased from 6.7 to 2.2 to 3.05-fold ratio reductions while the pharmacy technician per 10,000 population increased from 2.67 to 4.29 to 1.61-fold incremental ratio over the past twelve years. **Conclusion:** The pharmacy technician worked at the Ministry of Health institutions increased over the past twelve years. The Saudi pharmacy technician was increased with reduction of non-Saudi nationality. The male gender more than female. The ratio of pharmacy technician to pharmacist was reduced by time. The pharmacy technician workforces needed to explore at all healthcare institutions in the Kingdom of Saudi Arabia.

Keywords: Pharmacy technician, Hospital, Health, Centers, Workforce, Ministry of Health, Saudi Arabia.

INTRODUCTION

The analysis, workforce of pharmacy staff is very critical in healthcare practice. That is related to detect the demand or forecasting of the pharmacy staff. Besides, to determine the Human Resources of the pharmacy department. One of the strategic goals of the pharmacy strategic plan and updated plan with vision 2030 was the pharmacy workforce, including the pharmacy technician.^[1,2] The Ministry of Health released the standard of pharmacist workforce requirements in the hospitals and primary healthcare centers.^[3,4] The pharmacy technician workforce standard has not existed yet. Several studies published locally for the pharmacist workforce or demand while pharmacy technician not investigated.^[5-9] However, the pharmacy technician workforce discussed during the mass gatherings hajj period only.^[10-12] The pharmacy technician workforce analysis at all healthcare sectors, including hospitals or primary healthcare centers or medical affairs administration, not existed. Besides, the pharmacist to pharmacy technician in the actual practice did not determine in Saudi Arabia or Gulf and Middle East countries based on the best of the author's knowledge. The study aimed to declare the pharmacy technician workforce at all

healthcare institutions of the Ministry of Health in the Kingdom of Saudi Arabia.

METHODS

It is a retrospective analysis of twelve years (2006-2017) of MOH hospitals, primary healthcare center (PHCs) and MOH administration pharmacy technician's workforce. All data derived from the Ministry of Health Statistical Year Books and any missing appropriate information about pharmacy technician workforce, that's will be estimated through allied healthcare professionals data at each region including gender or nationality.^[13-24] It included all types of pharmacy technicians included in the study while excluded all pharmacists or clinical pharmacist's workforces at MOH intuitions (Medical affairs and hospitals or primary healthcare centers). All pharmacy technicians expected to provide pharmaceutical according to the American Society of Health-System Pharmacist (ASHP) definition and requirements. All types of pharmacy services based on the Saudi Central Board of hospital accreditation, Joint Commission on Hospital Accreditation, ASHP best practice standards and general administration of the pharmaceutical care strategic plan.^[1,25-28] All pharmacy technician's works

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at MOH hospitals or administration or non-MOH government hospitals and primary care centers excluded from the studies. All private hospital or community pharmacy technician excluded from the study. All calculations were based on MOH workforce standards of hospitals and PHCs. All calculation was done using Microsoft Excel version ten. The calculations were for a total twenty-one regions; the hospitals and primary health care centers, distribution numbers in each year, the annual pharmacy technician distribution numbers, the ratio of the pharmacy technician's per pharmacist, the ratio of the pharmacy technician's per populations and the gender distribution of pharmacy technician at overall Saudi Arabia.

RESULTS

The total number of pharmacy technician at all sectors, hospitals, primary healthcare centers and medical affairs administration increased from 4,289 to 8,373 over twelve years to 1.96-fold increments (2006-2017). The number of Saudi pharmacy technician increased from 3,064 to 8,061 to 2.63-fold increments while non-Saudi pharmacy technician decreased from 1,225 to 312 to 3.92-fold reductions. The number of Saudi males of pharmacy technician increase 2,887 to 7,149 to 2.48-fold increments, while Saudi female increase 177 to 912 to 5.15-fold increments over twelve years. The male gender of non-Saudi pharmacy technician decreased from 744 to 56 to 13.29-fold reductions, while non-Saudi female reduced from 481 to 256 to 1.88-fold reductions. The rate of

pharmacy technician to pharmacist decreased from 6.7 to 2.2 to 3.05-fold ratio reductions, while the pharmacy technician per 10,000 population increased from 2.67 to 4.29 to 1.61-fold incremental ratio over the past twelve years (Table 1 and Figure 1).

The total number of pharmacy technician at hospitals increased from 2,899 to 6,619 over twelve years to 2.28-fold increments (2006-2017). The number of Saudi pharmacy technician increased from 2,071 to 6,373 to 3.1-fold increments, while non-Saudi pharmacy technician decreased from 828 to 246 to 3.36-fold reductions. The number of Saudi males of pharmacy technician increase 1,951 to 5,652 to 2.89-fold increments, while Saudi female increase 120 to 721 to 6.00 increments over twelve years. The male gender of non-Saudi pharmacy technician decreased from 503 to 44 to 11.43-fold reductions, while non-Saudi female reduced from 325 to 202 to 1.6-fold reductions. The rate of pharmacy Technician per hospital increased 13.18 to 23.47, while the rate of pharmacy Technician per bed increased from 0.09 to 0.15. The rate of pharmacy technician to pharmacist decreased from 4.54 to 2.04 with 2.23-fold ratio reductions, while the pharmacy technician per 10,000 population increased from 1.86 to 3.39 to 1.82-fold incremental ratio over the past twelve years (Table 2).

The total number of pharmacy technician at PHCs increased from 891 to 1,623 over twelve years to 1.82-fold increments (2006-2017). The number of Saudi pharmacy technician

increased from 637 to 1,562 to 2.59-fold increments, while non-Saudi pharmacy technician decreased from 254 to 61 to 4.16-fold reductions. The number of Saudi males of pharmacy technician increase 600 to 1,386 to 2.31-fold increments, while Saudi female increase 37 to 176 to 4.76 increments over twelve years. The male gender of non-Saudi pharmacy technician decreased from 154 to 11 to 14-fold reductions, while non-Saudi female reduced from 100 to 50 to 2-fold reductions. The rate of pharmacy Technician per PHCs increased 0.46 to 0.69, while the rate of pharmacy technician to pharmacist decreased from 11.46 to 3.47 to 3.34-fold ratio reductions, while the pharmacy technician per 10,000 population increased from 0.63 to 0.83 to 1.32 fold incremental ratio over the past twelve years (Table 3).

DISCUSSION

The pharmacy technician works at three kinds of places in hospitals, primary healthcare centers and medical affairs administration.^[13,15] Each sector had a specific job description accordingly. The findings of the study showed that the total number of pharmacy technician works at all types of sectors increased over twelve years, with a binary number with increased 0.16-fold annually. It is difficult to judge the increments number demand due to the standard of pharmacy technician requirements has not existed. Also, the workload of a pharmacy technician was not reported in the annual MOH statistical book. The findings showed there was increased with Saudi phar-

Table 1: Total Pharmacy Technicians general workforce's descriptions (Hospitals-PHCs-Medical Admin.)

Year	Total Population	MOH serving populations	Saudi pharmacy Technical			non Saudi pharmacy Technical			total male pharmacy Technical	total female pharmacy Technical	total of pharmacy Technical	No of pharmacist	pharmacy Technical / pharmacist	Rate / per 10,000 population
			male	female	total	male	female	total						
2006	23,678,849.00	14,207,309.40	2,887	177	3,064	744	481	1,225	3,631	658	4,289	636	6.7	3.02
2007	24,242,578.00	14,545,546.80	2,886	217	3,103	440	458	898	3,326	675	4,001	804	5.0	2.75
2008	24,807,273.00	14,884,363.80	3,023	222	3,245	331	393	724	3,354	615	3,969	1,065	3.7	2.67
2009	25,373,512.00	15,224,107.20	3,485	386	3,871	105	337	442	3,590	723	4,313	1,364	3.2	2.83
2010	27,136,977.00	16,282,186.20	4,724	532	5,256	91	353	444	4,815	885	5,700	1,601	3.6	3.50
2011	28,376,355.00	17,025,813.00	5,276	570	5,846	112	412	524	5,388	982	6,370	1,487	4.3	3.74
2012	29,204,842.00	17,522,905.20	5,457	813	6,270	73	276	349	5,530	1,089	6,619	1,661	4.0	3.78
2013	29,994,272.00	17,996,563.20	5,338	805	6,143	113	362	475	5,451	1,167	6,618	1,915	3.5	3.68
2014	30,770,375.00	18,462,225.00	7,259	796	8,055	51	242	293	7,310	1,038	8,348	2,239	3.7	4.52
2015	31,521,418.00	18,912,850.80	7,307	889	8,196	46	229	275	7,353	1,118	8,471	2,389	3.5	4.48
2016	31,742,308.00	19,045,384.80	7,263	904	8,167	49	236	285	7,312	1,140	8,452	2,714	3.1	4.44
2017	32,552,336.00	19,531,402.00	7,149	912	8,061	56	256	312	7,205	1,168	8,373	3,853	2.2	4.29

Table 2: Total Pharmacy Technicians general workforce's descriptions (Hospitals.)

Year	Hospital	No Beds	Hospital Pharmacists	Saudi pharmacy Technical			non Saudi pharmacy Technical			total male pharmacy Technical	total female pharmacy Technical	total of pharmacy Technical	pharmacy Technical / hospital	pharmacy Technical / bed	pharmacy Technical / pharmacist	Rate / per 10,000 population
				male	female	total	male	female	total							
2006	220	31,877	636	1,951	120	2,071	503	325	828	2,454	445	2,899	13.18	0.09	4.56	2.04
2007	225	31,420	804	1,974	148	2,122	301	313	614	2,275	461	2,736	12.16	0.09	3.40	1.88
2008	231	31,720	1,065	2,103	155	2,258	230	274	504	2,333	429	2,762	11.96	0.09	2.59	1.86
2009	244	33,277	1,364	2,439	270	2,709	74	236	310	2,513	506	3,019	12.37	0.09	2.21	1.98
2010	249	34,370	1,601	3,409	384	3,793	66	255	321	3,475	639	4,114	16.52	0.12	2.57	2.53
2011	251	34,450	1,487	3,720	402	4,122	79	291	370	3,799	693	4,492	17.90	0.13	3.02	2.64
2012	259	35,828	1,661	3,828	570	4,398	51	194	245	3,879	764	4,643	17.93	0.13	2.80	2.65
2013	268	38,970	1,820	3,845	580	4,425	82	261	343	3,927	841	4,768	17.79	0.12	2.62	2.65
2014	270	40,300	2,206	5,366	589	5,955	38	179	217	5,404	768	6,172	22.86	0.15	2.80	3.34
2015	274	41,297	2,389	5,432	661	6,093	34	170	204	5,466	831	6,297	22.98	0.15	2.64	3.33
2016	274	41,835	2,760	5,523	688	6,211	37	180	217	5,560	868	6,428	23.46	0.15	2.33	3.38
2017	282	43,080	3,248	5,652	721	6,373	44	202	246	5,696	923	6,619	23.47	0.15	2.04	3.39

Table 3: Total Pharmacy Technicians general workforce's descriptions (PHCs.)

Year	PHCs	No Pharmacist at PHCs	Saudi pharmacy Technical			non Saudi pharmacy Technical			total male pharmacy Technical	total female pharmacy Technical	total of pharmacy Technical	pharmacy technical / PHCs	pharmacy technical / PHCs pharmacy	Rate / per 10,000 population
			male	female	total	male	female	total						
2006	1925	131	600	37	637	154	100	254	754	137	891	0.46	6.80	0.63
2007	1925	211	553	42	595	84	88	172	637	130	767	0.40	3.64	0.53
2008	2028	163	555	41	596	61	72	133	616	113	729	0.36	4.47	0.49
2009	2094	91	843	93	936	25	82	107	868	175	1,043	0.50	11.46	0.69
2010	2094	18	1,198	135	1,333	23	90	113	1,221	225	1,446	0.69	80.33	0.89
2011	2109	219	1,393	150	1,543	29	109	138	1,422	259	1,681	0.80	7.68	0.99
2012	2259	137	1,209	180	1,389	16	61	77	1,225	241	1,466	0.65	10.70	0.84
2013	2259	164	1,110	168	1,278	24	75	99	1,134	243	1,377	0.61	8.40	0.77
2014	2281	326	1,325	146	1,471	9	44	53	1,334	190	1,524	0.67	4.67	0.83
2015	2282	374	1,293	157	1,450	8	41	49	1,301	198	1,499	0.66	4.01	0.79
2016	2325	430	1,367	170	1,537	9	44	53	1,376	214	1,590	0.68	3.70	0.83
2017	2361	468	1386	176	1,562	11	50	61	1,397	226	1,623	0.69	3.47	0.83

macy technician with increased 0.219-fold increments and at the same time, there were reductions with non-Saudi pharmacy technician with 0.326-fold reductions. The reductions of a pharmacy technician were faster than increments of pharmacy technician as replacements by 1.48-fold. That is mean there will be a shortage of pharmacy technician at such point

of time. In the comparison of both genders, the male Saudi pharmacy technician increased by 0.2-fold annually, while reductions of non-Saudi male with 1.1-fold. It was almost 5.5 times faster in the replacements. The possibility of a male pharmacy technician will be high. In the other word, the Saudi female pharmacy technician by 0.429-fold increased annually, while

the non-Saudi female technician decreased by 0.156-fold annually. The replacements of Saudi female pharmacy technician with the Saudization program were faster than non-Saudi female pharmacy technician by 2.75-fold increments. As results, it possible to have over a staff of female pharmacy technician. The findings showed the ratio of a pharmacy technician

Figure 1: Pharmacy technician nationality and gender (S: Saudi, NS: Non Saudi)

to pharmacy reduced annually by 0.254-fold. That is related maybe to increase the number of a pharmacist at primary healthcare centers without keeping consideration of constant ratio. However, still the ratio within a range and similar to the previous studies.^[29,30] There are increased of pharmacy technician per Saudi populations and that has expected because of double increments of pharmacy technician.

The findings showed the rate of replacements of a hospital pharmacy technician with Saudi nationality by non-Saudi almost the same. That is good to prevent over or under the staff of the pharmacy technician. However, the Saudi male pharmacy technician increased to 0.24-fold annually, while the reductions in the non-Saudi male pharmacy technician with 0.519 and the subsequent possibility of a shortage of male pharmacy technician in the hospitals. Regarding the Saudi female, pharmacy technician increased quickly while the reductions of non-Saudi female pharmacy technician slowly and possibly of other staff may occur. However, the male pharmacy technician was much higher than female pharmacy technician with different to previous studies with more in the female gender.^[31,32] The ratio of a hospital pharmacy technician to pharmacist or pharmacy technician per populations were increased due to an increase in the number of hospital pharmacy technician.

The findings of the study showed that is the number of Saudi pharmacies work at primary healthcare centers increased by 0.215-fold annually, while reductions in the non-Saudi Pharmacy Technician to 0.346-fold annually. As results, the replacements of a Saudi pharmacy technician are high and possible of other staff. The Saudi male pharmacy technician of PHCs replacements is lower than hospital by a non-Saudi male pharmacy technician and possibly a shortage of pharmacy will be high. Besides, the Saudi female pharmacy technician replacements almost equal to hospital female pharmacy technician. The ratio of a pharmacy technician to the pharmacist at primary healthcare centers was higher than pharmacist that's related to a low number of pharmacists at primary healthcare centers. The ration of pharmacy technician per populations of PHCs is lower than hospital that's due lower number of pharmacy technician works at PHCs.

The Saudization project was very high implemented with pharmacy technician workforce and very fast and possibly may affect the total number of pharmacy technician and resulted in a shortage or other staff. The planning of a pharmacy technician annually should be revised annually. Besides, the ratio of a pharmacy technician to pharmacist should be implemented in hospitals and PHCs and we would suggest 1:2-1:4 at PHCs and hospital, respectively in the Kingdom of Saudi Arabia.

CONCLUSION

The current study was the first done in Saudi Arabia and Gulf or Middle East countries. The pharmacy workforces over the past twelve years doubled with cumulative increased of Saudi nationality and both genders. The ration of pharmacy technician to pharmacist decreased with time and should be standardized by the healthcare sector. Further study is required to declare in depth detail of pharmacy technician at all governmental and private healthcare organizations in the kingdom of Saudi Arabia.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

ABBREVIATIONS

KSA: Kingdom of Saudi Arabia; **MOH:** Ministry of Health; **ASHP:** American Society of Health-System Pharmacist; **PHCs:** Primary Healthcare Centers.

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