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How to do (or not to do) . . . a health financing incidence analysis

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Abstract

Financing incidence analysis (FIA) assesses how the burden of health financing is distributed in relation to household ability to pay (ATP). In a progressive financing system, poorer households contribute a smaller proportion of their ATP to finance health services compared to richer households. A system is regressive when the poor contribute proportionately more. Equitable health financing is often associated with progressivity. To conduct a comprehensive FIA, detailed household survey data containing reliable information on both a cardinal measure of household ATP and variables for extracting contributions to health services via taxes, health insurance and out-of-pocket (OOP) payments are required. Further, data on health financing mix are needed to assess overall FIA. Two major approaches to conducting FIA described in this article include the structural progressivity approach that assesses how the share of ATP (e.g. income) spent on health services varies by quantiles, and the effective progressivity approach that uses indices of progressivity such as the Kakwani index. This article provides some detailed practical steps for analysts to conduct FIA. This includes the data requirements, data sources, how to extract or estimate health payments from survey data and the methods for assessing FIA. It also discusses data deficiencies that are common in many low- and middle-income countries (LMICs). The results of FIA are useful in designing policies to achieve an equitable health system.

Keywords: Financing incidence analysis, progressivity, regressivity, health financing, ability-to-pay, methodology

Key Messages

- Financing incidence analysis (FIA) requires the availability of comprehensive household survey data that contain information on a cardinal measure of ability to pay (ATP) such as income or expenditure and relevant variables to extract or estimate household contributions via various health financing mechanisms
- Progressive health financing is usually preferred to regressive health financing because it places less burden on poorer households relative to richer households. Researchers should be cautious however as progressive health financing can sometimes result from unfair treatment of the poor.

Introduction

Fairness in a country's health financing system is a key dimension to assess a health system's performance (World Health Organization, 2000). In fact, it has been noted that equity or fairness in health financing, where households contribute to the health system according to their ability to pay (ATP), should form an important health system goal to promote universal health coverage (UHC) (Kutzin, 2013). Financing incidence analysis (FIA) is a way to assess how equitable a health financing system is. In general, an equitable health system requires *inter alia* equity in health care financing and utilization, defined respectively as payment for health services according to ATP and the receipt of health service benefits according to need (Mills *et al.* 2012).

This article, which focuses on FIA complements an earlier article in this series which explains how to do (or not to do) a benefit incidence analysis (BIA) (McIntyre and Ataguba 2011). It is written to provide an introductory and detailed guide to FIA that will be accessible to different groups including researchers, data analysts and practitioners.

The rest of the article is structured as follows. The next section provides an overview of FIA. This is followed by an introduction to the different ways of assessing FIA. Thereafter, a detailed overview of how to conduct an empirical assessment of FIA is presented including worked examples. The last section provides a brief discussion of issues including the strengths and weaknesses of the approach.

What is FIA?

FIA is an analytical method used for comprehensively evaluating equity in health financing including the equity impact of UHC reforms relating to the health financing system. Some authors refer to FIA as progressivity analysis or just the analysis of equity in health care financing. FIA assesses the distribution of the 'burden' of health financing in a population stratified by household ATP and sometimes the extent to which this burden affects the underlying distribution of ATP (Wagstaff and van Doorslaer 1993, 1997). Such assessments could also be conducted over time to assess progress towards a more equitable health financing system (Ataguba, 2016). Essentially, FIA assesses who pays for health care and how payments are distributed according to socioeconomic status or a measure of ATP. Results from FIA indicate vertical equity when households or groups with different ATP contribute appropriately different amounts for health care (Culyer and Wagstaff 1993; Wagstaff and van Doorslaer 2000; Cissé *et al.* 2007). Unfortunately, there is no predetermined extent of differential treatments that analysts can describe as vertically equitable (Mooney, 1996) as this is an issue of normative judgement and such decisions will be different for different societies.

A progressive health-care payment occurs when such payment as a proportion of ATP is an increasing function of ATP (i.e. when the rich contribute a relatively higher proportion of their ATP in financing health services than the poor). Regressive health-care payments are the opposite of progressive payments and they are normally regarded as inequitable (Wagstaff, 2002) and unfair. Stated differently, FIA is based on assessing deviations from proportionality, a case where every household pays the same share of ATP towards health financing (Kakwani, 1977).

Because of the centrality of FIA for health sector reforms, there is an increasing demand for FIA among researchers, health managers and practitioners in many low- and middle-income countries

(LMICs) (Asante *et al.* 2016). A complementary analysis, BIA, is also used to assess the pro-poorness of the health-care delivery system and the extent to which those that need health services are benefiting according to need (McIntyre and Ataguba 2011; Wagstaff, 2012). Together, these analyses (FIA and BIA), which have been combined in recent research (Akazili *et al.* 2012; Ataguba and McIntyre 2012; Mtei *et al.* 2012; Kwesiga *et al.* 2015; Asante *et al.* 2017), provide an overall picture of how the health financing system of a country is performing on equity grounds and progressing towards UHC. For a holistic picture of equity, practitioners are encouraged to assess both distributions.

Different ways to assessing FIA

Countries vary in their health-care financing mixes. FIA can be conducted for individual health-care financing mechanisms and/or on the entire health financing system, comprising all the health-care financing mechanisms. Conceptual basis and empirical methods for FIA originate mainly within the economics discipline. We discuss the methods in turn with emphasis on the widely used approaches.

Structural progressivity

This is the simplest and perhaps one of the earliest ways to crudely assess progressivity. It makes no reference to the distribution of ATP (Khetan and Poddar 1976; Schueler and Terry 1983). Empirically, for health services, it has been assessed by looking at how payments for health care as a share of ATP vary by quantiles of ATP (Ugá and Santos 2007; Prakongsai *et al.* 2009; Akazili *et al.* 2011; Mills *et al.* 2012). An example of structural progressivity is illustrated in Figure 2. First, households are categorized into quantiles of ATP (e.g. tertiles, quartiles, quintiles, deciles, etc.) to assess progressivity. The share of ATP that each quantile spent on health care via each mechanism (for instance general tax, out-of-pocket (OOP) payments, social insurance contribution, etc.) is computed. Next, an examination of how the ratios or average payment shares (i.e. the analogue of average tax rate) vary across quantiles is used to assess progressivity. If the ratios are increasing with the quantiles of ATP, that health-care financing mechanism is considered progressive. It is regressive if the reverse is the case. If the ratios remain constant for all quantiles, health-care financing is considered as proportional. While the assessment of structural progressivity has an appeal, it has some limitations especially as it has been applied in health financing. For example, if quantiles are used, progressivity is not sensitive to variations that may occur close to the cut-off points for each quantile. Also, it does not show a holistic picture of how health-care payment to ATP ratio varies across the entire distribution of ATP. More importantly for policy, the exact extent of progressivity may not be obtained simply by looking at these ratios. In fact, in some situations it could be difficult to distinguish which mechanism is more progressive or less regressive than the other. Although it is not used in empirical assessment of progressivity in health financing, some degree of progressivity may be obtained using the structural progressivity approach. This is simply the slope coefficient of the curve that plots the relationship between each household's average payment share and ATP where households are ranked by increasing ATP (Schueler and Terry 1983).

Effective progressivity

The pioneering effort in defining effective progressivity in the broader economics literature is traced to the work of Musgrave and Thin (1948). Subsequently, several indices have been proposed to

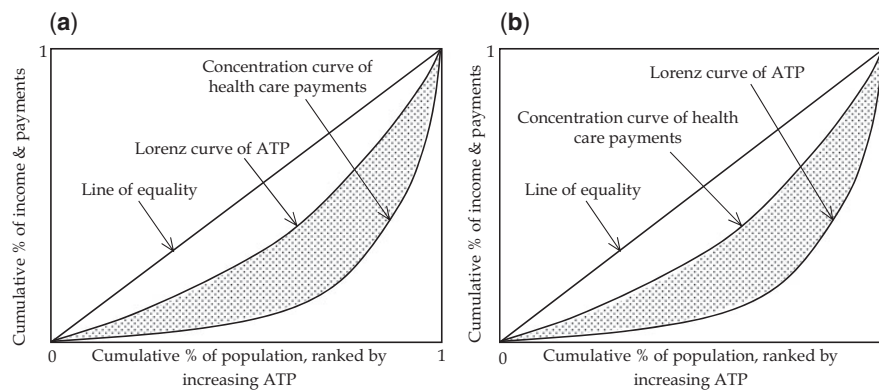


Figure 1. An illustration of a progressive and regressive health financing.

Note: ATP = Ability to pay.

Source: Authors' illustration

Table 1. A summary of the selected indices for assessing equity in health financing

Index type	Description
The Gini index	<p>This is obtained from the Lorenz curve that plots the cumulative percentage of ATP (e.g. income) against the cumulative percentage of the population, usually ranked by ATP. The Gini index corresponds to the ratio of the area between the line of equality (i.e. the 45° line) and the Lorenz curve of ATP to the area between the line of equality and the line of perfect inequality.</p> <p>The Gini index ranges from 0 (a case of perfect equality in the distribution of ATP) to +1 (a case of perfect inequality in the distribution of ATP).</p> <p>The closer the value of the Gini index is to +1, the less unequal is the distribution of ATP while the closer the Gini index is to 0, the more equal is the distribution of ATP.</p>
The concentration index	<p>This is obtained from the concentration curve that plots the cumulative percentage of health-care payments (e.g. private health insurance) against the cumulative percentage of the population, ranked by ATP (see Figure 1). The concentration index corresponds to twice the area between the line of equality (i.e. the 45° line) and the concentration curve of health-care payments.</p> <p>The concentration index ranges from -1.0 (a situation where the poorest household contributes all health-care payments) to +1.0 (where all health-care payments are made by the richest household).</p> <p>A negative concentration index means that the concentration curve of health-care payments lies above the line of equality while a positive value means that the concentration curve lies below the line of equality.</p> <p>A convenient Stata ado-file (-conindex-) can be used to estimate this index (O'Donnell <i>et al.</i> 2016).</p>
The Kakwani index	<p>For any health-care financing mechanism j, the Kakwani index of progressivity (π_j) is obtained as the difference between the concentration index of health-care payments (C_j) and the Gini index of ATP inequality (G). That is, $\pi_j = C_j - G$. The Kakwani index corresponds to twice the area between the Lorenz curve of ATP and the concentration curve of health-care payments.</p> <p>Its values lie between -2 (the most regressive financing) and +1 (the most progressive financing). Theoretically, the case of proportional financing corresponds to $\pi_j = 0$.</p> <p>A positive value ($\pi_j > 0$) means that the health financing mechanism j is progressive as richer households contribute proportionately more than their share of ATP. A negative value ($\pi_j < 0$) implies that the health financing mechanism is regressive as the proportion of health-care payments contributed by poorer households is greater than their share of ATP.</p>

assess progressivity mainly within the context of taxes (see e.g. Kakwani, 1977; Suits, 1977; Slesnick, 1986). These indices are often referred to as measures of effective progressivity as opposed to structural progressivity.

The most popular of these indices that will be considered in this article is the Kakwani index (Kakwani, 1977). This index is based on two underlying curves—the Lorenz curve of ATP distribution and the concentration curve of health-care payments (see Figure 1). A progressive health financing mechanism or system, as shown in Figure 1a occurs when the Lorenz curve of pre-payment ATP lies above the concentration curve of health-care payments and the extent of progressivity, that is the Kakwani index is defined as two times the shaded area. The relationship shown in Figure 1b is regressive. Proportional financing where the Kakwani index is theoretically zero corresponds to a situation where the two curves lie on each other. In some cases,

the Kakwani index may be zero when the two curves cross each other.

In an empirical analysis, the Kakwani index is computed from the Gini index and the concentration index that are associated with the Lorenz curve and the concentration curve, respectively (Kakwani, 1977; Kakwani *et al.* 1997) (see Table 1).

The Kakwani index is a summary measure. As such, it is sometimes complemented with statistical dominance tests using statistical software to ascertain whether progressivity or regressivity is consistent along the entire distribution of ATP (i.e. whether the Lorenz and concentration curves cross) and/or which financing mechanism is more progressive or less regressive than the other (i.e. whether concentration indices do not cross) (Bishop *et al.* 1994; Davidson and Duclos 1997). Dominance tests can also be performed to assess progressivity over time (Ataguba, 2016). Many empirical analyses

have used the multiple comparison approach (MCA)¹ for the dominance tests (O'Donnell *et al.* 2008b).

Computing the Gini, concentration and Kakwani indices

The Gini and concentration indices ($I_{G,C}$), hence the Kakwani index, can be computed using various formulas. One of the simplest ways to compute the Gini or concentration index is using the 'convenient covariance' formulation (i.e. in terms of the covariance between the relevant variable and the rank of pre-payment ATP) (Kakwani, 1980; Lerman and Yitzhaki 1989). This is shown as:

$$I_{G,C} = 2 \times \text{cov}(y, r) / \mu_y$$

where y is either pre-payment ATP (for the Gini index) or health-care payments (for the concentration index), r is the rank of ATP and μ_y is the mean of y . Another common approach used to compute $I_{G,C}$ is the convenient regression approach (Kakwani *et al.* 1997). A collection of Stata commands to compute $I_{G,C}$ and the Kakwani index can be found in O'Donnell *et al.* (2008b). Also, these indices can be estimated using the World Bank ADePT software (www.worldbank.org/adept). Due to space limitation, we did not provide all the methods for computing these indices but refer readers to Duclos and Araar (2006) and O'Donnell *et al.* (2008b) for a detailed exposition of these methods. A user-friendly Stata ado-file (-Fia-), which produces results for structural progressivity and the Kakwani index, has been written. This can be made available upon request.

Empirical assessment of FIA

Some empirical analyses have been conducted using the structural progressivity approach (Ugá and Santos 2007; Akazili *et al.* 2011; Mills *et al.* 2012) and the effective progressivity approach (via the Kakwani index) (Wagstaff and van Doorslaer 1997; Wagstaff *et al.* 1999). Some authors present results using both approaches (see Asante *et al.* 2016). Detailed steps and procedures for assessing FIA are presented in Table 2. The table also provides a summary of the data requirements and issues that analysts need to take note of when conducting FIA.

Three key issues that emerge from Table 2 that need further explanation include (i) the process of extracting or estimating the various health-care payment variables including the assumptions about who bears the final burden of such payments (Table 3 contains details of the various assumptions that researchers have used to extract health payments from household surveys), (ii) the different measures of household ATP for FIA (see Box 1) and (iii) the computation of per capita or per adult equivalent health-care payments and ATP (e.g. income or expenditure) (see Box 2).

In what follows, examples of structural and effective progressivity are presented using South Africa as the case study.

Assessing progressivity of health financing in South Africa

South Africa, a sub-Saharan African country with reliable data sources, finances health services via three broad mechanisms—general taxes (~38% of total health finances), private health insurance (~50%) and OOP payments (~12%) (Ataguba and McIntyre 2018).

Data sourcing, cleaning and extraction

The nationally representative Income and Expenditure Survey dataset for 2011/12 was used to extract household contributions to

taxes, OOP payments and private health insurance (Ataguba and McIntyre 2018). Because not all tax revenue is allocated to the health sector, only about 11% of total tax extracted was considered for analysis (see Table 2). ATP was measured using per adult equivalent consumption expenditure. In terms of the final burden of each financing mechanism, direct taxes are borne by the legal tax payer, indirect taxes by consumers, private health insurance by the insured household or individual and OOP payments by the users of health services. Due to space limitation, we refer the reader to Ataguba and McIntyre (2018) for details on how contributions for each health financing mechanism were extracted for each household.

Estimating the progressivity of each health financing mechanism

Structural progressivity was assessed by categorizing households into quintiles of ATP. Then, the average fraction of ATP that households in each quintile spends on each health financing mechanism was computed.

The results shown in Figure 2 indicate that OOP spending and indirect taxes are regressive. The richest quintile (i.e. the top 20% of the population in terms of ATP) pay less as a proportion of their income than the poorest 20% of the population. Direct taxes, total taxes and private health insurance are progressive because the bottom 20% of the population contributes less as a proportion of their ATP compared to the higher quintiles.

Effective progressivity was assessed using the Kakwani index of progressivity. The conclusions based on the results shown in Table 4 are similar to those shown in Figure 2. Indirect taxes and OOP payments are regressive (negative Kakwani indices) while direct taxes, total taxes and private health insurance are progressive (positive Kakwani indices). These results are also confirmed by the test of statistical dominance.

Estimating overall progressivity of health financing

Overall, health-care financing is progressive in South Africa. This is the case for both the structural and effective progressivity approaches. As shown in Figure 2, the bottom 20% of the population spends about 5% of their ATP financing health services compared to about 15% spent by the richest quintile. Also in Table 4, the Kakwani index of overall health financing in South Africa was estimated at 0.101 [i.e. $(0.38 * 0.0824) + (0.12 * (-0.0289)) + (0.50 * 0.1417) = 0.10$]. Ataguba and McIntyre (2018) exercise caution in interpreting these progressivity results since the major driver (private health insurance) covers <20% of the South African population who are mainly the rich. In fact, Ataguba and McIntyre (2018) showed that contributions to private health insurance were regressive among those that are insured.

Interpreting results for policy

Although the share of OOP payments in total health financing in South Africa is low, the regressivity of this means that there is a need to avoid increasing this burden either through increased co-payments or user fees. In South Africa, general taxes contribute significantly to total health financing and they are progressive. Thus, an increased reliance on especially direct taxes will yield a progressive total health financing, all things being equal. Recently, the South African government is in the process of reforming the health sector. Therefore, these findings will provide baseline information in terms of useful progressive mechanisms for financing their national health system.

Table 2. Detailed steps and processes involved in conducting FIA

Step 1: Data sourcing, cleaning and extraction	
Activity	<ul style="list-style-type: none"> Extract or estimate each household's total contribution to each health financing mechanism (e.g. OOP spending, direct taxes, indirect taxes, earmarked taxes, private and social health insurance contributions, etc.). Preferably, this should be expressed as annual contributions. Compute each household's income or expenditure (i.e. the household pre-payment income)—a measure of ATP. This should be gross of all health-care payments. It should also be annualized as some items like frequent purchases have a short recall period while non-frequent purchases have longer recall periods. Estimate household size (or an adult equivalent household size that accounts for the composition of the household) using the same dataset.
Requirement	<ul style="list-style-type: none"> Detailed survey data (usually nationally representative) that contain information on ATP (e.g. income or expenditure) and other relevant data for assessing health payments. Typical examples of datasets for national analysis include the Living Standards Measurement Surveys, Living Conditions Monitoring Surveys, Income and Expenditure Surveys, Household Budget Surveys, Consumer Expenditure Surveys, Survey of Household Spending and Health Expenditure & Utilization surveys. Typical sources of data include the national statistical authority, international data repositories or databanks and research institutions. Different parameter values are required for estimating adult equivalent household size depending on the adult equivalent scale that is selected. This is explained in Box 2.
Remark	<ul style="list-style-type: none"> The measure of ATP and all health-care payments should be extracted from the same dataset. They should be expressed in the same time frequency (preferably annual). In the case where health expenditures are not directly reported but are estimated (e.g. many indirect taxes), things like the structure of tax rates, tax brackets as well as any rebate or tax exemptions are necessary. This information is usually contained in government reports and published papers. Also, reliable assumptions about who bears the final burden of each payment are needed to extract them (see Table 3). In some cases, data on health payments may be limited in household surveys (Borghi et al. 2009) as these surveys were not designed primarily for health expenditure. It is important to note limitations in these data, if any, for FIA (see the discussion section). Where a household does not contribute to a specific health financing mechanism, their payment should be recorded as zero. For example, if household A did not pay OOP for health services, OOP spending for this household should be recorded as zero and not missing. This has implications for estimation in many software including Stata. In some cases (especially non-earmarked taxes), not all the contributions extracted or estimated are allocated to the health sector. Thus, only the proportion that is allocated to the health sector should be considered. For example, if only 15% of total non-earmarked tax revenue is allocated to the health sector, tax estimates need to be scaled by 15%. Where nationally representative household data are not available, it is possible for researchers to commission primary surveys for FIA (Borghi et al. 2009). However, this process can be very costly. Alternatively, analysts can lobby for relevant questions to be incorporated into already existing surveys.
Step 2: Estimating the progressivity of each health-care financing mechanism	
Activity	<ul style="list-style-type: none"> Estimate the progressivity of each health-care financing mechanism after adjusting for a measure of household size (or adult equivalent household size) either using the structural or effective progressivity approach. The structural progressivity approach involves categorizing households into quantiles (e.g. quartiles or quintiles) of pre-payment ATP. For each quantile, an estimate of health-care payment as a fraction of ATP (i.e. average payment share) is computed by applying the appropriate household weights. The effective progressivity approach (e.g. using the Kakwani index) involves applying a computer routine (e.g. -fia-) to obtain the index.
Requirement	<ul style="list-style-type: none"> Extracted or estimated contributions for all the relevant health financing mechanisms by all households. These are used to compute progressivity. Each household's estimated ATP (i.e. income or expenditure) before any health-care payment from the same nationally representative survey data. The dataset should contain relevant variables that show the detailed sample design of the dataset. This should include the primary sampling unit, the strata variable and household weight necessary to make estimates reflect national figures.
Remark	<ul style="list-style-type: none"> All health-care payments (including taxes, private or social insurance contributions, or OOP spending) estimated at the household level should be divided by a measure of household size (e.g. actual number of people in that household or an estimated adult equivalent household size). The appropriate household weight should be applied when estimating progressivity to obtain estimates that are reflective of the entire country or region of reference. In the case of structural progressivity assessments where some form of average payment rates are computed, it is necessary to adjust all relevant variables to reflect national aggregates. For example, comparing the extracted direct tax estimates with that reported by the national tax authority and adjusting the tax variable accordingly (see e.g. Borghi et al. 2009).
Step 3: Assessing overall progressivity in health-care financing	
Activity	<ul style="list-style-type: none"> <i>Structural progressivity</i>: this can be assessed in two ways: (1) adding up all the extracted health-care payment variables for each household and computing the average payment shares by quantiles or (2) adding up the average payment share of each health-care financing mechanism by quantiles. <i>Effective progressivity</i>: the additively separable property of the Kakwani index allows for the weighting of the estimated index of each mechanism by the share of that financing mechanism in total health financing. This is used to obtain overall progressivity for that country.

(continued)

Table 2 (continued)

Step 1: Data sourcing, cleaning and extraction

Requirement	<ul style="list-style-type: none"> • <i>Structural progressivity</i>: (1) estimated or extracted health-care payments for all financing mechanisms for each quantile and (2) the computed average payment shares by quantiles for each financing mechanism. • <i>Effective progressivity</i>: In addition to the Kakwani indices, the share of each health financing mechanism in total health financing is needed. Such information can be obtained from the country's National Health Accounts (NHA), published papers, the Ministry of Health or Finance or any other relevant government institution.
Remark	<ul style="list-style-type: none"> • Ideally, the health financing mix (e.g. a_1, a_2 and a_3) should be obtained from NHA data. An earlier paper in this series shows the various uses of the NHA (Price <i>et al.</i> 2016). Generally, for countries where data are available, NHA country tables can be found at http://www.who.int/health-accounts/en. Where NHA data are not available, public expenditure reviews and reports that collect information on household health care and other expenditure can be used. Even published empirical research on health financing mix can be used. • Using the Kakwani index, it is possible that the extracted financing mix accounts for less than 100% of total health financing. So, there are suggested ways to adjust overall health financing based on assumptions about how the omitted financing mechanism is distributed (O'Donnell <i>et al.</i> 2008b). For example, if the omitted financing mechanism is private health insurance and by assumption it is distributed in a similar way to personal income tax, the Kakwani index of personal income tax is assumed for private health insurance.
Step 4: Interpreting results for policy	
Activity	<ul style="list-style-type: none"> • Interpret the results to assist in policy formulation and/or implementation.
Requirement	<ul style="list-style-type: none"> • An understanding of the country's health financing challenges.
Remark	<ul style="list-style-type: none"> • Sensitivity analysis may be conducted to assess the impact of changing the health financing mix and the structure of health financing in the country. For example, what will happen to overall progressivity if the country's reliance on OOP spending drops by 20%? This can be answered using the Kakwani index because $\pi_{Total} = a_1\pi_1 + a_2\pi_2 + a_3\pi_3$ in the case where there are three financing mechanisms.

Table 3. Extracting the various health-care payment variables

Health financing mechanism	Estimation process
OOP spending	The final burden of OOP spending rests on the household that pays. Importantly, such payments include all direct payments made to a health service provider usually at the point of using such health service (Rannan-Eliya 2010). In some surveys, they are disaggregated while in others they are reported as an aggregate figure. While disaggregated OOP data may be more comprehensive (Lu <i>et al.</i> 2009), it is important to ensure that OOP spending does not include any portion reimbursed by any third party. A household's OOP financing of another household's OOP costs may not be included in the recipient's OOP spending.
Private and social health insurance contributions	Generally, the final burden of private health insurance (whether it is financed by the employer and/or employee) is, by assumption, borne by the household. The same is usually the case for social health insurance contributions on behalf of the employee.
Taxes	For taxes, except for personal income tax, the final burden may be shifted away from the entity that was initially levied. A detailed understanding of this process within each country is relevant for extracting and estimating household contributions to taxes. Generally, however, indirect taxes tend to be shifted forward onto consumers/households. The tax rates of these indirect taxes are applied to household reported expenditures to extract household tax payments. Where a tax is earmarked, it is extracted accordingly depending on the type of tax. For example, an earmarked tax on income from gambling will be extracted by applying the tax rate on reported income from gambling. In this case, the final burden rests on the gambler. One of the most challenging taxes to allocate is corporate income tax and some researchers either assume that the burden is similar to personal income tax (Wagstaff and van Doorslaer 1992) or shared between consumers and capital owners (Ataguba and McIntyre 2012). Readers interested in detailed examples of how to extract or compute the contributions through each health financing mechanism for every household can refer to the studies in Ghana (Akazili <i>et al.</i> 2011), South Africa (Ataguba and McIntyre 2012), Tanzania (Mtei <i>et al.</i> 2012) and Fiji (Asante <i>et al.</i> 2016).

Discussion

FIA remains an important analysis for countries wanting to assess how equitable its health financing system is. Such analysis is useful for assessing how each health financing mechanism deviates from proportionality and for assessing how progressive or regressive an entire health financing system is. Regressive financing is usually considered as unfair as it places a heavier burden on the poor. Although progressive health financing is preferred, such a result needs to be critically examined within the context of the health financing arrangements in a country. This includes a careful and

thorough examination of the way health funds are used to purchase health services. For example, it may be the case that OOP spending comprises the bulk of total health financing and it is estimated as a progressive financing mechanism. Such a progressive relationship may result from a case where the poor are unable to pay and use health services. It may also be primarily because the poor are exempted from paying fees. The interpretation given to either of these cases is different. If OOP spending is progressive because the poor are exempted from paying for health services and there are no other access barriers, such progressivity may be

regarded as 'fair'. This is opposed to the case where a progressive OOP spending is primarily because the poor are unable to afford and/or use health services. Also, if private voluntary health insurance constitutes a large share of total financing and it is progressive, it may not mean that the entire health financing system is equitable per se as discussed in [Ataguba and McIntyre \(2012\)](#).

Box 1: Different measures of household ATP for FIA

The measurement of ATP is a key element of FIA. There has been widespread debate about the most appropriate measure of ATP ranging from permanent income to consumption expenditure ([Buehler, 1945](#); [Wagstaff and van Doorslaer 1993](#); [Miller, 2005](#)). In general, there are a few options for estimating ATP for FIA. In developed countries, apart from a few studies that use expenditure ([Lancaster et al. 1999](#)), income is often the preferred measure. In developing countries, however, expenditure or consumption is usually the preferred measure ([Younger et al. 1999](#); [Sahn and Stifel 2003](#); [O'Donnell et al. 2008a,b](#)). The use of expenditure in many developing countries is attributed to the difficulties inherent in measuring income, 'the seasonal variability in such earnings, and the large shares of income ... from self-employment both in and outside of agriculture' ([Sahn and Stifel 2003](#), p. 464) that may not be recorded by households as income ([O'Donnell et al. 2008b](#)). The large informal sector in developing countries also contributes to the unreliability of income. Income may also be concealed to evade taxation ([Lancaster et al. 1999](#)). A more robust measure of ATP is household consumption expenditure that measures long-term welfare level rather than current income ([Blundell and Preston 1995](#)). This includes the value of non-market consumptions in addition to household frequent and non-frequent purchases. In empirical studies, it is defined as the '[f]inal use of goods and services, excluding the intermediate use of some goods and services in the production of others' ([O'Donnell et al. 2008b](#), p. 70). Thus, depending on the availability of indicators for ATP, only cardinal measures of ATP rather than ordinal measures are used for assessing progressivity or FIA.

Box 2: Computing per capita or per adult equivalent health-care payments and ATP

Per adult equivalent household size can be computed in many ways. One of the most popular ways is to define an adult equivalent scale (ES) as ([Deaton, 1997](#)):

$$ES = (A + \alpha C)^\theta$$

where A is the number of adults in the household, C is the number of children, α is a measure of the relative weight accorded to children and θ is a measure of economies of scale. If the value of α gets closer to 1, then the consumption of a child is assumed to be almost equivalent to that of an adult. If the value of θ gets closer to 1 it signifies the absence of economies of scale such that larger households, on average, do not live more cheaply than smaller households. When $\alpha = \theta = 1$, ES

becomes the total household size and this is used to estimate per capita ATP and per capita health-care payments. [Deaton and Zaidi \(2002\)](#) suggest that, for developing countries, the value of θ should be between 0.75 and 1.0 while the value of α should lie between 0.3 and 0.5. This is because of the relative importance of food in total consumption, and the limited scope for economies of scale. So, if a household has 2 children and 2 adults, and we set α and θ to be 0.5 and 0.75, respectively, then $ES = 2.28$ meaning that there are about 2.28 equivalent adults in that household even though the total household size is 4 persons. If income is used as a measure of ATP, per adult equivalent income and per adult equivalent health-care payments are obtained by dividing total household income and total household health-care payments by the value of ES for each household.

Thus, FIA should not necessarily be an end but a means to an end—that is ensuring equity in the entire health system. FIA results, combined with a detailed BIA can be used to inform policy towards ensuring UHC. One way to use the results is to reassess overall progressivity in health financing for a country and to reduce reliance on regressive financing mechanisms. For example, if OOP spending comprises 50% of a country's total health financing and it is estimated as a regressive financing mechanism, a reduction in this share is likely to have a 'positive' effect on overall progressivity as discussed in [Table 2](#). This is because the overall Kakwani index is the weighted sum of the Kakwani indices of each health financing mechanism.

As noted earlier, the availability of quality household survey data remains a *sine qua non* for a good FIA. The data should contain information on a cardinal measure of ATP, and information relevant for extracting each household's contribution towards most, if not all, the health financing mechanisms. Unfortunately, many LMICs face the challenge of poor quality household survey data or the absence of routine data for the assessment of FIA. When data for estimating contributions via any health financing mechanism are not comprehensive, the analyst needs to recognize this and note its impact on the FIA results. For example, contributions towards social health insurance may come from both the employer and the employee. If a dataset does not contain information on the employer's contribution, assumptions may be used to estimate this directly from the survey. However, if this is omitted, its impact on the final results needs to be noted. In a case where there is a general absence of reliable household survey data, [McIntyre and Kutzin \(2016\)](#) discuss an interim measure to provide some reasonable approximation of how progressive or regressive each mechanism may be. In the long term, there will be a need for countries to invest in the collection of reliable routine data for monitoring progress towards a progressive and equitable health financing system. In many cases, there may not be a need for an entirely 'new' survey. A module that will elicit relevant (or missing) health expenditure and/or ATP variables may be added to an existing routine household survey. In general, it is important that comprehensive household survey data contain enough information as outlined in [Table 2](#) for conducting FIA.

Routine FIA can be useful not only for assessing progress towards UHC but also for assessing areas where action is needed for the country to ensure that the health system is treating households

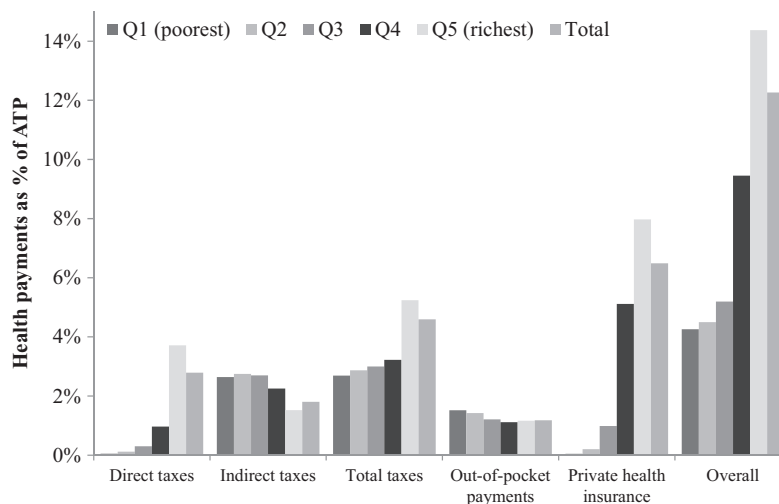


Figure 2. Assessing structural progressivity of health care payments in South Africa, 2010/11.

Note: Q1–Q5 represent quintiles of ATP.

Source: Ataguba and McIntyre (2018), page 78, reproduced with permission.

Table 4. Kakwani indices for major health financing mechanisms, South Africa, 2010/11

Equivalent household ATP quintile	Equivalent household ATP	Taxes		Total taxes	OOP payments	Private health insurance	Overall
		Direct taxes	Indirect taxes				
Concentration index ^a	0.6466 [†] (0.0062)	0.8637 [†] (0.0047)	0.5461 [†] (0.0084)	0.7290 [†] (0.0064)	0.6177 [†] (0.0179)	0.7937 [†] (0.0062)	0.7477 [†] (0.0045)
Kakwani index		0.2171 [†] (0.0071)	-0.1005 [†] (0.0048)	0.0824 [†] (0.0037)	-0.0289 [†] (0.0171)	0.1471 [†] (0.0091)	0.1011 [†] (0.0054)
Test of dominance against 45° line		-	-	-	-	-	-
Test of dominance against Lorenz curve		-	+	-	+	-	-

Source: Ataguba and McIntyre (2018), page 79, reproduced with permission.

Note: Standard errors in parenthesis.

^aGini index for equivalent household ATP.

[†]indicates significant difference from zero (1%); [‡]indicates significant difference from zero (10%).

Dominance tests: - indicates the 45° line/Lorenz curve dominates the concentration curve.

[‡]indicates concentration curve dominates 45° line/Lorenz curve.

Dominance is rejected if there is at least one significant difference in one direction and no significant difference in the other, with comparisons at 19 quantiles and 5% significance level.

fairly. Where necessary, FIA results should inform policy choices towards a better performing health system.

Note

- In Stata, -dominance- command written by Owen O'Donnell can be used to perform statistical dominance tests. [http://sitereources.worldbank.org/INTPAH/Resources/Publications/459843-1195594469249/dominance.ado](http://sitereources.worldbank.org/INTPAH/Resources/Publications/459843-1195594469249/dominance ado)

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