# Resource Allocation and Deprivation Issues For Health Equity : Report of a Research Meeting

Report of the EQUINET Regional Meeting
In collaboration with IDRC (Canada)
Johannesburg, 14 –16 May 2002


Regional Network for Equity in Health in Southern Africa (EQUINET),
with
Health Economics Unit, University of Cape Town and
Centre for Health Policy, University of the Witwatersrand

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# RESOURCE ALLOCATION AND DEPRIVATION ISSUES FOR HEALTH EQUITY: REPORT OF A REGIONAL MEETING

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## 1. Background to workshop

During the first phase of Equinet supported research activities, a South African team undertook a project to critically evaluate alternative ways of measuring deprivation using census and household survey data. The implications of the geographic distribution of deprivation between small areas in South Africa for public sector resource allocation patterns were also evaluated.

There has been considerable interest among SADC countries in undertaking similar research into the geographic distribution of deprivation and the implications for resource allocation. As part of the first phase of Equinet research, a summary research report which outlines the methods and findings of the South African study has been widely disseminated. In addition, a report containing a detailed guide to the tools used in the South African research project was prepared (see Appendix C). It was envisaged that these two reports would assist other countries in undertaking similar research in their own countries.

In addition, Equinet raised funding for a workshop, where interested research teams could meet and discuss how such research could be undertaken. A call for expressions of interest was circulated on the Equinet mailing list. Three countries, Namibia, Tanzania and Zambia indicated an interest in attending the workshop and participating in potential future research. All three countries sent a team including a combination of Ministry of Health officials and researchers based in academic or other institutions to the workshop (see Appendix A for list of participants). Teams were sent copies of the two reports mentioned before the workshop and were requested to bring relevant household survey databases to the workshop, which was held in Johannesburg from 14 to 16 May 2002 (see workshop program in Appendix B).

The objectives of the workshop were to:

- Explore alternative approaches to identifying those most in need of public sector health care resources and for allocating resources to particularly benefit these groups;
- Share information on methods that can be used to achieve equitable resource allocation, particularly drawing on participant's experience; and
- Facilitate a process of considering the most appropriate approach and methods for resource allocation in each country team's context.

It was stressed that country teams were not expected to all adopt a uniform approach, and that there could be value in adopting a range of different approaches, based on the appropriateness to each country context.

The workshop was facilitated by members of the original South African research team (Di McIntyre, Health Economics Unit, University of Cape Town and Debbie Muirhead, Centre for Health Policy, University of the Witwatersrand). In addition, a team from the Western Australian Department of Health and Curtin University were invited to participate in the workshop. Their participation was funded through the Australia-South Africa links program (IDP funded) between Curtin University in Perth, Australia and the Universities of Cape Town and Witwatersrand in South Africa. This team has adopted a very innovative and participatory approach to resource allocation issues, and it was felt that this would provide a useful contrast to the more statistical approach used in the South African study. In this way,

participants could be presented with alternative methods for approaching resource allocation in their contexts.

## 2. Country presentations on key resource allocation issues

Each country had been asked to prepare a presentation of key issues in relation to resource allocation, which had engendered their interest in participating in this Equinet initiative. Some of the key issues from these presentations are detailed below.

Zambia
Zambia has undergone considerable health sector reform in recent years, particularly in relation to decentralisation. Previously, resource allocation decision-making was centralised and based on historical budgeting. It was felt that this perpetuated historical imbalances.

There were two factors driving consideration of changes to resource allocation in this context. Firstly, hospitals were receiving 60-80% of public sector health care resources and there was a desire to redistribute resources towards PHC. Secondly, resource allocation patterns needed to change in order to pursue equity in access to health services.

A resource allocation formula for determining the distribution of recurrent budgets was introduced a few years ago. This formula was based on the population size in each district, with adjustments for the rurality of the district and other relevant indicators. Despite having a formula, it is felt that resource distribution hasn't improved and that health status is not improving.

Work on revising the formula was initiated in 1998. There is a desire to include a wider range of indicators of need such as the distribution of the burden of ill-health between districts and other variables that reflect the determinants of health. There is also a desire to ensure that the resource allocation mechanism impacts on the hospital sector and to take account of the context of SWAPs.

Namibia
Resource allocation decision-making is currently based on historical budgeting processes. Although the extent of inequity in the geographic allocation of health care resources has not been measured, there is clear evidence of substantial differences in health status and socio-economic status between geographic areas. Although health status has improved dramatically in the 1990s (e.g. IMR dropped from 57 to 38 per 1,000 live births), the disparities in health and socio-economic status remain. There are particularly vulnerable groups, such as the San.

As there is evidence that there are different health needs in different areas, it is felt that resources should be allocated more in line with these needs, rather than on the basis of historical supply patterns. A particular challenge in the Namibian context is the existence of a substantial private sector, which needs to be taken into account in relation to resource allocation decision-making. In addition, there is a lack of transparency about the resource allocation decision-making process and about current spending levels in different geographic areas.

Tanzania
Tanzania is also in the process of decentralising to district level. There are approximately 120 districts with an average of 275,000 people per district. In order to facilitate district planning, a map of each district is being prepared with the location of facilities, roads, communication and other infrastructure, as well as information on the population size, morbidity and mortality and other relevant indicators of need. This could form the basis for

allocating resources between districts more appropriately in relation to health need. At present, a grant from donor 'basket-funds' is allocated to each district on the basis of population size ($0.5 per person).

Within the Tanzanian context, there are a number of issues that also need to be taken into account when planning for resource allocation. One such issue is the substantial rural-urban migration currently occurring. This is likely to impact on deprivation (e.g. there will be a growing number of relatively disadvantaged people within urban areas), which has implications for resource allocation. Another key issue is that there is a complex flow of funds from a range of sources for district health services (e.g. block grants, council own funds, basket grants, other sources) which all need to be taken into consideration in resource allocation decision-making to ensure overall equity in district resources. Finally, there appear to be considerable cross-boundary flows which complicates determining the size of the population dependent on particular health services.

## 3. Key concepts and issues of relevance to resource allocation

The rest of the first day was devoted to facilitated discussions of key concepts and issues of relevance to resource allocation, including the concept of equity, deprivation or relative disadvantage and the issue of small area analyses.

Concept of equity and social justice

Gavin Mooney facilitated this session. He highlighted the importance of being clear on what equity objective one is trying to achieve, and on the definition of equity that is being used, before considering how one can allocate resources to achieve whatever equity definition is chosen. He also stressed that there is not a single 'correct' definition of equity, but that the concept of equity and social justice should be defined in each country and cultural context. It is also important to engage in a process of eliciting views from a wide range of stakeholders as to what the equity objective should be.

There was some discussion of equity objectives in the different countries, based on statements in health policy documents. There was also considerable discussion about the pros and cons of alternative definitions of equity, including:

- equal expenditure per capita;
- equal inputs/resources per capita (reflecting different price levels and therefore different ability to purchase health care inputs in different areas);
- equal inputs for equal need (reflecting differential need for health services, e.g. relating to different age and gender profiles in different areas);
- equal access to health care for equal need (reflecting differential costs to individuals in using health care, e.g. transport and time costs, as well as other barriers to use such as cultural factors);
- equal utilisation of health care for equal need (which takes both supply and demand factors into account and discriminates positively in favour of those less willing to use health care); and
- equality of health.

There was also discussion of the difference between a horizontal equity objective (the equal treatment of equals) and a vertical equity objective (the unequal, but equitable, treatment of people with different needs). Vertical equity implies giving preference to, or positively discriminating in favour of, health gains for those who are worst off/in greater need.

Concept of deprivation and identifying particularly disadvantaged groups

There was some discussion of the concept of deprivation (see Appendix C for summary of key issues relating to deprivation), and its relationship to vertical equity. There was a

particular emphasis on brainstorming a list of groups that may be regarded as particularly disadvantaged or vulnerable in the different countries represented at the workshop. The groups identified included:

- The San (specific to Namibia)
- Those with mental illness
- Child-headed households
- Female-headed households
- Rural dwellers (especially in terms of lack of access to water, sanitation, safe energy sources)
- Informal urban/squatter settlement dwellers (especially in terms of lack of access to water, sanitation, safe energy sources)
- The unemployed
- Informal sector workers
- Nomads (specific to Tanzania)
- Street children
- Poor children
- Old people (who are poor and/or caring for children dying of AIDS or orphaned grandchildren)
- The illiterate population
- The disabled
- Refugees
- The poor

From this list, it was possible to identify what types of indicators (or variables) one may need in datasets in order to evaluate the distribution of deprivation between geographic areas. It was stressed that there are different ways of measuring deprivation/vulnerability. For example, one can use statistical techniques to construct a composite, weighted deprivation index. One could also elicit views from a range of stakeholders on who should be regarded as particularly disadvantaged/vulnerable and to what extent they are disadvantaged (to get some kind of weighting). A mixture of stakeholder consultation and statistical techniques can also be used. It was stressed that each country should consider the range of techniques available and select which one, or combination of techniques, was most appropriate in their context. Whichever technique is adopted, it is necessary to have access to accurate data on the distribution of the indicators of deprivation/vulnerability between geographic areas.

There was also a brief discussion of the relevance and usefulness of small area analyses (see Appendix C for summary of key issues). It was stressed that country teams did not have to undertake small area analyses, but that it is useful if one:

- is going to develop a deprivation index using statistical techniques;
- wants to explore the relationship between deprivation and ill-health; and
- is to ensure that specific communities are to benefit from 'positive discrimination' in resource allocation.

## 4. Data requirements and guided tour of statistical modelling

The second day focused primarily on a discussion of data requirements and statistical approaches to measuring deprivation. There was some discussion of the different types of data required (demographic variables, individual socio-economic variables, household socio-economic variables and health status variables – see Appendix C for more information).

Country teams were then asked to complete the table contained in Appendix D, to assess what variables they were able to obtain from different household survey or census

databases. While some countries have access to databases which include information on a number of the possible variables of interest, others have very limited access to data and will have to consider ways of adapting their analyses to these data constraints.

Considerable time was then devoted to a discussion of Principal Components Analysis (PCA) and a 'guided tour' of how to undertake a PCA using a South African household survey dataset. Each country team had a computer on which they could undertake their own PCA using either SPSS or STATA (see Appendix C for detailed description of the steps involved in undertaking a PCA).

## 5. Alternative resource allocation mechanisms

There was some discussion of what type of area (e.g. district, region, province) different countries were interested in from a resource allocation perspective. An important first step is to evaluate the extent of inequities in the current distribution of resources. This requires that one collect data on public sector health care recurrent expenditure in each area, for each different source of funding.

Most countries adopt some type of needs-based formula to guide resource allocation decision-making. Participants brainstormed the following list of possible indicators of need that could be included in a resource allocation formula:

- Population size
- Demographic composition (age/sex)
- Burden of disease/morbidity/mortality
- Low socio-economic status / high levels of deprivation
- Indicators of the relatively higher cost of providing health services in certain areas (e.g. presence of a bank, the fuel price in each area, low population density, remoteness/rurality, distance to the capital city).

It was stressed that one does not need to have a complicated formula; for example, one may decide just to use population size (particularly if there are no sources of accurate data on other indicators) and allocate resources on a per capita basis. This may sometimes represent a major step forward, compared with the existing allocation, even if well short of some ideal. Adding other indicators of need, in most cases, tends to heighten the disparities between geographic areas (in terms of resources available relative to need). Thus, by starting with per capita allocations, one will at least be initiating the process of redistribution while refining data on other indicators of need for use in a future, more comprehensive formula.

Other issues that could be taken into account in resource allocation decision-making, that are of particular relevance to the countries participating in the workshop, were also discussed. These include:

- How to take into account the fact that there are some areas where a large proportion of the population uses private sector services while in other areas the majority of the population is heavily dependent on the public sector;
- How to address cross-boundary flows;
- How to take rural-urban migration into account, particularly if urban areas are relatively over-resourced at present and resources are being shifted to rural areas while the population is shifting in the opposite direction; and
- How to take into account 'own-revenue' generated at the decentralised level or donor funding granted directly to lower levels of the system.

There was some discussion of how one combines different indicators of need into a formula and of appropriate weighting. In addition, the technical aspects of calculating equity target allocations and the process of redistributing resources over time were discussed. There was considerable discussion of the importance of process issues, such as:

- Getting 'buy-in' to promoting equitable resource allocation from key stakeholders at the outset.
- Ensuring wide participation in identifying the variables to include, and the relative weightings of each variable, in a resource allocation formula. Agreement on these issues should be reached before data are presented.
- Undertaking a stakeholder analysis to identify likely opponents to resource redistribution and strategising about how to minimise the potential adverse impact of opposition, and to identify policy champions/change agents who are high profile, respected leaders to promote equity and resource redistribution objectives.

## 6. Resource allocation issues in Australia

Gavin Mooney, Shane Houston and Trevor Jewell made a presentation on the approach that they had adopted to resource allocation in Western Australia (see Appendix E for copy of presentation). Some of the key issues that arose from the presentation and discussion afterwards include:

- Importance of the vertical equity approach – vast disparities between Aboriginal and non-Aboriginal populations in Australia due to history of discrimination against Aboriginal people. General acceptance of the importance of 'positively discriminating' in resource allocation in favour of Aboriginal communities (as well as between Aboriginal communities given that some more disadvantaged than others).
- Recognition that equity in access is not just about how close a facility is, but includes a range of factors. One factor that frequently does not receive adequate attention is that of cultural barriers to access. Such barriers are important and need to be addressed.
- Consultative approach adopted – finding out what the key factors are that Aboriginal communities regard as contributing to ill-health and vulnerability/deprivation, and the basis on which different communities should receive priority and to what extent. This meant that each community representative could defend the allocation of resources to their own community and to each of the other communities, even if they were receiving considerable fewer resources per capita than others.
- Use of the concept of capacity-to-benefit, which changes the focus from viewing health need as merely sickness and instead focuses on potential outcomes from allocating more resources. The separate contributions of social, environmental and lifestyle factors to mortality and morbidity need to be considered.
- Recognising that allocating additional resources is not enough in itself – communities may not have the capacity-to-benefit from these resources if they lack adequate infrastructure. Recommended that some of the additional resources directed to communities be used, especially in the early stages, to develop **M**anagement, **E**conomic, **S**ocial and **H**uman (MESH) infrastructure to improve communities' capacity to benefit from additional resources.
- The importance of taking into account the differential cost of providing health (and other) services in different areas, particularly due to factors such as remoteness.
- The power of data – the team was able to challenge current views on which communities are remote and which not, based on a remoteness index developed by other researchers.
- Started with the principles and then looked for data – have found problems in obtaining some data. Important to have parallel or an iterative process of developing principles and considering data availability.

## 7. Developing country plans

Significant time was devoted to allowing each country to discuss the different approaches to undertaking research and alternative resource allocation mechanisms in their country teams. They were asked to develop a plan for how they would approach resource allocation in their context, with inputs from the facilitators and Australian team. To assist in this process, the following questions were posed:

- What equity objectives will guide resource allocation (what definition of equity will be used)?
- What equity principles do you think are most appropriate in your context?
- Will there be broader consultation around these principles and objectives? If so, who will be consulted and through what process?
- What process can be used to get 'buy-in' to resource reallocation?
- What data do you need, what data do you have and how do you fill any gaps?
- Implementation issues – how can you ensure that budgets are translated into changes on the ground?
- Who should do what by when?

Each country presented their initial plans for taking resource allocation issues forward (see Appendix F). From these presentations, key issues included:

- Most countries wanted to adopt a vertical equity approach and viewed equity as equal access for equal need;
- In all cases, there was a desire to undertake this work in a consultative way, to ensure 'buy-in' from key stakeholders and to elicit stakeholder views on factors to take into account in resource allocation
- In some cases, there was an interest in undertaking statistical analysis to consider deprivation issues, while in other countries it was recognised that there is inadequate data for such analyses and that simpler methods should be used initially.

## 8. The way forward

It was agreed that the key step to take the process forward was to develop a proposal for each country but that funds were limited. Each team needed to develop a detailed proposal, with a realistic budget, for consideration by Equinet for funding. Equinet would assist teams in seeking additional funding where necessary, but that it would ultimately be the responsibility of each country to secure funding for any resource allocation research above what Equinet could fund. It was stressed that teams should focus on using existing, secondary sources of data, supplemented by consultative processes with key stakeholders and try to consider what would be feasible to accomplish with the limited Equinet funding. It was agreed that the workshop facilitators would provide a suggested outline of the proposal format in the week after the workshop (see Appendix G). Everyone would submit first drafts of their proposals by 31 May 2002 and the facilitators would send some comments to assist in finalising proposals. It was agreed that the proposals would be finalised and sent to the facilitators by 12 June 2002.

There was agreement that it would be useful to have a second workshop after the research has been conducted to share ideas and experiences and to undertake a collaborative cross-country comparison of resource allocation approaches, issues and research findings. It is envisaged that country research will take approximately one year to undertake, from the time of receiving funding. It was also agreed that the South African team would attempt to undertake further research, particularly in relation to eliciting stakeholder views on equity and resource allocation issues.

It was also agreed that it would be helpful if a closed electronic discussion list be established between all of the country research team members, to promote communication during the research process. The Equinet co-ordinator agreed to arrange such a list. The Australian team indicated their willingness to assist in any way possible and encouraged the country teams to contact them if they wanted any further information and/or comments on draft proposals or research reports. Participants indicated that such assistance would be greatly appreciated.

## APPENDIX A: WORKSHOP PARTICIPANTS

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## APPENDIX B: WORKSHOP PROGRAM

| | |
|---|---|
| ***Tuesday 14 May*** | |
| 8h30-10h30 | ♦ Participant introductions<br>♦ Background to workshop and information on Equinet<br>♦ Country presentations on key resource allocation issues |
| 10h30-11h00 | **Tea** |
| 11h00-12h30 | ♦ Country presentations continued<br>♦ Discussion on equity principles |
| 12h30-13h30 | **Lunch** |
| 13h30-15h00 | ♦ What is deprivation/vulnerability and why are we as health researchers interested in it? (Brief inputs and brainstorming including developing list of useful indicators) |
| 15h00-15h30 | **Tea** |
| 15h30-17h00 | ♦ Continued brainstorming on deprivation<br>♦ What are small areas and why are they useful for research and planning? |
| ***Wednesday 15 May*** | |
| 8h30-10h30 | ♦ What databases exist in countries, what variables do they include, and other data related issues<br>♦ The ABC of PCA – how do you do it? |
| 10h30-11h00 | **Tea** |
| 11h00-12h30 | ♦ Group work on computers – doing it! |
| 12h30-13h30 | **Lunch** |
| 13h30-15h00 | ♦ Group work on computers – doing it! |
| 15h00-15h30 | **Tea** |
| 15h30-17h00 | ♦ How to go about resource allocation decision-making (formula versus other approaches) – discussion |
| ***Thursday 16 May*** | |
| 8h30-10h30 | ♦ Resource allocation experiences in Australia |
| 10h30-11h00 | **Tea** |
| 11h00-12h30 | ♦ Discussions in country groups about how to take work forward |
| 12h30-13h30 | **Lunch** |
| 13h30-15h00 | ♦ Discussions in country groups about how to take work forward |
| 15h00-15h30 | **Tea** |
| 15h30-17h00 | ♦ Brief presentations on how each country will take issues forward<br>♦ Discussion of action plan |

**APPENDIX C:**
**Undertaking small area research to explore deprivation and resource allocation issues (SARDRA): Key issues**

# 1. Introduction

There is a growing interest internationally in undertaking studies which consider health disparities between small geographic areas, both as a tool to understand better the determinants of health inequalities and to explore appropriate policy responses. One of the potential policy responses is to consider ways in which government resources can be allocated to redress health inequalities. Small area analyses can be used to identify locations with the greatest health need, and then to give preference in the allocation of health care resources to these areas. A study was recently undertaken to consider these issues in the South African context[1]. This study focused on estimating deprivation in small areas and analysed the distribution of deprivation between these areas. The relationship between deprivation and ill health was also explored. Finally, this study considered how deprivation indicators could be considered when determining the allocation of public sector resources.

The purpose of this document is to provide a guide to the main steps in completing a small area analyses into deprivation and resource allocation using lessons learnt in the South African study. It is hoped that this will facilitate similar research being undertaken in other countries in the SADC region. This document should be read in conjunction with the research report[1], which provides greater detail on certain conceptual issues as well as insights into the interpretation and analysis of the data.

## Steps to conducting small area research of deprivation and resource allocation (SARDRA)


STEP 1 – DETERMINING HOW TO VIEW DEPRIVATION

The concept of deprivation relates to relative social and material disadvantage. Thus, it refers to the material and social *conditions* that are experienced by individuals and households, where these conditions are inadequate *relative to* what is usually available or experienced in society. Deprivation is a broader concept than poverty, which traditionally has been defined as insufficiency of income.

A large number of studies have attempted to measure deprivation, most of which have been conducted in the United Kingdom. More recently, a number of studies have been undertaken in middle-income countries. Despite the growing body of literature, there exists no definitive method of measuring deprivation. However, common to all these measures is the combination of a number of socio-economic and demographic variables into a composite index of deprivation. The key factors differentiating the indices from each other are the selection of their component variables, and whether the variables are weighted equally or differentially to form the composite deprivation index. Table 1 highlights the kinds of variables most frequently included in deprivation indices in different country contexts. While there are some similarities between the variables used in the different country contexts, there is a

[1] McIntyre D, Muirhead D, Gilson L, Govender V, Mbatsha S, Goudge J, Wadee H, Ntutela P (2001). Geographic patterns of deprivation and health inequities in South Africa: Informing public resource allocation strategies. Harare: Equinet.

much greater emphasis on lack of access to basic facilities (e.g. potable water, sanitation, safe energy sources) in middle-income countries.

**Table 1: Variables frequently included in deprivation indices in different contexts**

| Variables frequently included in deprivation indices in high-income countries | Variables frequently included in deprivation indices in middle-income countries |
|---|---|
| Unskilled worker/Low social class | Illiteracy/low educational attainment |
| Unemployment | Lack of access to running water |
| Overcrowding in housing | Lack of access to electricity |
| Socio-economic group | Lack of access to sanitation/sewerage facilities |
| Child under the age of 5 | Low quality housing |
| Pensioner living alone | Overcrowding in housing |
| Belonging to a minority ethnic group | Low income levels |
| Changed house/address in past year (Mobility) | Unemployment |
| Don't own a car | Extent of debt |
| Single parent | Lack of assets/durable household goods |
| Living in rented accommodation/don't own a house | Age (children and the elderly may be more deprived) |
| Lack of amenities (shower & inside toilet) | Gender (women may be more deprived) |
| Lack of educational qualifications | Geographic area (rural dwellers) |

The choice of which variables to include in an analysis of deprivation will vary from country to country. The selection of variables will be strongly influenced by what data are available.


## STEP 2 – EXPLORING AVAILABLE DATABASES

### 2.1 Types of data needed

There are broadly four categories of variables that are valuable for this type of analysis. These are:

- Demographic variables (e.g. age, gender);
- Socio-economic variables that are specific to the individual (e.g. educational status);
- Socio-economic variables that apply to a household (e.g. type of sanitation, overcrowding); and
- Health status indicators

### 2.2 Potential sources of data

The national census database often has a variety of demographic and socio-economic variables. It also has the benefit of including the majority of the population, if not the entire population, so the numbers involved are large. This enables you to undertake a wide range of statistical analyses at a small area level. However, a national census usually represents income in terms of categories (e.g. $0-$500; $501-$1,000) which limits the use of income data. In addition, a census very rarely includes health status indicators.

In most low- and middle-income countries, there are some household surveys that include the four categories of variables mentioned above. This includes surveys such as the Living Standards Measurement Survey (LSMS). Unfortunately, one of the household surveys

undertaken in a large number of low- and middle-income countries, the Demographic and Health Survey (DHS), has very limited socio-economic data which restricts its usefulness in this type of work. Some countries may have routine national household surveys that may include relevant variables. The major drawback with household survey databases is that they often have a relatively small sample size. This limits the statistical analyses that can be done and conclusions that can be proposed.

In the absence of health status data from any of the above types of surveys, you may have to rely on vital statistics (i.e. data from registration of births and deaths). However, the use of these data can have some specific problems. In low- and middle-income countries, there is a tendency for a lower proportion of the deaths occurring in rural areas to be registered than in urban areas. When indicators such as mortality rates are then calculated, a false picture can be created that residents in rural areas have better health status than urban. In addition, it may be difficult to get this data according to the small areas you wish to use.

In summary each type of database has advantages and disadvantages. These need to be assessed within the specific country context and the level of analysis you wish to perform.

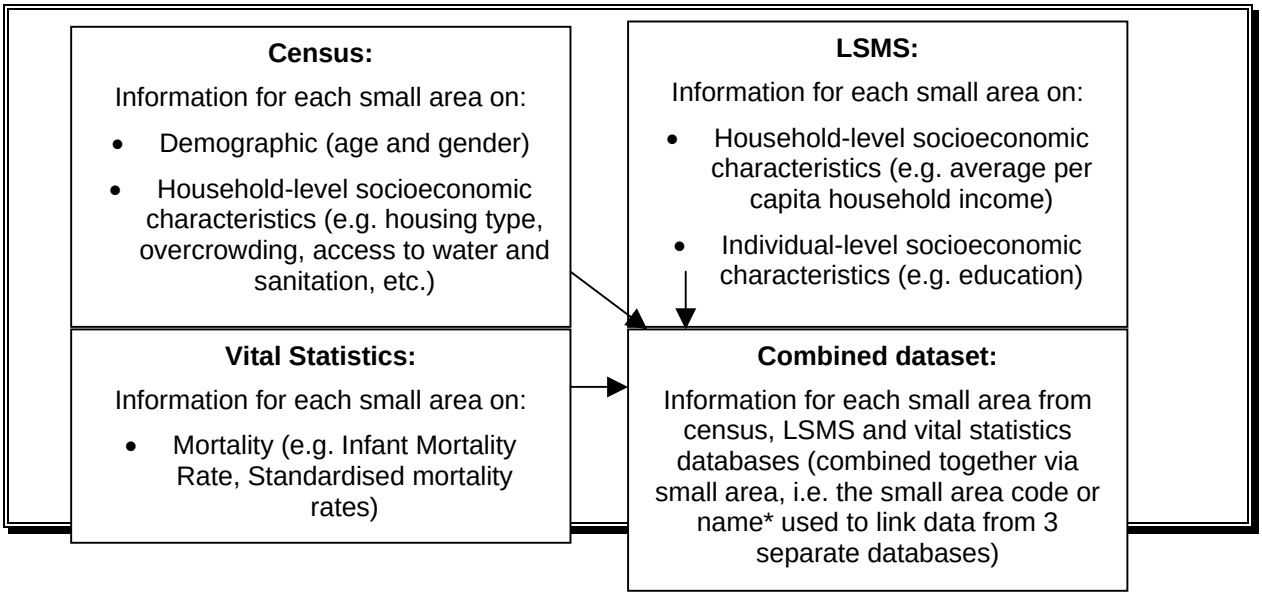
2.3 Selecting appropriate databases and combining them

In selecting potential databases for use, three guiding principles should be borne in mind:

- You should attempt to get as wide a range of variables as possible – although you may have ideas on what variables may be important in measuring deprivation, one should not rely too heavily on preconceptions as this may limit the analysis.
- The database (s) should have a sufficiently large sample size at a small area level to enable statistical analysis.
- The data should be available in a way that allows analysis using different sizes of geographic area. This will allow one to use a smaller geographic area if it is found that the geographic area initially selected does not have a sufficiently homogenous population (see later discussion of homogeneity analysis). Surveys used in small area analyses will generally have codes, or at least names, that represent each small geographic area (e.g. enumerator area, ward, magisterial district).

Though the ideal may be to have access to the full range of these variables in one database, this is rarely possible. However, you may have access to a number of different databases that, when used together, could provide the range of information necessary. The databases can be combined at the small area level (see Box 1).

## Box 1: Illustration of how to combine datasets



* ***Note:*** Remember to check that the small areas used are consistent between datasets. Even if the same codes or names are used, the area boundaries that this represents could have been changed between the surveys.

***See appendix B for statistical commands in SAS, SPSS and STATA- 1. COMBINING DATASETS.***


## STEP 3 – SELECTING THE SMALL AREA

A range of different sizes of areas (both in terms of physical and population size) have been used in what are classified as "small area" studies. There are problems both with "going too small" and of "not going small enough". The main concern with relatively large areas is that they are less likely to contain a homogenous population. This may mean that while an area on average has relatively good socio-economic indicators, it may contain pockets with very poor socio-economic status. The key problem with extremely small areas is that there may be inadequate numbers in certain variables to allow for statistical modelling.

While there is no agreement on exactly what size a small area should be, the international literature provides some useful guidelines on how to determine an appropriate size within specific country and study contexts. In particular, the following factors should be taken into consideration:

- Availability of information – one needs to consider the usual level of disaggregation of data in alternative databases that contain variables needed for analysis in the study (e.g. do the various databases provide information in terms of enumeration areas or only at a higher level of aggregation such as a ward/magisterial district/municipality);
- Physical and population size – it is also important to assess whether the preferred small area categories will yield sufficient numbers to permit statistical analysis; and
- Homogeneity – evaluating whether there is wide variation in the variables being measured within the preferred small area (e.g. if one is exploring differences in average household income between small areas, there should not be a wide range of household incomes within each small area).


## STEP 4 – BASIC PRINCIPLES FOR COMPILING A DEPRIVATION INDEX

A deprivation index, particularly the variables selected to form part of the index, should be specific to the country in which it is be used. Useful principles that can be used to guide the development of a country-specific deprivation index include:

- Indices should follow from the policy goals – It is important to clearly state the policy goals of the study, and to ensure that index development is based on these goals.
- The variables included in the index should be additive – The concept 'additive' means that if an individual ranks poorly with regard to two or more variables included in an index, that individual is more likely to be deprived than an individual belonging to only one of the categories. For example, if an index is constructed from 2 variables, which are 'elderly

person (over the age of 60)' and 'living alone', then elderly people living alone are *likely* to be more deprived than either elderly people who do not live alone or people who live alone but are not over the age of 60.[2]

- Different weights should be assigned to each variable in the index – If individual variables are not weighted (i.e. each variable's value is simply added to the value for every other variable to form a composite index), there is an implicit, and often false, assumption that each variable or indicator contributes to deprivation to the same extent as every other variable in the index. This means that individuals displaying any one characteristic reflected in the index are just as likely to experience deprivation as individuals or households displaying any other characteristic. Assigning weights to each variable makes explicit the relative importance of different variables/indicators in driving deprivation.

A statistical technique (called principal component analysis - PCA) exists that ensures that an index includes variables that are additive and assigns different weights to each variable. There is a growing consensus in the international literature that PCA is the preferred technique for developing a country-specific deprivation index. For this reason, PCA is described in some detail in a later section. However, it should be noted that the South African study found that much simpler indices were almost as effective in identifying small areas with high levels of deprivation as the more complex index developed using PCA techniques. Simpler indices may have a smaller number of variables that are not weighted or may be a single variable that has been shown to be an important indicator of deprivation. These have some distinct advantages over a more complex composite index, particularly in their ease of calculation aiding ongoing monitoring. The degree of information that may be lost taking this approach, though, should be determined prior to settling on a single variable indicator of deprivation.


## STEP 5 – UNDERTAKING A PCA

### 5.1 Introduction

At this stage, you may have large numbers of variables that you are considering including in a deprivation index. Factor analysis is a technique that can do two important things:

- Firstly, it can guide you as to the variables to include in an index of deprivation
- Secondly, it can produce weights for each of your variables from the data itself

Factor analysis combines individual variables that are highly correlated with each other into subsets, each subset being relatively independent of (uncorrelated with) the others.

Principal component analysis (PCA) is a particular type of factor analysis. It identifies which variables interact with each other and identifies the 'component' (combination of variables) that explains the interaction between these variables most comprehensively. Stated differently, PCA identifies the most important relationships between variables. More details of factor analysis and principal component analysis can be found in the literature referred to in the annotated bibliography (see Appendix A).

### 5.2 Selecting and preparing the variables to include in the PCA

As indicated previously, one should select a relatively wide range of possible variables initially, depending on data availability. The selection of variables to include in the initial analysis can be guided by international experience of the variables that are likely to be of greatest relevance (see Step 1) and by considering the relevance to the country in which the analysis is being conducted. For example, it may be important to review recent policy documents and/or to interview stakeholders about what characteristics or variables are most

[2] Two useful references on this topic are Gordon, 1995 and Folwell, 1995 – see Bibliography – Appendix A)

likely to contribute to deprivation in that country. One could include just demographic and socio-economic variables, in order to explore general deprivation. Alternatively, if one wanted to explore health-related deprivation, one could include a health-related variable (e.g. Standardised Mortality Ratios) along with the demographic and socio-economic variables.

Once the variables have been chosen, it is necessary to ensure that the data for these variables is translated into a useable format. For example, if the variable 'unemployment' were selected, data would most appropriately be presented as the percentage of the economically active population who are unemployed in each small area. If one simply uses the total number of people who are unemployed in each small area, an area that has a large number of unemployed people may be considered relatively deprived even if it has a large population size and hence a relatively low unemployment *rate*. Essentially, one needs to express the specific variable in relation to the underlying population of relevance to that variable.

A further aspect of preparing the data relates to transforming data for variables that are not symmetrically distributed. If the underlying distribution of any of the variables you are using is skewed, false relationships between variables can be produced and therefore the factor analysis biased. The distribution of each variable to be used should be looked at through a histogram or by producing statistics of skewness and kurtosis prior to undertaking the factor analysis. Any variables showing skewed distributions should be transformed prior to placing them in the factor analysis procedure. The most common types of transformations are the square root, reciprocal and logarithm with their corrective power increasing respectively. After applying the transformation the variables distribution should again be checked until the skewness is reduced to as close to zero as possible.[3]

Once these steps have been undertaken, it is necessary to make the final selection of variables to include in the PCA. There are two elements to this process, namely ensuring that all variables are highly correlated with each other and ensuring that variables are additive. To investigate the correlation in data, all socio-economic and demographic variables selected above should be included in a bivariate Spearman rank correlation analysis. Variables that show a high correlation with all other socio-economic and demographic variables (defined as significant at 1% level) may be included in the PCA. The final stage is then to ensure that each of the variables can be considered to be additive (see Step 4). It is particularly important to assess whether any of the variables may lead to duplication of 'double-counting'. For example, if the variables 'proportion of household heads who are unemployed' and 'overall proportion of unemployed' in the small area are highly correlated, including both variables in the PCA may lead to a duplication of the effect of unemployment.

### 5.3 Finalising the selection of small areas for analysis

As indicated previously, the type of small area (e.g. enumeration area, ward or district) selected is also heavily influenced by data availability (see Step 3). However, it is important to ensure that the preferred small areas do have a relatively homogenous population. The extent of homogeneity can be assessed by calculating the coefficient of variation (= standard deviation ÷ mean) for key variables within each small area. If this analysis shows that there is considerable variation in key variables within the small areas, it may be necessary to select areas that are even smaller than initially anticipated.

### 5.4 Undertaking the PCA

Most statistical packages have a function for undertaking different types of factor analysis, including PCA.

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[3] See annotated bibliography appendix A for good reference on normalisation – Gilthorpe (1995).

***See appendix B for statistical commands in SAS, SPSS and STATA- 2. UNDERTAKING THE PCA.***

As indicated previously, the PCA will produce a series of components (i.e. subsets of highly correlated variables, with each component or subset being relatively independent of, or uncorrelated with, the other components). When undertaking the PCA, it should include a 'varimax rotation'. Varimax rotation simplifies the results in that it ensures that the components extracted reduce the number of variables of importance within each component providing the simplest solution. An example of a PCA output is shown in Table 2 below.

**Table 2: Components arising from analysis of general deprivation**

| | 1 | 2 | 3 |
|---|---|---|---|
| **FEMALE** | **0.556** | 0.262 | **0.599** |
| **CHILD** | **0.872** | 0.075 | 0.077 |
| **RURAL** | **0.876** | 0.055 | 0.020 |
| **BLACK** | 0.488 | **0.744** | -0.281 |
| **NOSCHOOL** | **0.800** | 0.163 | 0.111 |
| **UNEMP** | **0.529** | **0.672** | 0.097 |
| **DISAB** | -0.006 | **0.915** | 0.100 |
| **HOUSE** | **0.721** | 0.404 | -0.238 |
| **WATER** | **0.877** | 0.334 | 0.043 |
| **REFUSE** | **0.803** | 0.151 | 0.021 |
| **PHONE** | **0.892** | 0.223 | 0.063 |
| **LIGHT** | **0.820** | 0.316 | 0.010 |
| **FEMHD** | **0.782** | 0.405 | 0.235 |
| **ELDERLY** | -0.033 | -0.067 | **0.914** |
| **% total variance explained** | **50.056** | **18.305** | **10.208** |

The above PCA output has 3 components. The variables of importance in each component are the unshaded ones the respective columns. The first component indicates that a large number of variables are contributing to that particular aspect of deprivation. The second component indicates that 'race', unemployment and disability seem to interact to contribute to certain types of deprivation, while the third component indicates that gender and being elderly interact to contribute to other aspects of deprivation. The 'loadings' on each variable (i.e. the numbers next to each variable in the components) indicate the relative importance of each variable in contributing to deprivation (e.g. the proportion of households that have a phone is the most important variable contributing to deprivation in the above example). The first component is the one that should form the basis of the deprivation index as it explains the largest proportion of the variance in correlations between small area characteristics of all of the three components.

In order to calculate the final deprivation index factors scores must be produced using the statistical package when completing the PCA (see Appendix B). This will produce component score coefficients which will act as weights for each variable in the final index. It should be noted that these coefficients are *not the same* as the 'loadings' found in the PCA (compare the coefficients in the equation below with the 'loadings' in Table 2 for each variable). The standard scores (z-scores) should also be calculated for each variable that contributed significantly to the component. The index is calculated by summing the weighted variables, and can be represented (for the PCA output presented in the Table above) in simplified terms as follows (where each of the variable labels represents the z-score of that variable):

Deprivation index = (0.028 x FEMALE) + (0.181 x CHILD) + (0.190 x RURAL) +

(0.141 x NOSCHOOL) + (0.040 x UNEMP) + (0.091 x HOUSE) + (0.124 x WATER) + (0.151 x REFUSE) + (0.152 x PHONE) + (0.117 x LIGHT) + (0.072 x FEMHD)

Once the deprivation index value has been calculated for each small area, various analyses can be undertaken, as discussed in the next section.


## STEP 6 – EXPLORING THE DISTRIBUTION OF DEPRIVATION

As a first step, it m[illegible]ndex value. This will assist in identifying those areas that experience the highest levels of deprivation. One can also present the information in terms of quintiles of deprivation index values (i.e. allocate small areas to the most deprived 20% of small areas, the next most deprived 20% of small areas, etc.). This can then be used to show the distribution of deprivation across the country, either in the form of bar charts (e.g. percentage of most deprived small areas/districts in each province/region) or in the form of maps (e.g. colour coding small areas/districts according to the 5 quintiles). The use of maps is particularly effective in drawing politicians' attention to the distribution of deprivation in the country. It is easy to identify the most deprived areas in this format, and politicians may then be more likely to support initiatives to secure and target additional resources to relatively deprived areas.

It may also be worthwhile comparing the distribution of deprivation with the distribution of health-related indicators (such as mortality). Although numerous studies in high-income countries have found a significant relationship between deprivation and ill health, this has not been explored in much detail in low- and middle-income countries. Such an analysis may once again be powerful in persuading politicians about resource allocation priorities as one is highlighting that certain communities are not only deprived in relation to a range of socio-economic and other factors influencing relative disadvantage, but also in relation to their health status.

Finally, it may be valuable to undertake a comparison of the distribution of deprivation and health indicators with that of health service indicators. In many countries it has been found that the areas that are most deprived and bear the greatest burden of ill-health are also the areas that have the least access to health services / have the lowest levels of health care resources. This provides yet another persuasive element to arguing for equity to be a driving force in health care resource allocation decision-making.


## STEP 7 – INCORPORATING THE INDEX INTO A RESOURCE ALLOCATION FORMULA

### 7.1 Introduction to needs-based resource allocation formulae

In an effort to promote geographic equity, an increasing number of countries are basing their decisions about the allocation of public sector resources between geographic areas (e.g. provinces, regions, districts) on formulae which include measures of relative need for health care within particular geographic areas. The size of the population in each geographic area is the primary indicator of need for health services used in such formulae. Population size can then be weighted by a range of other indicators of the relative need for health care, such as:

- The demographic composition in each area, to account for the different health care needs of different age and gender categories;
- Mortality levels in each area, such as standardised mortality ratios (SMRs), to account for different levels of ill-health between geographic areas;

- The level of deprivation in each area as this may not only influence the level of ill health in an area but also indicate the extent to which communities are able to pay for the costs of health care and hence the level of dependence on publicly financed health services.

Thus, the deprivation index calculated through the methods described above can be used in a resource allocation formula to guide health care decision-makers.

7.2 Calculating a resource allocation formula that includes a deprivation index

The first step is to 'normalise' the deprivation index. The index values will be negative for some geographic areas (those that are least deprived) and positive for other areas (those that are most deprived). Normalising the index results in the least deprived area having a value of 1 and all other areas being expressed in relation to the least deprived area's value. In essence, one is 'shifting the axis' across so that the lowest value is 1. Table 3 below indicates the deprivation index value for provinces in one country. It indicates that the least deprived province (Province C) has an index value of –1.18893. In order to normalise the index values, one needs to add 2.18893 to the index value in each province, thereby making province C's normalised value 1 with all other provinces being expressed relative to this province's deprivation index.

**Table 3: Normalising deprivation index values and weighting the population**

| ***Province*** | **Deprivation Index value** | **Normalised deprivation index score** | **Population** | **Population weighted by deprivation** | **% share of weighted population** |
|---|---|---|---|---|---|
| **A** | 0.86061 | 3.04954 | 6,302,525 | 19,219,802 | 22.0 |
| **B** | -0.49656 | 1.69237 | 2,633,504 | 4,456,863 | 5.1 |
| **C** | -1.18893 | 1 | 7,348,423 | 7,348,423 | 8.4 |
| **D** | 0.28813 | 2.47706 | 8,417,021 | 20,849,466 | 23.9 |
| **E** | 0.08357 | 2.2725 | 2,800,711 | 6,364,616 | 7.3 |
| **F** | -0.604 | 1.58493 | 840,321 | 1,331,850 | 1.5 |
| **G** | 1.02013 | 3.20906 | 4,929,368 | 15,818,638 | 18.1 |
| **H** | 0.08551 | 2.27444 | 3,354,825 | 7,630,348 | 8.7 |
| **I** | -1.12222 | 1.06671 | 3,956,875 | 4,220,838 | 4.8 |

The next step is to multiply the population in each geographic area by the normalised index value to estimate the weighted population. Thereafter, each geographic area's share of the weighted population is calculated (see Table 3 above). If one is only using population size and deprivation in the resource allocation formula, each geographic area's the percentage share of the population, weighted for deprivation, is the basis for calculating target equitable shares of budgetary resources. As can be seen in Table 4, if there is a total budget of $25.99 million available for distribution to different provinces, the target equitable share per province is the total budget multiplied by the percentage share of the weighted population in that province. For example the equity target share of the budget for province A = $25.99 million x 22%.

**Table 4: Calculating equity target shares of budgets**

| ***Province*** | **% share of weighted population** | **Equity target share of budget ($ thousands)** | **Actual budget ($ thousands)** |
|---|---|---|---|
| **A** | 22.0 | 5,725 | 3,999 |
| **B** | 5.1 | 1,328 | 1,773 |
| **C** | 8.4 | 2,189 | 6,564 |

| | | | |
|---|---|---|---|
| **D** | 23.9 | 6,211 | 5,177 |
| **E** | 7.3 | 1,896 | 1,224 |
| **F** | 1.5 | 397 | 406 |
| **G** | 18.1 | 4,712 | 2,305 |
| **H** | 8.7 | 2,273 | 1,623 |
| **I** | 4.8 | 1,257 | 2,916 |
| **TOTAL** | **100** | **25,987** | **25,987** |

As can be seen from Table 4, there are often substantial inequities in the distribution of public sector health care resources between geographic areas. For example, provinces C and I currently have a budget share that is substantially above their equity target share (despite being the least deprived provinces – see Table 3), while provinces A and G have budget shares that are significantly below their target shares (yet are the most deprived provinces – see Table 3). Given the extent of the relative over- and under-funding of different provinces, the equity target budgets cannot be achieved overnight. A process of gradual redistribution of resources from relatively over-resourced areas to relatively under-resourced areas is required.

## References


**Additivity and weighting**

Folwell K (1995) Single measures of deprivation. *Journal of Epidemiology and Community Health* Vol 49 (Supp 2) pp S51 – S56.

Gordon G (1995) Census based deprivation indices: their weighting and validation. *Journal of Epidemiology and Community Health* Vol 49 (Supp 2) pp S39 – S44

**Transforming variables**

Gilthorpe MS (1995) The importance of normalization in the construction of deprivation indices. *Journal of Epidemiology and Community Health* Vol 49 (Supp 2) pp S45 – S50

**Undertaking a PCA**

Tabachnick BG & Fidell LS (1996) *Using Multivariate Statistics* 3rd Ed. Chapter 13 – Principal Components and Factor Analysis.


## STATISTICAL COMMANDS TO CONDUCT SARDRA

### 1 - Combining datasets

If you now have two or more datasets that have the variables you wish to use for your deprivation study you will need to ensure the following before you combine them:

1. That the same small area with the same code is used in both datasets for example district, and the districts are coded in the same way with the same number referring to the same district in each dataset
2. That both datasets are sorted by the small area code in the same way

***IN SPSS***

With one of the datasets you wish to combine showing in your data editor and ensuring the above, go to

**DATA → MERGE FILES → ADD VARIABLES**

A dialogue box will appear to select the other file you wish to combine with. Open this external file.
Another dialogue box will then appear entitled Add Variables from [***filename***…]
Remove any variables from the window "New Working File" that you do not wish to appear in your final combined dataset. They will then appear in the "Excluded Variables" window.
Tick the "Match cases on key variables in sorted files" and select your small area code variable as your "Key Variable" by moving it from your "Excluded variables" window to "Key Variable". You should also tick that both files are have keyed variables.
Click **PASTE**.
Go to your syntax file and run the Merge Files set of commands.
A new combined dataset should then appear in your data processor window. Check for any missing data that you did not expect to be missing to check the merge was completed successfully.

**IN STATA**
In the command window run:
**joinby** [*small area variable label*] **using** [*filename of the external file you wish to combine data from*]

## 2. UNDERTAKING THE PCA

**IN SPSS**
In the data processor go to
**ANALYZE → DATA REDUCTION → FACTOR** ...
In the dialogue box that appears
Transfer the variable that you wish to complete the principal components analysis on to the *Variables* box.
There are various options that need address that each have a button at the base of the dialogue box

***Extraction***

- Ensure the method showing is principal components (this is the default)
- Ensure show unrotated solution is checked (this is the default)
- Click scree plot (the scree plot shows you how many components should be considered as important. The point at which the line gradient substantially changes is this number of factors (this is usually between 2 and 4).
- Ensure that extract eigen values over 1 is checked (this is the default)

***Rotation***

- Check the varimax rotation box

***Scores***

- Check the save as variables box
- Check the display factor score coefficient matrix box.

**Running the programme**
Click paste and then run the **DATA REDUCTION** command section from your syntax file by highlighting it and then clicking on the arrow in the toolbar.
**The Output**
You will get output in your output file that should include the following:

1. correlation matrix
2. the unrotated solution
3. a scree plot
4. a table of the eigen values and the proportion of the variance explained by each factor and cumulatively
5. the rotated solution which gives you your components and each variables factor loading
6. the matrix of factor score coefficients from the rotated solution

**IN STATA**
Two separate commands must be processed in Stata to complete a PCA (three if using another form of factor analysis).
**factor [***specify list of variables that the PCA is going to be performed on***] ,pc factors(#) mineigen(#)**
This will produce # number of factors (or components) as specified in the factors subcommand where the minimum eigen value is (#) as specified by the mineigen subcommand in the results window.
******NB – all your commands and results should be saved in a log file******
**score [***names of the variables you want the factor scores to be called for each component***]**
(note that the default method of producing factor scores is the regression method and this is preferred).
This will produce a vector of factor scores for each component as retained in the **factor** command above. The scores will then be retained in the data under the variable name you have specified after in the **score** command above

**It is these factor scores that are then multiplied by their respective standardized variable to produce the composite index of deprivation.**

## APPENDIX D:
## Checklist for evaluating databases for deprivation analyses

| Indicator: | Database 1:_____ | Database 2: _____ | Database 3:_____ |
|---|---|---|---|
| **General information on database** | | | |
| Accessible? | | | |
| Year conducted | | | |
| How often conducted? | | | |
| Sample size | | | |
| If sample survey - are weights present to get population related figures? | | | |
| Geographic areas | | | |
| Coding standard? | | | |
| Format of data | | | |
| **Demographic variables** | | | |
| Sex | | | |
| Age (if in categories are they useful?) | | | |
| Rural / urban split | | | |
| Other: | | | |
| Other: | | | |
| **Individual socio-economic variables** | | | |
| Educational status | | | |
| Employment | | | |
| Income (how represented?) | | | |
| Other: | | | |
| Other: | | | |
| Other: | | | |
| Other: | | | |
| **Household socio-economic variables** | | | |
| Access to potable water | | | |
| Access to sanitation | | | |
| Access to electricity | | | |
| Type of housing | | | |
| Overcrowding | | | |
| Other: | | | |
| Other: | | | |
| **Health status indicators** | | | |
| Infant mortality rate | | | |
| Nutritional status | | | |
| Other: | | | |
| Other: | | | |

## APPENDIX E: Need, effort and equity: Painting the picture of Aboriginal Health Presentation by Shane Houston, Gavin Mooney and Trevor Jewell

| | | |
|---|---|---|
| ***Aboriginal Western Australia***<br>•estimated 55,878 Aboriginal people in WA - about 3% of State total(HDWA 2001 estimate)•58% of Aboriginal people under 25, 36% in broader population.<br>•15% of Aboriginal population under 5, 7% of the broader population<br>•52% of Aboriginal population lives in remote areas compared to 30% for Aboriginal population nationwide and 8% in NSW. | ***Defining Health Need***<br>•Health has been viewed in consistent terms by Aboriginal people since it was defined by NAIHO in 1972<br>•It draws attention to the physical, emotional, social and cultural needs of Aboriginal people | ***Culture and Health Services***<br>Culture influences Aboriginal peoples decisions about accessing health services, their acceptance or rejection of treatment, the likelihood of compliance and follow up, the likely success of prevention and promotion strategies, the clients assessment of quality and view about the facilities and personnel. |
| ***Cultural Security***<br>Cultural Security is about ensuring that the delivery of health services is such that no one person is afforded a less favourable outcome simply because she or he holds a different cultural outlook. | ***Social determinants***<br>*Education* - Correlation exists between poor levels of educational attainment and high rates of ill health<br>*Employment* - High unemployment has been linked to increased rates of mortality<br>*Income* - Disparity of income is associated with poor health and other social outcomes | ***Good Environment***<br>*Dwellings* - People who are poorly housed or homeless have higher risk of respiratory and skin infection, violence, mental ill health and self harm<br>*Dunnies, Ditches,Drains and Dogs* - Poor waste disposal, hygiene and infrastructure is linked to poor growth, gastrointestinal and skin infections |
| ***Costs***<br>•*Geographic* - considered health system costs, personal costs and variation in regional prices.<br>•*Cultural & Language* - considered costs where English is not 1st language and were doing things culturally costs | ***Aboriginal Health Varies***<br>•Patterns of health need vary across the State<br>–some regions have heavy environmental health needs–others have significant health needs related to lifestyle –others have significant issues with social health needs | ***How Big is the Ask...***<br>•Progress for Aboriginal health is much slower than for other Australians.<br>•Health disadvantage is cumulative requiring extra-ordinary effort |
| ***Acute Care Sector***<br>•Costs more to treat Aboriginal people compared to non Aboriginal people<br>•Acute care sector carries Medicare's failure in non remote and very remote regions<br>•Renal costs increasing significantly<br>•1940s age cohort get *end of life* care only<br>•More detailed investigations continue | ***Total Funding***<br>•WA estimated expenditure on Aboriginal health is $175m ( $167 adjusted for accruals)–52% in acute care. –7% in other institutions─25% in community/public health areas<br>• Equals about $2850 per head<br>•Aboriginal/non Aboriginal per capita funding in WA about 3:1 | ***Comparisons***<br>***daft national expenditure report***<br>•Nationally, per capita spending on Aboriginal health is about 26% (8% in 95-6) higher than for non Aboriginals.<br>•Non Aboriginal people have higher Medicare consumption than Aboriginal people, about 230% in for HA and VR. •Aboriginal Medicare in HA is 180% greater than for VR Aboriginal residents |
| ***Capacity to Benefit***<br>•Programming needs to consider the depth of management, economic, social and human infrastructure in communities and regionsPromote vertical equity to ensure least capable and least well off move up the ladder faster - capacity building should be transparent and explicit | ***Historic Inadequacy***<br>•Historic funding levels are not matched to need<br>•Has produced a skewing in allocation<br>•Everyone agrees that current levels of expenditure are not enough even under historic patterns of allocation | |

**Resource Allocation: Weighted Capacity to Benefit + MESH**
Study in Western Australia (WA) as part of a funding inquiry nationally in Australia to look at resource allocation across different Aboriginal communities. Undertaken by staff of the Health Department of WA (Shane Houston & Trevor Jewell and others) and Gavin Mooney Involved various meetings with key Aboriginal leaders in WA.

**Basis**
Resources should be allocated in such a way as to reflect the principles that policy seeks to pursue. These are taken to be to use available resources to provide as much good as possible those concerned.

**What is the nature of the good?**
In cultural terms, there are four components to the nature of the good in defining this in Aboriginal health and as set out in the Aboriginal Definition of Health Need (Houston 2001): cultural security, physical wellbeing, good environment and freedom from poverty.

**Resource allocation formulae draw on notion of 'need':**
*The greater the health problems, the more spending should be allocated.*

***Standard Resource Allocation***
Allocating pro rata with the *size of the problem* does not represent a rational approach to deciding what *the size of the inputs* should be to address the problem of need.

**Why should we expect that the relative size of the problem would determine the relative size of the solutions?**
**Four components**
*Capacity to benefit*
*Weighting of capacity to benefit (vertical equity)*
*MESH (= Management, Economic, Social and Human) Infrastructure*
*Access cost factors*

**Construction of the Model**
Respect the preferences of the population affected. These *informed* preferences together with relevant information on costs drive priorities for resource allocation.

**Major Advantages of the New Approach**
More subjective (based on community preferences)
Does not assume that all that is at stake is health need.

**Problems of using degrees of sickness e.g. SMR of 110 translates into an additional 10% of resources**
1. Death rates 10% higher does not mean sickness 10 % higher.
2. Why would 10% higher sickness translate to 10% more resources?
3. Why would that result in an equitable outcome?

**Inappropriate Use of Cardinal Ratios from One Domain to Another**
There is no reason why the cardinal ratios for SMRs should translate into the same cardinal ratios for need and no reason why the cardinal ratios of need should translate into the cardinal ratios for allocating resources.

**Simple Explanation**
The sickness based needs approach allocates according to *the size of the problem as it is*. It doesn't consider what the impact might be in terms of *where populations end up*, in other words the 'value added' by the resources.

**Also MESH …**
MESH requires a different way of thinking about funding of services with which 'sickness needs based' formulations cannot cope. It requires acceptance of two components:
1. The conventional funding of programs such as an eye program.
2. The building up of a community or region to increase its capacity to benefit.

**Measurement and the New Approach**
1. Aspects driven by data
2. Aspects which require value judgments

**An Example**
In deciding on the relative weights to be attached to degrees of disadvantage, it matters whether this is on a scale of 0.5 to 2 or 0.2 to 4.0 as these figures are used to weight cardinally the capacity to benefit. In other words how important relative disadvantage is can only be determined subjectively according to some set of preferences.

**MESH**
Precise contents can vary from community to community.
need to decide proportion to MESH & how most efficiently to develop MESH?
What are the returns in terms of increased capacity to benefit?

**Cost Factors**
All resource allocation formulae build in some cost adjustment factors
1. Remoteness. 'EPEA' - Equally Productive and Equally Attractive costs
2. Cultural security

**Developing a Formula**
1) Reflects Aboriginal Health Need.
2) Preferred by Aboriginal leaders
3) Components determining the good.
a. Population size
b. Split between MESH and programs
c. CTB: mix of environmental; social illness; and life style illness.
d. Relative disadvantage index (RDI)

**4) Need to take account of remoteness and cultural security costs.**
**Where things are at:**
a. Evidence to date suggests that MESH be 40%.
b. For the CTB ratings, beyond absolute levels, suggest that environmental health, social illness and lifestyle sickness be weighted 5:3:2 respectively.
c. For remoteness costs (but not reflecting the EPEA) the cost ratios between 1.7 to 0.7.
d. RDI in range 1.2 to 0.8.
e. Three disease categories for CTB in range 0.3 to 1.7.
f. Different levels of MESH between 0.0 and 2.0

## APPENDIX F: PRESENTATIONS OF COUNTRY PLANS

**Namibian presentation:**

**(a) Equity objectives (that will guide Resource Allocation)**

- Equal access ((distance, financial and eventually quality access in terms of attitude, time inputs availability) for equal need (as per MOHSS policy aimed at the "correction of disparities" in the distribution of resources) incorporating the vertical equity principle.

**(b) Will there be broader consultations around these principles and objectives? If so who will be consulted and through what process?**

- Yes, because if there is no common understanding from the beginning the process may not be successful. The stakeholders; MOHSS managers, technocrats, politicians and community representatives will be consulted. Through mainly facilitated discussions.

**(c) What process can be used to get "buy-in" to resources reallocation?**

- It should be a phasing-in process where those who are disadvantaged are moved up while keeping those who are getting more resources where they are with the aim of reducing if not eliminating the inequities. This option assumes mobilization of additional resources internally (e.g. efficiency gains) or externally, and the existence of transparency and agreement on the need for reallocation supported by information. How? by considering the weights e.g. 2, 5 times, consensus or developing a depreciation index.

**(d) What data do you need, have and how do you fill the gap?**

- Data available:
  -Historical data (e.g. expenditure reports of previous financial years).
  -HIS, Survey reports (DHS),Reports of international organizations, e.g. UNDP, WHO, Census data
- Data needed:
  -Data incorporating both socio-economic and health indicators
- The Gap:
  -Will be filled relying on upcoming studies, e.g. the Health System Performance Assessment (HSPA)

**(e) Implementation issues:**

- How to ensure budgets translate into changes on the ground?
  -By assessing and building capacity where needed (learning from MESH)
  -By conducting impact assessment studies

**(f) Who to do what and by when?**

- Leading; DPP & HRD (soliciting political support; top management and community support (community leaders, counselors, governors)
- Technical input and support; MOHSS Resource Allocation Team and WHO and partners.
- Date will be determined after consultations with stakeholders (including non-health sectors).

**Tanzanian presentation**

1.0 Objective: To improve equity in allocation of resources in the health sector

2.0 Specific objectives:

- To analyse the prevailing equity in resource allocation ( Horizontal and Vertical)
- To identify and describe existing data which could be used to measure the level of equity for the past 10 years.

- To identify how does the existing financing mechanism in the reformed districts address equity (Vertical and Horizontal)
    - Within and Across districts

3.0 Main activities.

- Establish the existing criteria which is being used to allocate resources in the health sector (at different levels).
- Conduct stakeholder analysis at different levels to get their views and opinions on how the resources should/are allocated.
- Analysing the existing data to show the levels of deprivation
- Compare the level of deprivation across districts
- To facilitate stakeholders participation in the study

4.0 Methodology

- Review and analysis of documents
- Retrieve and analyse secondary data
- Mapping of stakeholders at national and district levels
- Analysis of stakeholders
- Mapping of district resources.
    - Surveys
    - Analysis of district health plans
    - Analysis of district budget vs. Expenditure
- Deprivation analysis
- Correlation of deprivation variables and resource allocation by
    - Deprivation index
    - Stakeholder/policy maker index
- Dissemination of the findings
    - Pre-study stakeholder involvement
    - Within study stakeholder involvement
    - After study stakeholder involvement

5.0 The way forward:

- Preparation of leaflets
- Preparation of publication
- Creation of stakeholder alliance
- Monitoring of equity.

6. 0 Plan of action:

| **S/ No** | **Major activity** | **Sub-activity** | **Duration of imp.** | **Responsible person** |
|---|---|---|---|---|
| 1 | Preparation of the proposal | | | |
| 2a. | Establish existing criteria being used for RA in the health sector NATIONAL LEVEL | S/H consultation at national level<br>Retrieve and review of documents | Four weeks | |
| 2B | Establish existing criteria being used for RA in the health sector DISTRICT LEVEL | Visit four districts<br>S/H consultation | Seven weeks | |
| 3. | Analysis of existing data | | | |
| 4. | Compare the level of deprivation across districts | | | |
| 5. | Facilitate stakeholder participation in the study. | Identify key stakeholders<br>Conduct interviews workshops and consult | | |

**Zambian presentation**

General Objective: To develop population needs based resource allocation criteria that will attain a more equitable system of health care provision and achieve greater accessibility of health services through investment and resource re-distribution.

Specific Objectives:

To analyse and compare experiences on the historical budgeting allocation process of DHBs and HMBs in the last five years.2. To analyse and compare experiences on the current population (per-capita) based allocation criteria from DHBs and HMBs in the last five years. 3. To determine indicator variables of health needs4. To develop resource allocation criteria on the basis of the findings, for allocating publicly funded health care resources among the DHBs and HMBs relative to their levels of needs using available data.Revision of draft proposal (objectives and methodology

Define equity (equal resource equal Need –equal access equal need)

Selection of Research Assistants (two) and Statistician

Analyse districts returns to see whether money spent is addressing peoples needs

Advocacy and consultation with stakeholders

Collection of data and data sets (Census,LCMS DHS)

Sample survey of select small areas (focus groups) on health; ill health & health needs

Selection of variables

Data analysis

District selection/rankings for health purposes

Formula application

Policy recommendation

## APPENDIX G: SUGGESTED OUTLINE FOR EQUINET PROPOSALS ON RESOURCE ALLOCATION RESEARCH (10 pages)

### Introduction
This section should be relatively brief and provide some background information on the health service context, of relevance to resource allocation, in your country. It should also describe 'the problem' – what problems do you face in relation to resource allocation/why do you want to undertake research on resource allocation?

### Aim and objective
Briefly outline the aim and objectives of the project you wish to undertake.

### Conceptual approach
We do not require a literature review (if you would like to include some reference to the literature, this is great, but it should be relatively brief). The main feature of this section is for you to give some idea of different approaches that you could use, but particularly to outline your preferred approach. You should refer to the following issues (as well as any other issues you feel are important in outlining your preferred approach):

- What resource allocation issue you are going to look at (e.g. allocation of resources from national to provincial/regional level; allocation of resources from national to district level; or some other resource allocation issue).
- What definition of equity will guide your resource allocation analysis (e.g. equal resources for equal need; equal access for equal need etc.).
- What approach are you going to use to evaluate the equity of current resource allocation and to promote equitable allocation in future (e.g. are you going to use a 'needs-based' resource allocation formula; what indicators of needs – in broad terms – will you use; to what extent do you want to use statistical modelling approaches and/or approaches which involve consulting with key stakeholders; etc.)
- What process are you going to use to get 'buy-in' from key stakeholders.

### Methods
Include the usual description of methodology that will be used, but it should be reasonably detailed so that we can understand exactly what you propose to do. Should include:

- What data will you collect, and how will you get that data (data sources etc.) – you should not only focus on quantitative data here (if you are intending to collect qualitative information, e.g. through interviews, also give an idea of what information you want to collect and how you propose to collect it)
- What analyses you will undertake

### Timeframe
Outline what activities will be undertaken when.

### Staffing
Who will work on the project?

### Budget
Please be quite specific about what inputs are required (e.g. days of staff time required for what activities, etc.) and the cost of these inputs

### References
If you do refer to any literature, please include the reference