Deprivation-based resource allocation criteria in the Zambian health service: A review of the implementation process

Bona M. Chitah and Felix Masiye
Department of Economics, University of Zambia, Lusaka, Zambia

The Regional Network for Equity in Health in east and southern Africa (EQUINET)
in co-operation with the
Health Economics Unit, University of Cape Town

EQUINET DISCUSSION PAPER 51

September 2007

Table of contents

Executive summary

Resource allocation is a major and often complex challenge in the funding of health services. Faced with the aim of addressing improvements in the health, especially health of the poor and disadvantaged such as children and women, the health sector in Zambia has been grappling with the question of an appropriate 'health needs' based allocation formula. Such a formula required to also address the equity aspects of society in terms of influencing the re-distribution of other resources such as human resources; the right sizing of health facilities; related infrastructure and the setting of guidelines for future health sector investments.

During 1993/94, the Ministry of Health shifted from the use of historical adjustments in the budgeting and resource allocation process towards: activity based budgeting and a population based allocation criteria. These changes were accompanied by system changes that included the decentralisation of the governance structure. The relationship with the resource allocation mechanism was embedded in the control of resources at the district level - the district health board were to be responsible for resources as 'fund-holders or 'gatekeepers'. Eventually, during 2002/4 the Central Board of Health, Ministry of Health and the Resource Allocation Working Group agreed on attempting to factor in deprivation or poverty into the resource allocation formula.

This study reviews the formulation of the deprivation-based formula and also assesses how the deprivation-based resource allocation formula has been implemented in terms of achieving the initial desired goals of resource – re-distribution. It further considers the extent of converge or divergence in the equity goals relating to resource re-distribution through the allocation of funding to the districts.

Qualitative and quantitative data was collected. The study relied broadly on two approaches:
- Desk reviews which collected data from the various documents of the Ministry of Health, donors and the Central Board of Health. These documents related to the budgets and disbursements of resources made over the period under consideration. Also collected and analysed were various documents of the Resource Allocation Working Group.
- Key informant (in-depth) interviews were conducted with various stakeholders. These interviews were structured on the premise of focussed interviews in some cases as were as on a one to one basis. Structured information guides were used.

Bivariate and logistic regression analysis was conducted to investigate the association of the population, deprivation and actual disbursements in terms of the equity targets of the resource allocation formula was investigated primarily through the regression model.

It was established that implementation a functional formula that addresses existing imbalances is highly prioritised by key stakeholders such as the funders (donors) and service providers, yet significant lapses in the design and implementation of the resource allocation formula exist. Changes in the institutional framework through the dissolution of the Central Board of Health and the Resource Allocation Working Group appear to have had a negative consequence on the appropriate implementation, monitoring and evaluation of the formulae implementation, which seem to have led to ad hoc implementation of the formula.

Divergences from the equity objectives are exacerbated by the lack of well articulated schedule or framework for a logical progression to guide attainment of the equity goals without disrupting the system. Yet, the fears of disruption and losses of resource created opposition to the expeditious implementation of the formula. The variance between the actual equity budget and the disbursements has been significant demonstrating the failure towards attaining any systematic changes in the system both to compensate the poorer and more deprived districts and also minimise the exacerbation of the difference between the more well off districts and the more deprived districts.

1. Introduction

Of the many problems that confront decision makers in the health sector, few are more controversial than the allocation of resources for public health (Bobadilla et al 1993; Casto et al, 2000; McMillan, 2002). So what is resource allocation and why is it so controversial?

Governments practise resource allocation when they decide how to spend their resources on a range of health care needs. In developing countries like Zambia, resources are limited so they usually fail to meet all their citizens' public health needs, which are many and varied. In Zambia, the Ministry of Health is forced to make difficult decisions about who will get resources and who won't, while simultaneously dealing with the problem of developing a form of resource allocation that is equity-based and will lead to the stated national health goals of improving access, equity and equality. These decisions often have conflicting technical, political and ethical dimensions. In this paper, we will examine how resources are allocated to health districts in Zambia, which presents great challenges because they are so geographically diverse and far apart from one another.

Many countries, ranging from the United Kingdom and Sweden to South Africa, Namibia and Ghana, have been struggling to develop better mechanisms for the geographical allocation of resources (McIntyre et al, 2001; Diderichsen et al, 1997; Andersson et al, 2000). The UK has been dealing with resource allocation problems since the 1970s, so it provides useful experiences of how inequities in health and in funding had been perpetuated by experiences of historical programming (Diderishsen et al, 1997). Here in Africa, McIntyre et al (2001) draw attention to the problem of geographical health care inequity in South Africa, a country with one of the highest underlying inequities in the world. And recent experiences in Ghana demonstrate a difficult path towards an equitable geographical resource allocation formula (Asante et al, 2006). Zere et al (2007) also found that Namibia is grappling with considerable geographical inequities in the allocation of its health resources.

Since the beginning of Zambia's health sector reforms in 1993, the development and implementation of an equitable resource allocation formula under a decentralised, district health-oriented system has been at the top of the health care financing policy agenda. Reforming resource allocation was seen a central instrument for achieving the benefits of an equity-oriented, responsive decentralised health care system:

> *The sum of our health strategies must lead to a society in which Zambians create […] and provide basic level health care for all. […] The re-allocation of resources between and within districts, and between the centre and the districts, will be necessary to implement the new system. This transition will not be accomplished overnight. It will require appropriate incentives to districts to re-allocate resources and national strategies for defining appropriate allocations for public financing.*
>
> Katele Kalumba, Minister of Health in *National Health Strategic Plan 1995-1999*: 6.

In 2004, the Central Board of Health (CBOH) and Ministry of Health (MoH) developed a deprivation matrix that was used to rank all districts in order of material deprivation. This was clearly an important step in promoting equity of resource distribution across regions of a relatively unequal country. In 2004, Zambia finally adopted a deprivation-based resource allocation formula, replacing the previous system that was based on mark-ups defined through historically adjusted budgets. Historical budgets did not reflect any clear equity values and actually perpetuated historical imbalances in allocations arising out of a history of urban-biased social investment (MoH, 1995). For instance, there was an imbalance in the allocation of funds to areas like infrastructure, human resources, drugs and medical supplies. This imbalance was partially caused by the under-funding of primary health care services in preference to secondary and tertiary services (MoH, 2000; Lake et al, 2002). Since the formulation of the deprivation-based allocation formula, there has not been any systematic follow up (monitoring and evaluation) of the implementation process and results arising from it. Implementing resource allocation reforms can often be fraught with conflicting

moral, ethical, financial, technical and political perspectives, which suggests a cautious approach is better than a rapid attempt to reverse existing imbalances (Diderishsen and Whitehead, 1997). This paper provides an analysis of the progress of implementation of the resource allocation formula in Zambia. This paper:

- serves as a basis for informing the technical experts involved on some salient aspects of the allocation formula, including the attainment of equity objectives;
- provides a systematic assessment of whether deprivation criteria alone are sufficient to bring about a successful implementation of equitable resource allocation in health;
- evaluates the performance of the formula to date, in line with the expectations of the RAWG to continuously monitor and evaluate the implementation process; and
- can inform policy markers concerned with the fulfilment of national goals of efficiency, effectiveness and equitable access to health care.

Zambia has a population of 11 million inhabitants and is classified as a low-income country with an average GDP per capita of US$400 (Ministry of Finance and National Planning, 2006). The economy is small, relatively weak and largely dependent on external assistance. Since successful political reforms that delivered a new government in 1992, Zambia has been implementing wide-ranging economic and institutional reforms. A main aim of these economic policies was to reduce public spending (including social spending) with a view to reducing inflation. There has been a clear association between these liberal economic reforms and negative trends in health outcomes in Africa (Bell and Reich, 1986).

At the micro level, employment was lost in both rural and urban areas, causing massive poverty among families. The agriculture sector, which provided the largest source of employment and livelihood for rural communities, was also affected by reduced public funding, leading to loss of productivity among peasant farmers who depended on government subsidies for their inputs, veterinary services for prevention of animal disease and marketing of their produce. In the urban areas, unemployment grew in the wake of job losses arising from privatisation. While all this was happening, individuals were expected to start paying user fees for health services. These economic reforms have been associated with a short-term deterioration in poverty and access to public services such as water and sanitation (Ministry of Finance and National Planning, 2000-2006; Weeks and McKinley, 2006). Significantly, the economic map of Zambia portrays a clear urban bias in socio-economic development. This pattern of growth has been driven largely by a long history of urban-biased policies that disadvantaged rural populations (Thurlow and Wobst, 2004). *Table 1* shows trends in key health and socio-economic indicators since the early 1990s.

Table 1: Selected economic, social and health indicators

Indicators	1991-1992	1996	2002
GDP per capita, US$ 1995 prices	350	380	440
Total health expenditure% GDP	-	6.0	6.4
Population below poverty line (%)	75.4	68.9	66.5
Infant mortality rate	101	102	95
Under-five mortality rate	180	197	168
Maternal mortality rate (per 100,000)	730	649	729
Total fertility rate	-	6.1	5.9
Population without any level of education (%)	24.2	24	14
HIV prevalence rate (%)	-	19.7	15.6

Sources: Zambia DHS, 1996; UNICEF, 2002.

Overall, Zambia's health profile is characterised by a high burden of communicable diseases, notably HIV/AIDS, tuberculosis and malaria, with high child and adult mortality rates. Although total health sector spending as a share of GDP is reasonably modest at 6%,

it is low in absolute terms, averaging only US$20-30. All the key health indicators connected with Millennium Development Goals (MDGs) are still dismal, suggesting that health service delivery to the poorest will be a key policy challenge in the near future.

In this paper, we systematically evaluate the progress made in implementing the deprivation-based resource allocation formula in Zambia, which was developed as a key aspect of the overall strategy for achieving fair or equitable allocation of health sector resources to district health services. We track the decisions and actions of the Resource Allocation Sub-committee (RASC) of Central Board of Health that was in charge of devising the new resource allocation criteria. We identify any factors that might have facilitated or constrained the implementation of deprivation-based resource allocation criteria in Zambia. More specifically, we aim to:
- determine how the deprivation formula has been applied in re-allocating resources pre-2004 and post 2004;
- assess if there are significant discrepancies between the formula allocations and actual disbursement by district and by region (i.e. province);
- determine if there has been any systematic and real allocation towards less deprived districts; and
- document any major policy issues considered during the process of reform and assess how these were managed.

This study was formulated in order to inform stakeholders including policy makers, technocrats the donor community and others, on the progress with the revised resource allocation formula. It was intended to draw on the experiences learned and provide recommendations to strengthen the implementation process.

2. Methodology

The data used in this paper were collected from the Financial and Administration Management Systems (FAMS) unit of CBOH. The data include spreadsheets on funding allocations, disbursements, district population, deprivation index, levels of locally-generated incomes and other items. Data were available for the three years from January 2004 through December 2006. All amounts are in nominal terms. The financial years runs from January to December. The year 2004 is considered as the baseline as the time that the allocation formula was adopted during 2004. We use a number of important terms:
i.   **Allocation:** the amount determined by the deprivation-based formula for each district.
ii. **Disbursement:** the amount actually transferred (or disbursed) to that district, which may or may not be equal to the allocation.
iii. **Equity budget:** the desired eventual targeted allocation based on the resource allocation formula. Although this is identical to the concept of 'allocation' as we have defined it, the equity budget, does not necessarily have to be achieved as an immediate goal. The process of attaining the equity budget may be achieved over time. However it is cardinal that the process is representative of a consultative process, consensus, political support as well as stakeholder participation. In addition it is necessary to recognise that this may be a function of time duration. That duration may be defined by various factors including stakeholder commitment, resource availability and disturbance effects on the system in terms of the risk of disrupting service delivery.

In addition, during the process of the study, interviews were held with members of the RASC regarding the implementation process of the new formula. In addition, interviews were held with 2 staff of the FAMS Unit of CBOH who were not members of RASC. Other interviews were held with representatives of district health management teams in Lusaka, Kafue, Livingstone, Kitwe and Chongwe districts. The districts were selected on the basis of proximity and ease of communication via telephone. The total number of interviewees was 23. Two main methods have been used in this study as elaborated below:

- We apply statistical analysis to the data available at CBOH and MoH. Graphical illustrations are also presented.
- In the second stage we apply qualitative analysis to interviews and documents gathered from CBOH and MoH.

We recognise that these approaches would be complementary. While the quantitative analysis would help answer some of the questions about progress, they are clearly inadequate to provide all the answers to explain processes which are not reflected in figures. Thus, we relied on the information gathered through key informants to inform our analysis.

The main method of analysis is regression analysis. Consideration is given to the use of actual disbursement as the dependent variable in order to determine how deprivation explains allocations across districts. The analysis is extended by through the inclusion of other variables. Again, the sign and significance of the coefficient of deprivation as well as the overall model power are examined. Specifically, the variables included are population size and geographical location (rural or urban) which are also used for control purposes. These models are run for each of the three years 2004 to 2006.

Specifically, the study used logistic regression in order to test whether the probability of a district receiving disbursement that is less than officially allocated depends on the factors above (population size and geographical location). This test is an indicator of reallocation and equity. Furthermore, progress towards reallocation means a time element. We test with a simple panel data model assuming random effects with the year as our time effect. Simple estimates of the differences in resources are also computed to determine the variation between the equity budget or allocation and the actual disbursements.

Our qualitative analysis, based on interviews and a review of some RASC minutes was focused on identifying the forces or factors that shaped both the pace and nature of implementation of the formula after the RASC had adopted it. This analysis is based on interpretation of events according to insider stakeholder RASC members and providers who were affected by this reform.

3. Historical review of equity-based resource allocation in Zambia

As already mentioned, prior to 1992/93, allocation of resources in the health sector was based on historically adjusted budgets. This practice continued briefly after 1993, following the creation of the district health boards. The Health Reform Implementation Team (HRIT), the forerunner to the CBOH, used a system of budgeting for health care that was inherited from the past as a basis for providing resources to districts. For each subsequent year, it was a matter of adjusting for inflation and, in some cases, simply an arbitrary mark-up based on the Treasury (Ministry of Finance) directives. Eventually, by 1994, a simple population-based resource allocation system was introduced to replace the previous one. For the first time since user fees were abolished in the early 1970s, public health facilities were allowed to charge user fees again.

Smaller districts and other stakeholders complained that the allocation formula favoured in the larger districts. When revenues from user fees were taken into account, the larger and wealthier districts were able to raise more revenue. User fee collections amounted to 7-10% of total income in some of the larger districts; in contrast, they were typically less than 3% in the poorer districts (MoH/CBOH, Financial Statements, various). As pointed out already, the idea of health reforms was to have a decentralised, district-based functional health system fully supported by an equitable resource allocation framework, both geographically and across all levels of care.

The institutionalisation of resource allocation reforms in the health sector was to be done through a broad-based committee within the ministry consisting of MoH and CBOH staff, bilateral and multilateral donors (who were giving substantial resources under the Sector-Wide Approach to advance health reforms), as well as representatives from newly created health structures and line ministries such as the Ministries of Finance, Community Development and Social Services, and Education. By this time, the health sector was operating consultative mechanisms through a formal structure called the Health Sector Steering Committee (HSSC). This Committee was a structure proposed under SWAP to rekindle the trust and confidence between the ministry and its donors after the some loss of trust in of the mid 1990s (MoH, 2000). The HSSC meets biannually to review progress on key objectives and make pronouncements for future targets and goals. The HSSC appointed four technical sub-committees to be in charge of routine functions. These sub-committees were in charge of resource allocation (such as the RASC), monitoring and evaluation, human resources and health infrastructure.

Before we look at the two main criteria that were used to determine resource allocation, namely, population-based criteria and deprivation-based criteria, we will first examine the role of the Resource Allocation Sub-committee (RASC) mentioned above.

3.1 The Resource Allocation Sub-committee

The main mandate of the Resource Allocation Sub-committee was to provide technical guidance and oversight in the search for an equity-based allocation formula. Members of RASC came from the MoH, CBoH, donor organisations, the financial sector, academic institutions and selected line ministries, using a basic framework described in *Box 1*.

Box 1: Framework of the commissioning mechanism and resource allocation formula used by the RASC

Resource allocation reforms were being conceived within the organisational changes taking place under the principle of Sector-wide Approach (SWAp) in the health sector. Under SWAp the Central Board of Health created an instrument for pooling Government and donor funds into a 'basket'. Initially this initiative, referred to as the District Basket, was meant to secure some funding for district level services. It was later expanded to include hospitals, training institutions and other institutions into a Health Sector Basket. The pooled funds included sources from domestic and several external donors from foreign bilateral and multi-lateral agencies. The concept of the district basket was aimed at providing predictable funding directly to the districts. This was seen as crucial for sustaining the district health system under District Health Boards (DHBs) and DHMT. There were two strategic elements that came into being between 1993 and 1995. These were the creation of autonomous District and Hospital Boards that would assume responsibility for the provision of health care services (National Health Services Act, 1995) as well as the restructuring of the funding mechanism to the district health services based on the pursuit of equity principles as well as population considerations that have been alluded to above.

Under this arrangement, CBOH was the funding intermediary (principal). Thus, CBOH would perform its commissioning role in terms of purchasing or payment for services from the agents or health care providers i.e. the District Health Boards. Ambitions for greater attainment of vertical equity have in the course of the last decade fuelled policy objectives designed for purposes of achieving some of the following:
i.   Make resources available throughout the country in order to ensure access to care for every Zambian regardless of ability to pay.
ii. Develop strategies for pooling and sector expansion of a common resource base so as to increase the effectiveness of any allocation criteria. This was necessary as the health sector in Zambia was funded through a multiplicity of sources, both bilateral and multi-lateral. The policy by MoH was to reduce the extent of programmes and budgets

financed under vertical arrangements. Rather, MoH was developing and strengthening the pooling of resources ('basket funding'). MoH policy was therefore to centrally and uniformly fund the sector. This approach would then expand the resource envelope and make the resource allocation criteria fairer as resources were more harmonised within the sector.

iii. Attempt to equalise resource availability across regions so that districts can have similar access to resources in order to deliver their services.

Further, a specific strategy was devised to address the question of funding. This embraced a broader concept and function of "Commissioning" rather than simply 'resource allocation'. Commissioning was an operational framework based on the decentralised structures of the health system which allowed DHBs the autonomy to take greater control of their own budgets (MoH 1995, CBoH 1996). The function of health service commissioning was executed through contracting in which the DHMTs and hospital boards were the providers and the CBoH remained as the fund holder on behalf of the Ministry of Health. This was intended to promote performance based financing and attainment of goals.

It is from the above perspective that it is, in Zambia, accepted that the challenges of commissioning were broader than that of resource allocation as they impinged on broader health sector financing goals and objectives. Thus, resource allocation criteria were considered in a broader context of health service commissioning. DHMTs, Hospital Management Boards, training institutions and other legal structures of the health sector worked in a framework in which they were to engage in a contractual relationship with the Ministry of Health through the Central Board of Health (CBOH, 1996). The contracting process would then be the basis for ensuring that resources allocated on the basis of a formula were further subjected to service provision performance assessment. Basically, commissioning entailed the creation of a purchaser-provider split epitomised in the concept of 'principal – agent' theory. This would also lead to the creation of an internal market through contractual arrangements among service providers (i.e. DHMT and other institutions) and the financing intermediary who is the CBoH in this case.

Contracting arrangements between the CBOH and DHMTs stipulated that DHMTs would allocate resources across various health units and functionaries within the district.

Further stipulations concerned how the districts would allocate resources to referral facilities in cases of referrals or/and for district health services in cases where the districts had no district hospital and only had ambulatory care i.e. how the demand for hospital care would be financed or purchased within the framework of the resource allocation guidelines or formula.

The RASC further constituted a smaller sub-entity called Resource Allocation Working Group (RAWG) to provide technical expertise and leadership in the process of developing and reviewing resource allocation formula. The RAWG was also mandated to provide technical guidance on a comprehensive health resource allocation programme that would include allocating resources according to level of health care or budget line item, and would consider involving the private sector in public-private partnerships. However, the specific role of RAWG in this context was to oversee the development and adoption of a material deprivation index (MoH, 2004; MoH, 2005).

3.2 Population-based resource allocation criteria

In the beginning, the search for a new equity-oriented resource allocation approach was focused on population size only. This allocation criterion was only intended to be an interim mechanism as processes for more rigorous criteria were being devised. Nonetheless, this change represented a drastic and politically bold step from historically based allocations, both conceptually and in practice (CBOH, 1997). This attempt was aimed at equalising per capita allocations. The population data was based on the Central Statistical Office's official

Government district population rather than what districts quote as their catchment population, which often differed from official CSO figures.

Later, RAWG agreed that district population should be weighted by a number of variables that they considered crucial to the (cost of) provision of health services, namely:
- The distance of each district from Lusaka, should be taken into account because the costs of services and inputs increase the further away from Lusaka you go.
- The varying price of fuel in each district affects the cost of many other items raising the overall running cost of DHMTs.
- Banking facilities are not equally distributed among the districts. Some districts have no bank facilities, so they incur an extra and significant charge in their operational costs.
- Some areas are prone to outbreaks of specific diseases, such as cholera, which raises their overall running costs.

These variables were referred to as 'adjustment factors', but were really practical considerations and using the variables generated a number of problems. For example, deriving the weights of each parameter was largely ad-hoc and highly controversial. Further, the assumption that the further a district was from Lusaka, the greater the cost of its programmes was challenged. Critics pointed out that there was no data on the marginal cost of each kilometre travelled from Lusaka to fully substantiate this assumption. In general, there was dissatisfaction with this process. A former member of RASC and bilateral health advisor remarked: 'The variables did not have much meaning in terms of the relationship to influencing the status of health'. According to a financial specialist at CBOH, the population-based formula was regarded as 'temporary' because the weighting variables were identified on an ad-hoc basis and were 'included and dropped depending on prevailing conditions'. Thus, the process advanced to the next stage, to experiment a need-based approach.

3.3 Deprivation-based resource allocation criteria

Two approaches are commonly used to define health need in health care: those using population health measures (e.g. morbidity or mortality) and those using material deprivation measures (or economic indicators) of need (Coast et al, 1996). In this section, we will examine these two approaches separately.

4.3.1 Using population mortality measures to define Zambia's health needs

Ideally, morbidity (or mortality) data can be considered as a relatively direct measure of a population's ill health and therefore its health needs. Regions with higher morbidity or mortality rates are seen as needier than others.

Although this data can be used to determine the allocation of health resources, Zambia does not have a comprehensive vital registration system to obtain mortality data by cause of death. In fact, in most rural districts there is virtually no vital registration. National mortality data are only obtained from surveys such as the demographic and health survey, which is conducted only once in five years, or the census, which comes once in ten years. So, this data cannot be used for annual allocation purposes and the ministry has so far had to rely on data collected through the health information systems (HMIS).

Nonetheless, there are fundamental concerns regarding the validity and reliability of morbidity data collected through HMIS. Firstly, HMIS typically represent a biased coverage of the population. For example, in areas in which deprivation is high, access to facilities is low, implying that morbidity records would misleadingly suggest prevalence of low morbidity. A large share of morbidity and mortality burden occurs outside the formal health care system and is never captured in HMIS records. For instance, it is estimated that as much as 60% of malaria cases among children (Demographic and Health Survey, 2002) may not be captured in the health facilities because they occur at home. In this way, HMIS morbidity statistics

might actually emphasise the health care needs of the wealthier sections of society because they have better access to health care. In addition, some facilities do not maintain accurate records, so their HMIS data is not really a reliable indicator of disease burden and needs to be validated by population-based survey data.

Secondly, the philosophical foundations of deprivation-based criteria emphasise the significance of underlying causes of ill health and therefore health needs. In particular, health is seen as a multifaceted outcome influenced by the environment, socio-economic status, genetics, cultural conditions and other factors. Of these factors, the one that is often seen as most central is socio-economic status. Although the channels through which material wellbeing affects health status are complex, the evidence of a correlation is quite strong (Carr-Hill et al, 1996; Diderichsen et al, 1997; Eachus et al, 1996). Root (1999) suggested that disparities in socio-economic status aggravated health care needs across sub-national areas in Africa, even in areas where the disease pattern was fairly homogeneous. If socio-economic factors do have a confounding effect on disease burden, it can be argued that deprivation-based allocation is intended to mitigate the effects of disparities in health care needs caused by socio-economic conditions. In practice, however, the link between the deprivation index and health need versus mortality has not been straightforward as was the case in South Africa (McIntyre, 2000).

Thirdly, funding based on morbidity ignores many district health care needs that cannot be appropriately measured in terms of morbidity such as family planning and many prevention services. Finally, in practice, morbidity data could also be manipulated by districts that are trying to get more resources.

In conclusion, direct measures of health need, such as morbidity, are clearly less useful as tools for allocating health resources than they initially appeared to be. In this context, the idea of deprivation-based allocation is to give all districts similar capacity to address their local primary health care needs. This has been the motivation behind need-based allocation approaches in many health systems (Rice and Smith, 2001).

4.3.2 Using levels of material deprivation to define Zambia's health needs

In 2003, RAWG commissioned the Central Statistical Office (which also conducts the Living Conditions Monitoring Survey (LCMS) and Demographic and Health Survey (DHS)) to assist in developing a material deprivation-based index of every district. This was a transparent way to provide a national district weighting scheme. Using a database on various dimensions of socio-economic and demographic conditions, a deprivation index was calculated for each district (see *Table 2*). All 72 districts were then ranked according to deprivation. In early 2004, a new formula based on deprivation was devised and presented to RASC. The proposed recurrent resource allocation formula incorporating the deprivation index is: $D_{iA} = R_T * w_{iMD} + B_{iD}$

> Where:
> D_{iD} = Weighted resource allocation for district i
> R_T = Total resources available
> W_{iMD} = material deprivation index weight for district i
> B_{iD} = proxy for disease burden[1] in district i (i = 1, 2,3,…72)

Following this, an extensive orientation process was launched for MoH and CBOH officials on how the formula was to be applied. Further, all DHMT officials (directors and accountants) were also oriented on the revised formula. The implications of the formula were demonstrated to these stakeholders in terms of the changes to the allocation of resources.

---

[1] Malaria is used here because it was statistically 1% significant

The *per capita* equivalent for the allocations and disbursements were also computed. Taking two districts only for illustrative purposes of this approach, namely Chibombo and Kabwe, from *Table 2* for 2004 we see that the *per capita* allocation should have been K13,681 and the disbursement K9,854 for Chibombo. This results in an over-allocation of K3,827. Similarly Kabwe had an allocation of K5,973, and a disbursement of K10,941 with a resultant negative allocation of (K4,968) *per capita.*

Table 2: Derivation of Deprivation Index based on material deprivation

Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Livingstone	-3.09	Monze	-0.18	Luangwa	0.33	Mporokoso	0.53	Zambezi	0.72
Lusaka	-2.85	Kasama	-0.04	Mpika	0.38	Isoka	0.57	Mungwi	0.73
Kitwe	-2.79	Kalomo	0.03	Mambwe	0.42	Kaoma	0.61	Kabompo	0.74
Mufulira	-2.74	Mumbwa	0.05	Kawambwa	0.42	Chinsali	0.62	Mwinilunga	0.74
Chililabombwe	-2.69	Sinazongwe	0.06	Solwezi	0.43	Nyimba	0.63	Senanga	0.74
Chingola	-2.64	Siavonga	0.07	Sesheke	0.44	Petauke	0.64	Kaputa	0.75
Luanshya	-2.51	Chipata	0.09	Mbala	0.47	Lufwanyama	0.65	Lundazi	0.78
Ndola	-2.5	Mongu	0.1	Itezhi-tezhi	0.47	Katete	0.65	Chilubi	0.8
Kabwe	-2.17	Mansa	0.16	Gwembe	0.48	Nchelenge	0.65	Kalabo	0.8
Kalulushi	-2.08	Chibombo	0.17	Masaiti	0.49	Mufumbwe	0.65	Lukulu	0.83
Kafue	-1.81	Mkushi	0.24	Serenje	0.5	Samfya	0.66	Chiengi	0.9
Mazabuka	-0.6	Namwala	0.27	Mwense	0.52	Milengi	0.7	Chama	0.91
Chongwe	-0.46	Kapiri Mposhi	0.29	Luwingu	0.52	Chadiza	0.71	Chavuma	0.92
Choma	-0.39	Nakonde	0.31	Kasempa	0.52	Mpulungu	0.72	Shangombo	1.09
		Mpongwe	0.33	Kazungula	0.52				

Quintile 1 - Least Deprived, Quintile 5 Most Deprived)*

The approach used in the analysis was SPSS-based Principal Component Analysis (PCA). (For further reading on this analysis, refer to the report on the analysis and derivation of the deprivation index by the Ministry of Health, 2004). *Box 2* below shows the complete list of variables initially used as a basis in the computation of the deprivation index. The variables that were later included on account of significance are given in *Box 3*.

Box 2: Variables for deprivation index

Dependence ratio
% under fives in population
% women of reproductive age in population
% female headed household of all households
% Households situated more than 5 km to food market
% households more than 5 km to health facility
% households more than 5 km to primary school
% households more than 5 km to Boat/Bus/Taxi transport
Poverty headcount (see list below)
Proportion of households with roof of poor material
Proportion of households with wall of poor material
Proportion of households with floor of poor material
Proportion of houses of poor material
Proportion of households overcrowded (>3 persons per room)
Proportion of households without electricity for lighting
Proportion of households without no electricity/gas/solar/candle for lighting
Proportion of households without car
Proportion of households without radio
Proportion of households without bicycle
Proportion of households without fridge

Poverty headcount
Proportion of households without TV
Proportion of households without plough
Proportion of households without canoe
Proportion of households without flush toilet
Proportion of households without a safe toilet
Proportion of households without tap water source
Proportion of households without safe water source
Illiteracy rate of head
Illiteracy rate
Non-blood diarrhoea incidence
Non-blood diarrhoea case fatality rate
Malaria incidence
Malaria case fatality rate
Pneumonia incidence
Pneumonia case fatality rate
Non-pneumonia respiratory incidence
Non-pneumonia respiratory case fatality rate
Eye infection incidence
Health Centre staff contact rate
Health Centre staff non-contact rate

Box 3: District-level variables later included in the formula

% of households situated more than 5km to food market
% of households situated more than 5km to primary school
% of households situated more than 5km to Boat/Bus/Taxi transport
Poverty headcount P0
Proportion of households with houses of poor material
Proportion of households with no electricity/gas/solar for lighting
Proportion of households with no electricity/gas/solar for cooking
Proportion of households without electricity
Proportion of households without car
Proportion of households without radio
Proportion of households without TV
Proportion of households without plough
Proportion of households without safe toilet
Proportion of households without safe water source
Illiteracy rate

Source: Living Conditions Monitoring Surveys 1998 and 2002-3; Census 2000 and Health Management Information Systems (HMIS)

The derived index of material deprivation was developed by taking into account the above mentioned variable sources. These were selected on the basis of the level of significance in explaining deprivation relative to other variables, which were then excluded. The index was subsequently used to determine the weighted population of each district to make resource allocation and the funding of district health care more equitable.

4. Implementation of the Resource Allocation Formula, 2004-2006

As we will discuss below, we found that in terms of the resource allocation formula, there were:
- political pressures and arbitrary adjustments to the formula; and
- discrepancies between allocations and disbursements.

4.1 Political pressure and arbitrary adjustments to the formula

The implementation of the resource allocation formula has not proceeded according to the technical basis for the computation and derivation of the formula. Below, we will describe the experiences of various stakeholders involved in resource allocation. The results of the various interviews that have been held have been categorised by the type of respondent. From the summary presented in *Table 3*, it is evident that stakeholders were generally in agreement about principles of a new equity-based formula.

The need for a change to include deprivation seems to have wide support across all stakeholders. All were in favour of the principle that a population-based formula should include deprivation as a key determinant of the status of health. We also see that the element of deprivation (poverty variables) was heavily supported as a tool for eliminating existing variations in health status and for achieving equitable access to health care. However, most stakeholders also expressed the view that the potentially disruptive consequences on service delivery of rapid implementation were to be avoided. In particular, the stakeholders expressed concern that since all districts were already operating under budgetary constraints it was not feasible to simply take resources from one highly ranked district and transfer them to a more deprived district.

As expected, the greatest challenge of this reform emerged during implementation, once allocations were produced with the use of the formula. Different stakeholders voiced major concerns with the implementation of the revised formula. The most vocal opposition came from DHMTs who stood to lose resources as a result of the formula. For example, the larger districts such as Lusaka, Ndola and Livingstone argued that the revised or proposed revisions to the allocation of resources would impact negatively on their ability to implement programmes. Because the whole health system is grossly under-funded, any reductions in their budgets would lead to deterioration of health services provision and failure to meet the basic targets of their district strategic and annual plans. Almost all districts were of the view that such drastic changes would lead to adverse effects on the quality and provision of health care:

It's a joke to think we can provide services with such an adjustment.

Official of large, urban District Health Management Team.

However, the smaller districts welcomed the chance to improve their individual conditions and quality of care. The donors raised anxiety over what they considered as firstly a violation of public finance principles. It was argued that an institution should not be made worse off for the purpose of benefiting another institution:

We cannot allow a district to be worse off than it was before.

Health Advisor of bilateral mission.

It was also argued that an immediate implementation of the formula was not possible in view of the apparent drastic nature of the losses to the losing districts. Rather a practical approach was to ensure that the formula was implemented over time. A two to three year period was identified as a possible time frame. During this time a progressive increase in the resource envelope for district and hospital services was recommended.

However, other technocrats from CBOH and MoH argued in favour of a full implementation of the formula or additionally increased funding from the Government and donors in order to expand the resource envelope. It was argued that deviating from the consensus on the adoption of the formula would render it meaningless over time. On the other hand, other officials from the Ministry of Health were mindful of what would be the politicians' response in the areas where major resource re-allocations were to happen:

Is it feasible that in Lusaka, where the seat of Government is, we can simply cut resources just like that?

Senior MoH official

Table 3: How stakeholders perceive implementation of the deprivation-based resource allocation formula

Questions	Co-operating partner (Bilateral donor): 4	Co-operating partner (Multi-lateral agency): 2	District Health Management Team staff: 6	CBoH (Since dissolved): 6	MoH: 5
In principle, are you in favour of a population based formula that includes deprivation as a key determinant in the status of health?	All interviewed responded in affirmative	All interviewed responded in affirmative	All interviewed responded in affirmative	All interviewed responded in affirmative	All interviewed responded in affirmative
Would you classify this as an improvement over the previous formula?	All interviewed responded in affirmative	All interviewed responded in affirmative	All interviewed responded in affirmative	All interviewed responded in affirmative	All interviewed responded in affirmative
What are the major concerns with the implementation of the revised formula?	•Resource envelope is too narrow to support radical changes •Adverse effects on quality of care for losing districts •Public finance principles - districts should not lose current revenue •Utilisation (morbidity) does not appear to have been addressed	•Resource envelope too small •Adverse effects on quality of care •Public finance principle - districts should not lose current revenue •The process should be cautious and less ambitious to avoid a backlash •Inequitable distribution of other health inputs (human resources, capital and equipment) have a far greater negative equity weight than recurrent budgets	•Resource envelope too small •DHMTS of large districts stated that they would lose out if formula implemented in current format without any adjustment for morbidity and staffing and infrastructure capacity. This was simply because they face higher fixed costs. •The formula does not address the special cost needs of districts. Deprivation alone can't be the basis for allocation. Some districts have to maintain staffing levels above official levels in order to survive. So we use every means legal to hire staff using different revenue sources in order to keep staff. Also, some districts have serious accommodation	•Resource envelope has to be extended first. •Political repercussions at district level have impeded progress •Adverse effects on quality of care in big districts •Factors that are exogenous to deprivation that impact on cost tend to distort equity impact of allocation criterion •High overhead costs determined by cost structure in big districts makes severe under funding politically impossible.	•Political considerations at the district level •Adverse effects on quality of care for districts that need to sustain a high level of care profile •Little debate and agreement about full redistributive consequences of formula.

		could ever redress. Debate to look at a broader context.	and transport issues which this formula doesn't address. The service profile of districts also differs.		
What are the major successes or advantages of the current proposed formula	• Equity objectives have been more integrated into the process • Criteria address poverty which is important	• Equity objectives have been more integrated into the process • Addresses poverty concerns • It is crucial to maintain this consciousness in policy	Equity objectives have been more integrated into the process	Equity objectives have been more integrated into the process Consistency Addresses poverty; health needs	Equity objectives have been more integrated into the process It's a good, bold start. With time, equity objectives can be achieved

Unless the resource envelope expanded it was not feasible to implement this formula in full. Stakeholders within the SWAp led by MoH and some donors that contribute pooled funding argued that a staggered approach would be ideal (MoH, 2004.) Immediate implementation would have resulted in a major disturbance to the system through radical adjustments or 'losses' for major urban-based districts such as Lusaka, Kitwe, Livingstone, Chingola etc, while the rural based districts with the most observed deprivation levels such as Shango'mbo would gain. However, a condition for implementing this formula was that that no one district should suffer reduced funding in absolute terms while the others were made better-off. This meant that reallocation was to be realised only from future growth in resources.

4.1.1. RAWG Recommendations on the implementation of the formula

The RAWG presented the context for implementation of the resource allocation formula. However, as noted by the some of the members, 'nothing definitive or conclusive' was documented on this issue. General principles appear to have been more of concern than specifics. For instance, there was general agreement that the assumed allocations that were the result of the formula were:

- too drastic to implement effectively without negative consequences; and
- would lead to unacceptable circumstances at variance with public finance practices, which it was argued, generally maintain that no institution should be made worse off as a consequence of improving the status of another institution. This reference was made with respect to the potential risks faced by some of the large districts that would otherwise have losses as shown in the appendices relative to the gains by the other districts. Given say a weighting factor of over 4, for Chadiza for instance, this meant that Chadiza would get four times the resources it used to get as opposed to the redistribution that would be experienced by Lusaka or Livingstone.

More significantly, a recommendation was made to ensure that the allocation of resources should be done over two to five years (although no definite time was determined according to the RAWG Secretariat, 2004/5). This meant that adjustments to increase resources to the underserved districts would be gradually increased, but at a faster rate than the other districts in order to attain the equity targets.

RAWG further recommended that flexibility about deprivation be maintained such that the recommended variables in *Table 5* below would from time-to-time be considered in terms of: (a) How was the formula fairing in addressing some of the variables in the table e.g. was the share allocated to reproductive health in district programmes sufficient enough to generate improvements in reproductive health indicators? (b) Should other variables such as infrastructure, human resource or maternal mortality be factored into the weight?

Table 5: RAWG-recommended variables for adjusting the resource allocation formula

Proposed parameter	Rationale for selecting proposed parameters
Population number	Population number is obviously important.
Population by age	Children and young adolescents could be seen as vulnerable groups.
Population by gender	Female literacy is considerably lower than male literacy. Female disease burden including maternal mortality is very high.
Levels of poverty/deprivation	Poverty is a powerful indicator for health problems.
Population density	Proxy for transportation needs and hence costs.
Health problems: Maternal Mortality Rate as sub-indicator	MMR is a strong indicator, reflecting access to and availability of qualified health care

Refugees	Refugee populations are vulnerable groups adding to health care strain.
Needs for staff incentives in hard-to-reach areas	Human resources are the main production factor. Districts with facilities in hard-to-reach areas cannot easily attract qualified staff.
Extra costs for transports	Districts with needs for boat (or air) transports need more resources.
Discounting	Population in districts provided with additional external funding are better off than districts without such funding.
Fixed allocation	There is a minimum staff and infrastructure needed for each DHMT.

However, following the dissolution of both RAWG and the CBOH, the process that was supposed to be structured on the formulation and process of adjustment of the formula was not implemented. In effect, only the officer responsible for budget coordination made any changes to the formula. As shown in *Table 2* above and *Tables 7-9* below, this adjustment is equivalent to a reduction of about 56% of the weighting factor of the actual deprivation formula. The justification provided for this measure was that it minimised variances across the board. This compromise was considered desirable and less controversial, as it helped address the concern about the effects of an immediate change to the allocation criteria. The unfortunate consequence of this arbitrary adjustment was to disadvantage the districts that were supposed to benefit most from the deprivation formula. The funds required to implement the 56% scale-down in the formula were taken from allocations initially meant for the most deprived districts.

4.2 Discrepancies between allocations and disbursements

Over five years, progress was made in moving from the adjustments to the resource allocation formulation, as show in *Table 6*.

Table 6: Progress in resource allocation adjustments over a five-year period

District	Per capita resource differential (20% adjustment) (*Zambian Kwacha*)	Annual changes (Increments or deductions) in resources made available				
		Year 1	Year 3	Year 3	Year 4	Year 5
Chibombo	5,973	1194.6	2389.2	3583.8	4778.4	5973
Annual adjustment (*per capita*)		1194.6	1194.6	1194.6	1194.6	1194.6
Kabwe	(4968)	(993.6)	(1987.2)	(2980.8)	(3974.4)	(4968)
Annual adjustment (*Per capita*)	(993.6)	(993.6)	(993.6)	(993.6)	(993.6)	(993.6)

Note: Amounts would vary depending on time frame selected e.g. a three year would lead to higher adjustments per annum.

Table 7-9 show the deprivation index, normalised deprivation index score, adjusted weight, population; weighted population as well as the allocations and disbursements by district for 2004-2006.

Table 6: Table of Disbursements and Proposed Allocations for 2004

District	Material Deprivation Index	Normalised Material Deprivation Index Score	Adjusted population weight	Population 2004	District Allocation 2004	Per Capita Alloca-tion 2004	Actual disbursements	Per capita disbursements	Difference 2004 (District allocation less actual disbursement)	Per capita difference 2004
Chibombo	0.17	4.26	1.98	261,758	3,581,067,694	13,681	2,579,275,934	9,854	1,001,791,760	3,827
Kabwe	(2.17)	1.92	1.28	184,713	1,103,310,641	5,973	2,021,006,220	10,941	(917,695,579)	(4,968)
Kapiri Mposhi	0.29	4.38	2.01	209,263	2,923,074,224	13,968	1,982,852,161	9,475	940,222,063	4,493
Mkushi	0.24	4.33	2.00	118,872	1,684,394,063	14,170	1,391,303,636	11,704	293,090,427	2,466
Mumbwa	0.05	4.14	1.94	172,326	2,300,931,076	13,352	2,041,867,825	11,849	259,063,251	1,503
Serenje	0.50	4.59	2.08	145,387	2,158,134,033	14,844	1,583,299,226	10,890	574,834,807	3,954
Chililabombwe	(2.69)	1.40	1.12	74,518	340,264,376	4,566	1,030,647,582	13,831	(690,383,206)	(9,265)
Chingola	(2.64)	1.45	1.14	184,618	856,074,116	4,637	1,741,582,607	9,433	(885,508,491)	(4,796)
Kalulushi	(2.08)	2.01	1.30	82,070	480,847,985	5,859	932,877,135	11,367	(452,029,150)	(5,508)
Kitwe	(2.79)	1.30	1.09	400,522	1,650,864,065	4,122	3,374,286,234	8,425	(1,723,422,169)	(4,303)
Luanshya	(2.51)	1.58	1.17	150,273	755,018,101	5,024	1,715,111,337	11,413	(960,093,236)	(6,389)
Lufwanyama	0.65	4.74	2.12	67,954	1,032,318,222	15,191	965,354,626	14,206	66,963,596	985
Masaiti	0.49	4.58	2.07	102,127	1,495,338,150	14,642	977,770,885	9,574	517,567,265	5,068
Mpongwe	0.33	4.42	2.03	69,136	960,150,197	13,888	1,604,493,549	23,208	(644,343,352)	(9,320)
Mufulira	(2.74)	1.35	1.11	156,756	682,408,286	4,353	3,418,797,132	21,810	(2,736,388,846)	(17,456)
Ndola	(2.50)	1.59	1.18	396,765	1,997,112,118	5,033	1,285,874,661	3,241	711,237,457	1,793
Chadiza	0.71	4.80	2.14	99,205	1,518,401,038	15,306	1,154,164,551	11,634	364,236,487	3,672
Chama	0.91	5.00	2.20	86,721	1,358,749,435	15,668	1,095,591,740	12,634	263,157,695	3,035
Chipata	0.09	4.18	1.95	384,908	4,978,756,282	12,935	3,735,565,207	9,705	1,243,191,075	3,230
Katete	0.65	4.74	2.12	204,339	3,069,972,054	15,024	2,043,441,839	10,000	1,026,530,215	5,024
Lundazi	0.78	4.87	2.16	272,880	4,148,997,895	15,204	2,559,113,363	9,378	1,589,884,532	5,826
Mambwe	0.42	4.51	2.05	51,207	737,286,009	14,398	994,268,238	19,417	(256,982,229)	(5,019)
Nyimba	0.63	4.72	2.12	76,604	1,160,722,664	15,152	2,577,802,317	33,651	(1,417,079,653)	(18,499)
Petauke	0.64	4.73	2.12	277,665	4,172,668,384	15,028	820,438,475	2,955	3,352,229,909	12,073
Chiengi	0.90	4.99	2.20	90,066	1,430,526,109	15,883	1,203,510,303	13,363	227,015,806	2,521
Kawambwa	0.42	4.51	2.05	106,419	1,557,231,886	14,633	1,344,777,356	12,637	212,454,530	1,996
Mansa	0.16	4.25	1.98	197,312	2,694,597,718	13,657	2,404,822,403	12,188	289,775,315	1,469
Milengi	0.70	4.79	2.14	29,935	459,996,867	15,367	636,785,258	21,272	(176,788,391)	(5,906)
Mwense	0.52	4.61	2.08	114,529	1,702,789,572	14,868	1,357,910,746	11,856	344,878,826	3,011
Nchelenge	0.65	4.74	2.12	119,031	1,795,966,904	15,088	1,477,956,313	12,417	318,010,591	2,672
Samfya	0.66	4.75	2.13	174,148	2,618,449,327	15,036	1,923,483,725	11,045	694,965,602	3,991
Chongwe	(0.46)	3.63	1.79	148,360	1,700,730,527	11,464	1,663,453,665	11,212	37,276,862	251
Kafue	(1.81)	2.28	1.38	159,722	1,153,137,646	7,220	1,696,619,291	10,622	(543,481,645)	(3,403)
Luangwa	0.33	4.42	2.03	20,614	298,377,860	14,474	575,416,852	27,914	(277,038,992)	(13,439)

District	Material Deprivation Index	Normalised Material Deprivation Index Score	Adjusted population weight	Population 2004	District Allocation 2004	Per Capita Alloca-tion 2004	Actual disbursements	Per capita disbursements	Difference 2004 (District allocation less actual disbursement)	Per capita difference 2004
Lusaka	(2.85)	1.24	1.07	1,141,350	4,432,044,510	3,883	11,422,579,511	10,008	(6,990,535,001)	(6,125)
Chilubi	0.80	4.89	2.17	72,200	1,106,748,039	15,329	952,333,692	13,190	154,414,347	2,139
Chinsali	0.62	4.71	2.11	138,559	2,054,938,562	14,831	1,610,037,820	11,620	444,900,742	3,211
Isoka	0.57	4.66	2.10	105,808	1,534,365,865	14,501	1,320,745,751	12,482	213,620,114	2,019
Kaputa	0.75	4.84	2.15	93,131	1,402,259,807	15,057	1,232,481,040	13,234	169,778,767	1,823
Kasama	(0.04)	4.05	1.92	183,406	2,319,075,676	12,644	2,029,788,151	11,067	289,287,525	1,577
Luwingu	0.52	4.61	2.08	84,874	1,217,346,522	14,343	1,141,279,558	13,447	76,066,964	896
Mbala	0.47	4.56	2.07	161,686	2,320,310,038	14,351	1,915,466,214	11,847	404,843,824	2,504
Mpika	0.38	4.47	2.04	156,488	2,172,062,636	13,880	1,739,123,472	11,113	432,939,164	2,767
Mporokoso	0.53	4.62	2.09	81,541	1,211,532,401	14,858	1,225,782,836	15,033	(14,250,435)	(175)
Mpulungu	0.72	4.81	2.14	72,197	1,079,025,674	14,945	1,861,895,981	25,789	(782,870,307)	(10,843)
Mungwi	0.73	4.82	2.15	122,798	1,873,897,504	15,260	1,680,057,695	13,681	193,839,809	1,579
Nakonde	0.31	4.40	2.02	79,982	1,095,340,095	13,695	995,127,265	12,442	100,212,830	1,253
Chavuma	0.92	5.01	2.20	32,162	511,380,127	15,900	652,806,650	20,297	(141,426,523)	(4,397)
Kabompo	0.74	4.83	2.15	78,280	1,223,585,129	15,631	777,592,526	9,934	445,992,603	5,697
Kasempa	0.52	4.61	2.08	56,953	846,422,373	14,862	1,069,145,352	18,772	(222,722,979)	(3,911)
Mufumbwe	0.65	4.74	2.12	48,605	745,485,033	15,337	854,364,411	17,578	(108,879,378)	(2,240)
Mwinilunga	0.74	4.83	2.15	128,609	1,998,224,616	15,537	1,621,648,219	12,609	376,576,397	2,928
Solwezi	0.43	4.52	2.06	219,272	3,138,489,538	14,313	2,271,961,338	10,361	866,528,200	3,952
Zambezi	0.72	4.81	2.14	69,911	1,071,756,949	15,330	1,007,488,848	14,411	64,268,101	919
Choma	(0.39)	3.70	1.81	212,664	2,426,769,524	11,411	2,184,270,033	10,271	242,499,491	1,140
Gwembe	0.48	4.57	2.07	37,613	554,536,414	14,743	731,715,301	19,454	(177,178,887)	(4,711)
Itezhi-tezhi	0.47	4.56	2.07	47,575	705,277,551	14,825	1,926,345,659	40,491	(1,221,068,108)	(25,666)
Kalomo	0.03	4.12	1.94	185,364.41	2,466,120,326	13,304	1,689,921,638	9,117	776,198,688	4,187
Kazungula	0.52	4.61	2.08	7397823%	1,094,340,006	14,793	2,459,177,456	33,242	(1,364,837,450)	(18,449)
Livingstone	(3.09)	1.00	1.00	107,210	333,117,237	3,107	1,896,529,563	17,690	(1,563,412,326)	(14,583)
Mazabuka	(0.60)	3.49	1.75	219,688	2,441,534,289	11,114	1,151,927,977	5,243	1,289,606,312	5,870
Monze	(0.18)	3.91	1.87	176,930.125	2,212,521,637	12,505	942,602,127	5,328	1,269,919,510	7,178
Namwala	0.27	4.36	2.01	93,032	1,334,822,158	14,348	1,300,094,265	13,975	34,727,893	373
Siavonga	0.07	4.16	1.95	61,945	809,258,442	13,064	1,003,997,958	16,208	(194,739,516)	(3,144)
Sinazongwe	0.06	4.15	1.95	89,617	1,211,211,312	13,515	814,785,613	9,092	396,425,699	4,424
Kalabo	0.80	4.89	2.17	119,383	1,832,706,958	15,351	1,509,108,296	12,641	323,598,662	2,711
Kaoma	0.61	4.70	2.11	173,021	2,590,339,354	14,971	1,848,539,999	10,684	741,799,355	4,287
Lukulu	0.83	4.92	2.18	73,017	1,146,729,178	15,705	1,028,299,365	14,083	118,429,813	1,622
Mongu	0.10	4.19	1.96	168,675	2,215,723,598	13,136	1,862,246,481	11,040	353,477,117	2,096
Senanga	0.74	4.83	2.15	113,674	1,725,926,937	15,183	1,427,395,255	12,557	298,531,682	2,626

District	Material Deprivation Index	Normalised Material Deprivation Index Score	Adjusted population weight	Population 2004	District Allocation 2004	Per Capita Alloca-tion 2004	Actual disbursements	Per capita disbursements	Difference 2004 (District allocation less actual disbursement)	Per capita difference 2004
Sesheke	0.44	4.53	2.06	81,721	1,158,262,674	14,173	1,127,225,881	13,794	31,036,793	380
Shangombo	1.09	5.18	2.25	74,101	1,210,230,022	16,332	1,184,972,650	15,991	25,257,372	341

Table 7: Table of Disbursements and Proposed Allocations for 2005

District	Material Deprivation Index	Normalised Material Deprivation Index score	District Allocation 2005	District Allocation Per Capita 2005	Actual Disbursement 2005	Actual Disbursements per capita 2005	Difference 2005 (District allocation less actual disbursement)	Per Capita Difference 2005
Chibombo	0.17	4.26	4,303,838,392	16,097	3,630,165,554	13,577	673,672,838	2,520
Kabwe	(2.17)	1.92	1,325,993,001	7,028	1,870,802,608	9,915	(544,809,607)	(2,888)
Kapiri Mposhi	0.29	4.38	3,513,041,401	16,435	2,748,703,353	12,859	764,338,048	3,576
Mkushi	0.24	4.33	2,024,357,107	16,672	1,855,622,501	15,282	168,734,606	1,390
Mumbwa	0.05	4.14	2,765,330,441	15,710	2,603,950,467	14,793	161,379,974	917
Serenje	0.50	4.59	2,593,712,519	17,465	2,145,951,069	14,450	447,761,450	3,015
Chililabombwe	(2.69)	1.40	408,940,297	5,373	1,003,394,210	13,182	(594,453,913)	(7,810)
Chingola	(2.64)	1.45	1,028,856,464	5,456	1,636,840,198	8,680	(607,983,734)	(3,224)
Kalulushi	(2.08)	2.01	577,898,045	6,894	927,921,654	11,069	(350,023,609)	(4,175)
Kitwe	(2.79)	1.30	1,984,059,714	4,850	3,185,979,495	7,788	(1,201,919,781)	(2,938)
Luanshya	(2.51)	1.58	907,404,206	5,912	1,490,033,312	9,707	(582,629,106)	(3,796)
Lufwanyama	0.65	4.74	1,240,672,106	17,874	1,185,015,874	17,072	55,656,232	802
Masaiti	0.49	4.58	1,797,143,838	17,228	1,346,011,968	12,903	451,131,870	4,325
Mpongwe	0.33	4.42	1,153,938,331	16,340	1,541,055,727	21,822	(387,117,396)	(5,482)
Mufulira	(2.74)	1.35	820,139,476	5,122	3,380,076,525	21,110	(2,559,937,049)	(15,988)
Ndola	(2.50)	1.59	2,400,191,380	5,922	1,678,718,390	4,142	721,472,990	1,780
Chadiza	0.71	4.80	1,824,861,533	18,008	1,577,643,243	15,569	247,218,290	2,440
Chama	0.91	5.00	1,632,987,277	18,435	1,497,419,332	16,905	135,567,945	1,530
Chipata	0.09	4.18	5,983,623,953	15,219	5,044,998,212	12,832	938,625,741	2,387
Katete	0.65	4.74	3,689,587,777	17,677	2,819,484,094	13,508	870,103,683	4,169
Lundazi	0.78	4.87	4,986,394,550	17,889	3,553,515,311	12,749	1,432,879,239	5,141
Mambwe	0.42	4.51	886,093,227	16,941	1,316,226,054	25,164	(430,132,827)	(8,224)

District	Material Deprivation Index	Normalised Material Deprivation Index score	District Allocation 2005	District Allocation Per Capita 2005	Actual Disbursement 2005	Actual Disbursements per capita 2005	Difference 2005 (District allocation less actual disbursement)	Per Capita Difference 2005
Nyimba	0.63	4.72	1,394,992,553	17,828	3,545,882,460	45,316	(2,150,889,907)	(27,488)
Petauke	0.64	4.73	5,014,842,479	17,681	901,501,670	3,179	4,113,340,809	14,503
Chiengi	0.90	4.99	1,719,250,714	18,688	1,640,529,610	17,832	78,721,104	856
Kawambwa	0.42	4.51	1,871,529,652	17,217	1,795,161,250	16,515	76,368,402	703
Mansa	0.16	4.25	3,238,451,240	16,068	2,816,047,130	13,972	422,404,110	2,096
Milengi	0.70	4.79	552,838,524	18,080	734,279,768	24,014	(181,441,244)	(5,934)
Mwense	0.52	4.61	2,046,465,401	17,493	1,862,550,878	15,921	183,914,523	1,572
Nchelenge	0.65	4.74	2,158,448,813	17,753	2,011,987,607	16,548	146,461,206	1,205
Samfya	0.66	4.75	3,146,933,738	17,691	2,645,714,140	14,873	501,219,598	2,818
Chongwe	(0.46)	3.63	2,043,990,777	13,488	1,974,119,218	13,027	69,871,559	461
Kafue	(1.81)	2.28	1,385,876,643	8,495	1,661,164,286	10,182	(275,287,643)	(1,687)
Luangwa	0.33	4.42	358,599,781	17,030	675,177,246	32,065	(316,577,465)	(15,035)
Lusaka	(2.85)	1.24	5,326,568,763	4,569	10,135,772,750	8,694	(4,809,203,987)	(4,125)
Chilubi	0.80	4.89	1,330,124,172	18,036	1,280,794,035	17,367	49,330,137	669
Chinsali	0.62	4.71	2,469,688,996	17,450	2,193,324,356	15,497	276,364,640	1,953
Isoka	0.57	4.66	1,844,048,559	17,062	1,773,814,416	16,412	70,234,143	650
Kaputa	0.75	4.84	1,685,279,394	17,716	1,668,640,139	17,541	16,639,255	175
Kasama	(0.04)	4.05	2,787,137,184	14,877	2,737,131,853	14,610	50,005,331	267
Luwingu	0.52	4.61	1,463,044,864	16,876	1,467,943,670	16,932	(4,898,806)	(57)
Mbala	0.47	4.56	2,788,620,679	16,885	2,579,011,281	15,616	209,609,398	1,269
Mpika	0.38	4.47	2,610,452,346	16,331	2,334,094,055	14,602	276,358,291	1,729
Mporokoso	0.53	4.62	1,456,057,273	17,482	1,356,616,700	16,288	99,440,573	1,194
Mpulungu	0.72	4.81	1,296,806,573	17,585	1,887,907,251	25,600	(591,100,678)	(8,015)
Mungwi	0.73	4.82	2,252,108,229	17,955	2,155,927,833	17,188	96,180,396	767
Nakonde	0.31	4.40	1,316,413,751	16,113	1,285,006,892	15,729	31,406,859	384
Chavuma	0.92	5.01	614,592,522	18,708	780,094,365	23,746	(165,501,843)	(5,038)
Kabompo	0.74	4.83	1,470,542,616	18,391	890,164,868	11,133	580,377,748	7,258
Kasempa	0.52	4.61	1,017,256,700	17,486	1,363,881,280	23,444	(346,624,580)	(5,958)
Mufumbwe	0.65	4.74	895,947,069	18,046	983,299,199	19,805	(87,352,130)	(1,759)
Mwinilunga	0.74	4.83	2,401,528,415	18,281	2,191,455,650	16,682	210,072,765	1,599

District	Material Deprivation Index	Normalised Material Deprivation Index score	District Allocation 2005	District Allocation Per Capita 2005	Actual Disbursement 2005	Actual Disbursements per capita 2005	Difference 2005 (District allocation less actual disbursement)	Per Capita Difference 2005
Solwezi	0.43	4.52	3,771,934,217	16,841	3,113,415,016	13,901	658,519,201	2,940
Zambezi	0.72	4.81	1,288,070,793	18,038	1,241,349,789	17,383	46,721,004	654
Choma	(0.39)	3.70	2,916,566,997	13,426	2,903,621,150	13,367	12,945,847	60
Gwembe	0.48	4.57	666,459,088	17,347	755,316,252	19,660	(88,857,164)	(2,313)
Itezhi-tezhi	0.47	4.56	847,624,469	17,442	2,601,955,622	53,543	(1,754,331,153)	(36,101)
Kalomo	0.03	4.12	2,963,860,012	15,654	1,625,544,522	8,585	1,338,315,490	7,068
Kazungula	0.52	4.61	1,315,211,812	17,405	2,806,563,695	37,141	(1,491,351,883)	(19,736)
Livingstone	(3.09)	1.00	400,350,643	3,656	2,527,906,199	23,084	(2,127,555,556)	(19,428)
Mazabuka	(0.60)	3.49	2,934,311,750	13,076	1,429,149,182	6,369	1,505,162,568	6,707
Monze	(0.18)	3.91	2,659,077,231	14,713	992,126,689	5,490	1,666,950,542	9,224
Namwala	0.27	4.36	1,604,230,732	16,882	1,330,961,044	14,006	273,269,688	2,876
Siavonga	0.07	4.16	972,591,933	15,371	1,245,672,424	19,687	(273,080,491)	(4,316)
Sinazongwe	0.06	4.15	1,455,671,379	15,902	849,794,265	9,283	605,877,114	6,619
Kalabo	0.80	4.89	2,202,604,151	18,062	1,995,101,814	16,361	207,502,337	1,702
Kaoma	0.61	4.70	3,113,150,299	17,615	2,591,880,200	14,666	521,270,099	2,949
Lukulu	0.83	4.92	1,378,174,747	18,478	1,313,180,280	17,607	64,994,467	871
Mongu	0.10	4.19	2,662,925,446	15,456	2,489,915,307	14,452	173,010,139	1,004
Senanga	0.74	4.83	2,074,272,606	17,864	1,865,973,519	16,070	208,299,087	1,794
Sesheke	0.44	4.53	1,392,036,061	16,676	1,395,604,302	16,719	(3,568,241)	(43)
Shangombo	1.09	5.18	1,454,492,034	19,216	1,437,563,577	18,993	16,928,457	224

Table 8: Table of Disbursements and Proposed Allocations for 2006

District	Material Deprivation Index	Normalised Material Deprivation Index Score	District Allocation 2006	District Allocation Per Capita 2006	Actual Disbursement 2006 (6 months disbursement)	Actual Disbursement 12 Month Projection 06	Per Capita Disbursements 2006	Difference 2006 (District allocation less actual disbursement	Per capita difference 2006
Chibombo	0.17	4.26	3,345,896,667	12,251	1,419,199,830	2,838,399,659	10,393	507,497,008	1,858
Kabwe	(2.17)	1.92	1,030,855,519	5,349	722,304,694	1,444,609,388	7,496	(413,753,868)	(2,147)

| District	Material Deprivation Index	Normalised Material Deprivation Index Score	District Allocation 2006	District Allocation Per Capita 2006	Actual Disbursement 2006 (6 months disbursement)	Actual Disbursement 12 Month Projection 06	Per Capita Disbursements 2006	Difference 2006 (District allocation less actual disbursement	Per capita difference 2006
Kapiri Mposhi	0.29	4.38	2,731,114,053	12,509	1,101,978,448	2,203,956,897	10,094	527,157,156	2,414
Mkushi	0.24	4.33	1,573,778,818	12,689	726,311,412	1,452,622,824	11,712	121,155,993	977
Mumbwa	0.05	4.14	2,149,827,447	11,957	1,017,268,897	2,034,537,794	11,316	115,289,653	641
Serenje	0.50	4.59	2,016,407,978	13,293	836,801,977	1,673,603,954	11,033	342,804,024	2,260
Chililabombwe	(2.69)	1.40	317,918,995	4,089	376,239,449	752,478,898	9,678	(434,559,904)	(5,589)
Chingola	(2.64)	1.45	799,855,176	4,152	628,343,581	1,256,687,162	6,524	(456,831,986)	(2,372)
Kalulushi	(2.08)	2.01	449,270,388	5,247	359,380,516	718,761,032	8,394	(269,490,644)	(3,147)
Kitwe	(2.79)	1.30	1,542,450,757	3,691	1,190,277,590	2,380,555,180	5,697	(838,104,423)	(2,006)
Luanshya	(2.51)	1.58	705,435,575	4,499	571,132,343	1,142,264,685	7,285	(436,829,111)	(2,786)
Lufwanyama	0.65	4.74	964,525,218	13,604	461,778,798	923,557,596	13,026	40,967,622	578
Masaiti	0.49	4.58	1,397,138,328	13,112	436,078,119	872,156,238	8,185	524,982,091	4,927
Mpongwe	0.33	4.42	897,096,513	12,437	575,500,393	1,151,000,785	15,956	(253,904,272)	(3,520)
Mufulira	(2.74)	1.35	637,594,094	3,898	1,298,284,745	2,596,569,491	15,876	(1,958,975,397)	(11,978)
Ndola	(2.50)	1.59	1,865,960,476	4,507	636,786,641	1,273,573,281	3,076	592,387,195	1,431
Chadiza	0.71	4.80	1,418,686,662	13,706	613,489,904	1,226,979,807	11,854	191,706,855	1,852
Chama	0.91	5.00	1,269,519,482	14,031	581,156,985	1,162,313,969	12,846	107,205,513	1,185
Chipata	0.09	4.18	4,651,798,143	11,583	1,968,500,832	3,937,001,664	9,803	714,796,479	1,780
Katete	0.65	4.74	2,868,365,008	13,454	1,121,688,387	2,243,376,773	10,522	624,988,235	2,931
Lundazi	0.78	4.87	3,876,530,525	13,616	1,411,956,010	2,823,912,019	9,918	1,052,618,506	3,697
Mambwe	0.42	4.51	688,867,961	12,894	509,819,208	1,019,638,417	19,085	(330,770,456)	(6,191)
Nyimba	0.63	4.72	1,084,497,258	13,569	1,418,954,600	2,837,909,199	35,507	(1,753,411,941)	(21,938)
Petauke	0.64	4.73	3,898,646,558	13,457	363,963,795	727,927,590	2,513	3,170,718,968	10,945
Chiengi	0.90	4.99	1,336,582,536	14,223	635,807,398	1,271,614,797	13,532	64,967,740	691
Kawambwa	0.42	4.51	1,454,967,463	13,104	700,581,543	1,401,163,086	12,619	53,804,376	485
Mansa	0.16	4.25	2,517,641,747	12,229	1,100,179,512	2,200,359,024	10,688	317,282,723	1,541
Milengi	0.70	4.79	429,788,576	13,761	312,916,332	625,832,664	20,038	(196,044,088)	(6,277)
Mwense	0.52	4.61	1,590,966,282	13,314	726,415,975	1,452,831,950	12,158	138,134,332	1,156
Nchelenge	0.65	4.74	1,678,024,598	13,512	781,464,737	1,562,929,474	12,585	115,095,123	927

District	Material Deprivation Index	Normalised Material Deprivation Index Score	District Allocation 2006	District Allocation Per Capita 2006	Actual Disbursement 2006 (6 months disbursement)	Actual Disbursement 12 Month Projection 06	Per Capita Disbursements 2006	Difference 2006 (District allocation less actual disbursement	Per capita difference 2006
Samfya	0.66	4.75	2,446,494,070	13,465	1,037,033,230	2,074,066,460	11,415	372,427,610	2,050
Chongwe	(0.46)	3.63	1,589,042,456	10,266	750,526,846	1,501,053,693	9,697	87,988,763	568
Kafue	(1.81)	2.28	1,077,410,353	6,465	636,410,440	1,272,820,880	7,638	(195,410,527)	(1,173)
Luangwa	0.33	4.42	278,783,193	12,962	287,765,106	575,530,212	26,759	(296,747,018)	(13,797)
Lusaka	(2.85)	1.24	4,140,989,286	3,477	3,829,904,623	7,659,809,245	6,432	(3,518,819,959)	(2,955)
Chilubi	0.80	4.89	1,034,067,181	13,727	500,852,831	1,001,705,662	13,297	32,361,520	430
Chinsali	0.62	4.71	1,919,989,420	13,281	852,709,867	1,705,419,734	11,797	214,569,686	1,484
Isoka	0.57	4.66	1,433,603,069	12,986	687,855,207	1,375,710,414	12,462	57,892,654	524
Kaputa	0.75	4.84	1,310,172,500	13,483	646,494,885	1,292,989,769	13,307	17,182,731	177
Kasama	(0.04)	4.05	2,166,780,479	11,323	1,055,408,675	2,110,817,351	11,031	55,963,129	292
Luwingu	0.52	4.61	1,137,402,590	12,844	571,595,810	1,143,191,621	12,910	(5,789,030)	(65)
Mbala	0.47	4.56	2,167,933,780	12,851	1,001,132,611	2,002,265,223	11,869	165,668,557	982
Mpika	0.38	4.47	2,029,421,881	12,430	906,154,672	1,812,309,344	11,100	217,112,537	1,330
Mporokoso	0.53	4.62	1,131,970,286	13,305	527,300,696	1,054,601,392	12,396	77,368,894	909
Mpulungu	0.72	4.81	1,008,165,362	13,384	718,891,931	1,437,783,861	19,087	(429,618,499)	(5,703)
Mungwi	0.73	4.82	1,750,837,446	13,665	835,778,157	1,671,556,314	13,046	79,281,132	619
Nakonde	0.31	4.40	1,023,408,404	12,264	499,008,746	998,017,493	11,959	25,390,911	304
Chavuma	0.92	5.01	477,797,464	14,238	332,848,753	665,697,506	19,838	(187,900,041)	(5,599)
Kabompo	0.74	4.83	1,143,231,504	13,997	364,101,808	728,203,617	8,916	415,027,887	5,082
Kasempa	0.52	4.61	790,837,269	13,309	526,234,215	1,052,468,430	17,711	(261,631,161)	(4,403)
Mufumbwe	0.65	4.74	696,528,549	13,735	387,884,625	775,769,250	15,297	(79,240,701)	(1,563)
Mwinilunga	0.74	4.83	1,866,999,916	13,914	855,775,285	1,711,550,569	12,755	155,449,347	1,158
Solwezi	0.43	4.52	2,932,382,904	12,817	1,235,557,122	2,471,114,244	10,801	461,268,660	2,016
Zambezi	0.72	4.81	1,001,373,978	13,728	479,601,788	959,203,577	13,150	42,170,401	578
Choma	(0.39)	3.70	2,267,402,003	10,219	1,129,290,711	2,258,581,423	10,179	8,820,581	40
Gwembe	0.48	4.57	518,119,650	13,203	324,120,814	648,241,628	16,518	(130,121,978)	(3,316)
Itezhi-tezhi	0.47	4.56	658,961,519	13,275	1,021,549,143	2,043,098,285	41,160	(1,384,136,766)	(27,885)
Kalomo	0.03	4.12	2,304,168,612	11,914	605,252,507	1,210,505,014	6,259	1,093,663,598	5,655

District	Material Deprivation Index	Normalised Material Deprivation Index Score	District Allocation 2006	District Allocation Per Capita 2006	Actual Disbursement 2006 (6 months disbursement)	Actual Disbursement 12 Month Projection 06	Per Capita Disbursements 2006	Difference 2006 (District allocation less actual disbursement	Per capita difference 2006
Kazungula	0.52	4.61	1,022,473,991	13,247	1,092,319,753	2,184,639,506	28,304	(1,162,165,515)	(15,057)
Livingstone	(3.09)	1.00	311,241,213	2,782	986,992,438	1,973,984,875	17,647	(1,662,743,662)	(14,865)
Mazabuka	(0.60)	3.49	2,281,197,156	9,952	555,690,386	1,111,380,773	4,849	1,169,816,384	5,104
Monze	(0.18)	3.91	2,067,223,913	11,198	396,223,333	792,446,667	4,293	1,274,777,246	6,906
Namwala	0.27	4.36	1,247,163,525	12,849	514,653,507	1,029,307,014	10,604	217,856,511	2,244
Siavonga	0.07	4.16	756,113,918	11,699	485,994,543	971,989,085	15,039	(215,875,168)	(3,340)
Sinazongwe	0.06	4.15	1,131,670,283	12,103	349,939,279	699,878,558	7,485	431,791,726	4,618
Kalabo	0.80	4.89	1,712,351,909	13,747	786,314,422	1,572,628,844	12,625	139,723,065	1,122
Kaoma	0.61	4.70	2,420,230,097	13,407	999,284,324	1,998,568,648	11,071	421,661,449	2,336
Lukulu	0.83	4.92	1,071,422,733	14,064	511,929,292	1,023,858,585	13,439	47,564,148	624
Mongu	0.10	4.19	2,070,215,599	11,763	973,304,135	1,946,608,271	11,061	123,607,328	702
Senanga	0.74	4.83	1,612,584,201	13,596	731,964,413	1,463,928,826	12,343	148,655,376	1,253
Sesheke	0.44	4.53	1,082,198,817	12,692	543,176,613	1,086,353,227	12,741	(4,154,410)	(49)
Shangombo	1.09	5.18	1,130,753,436	14,625	566,122,165	1,132,244,331	14,645	(1,490,895)	(19)

In *Figures 1-3* we can see the variations between the formula-based allocations and the actual disbursements from 2004-2006. If the implementation was perfect, the dots representing disbursement would be above the line showing allocations. The allocations portray a linear relationship with the deprivation index shows that allocations were indeed done in accordance with the formula. Although disbursements to some districts are within a narrow margin of the allocation, many districts receive more or less than was allocated.

Some of the extreme cases of diversion from allocation are easy to note in *Figure 1*. For example, according to the formula Livingstone, which is shown as the least deprived was allocated K3,000 per capita, while Petauke and Monze were allocated K18,000 and K15,000 respectively. However, Livingstone actually received K18,000 while Petauke and Monze received K3,000 and K5,000 respectively.

Figure 1: Allocations versus disbursement in 2004

Allocations vs Disbursements 2004
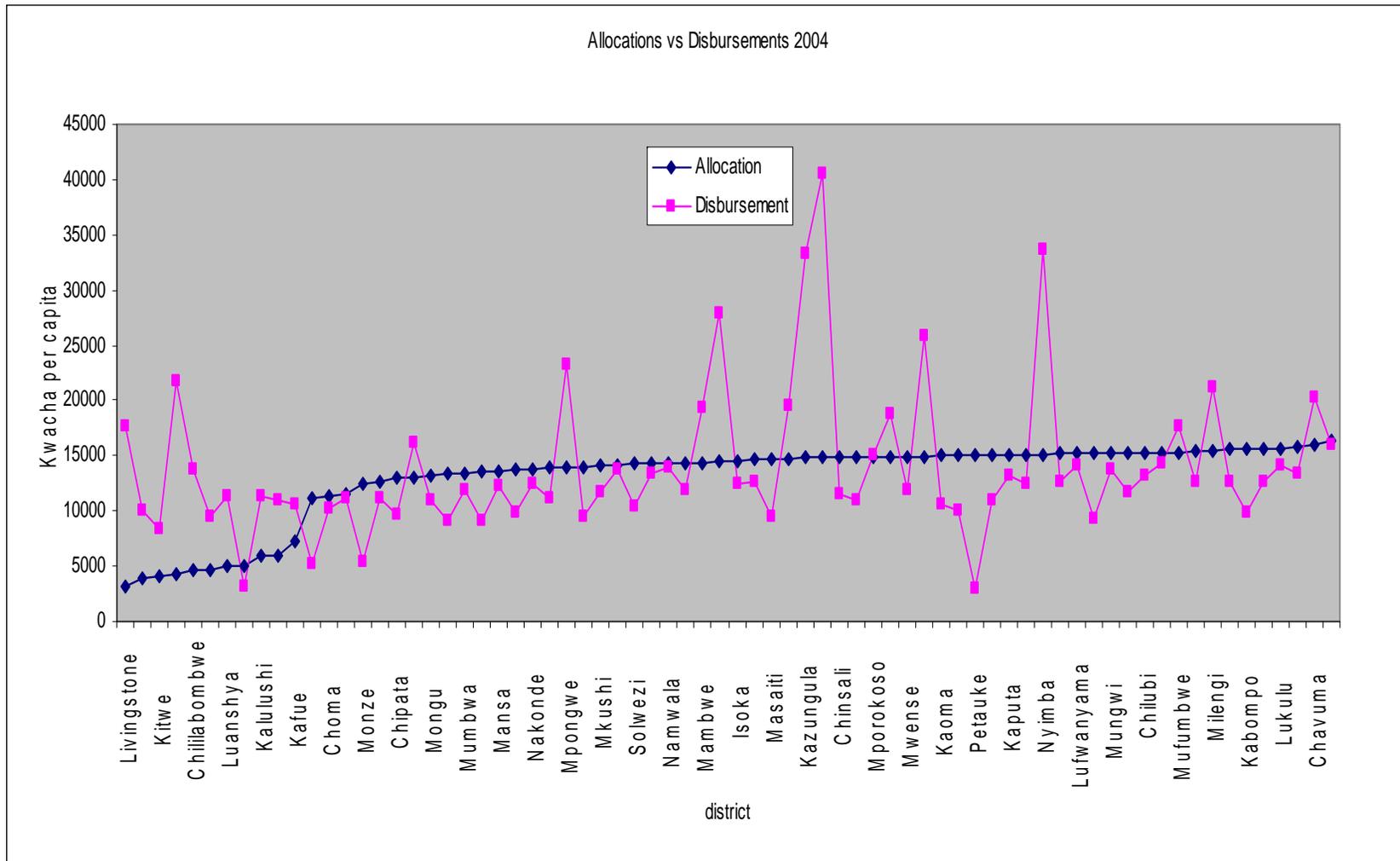
In *Figure 2* districts are bundled into deprivation quintiles, giving a crude picture of progress since 2004. The least deprived (left hand side) has consistently received a much larger share than was allocated. The opposite is the case for the most deprived. Disbursement levels may give a misleading view that disbursements are still equitable since per capita allocations are shown to be slightly higher among least deprived.

The total income (and expenditure) per capita is still much higher in wealthier districts because they are able to raise additional revenue from user fees, which in the big cities are greater than government grants. They also have much more human and capital resources both of which are funded through separate channels. Still, it is clear that the disbursements attempt to narrow the gap between the wealthiest and other districts.

Figure 2: Progress in implementing the deprivation allocation formula from 2004-2006
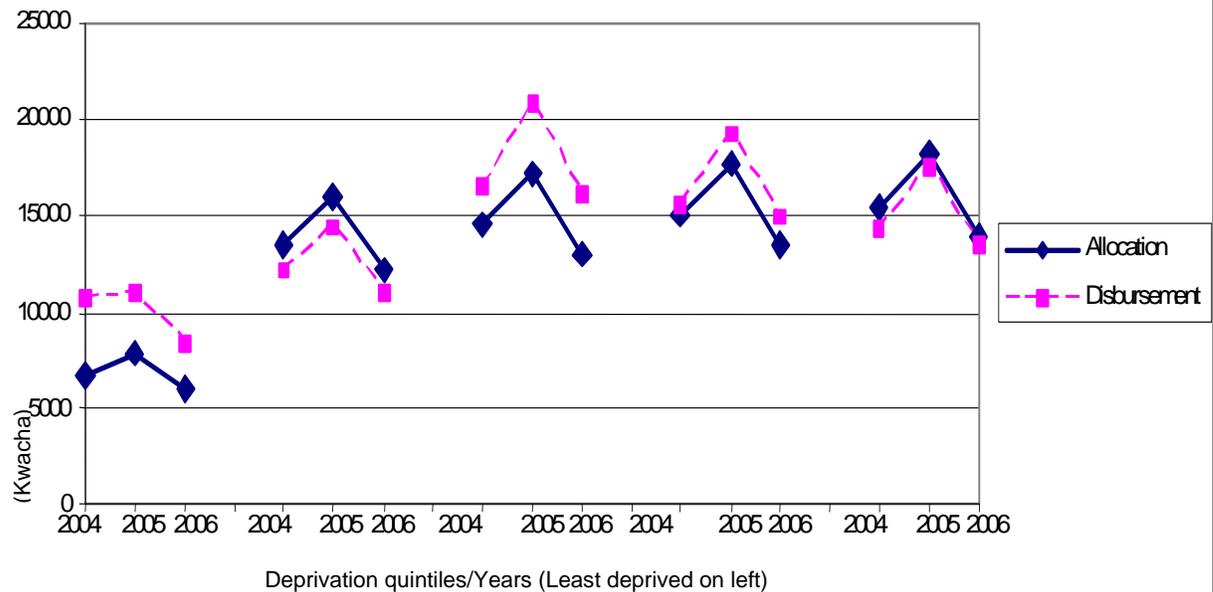
The differences between the current per capita allocations per the proposed criteria and the absolute amounts show that allocation continues to favour of wealthier districts. As shown *Figure 3* in 2005 only one wealthier district received less than its allocation. In some cases, variations are acute and cannot be justified given the comprehensiveness of the formula.

Ranking all districts in order of deprivation, *Figure 3* shows a mixed pattern of poor and richer districts receiving more or less than they were allocated. Since the total number of districts is small, it fairly easy to notice that the proportion among less deprived districts (deprivation less than 2) with positive differences (actual disbursements greater than allocations) was greater than those with negative differences. It can be seen that all the major districts had positive differences. The pattern was the same in all three years.

Figure 3: Discrepancy between allocation and disbursement in order of deprivation in 2005

Discrepancy from Allocation by Deprivation

- Difrference
- Normalised Mat Deprivation Index Score

District
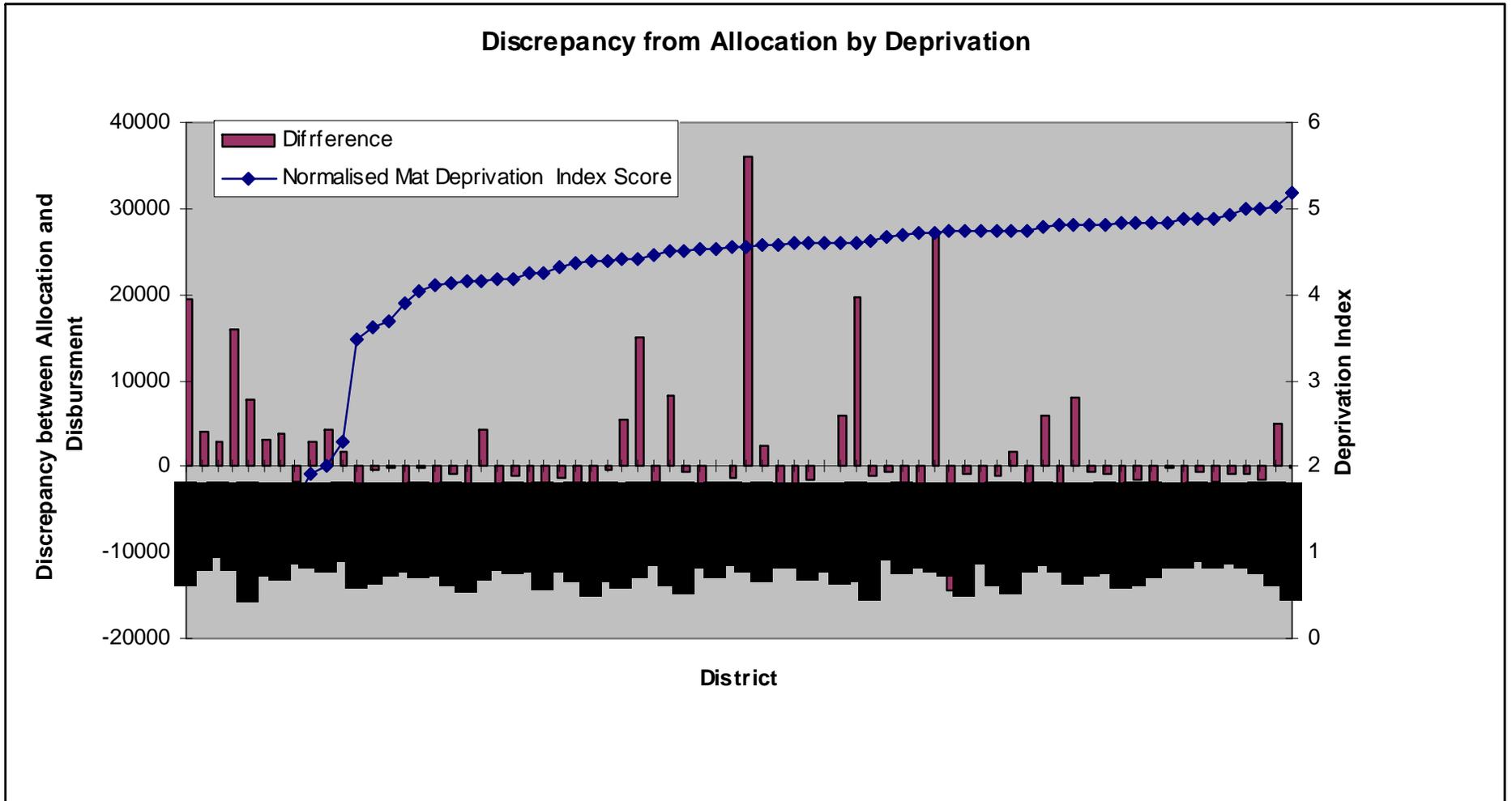
To measure how many of the changes in disbursement can be explained by changes in deprivation statues, we used regression analysis to measure the relationship between deprivation and disbursements. To facilitate the analysis, the deprivation index was normalised and used as the key explanatory variable or covariate. The estimation was done using standard robust regression in STATA 9 to avoid the potential problem of heteroscedasticity, which is often a problem in such cross-sectional data.

The basic model used in regression analysis is as follows:

$$\ln Y_i = \beta_0 + \beta_1 \ln D_i + \varepsilon_i$$
where Y = disbursement
       D = deprivation index

Population size and geographical location were added as additional covariates and controlled for in the analysis. Logistic regression was used for checking whether the probability of receiving less than the allocated amount depended on deprivation, population and geographical location. All estimations were made using the robust regression procedure using STATA 9.

4.2.1 Effects of deprivation on disbursement amounts

We tested what proportion of variations in the dependent variable (the disbursements across districts) can be explained by differences in deprivation between these districts. This analysis is more crucial for addressing the question of monitoring implementation of the formula. Our results show that deprivation now accounts for only 15 % of the differences in amounts given to districts. The coefficient of deprivation is positive and significant, but it does not account for a major part of what we observed as differences in per capita district income. This is a big concern for the implementation of deprivation-based resource allocation criteria. The asymmetry between allocation and disbursements is striking and points to an urgent need for more stringent monitoring.

4.2.2 Likelihood of under-funding and deprivation

Rather than rely on visual inspection to determine whether progress towards equitable allocation is being achieved, we applied regression analysis to show the statistical significance of any systematic relationship between deprivation and discrepancies in allocation and disbursement. Specifically, our probit model set out to test whether being poor increased the chance of receiving a disbursement that is less than the allocation. The dependent variable was defined dichotomously as one (1) if the disbursement was higher than the allocation and zero (0) otherwise. The variable normalised deprivation index increased with increasing deprivation.

The coefficients of deprivation in all the probit models are all negative and significant, implying that the probability of receiving more funding than initially allocated decreases with increasing deprivation (higher deprivation scores). These results confirm statistically what we observed in *Figures 1-3*: more-deprived districts have had a higher chance of receiving less than their allocation. The coefficient of deprivation is positive, implying that, as deprivation increases, the probability of receiving less than allocated or deserved also increases. This could be a result of the inertia that often characterises re-distribution of resources.

5. Discussion

After the 1993 institutional reforms, which granted decision-making and resource allocation powers to the district health service level (through DHMTs), major challenges emerged around allocation across districts. To tackle these challenges, different approaches were

tried over a decade to reach the deprivation-based resource allocation. Given that rigorous work was done in stages to develop a resource formula, there seems to be sustained political will for policy reform. Despite this political will, this study identifies some of the bottlenecks to full implementation, and therefore gives some early signals about the direction and pace of implementation in the three short years covered by the study.

The complexities identified by stakeholders in *Table 3* have slowed implementation of the resource allocation formula, and progress towards geographical equity of resource allocation has therefore been slow. Comparing (formula-derived) allocations and actual disbursements shows that implementation tended to depart significantly from policy. Several problems hamper implementation and implementing a new resource allocation formula in which there are gainers and losers is almost always a controversial process in any society.

The lack of growth in the overall resource envelope has hampered implementation. Despite agreement about the principle and application of the formula based allocations, full implementation in the face of meagre resources instead elicited reluctance from key stakeholders (including donors) and even downright opposition from some districts. The hoped for success of reform was based on redistribution of future addition income which did not materialise. Once an attempt was made to apply the formula, districts which were to lose out protested. From that point onwards, the RASC appears to have had no real opportunity to push the reform forward as planned. Even a phased in strategy has not worked so far.

The application of the new formula was slowed down by the desire within RASC and MoH to avoid potential deterioration in quality or disruption of services in any district. The Ministry was facing a dilemma of embracing fully the new allocation criteria and safeguarding against a decline in grants for all districts. When it emerged that no substantial additional resources were forthcoming, this generated political incentives for maintaining the status quo, i.e. using population and a few cost items as discussed earlier.

As the previous population-based formula had already been abandoned, the RASC resorted to an ad hoc adjustment factor to deprivation-based formula. Disconcertingly, the effect of this ad hoc adjustment (i.e. observed departures from the formula) has tended to disfavour poorer districts. This means that more deprived districts were more likely to suffer under-funding (i.e. disbursements are less than allocations). Within deprivation categories, the ratio of districts that received more than was allocated was higher among well off districts.

It was the original intention that the formula could be refined or modified at later stages, as the resource allocation working group became more familiar with different aspects of the formula. Therefore, the pace of implementation was perhaps not as important as showing systematic adherence to the new policy, since it was clear to policy makers that the path from historical budgets to an equity-oriented system in Zambia would be no less arduous than had been experienced by other countries who had undertaken resource allocation reform.

However, although a formula was designed and become policy, evidence shows that Zambia is yet to implement equity-oriented reforms in distribution of resources across geographical areas. Per capita recurrent spending remains widely skewed in favour or less poor districts. Possibly, the arbitrary adjustments that influence disbursements reflected political pressure from well-off districts trying to protect their revenues.

The implementation of resource allocation reform in Zambia also shows that deprivation alone is not a sufficient instrument to determine appropriate reimbursement. In practice, implementation has been thwarted by the perceived limitations of deprivation weights in defining health need. There is great heterogeneity in district service profiles in ways which cannot be adequately be explained by deprivation. Furthermore the concentration of morbidity caused by HIV and AIDS and higher prevalence rates in less deprived districts

such as Lusaka and Livingstone indicate that deprivation and health need are not necessarily linked. The burden of HIV and AIDS in particular, which imposes one of the greatest health care needs, bears no obvious relationship to deprivation.

At a practical level, a strong association between health profile and social deprivation did not provide a direct framework for allocating resources, and left room for arbitrary manipulation. Similarly, it is hardly straightforward that weighting populations by deprivation would reduce disparities in inter-district capacities to address health needs (in other countries such as Uganda social deprivation was given only a limited (20%) weight in the overall allocation formula (Person, 2002)). Therefore the current formula is still an inadequate tool for modelling health care need. A much better understanding of the district service profiles is essential to incorporate deprivation into the reimbursement system.

The formulation, implementation, monitoring and review of the formula require a degree of continuous consultative processes and consensus building. Yet, there is no systematic review mechanism. As a result, only one technocrat has implemented adjustments to the formula. The agreed upon monitoring and evaluation of the formula has not been put in place. Therefore, the defects or strengths of the formula cannot therefore be assessed and appropriately addressed.

The institutional framework around which the formula was conceptualised and monitored is no longer in existence. Both the RASC and CBOH were dissolved. The CBOH implemented RASC calculations of grants to districts. Without this institutional support, responsive implementation and monitoring have failed.

Some donors have since shifted from the sector budget support mechanism to the budget support mechanism of the Ministry of Finance and National Planning. This means that donor resources do not go into the basket but are part of overall resources at the national treasury. There is no 'ring-fencing' arrangement although most donors have stressed that the government should demonstrate that most resources are going into poverty-reducing sectors such as health.

In addition, since April 2006 user fees have been abolished in most rural districts. It remains to be seen how the compensation for this has been implemented.

These developments present new challenges for monitoring the implementation of deprivation criteria in resource allocation to districts.

6. Conclusion

It is necessary to structure an implementation framework for the full realisation of the formula based on the attainment of the equity goals of the formula, taking into account problems with the existing formula, and adjusting the formula accordingly. In particular good district health need profiles must be developed and used in conjunction with the deprivation based formula to determine appropriate resource allocation and address equity.

The structured implementation should take account of:
- available resources
- institutional changes
- the new budget support mechanisms
- the reduced 'ring fencing' arrangements for allocation of donor funds
- the abolition of user fees implemented from April 2006
- existing programme commitments
- the effects of specific programmes, if any, on the overall health system.

Alongside implementation, systematic consultative and consensus-building review mechanisms must be developed, to ensure that implementation changes in response to evidence. The review mechanism should the not only effective implementation, but also develop a contextual understanding to help monitor changing health needs and improved or declining equity.

References

1. Andersson PÅ, Varde E, Diderichsen F (2000) 'Modelling of resource allocation to health care authorities in Stockholm County', *Health Care Management Science* 3:141-149.

2. Asante A, Zwi A, Ho M (2006) 'Equity in resource allocation for health: A comparative study of the Ashanti and Northern Regions of Ghana', *Health Policy*, 78(2-3): 135-148.

3. Bell DE and Reich M (eds) (1986) *Health, Nutrition and Economic Crises: Approaches to Policy in the Third World*. Auburn House Publishing Company: Dover, Massachusetts.

4. Carr-Hill RA, Rice N, Roland M (1996) 'Socio-economic determinants of rates of consultation in general practice based on fourth national morbidity survey of general practices', *British Medical Journal* 312: 1008-12.

5. Castro-Leal F, Dayton J, Demery L, Mehra K (2000) 'Public spending on health in Africa: do the poor benefit?' *Bulletin of the WHO* 78:66-74.

6. Coast J, Bevan G, Frankel S (1996) 'An equitable basis for priority setting?' In Coast J, Donovan J, Frankel S (eds) *Priority setting: The health care debate.* Chichester: Wiley: 141-166.

7. Cuadras-Morato X, Pinto-Prades J and Abella-Perpinan J (2001) 'Equity considerations in health care: the relevance of claims', *Journal of Health Economics* 10: 187-205.

8. Diderichsen F, Varde E, Whitehead M (1997) 'Resource allocation to health authorities: the quest for an equitable formula in Britain and Sweden', *British Medical Journal* 315: 875-878.

9. Eachus J, Willaims M, Chan P, Smith, GD, Grainje M, Donovan J and Frankel S (1996) 'Deprivation and cause specific morbidity: Evidence from the Somerset and Avon survey', *British Medical Journal*, 312-287-292.

10. Jamison D.T, Mosley WH, Measham AR, Bobadilla JL (ed.) (1993) *Disease Control Priorities in Developing Countries.* Washington DC: World Bank.

11. Lake S, Daura M, Antezana I, Mulenga SB, Masiye F, Mabandhla M (2002) 'Zambian country report', *Analysing the process of health reforms in South Africa and Zambia*. Partnerships for Health Reforms, Major Applied Research: Bethesda, Maryland.

12. Lake S (1998) 'Exploring the potential for vertical equity and promotion through resource allocation and planning: A case study of Zambia'. Health Policy Unit; London School of Hygiene and Tropical Medicine. London.

13. Mays KJN (1994) 'Equity in the NHS: Allocating resources for health and social care in England', *British Medical Journal* 308: 1363-6.

14. McIntyre D, Muirhead D, Gilson L, Govender V, Mbatsha S, Goudge J, Wadee H, Ntutela P (2000) 'Geographic patterns of deprivation and health inequities in South Africa: Informing public resource allocation strategies,' *Policy Series 10*. EQUINET, Harare.

15. McMillan J (2002) 'Allocation of resources*', Surgery* 20(5): 117-120.

16. Olsen JA (1997) 'Theories of justice and their implications for priority setting in health care', *Journal of Health Economics* 16: 625-639.

17. Person M (2002) *Allocating public resources for health: Developing pro-poor approaches*. DFID Health Systems Resource Centre, http://www.healthsystemsrc.org (accessed June 2007).

18. Rice N, Smith PC (2001) 'Ethics of geographical equity in health care', *Journal of Medical Ethics* 27: 256-261.

19. Root (1999) 'Disease environments and sub-national patterns of under-five mortality in sub-Saharan Africa', *International Journal of Population Geography* 5: 117-132.

20. Smaje C and Le Grand J(1997) 'Ethnicity, equity and the use of health services in the British NHS' *Social Sciences Journal* 45(3): 485 – 496.

21. Thurlow J and Wobst P (2004) 'The road to pro-poor growth in Zambia: Past lessons and future challenges', *Discussion Paper Number 16*. International Food Policy Research Institute: Washington DC, http://www. ifpri.org (accessed 18 July 2007).

22. UNDP (2006) *The 2006 Human Development Report*. UNDP: New York.

23. Wagstaff A and Doorslaer van E (1997) 'Progressivity, horizontal equity and reranking in health care finance: A decomposition analysis for the Netherlands', *Journal of Health Economics* 16(5): 499 – 516.

24. Weeks J and McKineley T (2006) *Does debt relief increase fiscal space in Zambia?* International Poverty Centre, United Nations Development Programme, Brasilla Df, Brazil.

25. Zambia Central Board of Health (1999) 'Annual Planning Guidelines for Districts', CBOH: Lusaka.

26. Zambia Central Board of Health (1998) 'Annual Planning Guidelines for Districts', CBOH: Lusaka.

27. Zambia Central Board of Health (1997) 'Annual Planning Guidelines for Districts' CBOH: Lusaka.

28. Zambia Central Board of Health (1996) 'Structure and Organisation' CBOH: Lusaka.

29. Zambia Central Statistical Office (2004) 'Living Conditions Monitoring Survey 2002-3' CSO: Lusaka

30. Zambia Central Statistical Office (2002) 'Zambia Demographic and Health Survey 2001-2', CSO: Lusaka.

31. Zambia Central Statistical Office (1999) 'Living Conditions Monitoring Survey 1998', CSO: Lusaka.

32. Zambia Central Statistical Office (1992) 'Living Conditions Monitoring Survey 1991', CSO: Lusaka.

33. Zambia Ministry of Finance and National Planning (2006) 'Economic Report 2005', Ministry of Finance Headquarters: Lusaka.

34. Zambia Ministry of Finance and National Planning (2002) 'Poverty Reduction Strategy Paper', Ministry of Finance Headquarters: Lusaka.

35. Zambia Ministry of Health, (2005) 'National Health Services (Repeal) Act', Government Printers: Lusaka

36. Zambia Ministry of Health (2005) 'National Health Service (Repeal) Act, 2005, MoH Policy Meeting Minutes 2004- 2005', MoH Ndeke House: Lusaka.

37. Zambia Ministry of Health (2005) 'Minutes of the Resource Allocation Sub-committee (RASC)', MoH Ndeke House: Lusaka.

38. Zambia Ministry of Health (2004) 'Minutes of the Resource Allocation Sub-committee, (RASC)', MoH Ndeke House: Lusaka.

39. Zambia Ministry of Health (2003) 'Mid Term Review of the National Health Strategic Plan 2001-2005', MoH Ndeke House: Lusaka.

40. Zambia Ministry of Health (2001) 'National Health Strategic Plan 2001-2005', MoH Ndeke House: Lusaka.

41. Zambia Ministry of Health (2000) 'Joint Identification and Formulation Report', MoH Ndeke House: Lusaka.

42. Zambia Ministry of Health (1995) 'National Health Strategic Plan 1995-1999' MoH Ndeke House: Lusaka.

43. Zambia Ministry of Health (1995) 'National Health Services Act', MoH Ndeke House: Lusaka.

44. Zambia Ministry of Health (1992) 'National Health Policies and Strategies' MoH Ndeke House: Lusaka.

45. Zere E, Mandlhate C, Mbeeli T, Shangula K, Mutirua K, Kapenambili W (2007) 'Equity in health care in Namibia: developing a needs-based resource allocation formula using principal components analysis', *International Journal of Equity in Health* 29;6:3

Acknowledgements

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 health.*

EQUINET implements work in a number of areas identified as central to health equity in the region:
• Public health impacts of macroeconomic and trade policies
• Poverty, deprivation and health equity and household resources for health
• Health rights as a driving force for health equity
• Health financing and integration of deprivation into health resource allocation
• Public-private mix and subsidies in health systems
• Distribution and migration of health personnel
• Equity oriented health systems responses to HIV/AIDS and treatment access
• Governance and participation in health systems
• Monitoring health equity and supporting evidence led policy

EQUINET is governed by a steering committee involving institutions and individuals co-ordinating theme, country or process work in EQUINET:
R Loewenson, R Pointer, F Machingura TARSC, Zimbabwe; M Chopra, M Tomlinson, MRC, South Africa; M Masaiganah, Peoples Health Movement, Tanzania; I Rusike, CWGH, Zimbabwe; G Woelk, University of Zimbabwe; TJ Ngulube, CHESSORE, Zambia; L Gilson, Centre for Health Policy, South Africa; M Kachima, SATUCC; D McIntyre, Health Economics Unit, Cape Town, South Africa; G Mwaluko, Tanzania; Martha Kwataine, MHEN Malawi; A Ntuli, Health Systems Trust; S Iipinge, University of Namibia; L London, UCT; N Mbombo, UWC Cape Town, South Africa; P Makombe SEATINI, Zimbabwe; I Makwiza, REACH Trust Malawi; S Mbuyita, Ifakara Tanzania

For further information on EQUINET please contact the secretariat:
Training and Research Support Centre (TARSC)
Box CY2720, Causeway, Harare, Zimbabwe
Tel + 263 4 705108/708835 Fax + 737220
Email: admin@equinetafrica.org
Website: www.equinetafrica.org

Series Editor: Rene Loewenson
Issue Editors: Di McIntyre, Pierre Norden, Rebecca Pointer