

Designing a Pattern for Allocation of Family Health Care Providers to Comprehensive Health Services Centers Based on WISN

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Abstract

Because a large share of the expenses of organizations is spent on human resources, and in Iran, the allocation of health care providers in the hygiene sector continues to be done in a traditional population-based method, the purpose of this study is to design a pattern of allocation of health care providers to comprehensive health services centers based on the actual workload. The study was conducted in five phases, including literature review, identification of the service delivery process, work, and time measurement, designing initial pattern, and validation of the final pattern. The findings from the literature review, holding focus group meetings, and interviewing health care professionals led to the identification of factors that, in addition to the workload, should be considered at the time of deciding on the allocation of staff. These factors were placed in the initial pattern of allocation of health care providers to comprehensive health centers, and after validation by the Delphi method, the final pattern was presented.

Keywords: *Healthcare, Hygiene, Pattern, Staff, Workload.*

Introduction

The 2006 World Health Report "Working Together for Health" recognized human resources for health (HRH) as the most important resource in the delivery of health services (Kunjumen et al., 2022). HRH is one of the central pillars for access and universal health coverage and given the essential role health professionals play in the protection, promotion, and restoration of populations' health, it is fundamental for quantitative and qualitative planning of these professionals to be done cautiously, to respond to the different and changeable health needs of the communities efficient and effectively (Bonfim et al., 2016).

Hence, it seems that the one of most important issues of health organizations is to estimate the optimal number of staff to ensure the effective and efficient use of limited resources (Doosty et al., 2019). So, health workforce planning is understood as a strategic function and a continuous and iterative process, with investigations and analyses of the quantity and quality of workers, supported by data that reflect both planned and unplanned changes at the various determining levels of supply and demand. Some human resource planning methods, such as the Workload Indicators of Staffing Need (WISN), have been used in different regions of the world, in PHC, hospital, and outpatient services for decision-making and planning at local, regional, and national levels (Bonfim et al., 2022). The World Health Organization developed the

Staffing Needs Workload Indicators (WISN) in the late 1990s. The advantages of the WISN method indicated in some studies that the calculation based on actual work has made it a completely objective tool for determining the desirable level of human resources. In addition, the application of the WISN could lead to efficient use of resources and enhance the quality of services (Mabunda et al., 2021).

However, population ratios are based on the WISN and do not consider that workloads may differ in different localities; hospitals with the same bed capacity may not have the same morbidities, health-seeking habits, and facility workloads. Additionally, health requirements will vary with population density, demographic and socioeconomic characteristics, morbidity and mortality, geographical features, utilization patterns, and ease of access (Burmen et al., 2017).

According to the above-mentioned information, currently, in Iran, the allocation of healthcare providers as the majority of health staff in the hygiene sector is done in a traditional population-based method (one healthcare provider per 2500 residents), which does not take into account socially, economically, culturally and politically differences between different area in estimating the needed staff, this research has been conducted to design a pattern for the allocation of health care providers to comprehensive health services centers in the country. also 'in this study, it was tried to identify implicit factors that could affect workload directly and indirectly and designed patterns by considering them. Help managers allocate staff who work in areas with completely different conditions appropriately.

Unfortunately, in less developed countries, hospitals are the priority of research and development for managers due to more budgets and income, and the hygiene sector has been left out of basic reforms because their services are free and with an indirect effect on the physical and mental health of people. Therefore, researchers to pay special attention to the hygiene sector as the most important infrastructure of society's health decided to design a pattern for the allocation of family healthcare providers to comprehensive health services centers based on WISN.

Research Objectives

- 1- Collecting the experiences of researchers who had previously used WISN and provided suggestions to optimize the results of using this tool in the present study.
- 2- Determining whether the estimated number of needed staff obtained by the population-based approach is the same as the number estimated based on the actual workload of family healthcare providers
- 3- Determining the number of required staff based on the actual workload and other conditions that possibly affect that number

Research Questions

The study aimed to answer three questions:

- 1- What are the recommendations of other researchers who have used the WISN method?
- 2- Are the results of applying the WISN method similar to the results of traditional human resource allocation methods such as the population-based?
- 3- What other factors besides the actual workload are effective in the work pressure on health care providers?

Theoretical Framework

To find the answer to the questions, a scoping review was conducted of the studies in the field of Human Resource Management (HRM) using WISN in healthcare organizations, and the recommendations that researchers after using this method for improving the potential deficiencies of WISN were presented,

summed up and used when analyzing the present study data. These studies are mentioned briefly in Table 1. Also, opinions and views of hygiene sector experts and healthcare providers to find answers to the questions obtained and summarized.

Table 1: Specifications of studies in scoping review

Row	Author/authors	country	time	Aim/ target population/study place
1	Niaraees et al	Iran	2023	evaluate needed nurses in a general hospital in Iran using WISN
2	Okoroafor et al	Nigeria	2022	Assessment of staffing need for primary healthcare centers using WISN
3	Joarder et al	Bangladesh	2022	Assessment of the needed number of physicians and nurses in Bangladesh hospitals using WISN
4	Manalu et al	Indonesia	2021	Predicting Pharmacists' Human Resources in Hospitals using WISN
5	Tabatabaee & Daghighbin	Iran	2020	Estimating the required midwife in a maternity ward in the hospital using WISN
6	Wundavalli et al	India	2019	Determining needed nurses for the emergency department using WISN
7	Doosty & Maleki	Iran	2019	Investigating WISN in Healthcare Organizations
8	Mohamed et al	Oman	2018	Estimating staffing needs in primary care using WISN
9	Burmen & Owuor & Mitei	South Kenya	2017	Estimating the optimal number of physicians to provide AIDS counseling and care services in the hospital using WISN
10	Ernawati & Nursalam & Djuari	India	2017	Analysis of the required number of nurses in the hospital using WISN
11	Jocom & Massie & Porotua	Indonesia	2017	Determining the number of chefs needed in the hospital using WISN
12	Kumar et al	India	2016	Calculation of the workload of anesthesiologists in the hospital using WISN
13	Kayani & Khalid & Kanwal	Pakistan	2016	Calculating the Workload Pressure of Female Health Caregivers in Health Centers Using WISN
14	Bonfim et al	Brazil	2016	Prediction of nurses needed in family health centers using WISN
15	Nayebi et al	Iran	2016	Estimating the number of nurses required in the emergency department of the hospital using WISN
16	Liljamo & Lavander & Kejonen	Finland	2016	Determining the number of nurses required in the hospital using WISN
17	Mollahaliloğlu et al	Türkiye	2015	Determining the number of family physicians needed in health centers using WISN
18	Napirah & sulistiani	Indonesia	2015	Estimating the optimal number of hospital laboratory staff using WISN
19	Govule et al	Uganda	2015	Determining Health Workers' Requirements for Mityana General Hospital, Uganda
20	Dharmayuda & Wulandari & Wirawan	Indonesia	2015	Determining the number of physicians needed in community health centers using WISN
21	Namaganda	Uganda	2015	Estimates the number of needed staff in assistant nursing, nurses, midwives, doctors, and clinical officers in comprehensive health centers using WISN
22	Ly et al	Burkina Faso	2014	Measuring the ability to provide maternal care services in referral hospitals using WISN
23	Shivam et al	East Bengal	2014	Planning for the number of nurses needed in rural Bengal hospitals using WISN
24	McQuade et al	Namibia	2013	evidence-based allocation standard for physicians, nurses, and pharmacists in hospitals using WISN

Niaraees et al in their research aim to evaluate the workload of nurses in a general hospital in Iran using WISN. Their findings are consistent with the findings of the present study in such a way that they suggest that decision-making on staff arrangements should not be acted solely based on WISN's results, and modalities of nursing care should also be considered. While the WISN method is important in determining nurse workload, it must be used with other factors to ensure the standard of patient care is not compromised. This study contributes to the understanding of the practical use of the WISN method in the context of Iran's healthcare system (Niaraees Zavare et al., 2023).

The results of Okoroafor & Oaiya 's study illustrated the staffing needs of nurses, midwives, CHO (Community Health Officers), Community Health Extension Workers (CHEW) and Junior Community Health Extension Workers (JCHEWS) in the sampled facilities and indicated the need for using evidence for staffing decisions. This is pertinent considering it ultimately contributes to improvements in service delivery and health indices. The evidence from the application of the WISN tool and the scale-up of its application has the potential to contribute to the achievement of national goals as well as universal health coverage and sustainable development goals (Okoroafor & Oaiya, 2021).

Joarder et al in their study while referring to the lack of nurses based on findings believe that the government should adopt flexible health workforce planning and recruitment policy to manage the patient load and disease burden. WISN should, thus, be incorporated as a planning tool for health managers. There should be a regular review of health workforce management decisions, and these should be amended based on periodic reviews. Consistent with the findings of the present study they implicitly refer to customizing the method based on the conditions (Joarder et al., 2020).

Manalu et al in their study while confirming the shortage of pharmacists in hospitals, introduce recruitment and additional incentives as ways to correct the management of human resources in the shortage of staff (Manalu et al., 2021).

The findings of Tabatabaee and Daghighbin study's denote a shortage of nurses in educational hospitals and a surplus of nurses in non-educational hospitals. They suggest increasing overtime as one way to solve the staff shortage problem (Tabatabaee & Daghighbin, 2020).

Wundavalli et al study findings showed a lesser number of nurses in the academic emergency department than needed staff and also they believe that WISN is useful for identifying activities that do not require nursing professional skills and prescribe the skill mix of staff (Wundavalli et al., 2019). Doosty & Maleki by reviewing research that estimated the needed staff using WISN identified the indirect factors affecting the workload (Doosty et al., 2019).

Mohamed et al results showed that the number of doctors was closer to the ideal number as mentioned in the national standard than the number of nurses. Consistent with the present study researchers believe that while calculating the needed number of staff based on WISN this is necessary to consider additional parameters such as planned new services; local disease profile; and changes in health policies (Mohamed et al., 2018).

Burmen & Owuor & Mitei while confirming the WISN as a reliable and objective means of estimating staffing needs, based on their findings stated that there is a severe shortage of clinicians providing consultation services at the HIV clinic (Burmen et al., 2017). Study's findings of Ernawati & Nursalam & Djuari show the shortage of nursing staff compared to the actual workload (Ernawati et al., 2017).

Jocom & Massie & Porotua's study's result was a sign of staff shortage but consistent with present research they stated that WISN was not yet ideal because it only calculated the number of staff despite the productivity level of staff in the hospital (Jocom et al., 2017).

The findings of Kayani & Khalid & and Kanwal's research unlike most others, indicated a surplus of staff but they emphasized that the results are not generalizable to other areas and regions due to the specific topography of the study area (Kayani et al., 2016).

Bonfim et al while confirming the findings of WISN showed that there was an appropriate number of technicians/auxiliary nurses working in the Family Health Services (Bonfim et al., 2016). Nayebi et al study's results reported the shortage of staff and researchers believe that WISN was the correct tool for estimating needed staff (Azimi Nayebi et al., 2019).

Liljamo & Lavander & and Kejonen referring to the fact that there is currently an appropriate number of human resources, based on their findings expressed that minor deficiencies can be compensated by in-service training of nurses and equipping the health centers with advanced information technology (Liljamo et al., 2016).

Mollahaliloğlu et al in their research after calculating the number of family physicians confirmed the shortage of the needed number of them and consistent with the findings of the present study suggested that the workload of family physicians should be reduced by providing the ideal population per family physician or task shifting of some services that the physician was not required, to a family health officer or another health worker (Mollahaliloğlu et al., 2015).

Napirah & Sulistiani study's findings showed that pressure on staff can be corrected through correct and precise management, and there is no need to increase the workforce. Also consistent with the present study they stated that some other factors affecting staff workload should be considered while analyzing WISN data (Napirah & Sulistiani, 2015).

The findings of Govule et al's study revealed that there was a real staff shortage of both medical officers and medical clinical officers in hospitals and also much of health professionals' time is spent on activities other than their technical job descriptions (Govule et al., 2015).

The result of Dharmayuda & Wulandari & and Wirawan 's study in addition to confirming the shortage of staff based on WISN stated that when they used the ratio of functional medical doctors per population, the number was sufficient but when using workload analysis indicated shortage (Dharmayuda et al., 2015).

Namaganda et al study's result showed a shortage in staff and provided an evidence base to reshape policy, adopt workload-based norms, review scopes of practice, and target human resource investments (Namaganda et al., 2015).

The findings of Ly et al's study besides confirming the shortage of staff consistent with the present study introduced other factors such as demographic and economic situations as affecting factors on staff's workload (Ly et al., 2014).

Shivam et al in their study concluded there was a shortage of staff and consistent with the present study emphasized the effect of differences places on staff's workload (Shivam et al., 2014). McQuide et al's study results showed shortages of staff also inequities in their distribution. They suggested revising staffing norms; improving staffing equity across regions and facility types; and ensuring an appropriate skill mix at each level as ways to adjust the staff shortage (McQuide et al., 2013).

Research Methodology

This study is descriptive from the aspect of the purpose, applied from the aspect of results and consequences, mixed-method from the aspect of the implementation process, inductive from the aspect of logical implementation, and cross-sectional from the aspect of time. This project was designed and

implemented in five separate phases to achieve the main study's objective. Briefly, in the first phase, by reviewing related literature, the effective and important factors in estimating the needed staff were obtained. Then, in the second phase, through the holding of focus group sessions, the main activities done by healthcare providers in healthcare centers were extracted, and in the third phase by using WISN the difference and proportion of several current human resources to ideal proportion calculated. In the latter, the primary pattern of allocation of healthcare providers is designed, and in the last phase, the final pattern is released. The phases of conducting the research along with the details are mentioned below.

First phase: This phase of the study was carried out by scoping review method, and during it, related studies in the field of staff estimation in the healthcare organizations of Iran and other countries were investigated and the factors affecting the number of needed staff were extracted.

Second phase: This step was done to find the second question's answer and with the aim of identification of healthcare providers' activities.

Population and sample in Phase 2

At this stage, according to the agreement of the researchers, considering that in the quantitative phase of the study, data is collected to determine the actual workload of health care workers, people who had work experience related to health care providers were selected as experts for this stage. The target population was all the experts, knowledgeable people, and decision-makers working in the hygiene sector of the Iran University of Medical Sciences. The target sample (59 persons) were experts who had at least a bachelor's degree and also at least ten years of work experience in the field of hygiene or the people who make decisions for allocating staff to comprehensive health centers that these people were identified by the snowball method (Table 2). The information was gathered by holding focus group meetings and 17 interviews in the 10 provincial health centers. The interview guide was designed by the researchers based on literature review results and the interviews/meetings continued until data saturation.

Tale 2: Demographic information of interviewees

Variables		Number	Percentage
Gender	female	43	72%
	male	16	28%
Age	30-40 years	14	24%
	40-50 years	38	64%
	Over 50 years old	7	12%
Level of Education	bachelor's degree	24	40%
	Master's degree	31	52%
	PhD and above	4	8%

At the first meetings, the purpose of holding meetings was inform to all the participants, and after obtaining their consent, the conversations were recorded and at the same time, researchers wrote down the important points of participants' views. After that, the data was analyzed by a quantitative content method using Excel software.

Third phase: in this step, since Mashhad is the third most populous city in the country and it has the largest outskirts residents, it was selected as a pilot city to collect the data. In cities like Mashhad with class conflict, staff workload is in a wide variety range of rich and poor areas, because in the outskirts of the city, families are more receptive to using public health services, and in prosperous areas, people prefer to benefit from private sectors. Therefore, the distribution of staff in these cities is more important compared to more uniform cities. According to the findings of the scoping review and interviews with experts who emphasized the effect of the geographical region on the workload, the data was collected separately from the urban and the outskirts of the city centers.

Population and sample in Phase 3

The research population included healthcare workers working in comprehensive health service centers covered by the five health centers of Mashhad University of Medical Sciences. The total number of health care workers was 1,004 people the sample size using Cochran's formula was 297 and stratified sampling was done in proportion to each of the centers (Table 3). The demographic characteristics of the selected sample are shown in Table 3.

Table 3: stratified sample size

name of the center	Number of employed healthcare workers	Sample size
Health center number 1	247	68
Health center number 2	191	53
Health center number 3	310	86
Health center number 5	216	60
Samen Health Center	40*	30
Total	1004	297

*Due to the small size of the population, the minimum required sample considered 30 based on the principle of normal distribution

Table 4: Demographic characteristics of selected samples from five health centers

Variables	Interviewees	Percentage	Number
Age	20-30 year	25%	74
	30-40 year	41%	121
	40-50 year	31%	91
	50-60 year	4%	11
sex	Female	82%	243
	Male	18%	54
Educational level	Associate Degree	10%	31
	Bachelor's degree	84%	249
	Master's degree	6%	17
work experience	Less than 10 years	28%	84
	11-20 years	37%	109
	21-30 years	35%	104
Post Title	Associate/Family Health Expert	57%	170
	Associate/health expert in combating diseases	15%	45
	Associate/midwifery expert	28%	82

Fourth phase: the initial pattern of allocating healthcare providers designed based on obtained information from previous phases so do not rephrase the details here.

In the initial pattern, various factors extracted from the literature review (phase 1), focus group meetings (phase 2), and interviews with healthcare providers (phase 3) were identified as factors that affect allocating staff besides workload.

Fifth phase: The final pattern designed based on obtained information from the Delphi method and then presented as a graph.

Population and sample in Phase 5

In this phase, according to the agreement of the researchers, because the model was designed based on the opinions of experts in the second phase, its validation was also done through a survey so the target

population & and sample by necessity were the same as in the second phase. In the first round, Yes-No questions were asked of participants about the results of every step of the study, and the findings were analyzed by the quantitative content analysis method. In two other rounds participants about factors affecting healthcare workload in the initial pattern and scoring done according to the 5-point Likert scale (strongly agree: 4, agree: 3, moderate: 2, disagree: 1, and strongly disagree: 0), and the findings were analyzed by descriptive statistics. The criteria for accepting each component in the pattern was its placement in the 3rd to 4th quartile (75 to 100 percent). If the amount of collective agreement was between the 2nd and 3rd quartiles (50 to 75 percent), it was sent to the next round of Delphi. The components whose collective agreement was between 0 and 2 quartiles (0 to 50%) were removed from the final pattern.

Results

Table 5: Summary of research phases

Row	Research phases	Gathering data tool	Software	results
1	Scoping review	Gathering data form	END NOTE	Identification of affecting factors on workload
2	Qualitative study	Semi-structure interview	MAXQDA Office word	Identification and categorization of healthcare workers' activities
3	Quantitative study	Questioner	SPSS	Estimation of needed healthcare workers in comprehensive health centers
4	Mixed-method study	The sum of the tools of the previous three phases	SPSS	Presenting initial pattern
5	Pattern validation	Questioner	SPSS	Validating pattern and presenting final pattern of allocating healthcare workers to comprehensive health centers

Findings from the literature review showed that four key issues are implicit factors that probably affect workload and estimating the number of needed staff. These mentioned issues are summarized in Table 6.

Table 6: Factors Affecting Staff Workload

Row	Issues	Description
1	Service delivery time	Normally, in the evening and night shifts, the load of referrals gradually reduces and the workload is less than in the morning shift. Therefore, the number of employees required is less in the evening and night shifts and more in the morning shift
2	Geographical features of the region	In some countries, there is a big difference between urban and rural areas in terms of staff and demand for service in these areas. In these cases, employees usually have a great desire to work in cities with amenities so the low number of employees and the high demand of people in disadvantaged areas to benefit from public services lead to workload increasing
3	The level of complexity of work	In some cases, the staff with a lot of experience do not want to perform complex tasks and leave these tasks to the newcomers who do not have enough experience to do the work. So even with the right number of employees, works are not done properly
4	Labor supply	Lack of applicants for work, poor services, poor community communication, and inappropriate location of centers are important factors that limit the possibility of providing services and thus affect the work pressure.

In the second phase 16 main activities and 146 sub-activities (Table 7), 8 supportive activities (Table 8), and 6 additional activities (Table 9) were recognized as work components of healthcare providers based on WISN.

Table 7: Main and sub-activities of healthcare workers

Row	Activities	Number of Sub-Activities	Row	activities	Number of Sub-Activities
1	Completing the family health file	14	9	Pharmaceutical services	4
2	Disease care	25	10	Preparation of statistics and reports of daily performance	9
3	Childcare	9	11	follow-ups	9
4	Periodic care of target groups (pregnant women, elderlies, ...)	7	12	Public Affairs (answer to received letters, logistics,)	10
5	Vaccination	12	13	Providing health services in schools	6
6	special care (Some people who are in the group of high-risk clients require more care than others)	4	14	Mothers care	7
7	Health ambassadors (Native volunteers to provide basic services to the community)	4	15	Inspection of houses in terms of the degree of resistance to disasters (DART)	2
8	Education (In-service education, community education)	20	16	Fertility incentive programs	4
Total	146				

Table 8: Supporting activities

Row	Activities
1	Preparation of monthly statistics and reports to higher levels
2	Preparation of quarterly statistics and reports to higher levels
3	Participation in conferences and seminars related to health events
4	Conducting inter and intra-departmental coordination and follow-up of suspicious or endangered cases
5	Leaving the workplace to hold training courses at the city headquarters, mosques, academies, schools, etc.
6	Leaving the workplace to take care of students
7	Leaving the workplace to active follow-up
8	waiting time to complete the previous stage of processes by other personnel

Table 9: additional activities

Row	Activities
1	Internet interruption
2	System updates
3	Equipment breakdown
4	Interruption in work due to the inaccessibility of required equipment
5	Supervisory monitoring
6	Training recruits

The finding of the third phase was the determination of a shortage or surplus of healthcare providers based on WISN. This number was obtained by calculating available time, standard time for performing each sub-activity, and repeating each of them during the year through 103 individual and 64 group interviews. After calculation of the main activity standard, category allowance factor (CAF) for supportive activities, and individual allowance factor (IAF) for additional activities, the proportion of WISN and workload of healthcare workers were obtained. In addition, for activities such as eating breakfast (4000 minutes), tea (1000 minutes), and praying (3000 minutes), a total of 8000 minutes per year considered which should deducted from the available work time.

Estimating available work time was done based on the following formula

$$AWT = A - (B + C + D + E) * F$$

AWT: is the total available working time

A: is the number of possible working days in a year

B: is the number of days off for public holidays in a year

C: is the number of days off for annual leave in a year

D: is the number of days off due to sick leave in a year

E: is the number of days off due to other leave, such as training, etc., in a year

F: is the number of working hours in one day

Table 10: Available working time of healthcare worker

Reasons for absence	day
public holidays	73
paid leave	13
sick leave	2
Maternity leave	19
Total	107

$$AWT = [365 - (73 + 13 + 2 + 19)] \times 7^* = 1806h (258d)$$

The activity standard of main, supportive, and additional activities is calculated as mentioned below tables (10-12) It should be mentioned that due to the large amount of data, only the data related to the main activities of the outskirts centers have been presented as examples.

Table 12: Standard of supportive activities of healthcare workers

Work components	The time required to perform the activity	Repetition of activity in the year	Activity standard
Preparation of monthly statistics and reports to higher levels	45	12	540
Preparation of quarterly statistics and reports to higher levels	67	4	268
Participation in conferences and seminars related to health events	240	1	240
Conducting inter and intra-departmental coordination and follow-up of suspicious or endangered cases	18	17	306
Leaving the workplace to hold training courses at the city headquarters, mosques, academies, schools, etc.	240	6	1440
Leaving the workplace to take care of students	270	6	1620
Leaving the workplace to active follow-up	60	7	420
waiting time to complete the previous stage of processes by other personnel	14	254	3556
Total	954	261	8390

Table 13: Standard of Additional activities of health care workers

Work components	The time required to perform the activity	Repeat activity per year	Activity standard
Internet interruption	32	36	1,152
System updates	24	14	336
Equipment breakdown	16	10	160
Interruption in work due to the inaccessibility of required equipment	250	4	1,000
Supervisory monitoring	65	8	520
Total	387	72	3.168

Then WISN difference and ratio are calculated as follows:

In comprehensive healthcare centers in the outskirts

$$AWT = 1806 - 8000/60 = 1673$$

$$Activity\ standard = 92985/60 = 1550$$

$$Required\ number\ of\ staff\ based\ on\ WISN = 1550/1673 = 0.92$$

$$CAF = 1 / [1 - (Total\ CAS / 100)]$$

$$CAF = 8390/60 = 140h, 140/1673 = 83\%$$

$$IAF = 31.68/60 = 52.5h, 52.5/1673 = 0.31$$

$$Total\ required\ number\ of\ staff\ based\ on\ WISN = 1.3 + 0.31 * 0.92 = 1.48$$

WISN ratio= $1/1.48= 0.67$
Difference WISN= $1- 0.67= 0.32$

In comprehensive healthcare centers in central city

AWT= 1806- 8000/60= 1673

Activity standard= $76013/60= 1267$

Required number of staff based on WISN= $1267/1673= 0.75$

CAF = $1 / [1 - (\text{Total CAS} / 100)]$

Total CAS= $8156/60= 136$ h, Total CAS percent= $136/1673*100= 8.1$

CAF= $1 / [1-(8.1\%)] = 1.2$

IAF= $3168m/60= 52.8h$, $52.8/1673= 0.31$

Total required number of staff based on WISN= $1.2+0.31*0.75= 1.13$

WISN ratio= $1-1.13= 0.87$

Difference WISN= $1- 0.88= 0.12$

In this study, since the target group was healthcare providers who provided services based on the standard protocol and had the same job description, the standard workload was calculated per one employee. The results of the estimation of the needed number of staff in urban and outskirts centers were shown in a comparative form in Table 14.

Table 14: Urban and outskirt comprehensive centers need staff

Type	Present staff	Needed staff	Shortage/Surplus	WISN proportion	workload
Urban centers	1	1.13	shortage	0.88	0.12
outskirts centers	1	1.48	shortage	0.67	0.48

Then after summarizing the information obtained from the literature review (phase), semi-structured interviews, and focus group meetings (phase), as well as the opinions of the healthcare workers in the field study(phase), indicated that the design of the healthcare providers pattern and to match the number obtained from the WISN with reality needed number as much as possible, other factors besides the workload should be considered.

For this purpose, during the focus group discussions with experts and the interviews with healthcare providers, the opinions of the participants were obtained regarding the impact of some factors, which were obtained from the scoping review or in terms of their expertise, on the workload of healthcare providers. The results of these questions were analyzed in the content method and 9 factors including workload, staff supply, geographical specifications of area, service delivery time, ability and willingness of employees, Knowledge level of employees, managers' management style, staff age and gender that should be considered when determining the needed staff based on the WISN method.

Fifth phase: As stated earlier, based on the results of the literature review and interview of experts, the geographical specification of the area affects staff workload. Based on this and according to the agreement of the researchers, the research samples were selected separately from the healthcare workers in the urban and the outskirts of the city centers to make it possible to compare the number of needed staff in these areas.

The 9 factors mentioned above were considered effective factors in the estimation of needed staff based on workload, and the initial pattern for allocating the health care providers needed in comprehensive health centers was designed based on these findings. After that to validate the designed pattern, the results were sent to the experts (target population in phase 2) by sending a Likert questionnaire, and then, the collected

information was analyzed using SPSS software. According to the number of experts participating in this step (59 people), the data analysis was done with Friedman's non-parametric method.

The method used in this research to design the analytical pattern was the hypothesized-inductive method in which the conceptualization and extraction of the pattern were done from the concepts obtained from the literature review and exploratory interviews/focus groups.

In the first round, open-ended questions were asked from the interviewees regarding the factors affecting the workload in comprehensive health centers. Then, in the second round, these factors were put into a survey through a Likert scale. The results did not show a significant difference between the second and third round results at the %0.05 level and with %95 probability. Therefore, the results of the third round were chosen to compare with the average Likert score and to research hypothesis test. The value of 1.02 was calculated for t, which was equal to 2.036 in the standard table, and considering that the calculated t is smaller than the t of the table, it is concluded that there is no difference between the results of the first and second round, at the level of 0.05% and the results are similar in both rounds with 95% probability. In the second round of Delphi, the size of the impact of the factors affecting workload was measured and the effective factors were selected. The scoring method was a Likert scale (strongly agree: 4, agree: 3, moderate: 2, disagree: 1 and strongly disagree:0) The average of this spectrum was 2, therefore, the average of each factor was calculated with this average, in such a way that the effectiveness of these factors was determined with numbers greater than 2 and ineffectiveness with numbers smaller than 2. Cronbach's alpha coefficient for the questionnaire of this research, which was calculated using SPSS software, was equal to 0.885, which is higher than 0.7 and confirms the reliability of the research questionnaire.

Table 15: Factors affecting the workload of healthcare providers in comprehensive health centers

Affecting factors	Number of answers	lowest score	The highest score	average score
Workload	59	0	3	1.41
Staff supply	59	0	3	1.64
Geographical specifications of the area	59	0	4	3.20
Service delivery time	59	0	3	1.55
Ability and willingness of employees	59	0	4	2.89
Managers' management style	59	0	4	2.57
Knowledge level of employees	59	0	4	3.11
Age	59	0	3	1.18
Gender	59	0	3	1.33

Finally, 4 factors as described below, with the highest score, were selected as the main effective factors in the allocation of health care providers in comprehensive health centers.

Table 16: Selected factors affecting the allocation of required healthcare providers in comprehensive health centers

Row	Affecting factors	Score
1	geographical specifications of the area	3.20
2	Knowledge level of employees	3.11
3	ability and willingness of employees	2.89
4	Managers' management style	2.57

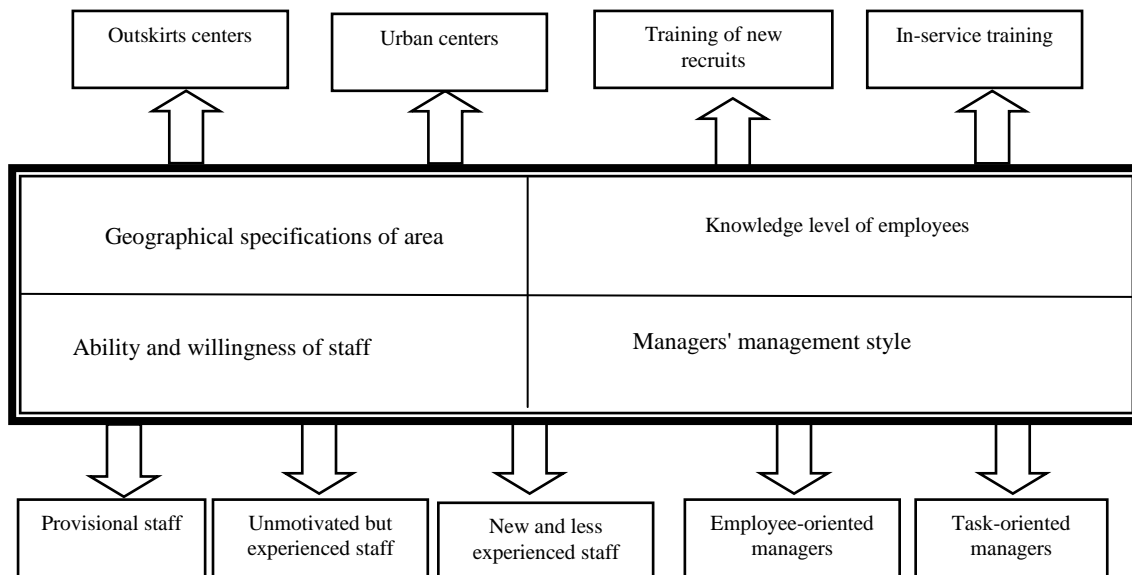


Figure 1: The designed pattern of allocating health care providers to comprehensive health service centers

Discussion

Researchers designed patterns based on four key factors obtained from the literature review, interviews, and focus groups. Here more details of the pattern are discussed.

Geographical specifications of the area

The geographical characteristics of each area, which are directly related to the economic, social, and cultural levels of the residents, can be effective in using public sector services. In addition to confirming the effect of this factor on the number of needed staff in organizations based on the findings of the literature review (as mentioned in Niaraees, Manalu, and Bonfim in their studies), in the interviews of the field study, this factor as one of the main factors affecting workload was repeatedly mentioned by the interviewees. According to the interviewee's opinion, because public services are free, people on the outskirts of cities tend to go to comprehensive healthcare centers, while in urban centers, people with the perception of the low quality of public services tend to benefit from private sector services.

Knowledge Level of Employees

According to the interviewee's opinion, in-service training classes that are held to empower healthcare workers as much as possible will have a great impact on their workload. If the employees benefit from in-service training and updated knowledge, the work will be done faster and the need for manpower will be less. Also, recruits, who are generally people who have recently graduated and are not familiar with the knowledge/information required in the workplace, will need less time and energy to do their assigned tasks if they are trained according to their job needs.

Ability and willingness of staff

According to the interviewee's opinion, employees have many differences in terms of ability and willingness to perform tasks with each other, and on the other hand, these factors can have a direct impact on the number of needed staff in each workplace. People who have a lot of ability to do things and due to a

lot of work experience, do not have much problem even in dealing with complex cases, but generally due to dissatisfaction with the path of a job promotion, salary, and benefits or the perception of injustice, spend less energy and time to doing tasks, so their performance can affect the other staff's workload.

Some other staff do not want to do diverse and complex tasks because they are nearing the end of their working period (Retirement). On the other hand, recruits, who generally have a great desire to do things, learn new tasks, accept multiple responsibilities, etc., with the aim of a sooner job promotion, but due to lack of experience, they may not be able to do tasks correctly and accurately and their poor performance may lead to rework and require additional time and energy to arrange tasks.

Also, contract staff as temporary employees who, at the beginning of the working period due to unfamiliarity with performing tasks (ability) and at the end of the working period due to lack of motivation to perform tasks correctly and accurately (willingness), generally need support and spend a lot of time from the other employees at the beginning and end of the working period can be considered as effective factors on the workload.

Managers' Management Style

According to many interviewees' opinions, the management style of managers who are more task-oriented or employee-oriented can also be among the factors affecting the workload. In this way, task-oriented managers put a lot of emphasis on doing all assigned tasks accurately and regularly, and they usually do not accept any mistakes or negligence for any reason. These managers with strict supervision led to high work pressure on the employees and as a result, there will be a need for more staff in such centers. On the other hand, managers who are employee-oriented and pay special attention to the needs and capabilities of employees while monitoring the staff performance, generally have calmer employees who perform their duties without feeling too much work pressure.

Finally, a pattern was designed that, while estimating the actual workload using WISN, takes into account other factors affecting the workload of staff, so hope these findings help decision-makers and policymakers in the hygiene sector that allocate health care providers fairly among comprehensive health centers.

Future Direction for the Study

Based on the information and results obtained from this research about the required number of employees based on the actual workload, it seems that more research is needed to estimate the required number of staff to provide better quality services. According to the researchers, the allocation of employees based on the actual workload is the primary need of organizations, especially healthcare organizations, but the allocation of employees to improve the delivery service quality means paying attention to the specific needs of each population and considering staff with the needed experience, education, interests and even culture consistency to the population is a leading step in the path of excellence. Therefore, it seems that in the field of staff estimation, as in other fields, the conducted research is very preliminary, and more and more in-depth studies are needed.

Conclusion

As mentioned before, based on the study and experience of researchers in less developed countries, hospitals are the priority of research and development for researchers, managers, and policymakers. This is even though improving the hygiene level of society can lead to the prevention of many complications or diseases, which in itself improves the health level of the people without paying for treatment.

Since hygiene services in Iran are provided free of charge, the main cost of this sector is related to employee salaries and benefits. Therefore, by proper HRH, especially the fair allocation of staff among comprehensive health centers, it is possible to have a direct impact on the satisfaction of employees and consequently improve the quality and quantity of health services. In fact, in such countries where limited resources are always one of the main obstacles to improving the quantitative and qualitative level of public services, it is possible to improve the staff allocation process instead of being prejudiced toward traditional methods with the help of up-to-date knowledge and without spending more money achieving great benefits. This research tried to design a pattern that takes into account all the factors affecting the workload of healthcare providers as much as possible and helps decision-makers and policymakers in the fair allocation of staff.

Suggestions based on research Findings

- Based on the calculation of the actual workload, the work pressure on healthcare workers was more than one in urban centers and nearly 1.5 per healthcare worker in centers on the outskirts of the city. Therefore, it is suggested that to do tasks as well as possible, for every 5,000 residents in each area (where currently two health care providers are considered) 3 health care providers be allocated. Also, it seems that if the officials and decision-makers consider special benefits for the employees working in deprived areas, more motivation will be created and they will provide services with more satisfaction.
- Many managers, after receiving information about some employees whose poor performance leads to the dissatisfaction of the supervisor, other employees, and clients, transfer these staff to centers on the outskirts of the city for punishment, so for other employees, in addition to the problems of these centers an unmotivated colleague is also added to the unfavorable conditions, which leads to a feeling of more dissatisfaction in them. It is suggested that instead of considering the centers on the outskirts of the city as an exile, think about the development of these centers as much as possible so that even the best employees volunteer to work there.
- It is suggested that more research be done by applying this pattern and considering all the factors affecting the workload to allocate employees more fairly.

Limitations

Because of the dispersion of the provinces in terms of distance, there was a delay in conducting the interviews and collecting data, on the other hand, due to the busy schedule of some managers, the interviews were not conducted in the expected schedule, which led to a delay in the entire project.

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Appendices

Abbreviations

Workload Indicators of Staffing Need: WISN
Human Resource Management: HRM
Human Resources for Health: HRH
Community Health Officers: CHO
Community Health Extension Workers: CHEW

Junior Community Health Extension Workers: JCHEWS

Category Allowance Factor: CAF

individual Allowance Factor: IAF

Available working time: AWT

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