Modelling the implications of moving towards universal coverage in Tanzania

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A model was developed to assess the impact of possible moves towards universal coverage in Tanzania over a 15-year time frame. Three scenarios were considered: maintaining the current situation ('the status quo'); expanded health insurance coverage (the estimated maximum achievable coverage in the absence of premium subsidies, coverage restricted to those who can pay); universal coverage to all (government revenues used to pay the premiums for the poor). The model estimated the costs of delivering public health services and all health services to the population as a proportion of Gross Domestic Product (GDP), and forecast revenue from user fees and insurance premiums. Under the status quo, financial protection is provided to 10% of the population through health insurance schemes, with the remaining population benefiting from subsidized user charges in public facilities. Seventy-six per cent of the population would benefit from financial protection through health insurance under the expanded coverage scenario, and 100% of the population would receive such protection through a mix of insurance cover and government funding under the universal coverage scenario. The expanded and universal coverage scenarios have a significant effect on utilization levels, especially for public outpatient care. Universal coverage would require an initial doubling in the proportion of GDP going to the public health system. Government health expenditure would increase to 18% of total government expenditure. The results are sensitive to the cost of health system strengthening, the level of real GDP growth, provider reimbursement rates and administrative costs. Promoting greater cross-subsidization between insurance schemes would provide sufficient resources to finance universal coverage. Alternately, greater tax funding for health could be generated through an increase in the rate of Value-Added Tax (VAT) or expanding the income tax base. The feasibility and sustainability of efforts to promote universal coverage will depend on the ability of the system to contain costs.

Keywords Modelling, universal coverage, Tanzania
KEY MESSAGES

- Expanded financial protection in Tanzania will have a significant effect on utilization levels, especially for public outpatient care.
- Universal coverage, offering a minimum benefit package to the population through the two largest health insurance schemes, would require the share of government allocation to health to increase to 18% initially (driven largely by the health system strengthening costs required to support additional demand, combined with costs of expanding cover among the informal sector).
- Reserve funds from the National Health Insurance Fund (NHIF) could be used to finance universal coverage or additional resources could be generated through increases in the rate of Value-Added Tax (VAT) or expanding the income tax base.
- The regulation of health care to control costs is paramount to the feasibility of universal coverage, as this affects the overall cost of expanding coverage as well as the extent of the revenue surplus available from the NHIF.

Introduction

There is growing recognition of the value of promoting universal health care coverage, or ‘a situation where the whole population (…) has access to good quality services according to needs and preferences, regardless of income level’ (Nitayarumphong 1998). Following recommendations by the World Health Assembly (WHO 2005) and the World Health Report (2010), many countries are currently considering how they can develop financing systems to move towards or sustain universal coverage in a way which is affordable, feasible and politically acceptable (World Health Organization 2010).

To this end, many low-income countries in Africa are committed to increasing financial protection among their populations (Carrin et al. 2007). However, to do so in an affordable and equitable manner, especially in contexts of a large informal sector, remains challenging. While there are some important developments in countries such as Rwanda (Saksena et al, in press) and Ghana (Akazili 2010) where financial protection was promoted through a rapid increase in health insurance coverage, there is still no clear way forward for many countries, and one of the major concerns is whether offering complete financial protection will be affordable and sustainable.

The Tanzanian Health Sector Strategic Plan III indicates a commitment to the expansion of pre-payment schemes as a means of generating complementary financing for health service provision and, ultimately, achieving universal coverage, with 30% coverage targeted by 2015 (United Republic of Tanzania 2008).

Modelling provides a means of estimating the resource requirements and likely revenue streams and overall affordability of different strategies towards universal coverage, be it through increasing health insurance coverage or providing greater tax funding to health care for the general population. Guidelines for undertaking such modelling exercises are available (Chichon et al. 1999) as are software tools such as SimIns, which was developed by the World Health Organization and the German Technical Cooperation. A number of studies have recently applied modelling techniques to analyse the financial feasibility of establishing systems of social health insurance (e.g. Carrin et al. 2007; Mathauer et al. 2011a; Mathauer et al. 2011b).

This paper aims to assess the impact in Tanzania of possible moves towards universal coverage compared with the current situation in relation to service use, health care expenditure and revenue generation, and to calculate expenditure as a proportion of government expenditure and gross domestic product (GDP). The paper also explores how the additional expenditures associated with greater coverage might be financed.

Methods

Study setting

Tanzania had a population of approximately 43 million in 2010 (United Republic of Tanzania 2006). At projected rates of population growth, by 2025 the health system will need to cater for 50% more people than in 2010 (Table 1). Tanzania has maintained relatively high levels of real GDP growth over the past 10 years, averaging around 7% (Braga et al. 2009). However, despite rapid economic growth, a significant proportion (34%) of the population is still living below the basic needs poverty line (National Bureau of Statistics 2008).

The Tanzanian health system is comprised of a large number of faith-based providers and a growing number of private for-profit providers. However, over 65% of all facilities in the country are government owned (MOHSW and World Health Organization 2007), and there is a wide discrepancy in the distribution of facilities between urban and rural areas. In 2008, the government launched a comprehensive plan to strengthen the public primary health system, including the construction of a dispensary in every village. This is referred to as the primary health care development programme (locally known as the MMAM) (MOHSW 2007).

Currently, Tanzania has a highly fragmented health financing system which combines funding through health insurance schemes and tax funding with out-of-pocket payments. An overview of key health financing indicators is provided in an accompanying paper in this series (Mills et al. 2012). An overview of tax rates in the country is also presented elsewhere (Mtei et al. 2012).

The Tanzanian government first introduced cost sharing through user charges in the public health sector in 1993 at secondary and tertiary level facilities, and this was extended to all facilities in 1994. In 2001, to provide financial protection to households, two pre-payment schemes were introduced targeting different population groups: the Community Health Fund (CHF), a voluntary scheme for rural districts, largely targeting the informal sector; and the National Health Insurance Fund...
Table 1  Characteristics of the Tanzanian population and projected changes

<table>
<thead>
<tr>
<th>Population characteristics</th>
<th>2010</th>
<th>Projected 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population (million)³</td>
<td>43.19</td>
<td>65.34</td>
</tr>
<tr>
<td>Women aged 15–49 years (million)³</td>
<td>10.37 (24)</td>
<td>15.45 (23.6)</td>
</tr>
<tr>
<td>Children aged 0–4 years (million)³</td>
<td>19.17 (44.4)</td>
<td>28.18 (43.1)</td>
</tr>
<tr>
<td>Working age population (aged 15–59) (million)³</td>
<td>22.02 (51.0)</td>
<td>34.18 (52.8)</td>
</tr>
<tr>
<td>Elderly population (aged ≥60) (million)³</td>
<td>2.00 (4.6)</td>
<td>2.97 (4.5)</td>
</tr>
<tr>
<td>Dependency ratios (%)³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young</td>
<td>87.06</td>
<td>82.45</td>
</tr>
<tr>
<td>Elderly</td>
<td>9.08</td>
<td>8.69</td>
</tr>
<tr>
<td>Total</td>
<td>96.14</td>
<td>91.14</td>
</tr>
<tr>
<td>Population growth rate³</td>
<td>2.51</td>
<td>2.73</td>
</tr>
<tr>
<td>Life expectancy in years³</td>
<td>55</td>
<td>61</td>
</tr>
<tr>
<td>GDP in billion Tshb</td>
<td>23 564</td>
<td>42 438</td>
</tr>
<tr>
<td>Government expenditure in billion Tshb</td>
<td>7541</td>
<td>13 580</td>
</tr>
<tr>
<td>Informal sector (% of population aged ≥15 years)³</td>
<td>69.9</td>
<td>62.1</td>
</tr>
<tr>
<td>Inactive and unemployed (% of population aged ≥15 years)³</td>
<td>20.8</td>
<td>13.9</td>
</tr>
<tr>
<td>Public formal sector (% of population aged ≥15 years)³</td>
<td>2.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Private formal sector (% of population aged &gt;15 years)³</td>
<td>7.1</td>
<td>21.7</td>
</tr>
<tr>
<td>Average monthly income in public/private sector (Tsh)³</td>
<td>253 295</td>
<td>340 901</td>
</tr>
</tbody>
</table>

Sources:
⁴The 2010 estimate is based on the Labour Force Survey (2006 data) (United Republic of Tanzania 2007); that for 2025 was projected by the model using the assumptions outlined in Table 3.
⁵This is based on the total NHIF contributions for the year 2010, divided by the number of NHIF principal members, divided by 3%, divided by 12. We assumed that average salaries in the private formal sector were the same as in the public sector.

Notes: *Includes agriculture, informal sector employment and household activities.
Tsh = Tanzanian Shillings.

(NHIF), a compulsory scheme initially established for public servants, which has since extended coverage into other sectors (Table 2). In 2009, the Tiba Kwa Kadi (TIKA) was launched in urban areas, as an urban version of the CHF. The benefits offered by the CHF/TIKA are generally restricted to lower level public facilities. Members of the NHIF, in contrast, can access services across all levels of care in non-public as well as public facilities (Table 2). However, in practice, users have greater access to public facilities, as all government facilities have been accredited by the NHIF, whereas only 34% of all faith-based and private facilities (including private pharmacies) have been accredited (National Health Insurance Fund 2009).

During the course of the last decade, a number of private insurance schemes and a small number of micro-insurance schemes operated by faith-based or voluntary organizations have also been established. However, their coverage remains extremely limited. In 2005, a scheme (the Social Health Insurance Benefits scheme, SHIB) was launched to cover members of the National Social Security Fund (NSSF), which covers 23% of the private formal sector. The SHIB contribution is drawn from the overall NSSF contribution. To benefit from the SHIB, NSSF members have to register with the SHIB and complete an enrolment card. Whilst all NSSF members are eligible for cover under the SHIB, only 13% have signed up, due to a lack of awareness of the scheme or alternative cover through private insurance.

Total health insurance coverage in 2008 was estimated at around 10% (author estimation). A detailed overview of the schemes and their structure is provided in Table 2.

Tax and donor funding subsidizes health care costs at public sector facilities. Those who are not members of the CHF/TIKA are expected to pay subsidized user fees for public primary care services, and everyone except members of the NHIF and SHIB and private schemes pay subsidized fees for hospital services. Out-of-pocket payments account for about 25% of total health care expenditure, donor funding for 44% and tax funding for 28% (MOHSW 2008b).

Summary of health care financing reform scenarios
Tanzania is currently committed to expanding health insurance cover within the population with a view to moving towards universal coverage. The Health Sector Strategic Plan III specifically identifies the NHIF and the CHF/TIKA as the means of expanding coverage (United Republic of Tanzania 2008). The NHIF took over the management of the CHF/TIKA from the Ministry of Health and Social Welfare in 2009, initially for a 3-year period, with a view to expanding coverage among the informal sector. This move is not currently seen as a merger, but rather as a means of allowing the CHF/TIKA to benefit from NHIF technical expertise so as to expand informal sector coverage. The revenue collection
### Table 2 Health insurance schemes in Tanzania

<table>
<thead>
<tr>
<th>Descriptive</th>
<th>NHIF</th>
<th>CHF/TKA</th>
<th>NSSF-SHIB</th>
<th>Private insurance</th>
<th>Micro-schemes (example: Chawana)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligibility-focus</td>
<td>Mandatory for public servants and up to 5 dependants. Since 2009 members of other sectors can opt in.</td>
<td>Voluntary for the rural population (CHF), urban population (TIKA)—covers a couple and their children under 18 years.</td>
<td>Members of the NSSF are eligible subject to completing a registration form.</td>
<td>Voluntary, often tied to employment—individual cover.</td>
<td>Informal sector (e.g. market vendors).</td>
</tr>
<tr>
<td>Estimated population coverage (2008)</td>
<td>5%</td>
<td>4%</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benefit package</td>
<td>Inpatient and outpatient care from accredited facilities. An estimated 72% of all health facilities across the country are accredited (National Health Insurance Fund 2009).</td>
<td>Primary level public facilities. Limited referral care in some districts.</td>
<td>Outpatient and inpatient care up to Tsh 80,000 at a small network of less than 300 facilities.</td>
<td>Various packages typically including outpatient and inpatient care at a range of providers.</td>
<td>Private outpatient care plus transport for referral and up to Tsh 10,000 referral costs.</td>
</tr>
<tr>
<td>Contribution rate and revenue collection</td>
<td>6% of gross salary, split between employer and employee, deducted at source.</td>
<td>Typically Tsh 5,000-15,000 per year/household with a 100% matching fund paid by the government through the health basket fund. Funds are collected at lower level health facilities and sent to the district.</td>
<td>NSSF contributions (20% of gross salary split between employer and employee) used to refund health care use of members, no earmarked funds for SHIB.</td>
<td>Various depending on benefits.</td>
<td>Tsh 50/person/day collected at the work place.</td>
</tr>
<tr>
<td>No. of risk pools</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>Each scheme has its own risk pool.</td>
<td>No risk pooling across schemes.</td>
</tr>
<tr>
<td>Provider payment method</td>
<td>Fee-for-service except for a few specialized hospitals in Dar es Salaam which operate under a capped daily rate system.</td>
<td>Essentially capitation, as there is no payment for services; facilities use CHF revenue to support service delivery.</td>
<td>Capitation, some fee-for-service</td>
<td>Fee for service</td>
<td>Capitation</td>
</tr>
</tbody>
</table>

*Note: Tsh exchange rate in 2008 was 1196 Tsh to 1 USD (Bank of Tanzania Annual Report 2008/2009).*
Box 1 Summary of scenarios and their key assumptions

Scenario 1: The status quo
The status quo was based on the 2008 situation, where 10% of the population is covered by a fragmented set of insurance schemes with varying levels of benefits. The remaining population benefit from subsidized user charges in public facilities funded mainly through tax revenue. Utilization rates were assumed to remain at current levels.

Scenario 2: Expanded insurance coverage
The expanded coverage scenario assumed that the entire formal sector would be covered by the NHIF under the existing benefit package (Table 2). Under this scenario the CHF/TIKA benefit package was assumed to expand to include public inpatient care. Coverage of informal sector households by the CHF/TIKA was set at 52% on the assumption that all those who currently pay more than the cost of the CHF/TIKA premium in user fees would enrol in the CHF/TIKA. Utilization rates for public inpatient care among CHF/TIKA members were assumed to increase by 90% due to the inclusion of these services within the benefit package. Those individuals not covered by the NHIF or the CHF/TIKA would benefit from subsidized user charges in public facilities funded mainly through tax revenue.

It was assumed that achieving significant increases in insurance coverage would require substantial investment in the public health system. Two scenarios for upgrading the public health system were considered: an upper and a lower cost scenario. In the lower cost scenario, the cost of training and recruiting sufficient health workers to meet national human resource requirements was included. In the upper cost scenario, the costs of comprehensive health system strengthening were included, as for the universal coverage scenario.

Scenario 3: Universal coverage
The universal coverage scenario assumed that the entire population would be covered by insurance financed either through contributions or from tax funding for those who could not afford premiums. The formal sector would be covered through the NHIF under the existing benefit package (Table 2), and the informal sector through the CHF/TIKA with benefits extending to public inpatient care, and all other members of the population would be dependants on either of these schemes. Within this scenario, we also considered the cost implications of removing CHF/TIKA premiums. The utilization rates were those considered under the expanded insurance scenario. We included the costs of comprehensive health system strengthening including: rehabilitation, human resource development, improving the referral system and improving the provision of medicines, equipment and supplies.

Model for estimating resource requirements
A model was developed in Microsoft Excel to explore the health care expenditures associated with each of the above reform scenarios in relation to the delivery of public health services and all health services (public, private and faith-based as well as pharmacies/drug shops). This process relied on three key variables: population; service utilization rates; and the unit costs of service delivery. Table 3 summarizes the key assumptions made for each variable. Population and utilization data were disaggregated by age, insurance status and location of residence (urban–rural). More details on the levels of disaggregation, as well as the corresponding data sources, are provided elsewhere (Borghi et al. 2011; McIntyre and Borghi 2012).

Population
Projections of insurance coverage expansion were dependent upon projections of the growth of the formal and informal sectors over time. At baseline, the formal sector was estimated at 5% of the total population, with 38% of the population being in the informal sector and 57% being economically inactive, unemployed or students (derived from the Integrated Labour Force Survey 2006). The analysis assumes that the public formal sector increases in line with government commitments to the expansion of health workers and teachers for the public formal sector (MOHSW 2008a; Naluyaga 2010), and that the
### Table 3 Summary of key assumptions used in expenditure and revenue models

<table>
<thead>
<tr>
<th>Status quo</th>
<th>Expanded insurance coverage</th>
<th>Universal coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National insurance coverage remains constant at 2008 levels—10% of the population. All government employees and their dependants covered by the NHIF (9% of the population), 4% covered by the CHF/TIKA and 1% covered by the SHIB and private and micro insurance schemes.</td>
<td>Formal sector and their dependants enrolled in the NHIF. CHF/TIKA covers 52% of the population. Expansion of coverage is achieved gradually over 15 years. The formal sector expands in line with government targets (public sector) and by 10% per year (private sector), equalling 14% of the population by year 15. The SHIB, micro-insurance and private schemes cease.</td>
<td>Formal sector and their dependants enrolled in the NHIF. The remaining population is covered either as a dependant through the NHIF, or through the CHF/TIKA. Same assumptions regarding the growth of the formal sector as for expanded coverage scenario. Expansion of coverage is achieved gradually over 15 years.</td>
</tr>
</tbody>
</table>

| **Utilization variables** | | |
| Utilization rates assumed to remain constant. | Utilization rates for public inpatient services increase by 90% for CHF/TIKA members. Utilization rates for NHIF members increase from the levels reported to the NHIF in relation to claims, to levels of service use reported by NHIF members in a household survey carried out as part of the SHIELD project, seen to reflect desired service use. Changes in utilization phased in over lifetime of model. | |

| **Unit cost variables** | | |
| Unit cost estimates based on literature review. 2% annual growth of unit costs in public sector, 3% for SHIB and private insurance. | Unit cost changes are effective immediately. Also considered effect on unit costs of reimbursement rates at private insurance level. 2% annual growth of unit costs in public sector, 3% for SHIB and private insurance. | |

| **Other expenditure variables** | | |
| Administration costs were assumed to be 7% of total health expenditure (MOHSW 2008b). Costs of other services not captured by the model also added in as a lump sum. | Administration costs were assumed to be 7% of total health expenditure (MOHSW 2008b) in the main analysis. We also considered the effect of administration costs increasing to 15% in line with expected administration costs for the NHIF since taking over the management of the CHF/TIKA. Costs of other services not captured by the model also added in as a lump sum. Costs of upgrading the public health system were added in as a lump sum and phased in over the 15-year projection period. Estimates based on human resource strategic plan costs of ensuring sufficient human resources within the system (MOHSW 2008a), and costs of comprehensively upgrading the primary health system (MOHSW 2007). | |

| **Revenue variables** | | |
| • Baseline estimates of real GDP levels and projected growth were estimated at 4% per year (Utz 2007). • In a sensitivity analysis, we also included lower level estimates for GDP growth of 2% (Utz 2007) and high level estimates ranging from 5 to 7% (Braga et al. 2009). • Government expenditure was assumed to be 16% of GDP (2009/2010) increasing to 20% (2017–2025) (Braga et al. 2009). • NHIF contributions were assumed to remain constant at 6% of gross income (split between the employer and employee). Average salaries in the formal sector were based on NHIF data. We assumed that real wage inflation was a minimum of 2% (in line with the minimum estimated rate of growth for GDP and a maximum of 5% in line with short-term assumptions for earnings growth (United Republic of Tanzania 2009). Investment income and other revenue accruing to the NHIF were not included in the model due to uncertainty as to how such income would grow over time, and to offer a conservative estimate of revenue. • We considered a constant CHF/TIKA premium of 10 000 Tsh per household per year from 2011. We assumed continued support through the government matching grant of the same amount. • SHIB and private insurance contributions were also assumed to be 6% of average gross income. • The uninsured pay user fees at all public facilities and non-public facilities. • The CHF members do not pay user fees for public outpatient care under the status quo but they do pay for public inpatient care. • It is assumed that NHIF members do not pay for services at any public or non-public facility (although in practice, they would still pay at facilities that were not accredited).  | • We also considered what would happen if CHF/TIKA contributions ceased and if tax revenue was used to finance the costs of the informal sector. • CHF/TIKA members do not pay for any public care (outpatient or inpatient) under expanded or universal coverage scenarios. • It is assumed that NHIF members do not pay for services at any public or non-public facility (although in practice, they would still pay at facilities that were not accredited).  | |

**Notes:**

\(^a\) The baseline scenario assumes a 3.3% growth in GDP (2009/2010) increasing to 7.5% (2012–2017), falling to 6% (2019–2025). To fill the year gaps (2010–2012 and 2018), we undertook a linear extrapolation.

\(^b\) Again the gaps in data for years 2010–2017 were filled through linear extrapolation.

\(^c\) Note that the matching grant is considered here as revenue as it is a revenue source to the CHF/TIKA, although it represents a cost to the Ministry of Health and Social Welfare (MOHSW).
private formal sector increases annually by 10% (International Labour Office 2010: 133). The size of the inactive, unemployed and student populations were assumed to remain constant over time. The rate of growth of the informal sector was estimated by subtracting the formal sector and inactive, unemployed and student populations from the total population.

All insurance schemes cover dependants. We assumed that all dependants were drawn from the economically inactive, unemployed and student population groups. The average number of dependants for formal sector schemes was based on 2008 data from the NHIF (2.3 in urban areas and 3.9 in rural areas). For the CHF/TIKA, the number of dependants was estimated by taking the total inactive/unemployed/student population minus the total number of dependants of the NHIF and other schemes. We assumed that insurance coverage increases linearly over the lifetime of the model at around 20% per year.

**Utilization**

Utilization was classified as an outpatient visit or an inpatient admission. Outpatient care use includes outpatient visits to a public, faith-based or private provider, or a pharmacy/drug shop. Most laboratories in Tanzania are located within a health facility, hence laboratories were not considered separately. We were unable to differentiate dental from other types of visits within the model. Surgical procedures were included within inpatient admissions but could not be analysed separately.

For the expanded coverage and universal coverage scenarios, utilization rates for NHIF members were assumed to increase from the levels reported by the NHIF in relation to claims, to levels of service use reported by NHIF members in a household survey carried out as part of the SHIELD project (Mtei et al. 2012). Under the expanded and universal coverage scenarios, the inclusion of inpatient care within the benefit package for CHF/TIKA members was assumed to increase inpatient admission rates by 90%, consistent with data from Thailand following the introduction of universal coverage (personal communication, Dr Viroj Tangcharoensathien), and data from Tanzania on the price elasticity of demand for public hospitals (Sahn et al. 2002).

**Unit cost**

Unit cost data were based on average values derived from a review of costing studies undertaken in the health sector in Tanzania (Makawia et al. 2010). Cost estimates were also derived from NHIF data on claims reimbursed and visits/admissions by members, however, these were lower than those obtained from the review, and were not used in the final analysis. There are growing concerns about spiraling costs under a fee-for-service system, especially in relation to private providers, due to weak regulation. Hence, average reimbursement rates of private health insurance companies were included as an estimate of unit cost in a worst case scenario analysis, to illustrate how much costs would increase if weak regulation prevails and insurers are not able to negotiate lower rates with providers.

We assumed that unit costs increase at a constant real rate. To ascertain increases in unit costs over time, the ideal approach would be to observe trends in expenditures and beneficiaries for particular schemes. However, observations of growth in public expenditure are highly dependent on levels of donor support that vary year on year, and hence do not provide a good estimate of the real cost increase of delivering public health services. Real growth in unit costs for those groups predominantly using public services (the NHIF, the CHF/TIKA and the uninsured) was, therefore, estimated at 2% in line with our lower level estimate of GDP growth (Table 3). Rates of 3% were used for private insurance and the SHIB.

**Benchmarking the model**

Model data were compiled for the year 2008 which served as a baseline for benchmarking the model. The projections of utilization and expenditure were benchmarked against data from the Health Management Information System (HMIS) and National Health Accounts (NHA) inflated to 2008 prices (MOHSW 2008b). There were certain expenditure items not covered by the model. As the expanded and universal coverage scenarios are largely reliant on the public health system, costs of strengthening the public health system to ensure adequate capacity for meeting additional demand from expanded insurance coverage were also added in as a lump sum. We derived estimates of the likely lower level [based on meeting national human resource requirements (MOHSW 2008a)] and upper level [based on comprehensive upgrading of primary health care (MOHSW 2007)] cost requirements to strengthen the public health system. We assumed that the government bears the full cost of health system strengthening, although in practice donor funds are often used to upgrade facilities in specific areas in the country. Further, the costs of community health services, health worker training, facility maintenance and service administration, as well environmental health activities, research and development and the National HIV/AIDS Control Programme, were added in as a lump sum and assumed to increase in line with real unit cost increases per year.

**Model for estimating revenue**

The second objective of the model was to forecast total revenue from user fees and insurance contributions associated with each scenario. There are no official co-payments for NHIF or CHF members at present for the services covered by the scheme. We also compared total expenditure to total revenue for the NHIF, the CHF/TIKA and for the uninsured to indicate how the resource surplus or gap varies by population group under different scenarios.

Public service user charges are subsidized, and certain categories are officially exempt from payment (under-5s, pregnant women, the elderly, chronic diseases). Non-public facilities all charge users for service use. Estimates of user fee payments for different categories of provider were derived from the SHIELD household survey (Makawia et al. 2010; Mtei et al. 2012). The model assumed that the uninsured paid user fees at government facilities. Members of the CHF/TIKA were assumed to make payments at government facilities for inpatient care under the status quo, but were exempt from such payments under the expanded and universal coverage scenarios (Table 3). For simplicity, members of the NHIF, SHIB and private health insurance were assumed not to make any user fee payments at
any type of provider, although in practice they would still pay at facilities which are not accredited.

To examine the affordability of various scenarios at a macro-level, we estimated public service delivery costs and total health care delivery costs as a proportion of GDP, and public service delivery costs as a proportion of total government expenditure. If additional resources were required, we explored to what extent these could be financed through additional health insurance revenue, and what tax rates would be required if extra funds were to come from Value-Added Tax (VAT) or income tax. The government budget was projected to increase in line with real GDP increases.

Costs and revenue were forecast over a 15-year time frame in 2010 constant prices. This was considered to be the minimum period to feasibly achieve universal coverage, given the adaptations required to the health system to ensure adequate capacity to cope with the associated increases in utilization.

We also undertook a best and worst case scenario to examine the sensitivity of expenditure and revenue results to variations in key variables. Under the best case scenario, we assumed high projections of GDP growth and a 5% annual increase in real wage inflation, with all other variables remaining constant. Under the worst case scenario, we assumed 15% administration costs, unit costs increasing to the levels reimbursed by private insurance schemes and low GDP growth, with all other variables remaining constant.

### Key findings

#### Changes in population coverage and service utilization

Under the status quo, financial protection is available to 10% of the population through health insurance schemes, with the remaining population benefiting from subsidized user charges in public facilities. Seventy-six per cent of the population would benefit from financial protection through health insurance under the expanded coverage scenario, and 100% of the population would receive such protection (by year 15) through a mix of insurance cover and government funding under the universal coverage scenario.

At baseline, the estimated total number of outpatient visits amounted to 101 million visits of which 64 million were visits to public providers (Table 4). The total number of inpatient admissions was 11 million of which 7 million were admissions to public providers. Under the status quo scenario, total outpatient visits would increase by around 50%, due to population growth (Table 4), with a similar percentage increase in the number of public service outpatient visits. In contrast, the increase in outpatient care utilization under the universal coverage scenario was estimated to be over 160% (200% for public facilities). In this scenario, utilization rates among the population have increased to address previous unmet need, driving up the total number of outpatient visits. The increase was higher in public facilities as the NHIF and CHF/TIKA primarily cover public facilities. The increase in inpatient admissions followed a similar pattern to that of outpatient visits, although the magnitude of the increase was lower. For example, under the universal coverage scenario, admissions were projected to increase by 100% (with a similar increase in admissions to public facilities). The rate of increase in the use of pharmacies/drug shops was similar to that for outpatient care overall, increasing by 38% in the status quo, to 100% and 160% in the expanded and universal coverage scenarios, respectively.

#### Projected expenditure levels

The annual costs of delivering public services, and the costs of delivering all health services, were twice as high under universal coverage as under the status quo (Table 5). Public service delivery costs represented just under 3% of GDP at baseline (total health service delivery costs represented 4%), increasing to almost 6% (7%) in year 1, reducing to around 5% (6.5%) of GDP in year 15 (Figures 1 and 2). The sharp increase in costs in year 1 was a result of the injection of additional resources for health system strengthening which were phased in over the 15-year period from year 1. However, the proportion of GDP consumed declines over time as the relative size of the investment reduces as a share of GDP. With more modest health system strengthening (under the expanded lower scenario), average annual costs of service delivery were only 1.2 times higher than the status quo, amounting to just over 3% of GDP with little change over the 15-year period, similar to the status quo (Figures 1 and 2).

The results were highly sensitive to underlying assumptions. Under the worst case scenario, the expanded coverage (lower) scenario would amount to 15% of GDP by year 15, with the universal coverage scenario amounting to 24% of GDP in the same year (Table 6). Under the best case scenario, the expanded coverage (lower) scenario would consume a constant proportion of GDP (3%) over time, with the universal coverage scenario increasing to 6% of GDP initially and gradually reducing to 4% over time.

#### Revenue issues

Both the expanded and universal coverage scenarios lead to a reduction in user fee revenue and an increase in insurance

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Baseline</th>
<th>Status quo</th>
<th>Expanded coverage</th>
<th>Universal coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total outpatient visits</td>
<td>101</td>
<td>157</td>
<td>228</td>
<td>268</td>
</tr>
<tr>
<td>Total inpatient admissions</td>
<td>11</td>
<td>17</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Total outpatient visits to public providers</td>
<td>64</td>
<td>98</td>
<td>150</td>
<td>196</td>
</tr>
<tr>
<td>Total outpatient visits to pharmacies/drug shops</td>
<td>64</td>
<td>89</td>
<td>134</td>
<td>182</td>
</tr>
<tr>
<td>Total inpatient admissions to public providers</td>
<td>7</td>
<td>10</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>
The universal coverage and expanded insurance (upper) scenarios would require an increase in government allocations to the health sector from just over 8% of total government expenditure at baseline to 18% in year 1, reducing to around 16% by year 15 (Figure 3). In contrast, with minimal health system strengthening, under the expanded lower scenario, the government would need to increase allocations to public health services gradually up to 10% of government expenditure by year 15.

Again, the results are highly sensitive to underlying assumptions. Under the best case scenario, government allocations to health would only have to increase to 11% of government expenditure to achieve universal coverage. Expanded coverage could already be achieved with current government allocations to health. However, under the worst case scenario, government allocations to health would need to increase to 36% and 44% of government expenditure to finance expanded and universal coverage, respectively.

Expanded insurance coverage with more limited health system strengthening could be feasibly achieved, under the base case scenario, by increasing allocations to health to 15% of government expenditure in line with commitments of African heads of state (Organization for African Unity 2001). Universal coverage could also be achieved under the best case scenario. However, additional resources would be required to achieve the higher level of health system investment required for universal coverage under the base case scenario.

Insurance contributions represent a potential source of revenue. There is currently an estimated annual revenue surplus per NHIF member of Tsh 25 162. This surplus is projected to increase under the expanded and universal coverage scenarios if contribution and reimbursement levels remain as they are. Indeed, the revenue surplus alone would then be sufficient to finance the expanded and universal coverage scenarios (Figure 4). However, the level of the NHIF reserve is significantly associated with the wage level of its members, the real rate of wage inflation and the level of reimbursement to providers. The size of the reserve is also dependent on membership contributions remaining at least as high as they are currently. If providers were paid according to private insurance rates, instead of a surplus there would be a deficit ranging from Tsh 101–107 billion in year 1 to Tsh 1374–2762 billion in year 15 (Figure 4).

Hence, it is doubly important to regulate health care costs, as cost escalation has implications for the ultimate cost of universal coverage as well as the availability of a revenue surplus from the NHIF.

In contrast to the NHIF, the CHF/TIKA does not represent a viable revenue source as it is generating a net cost to the system.
that is three times greater than the net cost generated by the uninsured (Table 7). This is due to the much higher utilization rates of CHF/TIKA members compared with the uninsured, combined with the fact that the premium contribution on a per visit basis works out at much less than the user fee contribution that would be paid by the uninsured. The costs incurred by CHF/TIKA expansion grow incrementally over time (Figure 5).

If the CHF/TIKA premium were removed but members retained their benefits, the government allocation to the health sector would need to increase by 1%, and health service costs as a proportion of GDP would increase by 0.4%.

Additional government revenue could be used to finance universal coverage. Assuming the government was able to increase its allocations to health to 15% of its budget, by transferring funds from other areas of government expenditure, then VAT would need to increase from 18% to 22.5% initially, reducing to 21.2% over time. Alternatively, additional income tax revenue could be generated by expanding the tax base. Currently only a small proportion of the population pays income tax, though the government is committed to expanding the tax base by taxing the informal sector, for example (Elinaza 2010; Daily News 2011). Using Household Budget Survey data for 2007, we found that if the government were to tax self-employed workers in addition to government, parastatal and private formal sector workers, this would result in an increase in income tax revenue of 75%, and would cover 38% of the universal coverage financing gap. If workers in the agricultural and fisheries sectors were also taxed on their income, this would double income tax revenue and cover 51% of the universal coverage financing gap.

Under the worst case scenario, both the expanded and the universal coverage scenarios would require government allocations to health of over 30%, which is unlikely to be affordable. Hence it is imperative that unit costs are contained.
Table 7 Per capita annual cost and revenue from user fees and insurance premiums and net cost to the government in Tsh associated with different population groups at baseline

<table>
<thead>
<tr>
<th>Population groups</th>
<th>Per capita service delivery costs</th>
<th>Per capita revenue from public sector user fees</th>
<th>Per capita revenue from insurance premiums</th>
<th>Net cost per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninsured</td>
<td>5 956</td>
<td>2 240</td>
<td>0</td>
<td>3 716</td>
</tr>
<tr>
<td>CHF/TIKA current package</td>
<td>12 778</td>
<td>392*</td>
<td>1702</td>
<td>10 683</td>
</tr>
<tr>
<td>NHIF</td>
<td>17 891</td>
<td>0</td>
<td>43 053</td>
<td>−25 162</td>
</tr>
</tbody>
</table>

Note: *At baseline, CHF/TIKA members are still paying user charges for inpatient care in public facilities.

Figure 5 Projected net public sector resource requirements (revenue minus cost) for CHF/TIKA members and the uninsured in 2010 Tsh billion

Note: SQ: Status quo; Expand: expanded insurance coverage; UC: universal coverage; Unins: uninsured. CHF/TIKA UC* signifies universal coverage in the absence of premium contributions from CHF/TIKA members.

Discussion

The current health financing arrangements in Tanzania are highly fragmented, financial protection is limited and health insurance coverage is low. However, there is a growing national commitment to expanding health insurance coverage to improve access to services and offer greater financial protection to the population. A potentially sizeable expansion in insurance coverage could be achieved just by expanding coverage within the formal sector. If the government made it mandatory for the entire formal sector to enroll in the NHIF, this would immediately expand coverage to around 50% of the population (including dependents). The achievement of universal coverage relies primarily on the successful expansion of CHF/TIKA cover among the informal sector and their dependents, which are the majority of the population, and expanding benefits to include inpatient care, without which financial protection would be incomplete.

In the two scenarios considered, health insurance expansion had a significant effect on outpatient care utilization at lower level public facilities due to the CHF/TIKA only covering public services, and the larger number of accredited public compared with non-public providers under the NHIF. These scenarios, therefore, rely on the existence of a sufficient network of appropriately equipped lower level public facilities to ensure that quality services are made available to the population in sufficient quantity. Interestingly, it was the costs of upgrading the public health system which had the greatest impact on the total expenditure associated with the various scenarios. A limited investment in the health system to ensure sufficient human resource availability, which may be adequate to achieve expanded insurance coverage, would have led to similar levels of total health care costs as the status quo. However, if extensive resources are ploughed into the public system, in line with the estimated requirements for the MMAM initiative to strengthen primary care, this would have a significant effect on overall resource requirements.

The other major cost driver is the expansion of coverage among the CHF/TIKA, which leads to increased service delivery costs and lost revenue from user fees, with premiums doing little to offset these costs. Premiums would need to increase over 10-fold in order to offset the costs of greater service use and user fee revenue loss. It is questionable what proportion of the population would be willing and able to pay premiums at this level. The removal of CHF/TIKA premiums would have little effect on the overall resource requirements associated with moves towards universal coverage. Given that there are costs associated with revenue collection, and that premiums can be a deterrent to enrolment, universal coverage might more readily be achieved by removing CHF/TIKA premiums and funding the informal sector through other revenue sources. One of the major challenges of achieving universal coverage at present is finding a means to encourage people to enrol in the CHF/TIKA. If premiums were removed and coverage was automatic, this would no longer be a problem. Such an approach is now being proposed in Ghana with the one-time payment scheme (Mills et al. 2012), and has also been adopted in Thailand where general tax revenue was used for the universal coverage scheme (Tangcharoensathien et al. 2011).

Under the base case and best case scenarios, expanded insurance coverage was largely affordable at current levels of government health sector spending. However, universal coverage would require a doubling in the proportion of GDP going to public health services from 3% to 6% in the short term. Government expenditure on public health services would also need to meet and exceed (under the base case scenario) the Abuja target of 15% of tax revenue spent on health services (African Union 2006), which a number of African countries have met (Equinet 2007).

There are a variety of ways to finance this additional allocation of resources to the health sector. This paper has shown that currently the NHIF revenue surplus would be more than sufficient to offset the additional resource requirements associated with universal health coverage. However, this would require cross-subsidization between the NHIF and the CHF/TIKA. Currently, there is no government commitment to a formal merger of the schemes, or cross-subsidization. There are also concerns as to the acceptability of cross-subsidization to NHIF members. The 2007 Household Budget Survey indicates that about 17% of household heads who work in the informal sector reported income which is equivalent to or exceeds the taxable income threshold. It may, therefore, be desirable to identify methods of eliciting contributions from the wealthier parts of the informal sector, in order to ensure equity within the system.
We have shown that if the government allocation to health increased to 15%, VAT would then need to increase by between 3.2 and 4.5 percentage points, and this additional revenue go to health, to reach the 18% of government expenditure needed to achieve universal coverage. VAT is paid by the entire population and is also marginally progressive (Mtei and Borghi 2010). Whilst such rates are seen in other countries, this will impose an additional burden on the poorest. Imposing income tax on segments of the informal sector, to which the government is already committed, would provide a means of expanding the tax base in a progressive way, and may be more acceptable to the population than a VAT increase. However, the challenges of registering agricultural and fisheries workers for tax payment should not be underestimated, and the amount generated would finance only half of the required gap.

It is clear that as Tanzania progresses towards universal health coverage this will impact on the relative share of financing sources that constitute total health expenditure. Even if donor and general tax contributions remain at current absolute levels, the revenue from NHIF contributions would become the single largest source of health financing. Out-of-pocket payments as a share of total expenditure would reduce dramatically, although those covered under the CHF/TIKA would still pay for non-public services.

Conclusion

In summary, there are a variety of options to finance expanded and universal coverage in Tanzania. The use of NHIF reserve funds to cross-subsidize, at least, a proportion of the informal sector would be the most straightforward and equitable way of financing insurance expansion. The funds are already there and would not impose an additional burden on the population. However, the achievement of universal coverage will be highly dependent on Tanzania’s ability to contain health care costs by negotiating with service providers to ensure reimbursement rates remain reasonable. This is critical as it will impact not just on the eventual cost of the system but on the size of the revenue surplus generated by the NHIF. Under the worst case scenario, neither the expanded nor the universal coverage scenarios were likely to be affordable. The government commitment to upgrading the public health system outlined in the MMAM will also need to be made a reality in order to deliver services of adequate quality to the population. Indeed, ensuring that quality services are available will be critical to the success of a universal coverage plan and to the willingness of the population to pre-pay for health care.

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Conflict of interest

The authors declare having no competing interests.

Endnote

1 The assumption of an optimistic or pessimistic expansion of the formal employment sector made little difference to the projections of utilization rates. The results presented reflect an optimistic assumption about the rate of expansion of the formal sector.

References


