Incorporating Concerns for Equity into Health Resource Allocation. A Guide for Practitioners

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A guide for practitioners

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Background to series

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Abstract

Introduction

Unfair differences in health care access, quality or health outcomes exist between and within countries around the world, and improving health equity is an important social objective for many governments and international organizations. This paper summaries the methods for analysing health equity available to policymakers regarding the allocation of health sector resources.

Methods

We provide an overview of the major tools that have been developed to measure, evaluate and promote health equity, along with the data required to operationalise them. These are organised into four key policy questions facing decision-makers: (i) what is the current level of inequity in health; (ii) does government health expenditure benefit the worst-off; (iii) can government health expenditure more effectively promote equity; and (iv) which interventions provide the best value for money in reducing inequity.

Analysis

Benefit incidence analysis is identified as the principal tool for estimating the distribution of current public health sector expenditure, with geographical resource allocation formulae and health system reform being the main government policy levers for improving equity. Techniques from the economic evaluation literature, such as extended and distributional cost-effectiveness analysis can be used to identify 'best buy' interventions from a health equity perspective. A range of inequality metrics, from gap measures and slope indices to concentration indices and regression analysis, can be applied to these approaches to evaluate changes in equity.

Discussion

Methods from the economics literature can be used to generate novel evidence on the health equity impacts of resource allocation decisions. They provide policymakers with a toolkit for addressing multiple aspects of health equity, from health outcomes to financial protection, and can be adapted to accommodate data commonly available in either high income or low and middle income settings. However, the quality and reliability of the data are crucial to the validity of all methods.

1.   Introduction

Health inequalities are the differences in health care access, quality of care or health outcomes present within a population, and can be addressed through health sector policies when they are either avoidable or remediable. Inequalities that are considered unfair, such as those based on socioeconomic factors, are known as inequities. Many such differences exist within the East, Central and Southern Africa (ECSA) health community region, and have persisted or worsened even as average population health improves. A study of infant mortality in Malawi found that children in the poorest fifth of the population had a 65% higher risk of death than those in the richest fifth in 2004, up from 33% a decade before (Zere et al., 2007b). Other studies in sub-Saharan Africa have found socioeconomic indicators are associated with higher levels malnutrition and stunting, higher incidence of flu and diabetes and lower rates of vaccination and immunization. (Ataguba et al., 2011; Gwatkin et al., 2007; Keino et al., 2014).

These differences in outcomes can be caused or compounded by the relative under-utilisation of health services by the worst-off and least healthy, a phenomenon known as the inverse care law (Hart, 1971). This trend has been observed within ECSA: studies of the Tanzanian (Mills et al., 2012) and Ugandan (Okwero et al., 2010) health care systems have found that, despite lower need for health care, utilisation by the wealthiest fifth of the population is approximately double that of those in the poorest fifth. Furthermore, the quality of care experienced by socioeconomically disadvantaged groups in the private sector is also markedly lower than better off groups, due to a lower ability to pay for equivalent services.

Improving health equity is an important social objective for many governments and international organizations. The World Health Organization now has multiple initiatives to monitor global and national health inequalities (Hosseinpoor et al., 2015), whilst the United Nations Sustainable Development Goals include targets for improving health-related financial risk protection and universal access to a wide range of health services (United Nations, 2018).

To provide information that can assist governments and policy-makers in making health resource allocation decisions in an equitable way, researchers have developed a suite of analytical tools. This briefing paper will provide an overview of the most prominent approaches, discuss their utility and limitations and provide examples of their application. We organize these tools by the broad policy questions that they can help to address:

(i)   What is the current level of health inequality?
(ii)   Does government health expenditure benefit the worst-off?
(iii)   Can government health expenditure more effectively address inequality?
(iv)   Which interventions provide the best value for money in addressing inequality?

Questions (i) and (ii) primarily relate to issues of inequality measurement: identifying existing inequities in the health system such as unequal access, utilisation or ill-health. These include benefit incidence analysis and various forms of regression analysis. The techniques relevant to questions (iii) and (iv) can be broadly referred to as policy tools: approaches that can be used to inform actions that address existing inequalities through the allocation of resources. These range from determining decentralised health budgets to analysing the inequality impacts of specific treatments and interventions.

Defining health equity

Health equity is a complex topic that deals with questions of social value as well as fact. Inequalities related to the health sector can usually be found however one chooses to stratify a population,

whether that be by age, sex, income, ethnicity or another characteristic. These differences are often present across indicators of health system performance and population health, with focus typically paid to health outcomes and access to and utilisation of health care services. Inequalities can be analysed in terms of absolute or relative differences, and can relate to adverse outcomes (such as mortality) or their absence (such as survival).

However, moving from an analysis of inequality to one of inequity requires deciding which differences are unfair and remediable. This in turn requires value judgements that depend on ethical, political or cultural principles. We do not discuss these principles in this report; our focus is instead on the set of economic techniques that can be used for whatever set of value judgements are used by a decision-maker (for an overview of these value judgement issues, see Kawachi et al. (2002) and Sen (2002)). Therefore, whilst we use socioeconomic status in the illustrative examples we lay out in this paper, the analysis would be equally viable using a different equity-relevant characteristics.

In reality, the total amount of inequality is comprised of a multitude of factors, only some of which are inequitable. We might conclude that higher utilisation in high income groups is fair if their health needs are also greater (although this is rarely the case). However, we may conclude that some of the differences observed in life expectancy are attributable to freely made choices and behaviours. Separating out the fair and unfair components in the total difference is a challenging task that is not frequently applied in health equity studies, although frameworks have been proposed to do so in recent years (Fleurbaey and Schokkaert, 2009).

When we consider health equity objectives, a distinction is typically made between vertical and horizontal equity:

- **Horizontal** equity is achieved when similar individuals are treated similarly
- **Vertical** equity demands that different individuals be treated proportionately.

Policies that seek to address health equity may only improve one aspect. For example, introducing means-tested user fees for prescription medication is an example of a vertically equitable policy, since this aims to have those with greater ability to pay contributing proportionately more to the health system. We therefore consider the policy tools of the report with respect to their effects on both the horizontal and vertical aspects of equity.

2.   What is the current level of inequality?

Studies that measure health inequality are quantitative analyses that analyse data on health care utilisation and costs and health outcomes. As equity is usually defined in terms of fairness between social groups, these datasets also require additional information on demographic and socioeconomic variables such as area of residence, age, sex, income or education level. The level of inequality can then be estimated from the data using a wide range of metrics that vary considerably in their sophistication.

Suppose that we have data on health care utilisation, age, sex and household assets of a large sample of randomly selected individuals in a population. A simple way to summarise equity might be to take the average level of utilisation in subgroups defined by households assets, our measure of socioeconomic status. From this we can calculate the absolute gap (e.g. an average difference of 1.6 visits between the lowest and highest income groups) or relative gap (e.g. a 180% difference in average visits). This approach ignores the information on the link between socioeconomic status and health from the middle groups. An alternative approach is to plot a line of best fit through the data that predicts 'fitted' estimates of utilisation. The slope of this line can be interpreted as the fitted difference in utilisation when moving from the bottom to the top of household asset distribution and is referred to as the slope index of inequality (Regidor, 2004). An example of this is shown in Figure 1 (left panel). If the relationship between income and utilisation is roughly linear, the slope index will be close to the absolute gap. The relative inequality index (RII) can be derived from the slope index by dividing through by mean health; this gives the percentage change in fitted utilisation when moving from the bottom to the top of the distribution.

Other metrics are more mathematically complex but can incorporate more information than group averages, providing a richer and more informative measure of inequity. Amongst the most commonly employed of these are concentration curve and Lorenz curve, the latter of which can be used to calculate a Gini coefficient. Both indices compare an observed distribution with a perfectly equal one to calculate how much inequality exists (O'Donnell et al., 2008b). The distribution can be defined in terms of the health variable itself (Lorenz curve) or by another variable such as socioeconomic status (concentration curve). In the example shown in the right panel of Figure 1, individuals are ranked in terms of their income; their income rank is then plotted against the cumulative proportion of health care utilisation. For instance, the bottom 20% of the sample account for 11.4% of overall utilisation, whilst the top 20% account for 29.4%. The concentration index provides a statistical summary of this inequality: it equals 0 when there is perfect equality, and 1 or -1 when there is perfect inequality (i.e. if all health care was utilised by the wealthiest (1) or least wealthy (-1) individual).
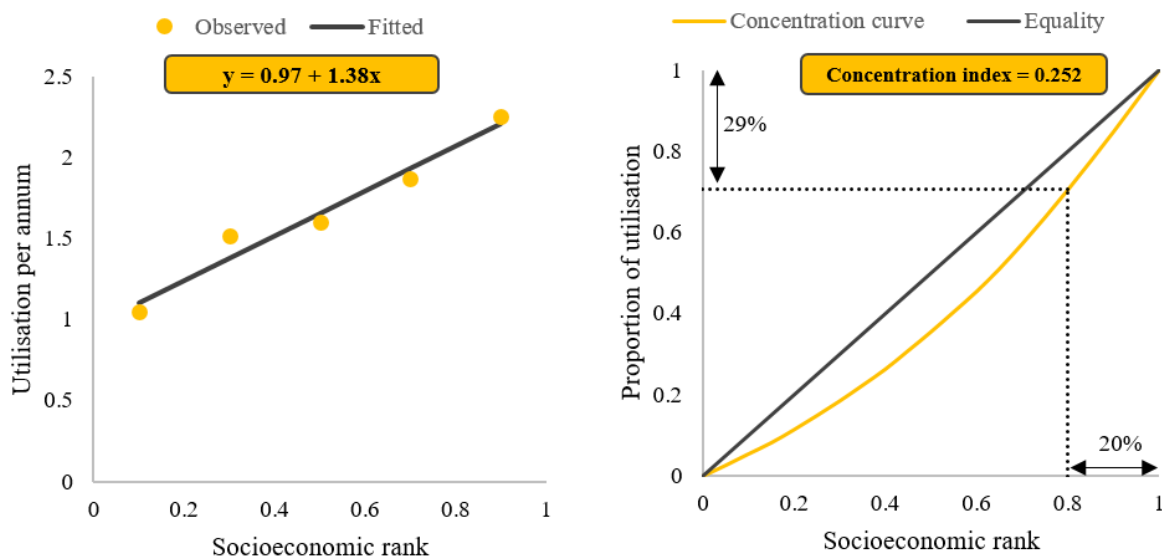
Figure 1: Visualizations of inequality metrics. The left panel shows the line fitted through a cloud of data to generate a slope index of inequality estimate (1.38). The right panel shows the concentration curve of health care utilization. In both instances, low income groups use less health care than high income groups.

Notes:

1. The equation in the left panel defines the line of best fit. The gradient of the line indicates the slope index of inequality: average utilisation increases by 1.38 units as we move from the lowest to highest income group.

2. The concentration index is defined as twice the difference between the concentration curve and the line of equality. The former becomes more convex as inequality increases, increasing the area and the concentration index.

Another way to evaluate the distribution of an outcome is to use social welfare indices. These can simultaneously evaluate the total amount of health and the degree of health inequality in a population. In effect, these attach a weight to each individual in the population according to (i) their rank in the health distribution (Bleichrodt et al., 2004) or (ii) how 'inequality averse' a decision maker is (Atkinson, 1970; Kolm, 1976). Inequality aversion captures how much we care about reducing inequality: when a high value is selected, those at the lower end of the distribution (i.e. those with the least health) are given greater weight, and those at the top end are given less weight. Improvements to the worst-off therefore generate greater improvements in social welfare.

Statistical methods such as multivariate regression analysis can also be used to estimate the associations between social characteristics and health-related outcomes. These typically go beyond the single-variable regression of the SII, and can incorporate multiple equity-relevant characteristics and control variables. The regression output can then be used to 'decompose' observed inequality – i.e. to derive the proportion of inequality that is attributable to characteristics of interest. Charasse-Pouélé and Fournier (2006), for example, use the popular Oaxaca-Blinder decomposition method to find that between 57% and 76% of the observed differences in health between ethnic groups in South Africa can be explained by their underlying socioeconomic profile. Details on the theory and application of these techniques are provided in the 'Further reading' section at the end of this report.

The approaches described can provide useful evidence to decision-makers, who can then choose whether to guide social policy towards programmes that target socially disadvantaged groups. Datasets that can be used to conduct these analyses can be found in regional or country specific

health surveys, or from routine and publicly available sources such as the Demographic and Health Surveys program.[1]

Which of these metrics to use will depend on the availability of data and the decision-making context. Simple gap statistics and the slope index of inequality can be simpler to compute and are more easily interpretable by a non-technical audience. However, by assuming a linear relationship between the health outcome and the equity characteristic (slope index) or ignoring data in the middle of the distribution (gaps), these measures can produce misleading estimates of the level of inequality. The more sophisticated techniques examined in the following sections of this report that analyse individual-level data or model large populations use the more technically complex measures like concentration and social welfare indices.

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[1] Analysis of survey data does need to be performed carefully, however. For example, those within a single household are 'clustered', and the sample may not be representative due to unresponsiveness. Techniques for accounting these factors are described in O'Donnell et al. (2008b)

3. Does government health expenditure benefit the worst-off?

An approach that has emerged in recent decades to measure inequalities in the distribution of government health expenditures is benefit incidence analysis (BIA). Benefits in BIA refers not to the improvements in health received by individuals but the financial value of the services they use. For each individual, these are calculated by multiplying the number of times each type of health service is utilised by the respective unit cost. Unit costs are typically estimated from national accounts, with utilisation measured from regional health surveys. User fees, in terms of both insurance premiums and out-of-pocket costs, are then subtracted to calculate the amount of public benefit received.

BIA is a technique that has been regularly used by the World Bank and others since the 1990's to answer the question of who benefits most from public health care expenditure (Akazili et al., 2012; Mangham, 2006; Mills et al., 2012; O'Donnell et al., 2008a; Onwujekwe et al., 2012). It consists of calculating the inequality in the benefits received by individuals from public health expenditures. Inequity is then analysed by calculating a concentration index and estimating the proportion of benefits received by each subgroup (typically socioeconomic groups), as shown in the left column of Figure 2. A step-by-step guide to conducting BIAs can found in McIntyre and Ataguba (2011).

BIAs, like all types of quantitative analysis, are dependent on the available data. Data requirements include information on utilisation by service type over a fixed period of time and private expenditures, and can be representative of the population of interest. Including a wider range of services will lead to a more accurate picture of inequality as the analysis can then incorporate more detailed variations in service use; this is, however, governed by the detail provided in national health expenditure accounts, which vary from country to country. Another key assumption is that the cost of a unit of utilisation is independent of the private user fee – in other words, that the service received is identical regardless of how much an individual pays. However, services with user fees attached may be more comprehensive than fully subsidized ones, resulting in higher unit costs. An extension to the standard BIA framework that relaxes this assumption is available in Wagstaff (2012).
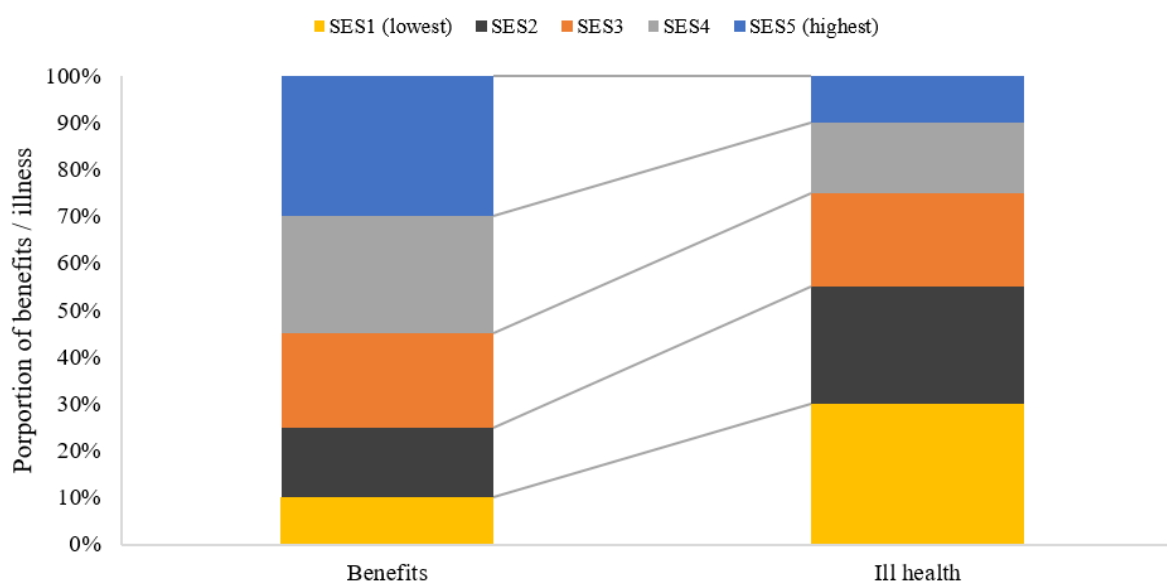

Figure 2: Comparison between the distribution of benefit incidence (left column) and ill health (right column). This shows an inequitable situation in which the lowest socioeconomic groups have the greater health needs but receive lower levels of public health service benefit.
Note: SES = socioeconomic status

As noted in the previous section with respect to utilisation, evidence on the distribution of public health system benefits does not provide sufficient information to determine how equitable the system is. In order to do this we also need to know the health care needs of individuals and/or groups. This distribution of need, represented in the right bar in Figure 2, can be calculated using a variety of metrics. These can be responsive to available data, from simple health survey questionnaire responses on self-assessed health to measures of total disease burden. As the latter quantifies all health losses associated with a comprehensive set of diseases, it can be seen as gold standard but does require rich data.

Box 1: Benefit incidence analysis case study: Malawi

Mangham (2006) conducted a benefit incidence analysis (BIA) of government curative health services in Malawi using data from 2004-5. Expenditure data was acquired directly from Malawian national health accounts, whilst utilisation was estimated from the Second Integrated Household Survey from 2004-5. The latter provided (i) the proportion reporting ill in the two weeks prior to interview and (ii) how many received treatment at government health facilities. The two-week rates are scaled up estimate annual utilisation.

Total expenditure was available for two types of facility for each of 28 districts: health centre and hospital. Total expenditure was divided by total utilisation for both types of facility to obtain an estimate of the government subsidy per unit of utilisation. This was then multiplied by the amount of utilisation in five, equally sized socioeconomic groups to obtain the distribution of benefit.

The lowest socioeconomic group had a proportionately smaller share of benefits: despite representing 20% of the population, their share of benefits was 15.8%. The three highest groups reported shares of 21.2% to 21.5%. The author notes that the observed inequity is lower than in other African countries, citing the Essential Health Package and the absence of user fees as potential causes for this relative success.

Facility	Socioeconomic group				
	1 (lowest)	**2**	**3**	**4**	**5 (highest)**
Hospital	14%	17.8%	20.9%	22.3%	24.9%
Health centre	18.2%	22.7%	18%	26.1%	15%
Overall	**15.8%**	**20.2%**	**21.3%**	**21.5%**	**21.2%**

The analysis highlights several common issues with conducting BIAs. The lower reported rates of illness and utilisation amongst the poorest are counter-intuitive to expectations about health needs, and are attributed to a higher tolerance of illness in lower socioeconomic groups. A potential consequence of this is that if low income patients are presenting with more serious illnesses, a unit of health care utilisation is likely to be more expensive, violating the assumption that each unit is associated with the same subsidy. Furthermore, the scaling up of the two week utilisation rates to annual figures does not adjust for the time of year of the survey, which may lead to under- or over-reporting due to seasonal variations.

BIAs can be relatively cheap to perform (World Bank, 2003), are adaptable to the available data and can provide an informative picture of inequity over time if they are conducted intermittently. A question that they do not answer is a key one for health policymakers: will additional expenditure improve health equity? Increases in expenditure could conceivably go to funding services that benefit higher income groups, generating more inequity. Addressing this question is, therefore, a pivotal one, as it will help to dictate policies intended to improve health equity. If budgetary increases are not expected to improve equity, then alternative means, such as addressing the social determinants of health inequality or targeting funding toward equity-improving interventions may be preferable.

Marginal benefit incidence analysis (MBIA) has been proposed as a means to resolve this question (Lanjouw and Ravallion, 1999; Younger, 2003). MBIA estimates the statistical relationship between benefit incidence (for each equity group) and public health expenditures, by comparing the levels of

each over time across regions or at a single point in time between regions. As a result, it produces estimates of the expected distribution of benefits that result from increases in expenditure (or alternatively, the health 'losses' from decreases in expenditure). In an analysis of marginal benefits in Indonesia, Kruse and others find that public health care expenditures benefited the low income groups more substantially than a static analysis would suggest; the bottom quartile received 23% of the benefits in the traditional BIA versus 25% in the MBIA (Kruse et al., 2012). Conversely the shares of the richest quartile dropped from 24% in the BIA to 21% in the MBIA.

MBIA was developed with a view to examining benefit incidence across the public sector, and despite its obvious utility, few applications have been made in the health sector. The causes for this low uptake are likely to include greater data requirements and more complicated estimation procedures relative to BIAs. MBIAs require (i) relatively detailed information on public health care expenditures (either over time or across a large number of regions) and (ii) knowledge of appropriate statistical methods to conduct the analysis. The latter is particularly important to avoid biases that can occur when estimating a causal relationship between health behaviours and public expenditure. Most prominent among these is that reverse causality is present: higher health expenditure may be historically allocated in response to poor health care outcomes, including utilisation. Consequently, any analysis based on the observed association between health care expenditure and utilisation is likely to be biased. A full discussion of these issues can be found in Gravelle and Backhouse (1987); for an applied example that uses instrumental variable regression to address these issues, see Lomas et al. (2018).

4.   Can government health expenditure more effectively promote equity?

The techniques described in the previous section are useful for assessing the level of health equity in a population, or, in the case of MBIA, assessing how current health expenditures affect health equity. This section looks at the toolkit available to health care decision-makers for improving equity, both in terms of organising regional health care budgets and funding specific interventions that contribute towards equity objectives.

Regional funding formulae

A substantial proportion of countries now fund health care using a national public budget. Whether this is funded almost entirely through general taxation (as is the case for many high-income countries) or from a combination of public and donor funds (as in many low- and middle-income countries), a growing number distribute this budget to decentralised, regional purchasing bodies (Mcintyre and Anselmi, 2012; Penno et al., 2013). The use of mathematical formulae to help allocate the budget originated in the UK in the late 1970s (Department of Health and Social Security, 1976) and is now a feature of many publicly funded health systems around the world.

Resource allocation formulae have been widely applied throughout sub-Saharan Africa, including Kenya (Briscombe et al., 2010), Uganda (Government of Uganda Ministry of Health, 2016), Mozambique (Anselmi et al., 2015) and Zimbabwe (McIntyre et al., 2007). Brief overviews of the formulae utilised in three ECSA health community countries is provided in Box 2.

Box 2: Overview of three resource allocation formulae in the east, central and southern Africa region

> **Malawi**: The Malawian allocation formula was first introduced in 2000 and applies to recurrent, operational health expenditures only. Following a revision in 2008, the budget is allocated to 28 districts based on a weighted population calculation determined by four factors: outpatient department utilisation, bed capacity, district cost level and the prevalence of stunting (Manthalu et al., 2010). The weights attached to each factor are set by health policymakers.
>
> **Tanzania**: A resource allocation formula was implemented in Tanzania in 2004 and applied to a pool of donor funds under the 'Sector Wide Approach' initiative. The formula weights the regional population according to three factors: a mileage index to account for supply costs; under-5 mortality rates as a measure of overall need and the local poverty level to reflect socioeconomic factors. (Semali and Minja, 2005). However, a major part of Tanzanian health care funding was reported to stem from 'block' grants allocated to regions for multiple public services, and therefore reflected a range of other regional needs besides health care.
>
> **Zambia**: Resource allocation formulae have been in use in Zambia since it began a process of decentralization in 1994. This population-based formula was revised in both 2004 and 2010 to include socioeconomic and geographical factors, respectively (Chitah, 2010). Although comparisons between the allocations derived from the formula and actual expenditure have shown large discrepancies, regions are showing gradual progress toward the 'equity target' allocations (Chitah and Masiye, 2007).

One of the central justifications for implementing a resource allocation formula is the promotion of both vertical and horizontal equity: regions with the same health needs are provided with the same resources, and regions with different health needs are provided with different resources. Without formulae, regional budget allocations are based on historical precedent, a phenomenon referred to by Maynard & Ludbrook as 'what you got last year, plus an allowance for growth, plus an allowance for scandal' (Maynard and Ludbrook, 1980, p. 293). Furthermore, budgets may also be influenced by favouritism or political importance. By distributing resources in accordance to the health care needs of the local population, allocation formulae can overcome these issues.

Resource allocation formulae are estimated by re-weighting regional populations using the relative expected level of health care need. This approach is intended to achieve vertical and horizontal equity by ensuring that the share of resources received by a region is proportional to its health needs. Typically, need has been defined in the first instance in terms of the historical levels of met needs, expressed in terms of health care utilisation (Penno et al., 2013). Utilisation for an area is predicted by analysing historical data on the demographic (i.e. age and gender) and socioeconomic patterns of health care use. Where utilisation is expected to be higher, a region's raw population will be up-weighted, and their share of resources will increase. An example of this process, from the original English 1976 formula, is shown in Table 1, and a step-by-step guide to estimating and implementing allocation formulae can be found in Mcintyre and Anselmi (2012).

Table 1: Need-weighted populations used in the resource allocation formula for English regions in 1976. A positive difference between the crude and weighted population indicates that health care needs are higher than average and the region requires a greater share of resources

Region	Crude population (000's)	Weighted population (000's)	Difference (%)
Northern	3173	3276	3%
Yorkshire	3576	3750	5%
Trent	4661	4594	-1%
East Anglian	1898	1817	-4%
NW Thames	3584	3422	-5%
NE Thames	3874	3757	-3%
SE Thames	3748	3815	2%
SW Thames	2918	3068	5%
Wessex	2816	2773	-2%
Oxford	2403	2118	-12%
South Western	3250	3185	-2%
West Midlands	5342	5153	-4%
Mersey	2543	2655	4%
North Western	4146	4549	10%

Source: Department of Health and Social Security (1976)
Notes:
1. The factors for weighting included age, sex, standardized mortality and hospital bed utilisation
2. NW = North west; NE = North east; SE = South east; SW = South west

Whilst historical utilisation provides a reliable guide to previously met health care needs, formulae also attempt to account for historically unmet needs that might have prevented individuals from seeking care. In the original English formula, this was captured by area-level mortality statistics. Although subsequently improved upon with more sophisticated measures, their original use demonstrates how formulae can consider administrative data that are becoming more widely available in low- and middle-income countries.

As well as health care need, other social needs can also be attended to through allocation formulae by introducing additional weighting factors that reflect some other type of inequity, such as lifetime health. This will create relatively higher allocations for areas with greater socioeconomic deprivation where lifetime health prospects are lower. However, this remains a controversial feature as it is not clear whether additional resources would alleviate these inequalities, since they may be generated through social causes rather than through health care (Smith, 2008).

The widespread use of resource allocation formulae over recent decades has generated a wealth of guidance on their design and application. One key observation is that the demographic and socioeconomic patterns of utilisation used to weight allocations vary by the type of health care

service. This has led to multiple formulae being estimated for the English National Health Service (NHS), including hospital and community health services, prescribing and mental health services (Morris et al., 2007). Second, health care supply variables (such as mean distance to a hospital or waiting time) should also be included in the analysis of utilisation. This will control for the fact that, independently of need, utilisation will lower in areas with less hospitals or primary care facilities. Last, the implementation of formulae allocations can and should be constrained in some respects. For instance, allocations should be slowly adjusted from existing levels to the formulae-derived target allocation, so that supply factors can adjust and any potential political ramifications of cutting allocations can be minimised.

Analysis of the design and implementation of formulae in the region highlights a number of issues that are novel to LMICs. The most typical of these is the availability of data of sufficient quality. For example, data to inform the allocation formulae may only exist at a high level of aggregation. When allocations are made to large regions, within-region variation in need is not accounted for, and consequently there is little guarantee that additional resources will be targeted to the more localised areas with high need.

Another issue relates to the use of variables calculated from administrative data, which can vary widely over time and between regions (for example, mortality rates as a measure of need). When underreporting is associated with being under-resourced, areas of greater need will not receive adequate allocations. Financial incentives can be utilised to improve data collection at subnational levels, although these should be carefully designed to limit unintended consequences (Smith, 1995). These improved data can be used to generate and update formulae, and monitor their effectiveness. Furthermore, they can provide evidence for a host of additional useful health service research.

The reliance on administrative data has been partly mitigated in some countries through the development of composite measures of material deprivation, a proxy measure for health care need. These measures combine multiple aspects of deprivation into one index and can be estimated for each region using demographic surveys. However, further analysis should ideally be undertaken to validate how strongly these indices relate to the need of health care services. Indices have been specifically estimated as a socioeconomic measure for use in formulae in both Malawi (Manthalu et al., 2010) and Namibia (Zere et al., 2007a).

The proportion of total health care expenditure that is financed through tax-funded public resources in LMICs is also typically smaller than is seen in high-income countries. For example, analyses in Kenya and Zambia found that the respective resource allocation formulae accounted for 10% and 25% of the total health expenditures only (Briscombe et al., 2010; Chitah, 2010), compared with over 60% for the NHS in England. The use of 'basket funds' that pool donor funding with government budgets are an important tool to increase the equitability of funding across the system. However, pooling frameworks like Sector Wide Approaches (Hutton and Tanner, 2004) can be politically challenging to negotiate, as donors may have a different set of objectives and may wish to allocate resources differently. For example, some donor organisations focus on specific diseases, and allocate their funding to infrastructure and treatments independently of existing health system infrastructure.

Lastly, the capacity issues associated with reallocating resources to areas with high need and low health care supply are likely to be more common and substantial in low- and middle-income settings. Equity-based target allocations can be used in conjunction with gap analyses of regional health system capacity (Mcintyre and Anselmi, 2012). These give an indication of the capital resources required to improve human resources and health care facilities to a sufficient level.

Health system reforms

Planners in the health sector are may also pursue equity goals through the design of the health system, whether this be through financing mechanisms or the organisation of health services. Typically, the objectives of introducing these types of reforms will be to increase access to health care or provide financial protection to citizens. These types of activities include introducing community-based or social health insurance schemes (Carrin et al., 2005) or investing in primary care initiatives such as community health worker programmes (Smith et al., 2014).

Health system reforms, insofar as they have an implementation cost and affect health care utilisation and health outcomes, are conceptually akin to highly complex interventions that can be evaluated using the methods covered elsewhere in this report. The most appropriate analysis to undertake will be dependent upon the equity objective behind the policy.

5.   Which interventions provide the best value for money in reducing inequality?

Even if the improved allocation of health care resources can in principle alleviate inequities, there is no guarantee that this will be achieved without understanding how specific interventions affect equity. Whilst for some diseases a relatively crude understanding of the distribution of the patient population can inform whether certain social groups will be expected to benefit more, there are now a number of tools available to provide quantitative and systematic analysis of the comparative impacts of interventions on equity and population health.

The prevailing approach in the economic evaluation of health interventions is cost-effectiveness analysis. This framework compares the benefits (expressed in terms of health gain) with the opportunity costs (expressed in terms of the health lost from not funding other interventions) for the average patient. Two alternative approaches that go beyond the average patient to consider impacts across a range of equity-relevant subgroups are considered here: extended cost-effectiveness analysis (ECEA) and distributional cost-effectiveness analysis (DCEA).

DCEA and ECEA both take the approach of traditional cost-effectiveness analysis and augment the mathematical modelling process to estimate the distribution of impacts of specific interventions. In addition to health outcomes and costs, ECEA also models criteria highly relevant to low- and middle-income settings: financial protection from catastrophic payments and the private expenditures averted from providing the intervention on the public budget (Verguet et al., 2016). Rather than combine the various criteria, ECEAs present a range of disaggregated outcomes, such as those shown in Figure 3.

There are many applications of ECEA in low- and middle-income countries in Asia, the Middle East and Africa. A wide range of health interventions have been analysed, including neonatal care (Nandi et al., 2016), tuberculosis treatment (Verguet et al., 2014) and rotavirus vaccination (Verguet et al., 2013).
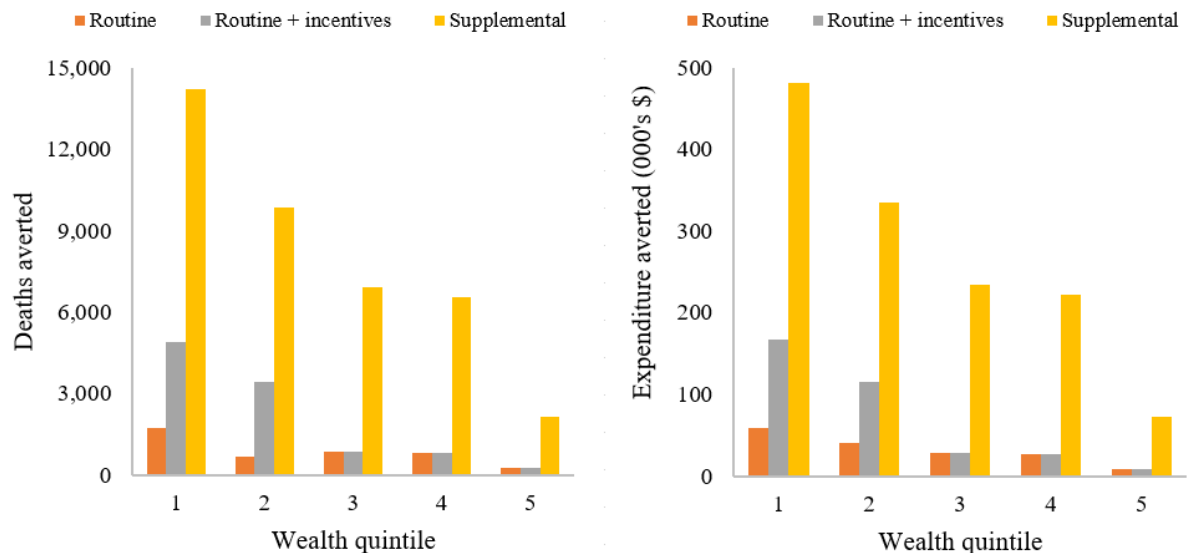

Figure 3: Output from an extended cost-effectiveness analysis of three measles immunization strategies in Ethiopia. The left panel shows the deaths averted for each strategy by wealth quintile; the right panel shows private household expenditures averted.

Source: Driessen et al., (2015)

DCEA utilises only two criteria: (i) the total health impact of an intervention and (ii) its distribution (Asaria et al., 2015a). Health inequality is modelled prior to an intervention, and economic modelling outputs are used to generate a hypothetical 'post-intervention' distribution. Social welfare analysis can be utilised to evaluate the changes in total health and health inequality in instances where a trade-off occurs (i.e. interventions that improve population health and increase inequality and vice versa). Therefore, while the evidence provided by DCEAs does relate directly to a decision rule (i.e. fund if the intervention increases social welfare), the social welfare analysis on which it is based itself depends on a highly subjective notion of inequality aversion.

Applications of DCEA are currently sparse (Asaria et al., 2015b; Dawkins et al., 2018), in part due to the novelty as a recently developed method. The additional demands it places on analysts in terms of data, relative to regular cost-effectiveness analysis, may also inhibit its application in low- and middle-income countries.

Box 3: Extended cost-effectiveness analysis of rotavirus vaccination in Ethiopia

Pecenka and colleagues used an extended cost-effectiveness approach to evaluate universal public financing of prevention strategies and treatment of diarrhoea in Ethiopia (Pecenka et al., 2015). Two strategies were compared: diarrhoea treatment and rotavirus vaccination plus diarrhoea treatment. They measured three outcomes across five, equally-sized wealth quintile group: deaths averted, household expenditures averted and government expenditures averted.

Over 10 separate studies are used to build a mathematical model simulating a cohort of children aged 0 to 5. The authors use data that reflects how health care resource use and rotavirus mortality differs by income group, and estimate how the costs are shared between the government and private households under each scenario.

Their results show that combining treatment of diarrhoea with rotavirus vaccination averts an additional 1,200 deaths and $1.5 million in private household expenditure, as well as saving $7 million of government expenditures. The health gains accrue mostly to the poorest wealth quintile, as they experience the highest levels of mortality from diarrhoea. Since private expenditures were highest in the wealthiest groups, averted household expenditures are lowest for the poorest.

A key aspect missing from this and other applications of extended cost-effectiveness analysis is opportunity cost. The resources being used to fund the public finance of vaccination and treatment could have been otherwise employed on other interventions or social programs, which may also have averted deaths and private household expenditures. Only when this is accounted for can an informative estimate of the value of the interventions be properly understood.

6.   Discussion

This report has summarised a wide range of techniques for measuring and addressing health equity that can be selected according to the objectives and constraints faced by decision makers. BIA can be conducted using commonly available data on health care utilisation and expenditure, whilst an MBIA answers a more decision-relevant policy question, but requires additional data and statistical expertise. In terms of evaluating policies and interventions, DCEAs provide the thorough estimation of health inequality impacts, whilst ECEA requires data across a range of outcomes – although these can be flexibly selected based on availability.

Needs-based resource allocation formulae also form a central policy tool for promoting health equity. As these have been widely implemented (with differing degrees of sophistication) across sub-Saharan Africa, the principal technical challenge is to collect and utilise better data that will provide more accurate indicators on health care needs. The other main challenges are largely political: (i) to bring a greater proportion of total health care expenditure under the purview of the formulae through the creation of donor funding pools and (ii) to reduce political pressure and interference. The latter could be achieved by engaging with stakeholders to increase support for the formulae and the explicit setting of intermediate annual targets that bridge current and target allocations.

Different combinations of the methods presented can be utilised depending on the type of equity objective that is being pursued. When this is increasing access to health care, BIA can be used to assess the extent to which utilisation differs from need, whilst a resource allocation formula can direct resources to where need is greatest. Alternatively, if the objective is to reduce unfair health outcomes, then a resource allocation formula can give extra weight to associated factors such as socioeconomic deprivation, whilst DCEAs can identify the interventions that best reduce disparities. ECEA can similarly be utilised to assess impacts on financial protection and poverty; key indicators for systems working towards universal health coverage.

A critical challenge common to all types of health equity analysis in an African setting is the availability of data. The lack of data collected by the health system or the various levels of government, such as administrative data and vital statistics, represents a major obstacle to conducting robust research, although the incentives for doing so may be prohibitively costly for some countries. Epidemiological studies of disease prevalence and incidence, meanwhile, can provide important evidence on the socioeconomic and geographical burden of disease. These data would provide a clearer picture of health care needs, as well as help to identify those health interventions that best promote health equity.

A key area of future research in ECSA is the health equity impact of the Health Benefits Packages (HBPs). A review of 13 packages in east and southern Africa noted that, although equity was a key motivation behind the design of the package, evidence-based methods for considering the equity impacts of the included interventions was inconsistent (Todd et al., 2016). The economic evaluation approaches described in the latter section of the report can be used to inform the design of future HBPs. Similarly, resource allocation formulae techniques may useful in equitably allocating regional health budgets so that local budget holders hold sufficient resources to provide the local populace with the interventions in the HBP.

Conclusion

This report is intended to provide an overview of the methods available to assess and address health equity. We have described the intuitions underlying the approaches and what types of equity questions they address. More than ever, health care decision makers can now utilise quantitative analysis to generate evidence to support their pursuit of this important social objective.

7.   Further reading

Inequality metrics

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