

Cost Efficiency of the Family Physician Plan in Fars Province, Southern Iran

Nahid Hatam¹, PhD; Hassan Joulaei², Pharm D, MPH; Yalda Kazemifar³, MSc; Mehrdad Askarian⁴, MD, MPH

¹Department of Health Management, School of Management and Information Sciences, Shiraz University of Medical Sciences, Shiraz, Iran;

²HIV/AIDS Research Center, Building No. 2, Shiraz University of Medical Sciences, Shiraz, Iran;

³Office of Health System Research, Jahrom University of Medical Sciences, Jahrom, Iran;

⁴Department of Community Medicine, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Correspondence:

Mehrdad Askarian, MD, MPH;
Department of Community Medicine,
School of Medicine,

Karimkhan-e-Zand Avenue,
P.O.Box: 71345-1737, Shiraz, Iran

Tel: +98 917 1125777

Fax: +98 711 2354431

Email: askariam@sums.ac.ir

Received: 25 January 2012

Revised: 22 April 2012

Accepted: 28 April 2012

Abstract

Background: In recent years use of family physicians has been determined as a start point of health system reform to achieve more productive health services. In this study we aimed to assess the cost-efficiency of the implementation of this plan in Fars province, southern Iran.

Methods: This cross-sectional descriptive study was done in 2007 in 18 provincial health centers as well as 224 rural health centers in Fars province. Data were collected using forms, statistics, and available evidence and analyzed by expert opinion and ratio techniques, control of process statistics, and multi indicator decision model.

Results: Although in the family physician plan more attention is paid to patients and the level of health training, availability, and equity has improved and the best services are presented, it has not only decreased the costs, but also increased the referrals to pharmacies, laboratories, and radiology clinics and the costs of healthcare.

Conclusion: Although the family physician plan has led to more regular service delivery, it has increased the patients' referral to pharmacies, laboratories, and radiology centers and more referrals to family physicians. It seems that the possibility of setting regularity in health system can be gained in the following years of the family physician program mainly via planning, appropriate management and organizing correct health plans according to need assessments, and continual supervision on activities, which would happen according to current experiences in this plan.

Please cite this article as: Hatam N, Joulaei H, Kazemifar Y, Askarian M. Cost Efficiency of the Family Physician Plan in Fars Province, Southern Iran. *Iran J Med Sci.* 2012;37(4): 253-259.

Keywords • Health care system • Community health • Cost-benefit

Introduction

The world health organization (WHO) has defined three goals for an ideal health system; providing health with an acceptable standard, ideal responsiveness, and establishing equity between families in financing health services.¹ Despite the presence of multiple differences among health systems in different countries, health systems encounter similar challenges in achieving these goals.² One of the most important challenges is the rapid increase of health care costs in recent years.^{2,3} The increased incidence of chronic diseases leads to higher healthcare costs and at the same time affects the development and use of technology and causes various problems for insurance markets.^{4,5}

There is no significant correlation between increased healthcare

costs and longer life expectancy, better quality of care, or better health effects.^{3,5-8} Therefore, many considerable strategies were suggested for decreasing healthcare costs.⁸ In addition to increased health care costs, health systems are exposed to some other challenges such as the imbalance between the health division's share of the country's gross domestic product (GDP) and potential expectations from the health system.^{1,9}

According to WHO recommendations and emphasis on primary health care (PHC),⁵ most health investments have been allocated to PHC to improve health outcomes and equity worldwide.⁹ Accordingly, the development of healthcare through accessibility as a universal concept must be carried for local settings with respect to their socioeconomic situation.¹⁰

Family physicians play an essential role and act as a communicational bridge between people and health care system in providing health care services efficiently, and equitably.^{9,11-13} The application of family physician plan has been determined as a start point of health system reform to achieve faster and easier service to patients. Hence, in 2005 the family physician plan was implemented in Iran.¹

Few years after the implementation of this program in Iran, the patients' burden, the average amount of drugs prescribed, and the number of paraclinical tests have increased exponentially.¹⁴ Whether this program has improved the health indices or the general accessibility to health services is not clear. We aimed to assess the cost efficiency of the implementation of the family physician plan in Fars province, southern Iran.

Subjects and Methods

This cross-sectional descriptive study was conducted in all target populations of rural areas of Fars province in 2007 using a data collection form. Rural centers which were under the insurance coverage of family physician plan in 2005 were included.

The data collecting form consisted of two main parts: the first part was related to the data which could be retrieved from the 40 available variables in mentioned centers during 2004-2006. The variables consisted of: 16 variables for the Coordinating Unit, 14 for the Family Health Unit, 9 for the Disease Prevention Unit and 6 for the Environmental and Occupational Health Unit. Data were collected and compared according to indices and health costs between 2004 (before the implementation of the family physician plan) and 2006 (one year after the national implementation of the plan). The second part of the data collection form was about the costs of the studied health centers.

With respect to health index verification in the study units (also known as the health network) and the huge number of these units in this study, we applied the multi indicator decision model (MADM) as a multivariable model. In this model, health networks were separately ranked according to the four health units (Coordinating Unit, Family Health Unit, Disease Prevention Unit and Environmental and Occupational Health Unit) and the cost and number of staff in each year (2004 and 2006). The ranking was done using the Shannon's entropy and simple additive weighting (SAW) techniques.¹⁵

In this method, the matrix of health indicators was designed separately for each health network and health unit. Since the scales of index metering are different from each other (for instance percent against number) the normalization method was used for assimilating the indicators to cause non-scaling by using the following equation, where P is the normalized indicator and r_{ij} is the indicator:

$$P_{ij} = \frac{r_{ij}}{\sum_{i=1}^m r_{ij}}$$

In the next stage, the relative importance or predominance degree of each index in decision making was determined by Shannon's entropy technique, as follows: where E is the probability distribution of normalized indicator and K is: $-1 / \ln m$ (m =sample size)

$$E_j = -k \sum_{i=1}^m (p_{ij} \times \ln p_{ij})$$

Then, the degree of deviation from information was calculated for each indicator, as follows:

$$d_i = 1 - E_j$$

And at the end, the following equation was used for giving weight to indicators, where W is the weight of indicator:

$$W_j = \frac{d_j}{\sum d_j}$$

After determining the weight of each indicator for each health network in order to rank the relevant units in each network, SAW technique was used and similar units among different networks were ranked by using this equation:

$$A = \left\{ A_i \mid \max \sum w_j r_{ij} \right\}$$

According to this ranking, it is possible to determine the status of each health network. By continuing this method for comparing all networks with each other in which the annual cost and staff number are indicators, the study units (health networks) are ranked on the health indicators' point of view in comparison with expending costs and staff numbers.

In this study, the research community consisted of all health centers (23 counties and 224 rural centers) affiliated to Shiraz University of Medical Sciences, Shiraz, capital of Fars province (table 1).

Since some centers such as Farashband, Khonj, Mohr, Pasargad, and Enghelab were merged in other centers in 2004, in order to compare their costs and health indicators in 2006 with 2004, the merged information was taken into account. Therefore, the total number of health centers was decreased to 18.

Results

The results of this study are presented according to Coordinating, Family Health, Disease Prevention, and Environmental and Occupational Health units during 2004 to 2006, before and after performing the family physician plan.

Data analysis revealed that indicators in Coordinating Units have increased substantially in 2006 compared with that of 2004. The highest increment was detected in the city of Arsenjan with a 43108.8% increase since 2004 and the

least was detected in Khorambid with a 82.82% increase since 2004 (table 1). Among the investigated units, the highest increase in indices was related to the Coordinating Units.

Moreover, in Family Health Units, the studied indices grew in all the health networks in 2006 compared with the baseline. The highest increase was detected in Firoozabad and Farashband with a 2520.7% increase and the lowest value was detected in city of Abade with 44.85% increase from the baseline in 2004.

We found a significant difference between the increase in indices in cities such as Shiraz, Marvdasht, Kazeroon, Mohr, and Lamerd with other cities such as Khorambid and Arsenjan. The most significant difference before and after the implementation of the program was found in Firoozabad (figure 1).

The comparison of Disease Prevention Units before and after the family physician plan showed that 73% of investigated health networks in 2006 had a better performance compared with 2004. The most significant increase was related to Mamasani (207.75%) and the least significant one was associated with Kazeroon (11.48%).

In Environmental and Occupational Health Units a better performance was seen in 28% of health networks such as Shiraz in 2006 compared with 2004. The highest increase was detected in Zarindasht (120.74%) and the lowest was detected in areas such as Mohr and Lamerd (4.24%) from the baseline in 2004.

The highest average of change among the

Table 1: Comparison of the average percent change in health unit indices and the cost of each percent change

County	Coordinating Unit	Family Health Unit	Disease Prevention Unit	Environmental Health Unit	Total costs	Total change	Cost of each percent change (\$US)
Abadeh	93.14	44.85	20.02	16.23	198.52	46.63	22.13
Arsenjan	43108.8	57.53	97.97	17.31	331.20	109.12	14.96
Estahban	224.2	78.54	-1.78	11.43	27.54	81.98	0.89
Eghlid	220.99	118.04	38.51	52.52	253.54	110.11	6.69
Bavanat	117.21	85.64	23.45	15.48	121.78	65.96	14.02
Khorambid	82.82	175.39	-1.28	7.33	-5.76	82.64	-1.70
Darab	266.24	611.37	33.65	68.45	208.22	290.17	56.86
Zarindasht	429.41	438.5	152.28	120.74	151.47	316.64	44.76
Sepidan	177.37	59.32	149.19	19.66	22.04	100.27	4.28
Shiraz	328.52	103.2	88.27	9.84	222.72	138.29	196.22
Firoozabad & Farashband	419.56	2520.72	102.88	32.68	345.49	1011.71	68.11
Ghirokarzin	824.6	332.39	43.6	17.85	107.39	330.88	27.61
Kazeroon	106.7	68.83	11.48	15.35	115.05	54.4	48.41
Khonj & Lar	539.7	168.52	50.2	5.21	413.49	203.56	142.33
Mohr & Lamerd	423.18	593.24	51.99	4.24	465.36	324.7	107/45
Marvdasht & Pasargad	174.65	182.69	23.48	11.71	7643	114.28	42.50
Mamasani	584.72	138.71	207.75	44.81	10.67	264.57	4.99
Neyriz	295.4	313.07	90.71	87.5	128.92	220.61	44.04
Average	2689.8	338.36	74.08	30.9	188.22	269.36	909.72

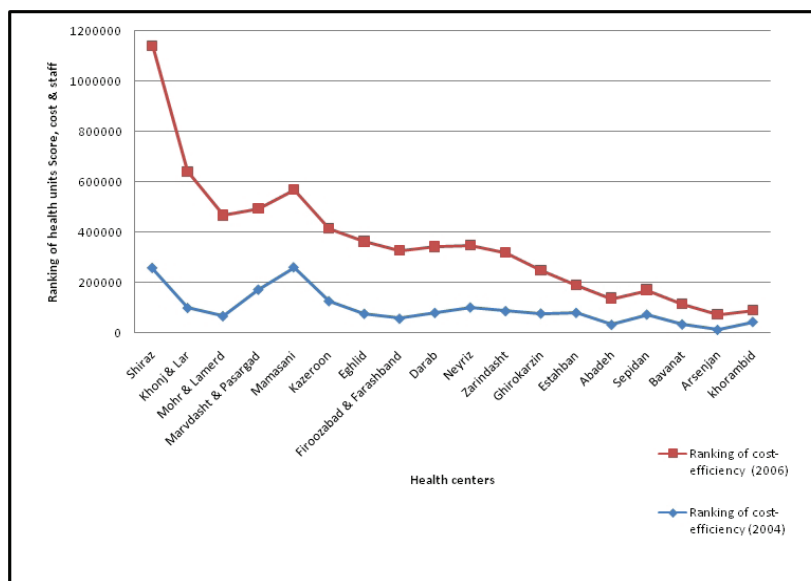


Figure 1: This figure shows the comparison of the cost efficiency of the family physician plan among the health networks of Fars province. The vertical line depicts the ranking of health units score of the studied health networks outputs (health indices) and inputs (cost and number of staff) to calculate efficiency.

studied health networks belonged to Mohr and Lamerd (324.7%) and the least change was seen in Kazeroun (54.4%).

The comparison of cost per each percent of index change showed that the highest amount belonged to Shiraz with 123,486,415 Rials (approximately \$13,393) and the least amount belonged to Khorambid with 922,470 Rials (approximately \$100) reduction in costs. Arsanjan had the highest total percentage of change among the cities and the lowest cost per each percentage of change (figure 2).

In spite of the increase in performance indices in the four studied units, in all the province's health networks, the costs of health care services after performing family physician plan have had a

154.67% increase on average. The comparison of cost efficiency during the two time points of the study showed that in 78% of health networks, the cost efficiency had further reduced in 2006 compared with year 2004.

Discussion

Several factors affect the performance of health systems such as lack of technical efficiency because of an inappropriate and ineffective management, organization, and payment system which results in low motivation, low quality of services, and limited access.¹⁶

We found that after the implementation of the family physician plan, the healthcare costs have

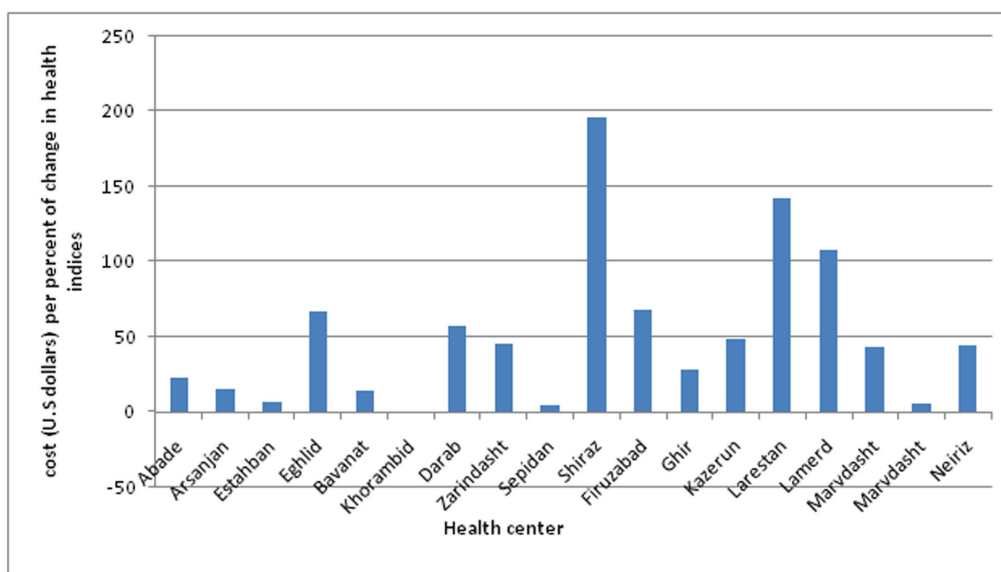


Figure 2: This figure shows the comparison of the relative efficiency cost per each percent change in health indices in the health networks after performing the family physician plan.

increased by 154.67% in all health networks in Fars province. This can be resulted from the increase in direct and indirect costs in the form of rural insurance funds for each network.

Considering the necessity of cost reduction in the health system, Evans and colleagues concluded that expending more costs did not necessarily lead to better health outcomes.⁸

Davise and co-workers also stated that the reduction of extra costs, investment for improvement of access and equity, and focusing on PHC are among the strategies that can substantially increase the efficiency.³

In all health networks in Fars province, the number of referrals to family physicians increased to an average of 222.45%. This is mainly because of increased number of physicians and improved access to physicians in rural areas. Although this can be interpreted as a beneficial point, it can also mean more unnecessary physician visits and the over-referral of patients by physicians because of the advantages of rural insurance system. According to a report by the Health Deputy of Shiraz University of Medical Sciences, 37% of patients referring to physicians for their complaints could be treated by assistant physicians with no need for the physician's intervention.¹⁷ Therefore, the establishment of policies to design a more efficient surveillance system for evaluating the physicians' performance seems inevitable.

Atune and colleagues implied that using general physicians as gatekeepers could lead to increased accessibility to services, equity, improved physician-patient relationships, increased responsiveness of the healthcare staff, and improved effectiveness.⁹

The ratio of direct referral numbers to physician visits decreased from 0.85 in 2004 to 0.81 in 2006; however, this reduction is not significant and mainly indicates lack of improvements in our referral system.

Gross and co-workers found considering family physicians as gatekeepers for referral to specialists might result in improved management and coordination in patient care and also affect the cost control.¹⁸ Frank and colleagues concluded that an efficient referral system might lead to cost reduction and an inappropriate referral could damage the quality of care.¹⁹

Moreover, the referral per each visit by the doctor to the pharmacies increased from 0.5 in 2004 to 1.2 in 2006 and also the burden of referral to laboratories increased from 0.09 in 2004 to 0.22 in 2006. Although physicians are not allowed to prescribe more than 2-3 types of drugs per visit and order laboratory tests in more than 10% of all visits, it can yet increase the direct costs of health.

With respect to family health, a considerable

increase was seen in pregnant women's referrals from health houses by physicians (152.2%), gynecological care by obstetricians (190.5%) as well as pregnant women's visits (70.11%), breast examinations (158.3%), insertion of intrauterine devices (16.14%), and pop smear requests (89.79%). This increase was because of adequate and proper access to obstetricians and establishment of necessary equipments and facilities.

Yaghoobi and colleagues indicated that creating family planning files, providing necessary education, providing access for all people and giving the correct consultation to women by health staff, could be the effective steps for accomplishment of population policies and fertility health plans.²⁰

As mentioned earlier, the family physician plan in Iran was established to increase the efficiency and effectiveness of the health system and easier accessibility of rural areas to health services. Stang and Yaen mentioned that the family physician's ability to provide a long term relationship with patients can improve the quality of outcomes and their satisfaction of PHC in spite of decreased use of resources.¹¹ However, our study shows that the family physician plan increased the costs and the rate of resources and cannot completely satisfy people and increase the quality desirably because of the inappropriate referral system.

Our study showed that the family physician plan has improved the health system. The number of people participating in educational meetings, consultations for family planning, and pop smear tests has increased significantly. However, some health networks show a decrease in the mentioned indices because of the lack of adequate access to physicians and obstetricians or the indifference of health personnel in service providing. Special attention should be paid to the service quality and patient satisfaction in order to improve health and preventive services and reduce health costs.^{21,22}

Furthermore, Mohanty and Hatam, in two different studies, implied that one of the most effective ways to achieve better outcomes while using fewer resources is total quality management that can manage the costs and emphasize on client satisfaction.^{23,24}

We must state that currently 70% of the family physician's salary is being paid at the end of each month. The remaining 30% is paid at the end of each season and furthermore their performances are constantly monitored by experts and specialist teams.

Altogether the comparison of cost efficiency among networks in 2006 and 2004 indicates that cost efficiency in most health networks has decreased after the implementation of the

family physician plan. However, among health networks, the cost efficiency increased in Khonj and Lar, Mohr and Lamerd, and Arsanjan after the deployment of the plan. The increase in cost efficiency in Arsanjan in 2006 was not significant compared with 2004.

Conclusion

Although the family physician plan has led to better and more regular service delivery and has better equipped the health centers, this plan has resulted in increased referrals to pharmacies, laboratories, and radiology centers and more referrals to family physicians. It appears that the possibility of regulations can be set in the health system in the following years of the family physician program. This aim can mainly be achieved through planning, appropriate management, and organizing correct health plans according to need assessments and at the same time, continual and principal supervision on activities which would happen according to current experiences regarding the family physician program.

Acknowledgement

This research was performed by Ms. Yalda Kazemifar in partial fulfillment of the requirements for obtaining an MSc in Health Administration at Shiraz University of Medical Sciences. This article is the result of a research project (87-4032) approved by the Deputy of Research of the aforementioned university. Also, we thank Mr. Erfan Kharazmi, PhD student of Health Administration for his help in data analysis, and all health-care workers of Shiraz University of Medical Sciences who helped us with data collection. We would like to express our special appreciation to the respected Health Chancellor who not only provided financial support, but also showed his interest in solving difficulties.

Conflict of Interest: None declared

References

- 1 National unit of reform of health system. The statutes of family physician and reform system. Tehran: Andishmand publication; 2005. 3-7 p. [In Persian]
- 2 Civil unit of reform of health system. Regulation of referral and family physician system. Tehran: Andishmand publication; 2005. 7-22 p. [In Persian]
- 3 Davis K, Schoen C, Guterman S, Shih T, Schoenbaum SC, Weinbaum I. Slowing the growth of U.S. health care expenditures: what are the options? *The Commonwealth Fund*. 2007;47:1-34.
- 4 Roberts MJ, Hsiao W, Berman P, Reich MR. *Getting Health Reform Right: A Guide to Improving Performance and Equity*. New York: Oxford University Press, Inc; 2003.
- 5 Huber M, Orosz E. Health expenditure trends in OECD countries, 1990-2001. *Health Care Financ Rev*. 2003;25:1-22. PubMed PMID: 14997690.
- 6 Poorreza A. *Health economics for developing countries*. Tehran: Management and planning research and education institute; 2004. p. 7-40. [In Persian]
- 7 Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff (Millwood)*. 2004;W4-184-97. PubMed PMID: 15451981.
- 8 Evans DB, Tandon A, Murray CJ, Lauer JA. Comparative efficiency of national health systems: cross national econometric analysis. *BMJ*. 2001;323:307-10. doi: 10.1136/bmj.323.7308.307. PubMed PMID: 11498486; PubMed Central PMCID: PMC37316.
- 9 Atun RA, Kyratsis I, Jelic G, Rados-Malicbegovic D, Gurol-Urganci I. Diffusion of complex health innovations--implementation of primary health care reforms in Bosnia and Herzegovina. *Health Policy Plan*. 2007;22:28-39. doi: 10.1093/heapol/czl031. PubMed PMID: 17237492.
- 10 Van Weel C, Sparks B. Caring for people's health around the world: a family physician for every community. *Fam Med*. 2007;39:616-7. PubMed PMID: 17932792.
- 11 Stange KC, Jaén CR, Flocke SA, Miller WL, Crabtree BF, Zyzanski SJ. The value of a family physician. *J Fam Pract*. 1998;46:363-8. PubMed PMID: 9597993.
- 12 Strasser R. Rural health around the world: challenges and solutions. *Fam Pract*. 2003;20:457-63. doi: 10.1093/fampra/cm422. PubMed PMID: 12876121.
- 13 Siddiqi S, Kielmann A, Khan M, Ali N, Ghaffar A, Sheikh U, et al. The effectiveness of patient referral in Pakistan. *Health Policy Plan*. 2001;16:193-8. doi: 10.1093/heapol/16.2.193. PubMed PMID: 11358921.
- 14 Vice chancellors of Health. Reports of family physician's plan of Fars province's rural zones. Shiraz: Shiraz University of Medical Sciences; 2004. 1-6 p. [In Persian]
- 15 Asgharpour MJ. *Multiple Decision Making*. Tehran: Tehran University Publications; 1998. p. 34-40. [In Persian]
- 16 Karimi I. *Health economics*. Tehran: Gap Publication; 2004. p. 42. [In Persian]
- 17 Foadband M, Eshaghi F. Survey of referee to family physician in Shiraz-Iran. Shiraz: Health Center. 2009. p. 28. [In Persian]

- 18 Gross R, Tabenkin H, Brammli-Greenberg S. Who needs a gatekeeper? Patients' views of the role of the primary care physician. *Fam Pract.* 2000;17:222-9. doi: 10.1093/famppra/17.3.222. PubMed PMID: 10846139.
- 19 Franks P, Zwanziger J, Mooney C, Sorbero M. Variations in primary care physician referral rates. *Health Serv Res.* 1999;34:323-9. PubMed PMID: 10199678.
- 20 Yaghoobi A, MohammadZadeh H, Barzgar M, Sadr K, Amini A. Knowledge, Attitude and Practice of Women in Need of family Planning Services. *Medical Journal of Tabriz University of Medical Sciences.* 2003;59:124-7. [In Persian]
- 21 Sajid MS, Baig MK. Quality of health care: an absolute necessity for public satisfaction. *Int J Health Care Qual Assur.* 2007;20:545-8. doi: 10.1108/09526860710819477. PubMed PMID: 18030971.
- 22 Hatam N. The role of Data Envelopment Analysis (DEA) pattern in the efficiency of social security hospitals in Iran. *Iran Red Crescent Med J.* 2008;10:211-7.
- 23 Mohanty RP, Santhi K, Haripriya C. A model for evaluating TQM effectiveness in health-care systems. *Work Study.* 1996;45:14-7. doi: 10.1108/00438029610110384.
- 24 Hatam N, Moslehi Sh, Askarian M, Shokrpour N, Keshtkaran A, Abbasi M. The Efficiency of General Public Hospitals in Fars Province, Southern Iran. *Iran Red Crescent Med J.* 2010;12:138-44.