

Health care financing and income inequality in South Africa: implications for a universal health system

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Abstract

A key dimension for assessing the performance of a health system is the extent of 'fairness' of its financing system. Financing health care while it primarily provides resources to the health sector, it also impacts on income inequality. In South Africa, health care is financed through allocations from general taxes, private health insurance contributions and out-of-pocket payments. This paper investigates the extent to which financing health care in South Africa impacts on income distribution, particularly whether it reduces income inequality. It also discusses the implications of the results for ensuring universal coverage in South Africa. Standard methodologies that have been developed and used in public economics were applied to data on health care financing extracted from the South African Income and Expenditure Survey (IES) 2005/06. The results indicate that financing health care through direct taxes (comprising personal and corporate income taxes) and private health insurance contributions leads to a reduction in income inequality while financing through indirect taxes and out-of-pocket payments leads to an increase in overall income inequality. Financing health care via general taxes (comprising direct and indirect taxes) contributes to a reduction in income inequality. In general, total health care financing in South Africa was found to reduce inequality in income. Based on international evidence and given the high income inequality in South Africa, general taxes that have been found to reduce inequality hold great promise for ensuring an equitable health care financing system and addressing income inequality. This requires that government increases its commitment to the health sector through increased public spending on health. We conclude that Tax funding, particularly direct taxes rather than indirect taxes, are the most reliable way to ensure progressive and pro-poor redistributive financing for the health sector.

Introduction

Health is recognised as a major determinant of economic growth and social development (Grossman, 1972; van Zon and Muysken, 2005). Within countries, health systems are responsible for ensuring a healthy population. Thus it is important to assess the extent to which the health system is performing. A key dimension for assessing the performance of the health system, according to the World Health Organisation, is the extent of 'fairness' of its financing system (World Health Organization, 2000). Policy makers within and across countries have been urged to devise ways to ensure such fairness in paying for health care (Wagstaff, 2002b) by building on existing health care financing structures. Recently, countries have also been encouraged to provide universal access to health care for their population (World Health Organization, 2010).

This global call for ensuring universal coverage has been embraced by South Africa in its recent commitment to a National Health Insurance (NHI) (Department of Health, 2011). It is envisaged that the NHI will contribute toward redressing existing health inequalities in the country. In this context, there is a need to provide research outputs that will feed into an evidence-based policy formulation.

A major problem faced in the country is the high level of income inequality. Income distribution in South Africa is such that, in 2005/06, the poorest 10% of the population shared only about R1.1 billion (representing about 0.1% of total incomes) compared to R381 billion (representing 51%) by the top 10% of the population (Statistics South Africa, 2008b). Also, access to social services between population groups, provinces and socio-economic groupings in South Africa is highly unequal to the favour of the well-off (Coovadia *et al.*, 2009; Mooney and Gilson, 2009).

In terms of financing health care, while its primary aim is to provide resources for the health sector, it also impacts on income distribution (Bilger, 2008; Cavagnero and Bilger, 2010). It can be used as an explicit policy tool for reducing income inequality in a country like South Africa that is battling with a high level of income inequality. It is in this area that the paper aims to provide evidence to contribute to the consideration of policy options. The paper investigates the extent to which financing health care in South Africa impacts on income distribution, particularly whether it reduces income inequality. This is important not only in assessing the impact on the overall welfare of South Africans currently, but also as a contextual factor in the consideration of the proposed NHI.

Generally, health care is financed in South Africa through both private and public sources. The public source is mainly allocations from general taxes while private sources include private health insurance contributions and out-of-pocket payments. In 2008 it was estimated that about 43% of total health care funds is accounted for by general government revenue. This is almost equal to that accounted for by private medical schemes alone. The private financing sources (i.e. household out-of-pocket payments and medical schemes) together account for about 57% of total health care resources in South Africa. Though private medical schemes account for about 43% of total health care funds, they

cover about 16% of the population that comprises mainly the rich (McIntyre *et al.*, forthcoming).

Since financing health care impacts on income distribution in a country, it is generally agreed that a progressive health care financing system, that places less burden on the poor than the rich, is preferred to a regressive one. Regressive health care financing is normally regarded as inequitable (Wagstaff, 2002b) and unfair. Similarly, it is expected that a good financing system contributes to the overall reduction in income inequality through a pro-poor redistributive process.

Methods

Data sources for different health care financing mechanisms

Data are drawn from the nationally representative Income and Expenditure Survey (IES) conducted by Statistics South Africa (Stats SA) between September 2005 and August 2006. A total of 3,000 primary sampling units (PSU) were selected and eight dwelling units from each were sampled. In total about 24,000 households or dwelling units were sampled. The IES 2005/2006 round was conducted using a combination of the diary and questionnaire recall methods (Statistics South Africa, 2008c). This is different to previous IES rounds that only used a once-off household questionnaire survey. All analyses were done taking into account the multistage sample design.

For each of the health financing sources (taxes, medical scheme contributions, and direct out-of-pocket payments), we estimate each household's total payments, using standard assumptions made in health care financing incidence studies (O'Donnell *et al.*, 2008). The calculations have been described in Ataguba and McIntyre (2012a) (see Table 1). For taxes, only the proportion of tax revenue that is allocated to the health sector (11.55% in 2006) (National Treasury, 2007) was considered. The assumption was that an equal proportion (i.e. 11.55%) of each tax category is allocated to health care funding. We considered the following tax categories that when combined account for over 90% of total tax receipts: personal income tax (PIT), corporate income tax (CIT), value-added tax (VAT), fuel levy (FL), and excise taxes (ET). For CIT it is difficult to establish who bears the final burden between capital owners and consumers (Fullerton and Metcalf, 2002; Auerbach, 2006). However we used the Hirschman-Herfindahl Index (HHI) of industry concentration (Rosenbluth, 1955; Hirschman, 1964) that has recently been computed for South Africa (Djolov, 2009). The index shows that manufacturing industries are characteristically leaning towards competition or oligopoly with an overall average index value¹ of 0.37. Therefore, it was assumed that the split between capital owners (shareholders, contributors to pension, etc.) and consumers would be in the neighbourhood of 40% (consumers) and 60% (capital owners).

¹ Theoretically the index ranges from 0 to 1. Zero indicates perfect competition while 1 indicates monopoly and it can be generally characterised as follows: (0 – 0.25) for weak, (0.25 – 0.50) for moderate, (0.5 – 0.75) for fairly strong and (0.75 – 1.00) for very strong with regard to how close the industry is to being a monopoly (Djolov, 2009)

Table 1: Summary showing how each components of health financing was extracted

Component	Basic Computation Technique
Taxes^a	
Personal Income Tax (12% of total health finance)	Apply the appropriate tax thresholds, tax rate and rebates to the gross income of individuals within each household within the taxable range
Corporate Income Tax (10% of total health finance)	Apportion total corporate tax receipts reported by Treasury to households based on an assumption of tax shifting in terms of percentage borne by capital owners (identified as those who report earning dividends) and that by households through consumption. As there was no prior research that provides a concrete basis for apportioning, the HHI index was used. Based on the value of the index that has been recently computed for South Africa, the assumption of 40%:60% sharing of the economic burden between consumers and capital owners respectively was used.
Value Added Tax (VAT) (10.8% of total health finance)	The VAT rate is applied to expenditure on goods and services that are standard rated, i.e. excluding the zero-rated and exempted goods.
Fuel Levy (2% of total health finance)	Fuel is consumed by households (personal or public transportation) as well as by corporate or industrial users, so estimation involved a process of generating the component attributable to public transport users, personal transport users and users in businesses. We assumed that the fuel levy is shifted to consumers reporting expenditure on minibus taxis, buses and other types of public transport. Fuel tax accruing to businesses and corporate users is also assumed to be passed forward onto consumers. Because we could not directly estimate from the dataset the component attributed to corporate or industrial users, we assumed that the difference between the fuel levy component accounted for by private and public transport users and that reported by National Treasury is attributable to industrial users.
Excise Tax (1.5% of total health finance)	For cigarettes, the tax rate was applied to expenditure on cigarette products. For beer, wine and spirits, reported expenditure on these products was translated into estimated quantities (litres) using average retail prices; the rate per litre was then applied.
Others (4% of total health finance)	Not estimated but includes taxes on property and unidentified levies, stamp duties and fines, air departure tax and skills development levy.
Health Insurance^b	
Medical Schemes (Private) (45% of total health finance)	Expenditure on medical scheme premiums by households were combined with employers' contributions on behalf of members of the household.
Out-of-pocket payment^c	
OOP payments (14% of total health finance)	Household expenditure on medicines, consultations, treatments and procedures were summed.

^a Taxes make up about 40% of total health care finance; ^b Medical scheme contributions make up about 45%; ^c Out-of-pocket payments make up about 14%.
Source: Adapted from Ataguba and McIntyre (2012a).

Measuring income

There are many alternative measures of household living standards (Deaton, 1997; O'Donnell *et al.*, 2008). These include: reported income, consumption expenditure, and a composite index of socio-economic status or assets (usually constructed around ownership of key assets, and housing characteristics, and sometimes including broader indicators such as education and employment status). Each measure presents both practical and conceptual challenges and there seems to be no 'best' measure to use (O'Donnell *et al.*, 2008). In this paper, household consumption defined as the "[f]inal use of goods and services, excluding the intermediate use of some goods and services in the production of others" (O'Donnell *et al.*, 2008 p.70) was used as a proxy for income. This includes all health care payments and is gross of direct taxes and where applicable, amounts households transferred out and not reflected in their expenditure (see for example O'Donnell *et al.*, 2008). Also the expenditure was adjusted upward to account for under-reporting in the food and non-alcoholic beverages category (Statistics South Africa, 2008a, 2008b). Based on previous IES rounds, this category was adjusted to account for about 28% of total consumption expenditure.

Total household income was further adjusted to account for variations in household size and composition by computing *per adult equivalent* income using the following scale:

$$AE = (s_A + \eta s_K)^\theta \text{ for } \theta \geq 0, \quad 0 \leq \eta \leq 1 \quad (1)$$

Where s_A is the number of adults in the household; s_K is the number of children, η is the cost of children and θ represents economies of scale. Based on Deaton and Zaidi (2002) we set $\eta = 0.5$ and $\theta = 0.75$.

Assessing the impact of health care financing on income inequality

This paper uses the Duclos *et al.* (2003) methodology to assess income redistribution associated with paying for health care in South Africa. This basically decomposes inequality measures based on the Atkinson-type social welfare functions (Atkinson, 1970) by incorporating some 'ethical' concerns. This is referred to here as the *DJA* methodology or model. The *DJA* method is a non-parametric approach that does not require a priori categorisation of households as income near-equals². In doing so horizontal equity can be assessed in the 'classical' sense defined as equal treatment of equals.

The *DJA* income redistributive effect of health care financing can be written compactly as:

$$\Delta I = I_X - I_N \quad (2)$$

where I_X and I_N represent inequality in gross and net (after health care payments) incomes respectively.

² Near-equals are obtained by grouping similar households using a predetermined income band. The households in a given band are not strictly speaking 'equals'.

Following Yaari (1988), a modified specification of the social welfare function of gross (or prepayment) income is given as:

$$W_X(\varepsilon, \nu) = \int_0^1 U_\varepsilon(X(p))w(p, \nu) dp \quad (3)$$

where $X(p)$ is the quantile (or percentile) function of per adult equivalent gross income or what Yaari (1988 p.382) loosely calls “individual p 's income.” The utility function is specified as an isoelastic utility function (see Duclos *et al.*, 2003) given as:

$$U_\varepsilon(y) = \begin{cases} \frac{y^{1-\varepsilon}}{1-\varepsilon}, & \text{when } \varepsilon \neq 1 \\ \ln(y), & \text{when } \varepsilon = 1 \end{cases} \quad (4)$$

This function is concave because the parameter ε captures how individuals will be averse to uncertainty in their net income. The parameter ε is therefore a measure of relative aversion to risk or horizontal inequality (see Duclos *et al.*, 2003).

The ethical weighting function ($w(p; \nu)$) is defined as:

$$w(p; \nu) = \nu(1-p)^{(\nu-1)}, \nu \geq 1 \quad (5)$$

where the parameter ν is a measure of aversion to rank inequality or reranking (Duclos *et al.*, 2003). The larger the value of ν , the faster is the fall in $w(p; \nu)$ for higher percentiles.

Duclos *et al.* (2003) decompose Equation (2) as:

$$I_X - I_N = \underbrace{(I_X - I_N^E)}_{V^{DJA}} - \underbrace{(I_N^P - I_N^E)}_{H^{DJA} \geq 0} - \underbrace{(I_N - I_N^P)}_{R^{DJA} \geq 0} \quad (6)$$

where $I_X = 1 - (\xi_X(\varepsilon, \nu) / \mu_X)$, $I_N = 1 - (\xi_N(\varepsilon, \nu) / \mu_N)$, $I_N^E = 1 - (\xi_N^E(\varepsilon, \nu) / \mu_N^E)$, and $I_N^P = 1 - (\xi_N^P(\varepsilon, \nu) / \mu_N^P)$.

By definition, $\xi_X(\varepsilon, \nu) = U_\varepsilon^{-1}W_X(\varepsilon, \nu)$ is the equally distributed equivalent gross income and μ_X is the mean gross income. $\xi_N(\varepsilon, \nu) = U_\varepsilon^{-1}W_N(\varepsilon, \nu)$ is the analogous measure for net income with μ_X defined as the mean of net income. $\xi_N^E(\varepsilon, \nu) = U_\varepsilon^{-1}W_N^E(\varepsilon, \nu)$ is the equally distributed equivalent net incomes when households with gross income rank p are given their expected net income ($\bar{N}(p)$) using a non-parametric Kernel regression. μ_N^E is the mean of $\bar{N}(p)$. $\xi_N^P(\varepsilon, \nu) = U_\varepsilon^{-1}W_N^P(\varepsilon, \nu)$ is the equally distributed equivalent net incomes when households with gross income rank p are given their expected net income utility ($\overline{U_\varepsilon(N(p))}$) and μ_N^P is the corresponding mean.

Vertical inequity (V^{DJA}) represents the extent to which health care payments treats unequals unequally. Classical horizontal inequity (H^{DJA}) represents the extent to which

health care payments treat pre-payment equals unequally. Re-ranking (R^{DJA}) represents the extent to which individuals are overtaken by others or the extent to which they overtake others in the redistributive process. It can also be interpreted as “improper treatment of unequals” (Abu-Zaineh *et al.*, 2009).

The major challenges with the *DJA* approach lie in the choice of parameters of aversion to rank inequality (ν) and aversion to risk or uncertainty in net income (ε). Empirical values for these parameters have been based on a “leaky bucket” or efficiency loss experiment (Duclos, 2000) that assesses the extent of society’s tolerance to costs incurred when transferring income from a rich to a poor individual (see Duclos *et al.*, 2003). Based on this experiment the values of ε should range between 0.25 and 1.0 while that of ν should be between 1 and 4 (Duclos, 2000; Duclos *et al.*, 2003). However Duclos *et al.* (2003) note that ‘reasonable’ values for ν and ε are 1.5 and 0.4 respectively. These reasonable values are used in this paper as they have been used in recent studies on health care financing (for example see Bilger, 2008; Cavagnero and Bilger, 2010).

Bootstrap methods (Efron and Tibshirani, 1986; Efron, 1987) were used to obtain standard errors for RE^{DJA} , V^{DJA} , H^{DJA} and R^{DJA} using 100 replications (see StataCorp, 2009). To avoid inconsistent estimates of bootstrap standard errors, bootstrap resamples took into account the full sampling structure and the non-parametric nature of some estimates (Cameron and Trivedi, 2009) especially the Kernel estimations for the indices. DAD³ software (Duclos *et al.*, 2010) had been programmed to take all these into account and was used to obtain all estimates for the *DJA* approach.

Empirical results

The results presented in Table 2 indicate that financing health care via personal income tax in South Africa reduces inequality in income. The redistributive effect (0.00430) was statistically significant. The vertical effect was estimated at 0.00431. This was significantly different from zero and it indicates the extent of equity in financing health care through personal income tax. The positive value of the estimate implies that personal income tax is progressive in the sense that unequals are treated unequally such that the poor are favourably treated. This effect represents the amount by which inequality in post payment incomes could decrease if there are no differential treatments arising from reranking or horizontal inequity. A very small and negligible horizontal effect was estimated (0.000005). This was not statistically different from zero at conventional levels and it is not surprising because personal income tax in South Africa is progressively structured to treat equals equally. Reranking was estimated at 0.00001 and this was statistically different from zero. Theoretically this means that some individuals are being outranked by others in the redistributive process. However in the current context, it is important to note that the assessment of redistribution was based on adult equivalent income which is however not the basis for levying personal income taxation in South Africa. It is not unlikely that some households that earn the same amounts could have large household

³ This software is freely available and it is used for distributive analysis. We are grateful to the authors particularly Abdelkrim Araar and Jean-Yves Duclos for technical assistance during estimation. The software can be downloaded from: <http://132.203.59.36/DAD/index.html>.

size and as such be ranked lower than their colleagues when household size and composition is taken into account.

Table 2: *DJA* decomposition of the income redistributive effect of health care payments, South Africa 2005/2006

Finance source	RE^{DJA}	V^{DJA}	H^{DJA}	R^{DJA}
Personal income tax	0.4299*** (0.04150)	0.4314*** (0.04142)	0.0005 (0.00047)	0.0010*** (0.00009)
Corporate income tax	0.0380 (0.02383)	0.0543** (0.02600)	0.0049*** (0.00183)	0.0114*** (0.00333)
Direct taxes	0.4717*** (0.04126)	0.4897*** (0.04156)	0.0054*** (0.00196)	0.0127*** (0.00342)
Value-added tax	-0.0576*** (0.01097)	-0.0571*** (0.01098)	0.0000 -	0.0005*** (0.00003)
Excise taxes	-0.0425*** (0.00310)	-0.0416*** (0.00316)	0.0005*** (0.00016)	0.0004*** (0.00004)
Fuel levy	-0.0204*** (0.00234)	-0.0202*** (0.00234)	0.0001 (0.00007)	0.0000 -
Indirect taxes	-0.1220*** (0.01430)	-0.1202*** (0.01443)	0.0007* (0.00042)	0.0011*** (0.00008)
General taxes	0.3546*** (0.03687)	0.3759*** (0.03729)	0.0066*** (0.00201)	0.0148*** (0.00375)
Private health insurance	0.9401*** (0.12467)	1.1091*** (0.12942)	0.0694*** (0.00729)	0.0996*** (0.00997)
Out-of-pocket payments	-0.0574** (0.02889)	-0.0297 (0.03032)	0.0124*** (0.00199)	0.0153*** (0.00320)
Overall health care payments	1.2738*** (0.13699)	1.5499*** (0.15421)	0.1076*** (0.00941)	0.1685*** (0.01992)

*, **, *** statistically significant at 10%, 5% and 1% levels respectively

The values of *DJA* parameters are: $\varepsilon = 0.4$, $v = 1.5$

All figures are multiplied by 100 to enhance readability.

Financing health care through corporate income tax induces a positive but statistically insignificant income redistributive effect. As shown in Table 2 it reduces inequality in income by about 0.0004. This redistributive effect is smaller than that obtained from personal income tax. The vertical effect also indicates a statistically significant progressive relationship which implies that unequals are treated unequally, with poorer groups treated more favourably. The magnitude of the vertical effect (0.0005) is larger than that of horizontal inequity (0.00005) and re-ranking (0.0001). Though personal income tax is horizontally equitable, corporate income tax is horizontally inequitable. This inequity in corporate income tax is statistically significant and implies that equals are not being treated equally. This result is because corporate income tax is paid not only by owners of capital and labour but also consumers. Because both the rich and the poor consume manufactured products, and there is no explicit differentiation in prices, horizontal inequity and reranking is likely to occur. Some of the horizontal effects may not be interpreted as inequitable because they reflect choices that individuals make but overall the lack of differentiation in those who contribute to health care financing via corporate income tax induces differential treatments that cause horizontal inequity and reranking.

Overall, financing health care through direct taxes induces significant pro-poor income redistribution in South Africa. The redistributive effect associated with direct taxes was estimated at 0.0047 which implies that inequality is reduced through direct income taxes in South Africa. This positive and significant income redistributive effect resulted from a positive vertical effect that dominates the negative effects of reranking and horizontal inequity. Because corporate income tax and personal income tax exhibit significant pro-poor vertical effects, direct taxes are also significantly progressive. The vertical effect associated with financing health care through direct taxes was estimated at 0.0049 and this is also greater than the combined negative effects of horizontal inequity and reranking. This vertical effect is larger than the individual vertical effects of personal income tax and corporate income tax. This is because it is the weighted sum of these two. Significant differential treatments in the form of horizontal inequity and re-ranking were recorded for direct taxes largely because of the prominence of these effects with corporate income tax. Horizontal inequity in direct taxes is 0.00005 while re-ranking is 0.00013.

While financing health care through direct taxes generally leads to reductions in income inequality, indirect taxes are the exact opposite. Health care financing through value-added tax increases inequality in income. The negative redistributive effect implies that post-payment inequality increased by 0.00058 over that of pre-payment income. The major driver of the negative income redistributive effect is the pro-rich vertical effect. There is an unfavourable treatment of unequals such that the poor are bearing a greater burden of health care payments through value-added tax than the rich. Vertical inequity was significantly estimated at -0.00057. Differential treatments in the form of horizontal inequity and reranking were estimated to be very small. In fact horizontal inequity was estimated to be <0.000001. The reranking effect (0.000005) was however statistically different from zero. This means that when households finance health care via value-added tax, some are overtaken by others in the redistributive process.

Health care financing through excise taxes in the form of tobacco taxes and alcohol taxes redistribute income in favour of the rich. A statistically significant negative redistributive effect (-0.00043) was estimated for excise taxes. The increase in income inequality associated with financing health care with excise tax revenue is largely associated with the significant pro-rich vertical effect. Vertical inequity was estimated at -0.00042 which means that unequal households are unfavourably treated. The poor are paying more as a portion of their income in total excise tax revenue than the rich. Differential treatments were almost equally shared between reranking and horizontal inequity. Horizontal inequity and reranking were respectively estimated at 0.000005 and 0.000004. Equal households end up being significantly treated unequally in contributing to excise tax revenue in South Africa. This is mainly because such taxes are as a result of consumption patterns of individuals and households. Only individuals that purchase items that are subject to excise taxes end up paying such taxes. The underlying differential treatment is therefore, to an extent, a reflection of the consumption decisions of individuals and households and may not necessarily be labelled as inequity. This is again largely because excise taxes are levied on items that are not necessarily categorised as necessities. These taxes are also often called sin taxes because they are levied on 'unhealthy' items (O'Donoghue and Rabin, 2006).

A fuel levy unlike alcohol taxes and tobacco taxes are not regarded as sin taxes. However just like other excise taxes, fuel levy revenue used in financing health care also significantly induces negative redistribution by increasing income inequality. The income redistributive effect was estimated at -0.0002. The extent of increases in income inequality associated with fuel levy is less than that observed for value-added tax and excise taxes. The pro-rich redistribution in fuel levy is mainly due to regressive fuel levy revenue. A statistically significant pro-rich vertical effect was estimated for fuel levy which indicates the extent to which unequal treatment of unequals increases income inequality. The reranking effect was negligible and horizontal inequity estimated at 0.000001 was not statistically different from zero.

The combination of all indirect taxes replicates the significant pro-rich redistribution associated with its components. The redistributive effect of indirect taxes was estimated at -0.0012. This is statistically different from zero and it indicates that financing health care via indirect tax revenue in South Africa increases income inequality. The increase in income inequality associated with indirect taxes (-0.00122) is less (in absolute terms) than the decrease in income inequality caused by direct taxes. As expected indirect taxes result in pro-rich vertical effects. Increase in income inequality is mainly as a result of unequal and unfavourable treatment of unequals. A statistically significant vertical inequity for indirect taxes was estimated at -0.00120. This implies a significant regressive pattern for indirect taxes. Differential treatments associated with indirect taxes are mainly due to significant reranking effects than horizontal inequity. Horizontal inequity was marginally significant at the 10% level but the reranking effect was estimated at 0.00001 and this was significantly different from zero signifying significant switching of ranks associated with financing health care through indirect taxes.

Combining direct and indirect taxes as shown in Table 2, financing health care through general taxes leads to a significant reduction in income inequality. The significant redistributive effect of 0.0035 associated with general taxes is a combination of the dominant pro-poor redistribution associated with direct taxes ($RE = 0.0047$) and a dominated pro-rich redistribution associated with indirect taxes ($RE = -0.00122$). Therefore health care financing via general taxes redistributes income away from the rich towards the poor. Because $V^{DJA} > 0$ for general taxes, it means that general taxes have a pro-poor vertical effect ($V = 0.0038$). This is so because the pro-poor vertical effect for direct taxes dominates the pro-rich vertical effect observed in indirect taxes. Therefore general taxes absorb a smaller share of poor households' income compared to the share of richer households' income they absorb. The contribution of the vertical effect to redistribution is decreased by significant reranking and horizontal effects. General taxes have horizontal and reranking effects that are mainly attributed to corporate income tax and indirect taxes. Horizontal inequity was statistically significant and was estimated at 0.00007. Also reranking ($R = 0.00015$) was significantly different from zero. These results mean that in the process of income redistribution through general taxes, equals were not treated equally and some households were unfavourably overtaken by others.

Pro-poor redistribution is also observed for private health insurance. Private health insurance accounts for about 45% of total health care financing and as shown in Table 2, contributions toward private health insurance reduce income inequality in South Africa. A

significant redistributive effect ($RE = 0.0094$) was computed for private health insurance. This significant effect was expected because private insurance cover is purchased mainly by the rich who can afford it. The share of private insurance contributions in poor households' income is very negligible. In fact the income redistributive effect of private health insurance is far more than that resulting from general taxes. The positive redistribution is largely attributed to the significant positive vertical effect. The pro-poor vertical effect ($V = 0.0111$) indicates that private health insurance favourably treats unequals unequally. Though this is the case, there is large reranking associated with private health insurance as some households, mainly those at the top of the income distribution, are outranked by their fellows. The reranking effect was estimated at 0.0010 and this was statistically different from zero. Similarly private health insurance treats equals unequally. The unequal treatment of equals gave rise to some of the re-ranking observed. A significant horizontal inequity effect was estimated at 0.0007. This horizontal inequity could be associated with the relatively similar premiums that households face. In fact some households choose less comprehensive insurance cover to try to mitigate the effect of the fixed premiums (Ataguba and Goudge, in press). However as shown in Table 2 these strategic decisions have not significantly reduced horizontal inequity and re-ranking of households.

Out-of-pocket payments, that represent about 15% of total health care finance, mildly increases income inequality. The redistributive effect of -0.00057 was computed and this is statistically significant at the 5% level. The vertical effect, though negative, was not statistically significant. However reranking and horizontal inequity were significantly associated with out-of-pocket payments. It may be argued in the context of out-of-pocket payments that the redistributive effects observed are related to the choices of individuals. However this is not always the case. The poor, even though the relationship is not statistically significant, pay more as a proportion of their income out-of-pocket for health care. If it is a matter of choice, we should expect that on average the rich, who can afford to pay, would pay more as a proportion of their income.

Overall health care financing in South Africa significantly redistributes income to the poor. This is because as shown in Table 2, a reduction in income inequality is associated with financing health care. The overall redistributive effect of health care financing in South Africa was estimated at 0.01274. The pro-poor redistribution in overall health care financing is the combined effect of pro-poor income redistribution in general taxes and private health insurance, and the pro-rich redistribution in out-of-pocket payments. The increase in inequality associated with out-of-pocket payments ($RE = -0.00057$), though significant, was small relative to the decreases induced by general taxes ($RE = 0.0035$) and private health insurance ($RE = 0.0094$). The resultant effect is a significant pro-poor redistributive effect of total health care financing. Total health care financing was also significantly progressive. The vertical effect was estimated at 0.0155 and was significantly different from zero. This effect shows the extent to which income inequality is reduced by unequal but favourable treatment of unequals. Even though total health care financing has a pro-poor vertical effect there were significant increases in inequality caused by differential treatment. Horizontal inequity and reranking were significant. Some households were outranked by others in the redistributive process and also equals were not treated equally. Horizontal and reranking effects were estimated at 0.0011 and 0.0017 respectively. These mean that health care financing is not entirely equitable judging from

the progressivity indicator alone. The effects of differential treatment are also substantial and constitute inequity in health care financing in South Africa.

Table 3: DJA decomposition of the income redistributive effect of health care payments, South Africa 2005/2006

Finance source	(V/RE)%	(H/RE)%	(R/RE)%
Personal income tax	100.35%	0.12%	0.23%
Corporate income tax	142.89%	12.89%	30.00%
Direct taxes	103.82%	1.14%	2.69%
Value-added tax	99.13%	0.00%	-0.87%
Excise taxes	97.88%	-1.18%	-0.94%
Fuel levy	99.02%	-0.49%	-0.48%
Indirect taxes	98.52%	-0.57%	-0.90%
General taxes	106.01%	1.86%	4.17%
Private health insurance	117.98%	7.38%	10.59%
Out-of-pocket payments	51.74%	-21.60%	-26.66%
Overall health care payments	121.68%	8.45%	13.23%

In Table 3 the relative contributions of the different components to overall redistribution is presented. This represents another way of presenting the results to show the major drivers of income redistribution (Wagstaff and van Doorslaer, 1997). The relative contributions of vertical equity, horizontal inequity and reranking in personal income tax to changes in inequality as presented in Table 3 show that the vertical effect dominates. Personal income taxes would have been 0.35% more redistributive in the absence of differential treatment. Of the 0.35% effect due to differential treatment, most (0.23%) is attributed to reranking while only <0.2% is attributed to horizontal inequity. It is important to also recall that as shown in Table 2 horizontal and reranking effects were statistically negligible. This is expected *a priori* because of the structure of income tax rates. However this result reflects the use of per adult equivalent incomes on a household basis while income tax in South Africa is not based on households but individual income recipients. For corporate income tax, even though the redistributive effect was shown to be statistically insignificant, the vertical effect dominates. As shown in Table 3 corporate income tax would have been 43% more redistributive in the absence of differential treatment. About 13% of the differential treatment is due to horizontal inequity or unequal treatment of equals while a larger proportion (30%) is attributed to reranking caused by improper treatment of unequals. Direct taxes as shown in Table 3 were found to reduce income inequality. This reduction is mainly attributed to a dominant vertical equity effect. As shown in Table 3 in the absence of differential treatment, direct taxes would have been 3.8% more redistributive. About 2.7% of this differential effect is caused by reranking of households while about 1% is caused by unequal treatment of equals.

Unlike direct taxes, indirect taxes generally induce significant negative income redistribution. For value-added tax, the pro-rich redistribution (-0.00058) would have been

0.87% less in the absence of differential treatment. Differential treatment in the form of reranking therefore increased the extent of pro-rich redistribution. The pro-rich redistribution in financing health care through excise taxes would have been 2.12% less in the absence of differential treatment. Of this difference, the majority (1.18%) is associated with horizontal inequity and only 0.94% is due to reranking. Similarly for the fuel levy, because reranking and horizontal effects were negligible, in the absence of differential treatment the pro-rich redistribution would have been about 1% less. About 0.5% of this is due to horizontal inequity while a negligible amount is due to reranking. Income redistribution associated with indirect taxes would have been 1.5% less pro-rich in the absence of differential treatment. About 0.9% of this is attributed to reranking while 0.6% is due to unequal treatment of equals.

General taxes were shown to induce pro-poor redistribution. As shown in Table 3 vertical equity dominates. General taxes would have reduced inequality by a further 6% in the absence of differential treatments. The majority (4%) of this effect comes from reranking of households while about 1.9% comes from horizontal inequity. Similarly for private health insurance about 18% further reduction in inequality would have been observed in the absence of differential treatments of households in the redistributive process. Though the vertical component also dominates, 10.6% of the differential treatment is accounted for by reranking of households or households being outranked by others and 7.4% is due to horizontal inequity in private health insurance. Out-of-pocket expenditures however increase income inequality. As shown in Table 3 the increase in income inequality would have been 48% less in the absence of differential treatment of households. Reranking alone accounts for about 27% of this effect while horizontal inequity accounts for 22%. Therefore if out-of-pocket payments were 'favourable' the negative redistribution would have reduced substantially. This is similarly the case for private health insurance. All these effects put together as shown in Table 3 indicate that overall health care financing that induces pro-poor redistribution could have been 22% more redistributive in the absence of differential treatment of households. Over 13% of the differential treatment effect in overall health care financing is attributed to reranking of households. The dominance of reranking over horizontal inequity is expected because for general taxes, private health insurance and out-of-pocket payments the reranking effect dominates the horizontal effect. Generally in the absence of horizontal inequity overall healthcare financing would have been 8.45% more redistributive while it could have been 13.23% more redistributive in the absence of reranking.

Discussion

Health care financing, whether through general taxes, health insurance contributions or out-of-pocket payments, involves some intra- and inter- household decisions that are likely to impact on the distribution and redistribution of income across households. Though the main purpose of health care financing is not to redistribute income (Cavagnero and Bilger, 2010), the extent to which income distribution is affected by health care financing is an important policy issue. It is determined by the way individuals and households end up being treated by the health care financing system. When the system is progressively financed in such a way that it imposes less financial burden on the poor relative to the rich it usually redistributes income away from the rich to the poor. Minimising differential

treatments in the form of horizontal inequity and reranking of households also improves the extent of income redistribution associated with health care financing.

Different countries have different health care financing mixes. The relative progressivity and shares of these sources to overall health care financing to a large extent determine the degree to which health care financing can redistribute income. This does not necessarily depend on whether the country in question is developed or is still developing. In fact in some developed countries such as Denmark, United States, Switzerland, Portugal, Germany and the Netherlands, overall health care financing has been shown to increase income inequality (Wagstaff and van Doorslaer, 1997; van Doorslaer *et al.*, 1999; Bilger, 2008). This unfavourable increase in income inequality translates into a negative redistribution of income away from the poor to the rich.

Equity is extolled as a key objective in health policy documents in all countries of the world. The major issue in relation to pursuing equity is to avoid placing an increasing burden on the poor who are already overburdened by disease, inequality and multiple deprivation (Wagstaff, 2002a). However some countries still struggle to strike a balance between competing challenges in the health sector and have not been able to guarantee an equitable distribution of health care financing burden and also access to health care for the majority of its citizens.

The study using the *DJA* approach has shown that health care financing via indirect taxes increases income inequality in South Africa. This result is consistent with those reported in other studies. Using the *DJA* methodology it was shown that the redistributive effect associated with financing health care via indirect taxes is -0.0012 and in countries such as Argentina (in 2002), Italy (in 1991), Portugal (in 1990) and United Kingdom (in 1992), using different methods, the income redistributive effect of health care financing via indirect taxes was estimated at -0.0011, -0.0014, -0.0012 and -0.0018 respectively (van Doorslaer *et al.*, 1999; Cavagnero and Bilger, 2010). In all previous studies the vertical effect is the major driver of the negative redistribution associated with indirect taxes. In some countries such as Denmark, Germany, Italy, Netherlands, Sweden and Switzerland the pro-rich vertical effect accounts for all of the negative income redistribution (Wagstaff and van Doorslaer, 1997; van Doorslaer *et al.*, 1999). Generally between 60% and 100% of the pro-rich redistribution is attributed to a regressive vertical effect in indirect taxes. In South Africa the *DJA* approach estimates put this at 98.5%. Differential treatments that account for about 1.5% of the loss in redistributive power of indirect taxes used in financing health care in South Africa can be attributed largely to the non-discriminatory nature of indirect taxes. It could also be associated, to a lesser extent, with the consumption patterns that exist among households with similar incomes. In the case of Portugal for example differential treatment was associated with multiple value-added tax rates on different goods and services (van Doorslaer *et al.*, 1999).

Internationally direct taxes on the other hand have been shown to reduce inequality in income. In all countries where research has been conducted and reported, the redistributive effect was positive. The same is true for South Africa. The redistributive effect of direct taxes in South Africa using the *DJA* approach was estimated at 0.0047 with the vertical effect dominating. The positive redistribution usually associated with financing health care via direct taxes is mainly the result of progressive direct taxes. In Argentina,

Denmark, Finland, Germany Ireland, Italy, Netherlands, Portugal, Sweden, Switzerland, the United Kingdom and the United States direct taxes were reported as progressive and the contribution of the vertical effect to overall redistribution ranged between 100% and 143% (Wagstaff and van Doorslaer, 1997; van Doorslaer *et al.*, 1999; Bilger, 2008; Cavagnero and Bilger, 2010). The reported differential treatment (horizontal inequity and reranking) in the case of Portugal is linked to differences in tax structure between wage earners and the self-employed (van Doorslaer *et al.*, 1999) such that individuals that earn a similar income end up making differential tax payments. In countries such as Denmark, Sweden and the United States differential treatments, though small, were attributed to geographical/regional differences in tax structure (van Doorslaer *et al.*, 1999). In some countries such as Germany, Italy and Ireland the pro-poor vertical effect accounts for all of the redistribution because there were no significant differential treatments (van Doorslaer *et al.*, 1999).

The combination of a pro-rich redistribution associated with indirect taxes and a pro-poor redistribution associated with direct taxes used in financing health care have produced a pro-poor redistributive effect for general taxes. The redistributive effect of financing health care via general taxes in South Africa was estimated at 0.0035 with the vertical effect accounting for over 106% of this effect. Internationally, albeit for developed countries where results are available, financing health care through general taxes also reduces income inequality. For example in Denmark (in 1987), using another methodology, the redistributive effect of general taxes was estimated at 0.0024 while in Switzerland (1992) it was estimated at 0.0035. In all these countries the pro-poor vertical effect associated with general taxes dominates the horizontal and reranking effects. In some countries such as Germany, Italy and the Netherlands there were no significant differential treatments associated with general taxes used to finance health care. This is because 100% of the redistributive effect is as a result of a progressive vertical effect. Generally most studies conclude that general taxes would have been between 2% and 18% more redistributive in the absence of differential treatment.

The result of the redistributive effect of private health insurance contributions in South Africa indicates that it reduces income inequality. The redistributive effect estimated was estimated at 0.0094 with a significantly dominant progressive vertical effect. The reduction in inequality caused by private health insurance is related to the distribution of the enrollees. It is important to bear in mind here that unlike general taxes where every citizen is entitled to services provided at public facilities, it is only those who are privately insured that can access benefits associated with private health insurance (Ataguba and McIntyre, 2012b). The poor, because they do not purchase private health insurance, do not benefit from the contributions. In South Africa the progressive vertical effect dominates the horizontal inequity and reranking effect. The presence of differential treatment is largely attributed to individuals facing the same premium schedule irrespective of income level. However some individuals mitigate this by choosing lower cost and less generous service benefit options. This could have accounted for the smaller than expected differential treatments observed.

Elsewhere the redistributive effect associated with private health insurance can be negative or positive depending on the nature of health insurance in the country (i.e. how premiums are structured and paid for, whether the insurance is supplementary or not,

whether it is only the rich who are covered, and whether enrolment is based on individuals or households). In the United States and formerly Switzerland (pre their 1996 reform) where private health insurance is dominant and not only restricted to the rich, pro-rich redistribution was reported while countries such as the United Kingdom, Portugal and Italy have pro-poor redistribution because it is only the rich that can afford supplementary cover (van Doorslaer *et al.*, 1999). The non-zero values associated with horizontal inequity in Portugal and the United Kingdom for instance were associated with likely differential treatments induced by those with similar incomes where some choose to purchase health insurance cover and others do not. In Switzerland insured individuals may choose more generous insurance packages to provide cover for luxurious hospital services (van Doorslaer *et al.*, 1999) thereby creating differentials that could be labelled as horizontal inequality rather than inequity. In countries such as Argentina where private health insurance accounts for about 32% of total private health expenditures, pro-poor income redistribution has been reported (Cavagnero and Bilger, 2010). The major driver of the pro-poor redistribution is the progressive nature of private health insurance as insurance premiums are too expensive for the poor to enrol. Cavagnero and Bilger (2010) attributed differential treatments in this case to heterogeneity in risk aversion and differences in health status. Whether private health insurance induces pro-rich or pro-poor income redistribution, the vertical effect dominates the horizontal and reranking effects.

As with indirect taxes, direct out-of-pocket payments are associated with negative income redistribution. The redistributive effect in South Africa was estimated at -0.0006 with a fairly dominant (51%) regressive vertical effect. This result is similar to those obtained from Vietnam and West Bank (Palestine) using different methodologies. In Vietnam (in 1993) it was estimated that the regressive vertical effect accounted for about 47% of total income redistribution (Wagstaff and van Doorslaer, 2001) while in West Bank it accounted for about 43% (Abu-Zaineh *et al.*, 2009). In the case of South Africa, even though out-of-pocket expenditures make up about 14% of total health care financing, the pro-rich redistribution induced is not equitable and would reduce the extent to which overall health care financing redistributes income. The non-zero values of horizontal inequity and reranking is largely a result of the non-discriminatory nature of out-of-pocket payments and health service utilization patterns especially for the rich and insured that make co-payments. Large and significant differential treatment associated with out-of-pocket payment in South Africa can be described as inequitable because of the stochastic nature of illness. Some individuals with the same level of income could randomly fall sick and this will inherently create randomness in out-of-pocket payments. Co-payments by members of private health insurance that make up over 60% of out-of-pocket expenditures in South Africa (see McIntyre, 2010) are a result of institutional failures in health insurance arrangements and this induces differential treatment of individuals with the same or similar level of income.

Internationally, even though there are cases where out-of-pocket payments result in substantial differential treatment, in general most studies show that the vertical effect substantially dominates the horizontal and reranking effects. For example the study in the Netherlands indicates that the vertical effect accounts for about 82% of the negative redistribution associated with out-of-pocket expenditures (Wagstaff and van Doorslaer, 1997) and in Switzerland Bilger (2008) reports that the vertical effect accounts for about 78% of the negative redistribution resulting from out-of-pocket payments. Some studies

have reported negative redistribution with out-of-pocket payments but with a progressive vertical effect (see Ichoku, 2006; Cavagnero and Bilger, 2010). In such countries the combination of horizontal and reranking effects dominates the progressive vertical effect. For instance in Argentina (in 1997) about 182% of the reduction in redistributive power of out-of-pocket payment is caused by differential treatment in the form of horizontal inequity and reranking (Cavagnero and Bilger, 2010) and this was even higher in the case of Nigeria (Ichoku, 2006). It is only in Argentina (in 2002) that out-of-pocket payments were recorded to be progressive and redistribute income favourably towards the poor (Cavagnero and Bilger, 2010). The general negative redistribution associated with out-of-pocket payments points to the inequitable nature of such payments. Even when they turn out to have a progressive vertical effect, it is a result of the exclusion faced by the poor on the grounds that they cannot afford the cost of treatment (Cavagnero and Bilger, 2010).

Overall health care financing in South Africa was shown to induce a pro-poor redistribution of income. This reduction in income inequality is attributed to the pro-poor redistribution caused by general taxes and private health insurance which dominates the fairly pro-rich redistribution associated with out-of-pocket payments. The reduction in income inequality associated with total health care financing in South Africa was 0.0127 with the progressive vertical effect accounting for over 121% of this effect. This is comparable to that reported elsewhere in Argentina ($RE = 0.018$) in 2002 (Bilger, 2008). Generally many countries record negative income redistribution for overall health care financing which is caused mainly by regressive vertical effects. These countries include Denmark, Germany, Netherlands, Palestine, Portugal, Switzerland and the United States (see Wagstaff and van Doorslaer, 1997; van Doorslaer *et al.*, 1999; Abu-Zaineh *et al.*, 2008; Bilger, 2008; Abu-Zaineh *et al.*, 2009). However a few countries such as Argentina, France, Italy and Sweden (see van Doorslaer *et al.*, 1999; Cavagnero and Bilger, 2010) have recorded a positive income redistributive effect with overall health care financing. Irrespective of the nature of redistribution caused by total health care financing, the progressive or regressive vertical effect generally dominates.

Implications of the results for universal health coverage in South Africa

While it is encouraging that health care financing in South Africa has a pro-poor redistributive effect, it must be recognised that this is largely attributable to medical scheme contributions by the rich. Overall, general tax funding is far less redistributive than medical scheme contributions, largely due to the pro-rich redistribution of indirect taxes partially offsetting the pro-poor redistribution of direct taxes. In addition, the contributions to medical schemes made by those who are members of such schemes are far greater than payments by this group towards tax funding of health care. Within this context, and within the context of the government commitment to pursue universal coverage, it is important to consider more closely medical scheme funding relative to tax funding.

While the statistical methods applied in this research indicate that medical scheme contributions have a strongly pro-poor redistributive effect, it is worthwhile unpacking the 'real world' implications of this finding. In effect, the rich are incurring a heavy health care financing burden to secure health services that they perceive to be of higher quality relative to tax funded services. The disposable income of this group is reduced while that

of non-members is not affected (which implies income redistribution); but only those who belong to medical schemes benefits from these payments.

A key question raised by this situation is whether it is really redistributive in the full sense of the term. The Growth, Employment and Redistribution (GEAR) policy made very little reference to the redistribution element, and where it did, it stated that the main mechanism for redistribution would be on spending on tax-funded social services. Given that the rich spend considerable amounts of money on buying private health insurance cover, but from which only they benefit, and far less on taxes to fund health services that benefit all South Africans, can this be regarded as truly redistributive? Or should more tax funding be devoted to health services to meet the considerable burden of ill-health in South Africa, which falls most heavily on the poorest? (Ataguba *et al.*, 2011).

Another question this situation raises is whether scheme members regard these payments as providing value for money or would welcome a 'real' alternative? This is difficult to determine at present. Some may argue that medical schemes are a form of *voluntary* private insurance. However, the reality is that medical scheme membership is a condition of employment for many South Africans, and for them, the decision to join a scheme is not voluntary at all. The value which current members place on the benefits they receive from medical scheme membership could be assessed by passing legislation that disallows any employer from making membership compulsory for their employees. Further, a recent study (Ataguba and Goudge, in press) has shown that medical scheme membership does not provide adequate financial protection to enrolled members. Thus membership does not entirely provide value for money.

The proposed NHI aims to increase the pool of mandatory, pre-payment funding that can be pooled and used to purchase services, from both public and private providers, for all South Africans. The key challenge is to ensure that all services purchased by the NHI Fund are of high quality, are efficiently provided and are in line with the health care needs of the population. If this is achieved, South Africans will be faced with a realistic and real choice of whether to rely entirely on their NHI service benefit entitlements or whether to pay for supplementary cover via medical schemes as well.

As the international experience clearly shows (McIntyre, 2012), universal health systems can only be achieved when the majority (70% or more) of total health care expenditure is funded through mandatory pre-payment mechanisms, particularly tax revenue. To achieve a universal system, which is the core goal of the proposed NHI reform, tax-funding of health services must be increased over time in South Africa. There has been discussion about the following taxes to be dedicated to health care funding (Congress, 2010):

- Introducing a surcharge on taxable personal income;
- Introducing a payroll tax on employers; and
- Increasing VAT.

The findings presented in this paper clearly indicate that while the first two tax funding mechanisms would contribute to pro-poor income redistribution, increasing VAT would exacerbate existing income inequalities through pro-rich income redistribution.

Conclusion

Based on international evidence from comparable studies, and given the high income inequality in South Africa, general taxes that have been found to reduce inequality hold great promise for ensuring an equitable health care financing system and addressing income inequality. This requires that government increases its commitment to the health sector through increased public spending on health. Many countries have been able to promote equitable economic development (i.e. growth as well as income redistribution) through increased public spending on social services. This has relevance to how the proposed universal health system or national health insurance for South Africa should be funded. Tax funding, particularly direct taxes rather than indirect taxes, are the most reliable way to ensure progressive and pro-poor redistributive financing for the health sector.

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