RESEARCH ARTICLE

Factors associated with induced demand for services in Iran's healthcare system [version 1; peer review: 1 approved]

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V1 First published: 02 Jul 2018, 7:978
<https://doi.org/10.12688/f1000research.14377.1>

Latest published: 02 Jul 2018, 7:978
<https://doi.org/10.12688/f1000research.14377.1>

Abstract

Background: One of the most important subjects in health economics and healthcare management is the theory of induced demand; that is, caring for or providing and selling unnecessary services to users of healthcare systems, which is accompanied by the exercising of power by the service providers.

Methods: This study was performed on physicians, nurses, and laboratory and radiology technicians working in Medical Science universities. Random sampling was conducted from five areas: the center, north, west, east and south of Iran. Data were gathered by a questionnaire, with a Cronbach's alpha of >0.7, consisting of nine dimensions on existence of induced demand and its associated factors.

Results: The results showed that overall, 65.2% of the participants agreed with the existence of induced demand. Chi-squared test showed there was no difference in the level of induced demand between the regions of the country, education level and occupation. However, there was a significant difference in terms of gender ($P < 0.005$). The Kruskal-Wallis test indicated a significant relationship between the associated factors and induced demand ($P < 0.005$).

Conclusions: Results showed that induced demand was influenced by factors including service recipients' awareness, personal benefits of service providers, the extent they cared about health, supervision of insurance companies, industrialization of the health sector, diversity and increased number of trained experts and the quality of methods

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1. Hanna Tiirinki , National Institute for Health and Welfare (THL), Helsinki, Finland	
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of training the service providers. Therefore, policymakers and planners should consider raising awareness of health service recipients, supervising insurance companies, reforming teaching methods, social culture making and changing the beliefs of society.

Keywords

Induced demand, Healthcare services, Hospital, Healthcare system

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Author roles: **Mahmoudi G:** Conceptualization, Supervision, Validation, Writing – Original Draft Preparation, Writing – Review & Editing; **Roohi G:** Data Curation, Writing – Original Draft Preparation; **Asadi M:** Data Curation, Writing – Original Draft Preparation; **Rasooly Kalamaki F:** Data Curation, Writing – Original Draft Preparation; **Abam S:** Data Curation, Writing – Original Draft Preparation; **Khojamli M:** Data Curation, Writing – Original Draft Preparation; **Abdi Talarposhti M:** Data Curation, Writing – Original Draft Preparation

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

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How to cite this article: Mahmoudi G, Roohi G, Asadi M *et al.* **Factors associated with induced demand for services in Iran's healthcare system [version 1; peer review: 1 approved]** F1000Research 2018, 7:978 <https://doi.org/10.12688/f1000research.14377.1>

First published: 02 Jul 2018, 7:978 <https://doi.org/10.12688/f1000research.14377.1>

Introduction

The provision of healthcare services is faced with serious challenges due to economic factors such as the adequacy or lack of financial resources, access to technology and medical equipment, and social determinants of health¹. Adverse selection, moral hazard and induced demand are three important phenomena that affect patients' behavior². Among these, induced demand is an issue that economists consider to have side effects and to affect interactions between patient and physician. Economic transactions generally involve two parties, a seller and a buyer. However, demand from patients (as buyers) in the health sector is mediated by other factors (i.e. physicians and sometimes healthcare agencies³). In fact, induced demand is defined as inducing caring for or providing and selling unnecessary services to clients of healthcare system that is accompanied with exercise of power by the service providers. This may result in providing services that do not have a positive impact on the health of the client⁴. The phenomenon of induced demand supplier; in other words, the information asymmetry between the service provider and the customer or service applicant in the healthcare market due to the poor knowledge of patients, the importance of health and concern over the consequences of diseases, clients tend to comply with the orders of the service providers⁵. For example, some patients assume that the services provided in hospitals are of higher quality than those in clinics, and prefer to be treated in hospitals even if treatment is available in clinics⁶. The assumption of asymmetric information between the physician and patient is the background for the induced demand theory⁷. The induced demand hypothesis emphasizes the motivations of doctors as healthcare providers to create induced demand⁸. The patients also affect the induction of demand as they have unlimited desire for, and tendency toward, services⁹. Moreover, economic incentives focused on insurance can affect patients' behavior and the profit of healthcare organizations¹⁰. Many studies have confirmed physicians' induced demand, identified and investigated various supply and demand factors^{11–15}. A study by Bogg *et al* in India showed that the government's financial support has resulted in induced demand⁷. Recent studies also demonstrated the impact of physicians' payment mechanisms on motivating health-seeking behavior in patients¹⁶. A study by Karimi *et al* showed that induced demand for medical and pharmaceutical services is more common among general physicians¹⁷. Cutler *et al* revealed a correlation between causes of induced demand from patients and physicians in providing services in different regions¹⁸. A study by Yuda showed that a 1% reduction in medical costs by the service providers could increase induced demand for services by up to 7.5%¹⁹. In their study in France, Delattre and Dormont showed that increasing the number of physicians relative to the population reduced the number of patients seeking medical advice/counseling; however, this reduction was minimal and a decline in the number of consulting physicians did not increase the volume of medical services sought²⁰. A study in Italy by Magazzino and Mele showed that the gross national product, unemployment rate, number of hospital beds, degree of urbanization and percentage of the population with high school education had a significant direct impact on health expenditure²¹.

The issue of induced demand is highly complicated due to the information asymmetry in medical services²². The possibility of induced demand and the severity of its effects are associated with interactions between a wide range of factors that affect patients' behavior, including market, behavior, rules and regulations. These factors could act as incentives and disincentives for patients' participation in or resistance against the phenomenon of induced demand⁴. Considering the extent of factors affecting induced demand and lack of a comprehensive study on this issue in Iran, the purpose of this paper is to examine the factors of knowledge and awareness of service providers, the personal interests of service providers, their sensitivity to health, the supervision of insurance companies, the industrialization of the health sector, the increase and diversity and the number of specialist forces and the quality of practices training to providers in hospitals.

Methods

Study design, setting and participants

This applied, cross-sectional, descriptive-analytical study was conducted from January to December 2015 in a number of health centers and hospitals in Iran. Overall, 511 subjects consisting of 78 physicians, 350 nurses, 26 laboratory experts and 28 radiology technicians were included in this study. The subjects were selected by a mixed sampling method, which included stratified random sampling (the country was classified into five regions: center, north, west, east and south) and cluster sampling of levels was conducted within hospitals and health centers (each center or hospital was considered as a single cluster).

The centers and hospitals studied were as follows:

- North: Imam Khomeini Hospital (Sari), Imam Reza Hospital affiliated to Sari University of Medical Sciences (Amol), 5th Azar Hospital (Gorgan), Shahid Sayad Shirazi Hospital affiliated to Golestan University of Medical Sciences (Gorgan).
- South: Golestan Hospital affiliated to Ahvaz University of Medical Sciences (Ahvaz).
- East: Imam Reza Hospital (Mashhad), Rasool-e-Akram Hospital (Zabol).
- West: Imam Khomeini Hospital affiliated to Ardebil University of Medical Sciences (Ardebil).
- Center: Rasool-e-Akram Hospital affiliated to Iran University of Medical Sciences (Tehran).

Finally, sampling within clusters was done by classification per ratio of physicians, nurses, laboratory experts and radiology technicians working in the medical centers. The main goal of the study was to determine the demand induction rate of services in Iran's health system and its related factors. The following formula was used to calculate the sample size, with a correction factor of 1.25 used for more precision.

$$n_0 = \frac{Z_{1-\alpha/2}^2 * P * (1-p)}{d^2} = \frac{1.96^2 * 0.5^2 * 0.5^2}{0.05^2} = 385 n = 1.25 * n_0 = 1.25 * 385 = 482$$

At least 480 samples were selected for this study, consisting of 350 females (72.9%) and 130 (27.1%) males aged 22–57 years. Inclusion criteria consisted of at least 6 months of work experience and willingness to participate in the study.

Data collection

Data were collected by a questionnaire (Supplementary File 1), which consisted of two parts: (a) background characteristics and (b) factors affecting induced demand for health services. The individuals completed the questionnaires in writing in the presence of the researcher. This questionnaire contains 33 items and 9 dimensions and uses the Likert scale. The items have 5 options that are as follows: I totally agree with the highest score (score of 1), I agree score of 2), I somewhat agree (score of 3), I disagree (score 4), and I totally disagree with the lowest score (score of 5). The dimension of service recipients' awareness had 3 related item with the minimum score of 3 and maximum score of 15, the dimension of the extent the service providers cared about their health had 8 related item with a minimum score of 8 and maximum score of 40, the dimension of supervision and planning of insurance companies had 3 related item with the minimum score of 3 and maximum score of 15, the dimension of personal benefits of service providers had 3 related item with the minimum score of 3 and maximum score of 15, the dimension of industrialization of the health sector had 3 related item with the minimum score of 12 and maximum score of 20, the dimension of diversity and increased number of trained experts had 4 related item with the minimum score of 4 and maximum score of 20, the dimension of service providers' awareness had 3 related item with the minimum score of 3 and maximum score of 15, the dimension of quality of models and methods used for training service providers had 3 related item with the minimum score of 3 and maximum score of 15, and the total score of questionnaire ranged between 33 and 165. The validity and reliability of the questionnaire was confirmed by a Master's thesis

(S. Montazeri, Master's thesis). The scientific validity of its contents was verified by 10 faculty members. Cronbach's alpha of 0.80 was achieved in a preliminary study on 30 samples. Cronbach's alpha of more than 0.7 was achieved for the nine dimensions. Table 1 shows the dimensions of the questionnaire of induced demand for health services in Iran.

Data analysis

Data were analyzed using SPSS (version 23) and descriptive statistics (the mean and standard deviation) were produced. Considering the difference in the number of options and scores of each factor, scores were first converted to a 0–100 scale. Non-parametric tests were used to determine the relationship between factors and induced demand. The Kruskal–Wallis test was used due to absence of normality assumption for factors associated with induced demand. The chi-squared test was also used for data analysis at a significance level of $P < 0.05$.

Ethical statement

Ethical approval was obtained from the relevant organization (Islamic Azad University of Sari Branch with code of ethics IR.IAU.SARI.REC.1397.7) and written consent of the participants (samples), and they were assured of the confidentiality of all data collected.

Results

Overall, 511 subjects, who were working in emergency departments (17.9%), wards (71.5%), laboratories (6.8%) and clinics (3.8%), completed the questionnaire. The highest and lowest level of agreement with induced demand was recorded in the west (71%) and south (57.5%) of Iran, respectively. Moreover, 65.2% of the subjects in the whole country agreed with the existence of induced demand, while only 4.4% did not agree with the existence of induced demand. The chi-squared test showed no significant difference between different regions of the country (Table 2).

Table 1. Dimensions of the questionnaire of induced demand for health services in Iran.

Dimensions of the questionnaire	Questions	Cronbach's alpha	Minimum score	Maximum score
Knowledge and awareness of service recipients	3	0.73	3	15
Sensitivity of clients toward their own health	8	0.80	8	40
Monitoring and planning of insurance companies	3	0.72	3	15
Personal interests of service providers	3	0.78	3	15
Industrialization of the healthcare sector	3	0.78	3	15
Increase in the variety and number of specialists	4	0.71	4	20
Knowledge and awareness of service providers	3	0.87	3	15
Induced demand	3	0.73	3	15
Quality of education models and training methods to service providers	3	0.91	3	15

Most individuals with bachelors' degree (67.7%) agreed with the presence of induced demand, while only 38.1% of specialists agreed with the presence of induced demand. However, there was no significant relationship between education level and induced demand.

Laboratory staff (73.1%) and physicians (55.1%) had the highest and lowest level of agreement with the existence of induced demand, respectively. Moreover, 68.1% and 3.8% of the nurses agreed and disagreed with the existence of induced demand, respectively. Furthermore, 57.1% and 4.4% of the radiology technicians agreed and disagreed with the existence of induced demand,

respectively. Chi-square test showed no significant relationship between induced demand and job categories ($P=0.194$).

The results also showed that women (69.4%) agreed significantly more with the existence of induced demand than men (53.8%) (Table 3). The results of this study indicate that 64.9% of the subjects believed that sensitivity of clients toward their own health affected the incidence of induced demand. In addition, 62.1% of the subjects believed that the monitoring and planning of insurance companies affected the incidence of induced demand. Kruskal-Wallis test showed a significant relationship between induced demand and its related factors (Table 4).

Table 2. The frequency distribution of induced demand for services provided in the Iranian healthcare system.

			Induced demand					
		Agree	Intermediate		Disagree			Total
Region	Number	%	Number	%	Number	%	Number	%
North	89	63.1	47	33.3	5	3.5	141	100
Center	101	69.7	38	26.2	6	1.4	145	100
East	73	62.9	34	29.3	9	7.8	116	100
West	27	71.1	11	28.9	0	0	38	100
South	23	57.5	16	11	1	2.5	40	100
Overall	313	65.2	146	30.4	21	4.4	480	100
Test result					$\chi^2 = 8.97$, df=8, p-value= 0.345			

Table 3. Relationship between gender and perception of induced demand for health services in Iran.

Gender	Induced demand							
	Agree		Intermediate		Disagree		Total	
	Number	%	Number	%	Number	%	Number	%
Female	243	69.4	95	27.1	12	3.4	350	100
Male	70	53.8	51	39.2	9	6.9	130	100
Total	313	65.2	146	30.4	21	4.4	480	100
Test result					$\chi^2 = 10.73$, df=2, p-value= 0.005			

Table 4. Relationship between induced demand for services and its related factors in Iran's healthcare system.

Related actors	Induced demand						
	Agree		Intermediate		Disagree		P-Value
	Number	Mean	Number	Mean	Number	Mean	
	(%)	(SD)	(%)	(SD)	(%)	(SD)	
Knowledge and awareness of service recipients	291	27.24	139	37.30	21	36.90	P<0.001
	64.6	15.67	30.8	18.74	4.7	15.50	
Sensitivity of clients toward their own health	307	30.56	145	38.22	21	50.89	P<0.001
	64.9	14.85	30.7	13.68	4.4	18.86	
Monitoring and planning of insurance companies	256	28.60	136	38.93	20	53.96	P<0.001
	62.1	21.95	33	23.85	4.9	08.09	
Personal interests of service providers	293	37.22	140	47.77	21	55.16	P<0.001
	64.5	21.83	30.8	22.56	6.4	22.12	
Industrialization of the healthcare sector	295	29.58	142	39.15	20	56.74	P<0.001
	64.5	17.70	31.1	18.83	4.4	22.14	
Increase in the variety and number of specialist	296	27.30	143	36.25	21	57.14	P<0.001
	64.3	15.33	31.1	16.02	4.6	17.60	
Knowledge and awareness of service providers	239	21.79	124	31.55	19	57.14	P<0.001
	62.6	18.63	32.5	22.46	5	30.65	
Quality of education models and training methods for service providers	246	19.67	125	31.11	19	37.70	P<0.001
	63.1	15.23	32.1	19.68	4.9	27.21	

Dataset 1. Responses of all participants to all questions²³

<http://dx.doi.org/10.5256/f1000research.14377.d201598>

Discussion

The results of the present study showed that the majority of participants (65.2%) agreed with the existence of induced demand, which is consistent with previous studies^{11–15}. Bogg *et al* showed that the government's financial support has led to induced demand⁷. In Japan, Sekimoto and Ii studied the supply and induced demand for chronic diseases, and reported an increase in induced demand for hypertension and diabetes²⁴. The findings of Crivellei *et al.* in Switzerland²⁵ Delattre and Dormont in France²⁰ were in line with the results of this study. However, a study in America showed no correlation between demand for services and services provided by physicians through Medicare²⁶. A study by Amporfu indicated that salaried physicians have no incentive to induce demand²⁷. Although few studies strongly reject the existence of induced demand, some experts believe that identification and determination of the incidence of induced demand are health economics issues due to the complexity of treatment, medical decisions, clinical uncertainty and modernization of health needs. It is not simple to distinguish between real demand and induced demand. In this regard, Richardson and Peacock claimed that medical

decision-making is often complex and uncertain even if all medical standards were met²⁸. Lien *et al* also stated that the development of needs, epidemiological changes and diversity of tastes have further complicated patient diagnosis and treatment, and the distinction between real and induced demand²⁹. It seems that the implementation of healthcare reform in Iran and significant reductions in patients' out-of-pocket payments have resulted in increased demand for services. This issue is not observed in countries with more stable healthcare system. On the other hand, cultural differences and health beliefs affect the amount of demand in different regions.

Induced demand occurs because of multiple economic and structural factors²². The present study found a significant relationship between induced demand and the related factors of knowledge and awareness of service recipients, sensitivity of clients toward their own health, monitoring and planning of insurance companies, personal interests of service providers, industrialization of the healthcare sector, increases in the variety and number of specialists, knowledge and awareness of service providers, quality of education models and training methods for service providers. Leone conducted a study in three provinces of India in 2014, which indicated the role of several factors in induced supply and demand³⁰. The present study is also in line with a study by Keyvanara *et al*, which demonstrated factors such as the role of supplemental health insurance,

lack of strict supervision on insurance companies, increased profit of equipment companies, diagnostic centers, pharmaceutical companies, the over-trusting of physicians, incorrect demands of patient from the physicians, lack of awareness, patients' free access to physicians, patients' willingness to make greater use of free services and franchising affect the incidence of induced demand⁴. Bazyar *et al* indicated inadequate supervision on the insurance system as the main cause of induced demand³¹. A study conducted in China reported that the high percentage of cesarean sections is due to the decision of pregnant women. However, the physicians' impact on the increased demand for cesarean section cannot be ruled out³². This imbalance between clients and physicians' knowledge may result in the physicians' tendency to provide questionable services³. A physician has the expertise and knowledge to have a dual role of a consultant and service provider for the patient³³. Borhanzade claims that poor monitoring and control by insurance companies on the payment system leads to easier demand for excess services³⁴. The findings of other studies indicate that consumers compensate for the increased costs of healthcare by using supplemental insurance³⁵. Madden *et al* believe that different methods of payment affect the professional behavior of service providers³⁶. According to a study by Dosoretz, physicians and other providers maximize their benefit when clinical values are not defined³⁷. The difference between the results of this study and those of other studies is due to the focus of other studies on methods of payment to physicians and other components of health economics, whereas the present study emphasized more on social factors, knowledge, attitude, commitment to medical ethics and insurance company monitoring. Authorities and decision-makers in the healthcare sector should aim to increase public awareness about diseases and treatment processes, and offer appropriate solutions to increase physicians' occupational commitment by changing the medical education system. In the meantime, other interfering factors in increased demand such as payment methods, performance of public and supplementary insurances should be monitored closely. In this regard, the mass media could be helpful in raising public awareness and modifying public beliefs.

The present study showed that the industrialization of the healthcare sector and an increase in the variety and numbers of specialists are effective on induced demand. Nowadays, market competition has been created between the providers of healthcare services. Ferguson demonstrated that induced demand results from the increasing role of the market in medical care³⁸. Economics is the most important factor affecting the medical institutions, which use induced demand as a means of increasing profits. An increase in unnecessary services leads to increased profit, and even distribution of money between various providers³⁹. Bhatia emphasizes that the pharmaceutical

market is highly competitive, and each company is constantly marketing to maximize their revenue⁴⁰. Palesh *et al* claimed that market forces such as advertising are significantly effective on the unnecessary use of technology. Moreover, advertisements of importers and manufacturers increase demand⁴¹. However, Bickerdyke *et al* suggest that induced demand is influenced by the patient's goals (including good health, vitality, longevity, information, autonomy, usefulness of process, regular source of care, confidence, access to benefits of social security or insurance payments and pain relief), medical history and environmental factors (including financial situation, family/work commitments, cultural background and attitude of the society)⁴². Nevertheless, it seems that this previous study was patient-centered, and mostly focused on the quality of services rather than social and economic aspects.

Practice implications

Although healthcare services are the main indicator of social development, the provision of such services is tremendously costly. The ever-increasing cost, along with induced demand for services, causes certain problems in society. The results of this study showed that the phenomenon of induced demand is influenced by various factors, including the knowledge and awareness of service recipients, sensitivity of clients toward their own health, monitoring and planning of insurance companies, personal interests of service providers, industrialization of the healthcare sector, increases in the variety and number of specialists, knowledge and awareness of service providers, quality of education models and training methods for service providers. Therefore, it is suggested that decision makers and policymakers in the community arena can improve health services by increasing the quality of services and satisfaction of patients reducing direct payments from people, reducing household expenses, observing tariffs, lowering under-payment and unnecessary inductive demand. To be efficient and optimal.

Data availability

Dataset 1. Responses of all participants to all questions.
DOI: [10.5256/f1000research.14377.d201598](https://doi.org/10.5256/f1000research.14377.d201598)²³

Competing interests

No competing interests were disclosed

Grant information

The authors declared that no grants were involved in supporting this work.

Acknowledgements

We would like to thank the Research of Islamic Azad University, Sari Branch, Iran, and those who participated in the project.

Supplementary material

Supplementary File 1. Demographic and induced demand questionnaire.

[Click here to access the data.](#)

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<https://doi.org/10.5256/f1000research.15643.r53621>

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Hanna Tiirinki

National Institute for Health and Welfare (THL), Helsinki, Finland

Thank you for allowing me to have the opportunity to review interesting manuscript "Factors associated with induced demand for service in Iran's healthcare system". Overall, the study is well organized. Study is a cross-sectional descriptive-analytical and the data has collected by a questionnaire. Analyze were done using SPSS.

As a whole, the paper has well written. In the background section of the manuscript, it would be good to open a bit Iran's healthcare system, especially for wide international readers to understand better the context of research. Please clarify the value of this research for international and national level. I agree there is a significant value of this kind of health economic and management research for the Iran's healthcare. But please clarify how.

Please, be critical with the cited literature. Literature cited in article are partly quite old.

Methods: Overall, 511 subjects consisting of 78 physicians, 350 nurses, 26 laboratory experts and 28 radiology technicians. Still 29 is missing? Clarify please.

Results: The tables of the paper are clear. It would be good to have some deeper understanding for the interesting results of this paper, comparing chosen method "descriptive-analytical".

Discussion: Authors do a comparisons and reflection between results of the present study and those obtained in other similar cited studies.

Authors explicites what this paper adds to knowledge of induced demand in healthcare. Authors should also explicit what it adds to Iran's healthcare and from what perspective the research of this topic need to be continue.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Health management, health service research, health quality, Lean, primary health care

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

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