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Inequality and inequity in healthcare utilization in urban Nepal: a cross-sectional observational study

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Abstract

Inequality in access to quality healthcare is a major health policy challenge in many low- and middle-income countries. This study aimed to identify the major sources of inequity in healthcare utilization using a population-based household survey from urban Nepal. A cross-sectional survey was conducted covering 9177 individuals residing in 1997 households in five municipalities of Kathmandu valley between 2011 and 2012. The concentration index was calculated and a decomposition method was used to measure inequality in healthcare utilization, along with a horizontal inequity index (HI) to estimate socioeconomic inequalities in healthcare utilization. Results showed a significant pro-rich distribution of general healthcare utilization in all service providers (Concentration Index: 0.062, $P < 0.001$; HI: 0.029, $P < 0.05$) and private service providers (Concentration Index: 0.070, $P < 0.001$; HI: 0.030, $P < 0.05$). The pro-rich distribution of probability in general healthcare utilization was attributable to inequalities in the level of household economic status (percentage contribution: 67.8%) and in the self-reported prevalence of non-communicable diseases such as hypertension (36.7%) and diabetes (14.4%). Despite the provision of free services by public healthcare providers, our analysis found no evidence of the poor making more use of public health services (Concentration Index: 0.041, $P = 0.094$). Interventions to reduce the household economic burden of major illnesses, coupled with improvement in the management of public health facilities, warrant further attention by policy-makers.

Key words: Health economics, health inequalities, health care utilization

Introduction

Universal health coverage aims to ensure equitable use of healthcare services for thllose in need without the imposition of financial risk (World Health Organization 2005, 2010). Providing equal treatment for those who have the same needs for healthcare, regardless of their socioeconomic and cultural background (Culyer and Wagstaff 1993; Van Doorslaer *et al.* 2000), has become a shared goal among many policymakers who strive to improve health systems. In an attempt to ensure equitable access to healthcare services, governments have been raising their health expenditures – for instance, between 2000 and 2011, per person public spending on health increased by 93% globally and by 127% in low-income countries with adjustment of purchasing power parity (World Health Organization 2014).

In Nepal, per capita government spending on health has increased from 11 to 29 international dollars between 2000 and

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Key Messages

- This study examines the major sources of inequity in healthcare utilization using data from a cross-sectional survey from urban Nepal.
- This study found a significant pro-rich distribution of healthcare use in private service providers.
- The pro-rich distribution of healthcare use and treatment was due to inequalities in household economic status and in the self-reported prevalence of non-communicable diseases such as hypertension and diabetes.
- Our analysis found no evidence of the poor making more use of public health services.

2011 (World Health Organization 2014). Around 80% of government health spending is allocated to public service providers via input-based financing, by which public health facilities receive funding to cover their operational costs. As such, most free - healthcare services are provided at health posts, primary healthcare centres and publicly-funded district hospitals (Torres *et al.* 2011).

Despite the large share of national health spending committed to the public sector, there is no evidence that the current health financing system allows equitable utilization of healthcare. Equity in health can only be attained if persons with the same level of healthcare needs receive equal treatment (Culyer and Wagstaff 1993). Therefore, it is important to assess equity in utilization rather than access to healthcare, since access simply denotes an opportunity to receive healthcare, while utilization means exercising the opportunity (Mooney 1983). In OECD countries, previous studies assessing equity in general healthcare utilization have consistently identified a pro-rich concentration in physician visits, even where government spending is intended to cover the majority of healthcare expenses (Van Doorslaer *et al.* 2000; Doorslaer *et al.* 2004; Bago d'Uva *et al.* 2009), and the same propensity has been reported from three developed countries in Asia (Lu *et al.* 2007). Reports from Africa have also shown persistent inequity in healthcare utilization (Bonfrer *et al.* 2014). Here, we examined the inequality and inequity in utilization of healthcare services under Nepal's current health financing framework, using cross-sectional household survey data.

Methods

Study design and data

Data on healthcare utilization were collected in five municipalities (Kathmandu, Kirtipur, Lalitpur, Madhyapur-Thimi and Bhaktapur) in Kathmandu Valley between November 2011 and January 2012. Details of the study design and data collection method have been published elsewhere (Saito *et al.* 2014). In brief, a total of 2000 households were sampled by probability-based multistage random cluster sampling, a common sampling method in cross-sectional household surveys which ensures the representativeness of samples in the study area (Macro International Inc. 1996). The pre-tested and validated study questionnaire included information on household demographics, education, consumption and durable goods, and self-reported disease episodes; and for each illness episode, information on care-seeking behaviour, treatment costs and hospitalization costs. We recorded all health provider visits and all types of morbidities that occurred in the past 30 days prior to the interview. All the reported illnesses/symptoms were coded according to a list of disease codes developed based on previous studies (Ahmed *et al.* 2005; Ir *et al.* 2010) and a focus group discussion conducted with primary healthcare workers in Kathmandu. Disease codes contained both the diagnosis made by doctors, or the symptoms if the patient had not seen a certified healthcare provider. Interviewers cross validated a

diagnosis with an outpatient card or hospital discharge report whenever these were available.

Variables

Table 1 shows the list of variables used in the analysis and the sample characteristics. Healthcare utilization was recorded as any visit to a public, private or traditional healthcare provider for outpatient and/or inpatient care in the 30 days prior to the interview. Private healthcare providers included both for-profit and NGO-based service providers (Hotchkiss *et al.* 2014), and traditional healthcare providers denoted ayurvedic, homeopathic and traditional healers.

We grouped predictors of healthcare utilization into need factors, non-need factors and economic status. Need factors are biological determinants used as a proxy for healthcare needs, which include age, sex and morbidity (O'Donnell *et al.* 2008). We included the 10 most commonly-reported diseases/symptoms as morbidity variables. Non-need factors are socioeconomic-related predictors for healthcare utilization, which include the education level of the individual (primary or lower, secondary or above) (O'Donnell *et al.* 2008; Trani and Barbou-des-Courieres 2012) and marital status (never-married, currently married, divorced/separated/widowed). Economic status was derived from household consumption in the past 30 days, by aggregating consumption of purchased or home-produced goods (foods, non-foods, housing and durable goods) (O'Donnell *et al.* 2008), which was converted into the logarithm of adult-equivalent consumption (Deaton and Zaidi 2002). Adult-equivalent consumption was also used as the ranking variable for the wealth status of the individual.

Concentration index

We constructed a concentration curve to illustrate inequality in healthcare use by the type of provider used in the previous 30 days. A concentration curve lying below the line of equality means that healthcare utilization is concentrated more among the wealthier (O'Donnell *et al.* 2008). To calibrate the degree and statistical significance of inequality, we used a concentration index that denotes differences in healthcare utilization across wealth status (O'Donnell *et al.* 2008). In this study, C_M is the concentration index for actual utilization of healthcare utilization with ranges lying between -1 and 1. The concentration index C_M is calculated using the covariance between the healthcare utilization and the fractional rank of the individual sorted by wealth status:

$$C_M = \frac{2}{\bar{y}} \, \text{Cov}_w \, (y_i, \, R_i), \tag{1}$$

where y_i is the binary variable of whether the ith person had used public, provider, traditional or all types of providers in the previous 30 days, $\bar{y}$ stands for the mean of actual healthcare utilization, R_i denotes the fractional rank of the ith individual by wealth status, and Cov_w i is the covariance with sampling probability weights

Table 1. Sample characteristics by type of health service provider used in the previous 30 days, Nepal, 2011–2012 (**N** = 9177 individuals)[a]

	All individuals		Public		Private		Traditional[b]		All providers	
	N	%	N	%	N	%	N	%	N	%
Total	9177	100.0	655	6.9	1925	21.6	128	1.4	2436	27.1
Need factors										
Age										
Age under 30	4786	54.9	166	29.9	719	39.2	29	22.3	863	37.8
Age 30–59	3551	37.3	312	46.9	803	43.8	68	52.2	1046	44.1
Age 60 and above	840	7.8	177	23.2	403	17.0	31	25.5	527	18.2
			P-value	<0.001		<0.001		<0.001		<0.001
Sex										
Male	4617	51.0	320	49.8	885	46.2	58	44.1	1149	47.8
Female	4560	49.1	335	50.2	1040	53.8	70	55.9	1287	52.3
			P-value	0.67		<0.001		<0.001		0.01
Self-reported diseases/symptoms										
Cold/cough/fever	1131	12.8	115	19.0	792	41.1	24	20.8	887	36.6
Peptic ulcer/gastritis	291	3.6	65	10.3	176	9.6	35	32.3	228	9.9
Arthritis	245	2.9	71	8.7	159	8.7	30	22.4	205	8.4
Asthma	130	1.1	48	5.6	97	4.2	7	4.5	125	4.1
Migraine/headache	70	0.9	19	3.4	46	2.9	4	2.6	62	3.1
Injury	69	0.7	24	3.5	46	2.4	3	2.0	66	2.6
Heart diseases	71	0.6	39	4.8	50	2.0	0	0.0	70	2.2
Eye problem	40	0.3	21	2.9	20	0.7	2	2.0	36	1.1
Hypertension ($\geq$20 yrs)	656	10.2	201	32.2	480	31.6	29	26.1	615	30.9
Diabetes ($\geq$20 yrs)	248	3.6	81	13.3	185	11.1	14	11.2	237	11.2
Non-need factors										
Education level										
Primary or lower	3581	40.0	365	56.9	953	50.1	65	50.7	1232	50.9
Secondary or higher	5596	60.0	290	43.1	972	49.9	63	49.3	1204	49.1
			P-value	<0.001		<0.001		0.008		<0.001
Marital status										
Never-married	3988	44.6	149	24.5	629	32.9	20	13.8	757	31.8
Currently married	4891	52.4	449	68.1	1150	59.6	99	82.3	1491	61.0
Divorced/separated/widowed	298	3.0	57	7.4	146	7.5	9	3.9	188	7.3
			P-value	<0.001		<0.001		<0.001		<0.001
Household economic status										
Household consumption per capita in NRs.			8862 (median)							

Sample weights applied. A total of 1997 households out of 2000 sampled households responded to the interview (99.8% response rate).

[a]Note that there are individuals who used more than one health service provider and/or who had multiple morbidities.

[b]Traditional providers include ayuredic, homeopathic and traditional healers.

(Kakwani *et al.* 1997; Doorslaer *et al.* 2004). The 95% confidence intervals for the concentration index and the associated *P*-values were obtained by the delta method (Kakwani *et al.* 1997; Koolman and Van Doorslaer 2004; Rao 2009). If the concentration index is significantly smaller than 0, poor individuals are more likely to use healthcare, while a C_M larger than 0 indicates that utilization is biased towards wealthier individuals (Kakwani *et al.* 1997; Van Doorslaer and Masseria 2004)

Decomposition of inequality

We conducted a decomposition analysis to assess the extent to which each of needs, non-needs and consumption factors contributes to the inequality in healthcare utilization. We used the linear approximation of a probit model with the partial effects evaluated at means (Doorslaer *et al.* 2004), which is expressed as:

$$y_i = \alpha^m + \sum_j \beta_j^m x_{ij} + \sum_k \gamma_k^m z_{ik} + \varepsilon_i, \qquad (2)$$

where i denotes the ith individual, x_{ij} refers to the jth need factor of the ith individual, z_{ik} is the kth non-need and consumption factor, and α^m is the intercept; β_j^m and γ_k^m are the marginal effects, dy/dx_j and dy/dz_k, of each need (x) and non-need/consumption (z) factor

evaluated at sample means; and ϵ_i is the error term, which includes approximation errors (Doorslaer *et al.* 2004). Plugging in the estimated coefficients from Equation (2), the concentration index (C_M) for y can thus be expressed as:

$$C_M = \sum_j (\beta_j^m \overline{x}_j/\mu) C_j + \sum_k (\gamma_k^m \overline{z}_k/\mu) C_k + GC_\epsilon/\mu, \qquad (3)$$

where μ is the mean of y; C_j and C_k are the concentration index of x_j and z_k, respectively, and calculated similarly to Equation (1); and GC_ϵ is the generalized concentration index of the error term ϵ (Doorslaer *et al.* 2004; O'Donnell *et al.* 2008). The products $(\beta_j^m \overline{x}_j/\mu) C_j$ and $(\gamma_k^m \overline{z}_k/\mu) C_k$ are the contribution of a need factor j and a non-need and consumption factor k to the actual concentration index, respectively. A concentration index was estimated for each of the factors, along with absolute and percentage contributions to the inequality in actual healthcare utilization (C_M). A positive (negative) contribution indicates that the given variable operates towards pro-rich (pro-poor) distribution of healthcare visits.

Horizontal inequity

To measure the inequity in healthcare utilization, we estimated the horizontal inequity index (HI), which denotes socioeconomic
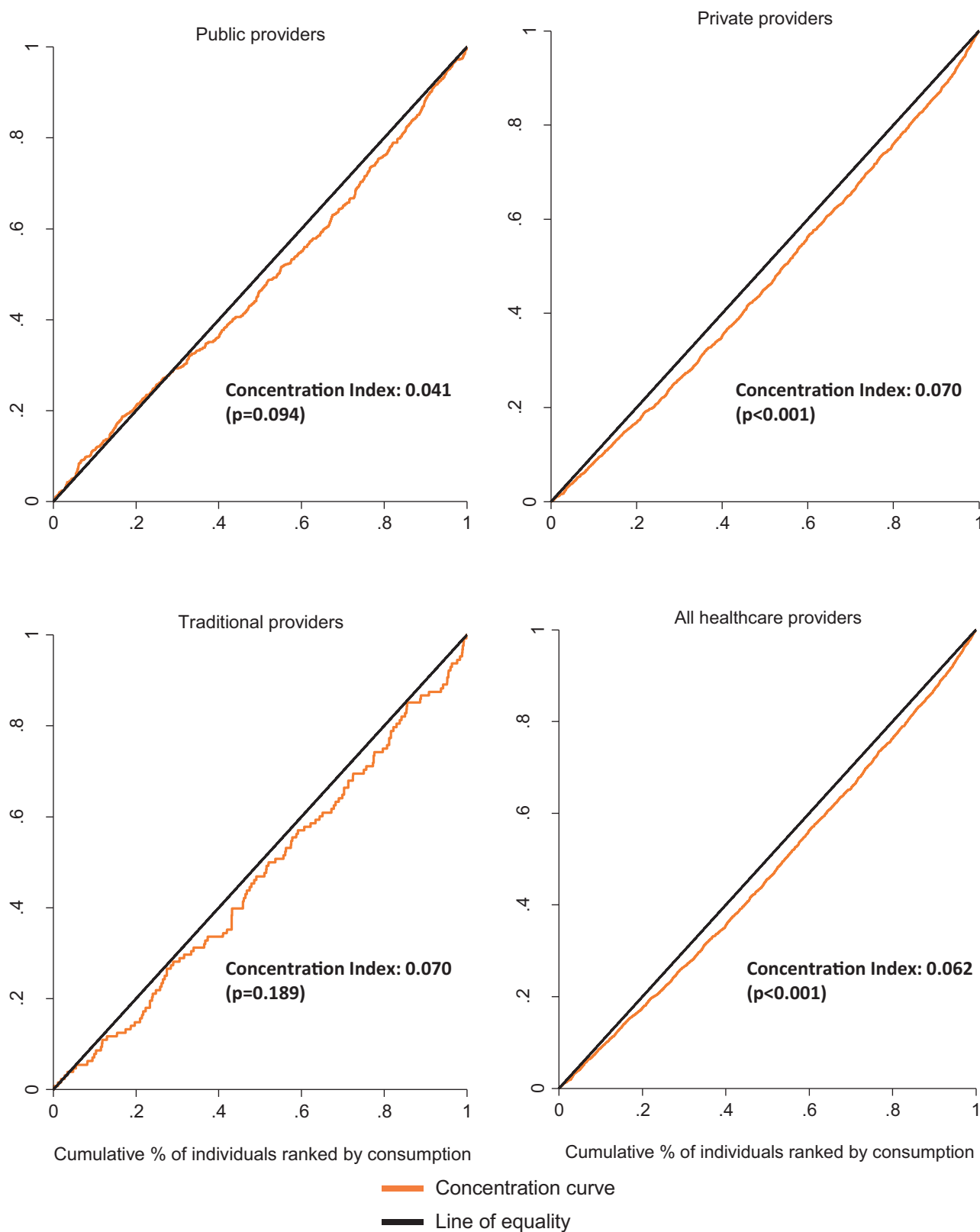
Figure 1. Concentration curves for probability of healthcare use by type of providers, Nepal, 2011-2012.

differences in healthcare utilization with control for the effects of biological needs (Van Doorslaer *et al*. 2000). Subtracting the absolute contributions made by need factors from the concentration index for actual healthcare utilization (C_M) yields the HI (O'Donnell *et al*. 2008). The HI ranges between -2 and 2, with a significantly positive (negative) HI standing for pro-rich (pro-poor)
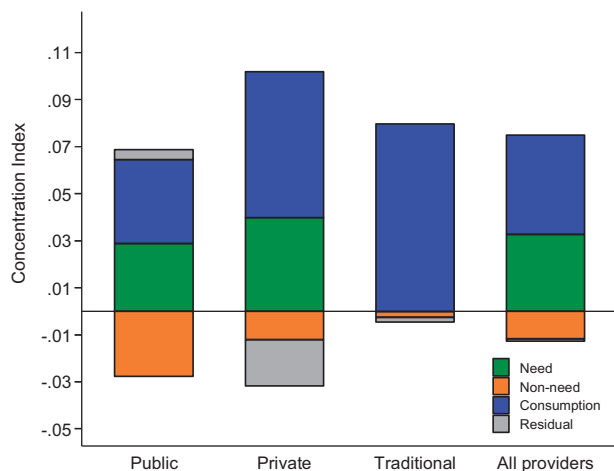
Figure 2. Contributions of need, non-need and consumption factors to concentration index for probability of healthcare use, by types of healthcare providers used, Nepal, 2011–2012.

inequity (Van Doorslaer et al. 2000). We obtained P-values for the HI using a probit model which standardized the need factors (Wagstaff and Van Doorslaer 2000). Stata version 12.1 (StataCorp, College Station, TX) was used for all analyses.

Results

Table 1 shows the characteristics of individuals in the sampled households. In total, 1997 households responded to the interview (99.8% response rate). Overall, private service providers were used more frequently (21.6%) than public (6.9%) and traditional providers (1.4%) irrespective of the individual's background characteristics. Figure 1 plots the concentration curves for probability of healthcare utilization by type of provider in the previous 30 days. A significant pro-rich distribution of healthcare utilization was observed for all providers (Concentration index: 0.062, P < 0.001) and for private service providers (Concentration index: 0.070, P < 0.001).

Figure 2 depicts the inequality in healthcare utilization decomposed by need, non-need, consumption factors and a residual term. Need factors and household economic status accounted for the pro-rich concentration of healthcare utilization in both public and private providers, while non-need factors operated to reduce the pro-rich concentration in the utilization of both public and private providers.

Table 2 shows detailed contribution of need, non-need and consumption factors to inequality in healthcare utilization probability. Household economic status was by far the most influential factor for pro-rich utilization in all providers (67.8%), public providers (88.0%), private providers (88.5%) and traditional providers (116.4%). Self-reports of illnesses, including hypertension and diabetes, showed strong contributions in favour of the rich across all types of service provider, which cancelled out the pro-poor distribution in self-reports of other illnesses. In contrast, being educated to the secondary level or higher contributed to pro-poor healthcare utilization, which was most pronounced in public service utilization (−68.3%). Horizontal inequity—after deducting the inequality induced by need factors—was significantly pro-rich in the utilization of private (0.030, P < 0.001) and all service providers (0.029, P < 0.001).

Discussion

This study found a pro-rich concentration of private healthcare utilization in urban Nepal. Our results are consistent with previous studies on general healthcare utilization in Hong Kong, China (Leung et al. 2009; Elwell-Sutton et al. 2013), and on the provision of institutional deliveries at private facilities in Bangladesh and Nepal (Hotchkiss et al. 2014). Decomposition of need and non-need factors in previous studies has consistently shown that need factors such as age, sex and self-reported health status operate in a pro-poor direction (Doorslaer et al. 2004; Elwell-Sutton et al. 2013; Bonfrer et al. 2014). However, our analyses showed that self-reports of diabetes or hypertension, which are need factors, operate largely towards a pro-rich distribution of healthcare utilization, while the effects of other self-reported illnesses/symptoms were either pro-poor or only marginally pro-rich. This may be because the self-reported prevalence of diabetes and hypertension are concentrated in wealthier individuals in the case of urban Nepal, although we cannot exclude the possibility of undiagnosed cases (Saito et al. 2014). Among the non-need factors, having secondary or higher education has a pro-poor effect on healthcare utilization in our study. This contradicts the findings of some previous studies which found that higher education makes a pro-rich contribution to healthcare utilization (Liu et al. 2002; Van Doorslaer and Masseria 2004). However, our results are consistent with those from other low-income settings, such as Anglophone countries in Africa (Bonfrer et al. 2014). The role of secondary or higher education in pro-poor utilization might be that people with education may be able to identify, make decisions about and use affordable healthcare services (Navaneetham and Dharmalingam 2002).

Similar to previous reports, our results showed that household consumption makes by far the greatest pro-rich contribution in healthcare utilization (Doorslaer et al. 2004; Lu et al. 2007; Bago d'Uva et al. 2009; Leung et al. 2009; Elwell-Sutton et al. 2013; Bonfrer et al. 2014). Such an income gradient is plausible for utilization of the private sector, as private providers operate on a fee-for-service basis in Nepal, and patients need to bear the full cost of treatment (Saito et al. 2014). Unexpectedly, our analysis found no evidence that the poor made more use of public health services, and showed that they had even less probability of healthcare utilization after adjusting for inequality in need factors, despite the provision of free consultation services at public facilities. This contradicts with findings in Hong Kong, where public services are used predominantly by the less well-off, and Hong Kong also maintains tax-based health financing to cover public services (Leung et al. 2009). Past studies have found dissatisfaction with factors such as long waiting times, drug shortages and medical equipment reduce the utilization rates (Basu et al. 2012). Improving the management of public service providers may encourage the utilization of public facilities amongst the poorest, and provide a relatively low-cost mechanism for providing financial protection for some illnesses.

One important reason for the underutilization of public facilities can be a heavy burden of out-of-pocket payments. First issue is limited coverage of financial protection. In Nepal's case, public health services are financed from general government revenues, and healthcare is delivered by salaried doctors and staff (Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH and Ministry of Health and Population 2010). Although the Government of Nepal endorsed a National Health Insurance policy in 2013 which aimed at universal coverage of health services and financial protection (Central Bureau of Statistics and The United Nations Children's Fund 2011), this scheme has not been

Table 2. Detailed contributions to inequality in probability of healthcare utilization by need, non-need and consumption factors, Nepal, 2011–2012

	Public Contributions to CM	Percentage contributions	Private Contributions to CM	Percentage contributions	Traditional Contributions to CM	Percentage contributions	All providers Contributions to CM	Percentage contributions
CI for actual healthcare use (CM)	0.041	100.0	0.070	100.0	0.070	100.0	0.062	100.0
Horizontal Inequity (HI) index	0.012		0.030		0.071		0.029	
Residual	0.004	10.2	−0.020	−28.0	−0.002	−2.9	−0.001	−1.4
Need factors								
Age								
Under 30 years	Ref.							
30–59 years	0.003	8.5	0.003	4.8	0.003	3.8	0.003	4.3
60 and above	0.001	3.4	0.000	0.6	0.002	2.7	0.001	1.6
Sex								
Male	Ref.							
Female	0.000	−0.6	0.000	0.2	0.000	0.0	0.000	0.0
Self-reported disease								
Hypertension	0.017	42.7	0.028	40.1	0.006	8.1	0.023	36.7
Diabetes	0.009	22.7	0.012	16.5	0.006	8.4	0.009	14.4
Heart diseases	0.003	7.2	0.001	1.5	n.a.	n.a.	0.001	1.7
Cold/cough/fever	0.001	3.3	0.004	6.3	0.001	1.9	0.003	5.4
Injury	0.000	1.0	0.000	0.5	0.000	0.0	0.000	0.5
Eye problem	0.000	−0.8	0.000	−0.1	0.000	−0.2	0.000	−0.2
Asthma	0.000	−0.8	0.000	−0.5	0.000	−0.2	0.000	−0.5
Peptic ulcer/gastritis	−0.003	−8.1	−0.005	−6.6	−0.014	−19.8	−0.004	−6.0
Arthritis	−0.001	−2.7	−0.002	−3.5	−0.004	−5.9	−0.002	−2.7
Migraine/headache	−0.002	−4.9	−0.002	−2.9	−0.001	−0.8	−0.002	−2.9
Non-need factors								
Education level								
Primary or lower	Ref.							
Secondary or higher	−0.028	−68.3	−0.012	−16.9	−0.008	−12.1	−0.012	−19.0
Marital status								
Never-married	Ref.							
Currently married	0.000	−0.3	0.000	0.0	0.000	−0.3	0.000	0.0
Divorced/separated/widowed	0.000	0.4	0.000	−0.5	0.001	0.9	0.000	−0.2
Household consumption (log of consumption per capita)	0.036	88.0	0.062	88.5	0.081	116.4	0.042	67.8

Decomposition based on probit model results. Sample weights applied. Statistically significant CM and HI are in bold type ($P < 0.05$).

implemented to date, and the coverage of financial protection remains sporadic given the country's limited fiscal space (Belay and Tandon 2011). Notwithstanding the availability of some subsidiary schemes, inconsistency exists between healthcare needs and the patient's ability to pay. Although free essential drugs are provided at public health facilities, other medicines for treatment of non-communicable diseases and medical examinations are paid for by patients in the current health financing framework (Ministry of Health and Population 2009; Torres *et al.* 2011). To ensure equitable access to necessary treatment, the majority of the population would benefit from alternative financing, such as starting from a small-scale health insurance programme covering major non-communicable diseases, with the central government consolidating the risk-pooling across insurances groups, to incrementally broaden its coverage (World Health Organization 2010; Spaan *et al.* 2012). For instance, urban health insurance reform in China significantly improved equity in the utilization of outpatient care services between 1994 and 1996 (Liu *et al.* 2002).

This study has several limitations. First, data collection was conducted between November 2011 and January 2012, which was the winter season. Change in the prevalence of infectious diseases such as common cold or diarrhoea might have altered healthcare needs. For instance, diarrhoea occurs primarily in the rainy season (Strand *et al.* 2012). However, the Nepal Living Standard Survey 2010/2011, which took place in four different seasons, confirmed that cold/cough/fever was the most prevalent disease throughout the year (Central Bureau of Statistics 2011). Chronic illnesses showed consistent prevalence when we validated the history of illness in the past 30 days and past 12 months.

Second, the study is based on self-reported illnesses. Healthcare needs for non-communicable diseases are better estimated by physical measurements and blood tests, but logistical constraints of the study allowed only the face-to-face interviews. For this reason, there might have been potential health needs that were not calibrated in our study. Despite the limitations, this is the first study in low-income settings to assess inequalities in healthcare utilization with validated disease types from a population-based household survey with a high response rate, following an established method that is commonly used in other cross-sectional surveys with a reliable sampling frame built from the latest census data.

Conclusion

This study observed a pro-rich distribution of healthcare utilization in all providers and private service providers. Socioeconomic inequity in healthcare visits widened for private provider visits. The pro-rich distribution of healthcare utilization was largely attributable to household economic status and self-reports of diabetes or hypertension, which outweighed the pro-poor contribution of other need and non-need factors. Our analysis found no evidence of the poor making more use of public health services, and even less so after adjusting for inequality in need factors. Financial barriers due to high out-of-pocket payments may explain the limited access to both private and public facilities. Interventions to reduce the household economic burden of major illnesses, coupled with improvements in the management of public health facilities, warrant further attention by policymakers.

Ethical approval

Ethical approval for the survey was obtained from the Research Ethics Committee of the University of Tokyo (approval number

3447) and from the Nepal Health Research Council (NHRC registration number 49/2011) in August 2011. Survey respondents received a full explanation of the content of the study, as well as the risks, benefits, freedom to participate and confidentiality before signing the informed consent sheet for the interview.

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