



## **Equality in Distribution of Human Resources: the Case of Iran's Ministry of Health and Medical Education**

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### **Abstract**

**Background:** Background: Equity in access to and utilization of health services is a common goal of policy-makers in most countries. The fair allocation of human resources is one of the dimensions of equity, which was evaluated in this study.

**Methods:** We evaluated the equity of human resources' distribution among Iran's medical science universities between 2005 and 2009 by inequality measures including Lorenze curve, Gini coefficient and Rabin hood indexes.

**Results:** In the distribution 60403 recruitment licenses among medical universities with 72456140 covered populations, Gini coefficient was 0.167 and Robin Hood Index 0.11.

**Conclusions:** Calculations indicated Recruitment licenses are equitably distributed in MOH&ME of Iran. However a portion of recruitment licenses should redistributed for achieving perfect equal distribution among all public medical universities of Iran.

**Keywords:** Human Recourse, Distribution, Inequality, Lorenz curve, Iran

### **Introduction**

Nowadays equity in health sector and removing inequity is one of the most important concerns of health systems the entire world (1). One of the important measures in resource allocations and access to healthcare services is equity which has been emphasized in Alma-Ata "health for all up to 2000" conference (2). Inequity is the existence of potentially correctable differences among population groups defined socially, economically, or geographically (3).

A handful of the big actually of a health system is the capacity of providing adequate and timely ser-

vices that recent attention has focused on it (4). In the developing countries, a key limiting factor in implementing health policies and health reforms is the shortage of qualified human resources for delivering health care (5). It means that most of the times there are enormous gaps between the potential of health systems and their actual presentation. The studies proved that optimistic health outcomes are directly depends on the density of the health workforce. But often there are too many inequities in the dispersing healthcare staff between countries and within countries. For exam-

ple, “in most developing countries, the health workforce is concentrated in the big towns and cities, while rural areas can only boast of about 23% and 38% of the country's doctors and nurses respectively (6). Developed countries expose the matter, too; dealing with health inequalities is high on the UK Government agenda (7). Also, the studies show there are some problems in physicians’ distribution in America, Japan, Australia and Canada, too (1). Portugal still presents inadequate results in terms of health care equity. The uneven geographic dispersing health care human resources have been identified as a factor contributing to these persistent inequities (8). Virtually all OECD countries face an uneven geographical distribution of physicians (9).

In Iran, Ministry of Health and Medical Education (MOH&ME) allocates a number of recruitment licenses among 41 health and medical science universities all over the country, annually. The universities based on the licenses are permitted to employ any kind of permanent workforce for their covered hospitals and the other facilities. In this study we evaluated the equity of this distribution in 2005 to 2009 (which more than 60000 recruitment licenses were distributed) by inequality measures (10).

Although some studies in Iran have examined the equity of some health human resources like physicians and nurses, no research has been done on the distribution of all human resources in public sector of the country. The results of this study give an overview of equity in human resources allocation and would help policy makers and MOH&ME planners.

## Materials and Methods

This study was an applied, cross-sectional and retrospective study. The survey was conducted among all medical sciences university’s affiliated to the Iran’s Ministry of Health and Medical Education (MOH&ME) .

The main variable was the distributed licenses for recruitment between MOH&ME universities during 2005-2009 as a whole and years 2005, 2007 and 2009 partially. Recruitment licenses were ex-

tracted from MOH&ME human resource’s database (10). Estimations for the tribe unperceivable by additional universities of MOH&ME was plagiarized through Iran Statistics Center (11).

For measuring equality or inequality in the distribution of recruitment licenses, due to the impossibility of using raw numbers of recruitment licenses, first the recruitment licenses ratio to the population during the study years were calculated. Then Gini was computed to determining inequality level and plotted relative inequality Lorenz curve indexes. Finally, using the Robin Hood index determined what percentage of the recruitment licenses should be redistributed if the perfect equal distribution is considered.

To draw the Lorenz curve, the aggregate dissemination function of funds and capital computed by ascending arrangement of individual’s financial holdings. By definition, the Gini coefficient is equals to the space between Lorenz curve and the 45 degree line fraction to the total area under the 45 degrees line (12).

Coefficient or Gini index is the most important indicators to measure the balance of the distribution of income or wealth in society, developed by the Italian statistician and sociologist Corrado Gini. The Gini is fit immigrant the affiliated Lorenz curvature. It is barely acceptable to the extent between zigzag curve and the party of uncompromised issuance equality. The Gini has a consideration between zero and one. The Gini coefficient between 0.2 to 0.35 means the distribution is relatively balanced is between 0.35 to 0.5 means the comparatively unequal distribution and the index between 0.5 to 0.7 shows very uneven the distribution (13, 14).

In the Health system, in the Gini coefficient as a measure of inequality is worn in the health services, resources or health care costs in the population (15).

The Gini coefficient can be figure with another formula. In this study below formula was used:

$$G = \frac{n+1}{n} - \frac{2 \sum_{i=1}^n (n+1-i)x_i}{n \sum_{i=1}^n x_i}$$

Where G, is Gini Coefficient; n, is number of classification; xi, is under study versatile (16).

The Robin Hood index is some other measure of the inequalities of income distribution. It ranges from 0 (perfect equality) to 1 (perfect inequality) and is calculated from the Lorenz curve associated. It is the supreme vertical distance between that curve and the line of perfect equality. This space shows how much income if transferred of wealthier people to poorer to reach the equality (17).

## Results

Ministry of Health and Medical Education distributed 60403 recruitment licenses between 41 Medical universities with 72456140 covered population between 2005-2009. Results shows that recruitment licenses to covered population ratio in 2005 and 2007 year was similar equal to 0.02, but this ratio decreased to 0.009 in 2009. Averagely between 41 universities the lowest ratio between studied years belongs to respectively Iran, Shahid Beheshti and Tehran universities with 0.048; 0.059 & 0.061 values and the highest ratio is pertained to Gonabad, Fasa and Jahrom universities respectively with 0.191; 0.178 and 0.158 values that are part of underserved universities. During 2005-2009, an average recruitment license to covered population ratio is 0.1 and Gini coefficient is 0.167. Robin Hood Index in this distribution is 0.11. Completely 11% of recruitment licenses should be redistribution.

**Table 1:** The distribution of recruitment license in MOH&ME of Iran between 2005-2009 by Gini coefficient & Robin Hood Index

|   | 2005    | 2007    | 2009     |
|---|---------|---------|----------|
| Covered Population                              | 6998822 | 7264705 | 74733229 |
| Recruitment license                             | 14062   | 13311   | 6397     |
| Recruitment license to Covered Population ratio | 0.022   | 0.022   | 0.009    |
| Gini coefficient                                | 0.15    | 0.19    | 0.21     |
| Robin Hood Index                                | 10 %    | 13%     | %15      |

## Discussion

Based on Gini coefficient and Robin Hood indexes calculations Recruitment licenses are equitably distributed in universities of Iran MOH&ME of Iran. However considering to Robin Hood index, In order to achieve perfect equal distribution of Recruitment licenses in all universities of Iran MOH&ME approximately 11 % of recruitment licenses should be redistributed from over served to underserve universities .

The findings of research about The Nurse and Specialist Physicians Manpower Distribution in Iran's between 2001- 2006, are relatively close to ours findings. It graphed Lorenz Curve and calculated Gini index during above years for specialist (0.08, 0.08, 0.09, 0.03, 0.09 and 0.05), nurses (0.02, 0.02, 0.0094, 0.0002 and 0.0007) that has been adhered in Iran's public hospitals. These findings are relatively close to ours findings (1).

The study on determining equalities in the dissemination of physicians worked on rural primary care in Greece and Albania concluded unequal distribution. The Gini and Robin Hood index for distribution of these physicians in these countries was 0.154 and 11.2%, which shows for decreasing inequality, approximately 173 physician should be allotment. Although in this research these figures were adjusted with mortality and consultation rates but inequality in general practitioners' distribution was significant in Albania during 2000 to 2004. Figures of Gini and Robin Hood indexes of Theodorakis et al study is close to related figures of MOH&ME of Iran (18).

Reviewing health inequalities in Thailand described geographic distribution of medical workers in the provinces and found inappropriate distribution of medical personnel in Thailand, especially physicians with calculating Gini index (0.433) that shows that this distribution is worse than MOH&ME of Iran (19). Measuring fairness in the allocation of health staff in Tanzania showed Gini coefficient for Tanzania health workers distribution (0.225) and it resulted in significant inequalities between country and civic and also inner cities districts. As whole we can

conclude that distribution in Iran's MOH&ME was more equitable than Tanzania but the important issue that differ their study from this study is considering the difference of distribution between rural and urban districts (20).

Same studies Turkey plotted unbalanced distribution of health workers and necessity for better health workers planning. In this article implied the considerable issues of redistribution indexes that are desire, need, population, target and workload. This article presents useful implications for redistribution of recruitment licenses in Iran's MOH&ME (21). Geographic allotment of physicians in Taiwan for the years 1984 to 1998 according to Gini coefficient were not improved and increasing the number of medical workforce in this country will improve geographic distribution (22).

The fairness in the distribution of recruitment license in 2009 depends on the kind of licenses distributed in that special year. There were two kinds of licenses which MOH&ME distributed in the mentioned period: one instead of retires and another according to some indicators like the number of population covered by university, its unemployed posts, etc. The year 2009 was the only year (of the mentioned period) which the first kind of licenses because of some regulations was allocated to the universities. Furthermore, that year's circumstance is different from previous years, so comparison was not very acceptable.

## Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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The authors declare that there is no conflict of interest.

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