

Modelling the affordability and distributional implications of future health care financing options in South Africa

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South Africa is considering introducing a universal health care system. A key concern for policy-makers and the general public is whether or not this reform is affordable. Modelling the resource and revenue generation requirements of alternative reform options is critical to inform decision-making. This paper considers three reform scenarios: universal coverage funded by increased allocations to health from general tax and additional dedicated taxes; an alternative reform option of extending private health insurance coverage to all formal sector workers and their dependants with the remainder using tax-funded services; and maintaining the status quo. Each scenario was modelled over a 15-year period using a spreadsheet model. Statistical analyses were also undertaken to evaluate the impact of options on the distribution of health care financing burden and benefits from using health services across socio-economic groups. Universal coverage would result in total health care spending levels equivalent to 8.6% of gross domestic product (GDP), which is comparable to current spending levels. It is lower than the status quo option (9.5% of GDP) and far lower than the option of expanding private insurance cover (over 13% of GDP). However, public funding of health services would have to increase substantially. Despite this, universal coverage would result in the most progressive financing system if the additional public funding requirements are generated through a surcharge on taxable income (but not if VAT is increased). The extended private insurance scheme option would be the least progressive and would impose a very high payment burden; total health care payments on average would be 10.7% of household consumption expenditure compared with the universal coverage (6.7%) and status quo (7.5%) options. The least pro-rich distribution of service benefits would be achieved under universal coverage. Universal coverage is affordable and would promote health system equity, but needs careful design to ensure its long-term sustainability.

Keywords

Health care financing, modelling, universal coverage, affordability, distribution of financing burdens, distribution of benefits, South Africa

KEY MESSAGES

- Universal coverage is affordable and sustainable in the South African context, but would require substantial increases in public funding for health care.
- Universal coverage, if funded through general tax allocations and a dedicated surcharge on taxable income, would result in the most progressive financing incidence when compared with the status quo and an alternative financing reform of extending private insurance to all formal sector workers and their dependants.
- Such an approach to financing universal coverage would also achieve the most equal distribution of benefits from using health services across socio-economic groups when compared with other reform options.

Introduction

In line with the growing international interest in pursuing health care financing options that promote universal coverage, the South African government has declared its intention to introduce a National Health Insurance (NHI). South Africa currently has a divided health system, with private voluntary insurance schemes covering about 16% of the population and the majority of the uninsured being dependent on under-resourced, tax-funded services. These private schemes account for roughly 44% of total health care expenditure, while allocations to health care from general tax revenue account for 43% and out-of-pocket payments for the remaining 13% of expenditure (McIntyre 2010a).

The proposed introduction of an NHI has led to heated media debate, with the affordability of a universal system being the major concern expressed by various stakeholders.

This research was undertaken as part of the SHIELD (Strategies for Health Insurance for Equity in Less Developed countries) project. The objective of this particular component of the SHIELD research was to model the likely expenditure levels and revenue generation potential of the proposed universal system, and of an alternative reform path, to assess the affordability of these options and compare them with the option of continuing with the current system. We also modelled the likely impact of each of the reform options on financing and benefit incidence to assess the options not only from an affordability perspective but also in relation to their equity impact. Given that a growing number of low- and middle-income countries are exploring how to pursue universal health systems, this paper demonstrates how such modelling can be undertaken to input to policy debates.

The purpose of the modelling was not to attempt to predict with absolute certainty future expenditure levels. Instead, it was seen as an input to policy debates by exploring the potential implications for the health system of health financing reform alternatives. As has been noted by others: *'Modelling is never an end in itself... financial models... can be used to explore the financial effects of alternative policy options... Models are therefore an instrument of governance, a supporting tool for policy makers – no more, no less... A model is not a crystal ball; it does not predict the future. Rather, models project a possible future state on the basis of observations and assumptions on future conditions... models are never final – they can and should always be improved... Modelling is not an event, it is a process'* (Cichon *et al.* 1999: 22–32).

Methods

Summary of health care financing reform scenarios

Detailed scenarios of potential future health care financing reform for South Africa were developed, based on interviews with key health sector actors (see Gilson *et al.* 2012) and tracking policy debates through a review of policy documents and media articles. These scenarios are summarized in Box 1.

As indicated previously, the ruling party in South Africa has indicated that it intends pursuing universal coverage through what has been termed an NHI, funded largely through general tax revenue but possibly also additional dedicated taxes, with a surcharge on taxable income, a payroll levy on employers and an increase in Value Added Tax (VAT) under discussion. Some stakeholders have suggested that instead we should begin by mandatorily covering all formal sector workers and their dependants through private health insurance schemes. Both of these alternatives were considered and were compared with the counterfactual, of continuing with the current health system.

Model for estimating the resource requirements of alternative scenarios

The likely level of health care expenditure in pursuing alternative health care financing reforms was estimated using spreadsheet models constructed in Microsoft Excel® (see McIntyre and Borghi 2012 for full details of the modelling methods). Estimated expenditure was the product of population, service utilization rates and unit costs.

Forward projections were made for a 15-year period. The key assumptions used for each variable are summarized in Table 1 (see McIntyre 2010b for full explanation of basis of assumptions). In terms of future utilization rates, two empirical studies that had developed utilization norms for primary health care services (Rispel *et al.* 1996) and hospital services (Monitor Company *et al.* 1996) were used as the basis for projections. Substantial increases in public sector unit costs are projected in the first 5 years in order to strengthen the public health system and dramatically improve quality of care.

Expenditure on services not included in the spreadsheet model (such as ambulance services and health worker training) were estimated separately and added to the total produced by the model. Estimates of administration costs for private insurance schemes and the proposed NHI fund were also added. Finally, given the magnitude of the acquired immune deficiency syndrome (AIDS) epidemic in South Africa and the

Box 1 Summary of scenarios

Status quo: In this scenario, the core elements of the current health system are maintained. Wealthier formal sector workers would be covered by private health insurance schemes, which cover a prescribed minimum benefit package of some chronic conditions and certain inpatient treatment. Each of the 120 schemes chooses which other services to cover, which generally attract quite large co-payments. There is pressure for improved cost-containment within these schemes. There will continue to be limited growth in coverage of these schemes. The rest of the population will remain largely dependent on tax-funded services. There would be some (albeit limited) improvements in the public health system, which would translate into some utilization increases over time. Public spending on health care would continue to show limited real growth and users will continue to pay income-related fees at public hospitals. A small section of the uninsured will continue to use private general practitioner (GP) and retail pharmacy services on an out-of-pocket basis.

Extended private schemes: This scenario evaluates the mandatory extension of private insurance scheme cover to all formal sector workers above the income tax threshold and their dependants within 5 years, and continued extension of coverage as formal sector employment grows. The prescribed minimum benefit (PMB) package would be expanded to include core primary care services. It is assumed that there will be pressure on private schemes to improve value for money. This is likely to be achieved by a relative shift in utilization within the schemes' environment in favour of primary care services and reduced utilization of specialist services, limiting administration costs (achieving some economies of scale) and by exerting pressure on private providers not to increase their fees as rapidly as has occurred in the recent past. A risk-equalization fund may be implemented (i.e. a mechanism to redistribute resources across individual schemes to ensure that the resources of each scheme reflect its expected costs according to the risk profile of its membership). Scheme members would continue to face relatively high co-payments on services outside the PMB and many services will not be covered at all. (Note: in the model, no distinction is made between health service costs funded through scheme contributions and co-payments/out-of-pocket payments by scheme members.) The remainder of the population would be covered by tax-funded health services, with limited increases in real spending by government. As a smaller share of the population would be entirely dependent on publicly funded services, utilization of these services would increase more rapidly than in the status quo scenario.

Universal coverage (UC): This is in line with the proposed NHI, which aims to fund a comprehensive package of services for all South Africans from an integrated pool of public funds, sourced from general tax revenue and possibly additional taxes (such as a surcharge on taxable income and increased VAT). This scenario includes a number of broad assumptions. There would be no co-payments. It is based on a public sector framework of service delivery but it uses unit costs that are substantially higher than currently prevail in the public sector. This reflects the investment needed to dramatically improve the quality of existing public sector services. These higher unit cost levels would also enable purchasing of services from private providers where appropriate (but fee-for-service would not be the preferred payment mechanism). There would be very large increases in utilization of health services over the next 15 years (due to improved financial protection for all citizens), particularly at the primary care level and in district hospitals, with somewhat smaller increases at higher level hospitals. Over time, some members of private insurance schemes, particularly lower income members, will 'opt out' of these schemes and rely entirely on their universal system entitlements. Nevertheless, some of the wealthiest South Africans will continue to have private insurance coverage, but will use at least some of their UC service entitlements.

roll-out of anti-retroviral treatment (ART) to all with a CD4 count below 200, we drew on a separate model for ART (see Cleary *et al.* 2008, and Cleary and McIntyre 2010 for details of the ART model).

Before any projections were undertaken, the model was 'benchmarked' to ensure that it correctly predicted actual spending on each category of service. Extensive sensitivity analyses were undertaken to assess the impact of changes in key assumptions on the modelled projections. These sensitivity analyses are not presented here; rather we present the findings based on our 'best guess' assumptions (i.e. the assumptions that best reflected recent trends or that were justified from drawing on a range of different sources and perspectives). Details of the full range of findings and sensitivity analyses can be found in McIntyre (2010b).

Model for estimating revenue

Estimates of revenue generation from various sources to cover each scenario's projected health care expenditure were also

modelled using Microsoft Excel[®] spreadsheets. This focused on estimating the percentage of total government budget required to fund public sector health services and if additional resources were required, what tax rates would be appropriate if either a proportional or progressive additional income tax or additional VAT was introduced. General tax revenue, or government budget, was projected to increase in line with real gross domestic product (GDP) increases estimated by National Treasury (2010) (i.e. it was assumed the tax to GDP ratio would remain constant). In terms of increases in personal income tax, the current policy discussions refer to a surcharge on taxable income, which would be imposed on all taxable income and not only wages and salaries. The extent of real increases in contribution rates for private insurance scheme members was also considered.

Model for assessing the impact on financing incidence

In assessing the impact of the three scenarios presented in Box 1 on the distribution of health care financing burden, we

Table 1 Summary of key assumptions used in expenditure and revenue models

| Status quo | Extended private schemes | Universal coverage |
|--|---|--|
| Population variables | | |
| Annual increase in private insurance scheme membership coverage of 2%, based on recent trends. | Formal sector employment grows by an average of 2% per year. Membership of private schemes extended to all formal sector employees and dependants within 4 years. | 40% reduction in private insurance scheme membership over 15-year period. Basis is that over 40% of members contribute more than 10% of income to schemes currently. |
| Utilization variables | | |
| Minimum normative target for public sector services reached within 20 years. | Minimum normative target for public sector services reached within 10 years. | Normative target for public sector services reached within 15 years. |
| Continued use of public sector services by privately insured (5% of target for uninsured population for primary health care (PHC), 10% for district and regional hospitals and 25% for provincial and central hospitals), based on current utilization patterns. | Usage of public sector services by those privately insured of approximately 10%. This is because there would be a mandatory service package that schemes would be required to cover, which would reduce use of public services which are outside of these schemes' current benefit package. | Usage of universal coverage (UC) entitlements by those choosing to have top-up private insurance of 25% of the utilization rates of those relying only on UC. The UC system may ultimately purchase services from both public and private services, but the same payment rate would apply to both sectors. The rate is based on the substantially increased public sector unit costs. Early reforms would need to ensure that public and private providers are able to compete on a 'level playing field'. |
| Use of private sector general practitioner (GP) and retail pharmacy services on out-of-pocket basis by uninsured (at 10% of the rate for insured), based on current utilization. | Use of GP services to increase by 5% per annum and use of specialist and private hospital outpatient services to decline by 2% per annum compared with previous year—to account for inclusion of PHC benefits in package and pressure for cost containment on schemes. | |
| Unit cost variables | | |
| Annual real increase in public sector unit costs of 1%, based on recent trends. | Annual real increase in public sector unit costs of 1%, based on recent trends. | Annual real increase of 10% per annum for first 5 years (for health service improvement) and by 1% per year thereafter. |
| Annual real unit cost increases in private sector of 5%—lower than recent trends (assume some pressure for cost containment). | Annual real unit cost increases in private sector of 5%—lower than recent trends (assume some pressure for cost containment). | Annual real unit cost increases of private sector services for those with private scheme coverage of 3%—less than half recent levels (assume considerable pressure for cost containment). |
| Other expenditure model variables | | |
| Private insurance scheme administration costs also increase by 5% per annum. | Private insurance scheme administration costs of 13% of all other costs of schemes (i.e. will increase at the same rate as other scheme costs). | Private insurance scheme administration costs also increase by 3% per annum. |
| | | Administration costs of single fund pooler and purchaser of 3% of all other costs—international evidence suggests administration costs under UC between 2 and 5% (World Health Organization 2005). |
| Revenue model variables | | |
| <ul style="list-style-type: none"> Real GDP growth: 3.2% in 2011, 3.6% in 2012, 4% in 2013, 4.5% 2014 onwards (National Treasury 2010) (lower than OECD estimate of 5% from 2011 onwards (OECD 2010). Constant ratio of government expenditure to GDP. | | |
| Estimated % of government budget required to fund public services. | Estimated % of government budget required to fund public services. | Assumed allocation to health sector would increase to 15% of budget (OAU 2001) Current taxable income baseline (National Treasury and SARS 2010) increase in line with real GDP growth. |

Table 2 Estimates of population coverage, utilization rates and distribution between funding sources of different scenarios in South Africa

| Estimates for Year 15 | Scenarios | | |
|---|------------|--|--------------------|
| | Status quo | Mandatory extension of private schemes | Universal coverage |
| Population covered by tax funding (% of population) | 79% | 61% | 100% |
| Population covered by private insurance schemes (% of population) | 21% | 39% | 9% |
| % change in outpatient visits to publicly funded services per capita | 44% | 56% | 116% |
| % change in inpatient days in publicly funded hospitals per capita | 52% | 67% | 94% |
| % change in outpatient visits per capita by privately insured | 1% | 13% | 11% |
| % change in inpatient days per capita by privately insured | 3% | 3% | 3% |
| % of funding from general tax | 37% | 24% | 58% |
| % of funding from private insurance schemes | 59% | 76% | 25% |
| % of funding from out-of-pocket payments (by those not covered by schemes)* | 4% | | |
| % of funding from additional dedicated tax | | | 17% |

Notes:

*Co-payments/out-of-pocket (OOP) payments by scheme members included in funding via private insurance schemes (i.e. total costs of services for scheme members captured under private schemes, whether funded via scheme contributions or OOP). Under universal coverage, the proposal is that there should be no co-payments. For both extension of private schemes and universal coverage scenarios, it is assumed that access to better quality public sector services will reduce to negligible levels OOP payments by non-scheme members (largely from occasional use of private providers for primary care services).

used data from the 2005/2006 Income and Expenditure Survey (IES) (Statistics South Africa 2008) and projected the data to 2025 (the end year in the spreadsheet modelling). STATA IC® software was used for this analysis. The extracted health care payments and per adult consumption expenditure were appropriately inflated to reflect underestimation (see Borghi *et al.* 2009), and real growth in expenditure over time. For general tax revenue, we assumed the current distribution of tax payments would persist in future (i.e. we used a static model). The estimates of total general tax revenue that would be allocated to the health sector at the end of the 15-year period were extracted from the spreadsheet model and were allocated across households in the IES according to their percentage share of current tax payments. For the proposed surcharge on taxable income, the required tax rates for both a proportional and a progressive structure estimated from the spreadsheet models (see later results) were applied to IES data on taxable income within each household and their percentage share of this dedicated income tax calculated. The total tax revenue that the spreadsheet model projected would be generated through this additional tax was then allocated across households according to their percentage share of the extracted tax. For the proposed additional VAT, the total revenue projected by the spreadsheet model was allocated across households in relation to their current shares of VAT payments.

As per adult consumption expenditure was used to assess the progressivity of health care financing, we also inflated current expenditure to the end of the 15-year modelling period. We assumed a static distribution of per adult consumption expenditure across households and that expenditure would increase in line with real GDP growth. The Kakwani index was used to assess the progressivity of each financing mechanism and the overall health care financing system for each scenario (see Ataguba and McIntyre 2012 for details on the methodology for extracting the various components of health care payments and the assessment of progressivity).

Model for assessing the impact on benefit incidence

The utilization rates and real unit costs for each category of service at the end of the 15-year modelling period were extracted for each scenario (from the projected expenditure spreadsheet model). This information was extracted for those covered by private insurance schemes and those not covered by these schemes. The SACBIA survey dataset (see Ataguba and McIntyre 2012 for details of this survey) was then used to assess the impact of the assumptions of each scenario on the distribution of health care benefits. Here we assumed a static distribution of household consumption expenditure but a dynamic distribution of utilization as reflected in the assumptions and results contained in Tables 2 and 3, respectively. Utilization of various services (public and private) for both scheme and non-scheme members were adjusted to reflect those predicted in the spreadsheet model described above and summarized in Table 2. The Benefit Incidence Analysis (BIA) methodology was then used to assess the distribution of inpatient, outpatient, public, private and total health care benefits (see Ataguba and McIntyre 2012 for detailed methodology on BIA using the SACBIA survey). Households were categorized into quintiles of per adult equivalent household consumption expenditure and the share of different types of benefits (measured in monetary terms based on utilization rates multiplied by unit costs for each category of health services) that accrue to each quintile, for each scenario, was measured. In addition, concentration curves and indices were used to formally assess the pro-pooriness of the distribution of benefits across all scenarios.

Limitations

Models of this nature face some potential limitations, particularly due to the many assumptions that are required around key variables (e.g. to what extent will utilization increase when financial protection is provided and how rapidly will these increases occur, what changes in unit costs can be expected,

Table 3 Kakwani indices for different health care financing options

| | Status quo | Extended private schemes | Universal coverage | | |
|-----------------------|-----------------|--------------------------|--------------------|------------------|------------------|
| | | | (a) | (b) | (c) |
| General taxes | 0.022 (0.090) | 0.022 (0.090) | 0.022 (0.090) | 0.022 (0.090) | 0.022 (0.090) |
| Insurance | 0.121** (0.061) | 0.033 (0.066) | 0.198*** (0.067) | 0.198*** (0.067) | 0.198*** (0.067) |
| Out-of-pocket payment | −0.058 (0.061) | – | – | – | – |
| Income surcharge | – | – | – | 0.115*** (0.036) | 0.198*** (0.048) |
| VAT-levy | – | – | −0.144* (0.075) | – | – |
| Overall | 0.078 (0.063) | 0.031 (0.067) | 0.040 (0.074) | 0.085 (0.068) | 0.100 (0.067) |

Notes: Robust standard errors in parenthesis.

(a) A 3% VAT rate; (b) a flat 4% income surcharge rate was used; (c) a graduated (1.2–6%) income surcharge rate was used.

*, **, *** significant at 10%, 5% and 1% levels of significance, respectively.

etc.). In carrying out this research, we took care to make each assumption explicit and to justify the assumption using available evidence. In addition, we undertook extensive sensitivity analyses and produced ‘worst case’/‘highest cost’, ‘best case’/‘lowest cost’ and ‘best guess’/‘expected’ estimates for each scenario. As the primary objective of this research was not to predict with absolute certainty future expenditure levels, but to consider the implications for the health system of *alternative* health financing reform scenarios, the focus in attempting to minimize model limitations was on being as consistent as possible across scenarios in the approach to making assumptions.

Key findings

Changes in population coverage and service utilization

If the status quo continued, private insurance scheme coverage could increase to just over 20% of the population within the next 15 years (see Table 2), due largely to growth in formal sector employment and the efforts to encourage civil servants to join the Government Employees Medical Scheme (GEMS), which was established in 2006 and has seen dramatic growth. If private scheme cover was extended to all formal sector workers and their dependants, coverage by these schemes would reach almost 40% of the population. In these scenarios, tax-funded health services would be the main source of care for those not covered by private insurance. In the case of universal coverage (UC), all South Africans would be covered from tax-funded services (which would include the additional dedicated taxes and the UC system may purchase some of the services from private providers). It is likely that the richest 9% of the population would continue to purchase top-up private insurance and only rely partially on their entitlements through the universal coverage system.

Table 2 shows that quite substantial increases in utilization rates of publicly funded out- and in-patient services would occur in all scenarios, but particularly under the universal coverage scenario. In the status quo scenario, it has been assumed that there would be limited efforts to improve the quality of public sector services, but that there would be an attempt to reach the Department of Health’s current target of

3.8 outpatient visits per person per year (but this would be feasible only within 20 years). Under the private scheme extension scenario, public sector utilization rates would reach the target levels within 10 years, as fewer people would be dependent on publicly funded services than at present. The very high utilization rate increases in the universal coverage scenario are expected due to the reduction in financial barriers to service access and investment in dramatically improving the public sector, as well as purchasing some services from private providers where additional delivery capacity is required.

The small increases in utilization by the privately insured are due to the very high baseline utilization rates. For example, utilization of outpatient services by private scheme members was 4.4 times greater than by those dependent on publicly funded services at baseline.

Projected expenditure levels

Figure 1 shows that the scenario of mandatory extension of private schemes has the highest level of resource requirements and would result in total health care spending in South Africa exceeding 13% of GDP. The main reason for the high spending levels is that within 15 years, almost 40% of the population would be covered by private schemes and spending is far greater per person in the private scheme environment than for publicly funded services. Spending by private schemes alone would be about 10% of GDP.

The status quo scenario eventually translates into higher spending levels (equivalent to 9.5% of GDP) than at present; the status quo scenario also translates into higher spending levels than the universal coverage scenario (8.6% of GDP). The reason for this is that private schemes would be covering more people under the status quo option than under a universal health system, but at a much higher cost per person than would be the case with publicly funded health services.

From Figure 2, it is clear that the universal coverage scenario will require a substantial increase in public funding, to the equivalent of about 6.4% of GDP. In contrast, the status quo and the mandatory extension of private schemes options will lead to declining demand for public funding. Under the status quo scenario, public spending would be equivalent to 3.5% of GDP, while it would be 3% of GDP under the mandatory extension of private scheme option.

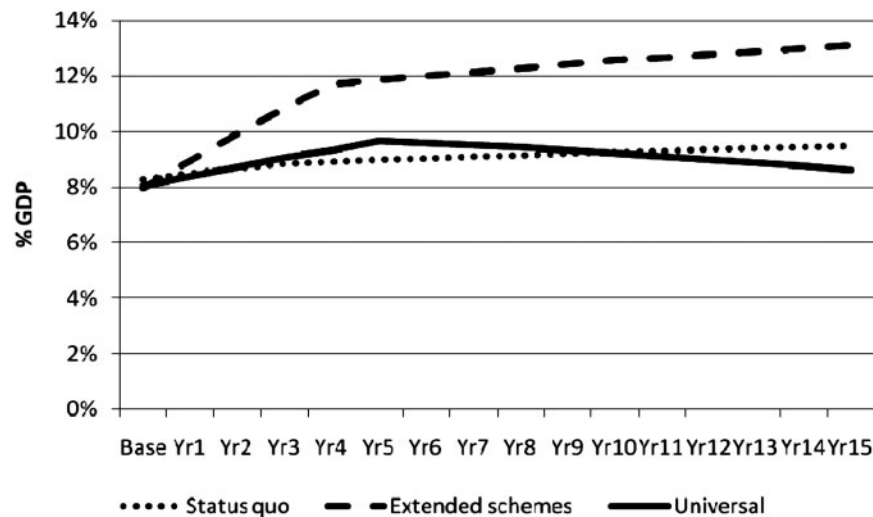


Figure 1 Projected trends in total health care expenditure as a percentage of GDP (South Africa)

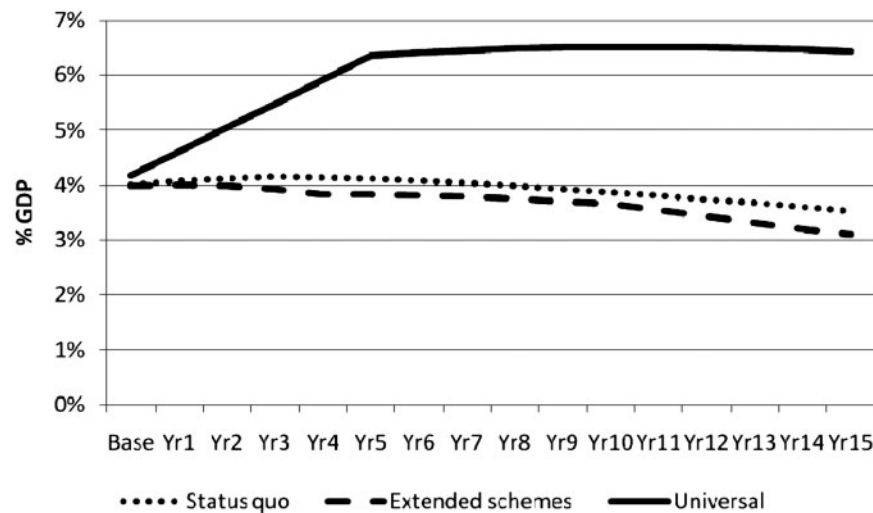


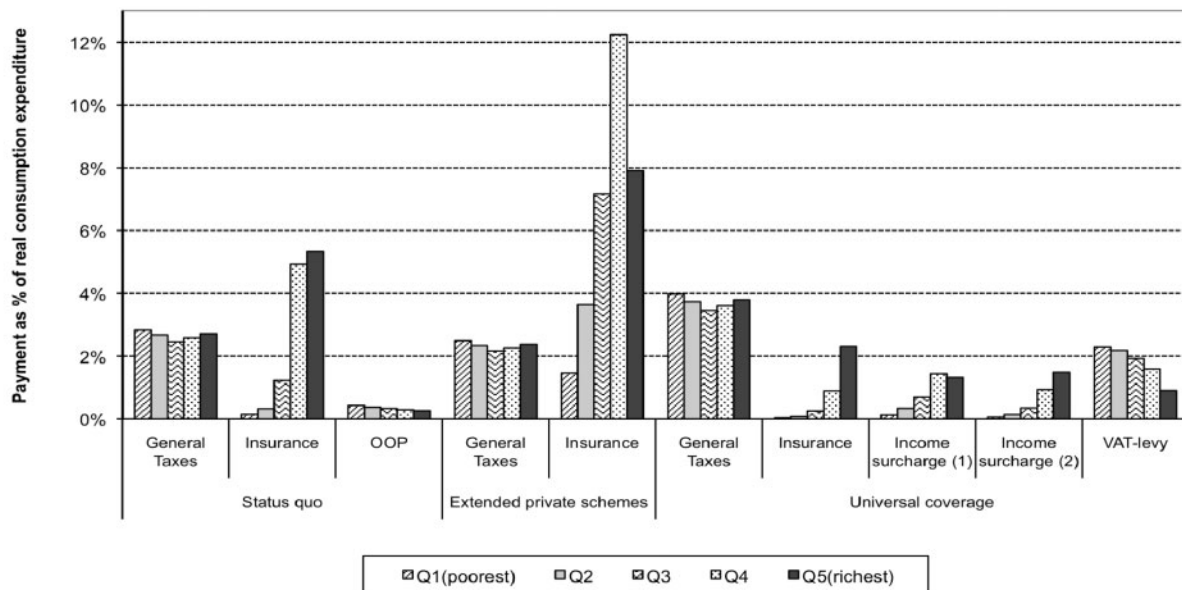
Figure 2 Projected trends in public expenditure as a percentage of GDP (South Africa)

Revenue issues

From the revenue perspective, the status quo scenario would require an allocation to the health sector from the government budget of about 10.5% (somewhat less than current allocation levels). If private schemes were mandatorily extended to all formal sector employees and their dependants, only 9.4% of the government budget would need to be allocated to health services. However, there would be a substantial increase in payments from the government budget for private scheme membership for civil servants. If government fully subsidized these contributions, they would account for 4% of the total government budget (or 1.3% of GDP), or would be 2.6% of the budget (or almost 1% of GDP) if the current subsidy of two-thirds of the private scheme contribution was continued.

As indicated by Figure 2, substantial increases in public funding are required under universal coverage. In addition to

increasing the allocation to the health sector to 15% of the government budget, which would be in line with commitments of African heads of state (OAU 2001), an additional surcharge on taxable income (or additional VAT) would be required. If a proportional dedicated income tax is applied, the maximum rate needed would be less than 4% of taxable income. As low-income earners pay a low percentage of their income in tax, a proportional dedicated tax would represent quite a large increase in their tax rate. If a progressive dedicated surcharge on taxable income tax is applied, the funding gap for universal coverage could be covered for example by a maximum tax rate of 6% and a minimum tax rate of 1.2%. Once again, this would represent a substantial increase in tax for the lowest income earners, but far less than under a proportional system. It would, however, represent a larger increase for the highest tax group than under a proportional system (see last two sets of bars



Note: Income surcharge: (1) a flat rate of 4% surcharge on taxable income; (2) a graduated rate (1.2–6%) surcharge on taxable income. Note that only one of the additional tax options would be used (i.e. *either* income surcharge (1) *or* income surcharge (2) *or* VAT-levy).

Figure 3 Health care payments as a proportion of consumption expenditure for different model options

in Figure 3). Finally, if an increase in VAT was used to fund universal health services, an additional 3% VAT would be required (i.e. VAT would increase from 14% to 17%).

Impact on financing incidence

Table 3 shows that health care financing would be progressive for all scenarios at the end of the 15-year modelling period. The most progressive system would be the universal coverage system (Kakwani index = 0.09 for the scenario with a proportional surcharge on taxable income or 0.10 for that with a progressive surcharge), but not if VAT were used to fund the shortfall from general tax revenue (Kakwani index = 0.04). The extended private schemes option would be the least progressive (Kakwani index = 0.03). The progressivity of the status quo option is driven largely by the progressivity of private insurance contributions (Kakwani index = 0.12) and its share (almost 60%) in total health financing.

Across all scenarios, the progressivity of general taxes remained the same, as shown in Table 3. However, given that the health sector would receive different allocations from general taxes in the different scenarios, the share of household consumption expenditure attributed to general taxes that are allocated to health care would vary (see Figure 3). The burden of general taxes is highest for the universal coverage option but lowest for the extended private schemes option. In relation to the surcharge on taxable income, as shown in Figure 3 and in Table 3, and as expected, the proportional rates resulted in a less progressive funding (Kakwani index = 0.115) compared with the progressively structured rates (Kakwani index = 0.198). Also as expected, an increase in VAT would be very regressive and would make overall funding for health care less progressive than the status quo. Private insurance scheme contributions become less progressive the greater the

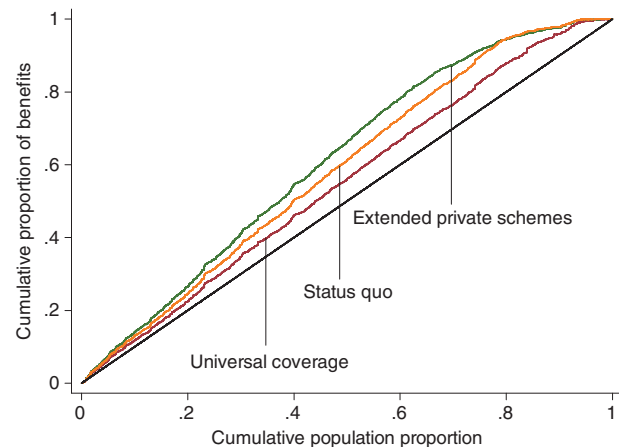


Figure 4 Concentration curves showing the distribution of public health care benefits

percentage of the population covered by these schemes. They are least progressive under the extended schemes scenario (Kakwani index = 0.033) and most progressive under the universal coverage scenario (Kakwani index = 0.198). Private insurance contributions would impose a higher burden on households under both the extended private schemes and the status quo options (see Figure 3), and would be relatively small under the universal coverage option.

Impact on benefit incidence

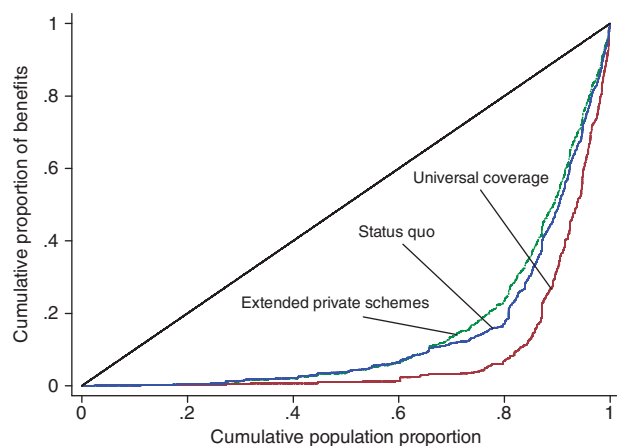
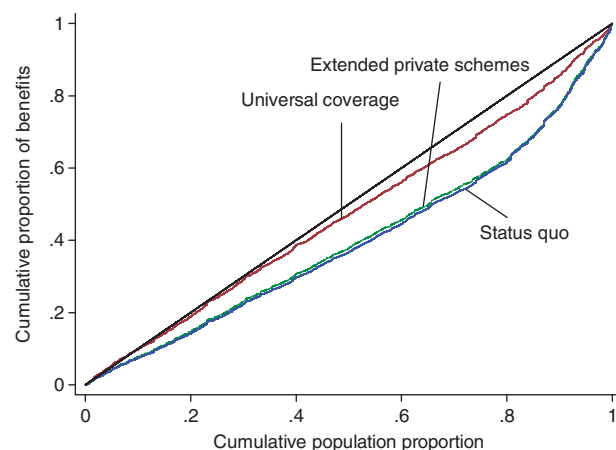
Figure 4 and Table 4 indicate that by the end of the 15-year modelling period, the distribution of benefits from public sector health care would be pro-poor and statistically significant under

Table 4 Concentration indices of health care benefits

| | Status quo | Extended private schemes | Universal coverage |
|---------------------|--------------------|--------------------------|--------------------|
| Private benefits | 0.722*** (0.0231) | 0.699*** (0.0213) | 0.827*** (0.0288) |
| Public benefits | −0.174*** (0.0212) | −0.224*** (0.0209) | −0.099*** (0.0245) |
| Inpatient benefits | 0.060* (0.0330) | −0.034 (0.0328) | 0.080** (0.0320) |
| Outpatient benefits | 0.209*** (0.0255) | 0.196*** (0.0246) | 0.051** (0.0252) |
| Total benefits | 0.208*** (0.0254) | 0.194*** (0.0245) | 0.051** (0.0250) |

Notes: Robust standard errors in parenthesis.

*, **, *** significant at 10%, 5% and 1% levels of significance, respectively.

**Figure 5** Concentration curves showing the distribution of private health care benefits**Figure 6** Concentration curves showing the distribution of total health care benefits

all three scenarios. This is because the concentration curves lie above the 45-degree line. The extended private schemes option would be the most pro-poor (concentration index = −0.224) and the universal coverage option the least pro-poor (concentration index = −0.099). The distribution of private health care benefits would be pro-rich and was statistically significant for all three scenarios. As shown in Figure 5 and Table 4, the most pro-rich distribution would be the universal coverage option (concentration index = 0.827) while the least pro-rich distribution would be the extended private schemes option (concentration index = 0.699).

Combining public and private benefits together as shown in Figure 6, the distribution of total health care benefits would be pro-rich for all scenarios, but less so for the universal coverage option. The concentration curve for the universal coverage option is close to the line of equality (Figure 6). The concentration indices contained in Table 4 also show that the most pro-rich distribution of total benefits would be associated with the status quo scenario (0.208) and the least pro-rich would be the universal coverage scenario (0.051). The distributions of both inpatient and outpatient benefits are also presented in Table 4. Outpatient benefits would generally be pro-rich but the universal coverage option shows the least pro-rich distribution (concentration index = 0.051). Benefits from inpatient care would be slightly pro-rich for both the status quo (concentration index = 0.06) and universal coverage (concentration index = 0.08) options but slightly pro-poor (concentration index

= −0.034) for the extended schemes option. However, this was not statistically different from zero.

In summary as shown in Figure 7, the distribution of *total* health care benefits would be more equally distributed under the universal coverage scenario than under the status quo or extended private schemes options. For instance, while under the status quo (extended private schemes) option the bottom 40% of the population would receive about 30% (31%) of total benefits, this would be about 39% under the universal coverage scenario. Also under the status quo (extended private schemes) scenario the top 40% of the population would receive about 56% (54%) of total benefits compared with about 44% under the universal coverage scenario. The distribution of public health care benefits would also be more equal under the universal coverage scenario than under the status quo or the extended schemes models. Although the richest quintile gains almost all the benefits of private scheme funded services under the universal coverage scenario, these schemes account for a much smaller portion of total health care funding than under the other scenarios and hence do not adversely impact on the distribution of total health care benefits.

Discussion

The intention of undertaking this modelling research was to provide information that could assist policy makers in deciding

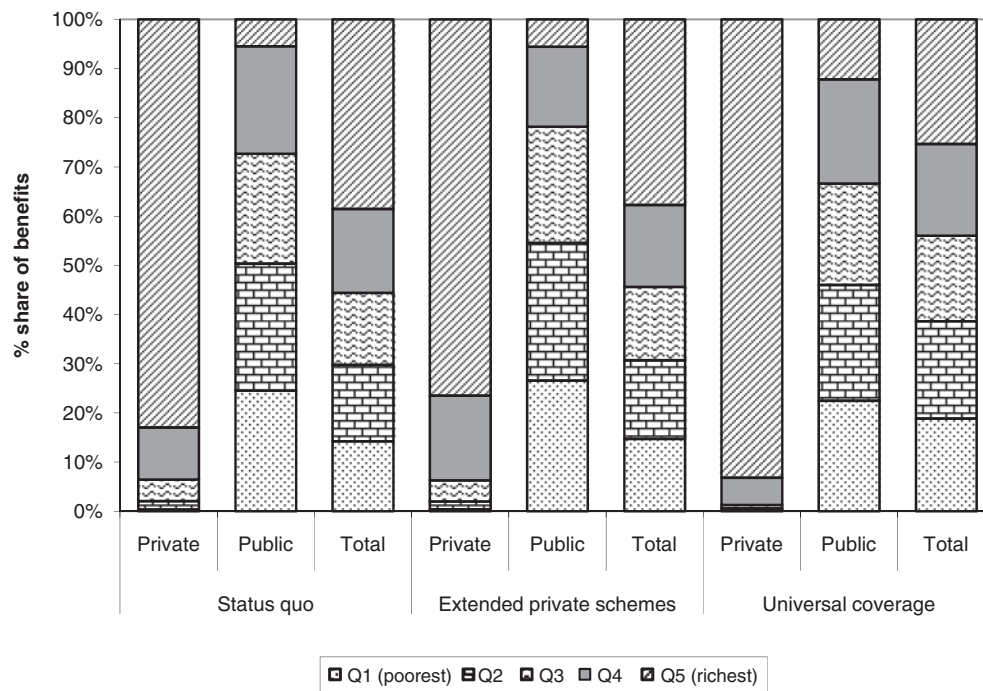


Figure 7 Distribution of health care benefits under the three scenarios

on future health care financing reform directions. The policy implications are briefly discussed below.

The total resource requirements to mandatorily extend private scheme coverage to all formal sector employees and their dependants are considerable. Only one country in the world has spending levels as high as 13% of GDP, namely the USA. This option is likely to be unaffordable in the South African context. In particular, the burden on households that are required to join a private scheme will be very high (see Figure 3), with average scheme contribution rates per person being twice as high as they currently are in real terms. Given that those formal sector workers who are currently not members of private insurance schemes are largely in the lowest income categories, there may be a need to introduce some element of income cross-subsidies or income-related contributions. It is unclear whether higher income groups would tolerate the very heavy burden that would be placed on them if this were to occur. Even in the absence of income-related contributions, contributions to private schemes by the richest two quintiles would be equivalent to 8–12% of household resources, compared with the status quo scenario of about 5% (see Figure 3). It may be possible to achieve mandatory extension of private scheme cover at a lower cost, but this would require extensive interventions to address the current cost escalation in the private scheme sector. It should be noted that the extended private scheme scenario presented here already assumes lower rates of annual real unit cost increases and lower scheme administration costs than prevail at present.

Some may look at the benefit incidence impact results and point out that the extended private schemes option results in the most pro-poor distribution of public sector service benefits. This finding is not unexpected as almost 40% of the population

would be covered by private schemes in this scenario, with members being concentrated among the richer socio-economic groups. This will inevitably translate into a relatively greater share of the benefits from public sector services among lower socio-economic groups. However, the distribution of total health service benefits (i.e. taking both public and private sector services into account) under this scenario is far more pro-rich than for the universal coverage scenario and comparable to the status quo scenario.

Given the affordability concerns about extending private insurance schemes, it is likely that the major decision facing policy makers is whether South Africa should retain the status quo or should pursue a universal health system. The universal coverage option would see health spending levels increasing in line with expected economic growth, so that when fully implemented, total health care spending as a percentage of GDP would be comparable to its current level. However, the key challenge with pursuing universal coverage is the need to allocate more public funds to the health sector, partly through increased taxes. However, as demonstrated in Figure 3, these additional taxes would not impose a major additional burden on households *if* government makes a commitment to increasing the allocation from general tax revenue to the health sector.

The analyses presented here demonstrate that the universal coverage option results in both the most progressive financing incidence and the least pro-rich distribution of total benefits from health service use. It also imposes the lowest overall health care funding burden on households (average of 6.7% of household consumption expenditure for universal coverage compared with 7.5% for the status quo and 10.7% for extended private schemes). On the one hand, the universal coverage scenario will impose a greater total funding burden on some

households than the status quo scenario, particularly for lower income households (4.1% of consumption expenditure for the income surcharge, but 6.3% for increased VAT, compared to 3.4% under the status quo in the case of quintile 1). However, it should be recognized that the funds available under universal coverage translate into far greater increases in health service utilization rates (more than double) than if the status quo is maintained (see Table 2). As the lowest income groups currently have the lowest health service utilization rates, they will be the greatest beneficiaries of the increase in overall utilization.

There may be a temptation to say that the universal coverage scenario is not desirable as it achieves the least pro-poor distribution of benefits from public sector services. However, this is merely a reflection of the fact that all South Africans (except some of the richest) will be using the improved quality public sector health services, and with much higher utilization rates than at present. As highlighted in Figure 7, this effectively translates into a more equal distribution of the benefits from public sector services across socio-economic groups in universal coverage than in other scenarios, although the richest quintile still receives the smallest share of these benefits. While the richest quintile receives even greater benefits from private sector services in universal coverage than in the other scenarios, because schemes' share of total funding under the universal coverage scenario is relatively low (see Table 2), this simply translates into a relatively equal distribution of the total health service benefits.

Although the sensitivity analyses are not presented here, they also provide valuable insights for policy makers. In particular, these analyses allow policy-makers to understand the impact of key reform design features on the feasibility and sustainability of a particular health care financing reform. For example, sensitivity analyses of the universal coverage scenario in South Africa highlighted the following key design issues:

- Future expenditure will be heavily influenced by the level of unit costs of the services purchased: this is particularly important in the context of the proposal to purchase services from private providers, who charge fees that are considerably higher than would prevail in public sector facilities even after dramatically improving their resourcing levels. If universal coverage was pursued at current private sector fee levels, total health care expenditure would rise to almost 24% of GDP (McIntyre 2010b).
- Careful attention should be paid to ensuring administrative efficiency to minimize administration costs as a percentage of total health care expenditure.
- Utilization increases must be managed carefully, particularly at hospital level. It will be critical to provide high quality, accessible primary level services and to implement a strong gate-keeping system at primary level facilities with monitoring of referral patterns.
- The pace of change must be carefully assessed: potentially the greatest concern to policy makers about the universal coverage findings is the rapid increase in the required public funding projected under this model. This pattern is particularly related to the assumption that there should be a dramatic improvement in resourcing of public sector services in the first 5 years (see steep curve in Figures 1 and 2).

While it is critical to achieve demonstrable improvements in public health services in the shortest time possible in pursuit of a universal health system, the pace of change should be reconciled with the likely availability of public funds. It is likely that the modelled rate of increase in the first 5 years will not be feasible, particularly given the poor global macroeconomic context at present, and that these funding increases will need to be phased in over a longer period. This would not change the final end-point, but would simply produce a less steep curve in the initial period in Figure 2 and flatten the curve in Figure 1.

While a universal health system would bring many benefits, there is likely to be considerable opposition to it from various actors (see Gilson *et al.* 2012). As the greatest concern expressed in the public debates so far is the affordability of universal coverage, the feasibility of pursuing this reform will depend on gaining buy-in from those who pay personal income tax (as they believe that the reform will place a major financial burden on them) and the National Treasury (which determines tax policy and budgetary allocations). The modelling we have undertaken here can be very helpful in allaying the fears of personal income tax payers. It demonstrates that the highest income quintile would pay on average 7 to 7.5% of their household consumption expenditure towards health care funding in taxes and any private health insurance scheme contributions under a universal system, depending on whether VAT or an income tax surcharge was used to raise additional public funds, compared with 8.3% if the status quo continues. The gain would be even greater for the second highest income quintile, who would pay 5.4 to 6% of their consumption expenditure under a universal system compared with 7.8% if the status quo continued. This is clearly dependent on the service benefits of the universal system being perceived by these groups as sufficiently good that the majority would not feel the need to have additional private insurance cover. It will, thus, be critical to achieve substantial improvements in health services and to address public perceptions about these services. The National Treasury will need to be convinced that resources made available to the health sector are used efficiently and that a universal health system will contribute ultimately to economic development gains.

Conclusion

The modelling presented here highlights the likely expenditure levels and impact on financing and benefit incidence of moving towards universal coverage within South Africa. It also compares this with the counterfactual of retaining the status quo or adopting an alternative health care financing reform path (extending private health insurance coverage). It demonstrates that achieving universal coverage will require increased public funding, through increased allocations to the health sector from general tax revenue and additional taxes on personal income or increased VAT. However, universal coverage would result in the most progressive financing incidence and least pro-rich benefit incidence of all the scenarios. Funding the gap between universal coverage public resource requirements and allocations from general tax revenue through additional VAT would be

regressive and result in the universal coverage option being less progressive than the status quo.

The intention of the modelling was not to provide a definitive, immutable estimate of the resources required to achieve universal coverage or the other scenarios. Instead, it provides information that may assist policy makers in evaluating the desirability of universal coverage as opposed to maintaining the current system or pursuing an alternative reform path. Undertaking sensitivity analyses in such modelling also highlights the key elements of the universal coverage system design that need to be addressed to ensure that universal coverage is affordable and sustainable within the country-specific context.

The analysis presented in this paper strongly suggests that universal coverage is a reform option worth pursuing: it would be affordable in the sense that its resource requirements increase in line with projected GDP growth, it is the most progressive of the reform options (if funded through an income tax surcharge but not through additional VAT) and it will promote a relatively equal distribution of the benefits from using health services. The affordability and sustainability of universal coverage can be assured by paying careful attention to the design of a universal health system.

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Conflict of interest

The authors declare having no competing interests.

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