Guidance on using needs based formulae and gap analysis in the equitable allocation of health care resources in East and Southern Africa

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Table of Contents

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Executive summary

The equitable allocation of limited public sector health care resources across geographic areas is a critical mechanism for promoting health system equity. The use of a needs-based resource allocation formula to calculate target allocations for each province or region and each district is becoming increasingly popular. Such a formula allows one to estimate the relative need for health services in each geographic area, using indicators such as population size, demographic composition, levels of ill health and socio-economic status.

EQUINET has supported the development of needs-based resource allocation formulae in a number of east and southern African countries in the past, and the methods for developing such a formula are summarised in this paper. Our work in the region has persuaded us that it is necessary to supplement the development of a formula with other initiatives to support the successful implementation of resource allocation processes. We believe that for real progress to be made the equity target allocations calculated through the formula must be linked explicitly to planning and budgeting processes to facilitate the gradual shifting of resources.

EQUINET has been developing such an approach in collaboration with the Ministry of Health in Mozambique, The Ministry of Health in Mozambique and EQUINET have developed a detailed manual which is currently under discussion (Mozambique MoH and EQUINET, 2012). A broad overview of this approach, which may be of value to other countries, is outlined in this paper. We propose that the needs-based formula be used to identify the provinces and districts that are furthest from their equity targets and that they should receive priority for the allocation of additional budgetary resources. A detailed 'gap analysis' focuses on comparing the current physical and human resources in each of these provinces and districts to national norms (developed by the Ministry of Health based on what is regarded as the ideal or good practice). Where there are no explicit norms, national averages could be used instead. The gaps in facilities, equipment and human resources are then translated into monetary terms; to fill the human resource and medical supplies gap within existing facilities a detailed infrastructure development plan and capital budget are prepared as well as a health service improvement plan and medium-term recurrent budget; to resource appropriately new facilities once built a longer-term recurrent budget is also developed. This process ensures that additional resources are only allocated to a province or district as and when they are able to absorb these resources, whilst maintaining the momentum for resource re-allocation.

By combining equity target allocations from a needs-based formula with a detailed gap analysis that is translated into local plans and budgets (or costed plans), there is a far greater likelihood of successfully implementing a resource re-allocation process to achieve equity.

1. Introduction

A key element of promoting health system equity is ensuring that available resources for health care are allocated equitably across geographic areas. Ministries of health generally have control over how government funds made available for the health sector are distributed among provinces or regions and districts. In more decentralised systems, where provinces have varying degrees of control over determining their own health budgets, the provincial office of the Ministry of Health at least has control over the distribution of resources to districts. Increasingly, with the advent of sector-wide approaches and direct budget support, ministries of health are also able to influence the distribution of donor funding. Unless explicit attention is given to equitable allocation of resources, most low- and middle-income countries (LMICs) allocate budgets between provinces and districts on a historical basis. Generally, this means that each year's budget is simply the previous year's budget with an adjustment for inflation (or by the increase in the overall health budget). This entrenches historical inequities in the distribution of health services across geographic areas.

A growing number of countries have introduced needs-based resource allocation formulae to guide the determination of budgets for provinces and districts to break this historical inertia. The first country to adopt this approach was England, with the goal of achieving "equal opportunity of access to health care for people at equal risk" (Department of Health and Social Security, 1976: 2). Since then, many other countries have followed this lead and developed their own resource allocation formulae.

Over the past decade EQUINET has supported a number of east and southern African countries to develop and implement such an approach (McIntyre *et al.* 2001; HEU and CHP, 2003; Namibian MoH and WHO, 2005; Semali and Minja, 2005; Chitah and Masiye, 2007; McIntyre *et al.* 2007; Chitah, 2010). Our experience with this work is that the development of a needs-based formula and establishment of equitable resource allocation targets are not sufficient in themselves. They need to be supported by additional strategies to facilitate implementation of resource redistribution.

This report provides an overview of how to develop a needs-based formula and how to integrate this with the planning and budgeting process in order to strengthen the implementation of equitable resource allocation, based on the EQUINET experience. It is intended to provide policy makers and Ministry of Health officials with clear guidance on how to initiate and implement equitable resource allocation approaches. Table 1 overleaf provides a glossary of the terms used in the report.

Table 1: Glossary of terms used in report

Absorption capacity	Ability of a health facility or a health district to use increased financial resources in an effective way (e.g. by attracting additional staff)
Composite index	An index consisting of a number of different variable combined to make a single index
Deprivation	Disadvantage in terms of social or material conditions relative to others in society
Medium-Term Expenditure Framework (MTEF)	A three-year budget that allows for planning over a longer time frame than just the upcoming financial year. It presents information for the next financial year as well as the following two financial years
Morbidity	Illness, presence of disease or poor health
Needs-based	Based on indicators that reflect need for health care within a particular geographic area
Normalised	Calculating how many times more need each district (or area) has compared to the best-off district (or area)
Per capita	Per person
Recurrent budget	Budget for expenses that are incurred on an ongoing basis (e.g. for salaries, medical supplies, water and electricity, etc.)
Risk-adjusted	Adjustment for the likelihood or risk of requiring health care
Utilisation rate	Rate at which health services are used (e.g. average number of outpatient visits per person per year or average number of inpatient admissions per 1,000 people)

2. Needs-based resource allocation formulae

2.1 Indicators of need most frequently included in formula

The purpose of a needs-based (sometimes called risk-adjusted) resource allocation formula is to ensure that public (and potentially also donor) funds for health care are allocated across geographic areas based on the relative need for health care in each area. Indicators most widely used to measure relative need for health services in a specific geographic area are:

- population size;
- demographic composition (young children, the elderly and women of childbearing age tend to have a greater need for health services than other population groups do);
- levels of ill health, with mortality rates usually being used as a proxy for morbidity; and
- socio-economic status, since there is a strong relationship between ill health and low socio-economic status and the poor are most reliant on publicly funded services.

Some countries also adjust for the difference in the cost of providing health services in different areas. In certain high-income countries, this adjustment relates to urban areas – in England, for example, the higher cost of employing staff in London is taken into account. In some LMICs, a similar adjustment is made for the higher cost of providing care in remote rural areas. There is now a substantial literature on the appropriateness and impact of different indicators of need, on which this report draws.

The challenge in the African context has been the lack of data on the different possible components for a resource allocation formula. In particular, there is frequently no accurate data on age-sex utilisation patterns nationally and poor death reporting. As can be seen from *Box 1*, many countries do not adjust for the demographic composition in different geographic areas. In addition, instead of including overall standardised mortality rates (as was done in England), other mortality indicators such as infant mortality rates (IMR), under-five mortality and/or maternal mortality rate (MMR) that can be accurately determined through household surveys such as the Demographic and Health Survey (or in some instances, may be available from the census) are used. In the past, EQUINET has contributed to the development of composite, multi-variable indices of socio-economic deprivation for inclusion in needs-based formulae, given that there is a strong relationship between low socio-economic status and high morbidity and mortality, and hence the need for health care. Such composite indices can be calculated from many household surveys and provide a basis for weighting the population in each geographic area by some additional indicator of the relative need for health care across areas.

Box 1: Overview of resource allocation formulae in east and southern African countries

Mozambique
Initially Mozambique used a formula that reflected health service demand rather than need. The Ministry of Health is discussing the proposals for a new formula for the allocation of resources between provinces and districts (Mozambique MoH and EQUINET, 2012). The formula under discussion includes: population size, demographic composition, infant mortality and population density (as an indicator of the differential cost of delivering health care in sparsely populated areas).

Namibia
Namibia adopted a formula that incorporated population size, demographic composition and level of deprivation (with the indicators included in the deprivation index being ownership of various assets, access to electricity, source of drinking water, type of toilet facility and type of flooring material in the home).

Tanzania
Tanzania has used a resource allocation formula that includes population size, the under-five mortality rate, extent to which area is rural (assessed by the mileage that health facility vehicles have to travel to provide services) and the poverty level.

Zambia
The resource allocation formula used in Zambia is based on population size, indicators of the burden of disease and level of deprivation (with the indicators included in the deprivation index being ownership of various assets, type of housing material, access to electricity, type of toilet facility, water source, distance to food markets, distance to primary school and distance to public transport, poverty headcount and illiteracy rates).

Zimbabwe
Zimbabwe developed a formula based on population size, various morbidity and mortality rates (IMR, MMR and tuberculosis incidence rate) and an indicator of socio-economic status (availability of grain per capita).

Source: Semali and Minja (2005); McIntyre *et al.* (2007).

2.2 Calculating the needs-based formula

Irrespective of which indicators of need are incorporated within the resource allocation formula, the basic calculations are similar. If one is allocating health care resources from a central level across different provinces, the size of the population within each province is the first and most important indicator of need to take into account. If one only uses this indicator, it implies that a province that has 23% of the total population would need 23% of total health care resources. Essentially, this is a measure of the **relative** need for health care in each province.

The population size of each province can be weighted for its demographic composition by using **national** age-sex utilisation rates. Essentially, the number of people within each age-sex group in that province is multiplied by the **national** average utilisation rate for that group. It is important to note that one does **not** use the actual utilisation rates for that province. Utilisation within a particular province is influenced by the availability of health facilities and staff and does not necessarily reflect **need** for health care within that province. For example, a province may have very high numbers of young children and old people who tend to require more health care than working-age adults relative to other provinces do. If the province has relatively few facilities and health workers it may have relatively low utilisation rates. By weighting a province's age-sex disaggregated population by **national** utilisation rates, one can estimate what that province's utilisation rates could (or should) be if all people had comparable access to health care irrespective of where they live. An example of the actual calculation process is provided in *Box 2* below.

Box 1: Overview of resource allocation formula calculations

Steps in weighting population for demographic composition

1. Determine age-sex groups appropriate to country context (generally need to at least distinguish between young children, the elderly, women of childbearing age and the rest of the population)
2. Obtain current population size in terms of these age-sex groups for each area
3. Obtain estimates of the national average utilisation rate of outpatient services for each group (generally this has to be derived from a household survey). If such data are not available for your specific country, you can use information from a comparable country (e.g. within the same region and similar national income level).
4. Normalise the utilisation rates, i.e. identify the age-sex group that has the lowest utilisation rate and divide the utilisation rate of all other groups by the lowest utilisation rate. For example, in *Table A.1 in Appendix 1*, females in the 5-14-year age group have the lowest utilisation (an average of 1.17 outpatient visits per person per year). Thus, the normalised utilisation rate for females in the 0-4-year age group is 3.63 (4.25 / 1.17) visits per person per year.
5. Calculate the weighted population for each age-sex group by multiplying the population in that group in that area by the normalised utilisation rate for that group. For example, for females aged 0-4 years in Province A, the weighted population is 518,863 (142,840 * 3.63).

Steps in weighting population for differential mortality

1. Obtain the selected mortality rate (e.g. IMR) for each province
2. Normalise the IMRs, i.e. identify the lowest IMR and divide the IMR of all other provinces by the lowest IMR. For example, in *Table 2*, Province B has the lowest IMR (of 79.2 per 1,000 live births). Thus, the normalised IMR for Province A is 1.11 (88 / 79.2)

3. Multiply the age-sex weighted population by the normalised IMR in each province (e.g. for Province A, the population weighted for both age-sex composition and IMR is 3,083,793 * 1.11 = 3,428,168).

Table 2: Calculations for weighting population for mortality

	Age-sex weighted population	IMR	Normalised IMR	Population weighted age-sex & IMR
Province A	3 083 793	88,0	1,11	3 428 168
Province B	3 782 047	79,2	1,00	3 782 047
Province C	9 615 764	89,2	1,13	10 834 133
Province D	9 266 929	89,7	1,13	10 494 949
Province E	3 888 129	82,5	1,04	4 053 654
Province F	3 064 962	84,3	1,06	3 262 814

The equity target allocation is then calculated as each province's percentage share of the total weighted population (e.g. for Province A, the percentage share for population weighted by age-sex composition and IMR is 9.56%, which is 3,428,168 divided by the national weighted population of 35,855,766). *Table 3* shows the equity target allocation for each province if a purely population-based formula was used, if the population was weighted for demographic composition and if the population was weighted for both the demographic composition and the infant mortality rate (IMR), and compares these to the current budget allocation.

Table 3: Current inter-provincial distribution of the budget and equity target shares based on different formulae

	Current budget	Population only	Age-sex weighted population	Population weighted age-sex & IMR
Province A	13,91%	9,38%	9,43%	9,56%
Province B	12,86%	11,45%	11,57%	10,55%
Province C	18,96%	29,62%	29,40%	30,22%
Province D	24,61%	28,32%	28,34%	29,27%
Province E	21,46%	12,13%	11,89%	11,31%
Province F	8,20%	9,09%	9,37%	9,10%

The same approach (of normalising the variable of interest and multiplying the weighted population by the normalised variable) can be used if including other variables in the needs-based resource allocation formula.

A similar approach applies to the inclusion of an indicator of the distribution of ill health across provinces. It takes into account the fact that some provinces may have relatively greater levels of ill health requiring health services (e.g. a higher incidence of malaria, HIV, TB etc.) than other provinces have. As indicated previously, mortality rates are often used as a proxy indicator of levels of ill health or morbidity. As shown in *Box 2*, these mortality rates are 'normalised' before being included within the calculation. As mortality is not a precise proxy of morbidity, it is helpful to also include an indicator of socio-economic status differentials across provinces, given that socio-economic status and ill health are closely related.

The different indicators of need for health care (e.g. mortality and socio-economic status) are given a weight. For example, the mortality indicator may be given a

weight of 0.1 or 0.2, in order not to skew resource allocation too heavily across geographic areas. For example, if two provinces have the same population size, but Province A has an IMR of 100 per 1,000 live births and Province B has an IMR of 50 per 1,000 live births, would it be appropriate to allocate twice the amount of resources to Province A than to Province B? While it is important to take into account differences in the burden of illness across geographic areas, mortality indicators cannot be applied mechanistically as it could lead to nonsensical and unrealistic resource allocation patterns. This is why weights of less than 1 are applied to these indicators.

However, there is no golden rule on what these weights should be. Determining the weighting for specific indicators of need is essentially a policy decision and should be given careful consideration and be subject to extensive discussion.

2.3 Managing the development of a needs-based formula

Resource allocation across geographic areas is a political process and can often be controversial. The process must be carefully managed (see *Box 3* for key management strategies).

Box 3: Summary of key process management strategies

As efforts to re-allocate public sector health care resources are a political process, it is useful to summarise key strategies for successfully managing the process. Based on our experience, we put forward the following tips for managing this process:

- Before embarking on developing a resource allocation formula, discuss the problem of inequities in the distribution of resources among provinces, regions and districts with all key stakeholders. Secure their support for moving towards a more equitable distribution of public sector health care resources, distribution based on the relative need for health services in each geographic area.
- Discuss the full range of possible indicators of need for health services with stakeholders to identify which indicators should be included in the formula within your country. Explore the potential advantages and disadvantages of each indicator and seek stakeholders' views on which indicators are regarded as relevant and important within your country context and the reliability of data for each indicator.
- Also discuss possible weights to assign to each indicator incorporated in the formula.
- Only at this point should data for each indicator be compiled and equity targets based on the agreed formula calculated. It is important to undertake sensitivity analyses (i.e. to calculate the equity targets using a range of different weights for different indicators in the formula) to present the implications of different formulae in a transparent manner. It is best to present this information in graphical form (such as in *Figure 1*).
- These results should then be presented to key stakeholders as a basis for agreeing on a final formula. It is likely that discussion will be heated at this point, as stakeholders become fully aware of the impact of the formula for their budgets. While compromises will be necessary, it is important to remind stakeholders of their support for promoting an equitable allocation of resources. At a minimum, equity targets should be based on the size of the population in each geographic area.
- At this stage, it is also important to agree on the pace of change. It may be necessary to agree that no area will receive a real budget cut, but it is important to secure agreement that any increases in the overall budget for health will be

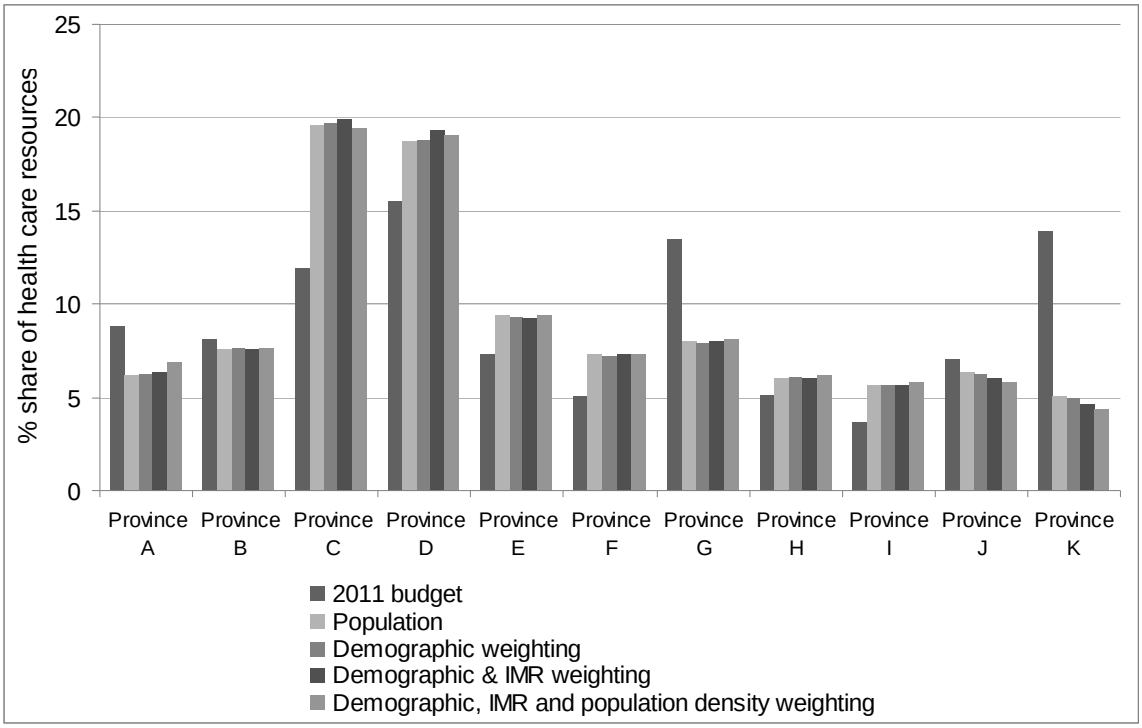
directed to provinces, regions and districts that are currently underfunded, with priority going to those areas that are furthest from their equity target.

- It is essential for a commitment at national level to support provinces or regions and districts to absorb any increases in budget allocations. If resources are not effectively absorbed in the resource re-allocation process, there will be mounting resistance to the process.

Before developing a specific formula it is useful to engage with key stakeholders, particularly senior managers at provincial and district level. An important first step is to achieve consensus on the principle that resources should be equitably allocated, i.e. that resources should be allocated to geographic areas based on each area's relative need for health services. The next step is to discuss with these stakeholders potential indicators of need that could be included in the formula and the relative weights to be given to different indicators. Thereafter, data can be compiled and different versions of a needs-based formula calculated so that their implications can be scrutinised.

There is likely to be considerable debate among stakeholders as to the most appropriate formula. Sometimes, stakeholders may argue for the inclusion of indicators that would particularly favour their area. There will certainly be efforts by those who stand to lose the most to minimise the impact of a resource allocation formula on their province or district. Very often this takes the form of stakeholders challenging the reliability of data for indicators that they would prefer not to be included in the formula (e.g. they may argue that IMR estimates are inaccurate). If this occurs, it is useful to suggest simply using population size initially, and including other measures of need at a later stage as data quality for these indicators improve. As noted by Cooper (1975): "In the absence of any reliable or accepted indicator of need, per capita equality would appear a more rational goal than the perpetuation of historical chance". In addition, as *Figure 1* indicates, population size is the most important component of the formula, particularly if relatively low weights are placed on the additional indicators of need.

Figure 1: Illustrative alternative formulae for allocating resources across eleven provinces



The equity share target changes only marginally with the addition of more indicators of need. Population size would indicate the direction of changes in resource allocation; it is only when allocations are near the equity target that the inclusion of other indicators of need in the formula becomes important.

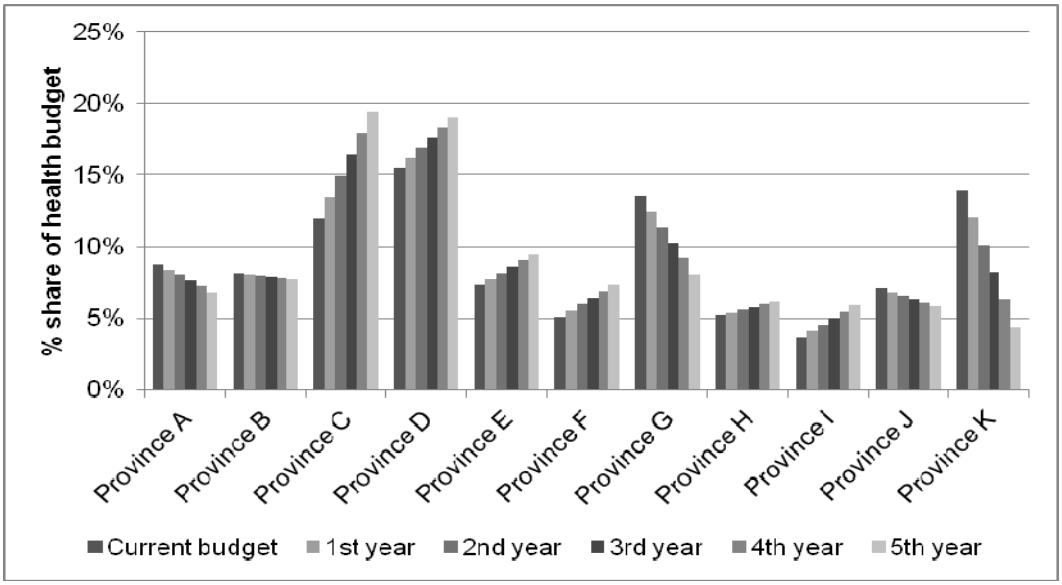
2.4 Managing the re-allocation process and pace of change

Once the formula has been agreed, the process of resource re-allocation (or moving from current budget allocations to the equity target allocations calculated through the formula) must be carefully managed. It is not possible for individual provinces or districts to cope with large annual budget increases or decreases. To avoid unmanageable annual budgetary changes, England set a ceiling of 5% real growth in budget over the previous year's allocation and a floor of a 2.5% reduction in real budgets (Department of Health and Social Security, 1976).

Despite these quite constrained annual changes, England managed more or less to achieve its equity target allocations over a ten-year period. One reason for this was that the distance between the existing budget allocations and the equity targets was far smaller than is the case in most low- and middle-income countries. Equally important was that the overall **real** health budget was increasing over this ten-year period. This meant that the budgets of relatively over-resourced areas did not have to be reduced in absolute terms. Instead, their real budgets were kept constant over this period (i.e. they received their previous year's budget plus an adjustment for inflation). The additional resources made available in the overall health budget were allocated to increase the budgets of relatively under-resourced areas. This reduced opposition to the needs-based resource allocation process as better-off areas did not feel that the public sector health authorities were robbing Peter to pay Paul. Wherever possible, it is best not to reduce the real budget of a district or province.

In low- and middle-income countries, the magnitude of the necessary changes to reach the equity targets is far greater than they were in England. The approach generally adopted in such cases is to phase in the resource re-allocation over several years (e.g. over a five- or ten-year period). *Figure 2* indicates what the annual equity targets would be if the resource redistribution process were to be implemented over a five-year period in an illustrative country.

Figure 2: Illustrative budgets if inter-provincial resource redistribution phased in over a five-year period



It indicates that the annual budgets of some provinces, particularly Province C and Province K, would need to change quite dramatically if resources were redistributed over a five-year period and that a ten-year (or even longer) phasing-in period is likely to be much more feasible. A key factor that will influence the pace at which resources can be redistributed is whether the overall budget for health care is increasing. If it is, budget cuts may not need to be imposed on areas such as provinces G and K.

Another factor that will influence the pace of change is the ability of health services to absorb budgetary changes. Inequities in budgetary allocations reflect inequities in the distribution of health facilities and human resources. Thus, even if the recurrent budgets of relatively under-resourced provinces and districts were increased, they may not be able to absorb these resources as it takes time to recruit new staff or build new facilities.

EQUINET's experience of working with countries in the region to adopt equitable resource allocation processes has highlighted a need to move beyond simply developing a formula. Sometimes the magnitude of resource redistribution required to achieve equitable allocations appears overwhelming. Although policy makers have adopted a needs-based formula, implementation in the form of actual resource redistribution never really occurs. We believe that for progress to be made, the equity target allocations must be linked explicitly to planning and budgeting processes to facilitate the gradual shifting of resources. EQUINET has been developing such an approach in collaboration with the Ministry of Health in Mozambique (Mozambique MoH and EQUINET, 2012) and the next section illustrates this approach.

3. Linking resource allocation targets to planning and budgeting

The key issue in making the link to planning and budgeting is not to use the equity targets produced by the needs-based formula in a mechanistic way. Provincial and district budgets should not simply be calculated based on the needs-based formula. Instead, the budget finally allocated should be based on carefully developed plans that demonstrate how resources would be used.

The equity targets are best used as an indicator of which provinces or districts are under-resourced. These areas should receive priority for the allocation of additional budgetary resources, with particular emphasis on those areas whose current budgets are furthest from their equity targets, based on realistic plans for absorbing resources (e.g. their ability to attract and retain additional staff).

It is necessary to get a good sense of what resources each of these provinces and districts can absorb within the next year (or next few years when a Medium-Term Expenditure Framework [MTEF] budget is used). A gap analysis can be undertaken to determine which provinces and districts are the most under-resourced. Such an analysis involves comparing current physical and human resources in these areas to national norms. Some health ministries have developed norms of what they regard as the ideal (e.g. facility to population ratios, staffing profile and equipment lists for each type of facility). Frequently, these norms are based on current resourcing in facilities that are regarded as good practice and by consulting experts (e.g. in directorates of human resources and infrastructure). If norms have not been established, national averages (e.g. of staff profiles in specific types of facilities) could be used.

3.1 Key data for the gap analysis

The initial gap analysis may require the collection of a considerable amount of primary data if such data are not compiled through health information systems. Nevertheless, it is worth investing in compiling this data as they will provide the basis for a clear plan for how to use additional resources in currently under-resourced areas, and when costed, a well-justified budget. Once the initial data have been collected, regular updating is less resource intensive, particularly if the health information systems are adjusted to include these indicators in future.

The focus of the needs-based resource allocation formula is on the distribution of **recurrent** budgets, and so this is a key focus of the gap analysis. In many instances, however, a province's or district's ability to absorb increases in recurrent budgets is dependent on **capital** spending, particularly if the area has insufficient health facilities. We recommend that data be compiled on:

- The number of each type of health care facility (primary care facilities and hospitals) within each district and province. As each type of health facility has a standard number of hospital beds, the number of each type of facility also reflects the number of beds. This is then compared to national norms, which are frequently expressed in terms of facility to population ratios (such as those presented in *Table 4*), to identify whether new facilities are needed. Once again, these norms should not be mechanistically applied. For example, in a very sparsely populated area, more primary care facilities may be needed than the population norm suggests to ensure reasonable physical access. Requirements for new buildings must be supplemented with an assessment of the current state of existing facilities, in order to identify facilities that require renovation or major maintenance repairs. This component of the gap analysis can then be used to develop a medium-term infrastructure development plan and capital budget.

Table 4: Example of facility norms for Mozambique

Facility type	Catchment population
Rural health centre I	7,500 – 20,000
Rural health centre II	16,000 – 35,000
Urban health centre C	10,000 – 25,000
Urban health centre B	18,000 – 48,000
Urban health centre A	40,000 – 100,000
District hospital	50,000 – 250,000
Rural hospital	150,000 – 900,000
Provincial hospital	800,000 – 2,000,000

Source: Mozambique Ministry of Health (2002).

- The number and condition of key items of equipment within existing facilities relative to national guidelines on equipment requirements in different categories of health facility (see *Table 5*). Depending on the cost of specific items of equipment, the need to purchase new equipment may inform the recurrent budget (for low-cost items) or the capital budget (for high-cost items).

- The number of each category of health personnel in each facility relative to national guidelines on staffing levels for different types of facilities (see *Table 4*) and for community-based services. This will generally constitute the largest component of additional recurrent budget requirements. For later years, it will be important to estimate the human resource requirements for the new facilities that have been built, so that as a capital project is completed, an adequate recurrent budget is available to make the facility immediately functional. This will also

require careful co-ordination between different directorates within a ministry (e.g. the finance section which undertakes the budget and the infrastructural development and human resources section).

Table 5: Example of simplified equipment and staffing norms for facilities in Mozambique

Item	Rural health centre I	Rural health centre II	District hospital	Rural hospital	Unit Cost (MZM)
Beds	6	64	130	130	20 000
Electric fridges	1	3	6	6	14 000
Electric sterilisation system	1	2	4	4	40 000
Measurement Devices:					
Scales for infants	2	4	8	8	4 500
Scales for adults	2	4	8	8	8 000
Sphygmomanometer	2	3	20	20	2 000
Auricular stethoscope	2	4	20	20	2 100
Pinard stethoscope	1	3	6	6	1 100
Clinical thermometers	4	15	25	25	120
Laboratory equipment:					
Microscope	0	1	1	1	45 000
ELISA test device	0	1	1	1	25 000
Haematology device	0	1	1	1	845 000
Biochemistry device	0	1	1	1	784 000
CD4 cell count device	0	1	1	1	28 000
Other equipment:					
Vacuum	2	4	7	7	26 000
Resuscitator	2	6	10	10	7 500
Oxygen kit	1	3	5	5	7 000
X-ray	0	1	1	1	1 750 000
ECG	0	1	1	1	19 000
Human resources:					
Doctor	0	1	7	7	217 035
Nurse	0	0	1	1	180 752
MCH nurse	0	0	1	1	180 752
General medicine technician	1	1	3	3	72 384
Preventive medicine technician	0	1	1	1	72 384
Laboratory technician	0	1	2	2	72 384
Radiology technician	0	1	2	2	72 384
Pharmacy technician	0	1	2	2	72 384

Source: Mozambique Ministry of Health (2002).

Once the gap in facilities, equipment and staff has been calculated, it can be translated into monetary terms using the cost of building each type of facility, cost of each item of equipment and the salaries of different categories of health personnel (see *Table 5*).

Table 6 overleaf provides a simplified illustration of such a gap analysis, drawing together gap estimates from individual facilities in each sub-district.

Table 6: Simplified gap analysis for a district

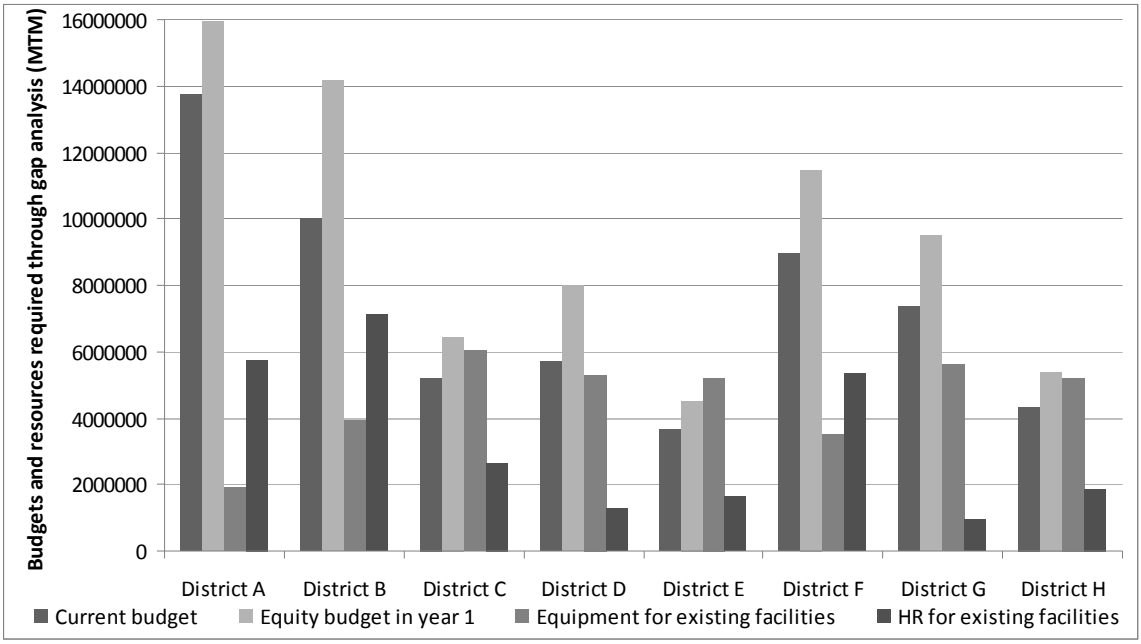
	Sub-district A		Sub-district B		Sub-district C		Sub-district D		Total gap	Monetary value of gap (MZM)
	Existing	Gap	Existing	Gap	Existing	Gap	Existing	Gap		
Gaps related to existing facilities										
Beds		36		4		4		4	48	960 000
Electric fridges	0	3	0	1	0	1	0	1	6	84 000
Electric sterilisation system	0	2	0	1	0	1	0	1	5	200 000
Measurement devices:										
Scales for infants	2	2	1	1	1	1	1	1	5	22 500
Scales for adults	2	2	1	1	1	1	1	1	5	40 000
Sphygmomanometer	4	0	0	2	0	2	1	1	5	10 000
Auricular stethoscope	4	0	0	2	2	0	1	1	3	6 300
Pinard stethoscope	4	0	0	1	1	0	1	0	1	1 100
Clinical thermometers	10	5	0	4	1	3	0	4	16	1 920
Laboratory equipment:										
Microscope	1	0	0	0	1	0	0	0	0	0
ELISA test device	0	1	0	0	0	0	0	0	1	25 000
Haematology device	0	1	0	0	0	0	0	0	1	845 000
Biochemistry device	0	1	0	0	0	0	0	0	1	784 000
CD4 cell count device	0	0	0	0	0	0	0	0	0	0
Other equipment:										
Vacuum	2	2	1	1	1	1	1	1	5	130 000
Resuscitator	0	6	0	2	0	2	0	2	12	90 000
Oxygen kit	2	1	0	1	1	0	1	0	2	14 000

	Sub-district A		Sub-district B		Sub-district C		Sub-district D		Total gap	Monetary value of gap (MZM)
	Existing	Gap	Existing	Gap	Existing	Gap	Existing	Gap		
X-ray	0	1	0	0	0	0	0	0	1	1 750 000
ECG	0	1	0	0	0	0	0	0	1	19 000
Human resources in existing facilities:										
Doctor	1	0	0	0	0	0	0	0	0	0
Nurse	0	0	0	0	0	0	0	0	0	0
MCH nurse	0	0	0	0	0	0	0	0	0	0
General medicine technician	1	0	0	1	1	0	0	1	2	144 768
Preventive medicine technician	0	1	0	0	0	0	0	0	1	72 384
Laboratory technician	0	1	0	0	0	0	0	0	1	72 384
Radiology technician	0	1	0	0	0	0	0	0	1	72 384
Pharmacy technician	0	1	0	0	0	0	0	0	1	72 384
Gaps related to new facilities										
Building of new health facilities										
Build health centre II								1		36 000 000
Build district hospital						1				90 000 000
Human resources for new health facilities										
New health centre II								1	1	1 572 545
New district hospital						1			1	6 092 047

3.2 Linking the resource allocation formula targets and the gap analysis

Figure 3 shows the relationship between the resource allocation formula targets and the gap analysis for districts in a province that is currently under-resourced. The first column indicates the current budget for each district while the second indicates the suggested budget based on phasing in the equity targets over a five-year period. The third and fourth columns are based on elements of the gap analysis. They indicate that in all districts the proposed increase in budgets through the resource allocation formula can be absorbed by addressing deficiencies in equipment and human resources within existing facilities. In many districts, the required resources highlighted in the gap analysis exceed the increase in budgets in the first year of phasing in the resource allocation formula; the gaps will only be filled over several years of budget increases.

Figure 3: Illustration budget increase based on resource allocation formula and magnitude of resource requirements through gap analysis



While the gap analysis indicates that increased funding through the equitable resource allocation process can be absorbed at district level, additional actions are required to ensure that resources are indeed absorbed effectively. The results of the gap analysis should first be structured into detailed plans and budgets along the following lines:

- Capital plans and budgets for building new facilities, making major repairs and renovations to existing facilities and purchasing high-cost equipment (both to close equipment gaps in existing facilities and to fully equip new facilities once construction is completed) – although it may take considerable time to close the facility gaps.
- Short-term increases in recurrent budgets, including increased staffing of existing health facilities to move towards national staffing guidelines, the purchase of low-cost equipment required to fully equip existing facilities and minor maintenance of existing facilities. The need for additional drug supplies should also be taken into account, although these are often centrally procured (i.e. additional budgets need to be provided at the national level for increased drug supplies).

- Medium-term increases in recurrent budgets for staff and medical supplies for newly constructed facilities.

When making adjustments for additional recurrent expenditures, take into account additional drugs and other medical supplies that will be needed as utilisation inevitably increases with the greater staffing levels, not only salaries for staff.

The gap analysis and associated development of detailed plans and budgets for expanding service capacity in currently under-served districts will promote greater capacity for absorbing resources allocated in line with the targets suggested by the resource allocation formula. However, these plans still need to be implemented successfully; the effective use of additional resources allocated to underserved areas is critical to ensure that the resource re-allocation process is sustained. Efforts to redistribute resources across geographic areas to promote equity are easily discredited if districts allocated additional funding are unable to use these resources effectively. Thus, implementation support should also be provided to districts and there should be careful monitoring and evaluation of the implementation process.

Finally, a critical element of the planning and budgeting process is taking into account whether there are overall human resource shortages within the country. If there is a shortage, it will inevitably make it more difficult for relatively under-resourced areas to recruit additional staff even if their budget is increased, hence reducing their capacity to absorb funds. While beyond the scope of this particular report, it is critical that the above planning and capital and recurrent budgeting process is closely linked to a human resource development plan.

4. Summary of overall process

This paper has outlined two processes that are important in promoting equity in the allocation of resources between geographic areas while simultaneously promoting the efficient use of resources. *Figure 4* provides an overview of these two processes and attempts to highlight the inter-relationship between them.

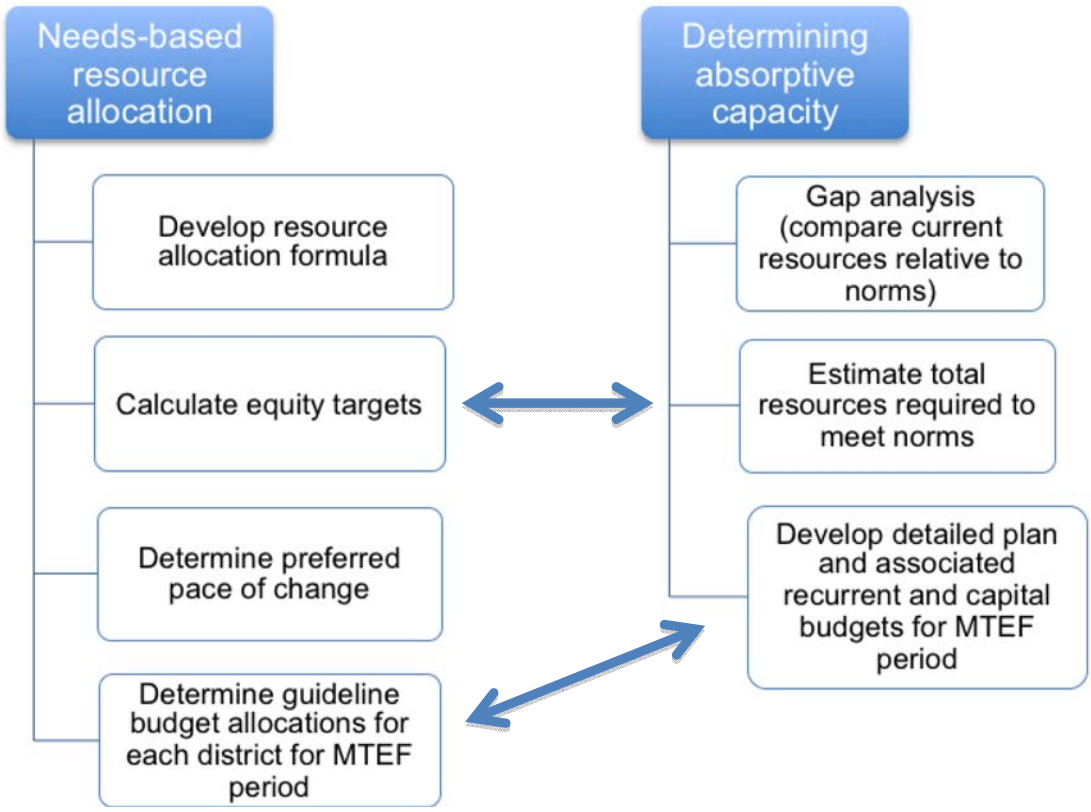
On the one hand, there should be a process for establishing equity targets or an equitable share of the health care budget for each geographic area (in this figure, focussing on districts). It is critical that this process is led by national government, which will have to provide stewardship in mediating the competing demands of different districts and must ensure that the principle of equity guides this process.

On the other hand, each district should assess its existing services, and the physical and human resources it has, relative to national norms. This gap analysis will allow each district to estimate the total resources each district requires to meet the national norms.

There needs to be a comparison of the equity targets/equitable shares of the overall budget with the total resource requirements of each district. In effect, this compares the **relative** equitable budget share of each district with its **absolute** resource requirements in order to reach the national norms. This comparison is necessary because the overall health system may be under-resourced, i.e. the combined total resource requirements for all districts may exceed the total budget available for funding district services. If this is the case, the pace of change should not be too ambitious as many districts will be under-resourced. However, if some districts are already resourced at or above the national norms, it is possible to give a clear priority

to the most under-resourced districts and to focus considerable energy on improving their resourcing.

Figure 4: Summary of overall process and inter-relationships



The equity targets and preferred pace of change (see *Figures 1* and *2*) can then be used to determine a **guideline** budget allocation for each district for each year of the MTEF period. This gives the district an indication of the magnitude of budget changes they can expect, which provides a basis for realistic planning and budgeting (i.e. to avoid unrealistic expectations). However, the **final** budget allocation to each district can only be determined once the gap analysis has been translated into detailed plans and recurrent and capital budgets for the MTEF period and after careful consideration of what budget increase is **feasible** for each district to absorb (as explained in section 3.2). For example, in the first year, it is only possible to increase recurrent spending on services provided at **existing** facilities by purchasing new equipment, improving the availability of medical supplies and employing additional staff (but there will need to be special efforts to ensure that staff can be attracted to currently under-resourced districts as these are likely to be in areas that are relatively unattractive to health professionals). It will also be important to initiate capital spending to expand existing or build new facilities in underserved areas as soon as possible. However, there may also be delays in implementing capital projects due to the need for transparent tendering processes etc. It is advisable to err on the side of caution in the first year, and based on implementation experience in that year, to gradually adjust the MTEF allocations for future years. This requires careful monitoring of the implementation process.

It cannot be stressed enough that the role of the national Ministry of Health should not be restricted to simply calculating equity targets and finalising MTEF budget allocations. Officials at the national and provincial or regional levels must support district managers to absorb increased budget allocations (e.g. to fast-track tendering for capital projects and procuring equipment; to facilitate attracting health professionals to underserved areas by offering rural allowances and other incentives).

5. Conclusions

This paper provides an overview of the methods used to promote an equitable distribution of health care resources across geographic areas. It highlights that a needs-based resource allocation formula is extremely valuable in breaking the inertia of historical incremental budgeting that is so frequently used to determine allocations across areas. It also highlights that all too frequently developing and trying to move towards equity targets generated by a needs-based resource allocation formula is not sufficient, particularly because geographic areas face challenges in absorbing additional funds allocated to them. Successful implementation of resource redistribution can be greatly facilitated by undertaking a detailed gap analysis. The gap analysis will provide a basis for developing detailed infrastructure and service development plans accompanied by capital and recurrent budgets. There is also a need to strengthen local capacity for planning, budgeting and implementing plans to ensure effective use of limited health care resources and phasing of implementation. Detailed monitoring and evaluation of all these processes will enable learning that can enhance effective redistribution of resources to promote health service equity across geographic areas.

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Appendix 1: Table A.1: Calculations for weighting population for demographic composition

Population 2012											
	Female					Male					Population
	0 - 4	5 -14	15 - 44	45 - 59	60+	0 - 4	5 -14	15 - 44	45 - 59	60+	
Province A	142 840	200 862	322 071	52 340	30 967	142 332	198 750	296 060	55 717	30 448	1 472 387
Province B	155 670	240 365	397 814	79 631	54 006	156 083	236 312	355 691	76 939	44 824	1 797 335
Province C	400 156	630 681	1 045 797	180 307	96 777	400 799	627 718	947 773	206 246	111 587	4 647 841
Province D	415 775	632 775	986 841	170 329	92 879	417 150	630 916	836 258	170 871	90 410	4 444 204
Province E	165 500	280 167	420 482	69 969	42 476	163 973	277 837	378 572	67 231	37 521	1 903 728
Province F	119 118	210 135	320 205	75 064	63 584	118 674	205 686	227 416	45 656	41 146	1 426 684

	Female					Male				
	0 - 4	5 -14	15 - 44	45 - 59	60+	0 - 4	5 -14	15 - 44	45 - 59	60+
National utilisation rates	4,25	1,17	2,98	2,50	5,10	4,36	1,23	1,20	2,60	5,00
Normalised rates	3,63	1,00	2,55	2,14	4,36	3,73	1,05	1,03	2,22	4,27

Population weighted by age gender utilization 2012											
	Women					Men					Weighted Population
	0 - 4	5 -14	15 - 44	45 - 59	60+	0 - 4	5 -14	15 - 44	45 - 59	60+	
Province A	518 863	200 862	820 318	111 838	134 984	530 400	208 942	303 651	123 816	130 120	3 083 793
Province B	565 468	240 365	1 013 236	170 152	235 411	581 643	248 431	364 811	170 976	191 556	3 782 047
Province C	1 453 558	630 681	2 663 654	385 271	421 848	1 493 576	659 909	972 075	458 324	476 868	9 615 764
Province D	1 510 294	632 775	2 513 492	363 951	404 857	1 554 508	663 271	857 701	379 713	386 368	9 266 929
Province E	601 175	280 167	1 070 971	149 506	185 152	611 045	292 085	388 279	149 402	160 346	3 888 129
Province F	432 694	210 135	815 565	160 393	277 161	442 238	216 234	233 247	101 458	175 838	3 064 962

Equity in health implies addressing differences in health status that are unnecessary, avoidable and unfair. In southern Africa, these typically relate to disparities across racial groups, rural/urban status, socio-economic status, gender, age and geographical region. EQUINET is primarily concerned with equity motivated interventions that seek to allocate resources preferentially to those with the worst health status (vertical equity). EQUINET seeks to understand and influence the redistribution of social and economic resources for equity-oriented interventions, EQUINET also seeks to understand and inform the power and ability people (and social groups) have to make choices over health inputs and their capacity to use these choices towards improving their health.

EQUINET implements work in a number of areas identified as central to health equity in the region:

- Protecting health in economic and trade policy
- Building universal, primary health care oriented health systems
- Equitable, health systems strengthening responses to HIV and AIDS
- Fair financing of health systems
- Valuing and retaining health workers
- Organising participatory, people-centred health systems
- Social empowerment and action for health
- Monitoring progress through country and regional equity watches.

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