



# Equity in financing and use of health care in Ghana, South Africa, and Tanzania: implications for paths to universal coverage

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## Summary

**Background** Universal coverage of health care is now receiving substantial worldwide and national attention, but debate continues on the best mix of financing mechanisms, especially to protect people outside the formal employment sector. Crucial issues are the equity implications of different financing mechanisms, and patterns of service use. We report a whole-system analysis—integrating both public and private sectors—of the equity of health-system financing and service use in Ghana, South Africa, and Tanzania.

**Methods** We used primary and secondary data to calculate the progressivity of each health-care financing mechanism, catastrophic spending on health care, and the distribution of health-care benefits. We collected qualitative data to inform interpretation.

**Findings** Overall health-care financing was progressive in all three countries, as were direct taxes. Indirect taxes were regressive in South Africa but progressive in Ghana and Tanzania. Out-of-pocket payments were regressive in all three countries. Health-insurance contributions by those outside the formal sector were regressive in both Ghana and Tanzania. The overall distribution of service benefits in all three countries favoured richer people, although the burden of illness was greater for lower-income groups. Access to needed, appropriate services was the biggest challenge to universal coverage in all three countries.

**Interpretation** Analyses of the equity of financing and service use provide guidance on which financing mechanisms to expand, and especially raise questions over the appropriate financing mechanism for the health care of people outside the formal sector. Physical and financial barriers to service access must be addressed if universal coverage is to become a reality.

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## Introduction

There is a growing focus on the goal of universal coverage in health systems. For example, the World Health Report 2010 on universal coverage of health care<sup>1</sup> and the associated declaration of the World Health Assembly<sup>2</sup> urged member states to “aim for affordable universal coverage and access for all citizens on the basis of equity and solidarity”.<sup>2</sup> Several countries, such as India<sup>3</sup> and South Africa,<sup>4</sup> have lately developed policy proposals to pursue this goal. The generally accepted core of universal coverage is that the health system should be financed in accordance with the ability to pay, and benefits received in accordance with the need for health care (panel 1). Analytical methods are available to assess health systems relative to these principles, notably in the form of financing incidence analysis (assessing whether health-care financing methods are progressive, regressive, or proportional), and benefit incidence analysis (assessing the monetary value of service benefits received by different socio-economic groups). However, debate on the relative merits of different approaches to financing of health care has tended to proceed without good evidence on the equity of present arrangements, and has made generalisations that

lack a sufficiently strong evidence base—eg, certain forms of tax financing are regressive in low-income countries and public services are exploited more by richer groups. As countries plan their paths to universal coverage, and debate grows on the relative merits of financing mechanisms including various types of tax financing, social health insurance, community-based insurance, and out-of-pocket payments, it is crucial that better evidence be made available on equity implications. We report the results of a three-country study on the equity of health-system financing and service use.

## Methods

### Countries assessed

We selected Ghana, South Africa, and Tanzania because they are all considering how best to develop their health systems towards universal coverage, and they represent systems at different stages of development (panel 2). Ghana began implementing a national health insurance scheme in 2004, with elements covering both the formal and informal sectors. South Africa has just released a Green Paper on introducing a national health-insurance scheme.<sup>4</sup> Tanzania in recent decades has introduced

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various health-insurance arrangements, which it plans to expand. All three countries have highly fragmented health systems with substantial private involvement, so in place of the traditional public-sector focus alone, we undertook a whole-system analysis. Furthermore, to make our analyses more useful for policy purposes, we explored the factors affecting financing and benefit incidence.

### Procedures

We derived the data for analysing progressivity of health-care financing and catastrophic health-care payments from the most recent national household survey in each country that had appropriate data (appendix). Each dataset contains information that can be used to estimate the various forms of tax payments, health-insurance contributions, and out-of-pocket payments. Since household surveys probably underestimate these payments (eg, because of under-reporting of income in surveys), we triangulated the revenues estimated from the surveys with actual revenue estimates wherever possible. For example, we obtained information on actual revenue from personal income tax, corporate income tax, VAT, and other taxes from tax authorities in each country, and we apportioned any difference between actual revenue and that estimated from the survey to households on the basis of their estimated proportional share of contributions to each tax. We used a similar approach for health-insurance contributions. The triangulation process does not affect the distribution across socioeconomic groups within a particular financing mechanism; it simply ensures that when distributions across different financing mechanisms are combined, the weighting of each financing mechanism relates to the actual share of total health-care financing of this mechanism.

The only tax for which we could not accurately establish incidence was corporate income tax, owing to the potential for shifting this tax between shareholders and households. For example, if there is little competition for a company's product, the company can set its price and thereby ensure that consumers bear the burden of the corporate tax. By contrast, if there is strong competition, it is difficult to affect prices and more probable that shareholders will bear the burden of corporate tax. For illustrative purposes, we assume an equal distribution for the data we report; alternative distributions did not change our overall findings.

We used household per adult equivalent consumption expenditure as the measure of socioeconomic status. We compared financing concentration curves with the Lorenz curve of household consumption expenditure.<sup>5</sup> The Lorenz curve depicts the distribution of income or consumption expenditure across households, ordered from the poorest household to the richest. If all households had an equal share of income, the Lorenz curve would lie on the 45° line (ie, 1% of households would have 1% of income etc). The financing concentration curve plots the cumulative percentage share of health-care payments for

### Panel 1: Glossary of key terms

#### Universal coverage

To "provide all people with access to needed health services (including prevention, promotion, treatment and rehabilitation) of sufficient quality to be effective" and "ensure that the use of these services does not expose the user to financial hardship"<sup>1</sup>

#### Progressive financing

A mechanism whereby groups with a higher income contribute a higher percentage of their income than do groups with a lower income (represented by a positive Kakwani Index)

#### Proportional financing

A mechanism whereby everyone contributes the same percentage of income to funding of health care, irrespective of income (represented by a Kakwani Index of zero)

#### Regressive financing

A mechanism whereby groups with a lower income contribute a higher percentage of their income than do groups with a higher income (represented by a negative Kakwani Index)

#### Pro-poor distribution of service benefits

Poorer groups receive a greater share of benefits from the use of health services than richer groups (represented by a negative concentration index)

#### Pro-rich distribution of service benefits

Richer groups receive a greater share of benefits from the use of health services than poorer groups (represented by a positive concentration index)

See Online for appendix

each household with the same ordering as for the Lorenz curve. If the concentration curve lies between the 45° line and the Lorenz curve (or above the 45° line), the percentage share of health-care payments for poorer households is greater than their percentage share of income or consumption expenditure and vice versa for richer households—ie, the financing mechanism is regressive (panel 1). Conversely, if the concentration curve lies outside the Lorenz curve, the share of health-care payments is progressive. We also assessed the relative progressivity of each health-care financing mechanism by calculating the Kakwani Index,<sup>6</sup> which compares the distribution of health-care payments (plotted on the concentration curve) with the distribution of income or consumption expenditure (plotted on the Lorenz curve). A negative Kakwani Index indicates a regressive financing mechanism and a positive index a progressive mechanism.

We calculated catastrophic spending on health care as the percentage of household consumption expenditure devoted to out-of-pocket payments on health services. Spending is judged catastrophic if it exceeds the commonly used threshold of 40% or more of non-food household expenditure.<sup>5</sup> The rationale behind this concept is that having to make this degree of out-of-pocket payment for

### Panel 2: Overview of health systems in Ghana, South Africa, and Tanzania

After independence from colonial rule, Ghana's public health system was funded by general tax revenue and external assistance, with no charges at the point of service. In the 1980s, substantial user fees were introduced in public-health facilities as part of a structural adjustment programme. These fees (called cash and carry in Ghana) posed a major barrier to health-service access and the introduction of a national health-insurance scheme (NHIS) in 2004 was seen as a way of providing financial protection for Ghanaians. The NHIS covers people in the formal and informal sectors for a comprehensive range of outpatient and inpatient services at accredited public and private facilities. NHIS coverage was estimated to be about 60% of the population by 2009, although coverage is subject to some debate. Whereas formal-sector contributions are transferred from social security payroll deductions, people in the informal sector have to pay their district mutual health-insurance scheme between US\$5 and \$35\* per person per year in accordance with their socioeconomic status. A 2.5% value-added tax (VAT) levy is dedicated to the NHIS and accounts for the largest share of NHIS funding. The National Health Insurance Act requires all Ghanaians to join the NHIS. Formal-sector workers automatically contribute to the NHIS through payroll deductions and benefit from it once they register and secure a membership card, but membership is effectively voluntary for people in the informal sector, since payment of their contributions cannot be enforced—ie, not all of the informal sector belong to the NHIS, and thus neither contribute to nor benefit from NHIS services. Ghana is at present considering introducing a one-time payment to replace the present annual premiums for those outside the formal sector. This payment could effectively imply tax funding for national health-insurance coverage for this group. Ghana has a per-person gross domestic product (GDP) of \$1511, and total health-care expenditure is 7.8% of GDP.

South Africa has a long history of private insurance covering mainly higher-income formal-sector employees. Enrolment is voluntary (although it is often a condition of employment) and on an individual basis. The premiums paid vary widely (about \$480–6800 per year†) depending on the benefit option chosen and the number of dependants enrolled. Each private insurance scheme is required to cover a prescribed minimum benefit package, which includes certain chronic diseases and inpatient services. Although private insurance accounts for 44% of total health-care financing in South Africa, it covers only 16% of the population. The rest of the population is dependent largely on

tax-funded public-sector services, particularly for specialist and inpatient care. Although there are no user fees at primary care facilities, there are income-related graduated fees at public hospitals, with some provision for exemption of poor people. Out-of-pocket payments are a small share of total health-care funding (13%), and most is in the form of co-payments by people with private insurance cover. The South African Department of Health has recently released a Green Paper to introduce a national health insurance, which aims at achieving universal coverage. The Department of Health proposes a publicly funded system, which will purchase a comprehensive package of services from accredited public and private providers for all citizens. South Africa has a per-person GDP of \$10 291, and total health-care expenditure is 8.3% of GDP.

Tanzania has a similar history to that of Ghana, with free publicly funded health services after independence and the introduction of user fees in the 1980s, although on a more limited scale than in Ghana. In the past decade, Tanzania has introduced mandatory health-insurance schemes for formal-sector employees, offering comprehensive health-care benefits to their members, the largest being the National Health Insurance Fund covering civil servants. The National Social Security Fund (for private formal-sector employees) has also introduced a Social Health Insurance Benefit. There is a voluntary insurance scheme, the Community Health Fund (CHF), for rural dwellers, with premiums of between \$4.2 and \$12.7‡ per household per year, offering public primary care to the informal sector. A similar scheme was introduced recently for urban dwellers, termed Tiba kwa Kadi (TIKA).§ Combined, these insurance schemes covered about 10% of the population at the time of our study. In view of the low level of coverage by insurance schemes, out-of-pocket payments remain a major share of health-care funding in Tanzania. Substantial attention is now being paid to expanding insurance coverage of the informal sector through the CHF and TIKA. Furthermore, management of the operation of CHF and TIKA has been assigned to the National Health Insurance Fund, which could open the way for greater integration across insurance schemes. Tanzania has a per-person GDP of \$1358, and total health-care expenditure is 5.1% of GDP.

\*The interbank exchange rate at the time (September, 2008) was GH¢1.40 to US\$1.00.

†This figure is at the relevant exchange rate of R7.5 to US\$1.0. ‡The exchange rate at the time of our study was 1178 Tanzanian shillings to US\$1. There is a uniform premium within a district, but premium levels vary across districts. §The TIKA was only introduced shortly before our study; hence, our focus is on the CHF.

health care will probably mean that households have to sacrifice spending on other basic needs and they might need to go into debt or sell productive assets, jeopardising household livelihoods. We also calculated the number of individuals who were impoverished by out-of-pocket health-care payments (ie, whose household consumption expenditure after making these payments fell below the absolute poverty line of \$1.25 per person per day, in 2005 purchasing power parity terms).

We derived data on the distribution of health service benefits from household surveys that we did in 2008 (appendix), since available national household surveys did not allow calculation of rates of service utilisation. We calculated utilisation rates for each category of health service, in both the public and private health sectors, and multiplied by the unit cost of that service to estimate monetary benefits. We plotted concentration curves of the distribution of service benefits;<sup>5</sup> these curves

plot the cumulative percentage share of benefits from the poorest to the richest household. If poorer households receive a greater share of health-care benefits than their population share (eg, if the poorest 5% of households receive more than 5% of benefits), the concentration curve lies above the 45° line and is judged pro-poor (panel 1). Conversely, a pro-rich distribution is shown by a concentration curve lying below the 45° line.

We collected qualitative data, to inform the interpretation of the quantitative analyses, through focus-group discussions and in-depth interviews (appendix). We did thematic analysis of qualitative data with a framework of core access dimensions: availability, affordability, and acceptability.<sup>7</sup> We received ethical approval from ethics committees in the three study countries and from the London School of Hygiene and Tropical Medicine (London, UK).

### Limitations

There are always some limitations associated with the use of household survey data. The secondary household surveys we used (for the financing incidence analysis) are nationally representative surveys with large sample sizes and their data collection methods have been improved in recent years (eg, through use of a household diary of income and expenditure). Triangulation with other data sources on total health-care financing improves the accuracy of financing incidence estimates. Our benefit-incidence analysis drew on primary household surveys we undertook; this approach was unavoidable because comprehensive service utilisation data were not available from secondary surveys. Although a national survey was feasible in South Africa (because additional funds were secured), the surveys in Ghana and Tanzania were undertaken in only six and seven districts respectively. Although we used sampling methods and survey weighting to support extrapolation to the national level, the data cannot be regarded as fully nationally representative.

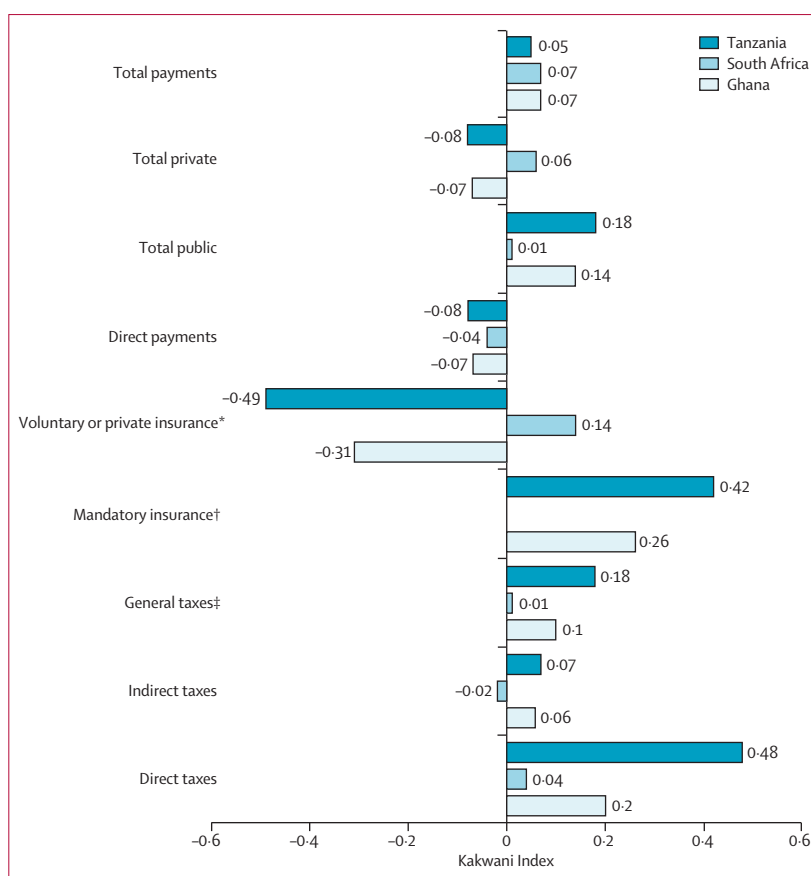
### Role of funding source

The sponsors of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. All authors reviewed the final report and approved submission. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

### Results

Direct taxes were progressive in all three countries. Indirect taxes were regressive in South Africa but progressive in Ghana and Tanzania (figure 1). Out-of-pocket payments were regressive and overall health-care financing was progressive in all three countries.

Figure 2 shows the differences between the countries in the relative progressivity of indirect taxes. All forms of indirect tax (value-added tax [VAT], fuel levies, and excise duties) were regressive in South Africa. By contrast, VAT and excise and import duties were all progressive in



**Figure 1: Kakwani Indices for financing sources in Ghana, South Africa, and Tanzania**

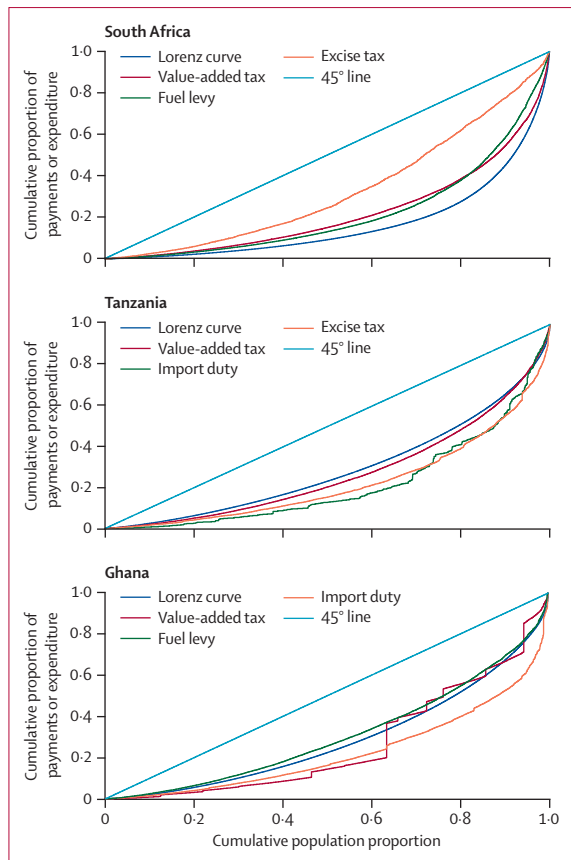
A negative index shows a regressive financing mechanism and a positive index a progressive mechanism.

\*Contributions by the informal sector in Ghana (although legislation requires all Ghanaians to join the national health insurance scheme, membership is effectively voluntary for people outside the formal sector); contributions to private health-insurance schemes in South Africa; and contributions to the Community Health Fund and related schemes in Tanzania. †Mandatory insurance in Ghana includes only the contributions by formal-sector employees. ‡General taxes refer to the combination of direct and indirect taxes.

Tanzania, although VAT was only marginally progressive. In Ghana, although VAT and import duties were progressive, fuel levies were regressive.

Figure 3 shows the concentration curves for premium contributions by those outside the formal sector to the national health-insurance scheme in Ghana and to the community health fund in Tanzania. These payments are regressive in both countries, more so in Tanzania than in Ghana. This finding contrasts with the progressivity of mandatory contributions by formal-sector workers in these two countries (figure 1) and private voluntary insurance contributions in South Africa (figure 4).

The proportion of the population incurring catastrophic expenditure due to health care was 2.43% in Ghana, 1.52% in Tanzania, and 0.09% in South Africa (appendix). For both Ghana and Tanzania (but not South Africa), the weighted index, which accounts for whether a greater number of poorer households than richer households make catastrophic payments, exceeded the unweighted index, which suggests that the burden of

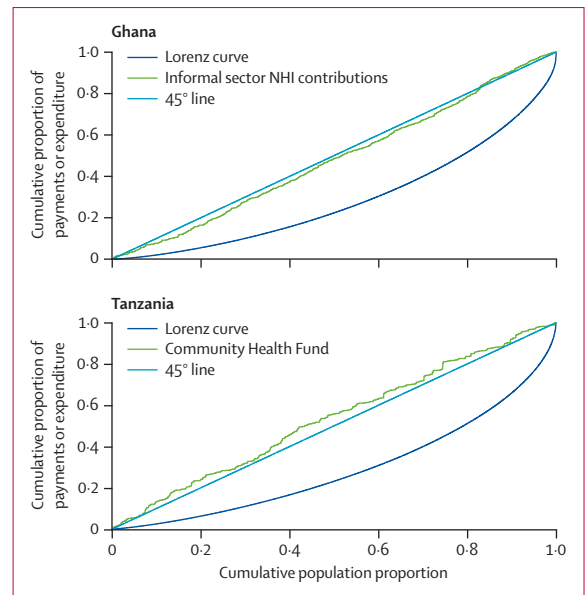


**Figure 2: Lorenz and concentration curves of indirect taxes in Ghana, South Africa, and Tanzania**  
 If the concentration curve lies between the 45° line and the Lorenz curve (or above the 45° line) the financing mechanism is regressive; if it lies outside the Lorenz curve it is progressive.

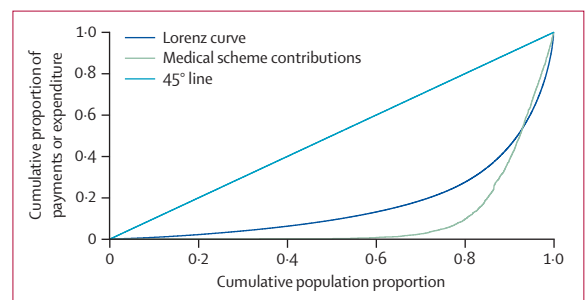
catastrophic payments affected poorer households more. 350 000 people (1.59% of the population) in Ghana, 215 000 (0.045% of the population) in South Africa, and 137 000 (0.37% of the population) in Tanzania were pushed into poverty by these payments. The appendix shows that the size of the problem of out-of-pocket payments was greatest in Ghana, then Tanzania, with South Africa having the greatest degree of financial protection.

Figure 5 shows that overall health-service benefits favoured the rich in all three countries, with services being most pro-rich in South Africa and only marginally so in Tanzania. Although public-sector and faith-based organisations' health-service benefits in Tanzania were evenly distributed across the population, those from private for-profit services were strongly pro-rich. In Ghana and South Africa, benefits from public-sector services were pro-rich and from the private sector even more so.

Panel 3 provides an overview of the key access issues that constrained the use of health services, and hence affected the extent to which different groups were able to



**Figure 3: Lorenz and concentration curves of insurance contributions by people outside the formal sector in Ghana and Tanzania**  
 NHI=national health insurance.



**Figure 4: Lorenz and concentration curves of private insurance contributions in South Africa**

benefit from health services. It highlights problems in relation to the availability, affordability, and acceptability of services.

### Discussion

Despite very different arrangements for health-care financing in the three countries (panel 2), we consistently identified that financing was progressive in all three, although there were wide variations in the relative progressivity of different funding sources across countries. Although the finding that total health-care financing was progressive is perhaps not unexpected, since richer groups might be more able to contribute to the cost of their health care, we note that all public sources of finance were progressive in all three countries (with the sole exception of indirect taxes in South Africa), by contrast with a common perception that public financing sources can be regressive because richer groups are better able to avoid paying tax.

There are no similar data for other African countries, but data for Organisation for Economic Co-operation and



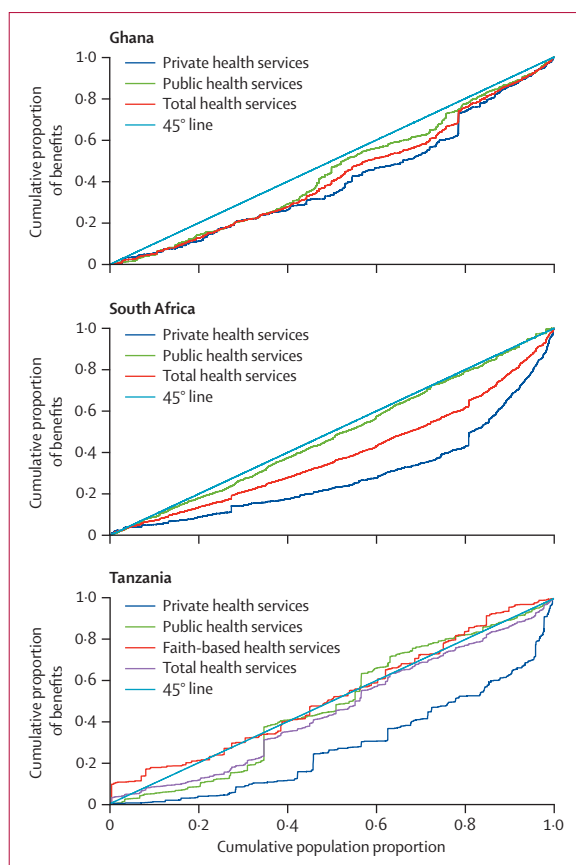


Figure 5: Concentration curves of health-service benefits in Ghana, South Africa, and Tanzania

Development (OECD) countries and for a set of Asian countries are available from two studies<sup>8,9</sup> and are summarised in the appendix so they can be compared with our findings. The South African picture of regressive indirect taxes was more in accordance with that of OECD countries and some middle-income and high-income countries in Asia; the Ghanaian and Tanzanian pattern of progressive indirect taxes accorded more with that of low-income and middle-income countries in Asia. As economies grow, lower socioeconomic groups become able to purchase a wider range of goods and services on which indirect taxes are levied, leading to these taxes becoming regressive. However, for low-income countries that have not yet reached this point, indirect taxes can be a source of non-regressive financing for health care (as is the case in Ghana with the national health-insurance levy, which is part of VAT), as well as contributing substantially to the total tax base. Clearly, it is the case with all tax funding that its allocation to the health sector is subject to political decision making.

Out-of-pocket payments are consistently regressive in OECD countries, but progressive in several Asian countries since poorer groups cannot afford to use services. Out-of-pocket payments were regressive in all three

### Panel 3: Key findings of qualitative research

#### Availability constraints

- Long distances to health facilities and poor public transport, especially in rural areas
- Frequent unavailability of drugs in public facilities
- Lack of diagnostic equipment in public facilities
- Insufficient skilled staff, especially doctors
- Poor availability of services at primary care facilities, leading to high referral rates with attendant distance and transport problems

#### Affordability constraints

- Affected by availability problems (eg, high transport costs to get to facilities, need to purchase drugs from private pharmacies, or informal drug sellers)
- Inability to pay the insurance premiums, which would reduce out-of-pocket payments
- Lack of awareness of entitlement to user-fee exemptions or subsidised membership of insurance scheme
- In a medical emergency, households might have to borrow or sell assets:  
"I went for six bags of maize and when I went to replace them after the harvest...he [the person from whom the speaker borrowed] said I should add three bags of maize. So I ended up returning nine bags of maize. At the time I borrowed from him, a bag cost US\$9, when he came for the nine bags each maize bag costs \$18. His profit was more than \$71." (Focus group discussion, rural region, Ghana)

#### Acceptability constraints

- Lack of patients' confidence in the expertise of health staff
- Poor attitudes of staff discourage use of facilities:  
"[I stopped going to antenatal care because] the nurse that was helping us had an attitude, when we asked her something she treated us like children or comics. She was so impatient with us...shouting all the time." (In-depth interview, urban region, South Africa)

African countries we included, most notably in Tanzania and Ghana where out-of-pocket payments are still a large share of total health-care expenditure. Levels of catastrophic spending are so much greater in Ghana than the other two countries because of the long history of high user fees at public-sector facilities. Ghana has the distinction of being the African country that generated the highest levels of user-fee revenue, equivalent to 15% of total government recurrent expenditure in the 1980s.<sup>10</sup> People who are not yet covered by the national health insurance continue to bear the consequences of these high user fees. In South Africa, most out-of-pocket payments are made as co-payments by people covered by private insurance. Although these are richer groups, the payments can nonetheless be catastrophic and should not be ignored. Although all countries have mechanisms for exempting vulnerable groups from user fees at public facilities, our primary household survey data (appendix) suggest that

some of those eligible for exemptions did not receive them (11% in Tanzania and about a quarter in Ghana and South Africa). A key contributory factor was lack of awareness by patients of their entitlements (panel 3).

The burden of out-of-pocket payments has encouraged African countries to introduce and expand health-insurance coverage through various types of schemes. Mandatory insurance contributions by the formal sector in Ghana and Tanzania, and private insurance in South Africa, were progressive because the schemes are targeted at workers in the formal sector—the less poor. However, in South Africa, not all formal-sector workers belong to private insurance, and more importantly, flat contributions are charged—so although private insurance contributions are progressive if assessed over the entire population, they are regressive when assessed across only private insurance members.

Voluntary, community-based health insurance is being widely promoted as an important means to financial protection.<sup>11</sup> However, contributions to community health insurance by people outside the formal sector are regressive in both Ghana and Tanzania. This finding is not unexpected since contributions are generally made as

flat amounts and many members of such schemes are from poorer groups. In Ghana, contributions are supposed to be related to income, but in reality variations in household income cannot be distinguished. Both countries have policies to exempt poor people from paying a premium but face difficulties in identifying them.

The overall distribution of benefits in all three countries favoured richer people, although the burden of illness was greater for lower-income groups.<sup>12–14</sup> It was clear that access to needed, appropriate services was the biggest problem in terms of universal coverage in the three African countries. The even distribution of benefits in Tanzania was a result of the even distribution of both public-sector service and faith-based organisations' benefits and restricted service provision by the private for-profit sector. In Ghana and South Africa, public services favoured richer people and hence accentuated the expected pro-rich orientation of private for-profit services.

Key factors affecting this picture of benefit incidence, all of which affected poorer groups more severely, were affordability constraints to accessing public services, particularly the costs of health care and transport to facilities; service availability problems such as drugs frequently being out of stock, limited or no diagnostic equipment, and insufficient skilled staff; and service acceptability challenges such as poor staff attitudes and lack of confidence in the skills of health workers (panel 3).

A unique feature of our study is that we undertook a system-wide assessment of financing and benefit incidence in both the public and private sectors (panel 4). Whereas most financing incidence studies cover all funding sources, whether public or private, benefit incidence studies have traditionally focused only on the benefits from the use of public-sector services. If we had solely assessed the public sector, inequities in the distribution of benefits from service use would have seemed small. Our inclusion of private-sector services, especially those provided by the for-profit sector, shows much wider disparities in the distribution of health-service benefits.

In the context of restricted human resources in low-income and middle-income countries and the drive towards universal coverage, health services provided by both the public and private sectors are of relevance. To inform changes relating to how health-care funds are generated and pooled as well as how services are purchased, all elements of the existing health system should be considered in the context of principles underpinning universal coverage (ie, payment according to ability to pay and service benefit according to need).

Our system-wide analysis highlights that, although there certainly could be changes in financing mechanisms to reduce catastrophic spending and promote more progressive financing, one of the greatest challenges in all three countries is to change the distribution of health-service benefits through addressing pervasive access

#### Panel 4: Research in context

##### Systematic review

We searched for relevant studies, from 1990 onwards, in PubMed, EbscoHost, Science Direct, Science Citation Index, and Social Science Citation Index (ISI Web of Science). We also searched key websites, including those of WHO and the World Bank. Our search terms were “financing incidence”, “benefit incidence”, “catastrophic payments”, “health financing equity”, and “health service equity”. Our searches were restricted to reports in English. We assessed the quality of the evidence by critically reviewing the methods used in each study relative to the internationally established methods for financing incidence analyses, benefit incidence analyses, and analyses of catastrophic health-care expenditure.<sup>5</sup>

##### Interpretation

Our study adds to the existing evidence because we used internationally accepted methods to produce previously unavailable information of this nature from African countries. We compared our results with the financing incidence findings from all other studies with comparable methods, which have been done in OECD and Asian countries (appendix). This approach allowed us to draw firmer conclusions on the relative progressivity of different financing mechanisms. The only instance in which this comparison was not possible was voluntary health insurance for people outside the formal employment sector. Since we report our findings separately for the public and private sectors, in addition to overall benefit incidence for the two sectors combined, our public benefit incidence results can be compared with earlier studies of this nature. Similarly, our findings on catastrophic payments are comparable to studies in other countries.

constraints. Although there is international consensus that progressive health-care financing mechanisms (based on the principle of social solidarity that is core to the notion of universal health systems) are preferable, the progressivity that is achievable within a particular country depends on the context and the degree of cross-subsidies that society will tolerate.

As countries plan their paths to universal coverage, they need to understand the equity of existing arrangements. Although some attention has been paid to the equity of public-service use, much less attention has been given to the equity of different ways of financing services. We add crucial information to the universal coverage debate, in four main ways.

First, we have made such data available for African countries. Second, we provide analysis of the financing incidence of voluntary schemes covering those outside the formal employment sector. Our finding that this type of insurance is regressive raises concerns over it being recommended as the first step on a path to universal coverage. By contrast, there are other financing mechanisms for covering the informal sector that are not regressive, notably VAT payments in Tanzania and Ghana, and direct taxes. What is the most equitable and efficient way of providing financial protection for those outside the formal sector is one of the most important issues facing low-income countries.<sup>15</sup>

Third, we show the importance of ensuring physical and financial access to services if universal coverage is to be a reality. Finally, our analysis of South Africa shows the importance of encouraging income and risk cross-subsidies between different population groups. Those with private insurance form a separate pool, which is then not available to cross-subsidise poorer population groups. Although many countries have private insurance schemes for those who can afford additional cover, it is generally a very small share of overall health-care funding. South Africa has the largest share in the world of total health-care expenditure funded through private insurance (44%),<sup>16</sup> yet only 16% of the population benefit from these resources.<sup>17</sup> Countries need to beware of segmenting their population by health-financing arrangements.<sup>1</sup> Once embedded in a health system, such segmentation can be very difficult to remove, as is the case in South Africa.

Future research in these three countries should test developing policies against whether they will improve the equity of financing arrangements and service use, and continue to monitor equity since health systems are dynamic and the incidence of financing and service benefits will change over time. Beyond these countries, similar analyses should be done in other countries in sub-Saharan Africa, both to inform policies in those countries and to build a clearer picture of the equity of health-system arrangements across the continent, and to be able to begin to explore relations between particular health-system arrangements and their equity implications.

#### Contributors

AM and DM developed the concept for and coordinated the overall project, and developed, drafted, and finalised the report. DM also supported the South African and Ghanaian teams in data compilation and analysis. All others contributed to reviewing and finalising the report as well as additional contributions: JA undertook the financing incidence analyses in Ghana; JEA undertook the financing and benefit incidence analyses in South Africa; JB and FM supported all the analyses in Tanzania; BG and SM undertook the benefit incidence analyses in Ghana and Tanzania, respectively; GM undertook the financing incidence analyses in Tanzania; BG, BH, and JM undertook analyses on the factors affecting incidence patterns in Ghana, South Africa, and Tanzania, respectively.

#### Conflicts of interest

We declare that we have no conflicts of interest.

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