Unmet need and met unneed in health care utilisation in Iran

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Abstract

Purpose – This paper uses a unique nationwide survey data derived from the 2003 Utilisation of Health Services Survey (UHSS) in Iran ($n = 16{,}935$) to analyse inequities of health care utilisation.

Design/methodology/approach – Concentration indices are used to measure socioeconomic inequality in actual use of the five types of health services, and in unmet need for two of those types of service (any ambulatory care and hospital admissions). Horizontal inequity indices are employed to examine inequity in ambulatory and hospital care. Generalised linear model (GLM) was employed to investigate factors contributing to the phenomena of "unmet need" and "met unneed". Moreover, a decomposition analysis of inequality is performed to determine the contributions of each factor to the inequality of "unmet need".

Findings – Results suggest that self-reported need for ambulatory and inpatient care is concentrated among the poor, whereas the utilisation of ambulatory and inpatient care were generally distributed proportionally. Results of horizontal inequity indices show that the distributions of any ambulatory care and hospital admissions are pro-rich. The probability of "unmet need" for ambulatory care was higher among wealthier individuals. The decomposition analysis demonstrates that the wealth index, health insurance, and region of residence are the most important factors contributing to the concentration of "unmet need" for ambulatory health care among the poor. Results also illustrate that higher wealth quintiles used more unneeded ambulatory care than their poorer counterparts.

Originality/value – A special characteristic of the UHSS is that it contains questions about the need for medical services use and about actual services use. This characteristic provides an opportunity to measure the inequality of health care consumption against self-assessed treatment needs, as well as an analysis of which observables are associated with "unmet need". Moreover, the incidence of health care use when it is reported as not needed can be analysed with this dataset. The analysis of this phenomenon – which we refer to as "met unneed" – is another novel aspect of this work.

Keywords Inequities, Health care, Unmet need, Met unneed, Iran, Personal needs

Paper type Research paper

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1. Introduction

Equity is often stated as an important social and economic policy objective (Gilson, 1989). In the health sector, this issue is usually recognised as a concern that guides policy and practice. However, in spite of the fact that there is broad agreement on equity as an important policy objective in health care, there has been a long-running debate about what aspects of equity in health care are important and how these should be measured (Layte and Nolan, 2004). Some authors (Le Grand, 1982; Mooney, 1983, 1991; Mooney *et al.*, 1992) argue that equity should be defined in terms of equal access to treatment, while others (Culyer *et al.*, 1992; O'Donnell and Propper, 1991) argue that equity in health care should be concerned with measures of health care consumption. In addition, the precise meaning of commonly used concepts such as "need" and "access" is, in this literature, often opaque.

From the early 1980s Le Grand (1982) and Mooney (1983) maintained that equity in most policy statements should refer to equity of access to health care services in the sense that those with an equal need for treatment have equal opportunity to get it, or face an equal cost of utilisation. Supporters of this statement believe that an individual's level of health care utilisation is determined by a variety of factors that shape the individual's demand for health care. One of these may be the need for treatment, but even individuals with equal need may end up consuming different amounts of care if preferences differ (e.g. because of individuals' perceptions of the benefits of treatment) and if their marginal utilities of income differ (Layte and Nolan, 2004).

On the other hand, Culyer *et al.* (1992) have maintained that although it is self-evident that persons in equal need may consume different levels of health care since their demand curves may differ, we still need to know why differences in demand arise and whether or not these differences may, in fact, be due to differences in income. In relation to the normative principles that are often invoked in this literature, there is also some empirical evidence of the preferences of the general public, and of the views of policy-makers, on the distribution of health care. Wagstaff *et al.* (1992) reviewed the evidence on the level of agreement among policy-makers and the general public regarding equity in health care in Europe and North America and found that there was broad agreement on the principle that health care should be financed according to ability to pay and utilised according to need.

A variety of studies has also been conducted to analyse the issue of horizontal equity in health care delivery. In the economic literature, the measurement of inequalities in the distribution of two or more variables has been used to operationalise studies of the normative question of inequity in the health sector. Studies of this kind typically have shed light on the distribution of measures of health care, health care financing and health *per se*, by income.

Most studies to date have used ANOVA and regression analysis to examine the distribution of health care delivery or consumption (Gerdtham, 1997; Gerdtham and Trivedi, 2001; Manning *et al.*, 1987; Yip and Berman, 2001). The aim of these studies is generally to test the null hypothesis of no horizontal inequity (HI) in health care utilisation (i.e. "equal treatment for equal need"). In other words, these studies tend to examine whether or not socio-economic variables (primarily income) have an effect on health care utilisation. While these studies can be used to test for the presence of HI, the approach does not allow one to quantify the extent of any inequities that may exist.

Thus, with this approach, it is difficult to assess changes in inequality over time or differences across subgroups of the population (Chen and Escarce, 2004).

Early studies in the area of health care utilisation that measure inequity were based on simple tabulations. For example, Le Grand (1978) and Hurst (1985) studied the distributions of public health care expenditure and mortality among socio-economic groups using 1972 and 1976 UK General Household Survey, respectively. In these studies the authors presented and compared the distribution of need and public health care expenditure. However, when van Doorslaer and Wagstaff (1992) published their report on equity in health care delivery, they broke new ground in measuring inequity in health care utilisation by introducing and employing a horizontal inequality index. They measured inequality of health care delivery by applying the index to the data in the USA and some European countries. Subsequent studies (Gerdtham and Sundberg, 1998; Lairson *et al.*, 1995) adopted this approach. Subsequently, van Doorslaer *et al.* (2000) expanded their study to five new OECD countries using a modified methodology that uses indirect standardisation, rather than direct standardisation. Following that study, health care utilisation has been assessed in some other areas such as Taiwan, Hong Kong and Korea (Lu *et al.*, 2007), Africa (Cisse *et al.*, 2007), Australia (van Doorslaer *et al.*, 2008) and Canada (Allin, 2008).

Equity of health care delivery is also considered an important policy goal in Iran. According to Article 29 of the Iranian Constitution, the government is required to provide every citizen of the country with access to social security that covers a range of life circumstances (i.e. retirement, unemployment, old age, disability), events (e.g. accidental injury, natural disasters), and services (e.g. health care). The government's responsibilities under the constitution are discharged using revenue from the sale of natural resources (principally, oil), taxation revenue and benevolent contributions by private individuals. The Iranian authorities have undertaken a series of measures that are designed to extend health insurance coverage toward a universal public health insurance scheme with the aim of increasing the accessibility and affordability of health care. The provision of public subsidies for health care in Iran increases, in principle, the accessibility of health care to the population. However, the National Health Accounts show that almost half of Iran's health care expenditure was financed by the private sector in 2005, mostly via consumer co-payments (World Health Organisation, 2008), which are considered as an important barrier to the utilisation of health care.

Although equity of health care financing in Iran has now been analysed (Hajizadeh and Connelly, 2010), equity of health care delivery in Iran has not. The purpose of this study is to assess the equity of health care delivery in Iran using the available data derived from the Utilisation of Health Services Survey (UHSS) in 2003. An important, and unique, feature of the dataset is that it includes information not only on health care utilisation but also on self-reported ambulatory and inpatient need. This characteristic provides an opportunity to measure the inequity of health care consumption against self-assessed treatment needs, as well as an analysis of which observables are associated with "unmet need". Moreover, the incidence of health care use when it is reported as not needed[1] can be analysed with this dataset. The analysis of this phenomenon – which we refer to as "met unneed" – is another novel aspect of this work. Therefore, this paper not only augments the body of information that is accumulating on the equity of health care delivery among developing countries, but also sheds some light on influential factors that are correlated with the inequities that are measured. The results may form

the basis for improving the equity of health care utilisation, which is one of the declared objectives in the Law of the Fourth Economic, Social and Cultural Development Plan in Iran (Management and Organization, 2005).

2. Health care delivery in Iran

The right of access to health care services is emphasised in Iran's constitution and the Iranian health care delivery system expanded very quickly after the Iranian Revolution, in 1979, with the aim of accomplishing this constitutional imperative. The Ministry of Health and Medical Education (MOHME), in conjunction with the country's 39 medical universities, plays a major role in delivering health care in the country. Health care is financed via a mixture of public expenditure, consumer co-payments, and revenue that is raised from special contracts between health insurance organisations and medical universities (The World Bank, 2009).

Figure 1 shows the structure of the Iranian health care system. Health care delivery is overseen by the MOHME, via the University of Medical Sciences and Health Services which is, in fact, a regulatory body that oversees the operations of the health sector, including the University Teaching Hospitals, Schools of Medical Sciences and two Deputy Ministers (one Deputy of Curative Services and one Deputy of Health). The Deputies of Health are responsible for the administration of the District Health

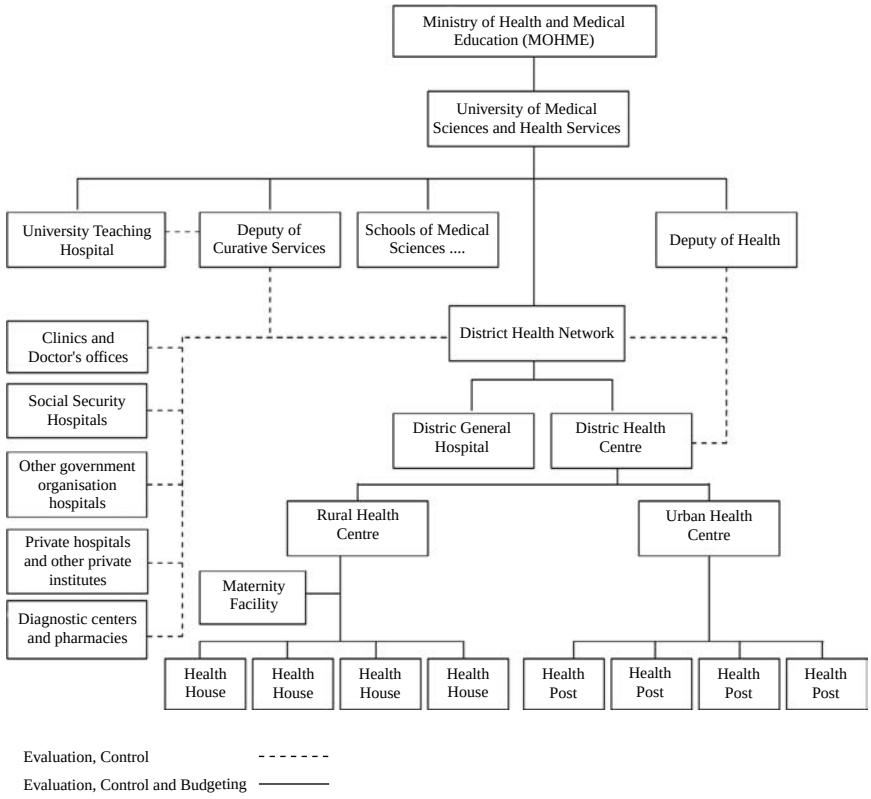


Figure 1.
Structure of health care delivery in Iran

Network (DHN), which governs 336 districts across Iran. Within these districts, primary health care (PHC) is delivered via a provider network in which entities called health houses (HH) in rural areas and health posts (HP) in urban areas is the front line of treatment, and perform a gate-keeper/referral role. The HHs and HPs are depicted along the bottom of Figure 1. In rural areas, the HHs provide basic public health care such as community health education, prenatal care, child care, family planning, nutrition, pastoral care and education, immunisation, school hygiene and care of school children, oral and dental health, occupational health, environmental health, disease detection, home visits, and treatment of the certain diseases. The HPs in urban areas provide a similar set of services, although because the logistics of referral are often simpler and medical labour may be more abundant in urban areas, service provision and referral patterns vary somewhat between the urban HPs and rural HHs.

The districts also operate Maternity Facilities and Rural and Urban Health Centres (HCs), which form the second part of the PHC system. These entities employ general practitioners (GPs) and, in the case of maternity services, specialists in obstetric care, and treat patients who have been referred to them by an HH/HP. The HCs also tend to manage chronic conditions and serious illnesses that the HHs/HPs are not well-equipped to deal with. Additionally, the HCs also coordinate the collection, control and classification of health data, implement, monitor and follow-up public health programs, and work with supervisory teams from the district HCs to conduct educational activities and to dispatch mobile teams to provide treatment to patients in outlying villages. Each of these elements of the Iranian health care system is financed from the public budget and delivered under the auspices of the MOHME.

District general hospitals (DGHs) and district health centres (DHCs) are the next line of treatment in the Iranian health care system. Although they fall within the DHNs, these entities are administratively autonomous units. The DGHs accept referrals from HCs, treating referred patients in their specialist clinics, emergency department, and inpatient facilities. The DHCs, on the other hand, are responsible for planning, supervising and supporting the activities of HCs.

The remaining elements of Iran's health care delivery system appear in the lower left-hand-side of Figure 1. They include:

- clinics and doctors' offices;
- social security hospitals;
- private hospitals and other private institutes (i.e. private treatment facilities); and
- diagnostic centres and pharmacies.

The DHNs do not control these facilities, but may refer patients to them for diagnosis and treatment. These units provide secondary and tertiary care and are financed through the compulsory Social Security Organisation (SSO) for formal sector employees and their dependents, the Medical Service Insurance Organisation (MSIO) for government employees, rural households, the self-employed, and others (e.g. students) and the Armed Forces Medical Service Organisation for members of the military and their dependents. Additionally, the Imam Khomeini Relief Foundation provides insurance coverage for the poor[2] (Schieber and Klingen, 1999).

In principle, the foregoing arrangements are designed to provide equitable access to health care for the Iranian population. Indeed, this emphasis, along with an emphasis

on the cost-effective use of health care (e.g. via primary care gate-keeping), is also seen in practice in the Iranian health sector. Nevertheless, the health care system is – like most other health systems – subject to some important weaknesses. First, the multiple insurance systems results in relatively high administrative expenses, complex management and probably inefficient risk-pooling. Second, the lack of separation of provision and financing in the MOHME and SSO discourages efficiency (Schieber and Klingen, 1999). Third, considerable variations in per capita expenditures among the different health insurance organisations probably reflects, and may even cause health care utilisation inequalities between the members of different health insurance funds in Iran (The World Bank, 2009; World Health Organisation, 2005). Finally, the health care system is heavily bureaucratised, with a substantial middle- and top-level management staff. Innovations and changes within the system are therefore difficult to effect (The World Bank, 2009).

In recent years, the health care system in Iran has undergone a series of reforms that were designed to increase the accessibility and availability of health care services to Iranian citizens, particularly the poor and other disadvantaged groups. One of the most important reforms was the introduction of the Public Medical Service Insurance Coverage Act, which was enacted in September 1995. This act established the MSIO to provide formal health insurance coverage to people from a range of occupations, social strata and circumstances, including civil servants, village dwellers, nomadic tribes, the self-employed, people with disabilities, university students, released captives and the families of individuals who are deemed, by the authorities, to be "martyrs". The Iranian Government also implemented a new insurance arrangement called the Urban Inpatient Insurance Scheme (UIIS) in 2000. The purpose of the UIIS is to subsidise inpatient health care for 10 per cent of Iran's population who live in urban areas but who do not hold health insurance. Finally, the Rural Health Insurance Scheme (RHIS) has been introduced and the MSIO has covered ambulatory care for 30 per cent of Iran's population in rural areas since 2005.

Notwithstanding these initiatives, and the constitutional right of Iranians to health care, there is evidence that the health care delivery system still suffers from extensive problems of inefficiency and inequality (The World Bank, 2009). For instance, a study of ambulatory care need and use in Iran has shown differential utilisation across income groups (Hosseinpoor *et al.*, 2007). Although the latter study sheds some light on the issue of inequality in the utilisation of health care services in Iran, the current paper has a much broader remit: it considers the utilisation of both hospital and ambulatory care. Thus, the present study constitutes the first attempt to analyse the equality of health care utilisation for both ambulatory and inpatient health care services, broadly conceived, in Iran. Furthermore, in addition to quantifying the inequalities of health care utilisation across these services, we determined factors influencing "unmet need" and "met unneed" for health care services. A decomposition analysis is presented to determine how much each observable variable (e.g. education, wealth) contributes to the observed inequalities in "unmet need" for health care use in Iran. The results of this study thus provide insights into the nature and causes of inequalities in Iranian health care utilisation, and may better enable policy-makers to redress these inequalities.

3. Methodology

To examine inequalities in Iran's health care utilisation a concentration index (C) is employed to represent the degree of inequality for health care utilisation and

self-reported need in Iran. The computed indices were used to measure HI indices for ambulatory and inpatient care using the following formula:

$$HI = C_a - C_n \tag{1}$$

where C_a indicates concentration index for health care use and C_n is the concentration index for self-reported need. The concentration index approach requires the plotting of the enumerated population of individuals or households, to be ranked in ascending order of (usually) income or consumption, against the cumulative percentage of the health or health care variable that is of interest. Note that the use of income or consumption to rank individuals or households in such studies is motivated by an interest in the underlying, and often latent, concept of ability to pay.

As the UHSS does not contain information on household total income or consumption, a wealth index was constructed using a principal components analysis (PCA), based on the rich survey information collected in the UHSS on households' assets ownership, as a measure of socio-economic status to rank households[3].

The *C*s were computed using the "convenient regression" approach that was suggested by Kakwani *et al.* (1997). We applied the Erreygers' correction (2009) to the measurement of *C*s (i.e. multiplying *C*s by $4\mu_h$, where μ_h, is the mean of health care variable) because the variables of interest in this study are binary. For the next part of the analysis, the Generalised Linear Model (GLM) is employed to determine which observable variables are associated with the phenomena of "unmet need" and "met unneed"[4] for health care services measures, where the latter refers to service use by individuals who indicate that the services used were not, in fact, needed[5].

The final part of the analysis involves a decomposition approach to the determinants of wealth-related inequalities in the distribution of unmet need. As was shown by Wagstaff *et al.* (2003) the concentration index of health (y) may be decomposed into the contribution of each variable (x) to income- (or wealth-) related health inequality. The contribution of each variable is computed as the product of the sensitivity of health to that variable and the degree of income-related inequality in that factor variable.

For any linear additive regression of health, y (here, unmet need) the concentration index for y, can be written as:

$$C = \sum_{k=1} \left(\frac{\beta_k \bar{x}_k}{\mu}\right) C_k + GC_{s/\mu}, \tag{2}$$

where μ is the mean of y, $\bar{x}_k$ is the mean of x_k, C_k is the concentration index for x_k, and GC_s is the generalised concentration index for the error term defined as:

$$GC_s = \frac{2}{n} \sum_{i=1}^{n} \varepsilon_i r_i, \tag{3}$$

where r_i is the fractional rank of the ith person in the income distribution (Wagstaff *et al.*, 2003).

According to equation (2), C is equal to a weighted sum of the concentration indices of the regressors, in which the weight for each x_k is the elasticity of y with respect to x_k,

$\eta_k = \beta_k(\overline{x_k}/\mu)$. Thus, each of these determinants, x_k, will contribute to the total income-related inequality in health (here, unmet need) to the extent that:

- it has a significant elasticity; and
- it is unequally distributed by income.

The residual component – captured by the last term – in equation (2) reflects the income-related inequality in health that cannot be explained by systematic variation across income/wealth groups in x_k (O'Donnell *et al.*, 2007).

As the variable of interest in the decomposition analysis is binary, we used the corrected concentration index suggested by Erreygers (2009), $E(h)$. Equation (2) for the corrected C (i.e. $4\mu_h \times C$) can be written as follow:

$$E(h) = 4\left[\sum_{k=1}\beta_k\bar{x}_k C_k + GC_s\right] \tag{4}$$

where GC_s is the generalised concentration index of x_k.

In order to decompose C in a non-linear (binary outcome) setting, we need to satisfy two requirements: first, the binary nature of the outcome variable (here, unmet need) must be taken into account; and second, the outcome variable must be a linear combination of the independent determinants for the mathematics of the decomposition of C to hold. The ordinary least square approach should not be employed because it does not meet the first requirement. A probit model cannot satisfy the second requirement because the result of estimation is sensitive to the choice of a reference group (van Doorslaer *et al.*, 2004a). Thus, we applied the GLM with binomial distribution and identity link approach for the decomposition analysis of unmet need. As Yiengprugsawan *et al.* (2010) showed, this model produces valid coefficients that do not vary according to the choice of reference group.

4. Data and variables

This study uses information from the UHSS, conducted in 2003, to analyse equity in health care. This survey collected data on the utilisation of inpatient and ambulatory care in Iran. A systematic sampling method was employed to determine 3,514 households in the UHSS using the sampling frames of Iranian households available at the Health Network Development Centre. The data were collected using a pre-coded and pre-tested questionnaire which was administered to households via a maximum of five visits during the survey period. At the end of the survey, the data were collected from 3,339 out of 3,514 households in the sample frame (i.e. a 95 per cent response rate). The number of individuals covered by these 3,339 households is 16,935. The survey sample was representative of the previous population census, which was conducted in 1996 (Hosseinpoor *et al.*, 2007). For the purposes of this study, attention is restricted to individuals who were 15 years and older at the time of the survey (as data for individuals under 15 years old is parent-reported, whereas the responses of older individuals are self-reported).

Several questions from the survey are used in this study to measure the need for health care, the utilisation of health care, and the gaps between them. The questions "have you visited a GP within the last two weeks?" and "have you visited a specialist within the last two weeks?" are used to compute the probabilities of at least one visit to

a GP, specialist, or any physician. The probability of ambulatory service use was derived from answers to the question "have you used any ambulatory services within the last two weeks?"[6]. The probability of inpatient services use was computed from answers to the question "have you been admitted to a hospital within the last 12 months?". Two measures of ambulatory and inpatient care need were computed using two different questions on the UHSS: "have you needed ambulatory care within two weeks?" and "have you needed inpatient care during the last year?".

Similar to some other studies in this area (Lu *et al.*, 2007; van Doorslaer *et al.*, 2008), the recall period for health care measures in the UHSS is two weeks – except for hospital admission which is a year. This implies that most people will respond no to the utilisation of health care.

The unmet need for any ambulatory visits and hospital admissions are also analysed by comparing stated needs with actual use: individuals who stated that they needed but did not use services are categorised as having an unmet need for those services. For example, an unmet need for any ambulatory services indicates that the person stated a need for an ambulatory service in the past two weeks but did not use any health services. There could be a number of reasons behind the phenomenon of unmet health care need. One possibility is that health problems were experienced, but were not severe enough to prompt a visit to a health care provider or, equivalently, that transactions costs and financial costs exceeded the expected benefit to the respondent. Second, a respondent might report having an unmet need while he or she is on a waiting list to receive health care services. Third, a respondent might report having an unmet need if he visited a health care centre but could not find a suitable health care professional to consult, or was not given care that relieved the health complaint.

Met unneed for any ambulatory services is also used. Individuals are classified as having a "met unneed" if they used a service, but stated that it was not needed[7]. This is a statement made by respondents who used health care services. The respondent's announcement might be affected after receiving the provider's opinion on the necessity of use. One of the possible reason for the phenomenon of "met unneed" for ambulatory care may be that some of the respondents consumed some ambulatory services such as a medical health check up and medical consulting that they considered, *post hoc*, an unnecessary use of health care.

The other variables used in this study are individual characteristics such as age, gender, education, marital status, occupation and whether the individual has a private health insurance policy. The household characteristics variables used in this study are: wealth quintiles, number of household members and a dummy variable for households headed by a female. Regional measures were also employed, by using dummy variables for the main and remote rural areas (i.e. using urban areas as the reference category).

4.1 Descriptive statistics of variables

Table I presents the descriptive statistics of variables used in the study. According to Table I, 22 per cent of individuals reported a need for ambulatory services in the past two weeks whereas only 15 per cent of people in the sample used any ambulatory services. As can be seen, 10 per cent of people in the sample reported a need for inpatient care in the past 12 months, while 9 per cent of individuals were admitted to a hospital. Figure 2 shows the percentage of self-reported need for both inpatient and ambulatory care among different age-gender groups. As the figure indicates, the proportion of people that reported a need for

Variables	Mean (SD)	Min.	Max.
Self-reported need for inpatient services	0.10	0	1
Self-reported need for ambulatory services	0.22	0	1
Visited any ambulatory care in the last two weeks	0.15	0	1
Visited a GP in the last two weeks	0.07	0	1
Visited a specialist in the last two weeks	0.08	0	1
Visited any physician in the last two weeks	0.11	0	1
Admitted to a hospital in the last 12 months	0.09	0	1
Unmet need for any ambulatory visits	0.08	0	1
Unmet need for hospital admissions	0.02	0	1
Met unneed for ambulatory visits	0.01	0	1
Age (years)	34.5 (16.6)	15	99
Sex (male = 1)	0.50	0	1
Education level (years of schooling)	7.01 (5.10)	0	16
Employed in public sector	0.08	0	1
Employed in private sector	0.05	0	1
Self-employed	0.20	0	1
Married	0.59	0	1
Divorced	0.06	0	1
Household size	5.65 (2.41)	1	19
Male ratio (no. of male/HH size)	0.50 (0.18)	0	1
Female headed household	0.02	0	1
Medical Treatment Insurance	0.58	0	1
Social Security Insurance	0.24	0	1
Armed Forces Insurance	0.03	0	1
Imdad (relief) Committee Insurance	0.03	0	1
Private Insurance	0.01	0	1
Special Organisation Insurance	0.02	0	1
Comprehensive Insurance	0.08	0	1
Main rural areas	0.28	0	1
Remote areas	0.08	0	1

Table I.
Descriptive statistics of variables used in the analysis

inpatient and ambulatory health care is greater for females than males. Self-reported need for health care need is higher in older age-groups than younger age-groups – except for the 45-59 female age-group where the percentage of self-reported need for ambulatory care is lower than the 30-44 female age-group, presumably due to child-bearing in the younger age-group.

The proportions of respondents who received GP, specialist, and any physician services within the previous two weeks were 7, 8, and 11 per cent, respectively. According to these figures, it is apparent that almost 4 per cent of individuals in the sample utilised both GP and specialist services during the last two weeks. It is interesting to note that, even though MOHME in Iran encourages patients to discuss their health needs first with a GP, but Iranians usually self-refer to a specialist rather than a GP when they get sick. The relatively-high availability of specialist health care services in Iran is probably one of the reasons why patients in Iran refer to a specialist rather a GP[8]. In contrast, in most OECD countries patients contact GPs more often than specialists (van Doorslaer *et al.*, 2004b).

Of those who stated a need for ambulatory care, 63 per cent received at least one type of ambulatory care. Considering the individuals who needed inpatient services,

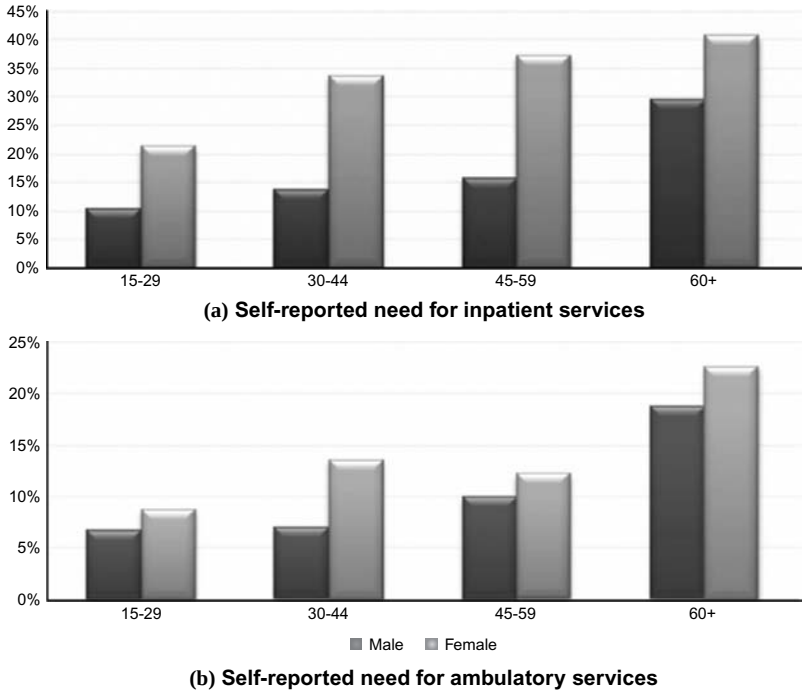


Figure 2.
Proportion of self-reported need for inpatient and ambulatory services among different age-gender groups

81 per cent of the sample utilised hospital services. As can be seen, 1 per cent of the sample utilised ambulatory care which they say they did not need to use.

The individual characteristics show that the average age in this sample is 34 years (Std. 16.6), evenly distributed between the sexes. It is apparent that only one-third of the sample was employed, and with 20 per cent of the sample self-employed (housewives, students and retirees were not counted as part of the workforce). It can also be seen that medical treatment and Social Security Insurance are the two most common carriers and provide health insurance coverage to 58 and 24 per cent of the sample, respectively.

5. Results

This section reports the empirical results starting with inequality analysis. Then, the results of factors associated with unmet need are reported. Finally, the results of factors associated with met unneed for any ambulatory care are presented.

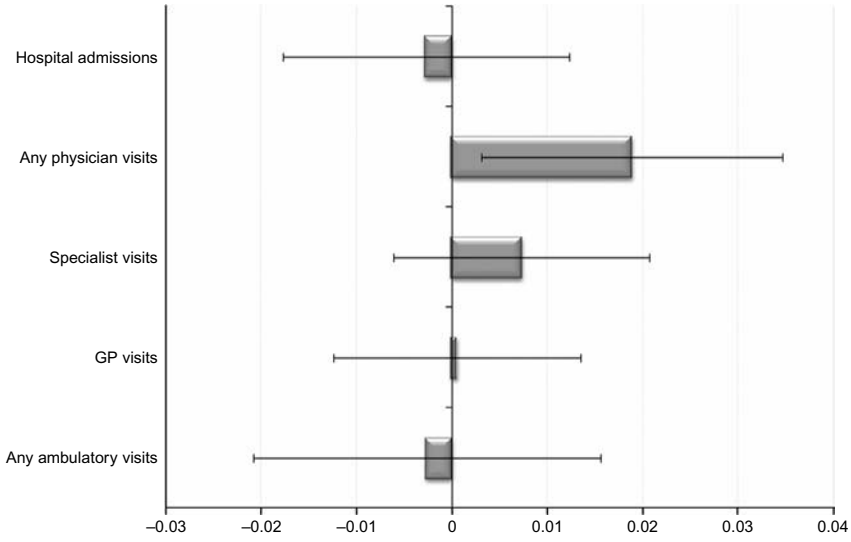
5.1 Inequality analysis

Table II reports the estimated *C*s and *HI*s for both ambulatory and inpatient services. An italic datum in Table II indicates that the index is statistically different from 0 at the 5 per cent level. Figures 3 and 4 show graphical depictions of the *C*s and *HI*s. Table II and Figure 3, show that there is a pro-rich inequality in the measure "any physician visits" in Iran, whereas the calculated *C*s for other health care services are not statistically significantly different from 0 at the 5 per cent level. The distribution of

	Quintile							
	1	2	3	4	5	Total	CI HI	Robust SE
Actual use								
Any ambulatory services, two weeks	0.1471	0.1544	0.1469	0.1555	0.1431	0.1496	−0.0026	0.0093
A GP visit, two weeks	0.0632	0.0796	0.0685	0.0781	0.0675	0.0716	0.0005	0.0066
A specialist visit, two weeks	0.0639	0.0784	0.0765	0.0845	0.0777	0.0764	0.0073	0.0068
Any physician visit, two weeks	0.0873	0.1105	0.108	0.1226	0.1145	0.1088	*0.0188*	0.0081
A hospital admission, 12 months	0.1003	0.0814	0.0815	0.0813	0.0968	0.0878	−0.0027	0.0077
Self-reported need								
Ambulatory need, two weeks	0.2804	0.2387	0.2185	0.1961	0.1738	0.2216	*−0.0794*	0.0109
Inpatient need, 12 month	0.1223	0.1045	0.0975	0.0916	0.0954	0.1021	*−0.0247*	0.008
Horizontal inequity								
Any ambulatory services, two weeks							*0.0768*	0.0143
A hospital admission, 12 months							*0.0220*	0.0111

Notes: Italic font indicates statistically significantly different from 0 at the 5 per cent level; the Erreygers' correction (2009) applied to the calculation of Cs and their standard errors; almost the same results were obtained using Wagstaff's correction (2005)

Table II.
Fraction of sample with self-reported use and self-reported need in each quintile and concentration, and HI indices for ambulatory and inpatient services



Note: Confidence intervals are calculated at the 95% level

Figure 3.
Computed concentration indices for inpatient and ambulatory care in Iran

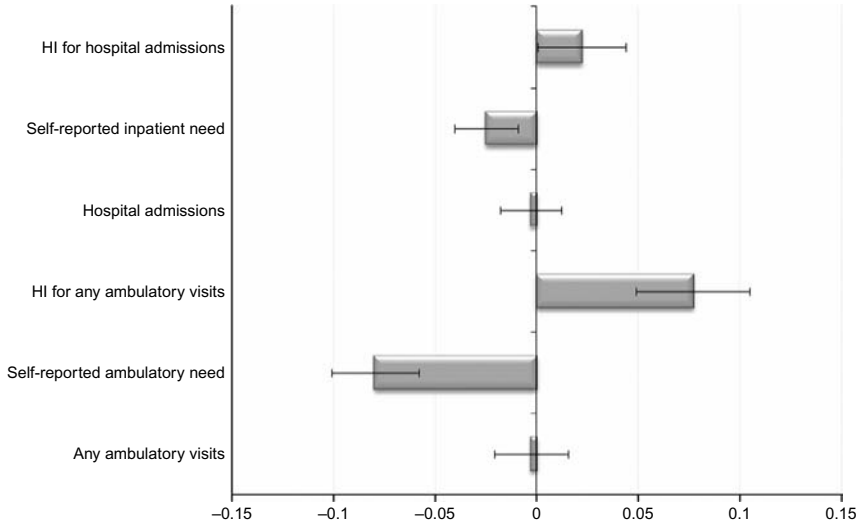


Figure 4.
Concentration and HI indices for inpatient and ambulatory care

Note: Confidence intervals are calculated at the 95% level

self-reported need indicates that needs for ambulatory and inpatient services are highly concentrated among less wealthy individuals.

The results on the *HI* estimates, presented in Table II and Figure 4, show that there is pro-rich inequity in the utilisation of any ambulatory health care services and hospital admissions in Iran, and these are statistically significantly different from zero. In other words, although both the need for health care services and their utilisation are more highly concentrated amongst the poor and the need-adjusted utilisation of ambulatory and inpatient services is pro-rich.

5.2 Factors associated with unmet need

This section investigates the factors that are correlated with unmet need. GLMs are used to examine the correlates of unmet need for any ambulatory visits and hospital admissions. Then, the decomposition analysis was performed to determine the relative contribution of each factor to the inequality of unmet need.

5.2.1 Regression results. Table III presents the regression results of "unmet need" for any ambulatory visits and hospital admissions. First, consider the results for any ambulatory visits: the coefficients on the male-age groups are negative and statistically significant. In other words, the probability of "unmet need" is lower for these age-groups than for the base gender-age group, namely males, 15-29 years of age. Private sector employees have higher probabilities of unmet need for any ambulatory visits, *ceteris paribus*. Among individuals who have a stated need for ambulatory care, self-employed people utilised less ambulatory visits than those individuals who are not employed. Married people were also less likely to have unmet need than individuals who never married. Number of household is another factor that is correlated with unmet need and the probability of unmet need increases with household size.

Type of health care services Independent variables	Any ambulatory visits Ceff.	 SE	Hospital admissions Coeff.	 SE
Male 30-44	−0.1629**	0.6460	0.0268	0.0849
Male 45-59	−0.1055	0.0739	0.0252	0.0901
Male 60 +	−0.1456**	0.0648	−0.0950	0.0805
Female 15-29	−0.0156	0.0446	−0.0311	0.0526
Female 30-44	−0.0141	0.0495	0.0558	0.0630
Female 45-59	0.0062	0.0555	−0.0106	0.0724
Female 60 +	0.0596	0.0626	−0.0720	0.0787
Education level	0.0039	0.0034	−0.0040	0.0043
Employed in public sector	0.0986*	0.0548	−0.1447*	0.0741
Employed in private sector	0.2025***	0.0744	0.0632	0.0827
Self-employed	0.1450***	0.0436	−0.0191	0.0555
Married	−0.1110***	0.0383	0.0383	0.0496
Divorced/Widowed	−0.0992	0.0638	0.1497	0.0994
Household size	0.0072	0.0053	−0.0161**	0.0068
Male ratio	−0.0803	0.0653	0.0100	0.0946
Female headed households	−0.0122	0.1032	−0.1247	0.1185
Medical Treatment Insurance	−0.0677**	0.0341	−0.0802**	0.0408
Social Security Insurance	−0.1336***	0.0342	−0.1422***	0.0443
Armed Forced Insurance	−0.0335	0.0643	−0.1025	0.0854
Imdad (relief) Committee Insurance	0.1025	0.0684	−0.0446	0.0789
Special Organisation Insurance	−0.3186***	0.0640	−0.1698**	0.0737
Comprehensive Insurance	−0.0971***	0.0360	0.0360	0.0455
2nd Wealth Quintile	−0.0806**	0.0356	0.0386	0.0505
3rd Wealth Quintile	−0.0773**	0.0381	−0.0207	0.0487
4th Wealth Quintile	−0.1511***	0.0409	−0.0421	0.0505
5th Wealth Quintile	−0.1702***	0.0478	−0.0023	0.0598
Main rural areas	−0.0157	0.0310	0.0559	0.0393
Remote areas	0.1963***	0.0472	0.0874	0.0731
Constant	0.5810***	0.0789	0.3227***	0.0937
Deviance (χ^2)	796.824		500.024	
Log likelihood	−398.412		−250.012	
n	2,210		1,003	

Note: Significant at: $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$

Table III.
GLM results for unmet need regressions

Also note the results on the health insurance variables "Medical Treatment Insurance", "Social Security Insurance", "Special Organisation Insurance", and "Comprehensive Health Insurance": these coefficients all have negative signs and are statistically significant. This result is consistent with the hypothesis of moral hazard under insurance: individuals with insurance are less likely than uninsured individuals to have unmet health care needs[9].

The coefficients on wealth quintiles also have negative and statistically significant coefficients. It is interesting to note that, generally, the negative marginal effects and coefficients on the wealth quintiles become larger in absolute magnitude (i.e. more negative) from the lowest- to the highest-wealth quintile. This is strong evidence that the chance to meet ambulatory health care needs increases with increasing wealth.

The coefficient on "remote area" also shows that residents of urban areas were less likely to have unmet need for ambulatory care than residents in remote areas of Iran.

Turning our attention to hospital admissions, the results indicate that being employed in the public sector and household size increased the probability of meeting needs for inpatient services. As with ambulatory care, health insurance coverage reduces the probability of unmet need for inpatient services (see the negative and statistically significant coefficients on Medical Treatment Insurance, Social Security Insurance, and Special Organisation Insurance). Finally, and in contrast with ambulatory services, the coefficients on wealth quintiles are not statistically significant. This is in line with expectations, given that the demand for hospital care is less income elastic than for ambulatory care.

5.2.2 Decomposition results. This subsection presents the results of a decomposition analysis, the purpose of which is to identify the contributions of observable variables (and, quite possibly, unobservable variables that are correlated with them) to the wealth-related inequalities in unmet need that were reported above. In fact, as with the results provided in Section 5.2 and regression results, the calculated *C* indices for unmet need also indicate the wealth-related inequalities for health care use. In other words, the *C* indices of unmet need for any ambulatory care visits (-0.1529, p-value $= 0.000$) and hospital admissions (-0.0657, p-value $= 0.003$) indicate that unmet needs for these services are concentrated among the poor. Therefore, we used a method introduced by Wagstaff *et al.* (2003), (see Section 3), in order to decompose the concentration index of unmet need.

The result of the decomposition indicates how much a certain observed factor contributes to the inequality. A factor that is distributed unequally by wealth and has an effect on the probability of unmet need can contribute to inequality in unmet need. The term "contribution" here means how much the variations in a given factor can explain the relationship between unmet need and the wealth rank via its partial association with unmet need (van Doorslaer *et al.*, 2008).

Table IV contains the results of the decomposition analysis for the probability of unmet need for any ambulatory visits. The table contains information about the coefficient, mean value, elasticity (i.e. $\eta_k = \beta_k(\overline{xk}/\mu)$), the *C* of the explanatory variable, and the contribution of each explanatory variable to the *C* index for unmet need.

The negative (positive) sign of the concentration index for each variable reveals that the factor concentrated among the lower (upper) wealth quintiles. For example, self-employed variable is higher among lower wealth quintiles. Whereas, years of schooling (i.e. education level) is higher among relatively wealthy individuals. The positive (negative) value of the contribution to the concentration index shows that the factor increases the probability of unmet need among the rich (poor).

As can be seen, the wealth quintiles make strong negative contribution to the inequality of unmet need for any ambulatory services. In other words, the probability of unmet need is lower among individuals in higher wealth quintiles. This is to be expected given the regression results that were reported in Tables III and IV: recall that the coefficients for the *WI* quintiles were negative. The result also illustrates that the health insurance and region of residence factors make negative contributions to the inequality of unmet need for ambulatory care whereas the contribution of education is positive. The negative contribution of the factor "region" is likely due to the fact that people living in the remote areas are generally poor and they have less access to health

Table IV.
Decomposition analysis of inequality in unmet need for any ambulatory visits

Variable	Ceff.	Mean	Elasticities	C of the variable	Cont. to inequality	Correct. cont. to inequality	Summed cont.
Age-gender groups							
Male 30-44	−0.1629**	0.0528	−0.0232	0.0899	−0.0021	−0.0031**	
Male 45-59	−0.1055	0.036	−0.0103	−0.0064	0.0001	0.0001*	
Male 60 +	−0.1456**	0.0505	−0.0198	−0.1959	0.0039	0.0058***	
Female 15-29	−0.0156	0.2565	−0.0108	−0.0228	0.0002	0.0003*	
Female 30-44	−0.0141	0.2426	−0.0092	0.0813	−0.0008	−0.0012	
Female 45-59	0.0062	0.1463	0.0025	−0.0245	−0.0001	−0.0001*	
Female 60 +	0.0596	0.0894	0.0144	−0.132	−0.0019	−0.0028	−0.0010
Wealth Index							
2nd Wealth Quintile	−0.0806**	0.2333	−0.0508	−0.2933	0.0149	0.0221**	
3rd Wealth Quintile	−0.0773**	0.2055	−0.0429	0.1458	−0.0063	−0.0093***	
4th Wealth Quintile	−0.1511***	0.1764	−0.072	0.5279	−0.038	−0.0563***	
5th Wealth Quintile	−0.1702***	0.148	−0.0681	0.8525	−0.058	−0.0859***	−0.1295
Other socio-economic characteristics							
Education level	0.0039	5.3869	0.0572	0.2356	0.0135	0.0200*	
Employed in public sector	0.0986*	0.0476	0.0127	0.4119	0.0052	0.0077*	
Employed in private sector	0.2025***	0.0279	0.0152	0.0903	0.0014	0.0021**	
Self-employed	0.1450***	0.112	0.0439	−0.077	−0.0034	−0.005	
Married	−0.1110***	0.7423	−0.2226	−0.0041	0.0009	0.0013***	
Divorced/Widowed	−0.0992	0.0644	−0.0173	−0.1541	0.0027	0.0040*	
Household size	0.0072	5.4887	0.1074	−0.0275	−0.003	−0.0044	
Male ratio	−0.0803	0.4888	−0.106	0.0069	−0.0007	−0.001	
Female headed households	−0.0122	0.0221	−0.0007	−0.1929	0.0001	0.0001	0.0247
Health insurance variables							
Medical Treatment Insurance	−0.0677**	0.4277	−0.0782	−0.1404	0.011	0.0163***	
Social Security Insurance	−0.1336***	0.2443	−0.0881	0.259	−0.0228	−0.0338***	
Armed Forced Insurance	−0.0335	0.0348	−0.0032	0.2226	−0.0007	−0.001	
Imdad (relief) Committee Insurance	0.1025	0.0383	0.0106	−0.5069	−0.0054	−0.008	
Special Organisation Insurance	−0.3186***	0.025	−0.0215	0.1594	−0.0034	−0.0050***	
Comprehensive Insurance	−0.0971***	0.0789	−0.0207	0.3733	−0.0077	−0.0114***	−0.0430
Region							
Main rural areas	−0.0157	0.3221	−0.0137	−0.3161	0.0043	0.0064*	
Remote areas	0.1963***	0.0981	0.052	−0.4836	−0.0252	−0.0373***	−0.0310
Residual							0.0265
Concentration index for Unmet Need							−0.1532

Notes: Significant at: *$p < 0.10$, **$p < 0.05$, and ***$p < 0.01$; the standard errors of the contributions were obtained through bootstrapping

care facilities and opportunities and thus a higher probability of unmet need. Health insurance makes a negative contribution to the inequality because in general the probability of having health insurance is higher among the better offs, and having health insurance has a negative impact on the unmet need. Although the education level increases with the wealth index, this factor also makes a positive independent contribution to the inequality of unmet need for ambulatory care. It may be that highly educated people are more inclined to report unmet need for health care than less educated people because they are more aware of their need for health care utilisation.

Figure 5 shows the results of the decomposition analysis for both ambulatory and inpatient care use. According to this figure, the *WI* is the most important factor associated with inequalities of unmet need. Health insurance and regional variables are two other important factors that contribute to the concentration of "unmet need" among the poor in Iran. Education factor makes a negative contribution to the inequality of unmet need for hospital care. Perhaps well-educated people are better able to find the hospital care they need, *ceteris paribus*, and/or put more effort into meeting their inpatient needs than less-educated patients. The decomposition analysis of unmet need for both ambulatory and hospital care illustrates a strong contribution of the residual. This indicates a misspecification of the current model. In other words, there are factors other than the variables in the model that have an affect on the inequality but that we are unable to observe or control.

5.3 Factors associated with "met unneed"

This section investigates the factors that are correlated with "met unneed". The GLM is used to examine the correlates of met unneed for only ambulatory health care because the sample size is insufficient for an investigation of other categories of health care services.

Table V reports the results of the met unneed regression for ambulatory health services. According to the results presented in the table, well-educated people and individuals from larger households are more likely to use ambulatory care that, by their own reckoning, was not needed. The coefficient of "male ratio" is negative and statistically significant, indicating that individuals in highly-feminised households were more likely to have met unneed.

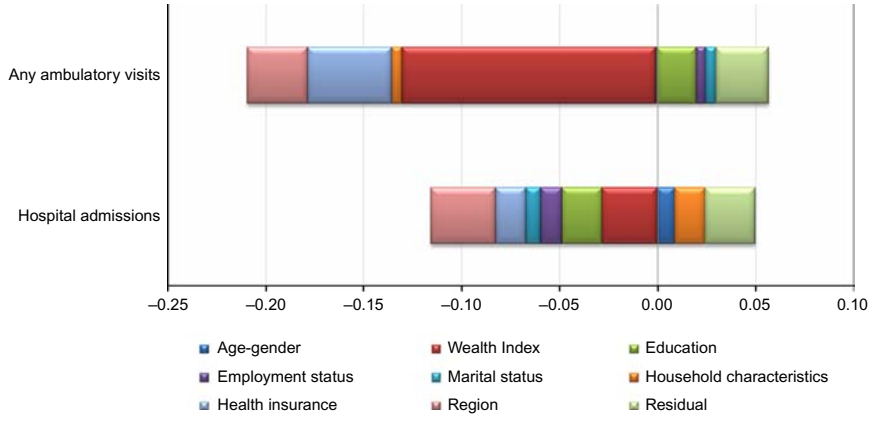


Figure 5.
Relative contribution of each factor to the inequality of unmet need

Type of health care services Independent variables	Any ambulatory visits Coeff.	SE
Male 30-44	−0.0083	0.0052
Male 45-59	−0.0072	0.0062
Male 60 +	−0.0004	0.0070
Female 15-29	0.0013	0.0035
Female 30-44	−0.0070	0.0046
Female 45-59	−0.0087	0.0056
Female 60 +	0.0035	0.0070
Education level	0.0007**	0.0003
Employed in public sector	0.0015	0.0053
Employed in private sector	−0.0079	0.0056
Self-employed	0.0000	0.0038
Married	0.0034	0.0033
Divorced/Widowed	0.0116	0.0064
Household size	0.0017***	0.0005
Male ratio	−0.0169**	0.0066
Female headed households	−0.0035	0.0107
Medical Treatment Insurance	−0.0053	0.0031
Social Security Insurance	−0.0042	0.0032
Armed Forced Insurance	0.0037	0.0069
Other type of health insurance	−0.0097	0.0056
Comprehensive Insurance	0.0010	0.0045
Second wealth quintile	0.0069*	0.0037
Third wealth quintile	0.0030	0.0039
Fourth wealth quintile	0.0093**	0.0042
Fifth wealth quintile	0.0121***	0.0045
Main rural areas	0.0041	0.0031
Remote areas	0.0033	0.0048
Constant	−0.0001	0.0074
Deviance (χ^2)		907.370
Log likelihood		−453.685
n		10,046

Note: Significant at: $^{*}p < 0.10$, $^{**}p < 0.05$, and $^{***}p < 0.01$

Table V.
GLM results for "met unneed" regression

A particularly interesting set of results in Table V is the coefficients on the quintiles of wealth. The coefficients on these variables are positive and statistically significant for all but the third quintiles. This demonstrates that people in higher wealth quintiles used more unneeded ambulatory care than did individuals in the first quintile. The finding that rich people consumed more unneeded ambulatory health care than their poor counterparts is consistent with the hypothesis that wealthy individuals have lower discount rates, and with the availability of more resources to invest in health, at the margin. Based on the results for unmet need and met unneed, it is evident that the probabilities of using both necessary and unnecessary ambulatory health services is higher among wealthier individuals. This findings may be related to the income elasticities of these services, which according to numerous studies (US Public Health Service, 1960; Andersen and Benham, 1970; Silver, 1970; American Medical Association, 1978; Scanlon, 1980; Sunshine and Dicker, 1987; Agency for Health Care Policy and Research, 1997; Parker and Wong, 1997) are strongly positive and sometimes

substantially exceed 1. This means that increases in income are likely to be associated with more consumption of ambulatory care services.

6. Discussion and conclusions

The objective of this study was to assess inequities of health care utilisation in Iran using the UHSS, a national survey conducted in 2003. The UHSS dataset is unique in the sense that, by contrast with the datasets that have traditionally been used for this type of analysis, the UHSS contains information on the self-reported need for health care as well as reported health care consumption. Therefore, not only were computations of concentration and HI indices possible, but also analysis of unmet health care needs and met unneeds for health care services. A decomposition analysis of inequality in unmet need for both ambulatory and inpatient care utilisation was also performed.

The results suggest that self-reported needs for health services in Iran are more concentrated at lower socio-economic levels. The concentration index for any physician visits (only) is statistically significantly different from proportionality and is pro-rich. The calculated *HI* demonstrates that there is a pro-rich inequity in the utilisation of ambulatory and inpatient services in Iran.

This study also shows that, given a stated need for ambulatory care, the probability of seeking any ambulatory care visits were higher among wealthy individuals. Moreover, having health insurance increases the probability of self-reported ambulatory and inpatient needs being met. Public sector employees were also more likely to have their health care needs met, and they used more inpatient services than other Iranians. Being employed in the private sector and being self-employed were associated with decreased probabilities of meeting ambulatory care needs. The results also show that regional differences in seeking ambulatory care exist. Residents of urban areas were more likely to have their need for ambulatory visits met than residents of remote areas of Iran. We also found gender inequalities in favour of males seeking any ambulatory care visits.

The results of our decomposition analysis demonstrate that the wealth index, health insurance, and region of residence are the most important factors that contribute to the inequality of unmet need in Iran. Living in an urban area and possessing health insurance also have positive influences on health care utilisation in Iran. More specifically, people residing in remote areas use ambulatory care less frequently than urban dwellers, and people who have health insurance use more ambulatory and hospital services than people without health insurance.

The results of the met unneed regression for ambulatory health service indicate that individuals from larger households are more likely to use ambulatory care that was not needed. Also, people in higher wealth quintiles used more unneeded ambulatory care than did individuals in the first quintile.

While it would be ideal to distinguish the quality of health care services used by individuals in order to address equity of health care delivery in Iran, there are no available statistics on quality at the aggregate level. Thus, we shall echo the emphasis in van Doorslaer *et al.* (2004b) on the inherent methodological limitation of this work: good and poor quality episodes and different intensities of care are indistinguishable. The implicit assumption that is employed in studies of this kind is that "a visit is a visit" (i.e. a visit is counted as a visit regardless of the differences in the quality of the service). This maintained hypothesis is not amenable to empirical testing with the UHSS data at our disposal.

Based on these results, although underlying principles of the health care system in Iran both in theory and in practise focus on emphasising equity in health care, health care delivery in Iran is not equitable especially in relation to ambulatory care. Thus, if equity in health care delivery is an important objective for Iran, further work is required. Strategies to decrease the share of out-of-pocket expenditure in health care financing should be considered a high priority as out-of-pocket expenses are an important obstacle to health care utilisation, especially among the poor. This reform would require a change in health insurance arrangements: in Iran as the current employer-based health insurance system, with the presence of government-subsidised health services for the uninsureds (i.e. the UIIS and RHIS), does not provide equal protection against health care expenditures in Iran. This is because individuals covered by employer-based insurance face lower out-of-pocket expenditures than those receiving government-subsidised health services (Hajizadeh and Nghiem, 2011). This variation in out-of-pocket expenditures could be an important source of the observed inequalities in health care utilisation between uninsureds and insureds in Iran. A universal health insurance plan that provides uniform services to all individuals regardless of their employment status thus might also reduce inequalities in health care utilisation in Iran. The implementation of such reform requires the involvement of many stakeholders including the MOHME, health insurance organisations (Social Security Organisation, Medical Services Insurance Organisation and Armed Forces Health Insurance), and other government agencies.

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Notes

1. This is a statement made by respondents who used health care services. The respondent's announcement might be affected after receiving the provider's opinion on the necessity of use.
2. The Ministry of Welfare and Social Security is responsible for the supervision of these four major health insurance organisations funds.
3. We used detailed guidelines set out by Vyas and Kumaranayake (2006) to construct the wealth index after selecting those assets and housing characteristics that would be expected to be highly correlated with households' wealth. The result of PCA showed that the first principal component explained almost 20 per cent of total variance.
4. We only analysed the "met unneed" for any ambulatory visits as there are insufficient individuals in the sample who did not need inpatient services but utilised hospital services to allow valid statistical inferences to be drawn.
5. Similar results were obtained when we employed probit model in the analysis of "unmet need" and "met unneed".
6. This includes a broad range of non-inpatient services such as GP visits, specialist visits, dental services, other (non-GP) health professional's services, alternative therapies, and traditional medicine.

7. This measure is used only for the category "any ambulatory care in the last two weeks", as there were insufficient observations of met unneed for inpatient services.
8. According to the Medical Council of Iran, the total number of doctors (GPs and Specialists) in Iran was 94,409 (68 per cent male and 32 per cent female) in 2006/2007. The proportion of GPs and specialists in relation to the total number of doctors were 64 and 36, respectively (Damari *et al.*, 2008).
9. Whether this particular manifestation of moral hazard is a source of efficiency or inefficiency is, however, an open question.

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