



Proper Distribution of Specialist Physicians: A Strategy Towards Realizing Justice and Equity in Access to Health Care Services

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ABSTRACT

Background: Paving the way for having equitable access to medical intervention programs is the most important action that a health system can take in realizing social justice. This study aims at examining proper distribution of specialist physicians as an strategy towards realizing justice and equity in access to and use of health services as well as providing recommendations for policy-makers.

Methods: This is a review-narrative and bibliographic research that used databases consisting of Magiran, Irandoc, Iranmedex, SID, PubMed, Scopus, EMBASE, Direct Science with the key words including Specialists, Health, Equity, Accessibility, Health system and Human resources. The data were collected from 1990 to 2015.

Results: There are evidences of regions in the world that still are lacking sufficient number of physician workforce and are not only faced with challenges of recruiting, but also with retention of specialist physicians. In fact, migration of human workforce from deprived regions to more organized and prosperous parts has been a factor influencing workforce shortage in these regions; thereby it adds further problem of recruitment and retention of specialist workforce.

Conclusions: Human workforce distribution (Specialist or non-specialists) has direct effects on realizing equity and justice in health system; it also influences economy of a given country indirectly. On the other hand, compensation is one of the important incentives that drives workforce behavior and makes them more inclined towards working in deprived regions. Taking the above mentioned ideas, it is recommended for the health system to use more economic incentives and insure proper distribution that fits individuals' needs. Using various tax policies in deprived, wealthy, and generally different geographical regions is one of the most important incentives available to leverage this purpose.

Keywords: Specialist Physicians, Equity, Accessibility, Human resources, Health

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Introduction

Remarkable technology advances in many industries has provided a suitable context for these technologies to replace manpower. This has made many workers to exit from manufacturing and servicing industries and replaced with technology in an increasingly rapid pace. This is so that in health and treatment industry, human workforce plays a vital role and providing services in this realm is fully dependent on human intervention. On the other hand, since service delivery is a specialized process, this system is distinguished from other areas in terms of need for specialists. Health systems have always had challenges in the field of human resources including manpower shortage, poor distribution, unmotivated personnel, etc., that can affect the health systems' performance and consequently public health (1). Paving the way for equitable access to medical intervention programs is the most important step that a health system can take in realizing social justice. In terms of health, social justice means justice in distribution of health in community. Since health is something that cannot be directly distributed among individuals, policy makers try to move towards a more equitable distribution in society by a justified distribution of health determinants (2). Lack of sufficient financial and human resources on the one hand and the ever-increasing complexity of health on the other hand, make things such as supply, preservation, and promotion of health in different communities a significant challenges. This highlights the need for attention to this important issue for all people, especially policy makers and relevant executives (3). However, it seems that in Iran's health system there has not been any comprehensive, evidence-based, and appropriate method to allocate resources according to people's actual needs and this allocation of human resources is still carried out based on traditional procedures. This method may lead to injustice in distribution of human resources and inappropriate use of resources, and on the other hand the basic needs of people may be left unanswered. Human workforce requirements of each organization are among the

most important sources which must be supplied through work and time measurement methods to provide better services and peruse a way in acquiring a better quality (4). The continuation of this unfair distribution of health facilities in the country and the charm of big cities for professionals in the health field have led to concentration of skilled and experienced workforce in these areas and inaccessibility of people to these professionals in the deprived areas (5,6). In this regard YarMohammadian et al. concluded that the final scores of human resources indicators including (input, process, output, efficiency, effectiveness, efficiency, and outcomes) was 1042 in Human Resources Department of Medical Sciences in Isfahan that accounts for 63% of the total score. In this study, based on various models (the General Auditing Office of Canada, the World Health Organization, and Organizational Excellence Model) a total of 60 indicators related to health human workforce including physicians and their distribution were extracted and the status of Isfahan University of Medical Sciences was assessed accordingly. Inadequate geographical distribution of physicians is not unique to Iran (7); mal-distribution of physicians and their concentration in urban areas followed by shortages in deprived areas is considered as a political problem in all countries (8). Many studies have confirmed the inappropriate concentration of specialists in prosperous and wealthy areas (9-11). Vali et al. in a study entitled as "factors influencing the density of both general and specialist physicians in the country" that was carried out in towns, found that the most important factors affecting the density of general physicians are urbanization, the number of public hospital beds, and number of beds in private hospitals. They also mentioned major factors affecting density of physicians as number of beds in public hospitals, private hospitals, and population (12).

Justice in distribution of specialist medical workforce is of concern in all countries particularly in high-income ones. For example, in Western Europe that the ratio of physicians to population is



high, equity in geographic distribution of physicians is not better than other countries. On the other hand, in England despite the low ratio of physicians to population, distribution is balanced better than other countries of the region. This is different even in the US to the extent that the number of physicians varies to more than 2 times among states. Japan, Australia, and Canada are also faced with distribution problems (14-17). One of the challenges facing the human resources in health system in Canada is improper distribution of physicians. This deficiency relates to problems of recruiting, retaining, and maintaining them (17). The problem of our country is not increasing the number of physicians, but their distribution in different regions of the country (12). Iran Ministry of Health and Medical Education as the main custodian of planning and policy making regarding skilled workforce in the field of health, has taken need-based distribution measures of specialists in Iran including, ranking health services and sending specialists to deprived areas (18). Inefficiency of used methods has caused problems related to lack of access to specialists in many areas (19). Programs such as "Messengers of Health" for physicians subject to military service, staffing plan for non-subject to military service male and female physicians, as well as many other programs of the Ministry of Health and Medical Education of Iran are examples of responses that health policy makers have provided to solve this problem (20).

Among the most recent initiatives proposed in our country are the family physician and development plan in the health system reform plans. Policy makers are faced with financial, structural, and in its most important dimension with providing human resources in different work levels in implementation of these two projects. So that in carrying out the family physician program there is shortage of general physicians for rural areas, and in the healthcare reform there is lack of persistence in residence of specialists as well as the amount of allocation in the program of making physicians' visits appropriate (21,22).

The health system reform plan has seven dimensions, namely reducing the amount of sick

client payments, supporting the retention of physicians in deprived areas, the presence of specialist physicians in hospitals (physician-resident), housing quality improvement programs, programs to improve the visiting quality, financial protection of patients with difficult to cure diseases, and natural childbirth (23). As it can be seen, two major packages in health system reform plan are related to supporting the retention of physicians in deprived areas as well as the presence of resident physicians in the hospital which reflect the importance of this issue and also Ministry of Health's attention to solve the human resources' distribution and adequacy problem. Thus, the aim of this study was proper distribution of physicians as a strategy to achieve equity in access to health care services.

Material and Methods

This is a review-narrative and bibliographic research conducted by using databases such as Magiran, Irandoc, Iranmedex, SID, PubMed, Scopus, EMBASE, and Direct Science with the key words of Specialists, Health, equity, Accessibility, Health system, and Human Resources. Data collection started from 1990 and lasted to 2015. The purpose of this search was to discover all the studies and reports on distribution of physicians carried to the date of the present study. Inclusion criteria in picking up key words were those used in the title and abstracts. All the studies that included the selected keywords but did not examine the issue of distribution of physicians were excluded. In this search, 65 articles were retrieved, 35 were related to full text Persian and Latin sources, and 30 articles merely provided abstracts and their full texts were bought and introduced to the study. By evaluating the content and qualitative evaluation of studies, finally 35 articles were selected to extract the most relevant information on developing countries such as Iran as well as developed countries.

Results

Equitable distribution of physicians has been the main concern of policy-makers in recent years, which is reflected in different documents.



Development and growth of any society depends on the correct use of human resources (24). Human resource is a strategic objective of any organization in achieving its goals. Skilled workforce, particularly physicians, in contrast to unskilled labor is not readily available; therefore, to provide and supply it properly according to the organization's future goals, necessary planning must be implemented (4). For equitable utilization of specialist physicians to work in deprived and less developed areas, payment system should be such that motivates them sufficiently and leads to dynamic and stable activity of these forces in providing health care services in their respective regions. Payment systems suitable for this level of payments are progressive payment. This means that if, for example, in a deprived geographical area in one province there is a severe need for eye surgeon and specialist and these special forces be

reluctant to attend and present their work in this area, payment policies will be on progressive basis in this area (25). In other words, if this person in a hospital treats 20% of patients during a month successfully and without referrals, 40% of the revenue made by this physician for the hospital will be paid to him/her and if he/she treats 20 to 40% of patients, 60% of the hospital's revenue will be paid to him/her. Of course, these numbers and figures are just examples and payments to these professionals, either in form of fee or insurance reimbursement follows health care policies of that area and is determined in accordance with policy maker's goals. For example, if the objective of a policymaker is that most people use the same type of health service, the type of payment introduced at this level motivates the service provider to work in dynamic and more active manner in this area.

Table 1. Advantages of implementing self-motivational Models

Items	Advantages of the Model
1	Reducing concentration of specialist workforce in big cities and increasing their presence in regions in need of specialty.
2	Making presence of young professionals and new practitioners possible in large cities due to limited payment to other professionals.
3	Reduction of induced demand in the areas enjoying services with supply-side control with respect to limited payments to service providers.
4	Public health improvement by creating positive incentives to provide the needed health services in different geographic regions of country
5	Creating justice in income distribution between the specialized forces in the field of health due to use of income control policy through restrictions on payments to service providers.
6	Creating a perfect tool to control health care market
7	Flexibility and possibility to update these approaches and handling different geographic regions at designated levels of service
8	Simple and transparent implementation and use of approaches in different geographic regions with respect to the specialists' working records in health service and insurance providing centers
9	Indirect cost reduction services available to the public through health specialized forces in different geographic regions
10	Possibility of taking advantage from these approaches for various specialized forces active in the field of health

Low efficiency in recruitment of health professionals in deprived areas caused by lack of necessary attractions in using and maintaining those forces is one of the challenges the health system is faced with. This problem has also been mentioned in performance report of Human Resources

Management office of the Ministry of Health in 2015. In this report, to resolve the current crisis posed for human health, the creation of sufficient attraction to health human resources' activities in deprived areas has been listed as a solution. Thus, the present study investigated the existing



documents and tried to provide detailed challenges and possible solutions for this issue. Since Iranian health system has no particular pattern for human resources policy making of health section and proper utilization of human resources (26), so, formulation of appropriate patterns to manage health human resources better and make use of their skills and expertise are of great importance.

Discussion

In the study by Alaedin et al. (28), on willingness of Iranian physicians to work in deprived areas and its related factors in 2005, it was concluded that about 3.4 of physicians in Iran refuse to serve in deprived and remote areas under certain circumstances; the most important conditions are income and employment relationship. Studies, researches, and surveys show that the current state of employment for physicians in different parts does not follow a specific pattern, but relies on regulations and standards, personnel or circulars prepared and presented from the Ministry of Health, Treatment and Medical Education. Ministry of Health has estimated the number of physicians based on the number of beds available in hospitals. According to the law of governmental organizations' human resources adjustment, passed by Islamic Council Parliament in 17.01.1988, Ministry of Health announced a circular to medical sciences universities on adjust hospitals' human resources, according to which the required number of physicians was declared as 10% of the total human resources of each hospital (29).

Aramaki and Shinjo (30) showed a strong correlation between distribution of human resources and providing services to patients in the health sector. However, it was reported that the number of specialist staffs is increasing in hospitals of Japan, but its distribution is still unfavorable (31). There is an improper distribution of human resources, especially nurses and physicians in China; this deficiency is mostly seen in rural areas, though uneven distribution of human resources exists in urban areas as well (32).

In Iran, the results achieved through the case study conducted by Zandi et al. (33), showed that

distribution of health resources in Ardabil province has been uneven and unbalanced. They also indicated that inequality in distribution of hospital experts' human resources in this province was significantly associated with higher rates of maternal mortality and death of children younger than one year and five years. Research results by Matsumoto et al. (34), in Japan, the US, and Britain showed that improper distribution of human resources in the health care sector can be seen in all the three countries. To solve this problem in addition to employing the egalitarian insurance system, the need for intervention by the authorities is necessary to develop a strategy and an appropriate model.

In addition, Imani et al. (35), stated in their comparative research that to achieve sustainable development goals in developing countries, special attention must be paid to appropriate distribution of skilled workforce in hospitals and other health centers. Based on Taghvayi and Shahivandi (36), it can be seen that cities of Iran don't benefit from the same level of health services' indicators and have large differences in distribution of these indicators. The most important factor contributing to unequal distribution of health services is the policy and planning that leads to concentration of activities, services, and specialists in large cities. Study results from Shahabi et al. (37), showed that the trend of expert medical personnel index ratio to 10000 population is in progress, but due to lack of proper planning and unequal distribution of facilities, this index is completely different among provinces. So that many provinces are facing a shortage of specialist physicians and simultaneously in other parts surplus of these workforces can be observed.

Conclusion

Evidences suggest that deprived areas are still faced with a shortage of skilled workforce and in addition to difficulty in attracting specialists to these regions; the possibility of keeping the existing skilled workforces has also reduced. In fact, the migration of labor from poor areas to rich prosperous areas has been an important factor in reducing the active power of deprived regions



which results in increase of deprivation and therefore attraction and retention of skilled workers becomes more difficult (38). Distribution based on the need for specialists in the field of health in different geographic regions of the country require use of methods that are mostly based on creating self-motivation in people rather than being communicated in an instructive manner. Just through this way effective performance can be expected from these specialist workforces.

Human resources' distribution (both specialist and non-specialist) has direct effect on achieving equity in health system and on the country's economy. Further, income is one of the most important factors giving motivation to manpower to work in deprived areas. Therefore, to have appropriate distribution consistent with the manpower need for health system, more economic motivators are recommended to be used. One of the most important material incentives is to use tax policy in different geographical locations; both deprived and prosperous regions. Since people's disposable income can be calculated by the relationship between personal income minus direct tax, with more income taxes, disposable income is less and with less taxes by government, disposable income is less.

The major reason to stay and be willing to work in a developed and prosperous areas and lack of desire to work in remote areas can be assigned to monetary issues. So, naturally if income benefits be reduced in developed and prosperous areas and increased in more remote and deprived areas, the workforce would be encouraged to withdraw from cities such as Tehran and other major cities to work in deprived areas. It is worth noting that most of the problems related to Tehran's traffic is due to the multiplicity of agencies and activities, abundant skilled labors and visits to this city from different parts of the country.

To encourage staff to work in deprived areas, regressive tax can be used; this means that with an increase in personal income, less tax is imposed which in turn by increased income, disposable income tax increases. Also, to force manpower out

of developed cities, progressive taxes can be applied, meaning that with higher income, higher tax is be imposed. Therefore, increase in personal income leads to higher tax which causes the disposable income less than that of the regressive tax. In addition to financial motivation strategies, strategies such as providing the necessary infrastructure in less developed regions, creating housing facilities, formulating and implementing laws regarding staffing plan, local selecting and etc. can be implemented to encourage physicians to stay in deprived areas. Appropriate law enforcement can also be applied as a solution to redistribute specialists and prevent their further concentration in provincial capitals and metropolitan area, so equity in access to health care services can be achieved.

This study was conducted systematically and investigated distribution of workforces with priority (physicians) in health service centers which can be mentioned as its strengths.

Poor distribution of other medical practitioners such as nurses, paramedics, and supporting staffs in centers is also performed in coordination with physicians and on the basis of Ministry of Health, Treatment, and Medical Training instructions. However, distribution of these forces must also be examined which has not been addressed in this study. Another weakness of this study was investigation of the issue in developing countries and developed countries were ignored.

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Conflict of interests

No conflict of interests exists

Authors' contributions

Asadi SA, Moradi R and Yarmohammadian MH designed research; Sokhanvar M, Asadi SA and Nmati A wrote the paper. Asadi SA had primary responsibility for final content All authors read and approved the final manuscript.



References

- 1) Ramadevi D, Gunasekaran A, Roy M, Rai BK, Senthilkumar SA, Senthilkumar SA. Human resource management in a healthcare environment: framework and case study. *Industrial and Commercial Training*. 2016; 48(8): 387-93.
- 2) Neutens T. Accessibility, equity and health care: review and research directions for transport geographers. *Journal of Transport Geography*. 2015; 43(0): 14-27.
- 3) Yousefi M, Akbari SA, Arab M, Oliaeemanesh A. Methods of resource allocation based on needs in health systems, and exploring the current Iranian resource allocation system. *Hakim Research Journal*. 2010; 13(2): 80-90.
- 4) Mobaraki H, Hassani A, Kashkalani T, Khalilnejad R, Chimeh EE. Equality in distribution of human resources: the case of Iran's Ministry of Health and Medical Education. *Iranian Journal of Public Health*. 2013; 42(1): 161-65.
- 5) Damari B. Study and analysis of health status: a review of human resource management of health and suggested interventions. 2012. Available from: http://hamahangi.behdasht.gov.ir/index.aspx?siteid=126&pa_geid=933.
- 6) Sadaghyani, E. Hospital management and organization. Tehran: Jahan Rayane; 1998. P. 47-8. [In Persian]
- 7) Yarmohammadian MH, Yaghoubi M, Mamikhani J, Ansary M, Karimian J, Kiani M, et al. Compiling the Basic Human Resource Indicators in Health System. *Health Information Management*. 2011; 7(Special Issue): 546-55. [In Persian]
- 8) Inoue K, Matsumoto M, Toyokawa S, Kobayashi Y. Transition of physician distribution (1980–2002) in Japan and factors predicting future rural practice. *Rural Remote Health*. 2009; 9(2): 1-9.
- 9) Carter RG. The relation between personal characteristics of physicians and practice location in Manitoba. *CMAJ: Canadian Medical Association Journal*. 1987; 136(4): 366-68.
- 10) Rivo ML, Kindig DA. A report card on the physician work force in the United States. *New England Journal of Medicine*. 1996; 334(14): 892-96.
- 11) Moscovice I. Policy approaches for improving the distribution of physicians. *Health Services Research*. 1983; 18(2): 270-74.
- 12) Vali L, Kafiantafti AR, Souresrafil A, Ata-allahi F. Affecting factors on density of general physicians and specialists in Iranian cities. *Healthcare Management*. 2014; 3(5): 7-14.
- 13) Matsumoto M, Inoue K, Farmer J, Inada H, Kajii E. Geographic distribution of primary care physicians in Japan and Britain. *Health & place*. 2010; 16(1): 164-66.
- 14) Smart DR. American medical association: physician characteristics and distribution in the U.S. 2010 1st Edition. Chicago: American Medical Association; 2010. P.1-456.
- 15) Toyabe SI. Trend in geographic distribution of physicians in Japan. *International Journal For equity in health*. 2009; 8(1): 5-13.
- 16) Productivity Commission. Australia's health workforce. Productivity Commission, Government of Australia Research Reports, SSRN Working Paper Series; 2006. P.1-435.
- 17) Kazanjian A, Reid RJ, Aplan LE, Wood LC, Pagliccia N. Issues in physician resources planning in BC: key determinants of supply and distribution, 1991-96: a report to the post-graduate medical education advisory committee; 2014. P.1-14.
- 18) Saadat S, Adhami A, Sohrabi M, Navabi K, Fakhre yaseri A, Gudarzi KH. Medical manpower planning methods and global experience. Tehran, Iran: Council Secretariat and the Special Education -Ministry of Health and Medical Education; 2009. P. 100-200. [In Persian]
- 19) Ardelan A, Fatemi R, Alaedini F. The comprehensive study of the effective factors to estimate the required number of general physician in Iran. *Proceedings of the Health Economic Congress Evaluation of Iran*; 2002 Dec 11-13; Tehran, Iran; 2002: 11-13. [In Persian]
- 20) Sadeghifar J, Pourreza A, Ahmadi B, Zeraati



- H, Arab M. Assessment of necessary staff for hospitals of Ilam university of medical sciences in accordance with personnel criteria and standards of Iranian health ministry. *Journal of Ilam University of medical Sciences* 2011; 19(1): 24-31. [In Persian]
- 21) Majdzadeh R. Family physician implementation and preventive medicine; opportunities and challenges. *International Journal of preventive medicine*. 2012; 3(10): 665-69.
 - 22) Moradi-Lakeh M, Vosoogh-Moghaddam A. Health sector evolution plan in Iran; equity and sustainability concerns. *Int J Health Policy Manag*. 2015; 4(10): 637-40.
 - 23) Esmailzadeh H, Rajabi F, Rostamigooran N, Majdzadeh R. Iran health system reform plan methodology. *Iranian Journal of Public Health*. 2013; 42(1): 13-7.
 - 24) Tian AW, Cordery J, Gamble J. Staying and performing: How human resource management practices increase job embeddedness and performance. *Personnel Review*. 2016; 45(5): 947-68.
 - 25) Yé M, Diboulo E, Kagoné M, Sié A, Sauerborn R, Loukanova S. Health worker preferences for performance-based payment schemes in a rural health district in Burkina Faso. *Global Health Action*. 2016; 9(1): 29103. doi: <http://dx.doi.org/10.3402/gha.v9.29103>.
 - 26) Khiavi FF, Maleki MR, Djafarian K, Vatankhah S, Tabibi SJ. A model for policy making in human resources for health sector Iran. *Research Journal of Biological Sciences*. 2010; 5(5): 380-388.
 - 27) Ahmadi AM, Assari A, Yousefi M, Fazaeli S, Maleki B. Proposing a need-based model to distribute professional human resources in health sector using benchmarking of various tax systems. *Hakim Research Journal*. 2012; 15(3): 221-28. [In Persian]
 - 28) Alla-Eddini F, Fatemi R, Ranjbaran Jahromi H, Asghari E, Eskandari SH, Ardalan A, et al. Iranian physicians' willingness to work in underserved areas and related factors in 2001. *Razi Journal of Medical Sciences*. 2004; 11(40): 247-55. [In Persian]
 - 29) Educational Affairs, Information department. Ministry of Health and Medical Education (MOHME). Available from URL: <http://dme.behdasht.gov.ir/>.
 - 30) Shinjo D, Aramaki T. Geographic distribution of healthcare resources, healthcare service provision, and patient flow in Japan: a cross sectional study. *Social Science & Medicine*. 2012; 75 (11):1954-63.
 - 31) Kobayashi Y, Takaki H. Geographic distribution of physicians in Japan. *The Lancet*. 1992; 340(8832): 1391-93.
 - 32) Anand S, Fan VY, Zhang J, Zhang L, Ke Y, Dong Z, et al. China's human resources for health: quantity, quality, and distribution. *The Lancet*. 2008; 372(9651): 1774-1781.
 - 33) Zandian H, Ghiasvand H, Nasimidoost R. Measuring of inequity in healthcare resources: a pilot study. *Payesh*. 2012; 11(6): 799-805. [In Persian]
 - 34) Matsumoto M, Inoue K, Farmer J, Inada H, Kajii E. Geographic distribution of primary care physicians in Japan and Britain. *Health & Place*. 2010; 16(1): 164-66.
 - 35) Imani R, Asefzadeh S, Mamikhani J. A comparative study of the health workforce in countries of the eastern mediterranean (2007-2008). *Qazvin University of Medical Science Journal*. 2010; 15(4): 6-12. [In Persian]
 - 36) Taghvaei M, Shahivand A. Distribution of health care in Iran cities. *Social welfare journal*. 2010; 10(39): 33-54. [In Persian]
 - 37) Shahabi MA, Tofighi SH, Maleki MR. The nurse and specialist physicians manpower distribution by population and its relationship with the number of beds at public hospitals in Iran's 2001-2006. *Journal of Health Administration*. 2010; 13(41): 7-14.
 - 38) Wilson NW, Couper ID, De Vries E, Reid S, Fish T, Marais BJ. Inequitable distribution of health care professionals to rural and remote areas. *Rural and Remote Health*. 2009; 9(2): 1060.