



## ORIGINAL ARTICLE

# Standard Development of Family Physicians to the Population Defined by WISN

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### ABSTRACT

*Objective: the purpose of this study was to develop a standardized family physician-to-population ratio defined by WISN in Ahvaz. Materials and Methods: This study used a descriptive-analytic methodology. The studied group included physicians working in health centres as family physicians in Ahvaz. In this study, all processes that physicians do in the health centres were identified and scheduled; using WISN, the number of required physicians was obtained for 4000 population. Results: the results from data analyses show that the required number of physicians for providing services to 4000 population is 214; currently, the program lacks 114 physicians for this population. Conclusion: to do all procedures of the family physician, a physician can provide 100% of the expected services in an optimal quality and quantity for almost 1900 people. For higher population, it cannot be expected to provide all services in an optimal form to achieve the goals of the family physician program and the health system. Planning is required to train, attract and maintain physicians in order to expand the program.*

*Keywords: planning, labor estimating, family physician, workload, timing*

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### INTRODUCTION

Considering the extent and importance of its goals to achieve better health for all and social justice, health sector requires training and distribution of human resources in the whole temporal and spatial ranges needed by the community [1]. Human resource is one of the main sources of health care system [2].

There are two different scenarios for generation of doctors: The small number of physicians causes insufficient services to patients and reduction in the public health; on the other hand, large number of physicians will lead to excessive services to patients, underemployment and the subsequent loss of skills [2]. Workforce planning in this area can provide the necessary preparation strategy, a suitable framework and capability [3].

Human resource planning process involves gathering information, setting goals, developing action plans and monitoring plans [4], [5], [6]. The main advantages of human resource planning include emergent labour supply, coordination and optimal use of human resources and cost reduction [7], [8]. Various factors such as the social, political, economic, demographic and epidemiological factors influence the labour estimating [9], [10], [11]. The estimation is based on two systems, activity system and dependence system [12], [13].

The factors in these systems include human resource-population ratio, destination services, demand, target population, and the average time required for the work unit [14].

Several methodologies are used in this area: The workload indicators of staffing needs (WISN) [15], Trend analysis [16], Regression analysis [17], Economic analysis [18].

WISN method is based on the actual work performed by employees in the health sector. WISN involves: 1) setting goals, 2) selecting a professional team and 3) selecting the evaluated services

The other powerful characteristic of WISN is that it can calculate the total amount of available forces, the total calculated forces, the total deficit/surplus and the average index (WISN workload pressure) by sum

of each different levels of health care workers. In this method, the helpful human resources are determined as follows:

Standard workload for the process/centre workload (frequency of services) = human resources

If WISN is equal to 1, the actual labour will be equal to the estimated workforce demand; therefore, the staffs available to perform the workload are exactly enough in accordance with specified professional standards [19]. In 2008, the American vision predicted future shortage of physicians in 2025. Despite a 30% increase in admissions in universities, the supply and demand model represents a shortage of 124,000 physicians by 2025. The data was analysed using this method [15]. Cooper (2002) showed that 1% GDP per capita growth by 0.75% would increase the ratio of physicians to population [20].

Harandi *et al* proposed a proper modelling for labour supply with respect to variable characteristics of response. As the study found out, although the working hours of all unemployed people is zero, the probability of their presence in the workforce is not similar. Another study was conducted on distribution of human resources considering their education in Iranian hospitals. In this study, 48.4% of the employees had associate degree and less, 40% had bachelor degree and the rest had higher education. The nursing and Gynaecology groups formed the largest group of personnel (48.1%); however, the distribution of support group was higher than other groups (29.1%) [21]. Movahednia *et al* evaluated the parameters of timing tests at the Firoozgar Hospital, Tehran. The average duration of the first nursing services in emergency was three minutes, the average waiting time for test responses is 930 minutes, and the average time between radiography and the radiology x-rays was 922 minutes and the average waiting time for patients was 802 minutes in the emergency. Timing parameters of emergency in Firoozgar hospitals were standard during March to August 2012. The reason is that there were physicians in the emergency and hospital committee rule [22]. The purpose of this study was to develop the standard physician-population ratio defined in the family physician program using workload determination method in Ahvaz.

The objectives of this study include determination of standard physician-population ratio in the family physician program based on WISN method in order to study the required number of family physicians, in regard to comprehensive sustainable services, health management, research and coordination with other wards.

## MATERIALS AND METHODS

This descriptive analytic study was done using the WISN method. The number of families included in this population was 4000. This research is practical. The studied group included physicians working in health centres in both sexes (men and women) with at least 2 years of experience in the family physician program. In the original program, 18 physicians were scheduled with 35 activities and 3 iterations. In this study, two people with BA degree and one with MA degree in health care services management were used to corporate in the scheduling process. The time available for family physician was set to 126240 min for 8-hour day, including holidays. Using the following equation, the coefficient of extra activities was calculated.

$$\{(total\ classified\ extra\ activities\ \%) - 1\} / 1 = coefficient\ of\ extra\ activities$$

Finally, the final required physicians were calculated using the following formula:

$$Staffing\ Requirement = (Annual\ Workload / Standard\ Workload) * Category$$

Allowance Factor + Total Individual Allowance Standards

$$* (Standard\ workload / annual\ workload) = final\ required\ physicians$$

Individual extra activities + coefficient of classified extra activities

By inserting variables for data analysis using SPSS, version 17 to summarize qualitative variables, distribution and percentages and for quantitative variables including mean and standard deviation, 95% confidence interval was reported.

## RESULTS

By evaluating the standard workload and workforce needed to carry out the medical services of family physician program, as shown in Table 1, the average time for process of examination was 20 min. Considering the workload calculated for examination, 0.608 physicians is required for examination process over a year. By evaluating the standard workload and workforce needed to carry out the medical services of health records, the average time for completing health record was 36 min. Considering the workload calculated for examination, 0.913 physicians is required for completing health record over a year.

**Table 1: timing for services provided by family physicians in Ahvaz**

Services provided for 4000 people							Current services by physicians
	Program	Target group	Service time (in minutes)	Standard workload	Expected distribution	Required physicians at baseline	Total time in minutes
1	Examining at the first visit and next visits	Regional population	20	6312	3840	0.608	For 8 minutes per examination = 30720 minutes
2	Examinations to complete health records	Regional population	36	3507	2000	0.570	Each individual examination to form health record 12 min and the average examination of 1150 persons, and records 13800 minutes
3	Examination of students	Students	28	4509	275	0.061	Examination of each student on average 17 min and 275 subjects in a year = 4675 minutes
4	Visits to schools	Schools	90	1403	27	0.019	1860 = often it is not done on a regular basis during school activities
5	Examinations of workers	Workers	44	2869	72	0.025	Up to 50% achieved 1584
6	Pre-pregnancy care (first visit)	Mothers	36.7	3440	84	0.024	Often not performed = 0
7	Pre-pregnancy care (second visit)	Mothers	16.1	7841	84	0.011	Often not performed = 0
8	Prenatal care in first visit	Pregnant Women	33.1	3814	96	0.025	1440 = Every 15 Minutes
9	Prenatal care for future visit	Pregnant Women	31.1	4059	12	0.003	156 = Every 13 Minutes
10	Postpartum Care	Pregnant Women	27.1	4658	84	0.018	50% expected = 1134 minutes
11	family planning	Eligible mothers	20	6312	498	0.079	15 cares in months = 7200 minutes per year
12	Child care and patient care	Children in need of care	24.6	5132	228	0.044	2280 = Every care 10 minutes
13	Elderly Care	Elderly	44.4	2843	296	0.104	Currently pilot program is conducted in one and it is not conducted = 0
14	Diabetes Care	Diabetic patients	31.6	3995	48	0.012	480 = each care 10 minutes
15	Hypertension care	Hypertension patient	28.7	4399	112	0.025	1008 = each care 9 minutes
16	thalassemia major care	Patients with thalassemia	29	4353	8	0.002	128 = each care 16 minutes
17	Care of patients with mental disorders in first visit	Mental patient	39	3237	12	0.004	120 = each care 10 minutes
18	Care of patients with mental disorders in next visits	Mental patient	33	3825	68	0.018	476 = each care 7 minutes
19	Bite care	Bitten people	34.2	3691	3	0.001	90 = each care 30 minutes
20	Care for other contagious	Patients	15	8416	72	0.009	936 = each care 13 minutes

	diseases (tuberculosis, brucellosis, meningitis, etc.)						
21	Prevention and control of cholera and other diseases transmitted through water and food	Patients and healthy controls	47	2686	12	0.004	480
22	Visiting public places	public places	107	1180	32	0.027	50% expected in month = 1712 min
23	Visiting food preparation and distribution centers	preparation and distribution centers	95.8	1318	64	0.049	It is not often conducted
24	Family planning counseling	Eligible mothers	12	10520	96	0.009	384
25	Thalassemia counseling	Couples and patients	11.5	10977	5	0.000	50
26	Nutrition counseling	Qualified persons	18	7013	36	0.005	252
27	mental disorder counseling	Mental patient	22	5738	24	0.004	286
28	Training needs	People	72.7	1736	4	0.002	160
29	Training session	People	120	1052	36	0.034	Approximately 50% of predicted amount = 2160 minutes
30	Village visit and health center monitoring	Health workers and the public	180	701	144	0.205	20160
<b>Total of physicians required for the main process for 4000 people</b>						<b>2.00</b>	<b>The total time for the main service offered at present = 93,731 minutes</b>
31	Staff Attendance Control	Staff	14	9017	48	0.53%	50% done (340 min.)
32	Admission Unit Control	Admission Control	25.5	4951	48	0.97%	50% done (590 min.)
33	Employee Activity Monitor	Employees	33.6	3757	48	1.28%	60% done (820 min.)
34	pharmacy activity monitoring	Pharmacy	45.3	2787	48	1.72%	not performed or privatized = 0
35	Other Services	Staff and Programs	209	604	12	1.99%	2270
<b>Percent of all extra activities of family physician for a population of 4,000 people</b>						<b>6.5%</b>	<b>The total time for services provided at present = 4020 minutes</b>

By evaluating the standard workload and workforce needed to carry out the medical services of school health, the average time for examining students was 28 min. Considering the workload calculated for examination, 0.061 physicians is required for this process over a year.

By evaluating the standard workload and workforce needed to carry out the medical services of school health, the average time for referring to schools was 90 min. Considering the workload calculated for examination, 0.019 physicians is required for this process over a year.

By evaluating the standard workload and workforce needed to carry out the medical services of worker examination, the average time for examining workers was 44 min. Considering the workload calculated for examination, 0.025 physicians is required for this process over a year.

By evaluating the standard workload and workforce needed to carry out the medical services of pregnant parents (before pregnancy in the first visit), the average time was 37 min. Considering the workload calculated for examination, 0.024 physicians is required for this process over a year. Moreover, the average time for medical services of pregnant parents (before pregnancy in the second visit) was 16 min. Considering the workload calculated for this process, 0.011 physicians is required over a year.

the average time for medical services of pregnancy care (in the first visit) was 33 min. Considering the workload calculated for this process, 0.025 physicians is required over a year.

The average time for medical services of pregnancy care (future visits) was 31 minutes. Considering the workload calculated for this process, 0.003 physicians are required over a year.

The average time for medical services of post-pregnancy care was 27 minutes. Considering the workload calculated for this process, 0.018 physicians are required over a year.

The average time for medical services of family planning was 20 minutes. Considering the workload calculated for this process, 0.079 physicians are required over a year.

The average time for medical services of childcare was 25 minutes. Considering the workload calculated for this process, 0.044 physicians are required over a year.

The average time for medical services of elderly care was 44 minutes. Considering the workload calculated for this process, 0.104 physicians are required over a year.

Evaluations on non-communicable diseases found some interesting results. The average time for medical services of non-communicable diseases (diabetes) was 32 minutes. Considering the workload calculated for this process, 0.012 physicians are required over a year. The average time for medical services of non-communicable diseases (hypertension) was 29 minutes. Considering the workload calculated for this process, 0.025 physicians are required over a year.

The average time for medical services of non-communicable diseases (thalassemia) was 29 minutes. Considering the workload calculated for this process, 0.002 physicians are required over a year.

The average time for medical services of health care for mental disorders was 29 minutes. Considering the workload calculated for this process, 0.002 physicians are required over a year. The average time for medical services of communicable diseases (Rabies) was 34 minutes. Considering the workload calculated for this process, 0.001 physicians are required over a year. The average time for medical services of other communicable diseases (tuberculosis, brucellosis, meningitis, etc.) was 15 minutes.

Considering the workload calculated for this process, 0.009 physicians are required over a year. The average time for medical services of disease prevention and control was 47 minutes. Considering the workload calculated for this process, 0.004 physicians are required over a year. The average time for medical services of public premises visit was 107 minutes. Considering the workload calculated for this process, 0.027 physicians are required over a year.

The average time for medical services of food industries visit was 96 minutes. Considering the workload calculated for this process, 0.049 physicians are required over a year. The average time for medical services of thalassemia counselling was 12 minutes. Considering the workload calculated for this process, 0.034 physicians are required over a year. The average time for medical services of nutrition consulting was 18 minutes. Considering the workload calculated for this process, 0.005 physicians are required over a year. The average time for medical services of mental disorder consulting was 22 minutes. Considering the workload calculated for this process, 0.004 physicians are required over a year.

The average time for medical services of public training requirements was 73 minutes. Considering the workload calculated for this process, 0.002 physicians are required over a year. The average time for medical services of training courses was 120 minutes. Considering the workload calculated for this process, 0.034 physicians are required over a year.

The average time for medical services of health-centre monitoring was 180 minutes. Considering the workload calculated for this process, 0.205 physicians are required over a year.

The average time for staff attendance control was 180 minutes. Considering the workload calculated for this process, it forms 0.53% of the classified extra activities.

The average time for admission control was 26 minutes. Considering the workload calculated for this process, it forms 0.97% of the classified extra activities.

The average time for staff monitoring was 34 minutes. Considering the workload calculated for this process, it forms 1.28% of the classified extra activities.

The average time for drugstore monitoring was 45 minutes. Considering the workload calculated for this process, it forms 1.72% of the classified extra activities. As the results show, the average time for other

services was 209 minutes. Considering the workload calculated for this process, it forms 1.99% of the classified extra activities

Based on data on time spent of family physicians for the main processes of the program was 93731 minutes over a year, as shown in the table below. In addition, the extra activities of physicians were determined and scheduled in percentage. Accordingly, the extra activities of physicians were calculated 6.5%. Moreover, the time spent on extra activities is currently 4020 minutes over a year. Considering the coefficient of classified extra activities (1.07), the number of physicians required for providing services to a population of 4000 is 214. Considering the calculations, the WISN ratio is 0.46, so that 0.46% of physicians are currently available for providing services based on the family physician program. The difference in WISN indicates that the program currently lacks 114 physicians for providing services to a population of 4000. By scheduling services currently provided to the population, the assigned time was 3072 minutes (31.72%) for medical visits, 13800 minutes (14.25%) for health record, 7200 minutes (7.44%) for family planning and 20160 minutes (20.82%) for village visits. Therefore, a physician can provide 100% of the services expected in the service package of the program by optimal quality and quantity (to be effective in improving indicators and public health) for a population of 1900. For more than this, the services are not expected to be provided optimally.

The total service currently provided by physicians is 97751 minutes over a year. According to results, some services are neither based on the package nor provided as much as the amount required in the instructions.

## DISCUSSION

Based on findings, the number of physicians required for providing services to a population of 4000 is 214, while the studied health care centres currently assign 1 physician per 4000 people. As Pourshirvani reported, 40% of the physicians cover a population with more than 4000 people [23]. According to claims of 32 physicians, Manca et al attributed the reasons of some inefficiencies in the family physician program to workload, time pressure, inequality, lack of access to specialists, lack of support from universities, lack of control, paperwork, frequent phone calls, patient's expectations and the bureaucracy of the insurance agencies [24]. Canadian and international studies have also raised concerns about the excessive workload, time pressure, paperwork and lack of control system [25]. Estimation of workforce using WISN has not been reported in Iran. Shahgoli, university of medical sciences in Tabriz, estimated the workforce required for health care workers in villages of the Eastern Azerbaijan based on workload. As the estimation showed, the health care system predicted 1 male and 1 female health workers for a population of 1500 and 1 male health worker for less than 1500, while, as the results showed, the total workforce estimated for 1500 people was 2.7 persons.

Although some unpredicted tasks such as cooperation in issuing insurance, cooperation with other organizations, training courses for students should be considered, revision of the estimated workforce for health centre, revision of services provided in health centres, reduction in waste and unnecessary things seem necessary and inevitable [26].

Mahdian estimated workforce based on WISN method and the workload to determine the work force. He found a shortage in workforce by calculating ratios and differences in human resources based on workload (WISN) [27].

A study conducted in Oman (2006) used WISN to estimate the required number of physicians for regional hospitals. The calculated number of physicians was 3.03 for public clinics of the regional hospitals [28].

Determining the optimal level of staff in academic hospital MOI using WISN, Musau et al (2006) showed that the available workforce was lower or higher than the optimal level in most wards; therefore, the personnel required for different wards was estimated 133 and 59 nurses [29].

Dr. Alam and Dr. Hoseyn evaluated the potential advantages of WISN for human resource management and planning in the health care sector of Bangladesh. They found that WISN promoted quality and quantity of services in the health sector. Using WISN, the estimated number of physicians required for a region was 141 out of which 86 physicians were available in that region; therefore, the WISN ratio was 61% [30].

Hagopian et al (2010) determined the health workers required for providing mother-child services using WISN. The estimated number of physicians was 104859 for 45 people; considering the available physicians, the WISN ratio was calculated (0.24) [31].

Information on the supply of work force in recruitment and training programs as well as analysis of capabilities of the workforce is of great importance. The results of estimated work force requirements will not be applicable without the knowledge of work force. In developed countries, the supply of human resources, especially in critical specialties, is continuously calculated and published with high cost of

education and training. European countries and the World Health Organization annually report on this [32].

## CONCLUSION

The implementation of family physician program in villages and cities with less than 20 thousand population requires 11500 physicians. However, the reports show that 3290 physicians were recruited by the March 2008 and 5204 by the July 2009 in the primary step of implementation. On the other hand, the quality and quantity of the services was not satisfied completely based on the requirements of the program. Based in findings, some services are neither based on the package nor provided as much as the amount required in the instructions.

Hence, revision and elimination of barriers is of great importance. The balance between the number of required physicians (demand) and the number of available physicians (supply) requires revision in the schedule of the program.

The workforce can be supplied by eliminating barriers in attraction and preservation of physicians. The change in population covered by the program in villages and cities with 20 thousand population and less depends on results of evaluation of the program in these areas.

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