Horizontal equity in health care utilization evidence from three high-income Asian economies

Jui-fen R. Lu, Gabriel M. Leung, Soonman Kwon, Keith Y.K. Tin, Eddy Van Doorslaer, Owen O’Donnell

Abstract

This paper compares the extent to which the principle of “equal treatment for equal need” (ETEN) is maintained in the health care delivery systems of Hong Kong, South Korea and Taiwan. Deviations in the degree to which health care is distributed according to need are measured by an index of horizontal inequity. Income-related inequality in utilization is split into four major sources: (i) direct effect of income; (ii) need indicators (self-assessed health status, activity limitation, and age and gender interaction terms); (iii) non-need variables (education, work status, private health insurance coverage, employer-provided medical benefits, Medicaid status (low-income medical assistance), geographic region and urban/rural residency and (iv) a residual term. Service types studied include western doctor, licensed traditional medicine practitioner (LTMP), dental and emergency room (ER) visits, as well as inpatient admissions. Violations of the ETEN principle are observed for physician and dental services in Hong Kong. There is pro-rich inequity in western doctor visits. Unusually, this inequity exists for general practitioner but not specialist care. In contrast, South Korea appears to have almost comprehensively maintained ETEN although the better-off have preferential access to higher levels of outpatient care. Taiwan shows intermediate results in that the rich are marginally more likely to use outpatient services, but quantities of western doctor and dental visits are evenly distributed while there is modest pro-rich bias in the number of LTMP episodes. ER visits and inpatient admissions in Taiwan are either proportional or slightly pro-poor. Future work should focus on the evaluation of policy interventions aimed at reducing the observed unequal distributions.

Keywords: Income-related inequality; Income-related inequity; Decomposition analysis; Health care utilization; Hong Kong; South Korea; Taiwan

Introduction

Health systems are widely recognized as an important determinant of and means to improve population health; thus their performance matters (WHO, 2000). The distributional implication of the
system is one dimension of performance that deserves particular attention because it is a major axis on which health systems are commonly judged. One of the core distributional concerns in most systems with egalitarian goals, mainly from the developed West so far, is to ensure that the horizontal equity standard is met, such that there is “equal treatment for equal need” or ETEN, notwithstanding the intense debate about its theoretical foundations and specifications previously (Culyer, Van Doorslaer, & Wagstaff, 1992; Le-Grand, 1991; Mooney, Hall, Donaldson, & Gerard, 1991; Wagstaff, Van Doorslaer, & Paci, 1991). Consistency of health care delivery systems with this principle has been tested across a number of OECD countries (Van Doorslaer, Koolman & Jones, 2004; Van Doorslaer, Koolman, & Puffer, 2002; Van Doorslaer, Masseria, & Koolman, 2006). There is however little evidence against which to evaluate the equity performance of the health systems of the high-income economies in Asia.

Whereas most OECD countries, with the US as a notable exception, have had a long history of developing social protection systems which are rooted in the egalitarian tradition, the three Asian health systems under consideration, Hong Kong, South Korea and Taiwan, have developed over a much more compressed timeframe concomitant with their rapid economic advance. Comparison of the equity performance of these three health systems is interesting given substantial differences between them in the financing and organization of health care. Moreover, the pervasive use of non-western allopathic health care in this region calls for the inclusion of licensed traditional medicine practitioners (LTMPs) in any equity analysis.

Health system characteristics

Hong Kong

As a former British colony, the development of Hong Kong’s health system closely followed that of the UK National Health Service. Annual total health expenditure was 5.5% of GDP in 2001/2 where public and private funding sources accounted for 56% and 44% of total spending, respectively. About 95% of public funding is derived from government general revenue with the rest recovered from fees and charges at the point-of-care. About 70% of private health financing is through out-of-pocket household expenditure, with private insurance schemes and employer-provided medical benefits accounting for the remainder. In terms of the delivery of care, 95% of total bed-days in Hong Kong are provided in the public sector. Provision of outpatient services is shared between private and public sectors in the ratio of 70:30, respectively. Hong Kong has no functional primary care network to perform gate keeping from inappropriate escalation of care. About half of all specialists work in the private sector, most of whom combine specialty care with general practice. All complementary care services including LTMPs, i.e. Chinese medicine, and other traditional or non-allopathic healers are provided in the private sector where out-of-pocket, fee-for-service payment is the predominant mode of financing (Leung, Wong, Chan, Choi, & Lo, 2005).

South Korea

Social health insurance was first introduced in the Republic of Korea for industrial workers in large firms in 1977. After incremental extension of population coverage based on insurance societies in firms for employees and geographic regions for the self-employed, Korea achieved universal coverage in 1989. National health insurance (NHI) experienced a major change when it became a single payer by merging all insurance societies in 2000 (Kwon, 2003a). Insurance premiums are proportional to income and shared equally by the employer and the employee. For the self-employed, government provides partial subsidy, and premium payments of the poor is fully subsidized. NHI offers a comprehensive benefit package including inpatient, outpatient care and traditional medicine. More than 90% (85%) of acute care hospitals (beds) are private. Hospitals run large outpatient centers as a feeder for inpatient services. There is considerable service overlap, and thus competition, between physician clinics and hospitals. Health care providers are reimbursed on a fee-for-service basis according to a government-regulated uniform fee schedule (Kwon, 2003b). Health care providers have a perverse incentive to rapidly adopt new services and high-technology care that are not NHI covered and thus outside the regulated purview of the standardized fee schedule, consequently contributing to a high proportion of household direct payment (35%) in national health expenditure. Traditional medicine is popular in Korea, and acupuncture is covered by NHI while only a limited number of herbal medicines are covered.
Taiwan

As of 2003, Taiwan spent 6.3% of GDP on health, where direct payment by households accounted for roughly 30% of national health expenditure (Department of Health, 2003). Taiwan achieved universal coverage in 1995 by integrating three existing social insurance schemes into the single-payer NHI program. NHI offers comprehensive benefit coverage that includes ambulatory care as well as inpatient services. Visits to LTMPs and dentists are also covered, but only to a limited extent.

Taiwan has a market-oriented health care delivery system, reflecting its free-enterprise economy (Lu & Hsiao, 2003), as evidenced by the pluralistic organization of health services. Hospital ownership is mixed where public hospitals account for 35% of all beds (Department of Health, 2003). Sixty-three percent of allopathic physicians are salaried employees of hospitals and the remainder are fee-for-service private practitioners. Chinese medicine practitioners, who are licensed medical professionals although not all underwent formal structured education, mainly practice in privately owned clinics. Over the years, hospitals have developed large outpatient departments and affiliated clinics for primary care in order to maintain inpatient volume and compete with private practitioners who operate free-standing clinics with beds (Lu & Hsieh, 2003). NHI revenue relies on payroll-based premiums with the government subsidizing the poor, veterans and farmers.

Table 1 summarizes key economic and health indicators and system characteristics of these three populations.

Equity and ETEN policy orientation

All three systems have developed in line with the egalitarian tradition where there is universal coverage and access to a fairly comprehensive range of services, either through social insurance contributions or general taxation. Hong Kong boasts a longstanding, expressed policy objective that “no one will be denied adequate medical care due to a lack of means”, and “providing equal access to health care for all citizens” was one of the two essential objectives promulgated when the Taiwan government planned its new NHI system. Implicit in their NHI schemes, with premium waivers for the indigent, South Korea and Taiwan also aim to achieve vertical equity in financing although less successfully than the taxation model of Hong Kong (O’Donnell, van Doorslaer, Rannan-Eliya et al., 2005a). However, to the best of our knowledge, there has not been any explicit policy statement pertaining to horizontal equity in the delivery of care nor broad consensus on system-wide ETEN targets in any of the three systems despite their generally egalitarian orientation.

In this paper, we examine whether there are systematic differences in the treatment of individuals with similar needs but different incomes in these three systems. This comparative analysis can inform whether the relative magnitude of any inequity is a serious cause for concern as well as which particular system attributes may contribute to inequitable outcomes in the high-income East Asian setting.

Methods

Data sources

Table 2 describes surveys of the three non-institutional populations on which the present set of analyses are based. All three surveys were carried out according to comparable methodologies adopted by the respective government census departments to ensure representativeness, based on stratified sampling designs with appropriate application of sampling weights. The surveys are selected on the basis of their suitability for this analysis and cross-comparability. In terms of content, they include a wide range of common, comparable set of variables comprising basic socio-demographics, gross monthly income, health status [self-assessed health (5-point Likert); activity limitation (3-point Likert)], education, economic activity status/occupation, insurance or medical benefits coverage, and geographic region (and/or urban/rural indicator). Different types of health care utilization are measured by self-reported use with varying recall periods as detailed in Table 2. Total volume of use, including those with zero consumption, is annualized by pro rata scaling to 12 months; whereas probability of use is for the actual recall period as specified. The Hong Kong survey distinguishes between general practitioner (GP) vs. specialist (SP) outpatient visits and South Korea survey covers western doctor visits by level of care but contains no information on emergency room (ER) services. In addition, the Korean survey predates the 2000 merger of existing insurance funds to become the single-payer NHI program although
this should not have affected the validity of the present set of analyses.

Measuring and decomposing inequality in health care utilization

We deploy the methods as used by Van Doorslaer and Masseria (2004) to measure and explain horizontal (in)equality in the utilization of health care in Hong Kong, South Korea and Taiwan. Deviation in the degree to which health care is distributed according to need is measured by an index of horizontal inequity (HI) (Wagstaff & van Doorslaer, 2000). This is a measure of income-related inequality in the utilization of health care after standardizing for differences in need, as

Table 1
Summary of health system characteristics

<table>
<thead>
<tr>
<th>System characteristics</th>
<th>Hong Kong</th>
<th>South Korea</th>
<th>Taiwan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic indicators, 2003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP per capita in USD (PPP adjusted)</td>
<td>24,691a</td>
<td>15,916a</td>
<td>12,726</td>
</tr>
<tr>
<td>NHE as % of GDP</td>
<td>5.5a (2001/02)</td>
<td>5.9a</td>
<td>6.3</td>
</tr>
<tr>
<td>NHE per capita in USD (PPP adjusted)</td>
<td>1347a</td>
<td>931a</td>
<td>808</td>
</tr>
<tr>
<td>Health indicators, 2003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant mortality rate</td>
<td>2.3</td>
<td>5.4a</td>
<td>4.9</td>
</tr>
<tr>
<td>Life expectancy</td>
<td>M: 78.5; F: 84.3</td>
<td>M: 72.8a; F: 80.01a</td>
<td>M: 73.3; F: 79</td>
</tr>
<tr>
<td>Health system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year of universal coverage</td>
<td>1964 (universal access to public services)</td>
<td>1989</td>
<td>1995</td>
</tr>
<tr>
<td>Scheme/model</td>
<td>Predominantly tax-funded inpatient and privately funded outpatient care</td>
<td>Social insurance</td>
<td>Social insurance</td>
</tr>
<tr>
<td>Ambulatory care</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Inpatient services</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Financing system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financing mix in 2000</td>
<td>Government general revenue: 55.8%</td>
<td>Government general revenue: 10.9%</td>
<td>Government general revenue: 8.84%</td>
</tr>
<tr>
<td></td>
<td>Social insurance: not applicable</td>
<td>Social insurance: 43.5%</td>
<td>Social insurance: 51.78%</td>
</tr>
<tr>
<td></td>
<td>Direct payment: 31.0%</td>
<td>Direct payment: 37.3%</td>
<td>Direct payment: 30.15%</td>
</tr>
<tr>
<td></td>
<td>Private insurance: 12.4%</td>
<td>Private insurance: 2.2%</td>
<td>Private insurance: 8.9</td>
</tr>
<tr>
<td></td>
<td>Other private sources: 0.8%</td>
<td>Other private sources: 6.1%</td>
<td>Other private sources 0.33%</td>
</tr>
<tr>
<td>Social insurance premium contribution rate</td>
<td>Not applicable</td>
<td>3.95%</td>
<td>4.55%</td>
</tr>
<tr>
<td>Delivery system, 2003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western medicine practitioners per 1000 pop</td>
<td>1.62</td>
<td>1.66</td>
<td>1.43</td>
</tr>
<tr>
<td>Licensed traditional medicine practitioners per 1000 pop</td>
<td>1.18 (registered or listed Chinese medicine practitioners)</td>
<td>0.3</td>
<td>0.19</td>
</tr>
<tr>
<td>Dentists per 1000 pop</td>
<td>0.25</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Acute beds per 1000 pop</td>
<td>4.88</td>
<td>6.65</td>
<td>4.00</td>
</tr>
<tr>
<td>Provider ownership</td>
<td>Inpatient: mainly public; Outpatient: mainly private</td>
<td>Dominant private sector</td>
<td>Mixed ownership</td>
</tr>
<tr>
<td>Hospital beds (pri: pub)</td>
<td>9:91 (acute beds)</td>
<td>85:15</td>
<td>65:35</td>
</tr>
<tr>
<td>Referral system</td>
<td>Yes in public system; No in private system</td>
<td>Yes, limited</td>
<td>No</td>
</tr>
<tr>
<td>Payment to providers</td>
<td>Salary for public doctors; mostly FFS</td>
<td>FFS for private doctors</td>
<td>Mainly FFS, global budget</td>
</tr>
</tbody>
</table>

Note: superior a = 2001. NHE, national health expenditure; GDP, gross domestic product; PPP, purchasing power parity; USD, US dollar; M, male; F, female; pop, population; FFS, fee-for-service.
proxied by age, gender and common health indicators. Inequality in utilization is explained through decomposition analysis (Wagstaff, van Doorslaer, & Watanabe, 2003). This reveals the contribution of different non-need and other variables to income-related inequality.

Specifically, we use a concentration index \( C \) as the measure of relative income-related inequality in use of health care (Wagstaff, van Doorslaer, & Paci, 1991; Wagstaff, Paci, & van Doorslaer, 1991). \( C \) lies in the range of \((-1, 1)\), with a positive (negative) sign indicating pro-rich (pro-poor) inequality. Estimates for \( C \) and its robust standard error are obtained by running the following convenient regression (Kakwani, Wagstaff et al., 1997):

\[
\frac{2\sigma^2_R}{\tilde{y}} y_i = \alpha + \beta R_i + e_i,
\]

where \( y \) is health care use, \( \tilde{y} \) is its mean, \( R_i \) is the weighted relative fractional rank of the \( i \)th individual in the income distribution, \( (R_i = (1/N) \sum_{j=1}^{N} w_j + \frac{1}{2} w_i, \) where \( w_i \) is the sampling weight \( w_0 = 0 \) and \( N \) is the sample size) and \( \sigma^2_R \) is the weighted variance of \( R_i \). The ordinary least squares estimate of the slope coefficient is the estimate of \( C \).

Wagstaff, van Doorslaer et al. (2003) show that for any linear model of a variable, such as health care use, it is possible to decompose the concentration index of that variable into the contributions of different factors such that the sources of income-related inequality are identified. Consider the following model:

\[
y_i = \delta + \gamma \ln \text{inc}_i + \sum_k \gamma_{ik} x_{ik} + \sum_p \gamma_{ip} z_{ip} + e_i,
\]

Table 2

<table>
<thead>
<tr>
<th>Location</th>
<th>Survey</th>
<th>Year</th>
<th>Sample size</th>
<th>Response rate (%)</th>
<th>Inclusion criterion by age (years)</th>
<th>Types of services included (recall period)</th>
</tr>
</thead>
</table>
| Hong Kong         | Thematic Household Survey | 2002 | 9389 households/19522 individuals | 78.4              | 16+                               | • Western doctor visit (1 month)  
|                   |                         |      |                   |                                 | • Emergency room (1 month)  
|                   |                         |      |                   |                                 | • Licensed traditional medicine practitioner visit (1 month)  
|                   |                         |      |                   |                                 | • Dental visits (12 months)  
|                   |                         |      |                   |                                 | • Hospital admissions (12 months)                                                                                   |
| South Korea       | National Health and Nutrition Survey | 1998 | 8823 households/8823 individuals | 95.3              | 20+                               | • Western doctor visit (2 weeks)  
|                   |                         |      |                   |                                 | • Licensed traditional medicine practitioner visit (2 weeks)  
|                   |                         |      |                   |                                 | • Dental visits (2 weeks)  
|                   |                         |      |                   |                                 | • Hospital admissions (12 months)                                                                                   |
| Taiwan            | National Health Interview Survey | 2001 | 5798 households/18099 individuals | 94.2              | 16+                               | • Western doctor visit (1 month)  
|                   |                         |      |                   |                                 | • Emergency room (12 months)  
|                   |                         |      |                   |                                 | • Licensed traditional medicine practitioner visit (1 month)  
|                   |                         |      |                   |                                 | • Dental visits (1 month)  
|                   |                         |      |                   |                                 | • Hospital admissions (12 months)                                                                                   |
where we distinguish between three types of explanatory variables: income (ln inc), need standardizing variables ($x_k$), i.e., age, sex, self-assessed health and activity limitation, and other non-need variables ($z_p$) including education, economic activity status/occupation, Medicaid status (low-income medical assistance), private insurance and/or medical benefits coverage (for Hong Kong and South Korea only), geographic region and urban/rural residency (for South Korea and Taiwan only). $\delta$ is a constant and $\gamma$ terms denote regression coefficients.

The concentration index for health care use can be written as

$$C = \eta_{\text{ln inc}} C_{\text{ln inc}} + \sum_k \eta_k C_{x_k} + \sum_p \eta_p C_{z_p} + GC_y / \bar{y},$$

where $C_{\text{ln inc}}$, $C_{x_k}$, $C_{z_p}$ are concentration indices for the respective variables and $\eta_k$ is the estimated partial demand elasticity of each determinant $k$, defined as $\eta_k = \gamma_k \bar{x}_k / \bar{y}$, where $\bar{x}_k$ is the mean of $x_k$; and analogously for $\eta$ and $\eta_p$. The first term in (3) denotes the partial contribution of income inequality, the second the contribution of need variables, the third the contribution of all other variables and the residual term is the generalized concentration index of the regression error $\varepsilon$. This method is based on a linear regression model, which may not be considered most appropriate for the binary and count variables examined here. The decomposition method can be applied to non-linear models only by using approximation techniques that introduce errors (see Van Doorslaer, Koolman et al., 2004). In fact, it has been found for many OECD countries that decomposition results differ little between least squares and non-linear estimators (Van Doorslaer & Masseria, 2004). Further, measures of horizontal inequity have been found to be insensitive to the use of non-linear models of health care utilization rather than least squares (Van Doorslaer, Wagstaff et al., 2000; Wagstaff & van Doorslaer, 2000). Given these results, we use least squares here for simplicity.

While $C$ gives us a measure of income-related inequality in health care use, it is not a measure of the degree of inequity in use since it still includes legitimate income-related differences in use due to need differences. Thus, by using a method of indirect standardization, we compute an HI in health care use by subtracting the need-expected inequality (i.e., the second term in (4)) from total inequality:

$$HI = C - \sum_k \eta_k C_{x_k},$$

$HI$ lies in the range of $(-2, 2)$, with a positive (negative) value indicating pro-rich (pro-poor) inequity. We compute $C$ (measuring income-related inequality in the unstandardized distribution of actual health care use;) and $HI$ (measuring income-related inequity in health care use after standardizing for need differences) for each of the health care use variables as listed in the last column of Table 2.

In addition to the total count-based outcome, $y$, we derive a probability-based outcome of any use with the reference period, as a proxy measure of access.

Dental visits are regressed on age (as a need variable) and sex (as a non-need variable) dummies separately, in addition to income and non-need factors, because the other self-reported health variables do not have a priori face validity as proxies for need for dental care.

**Results**

**Income-related inequality and inequity (Table 3 and Fig. 1)**

There is pro-poor inequality in the probability of visiting a western doctor in South Korea and Taiwan but pro-rich inequality in Hong Kong. The distributions of volume of doctor, i.e., both GP and SP, visits display a similar pattern. Controlling for variation in need shifts all probability and volume distributions of doctor visits in a pro-rich direction. The significantly positive HIs for doctor visits in Hong Kong indicate unequal treatment for given need that is to the advantage of the better-off. In South Korea, while the ETEN principle appears to hold for outpatient visits overall, the direction and magnitude of inequity varies by levels of care (i.e., provider types) where strong pro-poor bias is observed in health centers, but significant pro-rich inequity is detected in tertiary medical centers. In Taiwan, the poor are more likely to receive outpatient services. Adjusting for need, it is the better-off who are more likely to consume ambulatory visits, while there are no significant differences in the total number of consultations.

LTMP visits are distributed evenly in South Korea, while the probability of use (but not its volume) is greater among the better-off in both
Table 3
Income-related inequality and inequity in annual per capita health care utilization—probability of use* and volume of utilization

<table>
<thead>
<tr>
<th></th>
<th>Hong Kong</th>
<th></th>
<th></th>
<th>South Korea</th>
<th></th>
<th></th>
<th>Taiwan</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prob.*</td>
<td>C</td>
<td>HI</td>
<td>Total no.</td>
<td>C</td>
<td>HI</td>
<td>Total no.</td>
<td>C</td>
<td>HI</td>
<td>Total no.</td>
</tr>
<tr>
<td><strong>Outpatient visits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western doctor</td>
<td>0.18</td>
<td>0.0185</td>
<td>0.0927</td>
<td>0.18</td>
<td>0.01037</td>
<td>0.0241</td>
<td>0.1037</td>
<td>0.16</td>
<td>−0.0921</td>
</tr>
<tr>
<td>General practitioner</td>
<td>0.15</td>
<td>0.0581</td>
<td>0.1144</td>
<td>0.15</td>
<td>0.01181</td>
<td>0.0573</td>
<td>0.1181</td>
<td>0.03</td>
<td>−0.2013</td>
</tr>
<tr>
<td>Specialist</td>
<td>0.03</td>
<td>−0.2013</td>
<td>−0.0177</td>
<td>1.27</td>
<td>−0.1580</td>
<td>0.0243</td>
<td>0.0090</td>
<td>0.16</td>
<td>−0.0921</td>
</tr>
<tr>
<td>Health center</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Clinic</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<td>NA</td>
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<tr>
<td>Hospital</td>
<td>NA</td>
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<td>NA</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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</tr>
<tr>
<td>General hospital</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Tertiary hospital</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>LTM practitioner</td>
<td>0.03</td>
<td>0.0574</td>
<td>0.1195</td>
<td>2.55</td>
<td>0.0237</td>
<td>0.1237</td>
<td>0.02</td>
<td>−0.0178</td>
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</tr>
<tr>
<td>Dentist</td>
<td>0.31</td>
<td>0.2612</td>
<td>0.2098</td>
<td>1.14</td>
<td>0.2266</td>
<td>0.2586</td>
<td>0.02</td>
<td>0.0283</td>
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<tr>
<td><strong>Hospital services</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Emergency room</td>
<td>0.01</td>
<td>−0.2226</td>
<td>−0.1751</td>
<td>0.022</td>
<td>−0.2518</td>
<td>−0.2013</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Inpatient admission</td>
<td>0.07</td>
<td>−0.0502</td>
<td>0.0638</td>
<td>0.14</td>
<td>−0.0954</td>
<td>0.0468</td>
<td>0.10</td>
<td>−0.0744</td>
<td></td>
</tr>
</tbody>
</table>

LTM: licensed traditional medicine.

*Prob.: probability of use (for the relevant recall period as per Table 2) of outpatient visits/inpatient admissions in the previous year.
Total no.: total number of visits/admissions/hospital days per person per year (including those with zero consumption).
Statistically significant (p<0.05) C and HI indices are in bold type.
Taiwan and Hong Kong. For a given level of need, there is no difference in use of LTMP in South Korea, while there is pro-rich bias in Hong Kong and Taiwan. The distributions of dental care display the same general patterns as those for LTMP. Of note, recall periods for dental care differ substantially in the three surveys (Table 2) which are likely responsible for a higher (i.e., less under-reporting) observed probability of use for Hong Kong compared to the other two populations with much shorter durations (2 and 4 weeks, respectively) of recall.

The poor use significantly more emergency care in Hong Kong than in Taiwan, where the former shows a stronger income gradient. Controlling for need removes the pro-poor bias in Taiwan but not Hong Kong.

All three territories show marked pro-poor bias for inpatient care. This persists after adjusting for income-related differences in need in Taiwan and South Korea but not in Hong Kong, where there is some evidence of marginal inequity to the advantage of the better-off.

**Decomposition of inequality (Fig. 2)**

Income-related inequality of utilization is split into contribution by income, need and non-need...
factors and a residual term as per Eq. (3). As a result of aggregating the contributions of different variables under one of the four broad categories, positive and negative contributions may cancel out so that a small overall category total may mask larger underlying positive and negative contributions. The sum of the bars in Fig. 2 would be zero if utilization were equal across income, whereas the need bar would be the only one to appear if there were perfect equity. In the case of discrepancies between actual and need-expected distributions of use, other bars appear and they indicate either the direct contribution of income or its effect through common associated factors with health care utilization (Koolman & van Doorslaer, 2004).

Fig. 2. (a) Decomposition of inequality in probability of utilization. (b) Decomposition of inequality in total number of visits/admissions. HK, Hong Kong; SK, South Korea; TW, Taiwan; GP, general practitioner; SP, specialist; HC, health center; CL, clinic; H, hospital; GH, general hospital; TH, tertiary hospital.
Need factors account for most of the pro-poor inequality in western doctor visits in South Korea and Taiwan. In the former case, pro-poor tendencies are further reinforced by those with lower education attainment and Medicaid recipients consuming disproportionately more ambulatory care. In addition, the direct contribution of income is to reduce use of health centers, which are directly run by the government and requires only a trivial co-payment, and increase utilization of tertiary medical centers offering more sophisticated care with a higher co-payment. In Taiwan, the direct contribution of income is in a pro-rich direction but not sufficiently so to counterbalance the pro-poor inequality from the distribution of need. Hong Kong’s pro-rich inequality in all western doctor visits can be attributed to a large non-need contribution, mainly consisting of employer-provided medical benefits and private health insurance, as well as the direct effect of income in the case of total volume of use. However, there are contrasting findings for GP and SP care, with non-need factors acting in opposite directions. The employed and those with private coverage have higher incomes and consume more GP but fewer SP episodes.

LTMP decomposition results are qualitatively similar to those for GP visits in Hong Kong. Compared to western doctor visits, income and non-need factors substantially reduce the magnitude of pro-poor inequality in use probability for South Korea and push Taiwan into pro-rich inequality and inequity for both the probability and volume of use. Urban residency is an important contribution to this pro-rich inequality in Taiwan.

The pro-rich distribution of dental visits in Hong Kong and Taiwan is the consequence of both the direct effect of income and the correlation between income and non-need factors, e.g., education, private insurance and medical benefits (Hong Kong) and urban/rural differences (Taiwan), and dental care.

For the number of ER visits in Hong Kong, need and non-need contributions are negative, resulting in the pronounced pro-poor inequality observed. In the case of Taiwan, the lesser magnitude of pro-poor inequality is mainly driven by health care need, counterbalanced by the direct effect of income and regional differences in use.

Pro-poor inequality in inpatient admissions in Hong Kong and Taiwan is principally attributable to income-related differences in need. In South Korea, non-need factors make a stronger relative contribution to the pro-poor inequality. The non-employed, who have lower incomes, are more likely to be admitted and consumed more inpatient episodes.

The contribution of the residuals is large in some cases, especially in South Korea and Hong Kong and particularly for probability of use. This can be partially explained by the low explanatory power of the regression models in which the dependent variable takes a very low mean value, and hence the larger residuals for the probability models. Consequently, it can be related to short recall periods.

Our results confirm the universal observation that the poor have disproportionately greater health care needs. However, we find much heterogeneity in the distribution of utilization across these three high-income territories.

**Discussion**

This paper provides the first analysis of income-related inequality and inequity of health care utilization in three high-income East Asian economies.

In general, the direct effect of income is to shift the distribution of health care in a pro-rich direction. On the other hand, disparities in need factors are the major source of any pro-poor inequalities that arise in the utilization of health care. The contribution of non-need factors to income-related inequality in health care differs across the territories. In Hong Kong, they are mainly responsible for pro-rich inequity in all services except for emergency care. The concentration of private coverage among the best-off 30% of the population is the major driver of the utilization distributions of all service types, except for ER visits which is completely free of charge to all, in a pro-rich direction. In South Korea, non-need factors shift the distribution in a pro-poor direction. For instance, individuals with lower educational attainment or who are unemployed consume more outpatient and hospital services respectively. Moreover, about half of the Medicaid population (Medicaid type 1) makes no co-payment at the point of service. Anecdotally, inpatient admissions for mostly social reasons are also not uncommon among low-income groups. We also observe a strong income-related gradient in outpatient provider type, leading to a significant pro-poor bias at health centers that are frequently visited by the poor and pro-rich inequity.
at tertiary-level medical institutions. In Taiwan, non-need factors contribute to pro-rich inequity of LTMP and dental care but to pro-poor inequality of inpatient care. Urban residency, which is closely correlated with income and the distribution of health care resources, imposes a significant pro-rich bias to the utilization distribution for all types of services except for western doctor visits and hospital admissions. The pro-poor tendencies detected for the latter two service categories can be attributed to various deliberate policy interventions, including service-on-wheels in the rural areas and exemption of co-payment for rural residents, undertaken by NHI to specifically ameliorate the problem of access to care commonly encountered by the rural population. It is important to understand the contribution of such factors since they offer, to varying degrees, some of the most important policy levers through which to operate on horizontal inequity in health care utilization.

Hong Kong’s GP vs. SP dichotomy deserves a special note. International experience from Europe and elsewhere demonstrates an almost universally consistent pattern that GP care is usually pro-poor whereas the reverse is true for SP services, irrespective of the type of health care or financing system (Van Doorslaer et al., 2004). However, exactly the opposite is observed in Hong Kong. We hypothesize that this surprising finding is a reflection of Hong Kong’s uniqueness with respect to organization and funding. While the public sector provides almost free GP care, the absolute level of population coverage is very low, mainly catering to the most medically and socially indigent with a strong old age bias and implicitly rationed by very long queues on a first-come-first-served basis with no prior appointments allowed and inconvenient amenities. The vast majority of patients instead seek private care because of very reasonable out-of-pocket charges at US$15–20 per episode inclusive of 3–5 days of medication accompanied by virtually on-demand logistics. This would expectedly produce a pro-rich bias due to the out-of-pocket payment mechanism. In contrast, a much larger proportion of SP care is provided in the public sector with an efficient appointment system and better amenities but again very low co-pays serving a significant share of the chronic disease patient population. Both features would result in disproportionate utilization by poorer patients. In fact, a formal benefit-incidence analysis shows strongly pro-poor distributions of all hospital and non-hospital episodes and hence of the total public subsidy to health care. Specifically, the poorest (richest) fifth of the population use 37–48% (7.3–10.6%) of hospital and non-hospital services, where the percentage of public subsidy totals 37.3–46.3% (7.9–11.6%) to the poorest (richest) income quintile (O’Donnell, van Doorslaer, Rannan-Eliya et al., 2005b). These results are the product of a universally accessible public system, with minimal user charges from which the poor are exempted. The availability of private health care, coupled with rationing by waiting time in public facilities as well as the incentive of choice of and better amenities by private providers, gives the better-off and those covered by private insurance or medical benefits the alternative to opt-out of the public system, effectively and disproportionately directing the subsidy to the poor although this effect was not by deliberate design but a case of happenstance (Besley & Coate, 1991). Jointly considering Hong Kong’s ER and GP findings, we postulate a “crowd-in” phenomenon by most relatively poor individuals, but not the destitute with coverage under the limited GP public care, who lack appropriate access to GP care and therefore have little effective option but to use the ER as their entry point to the health care system. This is a classic case of substitution of medical services in response to perverse incentives in system organization. An important corollary concerns the possibility that these individuals may present with more severe illness than would otherwise be the case if they were to have adequate access to primary care facilities.

We can also draw important lessons from the two social insurance systems. While Taiwan’s and South Korea’s programs share many common features, our findings indicate sharp contrasts in horizontal equity for some service types. In Taiwan, the scope of service coverage by national insurance appears to largely determine the distribution of utilization across income groups. For South Korea, the almost universal pro-poor tendencies suggest additional explanatory factors apart from its social insurance financing mode. First, South Korea allows practitioners to extra-bill patients for uncovered services within the same utilization episode. However, Taiwan prohibits providers from rendering both covered and uncovered services in the same visit, i.e., either the providers see the patient as a self-pay patient or as a NHI insured. As the well-off are more likely to consume non-NHI covered services, pro-rich inequity would be observed. More
importantly, we did not measure the content, quality or comprehensiveness of a visit in the present exercise and thus cannot observe the within-episode extra-billing allowed in South Korea where the presumably pro-rich tendencies would have been masked. Nonetheless, the strong contrast observed in pro-poor/pro-rich bias in inequality and inequity in western doctor visits among different levels of medical institutions in South Korea appear to suggest that the better-off indeed have better access to medical institutions which offer more sophisticated care and requires higher co-payments at the point of service. Second, Taiwan has a more constrained supply of medical practitioners and the distributions of dentists and LTMP in Taiwan are known to cluster highly around urban areas, resulting in a pro-rich contribution to utilization inequity, as evidenced by the significance and magnitude of the urban dummy variable. South Korea does not report to have the same degree of geographic maldistribution of providers. Third, Taiwan’s private insurance sector that provides mostly indemnity-based supplementary coverage has grown considerably over the years, accounting for 9% of total financing sources, compared to only 2% in South Korea. As supplementary coverage is highly correlated with income, this may contribute, in part, to the observed pro-rich inequity.

Another unique set of insights derived from the present findings concerns LTMP episodes. Traditional medicine has always maintained its place in health care in East Asia and indeed is rapidly being adopted in the West as an alternative and complementary form of medical care. LTMP practitioners are formally registered and licensed medical professionals in all three territories. Our results show significantly pro-rich income inequity in Hong Kong and Taiwan, but insignificantly so in South Korea. A probable explanation is the scope of service coverage and the supply/distribution of LTMPs. Although both national insurance schemes in Taiwan and South Korea cover LTMP service, such care is mostly delivered privately and the dispensing fees of herbal remedies, which tend to be the major source of provider profits and a larger absolute amount compared to the consultation fee, fall outside the scope of coverage. The relatively smaller number of LTMP practitioners (Taiwan: 0.19 per 1,000 vs. South Korea: 0.3), who are aggregated in urban areas in Taiwan, results in greater pro-rich inequity, compared to South Korea. On the other hand, Hong Kong’s publicly financed direct service delivery program provides a trivial amount of LTMP services, again leaving most people paying out-of-pocket as in GP care thus resulting in a similarly pro-rich distribution.

We draw attention to two particular observations. The difference in recall periods (12 months for Taiwan vs. 1 month for Hong Kong) is likely responsible for the artifactually large gap in ER use probability between the two populations. Another explanation concerns the substitution of first contact or primary care by ER visits in Hong Kong where there is no point-of-care co-payment unlike government GP clinics which charge a small out-of-pocket fee. Second, although the public sector in Hong Kong is responsible for 95% of total bed-days, it only has 77% market share for ever hospitalizations and about 85% for number of admissions, where public hospitals have a more severe case-mix with longer lengths of stay. Therefore, we speculate that the finding of a slightly pro-rich need-adjusted distribution for probability and total volume of inpatient use is a reflection of private sector activity, which is more socio-economically patterned in Hong Kong than in the two social insurance systems of Taiwan and South Korea.

Several potential caveats bear mention. Like the European study from which our work derived, we echo Van Doorslaer et al. (2004) emphasis on the inherent methodological limitation of being unable to distinguish between good and poor quality episodes nor different intensities of care and thus having to default to the assumption that “a visit is a visit”. Closely related to this, as the pre-specified level of service coverage (e.g., high-technology service items, formularies and alternative medicine) varies across different national insurance or service schemes of the three territories, the content of a visit as locally defined may also differ. Similarly, our analyses were predicated on the tenet that all reported utilization were similarly appropriate with respect to particular levels of morbidity across the three territories examined, whereas the reality is that the average relationship between reported morbidity and use across jurisdictions likely represents different normative definitions of “appropriateness”. Third, we acknowledge that the relatively short recall periods in the three surveys for ambulatory episodes, while likely to reduce the problem of under-reporting due to recall errors, inevitably reduce explanatory power of the models, as it is harder to explain short term than longer
annual) term with the typical covariates used here. The shorter recall periods for all non-inpatient types of services preclude a direct comparison with the results for OECD countries which are all based on annual reported use. Fourth, although we extracted a set of common core variables from the three surveys, we cannot guarantee complete comparability due to different questionnaire formats, survey settings, country-specific circumstances and so on. More importantly, the slightly different and limited sets of covariates adopted for the three locations in the decomposition analysis preclude more detailed dissection of issues such as private—public sector interactions and the role of supplemental insurance coverage.

In sum, it appears that equals are treated mostly equally in South Korea, at least at the aggregate level, whereas Hong Kong’s otherwise highly progressive financing arrangements have not protected it from apparently inequitable treatment among those with equal medical need across income strata. In Taiwan, the scope and content of service coverage as well as geographic distribution of medical professionals seem to be the main drivers of the heterogeneous pro-poor/pro-rich mix of results. Future work should focus on developing, implementing and evaluating policy interventions to reduce the observed unequal distributions in these three economies.

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Appendix A. Supplementary Materials

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.socscimed.2006.08.033.

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