

**Redistribution or horizontal equity in Hong Kong's mixed public-private health system: a policy conundrum**

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## **Abstract**

We examine the distributional characteristics of Hong Kong's mixed health economy to identify the net redistribution achieved through public spending on health care, compare the income-related inequality and inequity of public and private care, and measure and explain horizontal inequity in health care delivery overall. Payments for public care are highly concentrated on the better-off while benefits are pro-poor. As a consequence, public health care effects significant net redistribution from the rich to the poor. Public care is skewed towards the poor in part because of allocation according to need but also because the rich opt out of the public sector and consume most of the private care. Overall, there is horizontal inequity favouring the rich in general outpatient care and (very marginally) inpatient care. Pro-rich bias in the distribution of private care outweighs the pro-poor bias of public care. A lesser role for the private sector may improve horizontal equity of utilisation but would also reduce the degree of net redistribution through the public sector.

**Keywords:** Health financing; health care utilisation; progressivity; net redistribution; equity

## **1. Introduction**

In contrast to other high-income economies of Asia (eg Japan, South Korea and Taiwan) and elsewhere, Hong Kong has not used the fruits of development to adopt social health insurance but has maintained a mixed model of public-private health care. The basis of this model is universal entitlement to a comprehensive range of publicly provided health services financed from government general revenue. In parallel, a substantial private sector, which is financed mainly by direct payments but with some private insurance and employer-provided health benefits, concentrates on outpatient care. In relative terms, this system has proved remarkably successful with respect to population health (eg life expectancy is second only to Japan), cost containment (total health spending is 5.7% of GDP), the progressivity of financing (O'Donnell et al 2005a), avoidance of catastrophic medical expenditure risks (Van Doorslaer et al 2005) and the targeting of public health spending to the poor (O'Donnell et al 2005b). Nonetheless, the system's characteristics do not completely shield it from economic forces generating an agenda for reform. Chief amongst these is a public finance constraint resulting from the demographic and epidemiologic transitions and the strict fiscal discipline imposed by highly competitive neighbouring economies. There is also political pressure from middle and upper income groups that often pay twice for health care; first via involuntary tax payments to finance public services and again through private purchase of their own health care. Within this context, various proposals have appeared on the health reform agenda intermittently since the early 1990s including higher public sector user fees, managed care, social insurance, extended private insurance and medical saving accounts.

To better appraise the case for imminent health system reform in Hong Kong and to speculate on the consequences of specific proposals, it is necessary to understand the performance of the current system. 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 (Daniels et al 2000, World Health Organization 2000). Moreover, the distributional characteristics are a potentially important seed to the plea for reform. In this paper, we examine distributional characteristics of Hong Kong's mixed public-private health economy in order to address three questions. First, how does the system perform with respect to equity objectives? Second, to what extent is the interaction between the public and

private sectors important in explaining the distribution realised by the system? Third, is that distribution a source of pressure for reform to the system or a force for maintenance of the status quo? We estimate the redistributive impact of public spending on health care by identifying not only who pays the taxes that finance spending but also who receives the benefits that derive from it. Showing how net benefits from public spending on health care vary in relation to income allows us to assess the balance of political support for the current system and to speculate on the winners and losers from changes to the status quo. In order to evaluate the extent to which the redistributive effect of the public system is due to its allocation according to need as opposed to the better-off opting out of public care, we compare the income-related inequality in public and private care and show the impact on each of standardising for differences in need. Finally, we evaluate the overall system with respect to the horizontal equity principle of “equal treatment for equal need” (ETEN) and explain deviations from this by decomposing income-related inequality in utilisation into differences in income alone, health need and non-need factors such as private health insurance coverage.

We find marked differences in the distribution of public and private care in Hong Kong. Public care is progressively financed, pro-poor in its delivery of benefits and thus effects a net redistribution from rich to poor. Despite this redistribution, taken overall, the system does not achieve horizontal equity in every service. There is pro-rich inequity in the delivery of general outpatient care and, very marginally, for inpatient care. The pro-rich bias in the distribution of private care outweighs the pro-poor bias of public care. The private sector opt-out contributes to the net redistribution achieved by the public sector, although the effectiveness of the public sector itself in targeting resources according to need is also important, particularly in the cases of specialist outpatient and inpatient care. If the balance between public and private care were to be shifted to give a lesser role for the private sector, there may be greater horizontal equity, as more health resources would then be distributed on the basis of need and not ability to pay. But bringing more middle- and high-income groups into the public system would reduce the net redistributive effect of that system. Within the context of a mixed public-private system, redistribution and horizontal equity objectives therefore pose a potential policy conundrum for decision makers.

In the next section, we describe salient features of the local health system. In section 3, we examine public health care, identifying the burden of financing, the

distribution of benefits and the net redistributive effect. In section 4, we compare the distributions of public and private health services utilisation. In section 5, we evaluate the consistency of the overall system with the ETEN principle. The final section draws lessons for potential health system reform strategies based on the present findings.

## **2. Health care financing and delivery in Hong Kong**

Historically, Hong Kong's health system evolved from a tax-funded British National Health Service model. However, it has always maintained a sizeable private sector, in keeping with its otherwise laissez-faire economy. As at fiscal year 2001/2, annual total health expenditure is 5.7% of GDP, where public and private funding sources account for 57% and 43% of total spending respectively. A detailed breakdown of the financing mix is provided in Table 1. Approximately one-half of public finance is raised from income and corporation tax. Hong Kong has a very narrow tax base. Only 37% of the working population pay any income tax and 10% contribute at the top marginal rate of only 16%. Non-tax government revenues contribute 16.5% of total health finance and one-half of this is from land sales and profits of public enterprises. At the time of the survey we analyse (fees have since been raised slightly), the public health care fee structure was heavily subsidized. The all-inclusive per diem charge at a public hospital was HK\$68 and outpatient consultation fees (including drug charges) were HK\$44 and \$36 for specialist and general practitioner visits respectively (US\$1 = HK\$7.8). Private finance is mostly from out-of-pocket (OOP) payments that contribute 31% to total expenditure on health, with private insurance premiums contributing 12%), of which three-quarters is from employer provided benefits. Together privately purchased insurance and employer-provided benefits cover 30% of the population. The predominant form of private insurance is indemnity policies (mostly as "riders" on life insurance policies), which pay providers on a fee-for-service (FFS) basis with caps on the maximum reimbursable amount. Managed care, in the various forms of contract medicine, prepaid plans and preferred provider networks, have grown considerably in the last decade although their penetration is still limited in scope (confined to the outpatient sector), size and level of sophistication.

About 90-95% of total bed-days in Hong Kong are provided by 44 public hospitals, under the management of the Hospital Authority (HA). There are 12 private hospitals that account for the remaining market share. Provision of outpatient services is shared by both public and private sectors in the ratio of 30:70 respectively. Hong Kong has no functional primary care network in terms of gate-keeping from inappropriate escalation of care. About half of all specialists work in the private setting, most of whom combine specialty care with general medical services. All complementary care services including licensed Chinese medicine practitioner visits are provided in the private sector (except for a few demonstration clinics in selected public hospitals) where OOP/FFS payment is the predominant mode of financing. Further details of Hong Kong's health system are available elsewhere (Leung et al 2005, Wong et al 2005).

Recent recurring operating budget deficits of the government, precipitated by the Asian financial crisis of 1997 and exacerbated by the continuing economic transition of the Pearl River Delta where Hong Kong's manufacturing sector (traditionally an anchor industry during the territory's first growth phase in the 1970s and 1980s) has migrated north of the border into neighbouring Guangdong province due to its low labour costs as well as the rapid development of other rival Chinese coastal cities such as Shanghai and Guangzhou, have forced the government to aggressively cap public spending at 20% of GDP thus limiting availability of resources for health care. A more depressed, or at least less speculative, real estate market compared to the pre-Asian financial crisis period has also limited the government's ability to tap into this traditionally robust source of public revenue (by selling more land) to buffer against the structural shortfalls as a result of the economic transition. Meanwhile, universal upward cost pressures in health care imposed by a rapidly ageing population (and higher dependency ratio; Hong Kong has the lowest total fertility rate in the world at 0.9) facing the twin burden of infectious (eg emerging infections including SARS and pandemic influenza as well as very high prevalence of antibiotic resistance) and chronic diseases has brought about four straight years of progressively larger deficits for the Hospital Authority. The (upper) middle class face a double financing burden, almost exclusively bearing the direct taxation burden that funds public care while paying more OOP for private care at the same time. Thus, the political and economic viability of continuing to rely on tax financing alone has been increasingly called into question.

In 1997, the government commissioned a review of the health system (The Harvard Team 1999). The Harvard consultants reported back in 1999 and identified two important financing issues requiring urgent reform:- 1) the lack of long-term sustainability of the financing infrastructure due to heavy reliance on general revenue funding for public services given the existing tax structure, and 2) the underdevelopment of private insurance products and managed competition in the private sector. They proposed phased options which would ultimately lead to a population-wide social insurance scheme for acute care, medical savings accounts for long-term care, and a managed care delivery system whereby vertically integrated private or public provider organisations would compete for patient enrollees (The Harvard Team 1999).

In response, the government issued a consultation document, *Lifelong Investment in Health*, in 2001 and counter-proposed user fee hikes in the public sector, maintaining the status quo general revenue funding model while establishing a medical savings account scheme to finance acute care after age 65 (Health, Welfare and Food Bureau, Government of the Hong Kong Special Administrative Region 2001). Most recently, since 2004, a newly appointed health minister has appeared to be backing off from these expressed intentions of the previous administration and is currently consulting the general public and vested interests regarding potential ways forward in developing a new set of major reforms possibly leading to a much larger role of private insurance financing.

The equity implications of these potential changes in financing mix have not yet been systematically studied. By describing the net redistribution of public spending and provision, comparing the income-related distributions of public and private services utilisation, and examining the extent to which the overall system achieves horizontal equity in delivery, we can comment on the distributional consequences of changing current finance and delivery policies. Thus the present study can provide timely evidence to inform policy formulation as well as render a baseline assessment against which future interventions can be benchmarked.

### **3. Net redistributive of public spending on health**

Government spending on health care confers benefits that vary across the population. Taxes necessary to finance this spending impose costs that vary between different

socio-economic groups. Some households are net beneficiaries (benefits exceed taxes contributed) whilst others are net losers from government intervention in health care. Previous analyses of Hong Kong have revealed that the incidence of taxes is heavily concentrated on the better-off (O'Donnell O et al 2005a) whereas benefits from public health subsidies are heavily concentrated on the poor (O'Donnell O et al 2005b). Consequently, the poor are the net beneficiaries from government spending on health care. But we do not know up to what point in the income distribution households are net beneficiaries and how heavily the net costs are concentrated on the rich. Nor do we know to what extent the net effect of government intervention in health care is redistributive, ie the degree to which it reduces inequality in living standards. Identifying the point in the income distribution at which households just break even from public health spending can make an important contribution to discussions about who gains and loses from the present system and can improve understanding of the balance of political support for reforms.

The net redistributive effect of government spending on health can be examined by comparing the distribution of income prior to the receipt of benefits from such spending and the subtraction of taxes that finance it with the distribution of post benefit and tax income. If the latter is more even than the former, then the net effect of government spending on health has been to redistribute in favour of the poor. Ideally, the baseline of this comparison would be the distribution of income if there were no government intervention in the health sector. But this is not observable and identification of the price and behavioural responses necessary to estimate it is formidable. As is common, we abstract from such responses and simply use income gross of taxes and before the allocation of benefits as the baseline. We will refer to this baseline as original income and to the post tax and benefit income as final income (Lambert 1993).

We are interested in the net redistributive effect of government spending on health only. One estimate would be to compare the distribution of income gross of the benefits from all non-health spending and net of taxes that finance this with the distribution of income after all benefits and taxes, including those derived from health spending. This would approximate the marginal effect of health spending, given government spending on other goods and services. But computation of this estimate requires identification of the incidence of all taxes and the benefits from all government spending. While the incidence of all taxes is required to establish the

progressivity of public financing of health care, establishing the benefit incidence of all government spending is a major additional step. An alternative approach, and the one we adopt, is to start from the distribution of income before accounting for any taxes or benefits and to consider the marginal net redistributive effect of government health spending on this distribution. This is consistent with the first approach only in the case that benefits from all non-health spending are distributed in exactly the same way as taxes and so there is no net redistributive effect from such spending.

We estimate the distribution of the public health subsidy and taxes in relation to household original income adjusted by an equivalence scale to allow for variation in the cost of living associated with the size and the age composition of the household<sup>1</sup>. Income, expenditure and health care utilisation data are from the government-commissioned Thematic Household Survey (THS) conducted in 2002<sup>2</sup>. For the benefit incidence analysis, distinction is made between hospital inpatient days, specialist outpatient visits, accident and emergency visits and visits to general outpatient clinics. All ambulatory visits are reported for the last 30 days, while inpatient days are reported for the past 12 months. Only utilisation of public care is considered and this is clearly distinguished from private care in the survey. The value of the subsidy to each individual is estimated from the volume of a service utilized multiplied by its unit cost, derived from government budgetary accounts data, minus the fee paid. The result is aggregated across services and then across individuals to get the total subsidy to the household<sup>3</sup>.

Tax incidence is estimated from the 1999/2000 Household Expenditure Survey (HES) conducted by the government Census and Statistics Department<sup>4</sup>. Income tax is estimated by applying the tax schedule to reported earnings and likewise excise tax and sales tax (vehicles only) rates are applied to reported product-specific expenditures or quantities. Payments of property tax are reported. Corporation and any other direct taxes are assumed to be distributed as a weighted

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<sup>1</sup> The equivalence scale is  $e_i = (A_i + 0.5M_i)^{0.75}$ , where  $A_i$  is the number of adults in the household and  $M_i$  the number of children (<15 years).

<sup>2</sup> The sample of 10,015 households (29,561 individuals) was generated by stratified sampling. Population weights are applied to make the sample representative.

<sup>3</sup> See (O'Donnell O et al 2005b) for more details on the methodology and results disaggregated by service.

<sup>4</sup> The sample comprises a stratified sample of 6,116 households representative of the non-institutional land-based population (response rate = 79.5%), plus an additional 1,510 households on welfare (Comprehensive Social Security Assistance) (response rate = 95.5%). Population weights are applied to both samples.

average of income and property taxes. Stamp duty is assumed to be distributed as property tax and any other indirect taxes as a weighted average of those estimated.

The tax and benefit distributions are derived from different data sets and must therefore be matched in order to compute the distribution of final income and of net benefits. An added complication is that tax incidence has been computed from the HES in relation to total household expenditure and not household income. From the HES, we estimate, for each percentile in the household expenditure distribution and each tax, the average tax rate, i.e., the average ratio of tax payments to total household expenditure. We then assume that these average tax rates are equal for corresponding percentiles of the household expenditure distributions estimated from the HES and the THS. Under this assumption, the tax paid by each THS household is estimated by applying the percentile specific average tax rate to total household expenditure. The tax distribution can then be compared with the THS income distribution.

Results of the net benefit incidence analysis are presented in Table 2. Households are grouped by deciles of original (equivalent) income. Decile averages are presented for all monthly incomes, taxes and benefits. On average, the poorest 10% of households have an income of HK\$1959 (US\$251) prior to the payment of any taxes and the receipt of benefits from government health spending. This is only 5% of the average income in the top decile. The degree of inequality is reflected in a Gini coefficient of 0.4446<sup>5</sup>.

Decile average tax contributions to health spending are given in the third column of the table. These are derived by applying the share of tax contributed by each income percentile, estimated from the survey data as described above, to the total tax financing of health care and averaging the resulting tax contributions within deciles. We estimate the total tax financing of health care by multiplying total tax revenue by the share of health expenditure in total government expenditure. Total government expenditure on health is HK\$41,033 million, which is 3.3% of GDP and 17% of total government expenditure in 2001/02. On average, households in the poorest decile contribute HK\$18 per month toward funding of public health care. Those in the richest decile contribute almost 80 times as much. The heavy concentration of tax payments on the better-off is reflected in a positive tax

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<sup>5</sup> The official estimate of the Gini is 0.525 in 2001 for income unadjusted for the size and age composition of households (Government of Hong Kong SAR 2001).

concentration index of 0.7122<sup>6</sup>. Not only is there a heavier absolute burden of taxation on the better-off, the relative burden is also greater, with tax contributions to health care accounting for only 0.9% of the income of the poorest decile and 3.7% of the richest decile. This progressivity is reflected in a positive Kakwani index of 0.2677 that is significantly different from zero (proportionality)<sup>7</sup>. About 30% of government spending on health care is financed from non-tax sources (see Table 1). Two-thirds of this non-tax revenue comes from profits of public enterprises and land sales. The rest are from fees for non-health public services. These revenues are not easily allocated across households. We assume that they are distributed as taxes. Below, we test the sensitivity of the results to this assumption. Given the assumption, the concentration and Kakwani indices for non-tax revenue are equal to those for taxes.

Decile averages of the government (net) expenditure on health services are given in the fifth column of Table 2. These are computed by applying percentile shares of the service-specific subsidies, calculated from the survey data as above, to total government expenditure on each service net of user fee revenue. The results are aggregated across hospital inpatient, specialist outpatient, general outpatient and accident and emergency care and decile averages are computed. On average, the government spends HK\$384 per month on each of the poorest 10% of households and HK\$81 on households in the top decile. The pro-poor bias in government spending on health services is reflected in a significantly negative concentration index of -0.3304. Given absolute spending on the poor is greater, so is spending relative to original income as reflected by a positive Kakwani index of 0.7745<sup>8</sup>.

Much government spending on health is not on health services for which it is possible to establish household level utilisation from survey data. In fact, about one-fifth of government health spending in Hong Kong is on activities that have some public good characteristics such as public health measures, health administration and capital investments. Estimating the net redistributive effect of public spending on

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<sup>6</sup> A concentration index measures departure from an equal absolute burden of taxation and lies in the range (-1,1), with a value of zero indicating equality and a positive value indicating a greater burden on the rich (Lambert 1993). All concentration and Gini indices, together with robust standard errors, are computed from a convenient regression of the (transformed) variable of interest on the income rank (Jenkins 1988, World Bank 2003a).

<sup>7</sup> A Kakwani index is equal to the tax concentration index minus the Gini index of income inequality and lies in the range (-2,1) (Kakwani 1977). A value of zero indicates proportionality and a positive value tax progressivity.

<sup>8</sup> The Kakwani index for benefits is computed here as the Gini index of income inequality minus the benefits' concentration index and lies in the range (-1,2) (Lambert 1993). A positive value indicates that the ratio of benefits to income is falling with income.

health requires that some assumption be made about the distribution of the benefits from such collective services. As a baseline, we assume benefits from collective services are evenly distributed, on a per capita basis, across the population. The slight differences in the decile averages reflect only differences in household sizes across deciles.

Final income is computed as original income plus the monetary value of benefits received from government individual and collective health services less contributions to the financing of these services through tax and non-tax sources. Of course, the term final income is a slight misnomer. No household actually receives these amounts as income. But comparing this income with original income does, to an extent, convey the change in spending power of the household not only because it must contribute to government spending on health care but also because publicly provided services need not be purchased in the private market and so income is released for spending on other goods and services. There are, of course, caveats to this interpretation. Costs incurred by the government do not necessarily correspond to those that an individual would face in a private market. Monetary expenditures incurred by the government do not reflect the variation in the value households place on the services they are provided with. Final income as a ratio of original income is provided in column 8 and average net benefits, the difference between final and original income, are given in the last column. Since we assume a balanced government budget for the health sector, with taxes raised just sufficient to cover government spending on health, the population average net benefit is zero. Only the top quarter of households are net losers from government spending on health. The net loss to the richest decile is equivalent to 4% of original income. The poorest 10% makes a net gain equivalent to 35% of original income. The next two deciles gain 18% and 8% respectively. There is little impact on the 6<sup>th</sup> to 8<sup>th</sup> deciles, with only a <1% change from original to final income.

The equalizing effect of government spending on health is seen by the fall in the Gini coefficient from 0.4446 for original income to 0.4256 for final income. Measuring the net redistributive effect as the difference between the Gini indices (Lambert 1993) gives a value of 0.0189, which is a 4.25% fall in the index of inequality. The net redistribution is demonstrated graphically in Figure 1 from the observation that the concentration curve for final income lies everywhere inside the

Lorenz curve for original income. That is, the poorest x% of households ranked by original income have a greater share of final income than they do of original income.

The net redistributive effect can be decomposed as follows,

$$G_o - G_F = (G_o - C_F) + (C_F - G_F) \quad (1)$$

where  $G_o$  is the Gini index for original income and  $G_F$  and  $C_F$  are respectively the Gini and concentration indices for final income (Lambert 1993). The first term on the left hand side of equation (1) is a Reynolds-Smolensky-type (R-S) measure of the progressivity of net benefits showing the extent to which the ratio of final to original income falls as original income rises (Lambert 1993). The second term is the contribution to the change in inequality due to the re-ranking of households. Absolute differences in net benefits are sufficiently large to change the position of some households in the income distribution. The positive value of 0.0264 (robust SE = 0.0011) for the R-S index indicates significant net redistribution towards the poor. Partially offsetting this is a much smaller re-ranking effect of  $-0.0075$ .

Sensitivity to assumptions concerning the distribution of non-tax revenue and collective health services is analysed in Table 3. In the baseline scenario, we assume that financing through non-tax sources of revenue (profits of public enterprises, land sales and fees from (non-health) public services) is as progressive as taxes and that per capita benefits from collective services are equal. To examine the effect of neutralising the redistributive effect of non-tax contributions, we assume that their burden falls precisely in proportion to original income. This has a modest impact on the results. The Gini coefficient for final income increases at the third decimal place, indicating a smaller equalising effect of government health spending. The net redistributive effect falls by 11% and the R-S index of net progressivity by just over 8%. The breakeven percentile at which net benefits become zero falls from the 75<sup>th</sup> to the 65<sup>th</sup> as would be expected if one assumes non-tax revenues are proportional rather than progressive. In the baseline scenario, government spending on collective health services has a redistributive effect only by virtue of the fact that an equal absolute subsidy represents a greater relative increase in the living standards of the poor. It can be argued that the utilisation of personal health care reflects the value placed on health spending more generally and, on this basis, the distribution of benefits from spending on collective services can be approximated by assuming it to be proportional to spending on personal services. Under this assumption (scenario 3), the progressivity

of net benefits, measured by the R-S index, increases by just over 8% relative to the baseline. Alternatively, the redistributive effect of spending on collective services can be neutralised by assuming that it is proportional to original income. In this case (scenario 4), the net redistributive effect falls by 15% and the R-S index by 11% relative to baseline. Overall, the results are reasonably robust to different assumptions made about the distributions of non-tax revenue and spending on collective services.

#### 4. Distributions of public and private health care

The analysis presented in the previous section reveals that public health care in Hong Kong is largely paid for by the better-off but predominantly used by the less well-off. As a result, public spending on health care effects a redistribution of welfare from the rich to the poor. Inequalities in health and consequently the need for health care will be one reason for the concentration of public health resources on the poor, the importance of which will depend upon the extent to which care is delivered according to need. Another reason could be that the better-off choose to opt out of the public system and purchase health care in the private sector either directly or through insurance or employer-provided benefits. In this case, the redistribution achieved by public spending on health is not simply a product of the structures of public financing and delivery but also of the interaction between the public and private sectors. To assess the relative importance of these two explanations, we compare the income-related inequality in publicly and privately financed health services and show the impact on each of standardising for differences in need.

Standardisation is by the indirect regression-based method (World Bank 2003b). Consider the following model for health care utilisation ( $y$ ):

$$y_i = \alpha + \beta \ln inc_i + \sum_k \gamma_k x_{ik} + \sum_p \delta_p z_{ip} + \varepsilon_i \quad (2)$$

where we distinguish between three types of explanatory variables: (log of) income ( $\ln inc$ ), health need standardizing variables ( $x_k$ ), i.e. age, sex, self-assessed health and activity limitation, and non-need variables ( $z_p$ ) i.e. education, economic activity status, occupation, private insurance and employer medical benefits coverage. Need expected utilisation is given by:

$$\hat{y}_i^x = \alpha + \hat{\beta} \overline{\ln inc} + \sum_k \hat{\gamma}_k x_{ik} + \sum_p \hat{\delta}_p \bar{z}_p \quad (3)$$

where  $\hat{\cdot}$  indicates OLS coefficients and  $\overline{\ln inc}$  and  $\bar{z}_p$  are sample mean values. Need standardised utilisation is given by:

$$\hat{y}_i^{js} = y_i - \hat{y}_i^x + \bar{y} \quad (4)$$

Computing a concentration index from standardised utilisation gives the horizontal inequity (HI) index that is positive if there is inequity favouring the rich (Wagstaff et al 2000). That is, for given need, the rich receive more health care. A negative index implies violation of the equal treatment for equal need principle to the advantage of the poor.

Data are again from the THS and, as for the benefit incidence analysis, we distinguish between 1) hospital inpatient care (number of admissions in previous 12 months), 2) specialist outpatient care visits, and 3) general outpatient visits. Emergency room services are not considered here because they are provided exclusively by the public sector. We examine the distribution of each of the three types of care in relation to living standards measured by household income per equivalent adult.

Overall, Tables 4a-c show that public care is pro-poor and private care is pro-rich. For public care, the magnitude of inequality falls greatly after controlling for differences in need, suggesting that the pro-poor distribution largely reflects allocation according to need. That is, once we allow for the greater concentration among the poor of the elderly and those reporting poor health, there is much weaker evidence that the poor make greater use of public health care. Standardisation for need reveals even more pro-rich bias in the distribution of private care. This sector does not allocate according to need but according to ability to pay.

Specifically, Table 4a shows that the private sector is dominant in the delivery of general outpatient care overall, delivering 79% of total number of episodes. Private care is concentrated on the better-off. For instance, the richest 40% use 51% of all private care compared to 43% of public care being consumed by the poorest quintile. Even after controlling for differences in need, there is significant and substantial inequality to the advantage of the poor in the distribution of public care, suggesting that allocation according to need does not explain all of the pro-poor bias. This, together with the opposite income gradients observed in the distributions of public and private care indicate that the private sector opt-out taken by the rich contributes to the concentration of public general outpatient care on the poor.

We observe from Table 4b that the public sector is dominant in the provision of specialist outpatient care. Public specialist outpatient clinics are attached to and staffed by government acute hospitals which are the predominant inpatient care providers. The distributions of public and private specialist outpatient care are almost mirror images of each other. Public care is heavily concentrated on the poor, with the poorest 40% receiving 64% of specialist outpatient care. In the private sector, the richest 40% consumes 61% of episodes. Given the predominant market share held by the public sector, it is less plausible that private opt-out is a major reason for the pro-poor distribution. The public sector delivers the majority of specialist outpatient care and most of this goes to the less well-off. The fact that the magnitude of the concentration index falls markedly from -0.2834 to -0.0732 after controlling for differences in need indicates that the delivery of public care according to need is the dominant reason for its apparent pro-poor distribution.

From Table 4c it is apparent that the public sector again dominates the provision of inpatient care, accounting for 80% of all reported inpatient admissions. Similar to outpatient care, public inpatient care is concentrated on the poor (non-standardised  $C = -0.2109$ ) while private services are concentrated on the rich ( $C = 0.4123$ ). Standardising for differences in need results in a large change in the concentration index for public inpatient care towards proportionality ( $CI = -0.0492$ ). Thus, it appears that most of the skewness in public inpatient care towards the poor reflects the delivery of care according to need rather than any bias towards the poor per se.

Our main conclusions from this public-private utilisation comparison are:- 1) the income gradients differ between public and private sectors; 2) public services are mainly paid for by the better-off and used by the less well-off whereas private care is both paid for and used by the rich; 3) the private sector opt-out likely explains, to a large degree, why the public sector general outpatient care is concentrated on the poor; and 4) for specialist outpatient and inpatient care, a smaller private sector means the private sector opt-out is less important in explaining the concentration of public resources on the poor; rather, this appears to reflect the allocation of care according to need in the public sector.

## **5. Horizontal equity in the delivery of health care**

In the previous section, we examined income-related inequality and inequity in the public and private sectors separately. The results show pro-poor distributions of public sector care and pro-rich bias in the private sector. We now turn to the question of whether these two biases cancel out, such that, overall health care is distributed in accordance with the equal treatment for equal need (ETEN) principle. Of course, simply aggregating units of service across the public and private sectors does not allow for any differences in quality that may exist. More interesting than measuring income-related inequality in health care use is to explain why this arises. For example, to what extent is inequality in the utilisation of health care explained by inequality in the distribution of private insurance cover? We answer such questions using decomposition analysis (Wagstaff 2003, Van Doorslaer 2004).

Given a linear model such as (2), the concentration index for health care use can be decomposed as follows:

$$\hat{C} = \hat{\eta}_\theta \hat{C}_{\text{inc}} + \sum_k \hat{\eta}_k \hat{C}_k + \sum_p \hat{\eta}_p \hat{C}_p + G\hat{C}_e \quad (5)$$

where  $\hat{C}_{\text{inc}}$ ,  $\hat{C}_k$ ,  $\hat{C}_p$  are concentration indices for the respective variables and  $\hat{\eta}_k$  is the estimated (partial) demand elasticity of each determinant k, defined as:  $\hat{\eta}_k = \hat{\gamma}_k \bar{x}_k / \bar{y}$  where  $\bar{x}_k$  is the mean of  $x_k$ ; and analogously for  $\hat{\eta}_\theta$  and  $\hat{\eta}_p$ . The first term in (5) denotes the direct contribution of income inequality, the second the contribution of health need variables, the third the contribution of all non-need variables and the last term is the generalized concentration index of the residual. Need and non-need variables are defined as in the previous section.

The inequality and inequity indices are presented at the top of Table 5. Results from the decomposition analysis are given numerically in Table 5 and also graphically in Figure 2. In Figure 2, for simplicity and ease of interpretation, contributions are aggregated into four broad categories (the direct income effect, need variables, non-need variables and the residual). With each category, positive and negative contributions may cancel out so that a small category contribution in the figure masks larger underlying variable contributions that are recorded in Table 5. The sum of the bars in Figure 2 would be zero if utilisation were equal across income, whereas the need bar would be the only one to appear if there were perfect horizontal equity. If there are discrepancies between actual and need-expected distributions of use, then other bars appear indicating the direct contribution of income or its effect

through common correlates with health care utilisation. There is pro-rich inequality in the utilisation of general outpatient care that strengthens after controlling for differences in need, such that there is significant violation of the ETEN principle to the advantage of the better-off. The decomposition analysis reveals that this pro-rich inequality in general outpatient care is partly attributable to the direct effect of income but more so to a large non-need contribution that is driven mainly by employer-provided medical benefits and private health insurance. As seen above, the private sector is dominant for this type of care and it appears that the rich have better access to the sector mainly due to their greater health insurance cover but also because they are more able and willing to pay out-of-pocket for private care.

For specialist outpatient care, which is mostly financed publicly, there is pro-poor inequality in utilisation but this does not prevail after standardising for differences in need. Horizontal equity is not rejected. The decomposition analysis (see Figure 2) makes clear that need factors explain more of the inequality in specialist care than in general outpatient care. This reflects the more severe nature of conditions treated in specialist care but presumably also the stronger presence of the public sector and allocation according to need. The direct income contribution is stronger for specialist than general care while the insurance effect is much weaker, suggesting that private specialist care tends to be paid for OOP rather than through insurance. This is symptomatic of Hong Kong's as yet immature insurance market where there is inadequate coverage of substantial risks but reimbursement for treatment of minor morbidities in primary care. Economic inactivity contributes to the pro-poor distribution of specialist care. Those in need of specialist care are less likely to be employed and they have lower incomes.

Although there is a significant pro-poor concentration index for inpatient care, need adjustment overturns the pro-poor bias such that horizontal equity is marginally rejected, there being very slight inequity in favour of the better-off. The pro-rich inequity of private inpatient care, found in the previous section, outweighs the very slight pro-poor inequity in public inpatient care. However, counting public and private sector inpatient admissions equally is somewhat misleading given that the public sector has a more complicated case-mix and longer average length of stay. The decomposition analysis confirms that pro-poor inequality in inpatient admissions is principally attributable to income-related differences in need. There is only a very small direct effect of income shifting the distribution in a pro-rich direction. In Figure

2, non-need factors cancel out. Differential health insurance cover shifts the distribution of inpatient care in a pro-rich direction. There is a shift in the direction of the poor due to the fact that the economically inactive are both more likely to be admitted to hospital and to have lower incomes.

## **6. Discussion**

Our findings indicate that payments for public care are highly concentrated on the better-off while benefits are enjoyed mostly by the less well-off. As a consequence, there is significant net redistribution from the rich to the poor through public spending on health care. While utilisation of all public services are skewed towards the poor, the rich account for the majority of private care by opting out of the public sector. For general outpatient care, where the private sector is dominant, the choice of the private sector alternative by the better-off contributes substantially to the concentration of public sector resources on the poor. For specialist outpatient care and inpatient care, the pro-poor distribution of public sector resources is partly explained by the private sector opt-out by the rich but it is more attributable to the allocation of care according to need within the public sector itself. Horizontal equity is only achieved or close to being achieved where the public sector is dominant – specialist outpatient and inpatient care. For inpatient care, departure from horizontal equity in favour of the rich is statistically significant but not substantial.

Answers to the three questions posed in the introduction are as follows. First, if one supports an egalitarian equity objective of redistribution, then the system will be considered to be performing very well. It performs moderately well with respect to the horizontal equity principle of equal treatment for equal need – more so for specialist outpatient and inpatient care and less so for general outpatient care. Second, the public-private sector interaction is important in explaining the distributional characteristics of the system. Horizontal equity is better in parts of the system where the public sector is more dominant, reflecting effectiveness in allocating according to need, but the private sector opt-out contributes to greater redistribution than would be achieved by a wholly public system. Third, the fact that it is only the richest 25% of households that are net losers from public spending on health might be interpreted as potential majority support of the status quo of tax-funded health care. Indeed, it is only the richest 10% that experience a net loss greater than 2% of incomes. On the

other hand, net benefits are effectively zero from the 6th to the 8th deciles in the income distribution. This suggests a large middle-income group whose support for the status quo, from an entirely self-interested perspective, could be in the balance. On average, households in this middle-income range take out what they put into the public system. But since the variance of benefits is very much larger than that of payments, within any one period, many more will be net losers than are net gainers. Many may not appreciate the implicit insurance provided by public finance and provision.

The results present policy makers with an interesting trade-off. To achieve greater horizontal equity in the delivery of health care, a more unified, public sector dominated system (even more so than the present case) would be required in order to allocate more resources on the basis of need. But if this were to be implemented, there would be less redistribution because the rich would no longer be able to opt out of the public system to the same extent. This presents a dilemma for health care planners who seek to use the system both to effect redistribution and to achieve equal treatment for equal need. In the case of Hong Kong but also elsewhere, it appears that the question of “redistribution or horizontal equity?” poses a serious policy conundrum. This policy trade-off arises in a number of the reform options under consideration in Hong Kong. A priori, one would expect social insurance, as proposed by the Harvard consultants, to be less redistributive. In part, this is because social insurance contributions are levied in proportion to earnings and have little effect on the income distribution in comparison with progressive taxation that equalises the post-payment distribution of income. The greater progressivity of health financing in Hong Kong compared with social insurance alternatives in neighbouring high-income economies has been confirmed (O’Donnell O et al 2005a). But social insurance is also likely to be less redistributive because it blurs the operational boundaries between public and private providers, with all being similarly reimbursed at fixed rates. Therefore the better-off would no longer have to opt out of public care and pay again to obtain care from private providers. The targeting of public spending towards the socially indigent would have to occur at the level of premium setting or waivers from such. While a single-pipe social insurance funding mechanism is likely to be less redistributive than a dual system of a tax financed public sector operating in parallel to a large private sector alternative, it may be more effective in realising horizontal equity in the delivery of care. There is evidence that Hong Kong is less successful in achieving

horizontal equity than the social insurance systems of South Korea and Taiwan (Lu et al 2005).

Another financing option currently considered by the government involves an expanded role of private insurance to purchase care delivered by a larger private provider market, concomitant with scaling down public provision of care. This would be expected to shift the payment distribution more towards regressivity than social insurance, and has additional concerns such as adverse selection and risk stratification in premium setting. Moreover, it would exacerbate the status quo pro-rich horizontal inequities that we have shown arise in part from differential health insurance coverage. On the other hand, it may encourage more better-off households to opt out of the public system, which would lead to even greater net redistribution to the poor, provided the predominantly tax financed mode of health care funding were continued. But the latter condition is unlikely to hold. Tax incentives would have to be provided to encourage the purchase of private insurance and if they were not, political support for tax-financed health care would be weakened even further.

One interpretation of the current situation in Hong Kong is that it is at an equity frontier, ie it is not possible to push the system any further toward achieving horizontal equity while maintaining the current degree of redistribution and respecting economic and political constraints. A great role for private insurance would not promote horizontal equity and is likely to release economic and political forces that would reduce the degree of redistribution. A shift to social insurance may achieve more horizontal equity while sacrificing progressivity and net redistribution. In this context, the status quo may not be so bad after all. Violation of horizontal equity is marked for general outpatient care but very minimal for inpatient care. Even from an equity perspective, perhaps it is acceptable to allow the market to operate on the outpatient side while making sure the public avoids inequities in delivery of and catastrophic payments on inpatient care.

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**Table 1 Total health finance by source**

<b>Finance source</b>	<b>Percentage of total health finance</b>
Government general revenue	55.63
Direct taxes:	26.71
Personal income tax	9.95
Corporation tax	13.37
Property tax	2.94
Other	0.45
Indirect taxes:	12.35
General sales tax	0.93
Import duties	2.62
Stamp duty	4.30
Other	4.51
Non-tax revenue	16.54
Profits from public enterprises / resources	8.16
Fees from public services (non-health)	4.93
Other	3.45
Private insurance premiums	12.29
Privately purchased	3.41
Employer provided	8.88
Out-of-pocket payments	31.22
Others	0.86
<b>Total</b>	<b>100</b>

Sources: Hong Kong Domestic Health Accounts (1999/2000); Hong Kong General Revenue Account (1999/2000)

**Table 2 Incidence of benefits and costs of public spending on health care in Hong Kong (HK\$ per month)**

Decile of original income	Original income <sup>a</sup>	Tax contributions <sup>b</sup>	Non- tax contributions <sup>c</sup>	Subsidy to personal services <sup>d</sup>	Subsidy to collective services <sup>e</sup>	Final income <sup>f</sup>	Final / original income	Net benefit <sup>g</sup>
1	1959	18	8	384	70	2387	1.35	428
2	3547	26	11	612	75	4197	1.18	650
3	4658	33	14	311	80	5002	1.08	344
4	6011	48	20	318	78	6339	1.06	328
5	7522	57	24	243	80	7765	1.03	243
6	9368	66	28	128	78	9480	1.01	112
7	11502	93	39	148	77	11595	1.01	92
8	14742	167	71	133	76	14713	1.00	-29
9	20251	368	156	82	74	19884	0.98	-367
10	38325	1402	594	81	74	36483	0.96	-1842
Overall	11714	225	95	244	76	11714	1.07	0
Gini	0.4446					0.4256		
(robust SE)	0.0074					0.0067		
Concentration index		0.7122	0.7122	-0.3304	0.0013	0.4182		
(robust SE)		0.0297	0.0297	0.0419	0.0015	0.0068		
Kakwani index		0.2677	0.2677	0.7745	0.4433			
(robustSE)		0.0180	0.0180	0.0420	0.0057			

Net redistributive effect = Gini for original income - Gini for final income = 0.0189

Reynolds-Smolensky index of progressivity (robust SE) = Gini for original income - Concentration index for final income = 0.0264 (0.0011)

Re-ranking = Concentration index for final income - Gini for final income = -0.0075

SE = standard error

Notes:

- Average household income per month prior to payment of any tax and receipt of any (in-kind) public health benefits.
- Distributions of income tax, property tax, sales tax and import duties estimated from the survey data. Stamp duty allocated as property tax. Other direct and indirect taxes distributed as weighted average those that can be allocated. Tax contributions sufficient to finance government spending on health only.
- Non-tax revenues (profits of public enterprises, land sales and fees from (non-health) public services) assumed distributed as taxes.
- Public expenditure cost (net of fees) of provision of hospital inpatient, specialist and general outpatient and accident & emergency care.
- Assumed public expenditure on collective health services distributed equally (per capita) across the population.
- Original income - tax contributions - non-tax contributions + subsidy to personal health services + subsidy to collective services.
- Subsidy to personal health services + subsidy to collective services - tax contributions - non-tax contributions.

**Table 3 Sensitivity analysis of the net redistribution results**

	Final income		Net redistributive effect	Reynolds-Smolensky net redistributive effect (Robust SE)	Net benefit break-even percentile
	Gini coefficient (Robust SE)	Concentration index (Robust SE)			
Scenario 1: Base case	0.4256 (0.0067)	0.4182 (0.0068)	0.0189	0.0264 (0.0011)	75 <sup>th</sup>
Scenario 2: Non-tax contributions allocated in proportion to income	0.4278 (0.0068)	0.4204 (0.0069)	0.0168	0.0242 (0.0010)	65 <sup>th</sup>
(% change from baseline)	0.50%	0.53%	-11.17%	-8.34%	
Scenario 3: Subsidy to collective services allocated as personal health services	0.4271 (0.0067)	0.4160 (0.0068)	0.0174	0.0285 (0.0013)	65 <sup>th</sup>
(% change from baseline)	0.35%	-0.51%	-7.94%	8.12%	
Scenario 4: Subsidy to collective services allocated in proportion to income	0.4285 (0.0067)	0.4211 (0.0068)	0.0160	0.0235 (0.0011)	75 <sup>th</sup>
(% change from baseline)	0.67%	0.69%	-15.16%	-10.91%	

SE = standard error

**Table 4a Annual general outpatient visits**

	Public				Private			
	Non-standardised		Need standardised*		Non-standardised		Need standardised*	
	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>
Poorest 20%	3.04	43%	2.31	33%	3.43	13%	2.72	10%
2nd poorest	1.65	22%	1.63	21%	4.58	16%	4.46	16%
Middle	0.95	13%	1.12	15%	5.45	20%	5.61	20%
2nd richest	0.96	13%	1.20	17%	6.71	25%	6.96	26%
Richest 20%	0.72	9%	1.08	14%	7.50	26%	7.95	28%
Overall/Total	1.48	100%	1.48	100%	5.52	100%	5.52	100%
	C	<b>-0.2956</b>	HI	<b>-0.1589</b>	C	<b>0.1515</b>	HI	<b>0.1921</b>
	Robust SE	0.0283	Robust SE	0.0277	Robust SE	0.0147	Robust SE	0.0147

**Table 4b Annual specialist outpatient visits**

	Public				Private			
	Non-standardised		Need standardised*		Non-standardised		Need standardised*	
	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>
Poorest 20%	1.92	41%	1.21	26%	0.21	14%	0.11	7%
2nd poorest	1.16	23%	1.12	22%	0.23	14%	0.21	13%
Middle	0.63	13%	0.81	17%	0.18	11%	0.20	13%
2nd richest	0.53	11%	0.76	16%	0.38	25%	0.42	28%
Richest 20%	0.54	11%	0.91	18%	0.59	36%	0.64	39%
Overall/Total	0.96	100%	0.96	100%	0.31	100%	0.31	100%
	C	<b>-0.2834</b>	HI	<b>-0.0732</b>	C	<b>0.2265</b>	HI	<b>0.3234</b>
	Robust SE	0.0340	Robust SE	0.0334	Robust SE	0.0762	Robust SE	0.0760

**Table 4c Annual inpatient admissions**

	Public				Private			
	Non-standardised		Need standardised*		Non-standardised		Need standardised*	
	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>	<i>Mean</i>	<i>Share</i>
Poorest 20%	0.20	36%	0.14	24%	0.01	5%	0.00	1%
2nd poorest	0.12	20%	0.12	20%	0.01	9%	0.01	8%
Middle	0.09	16%	0.11	20%	0.02	16%	0.02	16%
2nd richest	0.08	15%	0.11	19%	0.04	29%	0.04	30%
Richest 20%	0.07	12%	0.11	18%	0.06	42%	0.06	44%
Overall/Total	0.12	100%	0.12	100%	0.03	100%	0.03	100%
	C	<b>-0.2109</b>	HI	<b>-0.0492</b>	C	<b>0.4123</b>	HI	<b>0.4685</b>
	Robust SE	0.0230	Robust SE	0.0222	Robust SE	0.0437	Robust SE	0.0437

C = concentration index, HI = horizontal inequity index, SE = standard error

Statistically significant (p<0.05) in **bold type**

\*Standardised by age, sex, self-assessed health and activity limitation

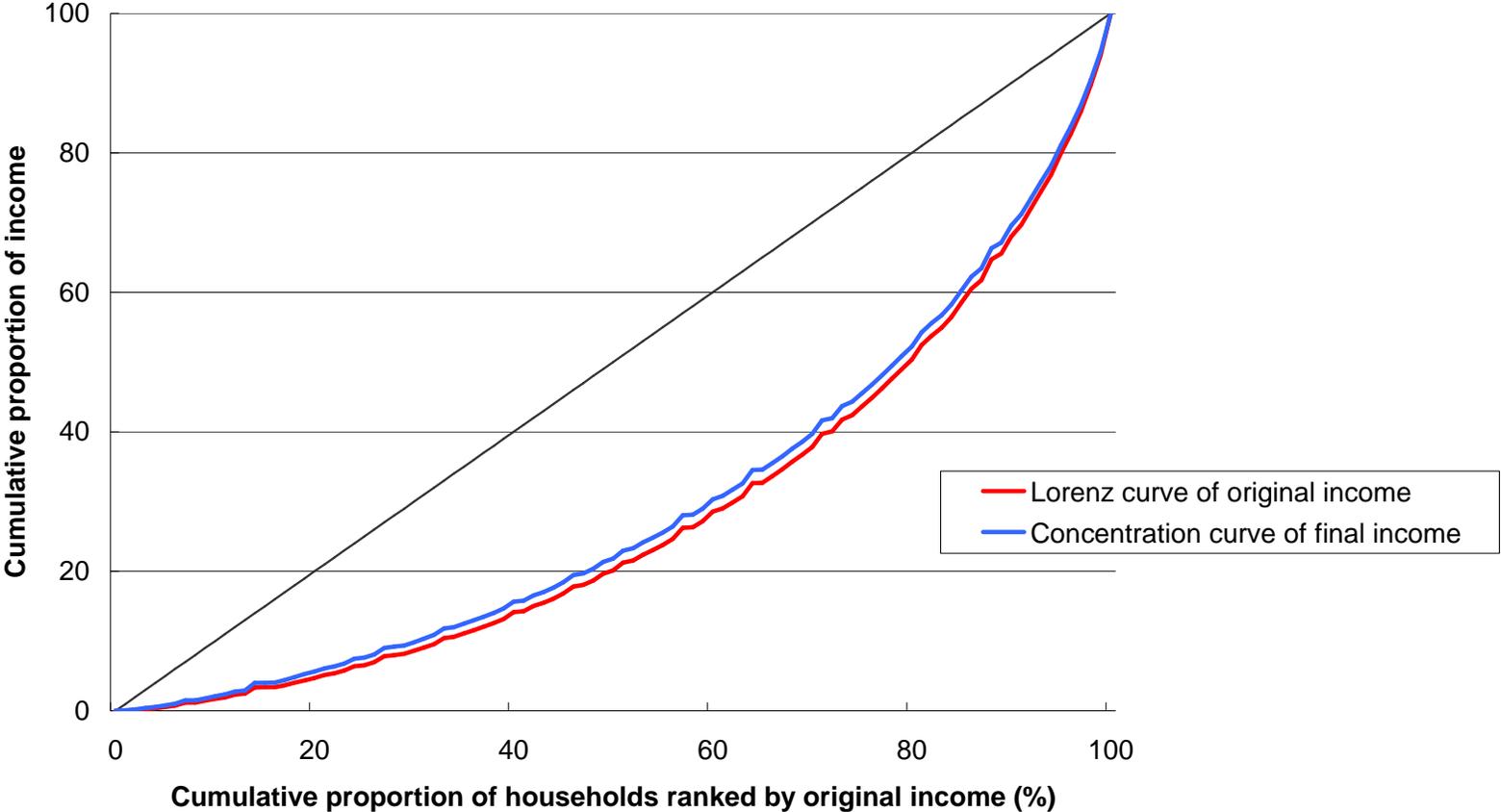
**Table 5 Level and decomposition of income-related inequality in overall health care (public and private)**

	Outpatient care		Inpatient admission
	General	Specialist	
<i>Concentration index (C)</i>	<b>0.0573</b>	<b>-0.1580</b>	<b>-0.0954</b>
<i>95% confidence interval</i>	(0.0317, 0.0828)	(-0.2209, -0.0952)	(-0.1354, -0.0554)
<i>Health inequity index (HI)</i>	<b>0.1181</b>	0.0243	<b>0.0468</b>
<i>95% confidence interval</i>	(0.0928, 0.1434)	(-0.0374, 0.0860)	(0.0081, 0.0856)
<i>C (predicted)</i>	0.0447	-0.1860	-0.1361
<i>GC (residual)</i>	0.0125	0.0280	0.0407
C contribution of:			
In (income)	<b>0.0221</b>	<b>0.0488</b>	0.0064
<u>Need</u>			
<i>Self-assessed health (Ref=Very good)</i>			
Good	0.0027	0.0007	0.0017
Fair	<b>-0.0103</b>	<b>-0.0101</b>	<b>-0.0081</b>
Bad	<b>-0.0318</b>	<b>-0.0859</b>	<b>-0.0595</b>
<i>Activity limitations (Ref=None at all)</i>			
A little	<b>-0.0087</b>	<b>-0.0266</b>	<b>-0.0200</b>
A lot	0.0037	<b>-0.0203</b>	<b>-0.0262</b>
<i>Age-sex dummies (Ref=16-34 male/16-34*)</i>			
35-44 male/35-44*	<b>0.0030</b>	<b>0.0096</b>	-0.0013
45-64 male/45-64*	<b>-0.0009</b>	<b>-0.0040</b>	<b>-0.0017</b>
65-74 male/65-74*	<b>-0.0053</b>	<b>-0.0125</b>	-0.0084
75+ male/75+*	-0.0036	-0.0089	<b>-0.0161</b>
16-34 female	<b>0.0071</b>	0.0032	0.0033
35-44 female	<b>0.0042</b>	<b>0.0044</b>	0.0007
45-64 female	<b>-0.0036</b>	<b>-0.0051</b>	0.0001
65-74 female	<b>-0.0049</b>	<b>-0.0137</b>	0.0002
75+ female	<b>-0.0052</b>	-0.0133	-0.0069
<u>Non-need</u>			
<i>Education (Ref=Graduate)</i>			
Undergraduate/College	-0.0086	-0.0209	-0.0021
High school	-0.0077	-0.0257	-0.0022
Middle school	0.0085	0.0152	-0.0014
Elementary/No schooling	0.0138	0.0568	0.0047
<i>Economic activity (Ref=Employed)</i>			
Inactive	<b>0.0128</b>	<b>-0.0654</b>	<b>-0.0355</b>
Housework	0.0030	-0.0037	-0.0037
<i>Medical benefit/insurance coverage (Ref=Nil)</i>			
Employer-provided benefit	<b>0.0396</b>	-0.0126	<b>0.0160</b>
Privately purchased insurance	<b>0.0220</b>	0.0038	<b>0.0239</b>

ref=reference

Statistically significant (p<0.05) in **bold type**.

**Figure 1 Net redistributive effect of government spending on health**



**Figure 2 Decomposition of income-related inequality in health care utilisation**

