



United Nations
Development Group



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Indicators
for policy management

*A practical guide for enhancing the statistical capacity
of policy-makers for effective monitoring
of the MDGs at the country level*

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2005

*Indicators for Policy Management:
A Guide for Enhancing the Statistical
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This manual is part of a United Nations Development Group initiative designed to enhance statistical capacity and literacy across country partners in order to increase data availability, enhance data use, and support evidence-based policy-making. It complements a series of training lectures on the same theme. The views expressed in this volume are those of the authors and do not necessarily reflect the judgements of the organizations' boards of directors or member governments.

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acronyms

CI	Confidence Interval
CFC	Chlorofluorocarbons
CPI	Consumer Price Index
CDR	Crude Death Rate
CWIQ	Core Welfare Indicators Questionnaire
DFID	UK Department for International Development
DHS	Demographic Health Survey
DOTS	Directly Observed Treatment Short-Course
DSS	Demographic Surveillance System
EFA	Education for All
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GIS	Geographic Information Systems
HIPC	Heavily Indebted Poor Countries
HIV	Human Immunodeficiency Virus
ICD	International Classification of Disease
ILO	International Labour Organization
IMF	International Monetary Fund
IMR	Infant Mortality Rate
LDCs	Least Developed Countries
LFS	Labour Force Survey
LSMS	Living Standard Measurement Survey
MDGs	Millennium Development Goals
MICS	Multiple Indicator Cluster Survey

MMR	Maternal Mortality Ratio
MTEF	Medium Term Expenditure Framework
NGO	Non-Governmental Organization
NSDS	National Sustainable Development Strategy
NCHS	National Center for Health Statistics
OECD	Organization for Economic Co-operation and Development
PPP	Purchasing Power Parity
PRGF	Poverty Reduction Growth Facilities
PRS	Poverty Reduction Strategy
PRSP	Poverty Reduction Strategy Paper
RMSE	Root Mean Square Error
SDR	Standardised Death Rate
SIDS	Small Island Development States
SPA	Strategic Partnership with Africa
STDs	Sexually Transmitted Diseases
TSED	Tanzania Socio-Economic Database
UN	United Nations
UNCT	United Nations Country Team
UNDG	United Nations Development Group
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNSD	United Nations Statistics Division
WHO	World Health Organization

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Introduction



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1.1 Background

Statistics on human development have improved considerably in recent years in terms of coverage, quality and timeliness. Although the situation is far from perfect, we cannot overlook the tremendous progress made and we have to acknowledge that the challenge is increasingly shifting from one of data collection to one of managing the vast and growing stock of statistics at our disposal and bringing them into the policy process.

This manual is part of a UNDG initiative designed to help meet this challenge by enhancing statistical capacity and literacy across a large number of partners in order to increase data availability and enable evidence-based policy-making.¹ The initiative consists mainly of a lecture-based training course, and the goals are to: raise awareness of the Millennium Development Goals (MDGs); discuss their role in policy-making and advocacy at the national and sub-national level; educate stakeholders on how to develop and use goals, targets and indicators; and improve stakeholders' statistics-related communications skills.

1.2 Structure of the manual

The present manual is a condensed and portable form of the material conveyed during the training course and is intended to complement the lectures. However, it can also serve as a stand-alone resource, helping to build statistical capacity among users not directly involved in the training.

The intended audience is wide. The manual was primarily developed for non-experienced readers, though many familiar with the topic will benefit from it. Experienced data-producing statisticians may find the manual a useful review of basic concepts; data users such as policy makers and advisers may find in it a guide to understanding the different ways data can be used in policy formulation and debate. Other groups, such as the media and civil society organizations, may see the guide as a useful tool for understanding and interpreting development conditions and trends as seen through statistics, which will in turn enhance their ability to use evidence in communication and advocacy.

Some chapters may require some knowledge of basic concepts of arithmetic and social science. In order to meet the needs of a diverse range of readers, we provide definitions and we use illustrative examples to help make concepts concrete. Readers interested in deepening their knowledge will find references throughout. Most of the cited documents are included in the accompanying Resource CD.

¹ The United Nations Development Group (UNDG) brings together the UN operational agencies working on development. It was created by the Secretary General in 1997 to improve the effectiveness of the UN in that field.

Chapter 1

The manual is structured modularly in order to allow readers to set their own path and follow their areas of interest. Accordingly, there is some repetition that will be noted as the reader progresses from chapter to chapter.

There is at least one exercise at the end of each chapter. These were designed to accompany the training course; nevertheless, they can be equally useful to those using only the manual. It is recommended that readers discuss the exercises in groups. The appendices include some reference material for the exercises as well as a country-specific project that encompasses the full breadth of information covered.

This manual includes references to DevInfo. DevInfo is a database system designed for the collation, dissemination and presentation of human development indicators. The technology was specifically designed to support governments in monitoring the MDGs, but it is most useful when it is adapted to host additional indicators during implementation. Over 60 countries and organizations have already adapted and implemented their own version of DevInfo – examples include MASEDA (Malawi); Caminfo (Cambodia); Nepalinfo (Nepal); and the United Nations Statistics Division (UNSD), which has developed MDGINFO, a version containing the official Global MDGs. Readers using this manual while attending a training course will receive a CD containing the DevInfo Database Technology and their country's Devinfo database. The DevInfo User's Guide and Data Administration Guide are on the Resource CD.

1.3 What is covered in this manual

The manual is meant to familiarize you with:

► ***The definitions and structure of the MDGs***

In order to operationalize the MDGs, it is important to have a grasp of how each goal links with the subset of targets that define concrete outcomes or outputs implied by the goal, and ultimately the indicators that measure progress toward the targets.

Goal 1, for example, is related to eradicating extreme poverty and extreme hunger. What does it mean to eradicate extreme hunger? First, we have to be very specific with the concepts, and what we can do about them. This means defining specific targets. In the case of Goal 1, halving the proportion of people who suffer from hunger is one of the two targets considered. Then we have to use indicators to measure what this means. In our example (see Figure 1.1), indicators MDGi4 and MDGi5 have been selected.

While we will discuss each of the MDGs, we will not cover them in full detail. The complete list of all goals, targets and indicators is given in Appendix 2.

► *The role MDGs can play in the policy process and advocacy*

Goals, targets and indicators play an important role both when developing and monitoring policy, as is depicted in Figure 1.2.

Figure 1.1: Structure of Goal 1

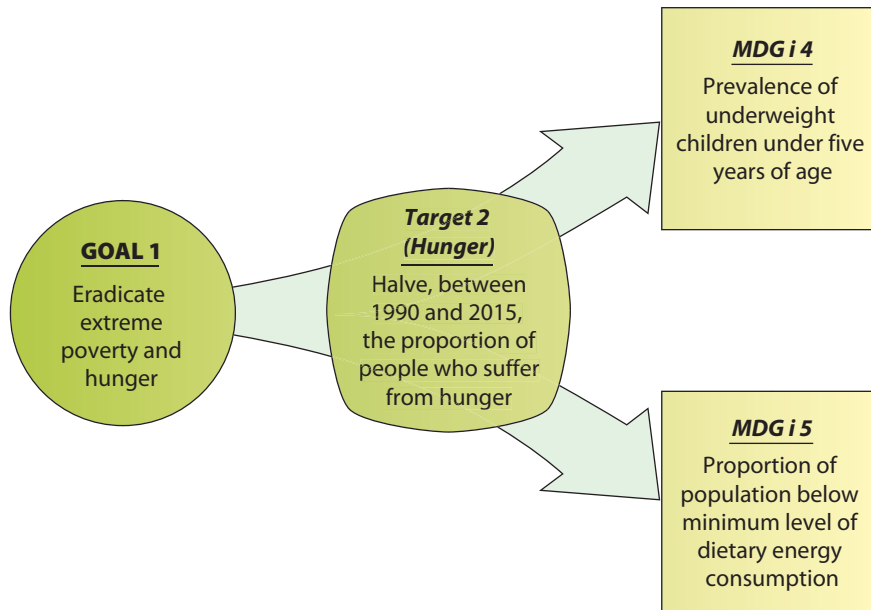
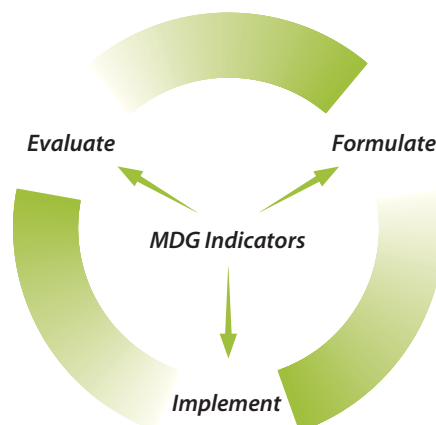


Figure 1.2: MDGs in the policy process



Chapter 1

The manual covers how the MDG indicators and other indicators can be used in the formulation and evaluation of policy by helping to:

- Identify issues and areas that require intervention, and decide upon reasonable targets;
- Measure the size of a development need, and the resources required to deal with it;
- Provide evidence to governments and donors that intervention is required; and,
- Target specific groups and geographical areas with differing needs and conditions.

Equally important is the role MDGs can play in effective advocacy. Goals and targets define the expectations against which civil society and other stakeholders can hold governments accountable; indicators provide the evidence needed to monitor progress and advocate for policy change.

▶ ***Diverse data sources***

The manual describes how indicators are produced and which data sources (household surveys, censuses and administrative data, etc.) can be used, and the implications of these different methods and sources. The importance of maintaining metadata is also stressed.

▶ ***The concept of variability and error***

By their nature, the MDG indicators are estimates rather than exact measures of conditions, and some are inevitably more accurate than others. This manual deals extensively with the issue of variability and error.

▶ ***How to use MDG indicators to measure progress toward national goals and monitor country strategies***

Assessing development strategies such as Poverty Reduction Strategies (PRS) requires a wide array of indicators. The manual describes the characteristics of the different types of indicators, classified both in terms of function (input, output, outcome, impact) and formulation (average, ratio, proportion, percentage, and rate).

▶ ***How to compare global, regional, national and sub-national indicators***

We explain why MDG indicators may take a different value depending upon the reporting institution, and whether and when they are best used for global comparisons or for national monitoring. Figure 1.3 shows a typical global comparison.

Figure 1.3: Global comparison

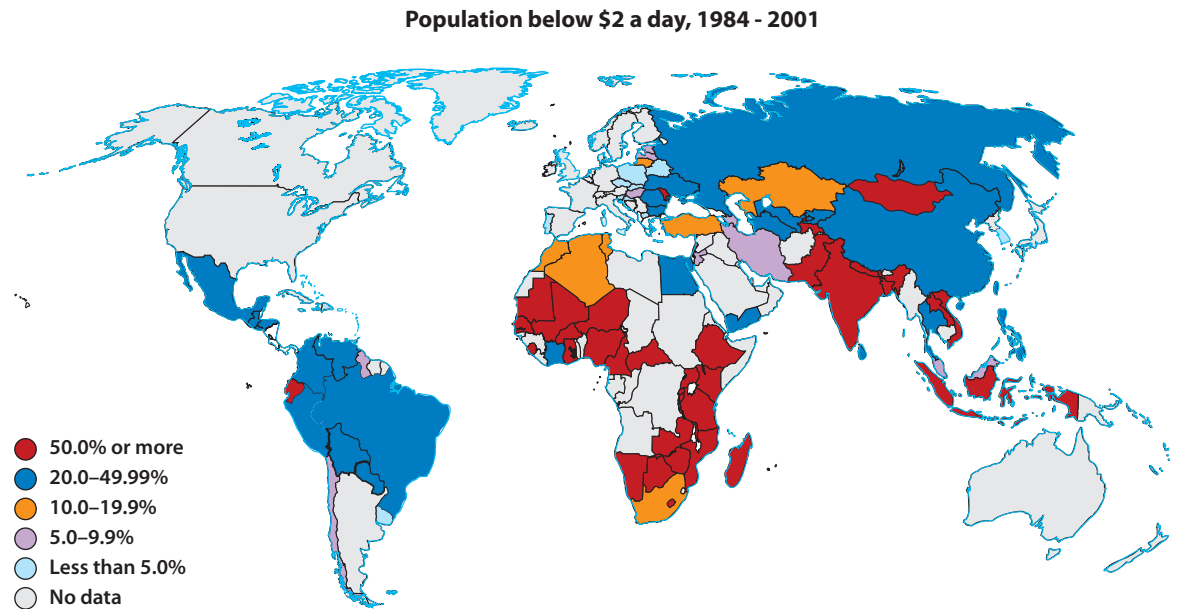
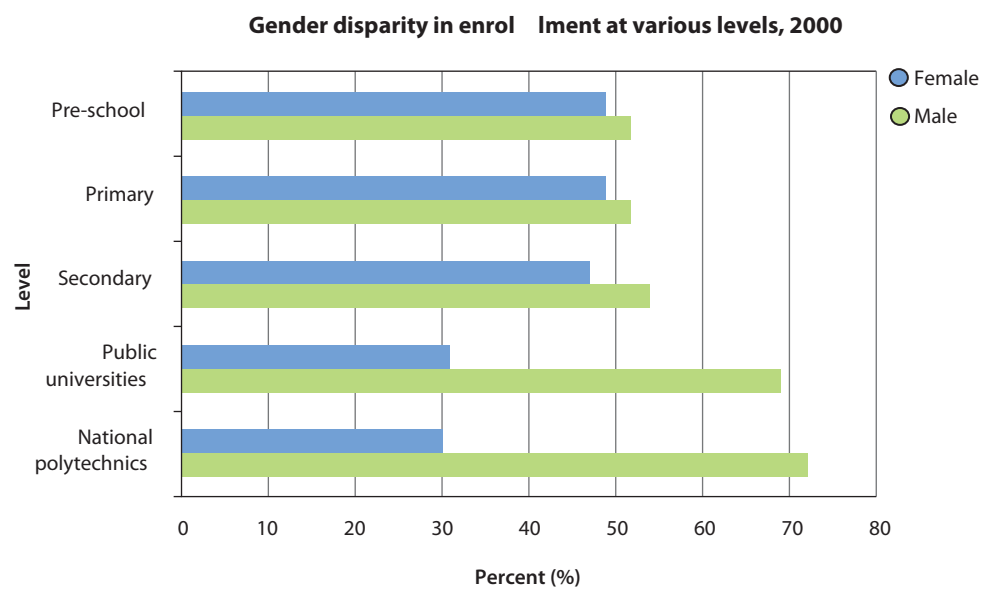


Figure 1.4: Reflecting Diversity



Chapter 1

Similarly, the manual explains how to interpret sub-national indicators, and how these relate to national indicators.

▶ ***How to use the MDGs to reflect diversity***

Policies and strategies often target specific subgroups such as geographical regions or age groups. The manual shows how this process can be strengthened through the disaggregation of indicators. Figure 1.4 shows an example of data disaggregation.

▶ ***How to produce effective presentations***

We provide some tips for improving the effectiveness and clarity of written presentations, tables, charts and maps, and describe how to target material to specific audiences.

exercises

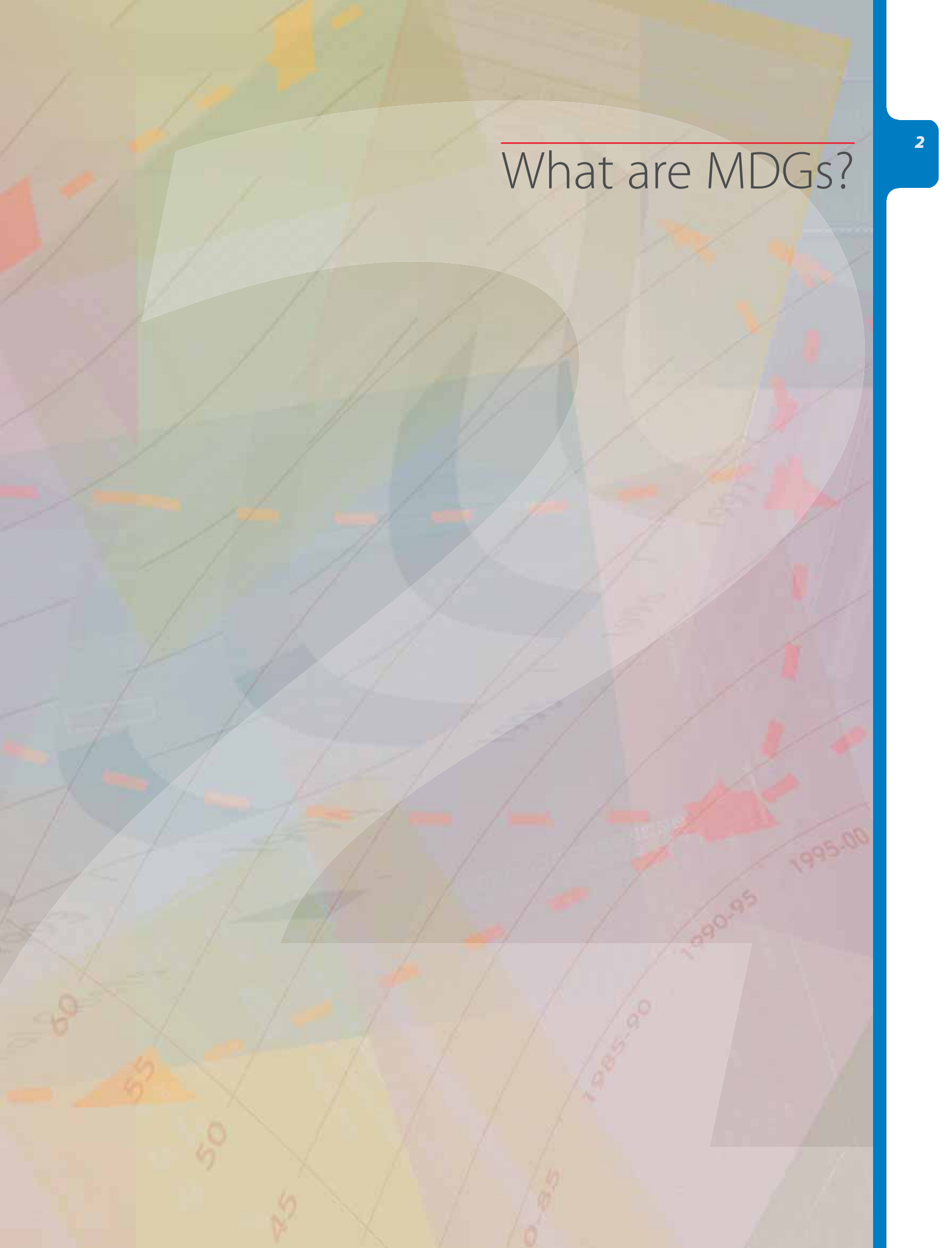
Exercise 1.1: Awareness and role of the MDGs

With a group or partner, consider the following questions:

1. How wide is the awareness of the MDGs in your country?
2. What role do the MDGs play in national policy-making?
3. What role do the MDGs play in advocacy?
4. What potential improvements do you see in these three areas in your country?

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What are MDGs?



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2.1 What is covered in this chapter?

In this chapter we describe the MDGs by looking into their underlying concepts, origins and rationale, as well as their importance at both the global and national levels. We also consider each goal and its associated targets and indicators.

2.2 Where do the MDGs come from?

The MDGs were derived from the Millennium Declaration adopted by the General Assembly of the United Nations at the eighth plenary meeting in September 2000.²

The Millennium Declaration consolidates a set of inter-connected development goals into a broad global agenda. It covers issues of peace, security and development, such as environmental sustainability, protection of vulnerable groups, human rights and governance. Following consultations among international agencies, including the World Bank, the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), and the specialized agencies of the United Nations, the MDGs were drafted in order to translate the principles of the Millennium Declaration into specific, measurable targets. The General Assembly subsequently recognized the MDGs as part of the road map for implementing the Millennium Declaration. While some issues, such as human rights and governance, are not covered by any specific goal, they 'cut across' the full list – that is, the MDGs depend on and encourage progress in these areas as well.

Each goal arose from one or more of the specific resolutions included in the Declaration. For example, '*We will spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected. We are committed to making the right to development a reality for everyone and to freeing the entire human race from want*', translates into MDG 1: eradicate extreme poverty and hunger.

The MDGs are not new, but rather they are the result of various UN world summits and global conferences held throughout the 1990s, starting with the Children's Summit in 1990. The UN Road Map toward the implementation of the Declaration identifies eight specific goals that fall under the following headings:³

² United Nations (2002). 'United Nations Millennium Declaration.' New York.

³ United Nations (2001). 'Road Map toward the implementation of the United Nations Millennium Declaration.' New York.

Chapter 2

1. Poverty & Hunger
2. Education
3. Gender equality
4. Child mortality
5. Maternal health
6. Major diseases
7. Environment
8. Global development partnership

The first seven goals relate to improvement in living conditions within developing countries, while the last one is concerned with establishing and maintaining an effective partnership between developing and developed countries.

2.3 What are the MDGs?

The MDGs are:

Concrete measures for judging performance through a set of inter-related commitments, goals and targets on development, governance, peace, security and human rights.

UNDG: The UN and the MDGs: A Core Strategy ⁴

The MDGs address the aims of the Millennium Declaration by defining specific and concrete goals and targets. Their strength relies on their specificity as to what needs to be achieved within a set time frame. This means that it is possible to monitor whether the goals and targets are being achieved and, if necessary, to address any shortcomings. These goals, and their related targets, however, do not fit every national need, but rather seek to strike a balance, covering aspects of development that are common to many countries, while limiting the total number of indicators used.

2.4 Why do the MDGs matter?

The MDGs make up the first set of quantitative and time-bound goals, shared by developing and developed countries that, offer an integrated, goal-oriented framework for poverty reduction. 'Poverty reduction' is a noble aim, but unless we have a framework that defines what it means in real terms and how to measure it, it will be impossible to determine whether it is actually being achieved. The indicators and targets that monitor progress toward the MDGs provide 'quantitative' measures that allow us to observe conditions and progress and place us in a better position to clearly define what action is necessary, when and by whom, and what resources are needed. As such, the MDGs form the basis on which to mobilize resources to invest in human development.

⁴ United Nations (2002). 'The United Nations and the MDGs – A Core Strategy.' New York.

Additionally, in improving access to hard evidence at all levels, the MDGs inspire debate across the whole spectrum of stakeholders, and provide a platform for discussion and advocacy at the country level.

2.5 Goals, targets and indicators

Goals are objective expressions of what is to be achieved. Usually, they are non-technical and often non-quantifiable statements. **Targets** are individual, observable achievements directly related to a goal, and **indicators** are variables used to measure progress toward a target. Generally, MDG indicators measure outputs and outcomes, though in some cases they measure inputs and impacts.

Let us consider MDG 1. This goal concerns the eradication of extreme poverty and hunger. At first, it may appear very well defined, but upon closer reading, it does not give us any clear information about the meaning of the words 'poverty' or 'hunger', or how we can tell whether they have been eradicated or even reduced. For goals to 'work', specific definitions are needed, as well as set levels of poverty and hunger at which to aim. There are two targets related to MDG 1:

1. Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day.
2. Halve, between 1990 and 2015, the proportion of people who suffer from hunger.

The first target tells us we need to be able to measure people's incomes. The second target tells us that we need to be able to say whether people are suffering from hunger. Both statements have three important characteristics: each embodies a definition of one of the concepts mentioned in the goal (poverty and hunger, respectively); each states a target (half the 1990 level); and each provides a specific time frame (between 1990 and 2015).

However, the targets do not tell us how to define 'income' and 'poverty'. Also, both targets are relative – they refer to a 'proportion of people'. Hence, we also need to know the size of the population, as well as the absolute number of poor and those that suffer from hunger.

The concept of poverty is made more explicit by three indicators:

1. Number of people living below the poverty line

The poverty line is the income threshold below which a given household or individual is classified as poor. For global comparison purposes the cut-off point is set at \$1.08/day at 1993 international prices, while for national purposes a specific

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national poverty line is generally used. In both instances, the results are estimated based on survey data on either consumption or monetary and non-monetary sources of income.

2. *Poverty-gap ratio*

This measure provides information regarding how far households are from the poverty line. It captures the mean aggregate income or consumption shortfall relative to the poverty line across the whole population.

3. *Income share that accrues to the poorest fifth of the population*

This indicator is a measure of income inequality that describes the share of income that goes to the poorest 20 percent of the population.

2.6 Goals

Let us look in some detail at each of the eight MDGs.

Goal 1 - 'Eradicate extreme poverty and hunger'

There are two targets related to Goal 1. Target 1 explores the issue of poverty, as discussed above. Target 2 is concerned with hunger, and is measured by two indicators:

1. Prevalence of underweight children under 5 years of age
2. **Proportion** of population below minimum level of dietary energy consumption

The total number of underweight children under 5 years of age is estimated from data collected at the national level through **household surveys**. The National Center for Health Statistics/World Health Organization (NCHS/WHO) table of child weights for each age group is used as the standard for weight comparison while **census** data are used to obtain population estimates. The second indicator is computed by the Food and Agriculture Organization of the United Nations (FAO).

Goal 2 - 'Achieve universal primary education'

Three complementary indicators are suggested for monitoring progress related to primary education:

1. Net enrollment ratio in primary education
2. Proportion of pupils starting grade 1 who reach grade 5 (**completion rate**)
3. Literacy of 15-24 year olds

The 'net enrollment ratio' and 'completion rate' are based either on administrative or **survey data**; 'literacy rate' is computed from survey data. All indicators use population estimates based on census data for the denominator.

The completion rate may be more difficult to compute since mathematical modeling may be required in order to factor in repeaters, dropouts and migration. The international definition of the completion rate refers to completing 5 years of primary school. Many countries with longer primary cycles (6 or 7 years) have accordingly adapted this indicator to monitor the full cycle.

Goal 3 - 'Promote gender equality and empower women'

This goal is monitored through four indicators:

1. Ratio of girls to boys in primary, secondary and tertiary education
2. Ratio of literate women to men, 15-24 years old
3. Share of women in wage employment in the non-agricultural sector
4. Proportion of seats held by women in national parliament

The first two indicators deal with education, with estimates derived from either administrative or survey data. The third indicator is mainly computed from labour force surveys, establishment surveys and census data. The fourth indicator is compiled from administrative records.

Goal 4 - 'Reduce child mortality'

This goal is monitored using two measures of child mortality: 'under-five mortality rate' and 'infant mortality rate'. Where vital registration systems are good (i.e. providing coverage of over 90% of the population), child and infant mortality are estimated from vital statistics using data from those systems. Otherwise, survey data are used – this is the case in most developing countries.

Besides these two direct indicators, an indirect measure is used: 'proportion of 1-year-old children immunized against measles'. This indicator is used for two reasons: first, measles is a major peril among children in developing countries; second, the indicator also shows us whether an efficient child-immunization system exists, which in turn sheds light on the breadth and quality of the national child health system. Immunization data may come from surveys, national administrative systems, or systems maintained by the agencies responsible for implementing immunization programmes.

Goal 5 - 'Improve maternal health'

The 'maternal mortality ratio' (MMR) is one of the indicators applied. Estimates are based either on data from vital registration systems or surveys. Again, the use of survey data is the norm in developing countries, although many of them do not produce any national estimate of maternal mortality at all, in which case modelled estimates prepared jointly by WHO, the United Nations Children's Fund (UNICEF) and the United Nations Population Fund (UNFPA) are used for global monitoring.

Chapter 2

Besides the MMR, the 'proportion of births attended by skilled health personnel' is used as a **proxy** for maternal risk, though it is important to be clear about the definition of the term 'skilled attendant', and remember that the competencies of health workers may vary from one setting to another.

Goal 6 - 'Combat HIV/AIDS, malaria and other diseases'

Two targets are related to this goal. The first target has to do with halting and reversing the spread of HIV/AIDS by 2015. This is monitored through three indirect indicators. 'HIV prevalence among 15-24-year-old pregnant women' measures the new infection rate and was chosen as an indicator after studies showed that decreases in HIV prevalence tend to begin with a decline in the prevalence among young pregnant women. 'Condom use rate of the contraceptive prevalence rate' monitors condom use, which is the only effective contraceptive method for preventing HIV transmission. Generally, data are generated either from household surveys or surveillance surveys.

The second target related to Goal 6 deals with malaria and tuberculosis. Both diseases are monitored by the prevalence and death rate, although it is known that cases and deaths are sometimes unaccounted for or incorrectly attributed. Data to compute both rates are generated either through administrative systems or surveys. However, it is very difficult to measure the specific cause of death where accurate vital registrations and medical certification are unavailable.

Two indicators monitoring the success of preventive and treatment measures are included. With respect to malaria, the percentage of children sleeping under insecticide-treated bed nets is the indicator used. Data are collected through household surveys. For tuberculosis, the proportion of cases detected and cured under the national DOTS programme of the World Health Organization (WHO) is considered.

Goal 7 - 'Ensure environmental sustainability'

Three targets relate to Goal 7. The first explores the status of environmental resources and the issue of sustainable development; several indicators are employed, and each of them relates to one of the following issues: forest coverage, biological diversity, energy use, carbon dioxide emissions and the use of solid fuel. The first two are the most commonly reported. Generally, data come from surveys managed either by countries or international agencies such as FAO.

The second target concerns water-source access. The target is monitored using the proportion of the population with sustainable access to an 'improved' water source. It is worth noting, however, that access does not guarantee use.

The third target is connected to improving the life of slum dwellers, and is monitored through the proportion of urban population with access to secure tenure.

Goal 8 - 'Develop a global partnership for development'

Unlike the first 7 goals, Goal 8 assigns primary responsibility to developed countries. This goal calls for building partnerships between industrialized and developing countries through larger and better development assistance; the development of an open and rule-based trading system; and a comprehensive solution to the debt issue. The goal suggests that special attention be given to LDCs, SIDS and landlocked countries. Twelve indicators are associated with these thematic areas.

Additional indicators within Goal 8 address issues such as youth employment, access to affordable essential drugs and to new technologies. Youth employment is monitored by tracking the unemployment rate of young people aged 15-24, both by gender and in total. Data are obtained from labour force surveys. Access to essential drugs is measured as the proportion of the population with sustainable access to the 20 most essential drugs identified by WHO. Access to 'new technology' is monitored by measuring access to telephones, including landline and cellular subscribers, personal computers, and Internet use rates.

2.7 At what level should indicators be measured?

Goals, targets and indicators, as defined in the UN publication, 'Indicators for Monitoring the Millennium Development Goals: Definitions, Rationale, Concepts, Sources', are primarily designed for global monitoring purposes.⁵ Accordingly, wide definitions are used in order to accommodate diverse conditions that may arise across countries.

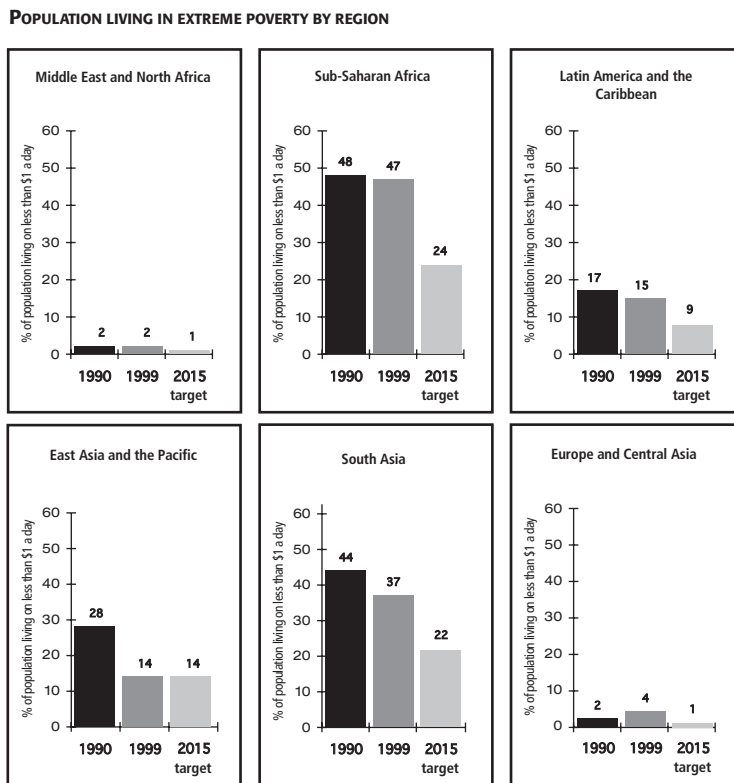
International agencies adjust the value of the national indicators produced by national agencies as required in order to ensure comparability across countries, and to allow for the production of global and regional aggregates. While much of the data is derived from national sources, in some cases data used to produce global estimates are collected directly by the international agencies (e.g. WHO, World Bank, FAO), and may not be available to national agencies.

As global and national definitions may vary, or different sources may be used, it is not unusual to find discrepancies between global and national values.

Figure 2.1 illustrates an example of regional comparison. The figure compares the actual and expected proportion of the population living in extreme poverty across six regions. As the same indicator is applied in each country, it is possible to compute regional averages and get a quick, overall picture of the relative situation of each region. This comparison lacks specificity however, so it would not serve any national policy-making context.

⁵ United Nations (2003). 'Indicators for Monitoring the Millennium Development Goals: Definitions, Rationale, Concepts, Sources.' New York.

Figure 2.1: Regional comparisons



Source: Report of the Secretary-General on implementation of the Millennium Declaration. Data based on World Bank estimates.

\$1/day is expressed in Purchasing Power Parity (PPP)

2.8 Adjusted & Disaggregated MDGs

The global MDG package of goals, targets and indicators is also used for national and sub-national monitoring. To take into account local conditions and data availability, however, the majority of countries have tailored global definitions to their specific context. For example, to compute the proportion of people living below the poverty line, many countries use a country-specific poverty line rather than the international threshold of \$1.08-a-day at 1993 international prices. This is a common example of customization. In other circumstances national authorities may decide to adopt locally-defined indicators not included in the global list.

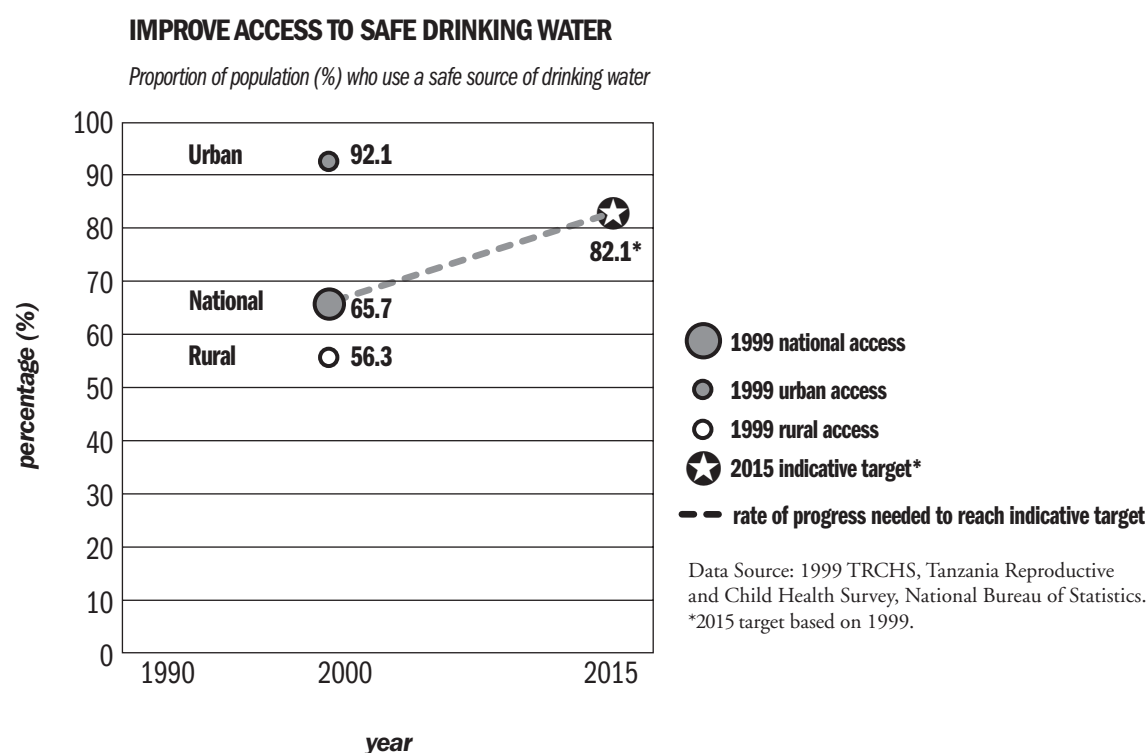
Even where global definitions are used, national targets may differ from global targets. In some countries the global targets may be out of reach, while in others

they may not be sufficiently ambitious or they may have already been met. Countries should consider which targets fit their priorities and resource constraints, and adjust targets accordingly. Let us consider the cases of Albania and Thailand.

Even though the global MDG agenda does not go beyond the primary cycle, Albania has set the target of achieving universal primary and secondary education. In addition, Albania aims to provide access to 'safe and sufficient drinking water', which again is a step ahead of the global target of 'sustainable access to an improved water source'. Thailand has introduced a framework called MDGs-Plus, which includes bringing poverty below 4% by 2009, which is substantially more ambitious than halving poverty by 2015. Similarly, Thailand plans to halve infant mortality by 2006, rather than 2015.

While national targets are necessary for the purpose of national budgeting, tracking sub-national differences requires that targets be disaggregated according to geographical regions, administrative areas, gender, urban/rural areas, income quintiles and other relevant dimensions. This can provide important insight and be very useful when devising targeted policies and advocacy strategies.

Figure 2.2: Disaggregating indicators



Chapter 2

The example from Tanzania may clarify this concept. Figure 2.2 shows that at national level, 66% of the population has access to safe drinking water. This is about 16 percentage points below the national target. When we disaggregate the national value, however, it is clear that in urban areas the target has already been met while in rural areas only 56% of the population has access to a safe drinking-water source. This indicates that more resources may be needed in rural areas. This is a simple yet clear case in which **disaggregation** allows policymakers to monitor progress more closely and tailor policy accordingly.

If we could disaggregate the urban population by slum and non-slum dweller, we might find a large disparity between the two sub-populations. This is to say that always, even within better-off groups or areas, there might be pockets requiring special attention.

2.9 Comparing global and national estimates

The above example can also help clarify the interplay between national and global values. The National Bureau of Statistics in Tanzania estimates that in 1999, 66% of the population had access to safe drinking water. The United Nations Statistics Division (UNSD) has a different value however, estimating that in 1990 the proportion with access to safe drinking water stood at 76%, and by 2000 it reached 90%.⁶

This discrepancy can be attributed to several factors: differences in definitions, adjustments, analysis and computation methods; differences in data sources; or time lags inherent to the reporting processes. Countries may differ in their definitions of safe drinking water. In our example, it is quite possible that the standards set by Tanzania authorities are higher than those set for global purposes. It is also possible in this case that global data may come from different sources than those used for national indicators.⁷

Which estimates shall we use? There is a place for both global and national as well as for regional and sub-national values. What is important is to use them in the correct context.

2.10 Are the MDGs global, regional or national?

There has been persistent ambiguity as to whether the MDGs should be interpreted primarily at the global, regional or national level. For example, should the target of cutting the proportion of people living below the poverty line aim at

⁶ The UNSD has a mandate to collect global indicators, which are available online: http://unstats.un.org/unsd/mi/mi_goals.asp

⁷ Carraro, L. et al (2004). 'Monitoring the millennium development goals – Current weakness and possible improvements.' Department for International Development, London.

reducing the proportion of poor by half worldwide? Should it cut the proportion in half for a region? Or should it cut the proportion in half in each country?

A third of the world's population lives in two countries, China and India, and if those countries maintain their current rates of progress in poverty reduction, the goal at a global level would be easily reached. Nevertheless, the spirit of the Millennium Declaration will not be honored, as its primary aim is to reach those left behind.

In summary, the key policy arena for addressing the MDGs is national. The remaining chapters of this manual will focus on national indicators, and how they can best influence the national policy-making process. A crucial message of this chapter is that, if we understand how indicators are compiled – their definitions, data sources, and time frames – we are equipped to make better use of them.

exercises

Exercise 2.1: MDG indicator definitions

Use the document *"Indicators for Monitoring the Millennium Development Goals: Definitions, Rationale, Concepts, Sources"* on your Resource CD to answer the following questions:

1. What is indicator 1A? How is it calculated?
2. What does 'net enrollment in primary education' mean?
3. How and why might data on net enrollment in primary education be disaggregated?
4. What unit is used to measure infant mortality? What does this indicator tell you about a population?
5. What are the limitations of indicator 17: proportions of births attended by skilled health workers?
6. What is the definition of indicator 46? How are the data collected?

The indicator numbering refers to the full list that you can find either in the document mentioned above or in Appendix 2.

Exercise 2.2: Indicator linkages

Look at the UNSD spreadsheet called 'All UNSD MDG values.xls', on the Resource CD, and your own country report. Choose three MDG indicators that have published values in your MDG Report, and compare the values (historic and current) with those in the UNSD dataset. Do they differ? How? If they do differ, how would you explain the differences?

The background features a collage of various maps and charts. On the left, there are maps of Africa and South America. On the right, there are line graphs with data points and shaded areas, representing trends over time. The overall color palette is muted, with greens, blues, and greys, overlaid with semi-transparent circular shapes.

MDGs and the policy cycle

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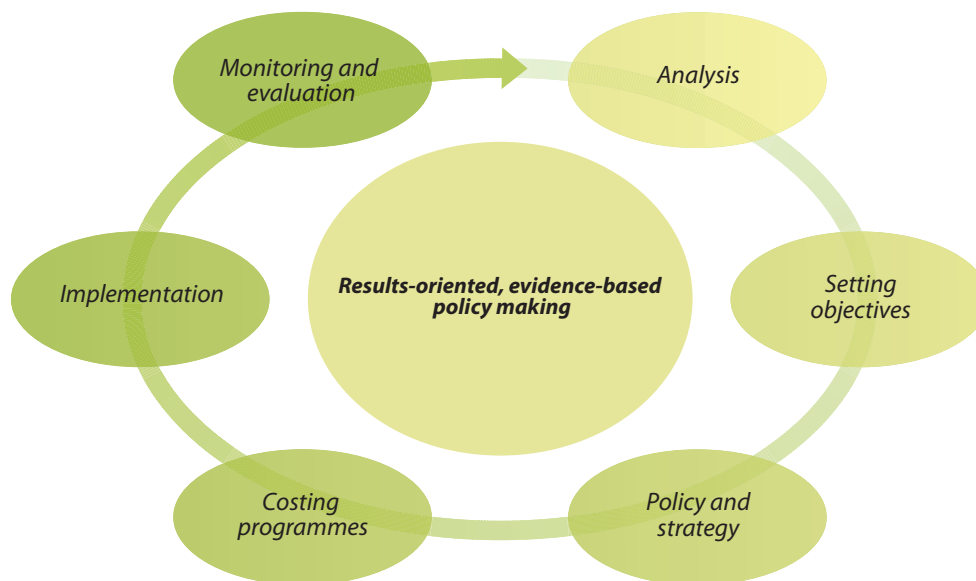
3.1 What is covered in this chapter

In this chapter we consider the steps that lead to the creation of policy and identify where the MDGs can play a role. We then describe some desirable attributes of policies. We conclude with the concept of evidence-based policy-making.⁸

3.2 Policy and the policy cycle

A policy is a principle or a course of action adopted by an institution or individual. Policies may either aim to maintain the status quo or bring about change. The **policy cycle** outlines how a policy is created and developed through a sequence of interconnected steps, which can be represented as in Figure 3.1:

Figure 3.1: The policy cycle



► *Analysing the situation*

Typically a policy cycle begins with an analysis of the current status, taking into account several aspects such as the characteristics of the population, macroeconomic context, social and political constraints, and strategies in place. For instance, a PRS cycle would focus on the nature of poverty using the quantitative and qualitative information available. In some cases, however, 'setting objectives' may precede 'analysis'. Democratization, for example, could be set as an objective without the backing of any analytical work.

⁸ This chapter draws extensively from: Poulsen, N. (2004). 'INSPIRE to inclusive and accountable policies.' Department for International Development, London.

Chapter 3

▶ *Setting objectives*

The next step involves reaching a consensus on specific objectives, and developing medium and long-term goals, targets and indicators accordingly. It is at this stage that we need to take the MDGs into account.

▶ *Developing strategies and policies*

In order to determine policy priorities and how to reach the targets, we need to review national and sectoral strategies; policies and programmes; macroeconomic and structural factors; and governance issues, such as institutional arrangements or public finance.

▶ *Costing programmes*

The cost of the policies, programmes and actions needed to achieve the targets has to be carefully assessed and linked to the annual budget cycle and the medium-term expenditure framework setting a precise order of priority.

▶ *Implementation*

The implementation stage consists of a series of practical steps set out in a strategy or policy. Pilot tests are generally conducted before full implementation.

▶ *Monitoring and evaluation*

Effective monitoring and evaluation is a key component of the cycle, informing policymakers as to whether the steps formally in place have been followed and, if so, how effective they have been. Such feedback is essential to adjust on-going policies and build an evidence-based institutional memory. We have to learn from past experience – both from mistakes and successes – and be willing to integrate them with the knowledge of a wide variety of disciplines.

An effective and efficient policy cycle must address a number of questions:

- *Where are we?* - Accurate situation appraisal;
- *Where do we want to go?* - Clear formulation of objectives;
- *What are the steps needed to get there?* - Clear formulation of policies, strategies, and tasks; understanding of the linkages and priorities;
- *Do we have the capacity to follow the steps?* - Sound implementation procedures, with good management, resource mobilization, and accounting; and,
- *Where do we stand vis-à-vis the planned progress?* - Effective, honest and unbiased monitoring and evaluation.

Effective and efficient policy cycles tend to have two distinctive characteristics: inclusiveness and accountability.

3.3 What is an inclusive and accountable policy cycle?

A policy cycle is inclusive if all relevant actors and stakeholders, from the executive and legislative branches to civil society and the private sector, are genuinely consulted and actively participate in all stages of the cycle. This means that efforts are made to ensure that the voice of each participant is heard, and to mitigate the tendency of some participants to monopolize or divert the process. An inclusive policy process requires an understanding of the integrated network of relations within the environment where the policy process takes place. This comprises individuals with different beliefs, needs, desires, attitudes, abilities, influence and access to resources. In this context, debate, alliance building and influence are as relevant to the policy process as is the process of rational appraisal backed by empirical evidence.

An accountable policy process requires open and transparent procedures that in turn rely on the individual, mutual and collective responsibility of all actors. It is also important to stress the responsibility of those in leadership and powerful positions.

3.4 How does an MDG strategy fit into the national policy cycle?⁹

To achieve the MDGs, countries need to review existing national and sectoral strategies, and revise and integrate them into a practical medium-term strategy designed to meet nationally defined goals and targets. A medium-term strategy is based on an assessment of the resources and capacity required to meet interim targets. Capacity and needs assessments, together with macroeconomic and sectoral policy analysis, support these efforts.¹⁰ These assessments, backed by medium and long-term donor support, provide a basis to formulate a customized, robust, nationally driven development strategy to achieve national targets.

In other words, stakeholders have to compare the current situation with their adapted MDG targets and develop strategies that include specific policies, programmes and public investments. Assessments should also identify any obstacles that may hinder progress and should include financing strategies. In many countries, this is done through the PRSP, while in others a national development strategy may serve this purpose. It is also important that medium-term strategies are placed in the context of a long-term vision and revisited periodically.

⁹ UNDP (2005). 'How-To Guide to MDG-based National Development Strategies.' New York.

¹⁰ A rigorous, broad assessment can also be a means to trigger partners' engagement.

3.5 What is evidence-based policy-making?¹¹

Many countries have moved in recent years toward '**evidence-based policy-making**'. Evidence-based policy helps planners make better-informed decisions by putting the best available evidence at the heart of the policy process. Evidence may include statistics, academic research, practice-generated impact evidence, 'best-practice' information and case studies. The following is a list of best practices for bringing evidence into policy-making:

- ▶ **Devote resources to providing sound evidence that is valid and relevant.** There is a need for adequate resources for the production and dissemination of data;
- ▶ **Empower the champions of evidence.** Ensure that those engaged in data production and use are recognized for their work;
- ▶ **Provide incentives to use evidence.** Promote the use of evidence at the highest level;
- ▶ **Ensure that staff have the information and skills to be intelligent producers and users of data.** Data collection and analysis techniques are constantly evolving and can only be kept up with through continual training;
- ▶ **Ensure that evidence is 'owned' within the organization.** Users and producers of data must be involved throughout the process of deciding data needs, designing data collection tools and focusing analysis;
- ▶ **Bring together data producers and users to ensure a shared understanding.** Establish monitoring networks or committees, bringing together groups of stakeholders – both users and producers of data – for monitoring national development strategies; and
- ▶ **Keep the use of evidence in perspective.** There are factors other than evidence that must be considered – evidence should strengthen but not dominate the policy process.

Despite its strengths, evidence-based policy-making is far from being perfect. Contradictory evidence may arise or the time frame for evaluation may be too short to assess the medium and long-term impact of a policy. Accordingly, it is always necessary to integrate the best available evidence with individual experience, expertise and judgement.

¹¹ Davies, P.T. (2003). 'The challenge of getting evidence into policy: lessons from comparative experience', Strategy Unit, Cabinet Office, London.

exercises

Exercise 3.1: Describing the policy process

Discuss the following questions with a group or partner:

1. Briefly describe the policy-making process in your country.
2. Are there distinct medium and long-term strategies?
3. What are the strengths of this process? (Identify three)
4. What are the weaknesses? (Identify three)
5. Is the policy process locally-owned or is it seen as externally-imposed?
6. Which stakeholders are involved (politicians, civil society, ministries, donors, etc.)?
7. Can you cite an example of when research was used to promote evidence-based policy-making?

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MDGs and
Poverty Reduction
Strategy Papers

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4.1 What is covered in this chapter?

This chapter gives an introduction to PRSPs, outlines some of their underpinning principles and presents some assessments. In the last part of this chapter we consider how PRSPs have incorporated the MDGs and the concept of the MDG-based development strategy.

4.2 What are PRSPs?

The Poverty Reduction Strategy (PRS) process reflects the World Bank and IMF's approach to development in low-income countries. PRSs are to be developed in a participatory manner and should help the government to prioritize in-country and external resources, including savings related to the Heavily Indebted Poor Countries (HIPC) Initiative for debt relief.¹²

The PRS process emerged in response to the disappointing poverty reduction performance in aid-dependent countries, the role played by national policy and the increasing awareness of the limitations of conventional conditionalities. The PRSP is the document that details the PRS. A PRSP describes the macroeconomic framework and the public expenditure programmes across key sectors, and schedules key policy actions and institutional reforms, as well as associated external financing needs in a country. PRSPs are intended to follow five guiding principles:

- Country-driven, with broad-based participation by civil society and the private sector;
- Results-oriented, with a focus on outcomes;
- Comprehensive, addressing the multidimensional nature of poverty;
- Partnership-oriented, involving multilateral and bilateral partners;
- Based on a long-term perspective on poverty reduction.

4.3 PRSP Evaluations

The body of studies on PRSPs is mixed. One study drawing from a synthesis paper undertaken for the Strategic Partnership with Africa (SPA) and eight country case studies concluded that PRSPs have helped to mainstream and broaden poverty reduction efforts and create new spaces for domestic policy dialogue, while also encouraging a transformation of the aid relationship.¹³ The country studies also

¹² For a good overview of poverty and policy issues see the World Bank's poverty net: <http://www.worldbank.org/poverty>. The Overseas Development Institute has a website with useful research on PRSP monitoring: <http://www.prspsynthesis.org/>. For further background see: http://www.worldbank.org/oed/prsp/prsp_process.html

¹³ Booth, D. (ed) (2003) 'Fighting Poverty in Africa: Are PRSPs Making a Difference?' Overseas Development Institute Working Paper 317, London.

Chapter 4

document a shift of responsibility for poverty monitoring to the Ministry of Finance, a more favourable institutional context created by linking pro-poor policies to budget priorities, and a move from the traditional approach of focusing poverty reduction efforts to the social sectors.

Another study examines the politics of the PRSP approach and concludes that pro-poor change has for the most part been slow, and its pace is a function of each country's context. Still accountability at local level is weak but there is no evidence that PRSPs have worsened the situation. Also the study refers to evidence that the PRS process helps to strengthen partnerships and to set a different balance of power among stakeholders.¹⁴ The study makes four recommendations:

- understanding the overwhelming importance of the national context;
- building on existing strategies and processes to promote national ownership;
- improving the quantity and quality of participation; and
- strengthening domestic governance.

At the same time an evaluation conducted by the World Bank's Operations Evaluation Department found that:¹⁵

*'There is an inherent tension in the design of a BWI-driven initiative involving conditionality that is simultaneously meant to foster a country driven process. This has led to two problems during implementation. First, there is no mechanism or guidance to adapt the Initiative's processes and requirements to differing country conditions, especially the weak public sector capacity found in many low-income countries (...). During implementation, countries have understandably focused on completing the documents that give them access to resources. This attention to requirements has often been at the expense of adaptation of the PRS process to country circumstances. The BWIs' initially ambitious timetable for completion of first round PRSPs in HIPC and Poverty Reduction and Growth Facility (PRGF) countries reinforced the tendency to generate standardized strategies in the early PRSPs.'*¹⁶

¹⁴ Piron, L., Evans, A. (2004). 'Politics and the PRSP Approach: Synthesis Paper.' Overseas Development Institute, London.

¹⁵ World Bank (2004). 'Poverty Reduction Strategy Initiative: an Independent Evaluation of the World Bank's Support Through 2003.' Washington D.C.

¹⁶ BWI (Bretton Woods Institutions): World Bank and IMF.

4.4 MDGs and PRSPs

In this section we consider how PRSPs provide coverage of the MDGs and MDG indicators, and how ambitious PRSPs targets are vis-à-vis those of the MDGs. We also introduce the concept of the MDG-based development strategy.

MDGs coverage

PRSP goals and indicators vary enormously from one country to the other. In general, however, the majority of PRSPs refer to the issues covered by the MDGs and, as of August 2005, all PRSPs provided at least one measurement for poverty headcount, education enrollment/attendance, and maternal health, while over 9 out of 10 covered child mortality and water health issues. Moreover, by 2005, PRSPs were giving more coverage to these issues than they did just two years prior, in 2003. However, the coverage of women's voice, income distribution, biological diversity and housing has been and remains low.

Figure 4.1: Coverage of the MDG indicators in PRSPs as of October 2005*

<i>POVERTY</i>	Poverty headcount	100	<i>HEALTH</i>	Child Mortality	98
	Poverty Gap	43		Immunization	80
	Income Distribution	30		Maternal health	100
	Child Malnutrition	73		HIV/AIDS; STDs	78
	Malnutrition	25		Other infectious diseases	78
	Poverty average	54		Health average	87
<i>EDUCATION</i>	Enrollment/Attendance	100	<i>ENVIRONMENT</i>	Energy/Electricity	73
	Progression/Completion	63		Forests	40
	Literacy	70		Biological diversity	25
	Education average	78		Housing	30
<i>GENDER</i>	Education (Gender)	83		Water	95
	Employment (Gender)	60		Sanitation	70
	Voice (Gender)	25		Atmosphere/Air quality	33
	Gender average	56		Environment average	52

* Percentage of PRSPs including at least one indicator per sub-category

Source: Harrison, M. and Swanson, E. (2005). 'MDG Indicators in PRSPs: Coverage and Trends.' Presented to the Interagency Expert Group. October 27, Rome.

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At the same time, PRSPs contain a range of goals that lie outside the scope of the MDGs. The most frequently mentioned non-MDG targets are: economic growth, macroeconomic stability, small and medium enterprise growth, governance and accountability issues, roads and rural development.

MDG-based development strategy

The next step would be to devise PRSPs or other strategies fully aligned to the MDGs. What exactly makes a national development strategy MDG-based? While both donors and their country partners now commonly use this term, there is no generally accepted set of characteristics by which to judge whether a strategy qualifies as MDG-based.

The UNDP 'How-To Guide' defines an MDG-based development strategy as 'a long-term vision consistent with the Millennium Declaration, based on nationally determined priorities, that is supported by medium-term cross-sectoral strategies, which are measured against progress toward MDG-based outcomes.'¹⁷

Backed by UNCTs' experience, the guide also identifies a number of key factors that, if properly addressed, can favour a successful alignment of PRSPs and the MDGs.

¹⁷ UNDP (2005). 'How-To Guide to MDG based National Development Strategies.' New York.

exercises

Exercise 4.1: MDGs and PRSPs

Discuss the following with a group or partner:

1. How has the introduction of a PRSP improved policy-making in your country?
2. Has the PRSP helped to make the MDGs operational?
3. Are the MDGs fully integrated in the PRSP? Which Goals are best represented? Which are less so? And how?
4. In what ways can the PRSP be improved to support the MDGs?

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Monitoring systems and indicators

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5.1 What is covered in this chapter?

After illustrating the role and importance of an effective monitoring system and presenting some good practices and emerging institutional arrangements for monitoring, we introduce different categories of indicators. We discuss why the MDG indicators are quantitative as opposed to qualitative. We also describe the properties that make indicators most effective for use in policy development and advocacy.

5.2 The monitoring system

In many countries the monitoring system is still in the early stages of development - the institutional arrangements are often not yet fully developed and are affected by resource shortcomings. Many countries have different monitoring systems housed in a range of institutions, and frequently these are not fully linked. A recent review of PRS monitoring systems indicated that in most PRS countries there are capacity constraints that have not been sufficiently addressed.¹⁸

Efforts are being made in many countries to coordinate the various systems of data collection, analysis and dissemination. These efforts include the creation of monitoring steering committees or networks that bring together the various data producers and users to discuss how the current system could be improved to better meet users' needs. Efforts also include the development of central indicator databases designed to hold a wide variety of indicators for monitoring a country's development strategies.

5.3 Good practices for monitoring

Several principles are essential for strong monitoring systems. These include: country ownership of the monitoring process; a medium-term perspective; coordination and coherence across actors involved in the monitoring process; and a focus on indicators and targets agreed by a broad set of stakeholders.

Despite increasing references to the multi-dimensional nature of poverty, income poverty is still the central focus of monitoring systems in many low-income countries.¹⁹ This would be of little concern if income poverty and other dimensions of poverty were closely related. However, an increasing stock of evidence shows a non-systematic correlation between poverty and other measures of deprivation such as nutritional status, empowerment and others. Poverty is increasingly shown

¹⁸ Lucas, H., Evans, D., and Pasteur, K. (2004). 'Research on the current state of PRS monitoring systems.' Institute of Development Studies, Brighton. See also: PARIS 21 web site: <http://www.paris21.org/>; and IMF/World Bank (2004). 'Poverty Reduction Strategy Papers - Progress in Implementation.' Washington DC.

¹⁹ Booth, D., Lucas, H. (2002). 'Good Practice in the Development of PRPS Indicators and Monitoring Systems.' Overseas Development Institute, London.

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to be a more complicated phenomenon than previously thought. The MDGs can help to ensure commitment to a broader agenda.

Looking only at final outcomes is not enough. Many monitoring systems neglect inputs and outputs despite the fact that these are essential for effective and proactive monitoring. To identify whether changes to policies or budget allocations are needed, it is critical to monitor the policy process at various stages and understand the linkages between inputs, outputs, outcomes and impacts. For example, if after an increase in paediatric care expenditure no progress on infant mortality is recorded, to intervene we need to understand what progress has been made at various stages between inputs and outcomes. Moreover, **final indicators** tend to change slowly when compared with **intermediate indicators** as the latter react much more quickly to policy changes. Consequently, intermediate indicators – both input and output – are more reliable barometers for tracking policies and programmes as they unfold.

It is important also to bear in mind the limitations of indicators. In many cases the exact causal links between policies and outcomes are subject to debate. It is often difficult to identify the most appropriate indicators, and even when the ‘correct’ intermediate and final indicators can be identified, they may prove expensive or difficult to measure. Also, mechanisms for tracking the share of the budget that goes to priority sectors are often inadequately developed in low-income countries.²⁰ Consequently, the link between expenditure tracking and other data is often missing.²¹

5.4 Institutional arrangements for monitoring²²

Institutional arrangements for monitoring must be carefully planned in order to ensure the proper flow of information. There is no blueprint – solutions must be designed in full consideration of every unique environment, including the power relations and conflicting priorities across associated actors, and ensuring that monitoring is not treated as a strictly ‘technical’ process.²³ The participation of a wide range of stakeholders is important, including civil society organisations such as NGOs, academic institutions and trade unions.

Two alternative institutional models for monitoring have emerged in recent years. The first envisages a monitoring unit close to the Ministry of Finance. This is the

²⁰ See ODI (2003). ‘Monitoring in Africa’. PRSP Briefing Note 7. London.

²¹ This also explains why in some countries the public expenditure review processes have been closely associated to the PRS process.

²² See the World Bank’s poverty monitoring page: <http://www.worldbank.org/povertymonitoring>

²³ Donors’ monitoring requirements may also conflict with national systems. In the past this has led to the establishment of parallel systems that have further weakened the fragile national monitoring institutions. The PRS process should reduce individual donor monitoring requirements. The evidence, however, does not always confirm this to be the case. See Overseas Development Institute (2002). ‘Reporting and Monitoring: post-full PRSP challenges.’ PRSP briefing note 2. London.

case of Uganda, Mozambique, and Rwanda, for example. The second model places the monitoring away from the Ministry of Finance, often in a statistical bureau, planning agency or the president's office.

The case of Uganda, which is often cited as a success, entails a small technical unit located very close to the budget office in the Ministry of Finance – a position that ensures strong ties with the budget process, and allows for a quick response to requests for information. The approach taken in Tanzania, which does not involve a centralized unit, is also widely praised and has emerged as a good example of broad involvement and shared responsibility.

A leading study suggests, however, that the issue at hand is not whether a country centralizes information-gathering and analysis in one or a number of institutions.²⁴ The question instead is whether it is more effective to have a well-placed unit that assumes responsibility for prompting action, or rather to have responsibilities dispersed across a plurality of stakeholders jointly supported by a secretariat. Regardless of the institutional setting, the overarching challenge is that of stimulating the use of data across stakeholders through participation. Some countries have indeed strengthened their statistical systems, but still there is a limited demand for monitoring data on the part of government and civil society, and there is little evidence that the statistical improvements have impacted the policy process.

It is crucial that monitoring agencies proactively devise incentives to boost demand for the data they manage. Improving marketing and communication, and tailoring supply to the specific interests of targeted stakeholders may be of help. Advocacy centred on the MDGs is one opportunity to put this into practice.

5.5 Definition and classification of indicators

Indicators are instruments that show the status and tendency of a given phenomenon. By focusing on certain aspects of the issue in question, indicators simplify a complex panorama into a much clearer picture. This simplification makes indicators a vital tool for monitoring and dissemination of information. The spectrum of indicators available is very broad, and they can be classified in a number of ways. We describe three major classifications below.

²⁴ Booth, D., Lucas, H. (2002). 'Good Practice in the Development of PRPS Indicators and Monitoring Systems,' Overseas Development Institute, London.

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Intermediate and Final

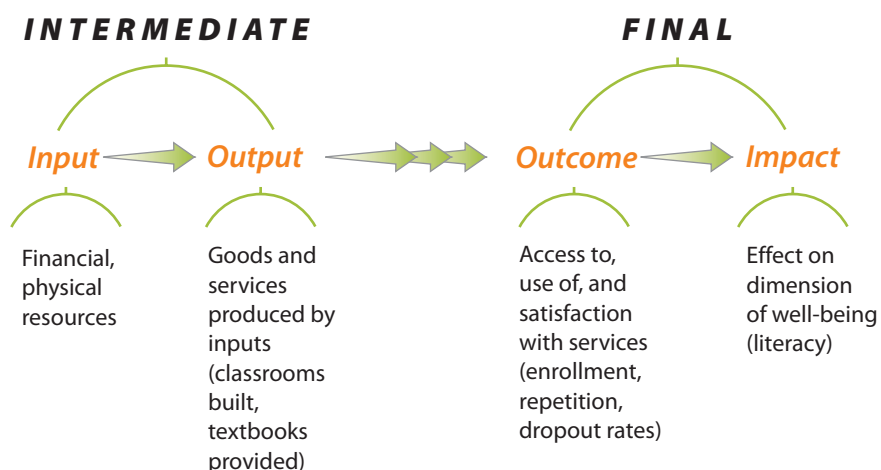
When an indicator measures a factor that determines an outcome or contributes to the process leading to an outcome, it is called **intermediate**. The most useful intermediate indicators are those capable of capturing the key determinants of the outcomes under examination across sub-populations and over time. For example, the number of people using insecticide-treated bed nets relates directly to the prevalence of malaria. If we are interested in monitoring the quality of education, the ratio between the number of pupils and the number of teachers would be useful, provided there is some **variability**. If this ratio varies only within a narrow range, however, it would not reveal anything.

Final indicators, in contrast, measure the effect of an intervention on individuals' well being. Thus, for example, the literacy rate measures a group's ability to read and write correctly.

Input and Output, Outcome and Impact

There are two types of intermediate indicators: input and output. **Input indicators** measure the financial and physical resources used in a process (e.g. money spent on new classrooms) as well as human resources dedicated to a process (e.g. number of teachers). **Output indicators** measure the goods and services produced by the input (e.g. number of new classrooms, or number of classes available).

Figure 5.1: *Intermediate to final indicators*



Outcome and impact are both final indicators. **Outcome indicators** measure access to – and satisfaction with – services (e.g. primary school enrollment rate). **Impact indicators** measure the dimensions of well being (e.g. literacy rate) that public policies aim to affect.

Both intermediate (including input and output) and final (including outcome and impact) indicators can be expressed either in numeric or descriptive form.

Quantitative and qualitative

Both quantitative and qualitative indicators are descriptive. While quantitative indicators use only numbers to describe a phenomenon, qualitative indicators are used to describe intangible characteristics that are difficult to measure in numeric terms. Qualitative information is expressed as nominal, for example as purely qualitative or ordinal categories.

Quantitative indicators may be either counts, such as the number of children immunized, or continuous measures, such as the proportion of the population below the national poverty line.

Quantitative indicators may also be computed from other indicators. The new indicator, however, will measure a distinct phenomenon. For example, to compute the ratio of girls to boys in primary, secondary and tertiary education, the number of children enrolled must be disaggregated by sex, and then the ratio of the two resulting values computed. The new indicator measures the degree to which girls and boys have equal access to primary education – something quite different than the simple count of girls and boys enrolled.

Quantitative indicators should be pursued and included in analyses and communication whenever possible. However, certain topics, such as performance measurements, do not readily lend themselves to quantification. In situations where quantitative measures are not effective, qualitative indicators can provide useful insight.

In their simplest form, qualitative indicators express a range of non-numeric values such as 'Good', 'Satisfactory' and 'Poor', which represent the respondent's estimations of degree. Such simple indicators are often obtained in response to a single question in a questionnaire – for example, 'Was the quality of your treatment: Good, Satisfactory, or Poor?' Often qualitative indicators are more complex and may be derived from several types of information and measure several dimensions of a phenomenon. For example, 'Satisfaction with clinic services' might be the combined result of the success of the treatment, the distance travelled to reach the clinic, and the kind and quality of facilities provided. In this case, an

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algorithm can be used to produce a single measure capturing the overall ‘levels of satisfaction’.

Qualitative indicators should be treated with care. Despite all possible precautions, qualitative indicators tend to carry an element of subjectivity. This can be minimized by providing respondents with specific categories rather than leaving room for descriptive statements.

In many circumstances, given the relevance and the complementarities of qualitative and quantitative information, a combination of the two types of indicators provides the most balanced and reasonable picture.

Both quantitative and qualitative indicators can take any of the following categories: input, output, outcome and impact. Let us consider the following example.²⁵

Figure 5.2: Cross-classification of indicators

	<i>QUANTITATIVE</i>	<i>QUALITATIVE</i>
<i>Input</i>	<i>Expenditure</i> on primary education	<i>Adequacy</i> of the curriculum
<i>Output</i>	<i>Number</i> of primary school teachers	<i>Quality</i> of teaching atmosphere in the classroom
<i>Outcomes</i>	Enrollment and dropout <i>rates</i>	<i>Satisfaction</i> with teaching methods
<i>Impact</i>	Literacy <i>level</i>	<i>Change</i> in perception of empowerment and poverty status

- ▶ **Input:** Expenditure on primary education is a typical input. It measures the amount of financial resources spent on primary education over a defined time period. The curriculum is also a critical input; its adequacy can be assessed indirectly by, for example, conducting interviews.
- ▶ **Output:** Part of the financial resources spent is used to pay the salary of teachers. Therefore, the number of teachers in service can be considered a direct output of those resources. The quality of teaching is also the output of several inputs: expenditure, teacher training systems, curriculum, etc.
- ▶ **Outcome:** The number of children enrolled in primary school and the dropout rate are both outcomes as they both depend, at least in part, on the quantity and quality of the service provided. Satisfaction with teach-

²⁵ Adapted from: Bastagli, F., Coudouel, A., Prennushi, G. (2004). ‘Poverty Monitoring Guidance Note 1 - Selecting Indicators.’ World Bank, Washington DC.

ing methods is another outcome and can be measured indirectly by interviewing a sample of students or parents.

- ▶ **Impact:** One of the aims of investing in primary education has been 'increasing literacy'. This can be tracked directly, usually through household surveys. Education is also a means to empower people and affects individuals' participation in the workforce. However, measuring people's perception of empowerment is more difficult. To capture opinions on the matter, one could develop a questionnaire with non-numeric categories.

It is important to note, though, that whether a given indicator is intermediate or final depends on the nature of the analysis being conducted.

5.6 Why are MDG indicators exclusively quantitative?

Indicators are useful tools only if we can attach value to them. There are cases where qualitative indicators are poorly defined or ambiguous. Even when well-defined, the information indicators provide may not be objective, which reduces their credibility. The MDG indicators are exclusively quantitative precisely to minimize this sort of ambiguity.

The purpose of the MDG indicators is to measure progress toward set targets, a function that implies repeated assessments of where a country stands at given points in time. As we measure indicators over time, we obtain evidence of the impact of past interventions, and we can see how close we are to the target.

Qualitative indicators are usually used by advocacy groups to inform debate. There are also circumstances, however, in which they can provide excellent evidence to complement quantitative indicators. It is not unusual for MDG country reports to use a mix of quantitative and qualitative indicators to gain a picture of the current context and potential to meet the targets.

Figure 5.3, from the 2001 Tanzania MDG report, shows the country's progress toward reaching the MDG targets through qualitative descriptions. Although the terms, 'Probably', 'Potentially', 'Unlikely' and 'Lack of data' are not defined in concrete terms, they offer a glance of Tanzania's potential to reach its goals.

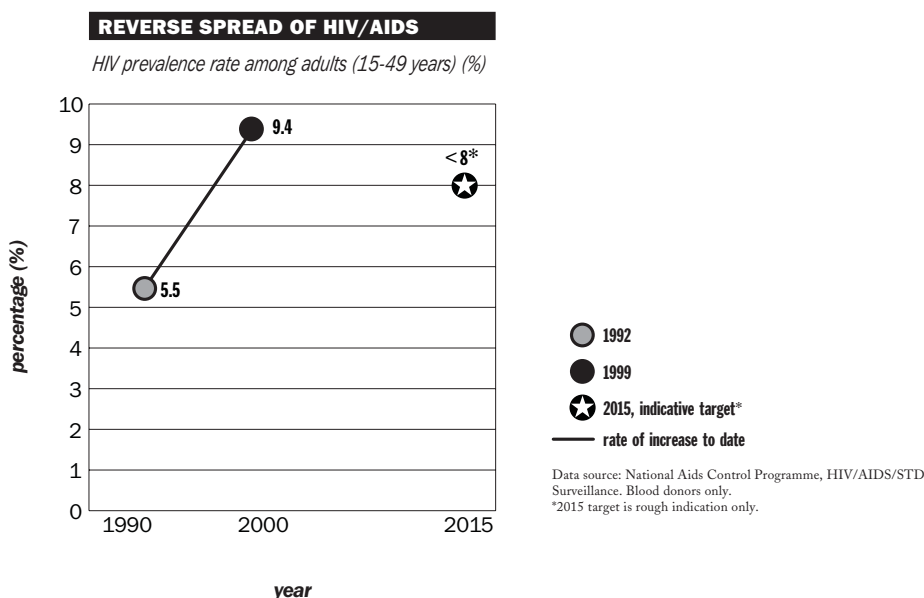
Figure 5.3: Progress toward the MDGs

Tanzania's progress towards the development goals

GOALS	WILL DEVELOPMENT GOAL BE REACHED?				STATE OF SUPPORTIVE ENVIRONMENT			
Extreme poverty Halve the proportion of people living below the national poverty line by 2015	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
HIV/AIDS Halt and reverse the spread of HIV/AIDS by 2015	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
Hunger Halve the proportion of underweight, under-five year olds by 2015	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
Basic amenities Halve the proportion of people without access to safe drinking water	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
Universal primary education Achieve universal primary education by 2015	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
Gender equity Achieve equal access for boys and girls to primary and secondary schooling by 2005	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
Reproductive health Reduce maternal mortality ratio by three-quarters by 2015	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
Under-five mortality Reduce under-five mortality by two-thirds by 2015	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak
Environmental sustainability Reverse loss of environmental resources by 2015	Probably	Potentially	Unlikely	Lack of Data	Strong	Fair	Weak but improving	Weak

Source: Tanzania 2001 MDG country report

Contrastingly, Figure 5.4 applies quantitative information only and shows in clear and objective terms that between 1992 and 1999 in Tanzania the prevalence of HIV/AIDS was substantially increased.

Figure 5.4: Spread of HIV/AIDS, Tanzania

5.7 Properties of effective quantitative indicators ²⁶

Indicators should provide direct and unambiguous measures of progress across sub-populations and over time. The time frame for change proposed by an indicator must be observable – ideally within the lifetime of the policies to which it relates. For example, we would need to wait at least a generation, probably even two or three, to observe a change in life expectancy, but changes in child malnutrition can be observed in a much shorter time span. The latter indicator, therefore, allows for changes to be monitored as they occur.

Indicators should be chosen at the appropriate level of disaggregation, depending on their expected use and on the country's circumstances. Disaggregation may be used to design targeted policy or advocacy strategies or to tailor budget allocations.

Indicators should have a direct link to interventions. For example, vehicle-operation cost depends on road quality but also on many other factors, such as international oil prices. Therefore, vehicle-operation cost would not be appropriate for monitoring the quality of roads. A better indicator for this purpose might be one that captures the proportion of different types of road (improved, paved, etc.).

²⁶ Bastagli, F., Coudouel, A., Prennuchi, G. (2004).

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Indicators should be relevant for policy-making and/or advocacy. The proportion of seats in parliament held by women is a very clear measure of women's participation in government. For more insight, though, some indicators that capture the 'quality' of their participation would be required. The number of enacted parliamentary bills that were introduced by women, for instance, could be a good complement.

Indicators should be reliable and definitions should include data sources and computation methods. Whenever available, measures of variability and a description of bias should also be included to help users to gauge the accuracy of the underlying data.

But more than anything else, indicators should be consistent with the data available and the data collection capacity. It is far better to have few well chosen indicators in line with the planned collection calendar than many unreliable and uncoordinated indicators.

exercises

Exercise 5.1: The monitoring system

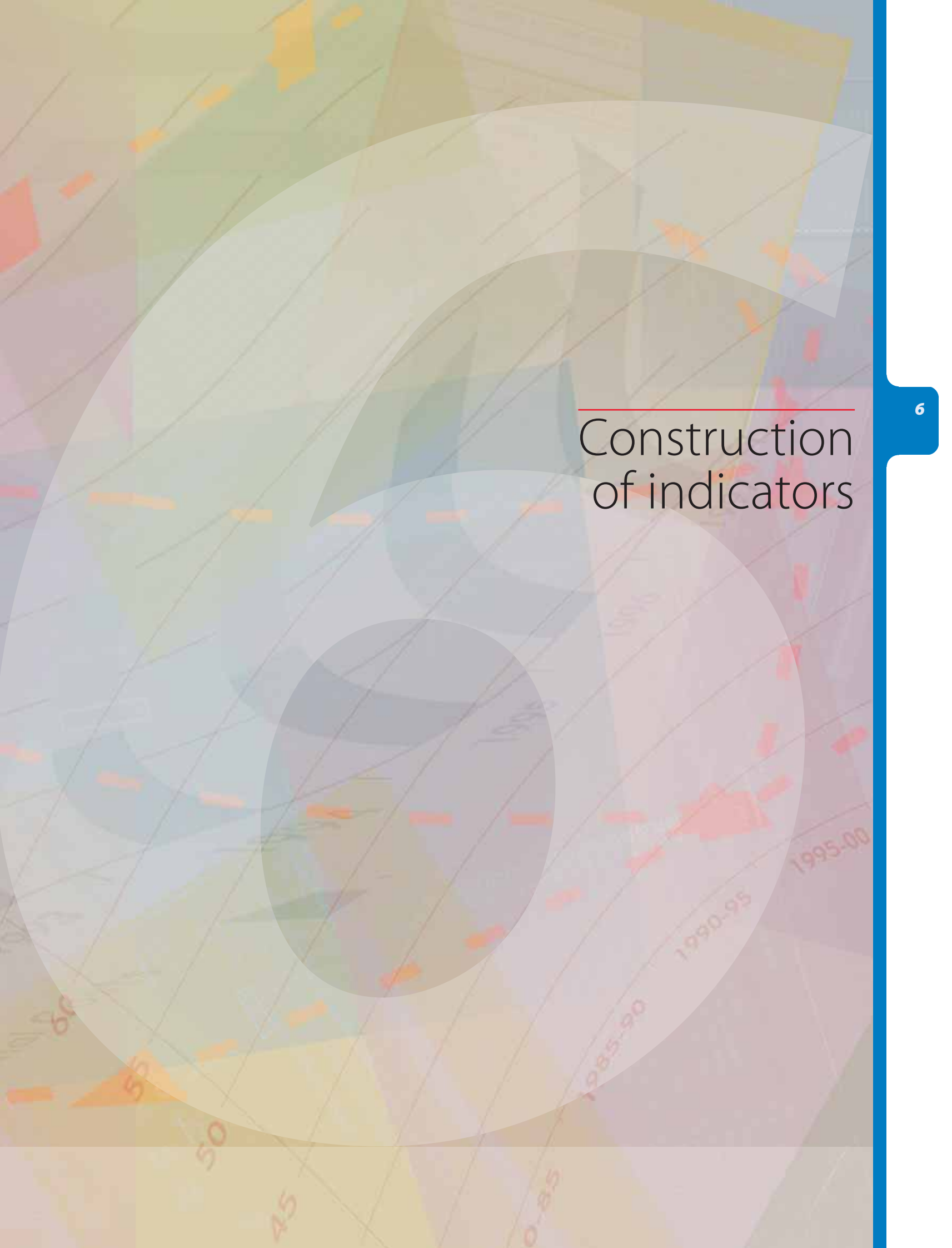
1. In a group, describe the monitoring system of the medium-term plan or strategy (PRSP if any) in your country in terms of:
 - institutional arrangements
 - scope
 - involvement of civil society
2. What are its strengths? (Identify three)
3. What are its weaknesses? (Identify three)
4. What progress has been made in monitoring public expenditure/budget execution?
5. How does information produced by the monitoring inform policy makers?

Exercise 5.2: Indicator categories

1. From the DevInfo dataset or any other suitable source, identify two indicators for each of the following categories: input, output, outcome, impact.
2. Are there any qualitative indicators in your DevInfo dataset or MDG Report? If so, list two and describe whether and why they are examples of input, output, outcome or impact indicators.
3. Choose one indicator, and discuss which actions may trigger progress in the area it monitors.

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Construction of indicators



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6.1 What is covered in this chapter?

In this chapter we look in detail at some of the most common measures used in the production of indicators, including those related to the MDGs. We explain how to compute them, we discuss their interpretation, and we consider some examples. We also briefly discuss the concept of 'variability' and how it can be used to enhance the effectiveness of indicators.

6.2 Indicators

We will discuss six different types of basic measures used in the production of indicators.

Means

The mean is the average of two or more values. We will consider both the simple and the weighted mean.²⁷

Simple Mean

The **simple mean** (\bar{x}) of a given set of values is the sum of all the values (x) divided by the number of these values (n).

$$\bar{x} = \frac{\sum x}{n}$$

A real-life case could be the average waiting time at a clinic. We would sum the time waited by each patient and divide that total by the number of patients. If the waiting times for three patients at a clinic were 10, 17, and 20 minutes, then their average waiting time would be:

$$\text{Average waiting time} = \frac{10+17+20}{3} = 15.7$$

Weighted Mean

When computing the average of a given set of values, if we want to give some values more importance than others, the weighted mean is used. We assign a weight (w) to each value (x) and we multiply each value by its corresponding weight. Then we add together all of the resulting products, and divide the total by the sum of the weights. That is:

$$\bar{x} = \frac{\sum xw}{\sum w}$$

²⁷ The average of a set of values is a measure of a 'central' value. The mean is the most commonly used type of average, which explains why the two terms are often used as synonyms.

The **weighted mean** is most commonly used in the process of standardization.

Standardization

Often when comparing indicator values we use data related to different groups within a population. Since these groups are likely to differ with respect to various characteristics, when analyzing one characteristic, it is important to remove the effect of the others, helping us to identify real differences and to begin to form ideas about their causes. This is done through standardization.

For instance, let us compare the urban and rural death rates in Romania in 1993.²⁸ Figure 6.1 shows the total population and the total number of deaths, by 10-year age groups, in rural and urban areas of Romania in 1993, as reported by the UN. We can compute both the crude death rate (before standardization) and the standardized death rate in urban and rural areas using as weights the population of each age group.

The crude death rate (CDR) is simply the total number of deaths divided by the total population size, multiplied by 1000.²⁹

$$\text{CDR} = 1000 \times \left(\frac{\text{TOTAL DEATHS}}{\text{TOTAL POPULATION}} \right)$$

Now let us compute it separately for urban and rural populations:

$$\text{Urban CDR} = 1000 \times \left(\frac{3,526+1,010 + \dots + 25,909}{12,406,204} \right) = 8.7$$

$$\text{Rural CDR} = 1000 \times \left(\frac{49,97+1,049 + \dots + 49,561}{10,349,056} \right) = 15.1$$

These results tell us that in 1993, on average, for every 1000 people living in urban areas, 8.7 died during the year; for every 1000 people living in rural areas, 15.1 died during the year.

Now let us calculate the standardized death rate (SDR) for both rural and urban areas. This is the weighted mean of the crude death rate for each indi-

²⁸ Woodward, M. (2005). *Epidemiology: Study Design and Data Analysis*, 2nd Ed., Chapman and Hall/CRC Press, Boca Raton.

²⁹ The death rate is normally expressed as the number of deaths per 1000 head of population.

vidual age group. For each age group, separately, we calculate the CDR for both rural and urban areas. We then take the weighted average of the CDRs of all age groups in each area. The weight applied, for both urban and rural areas, will be the total population in each age group.

Figure 6.1: Death counts - Romania, 1993

Age group	POPULATION			DEATHS	
	Urban	Rural	TOTAL	Urban	Rural
0-9	1,800,680	1,359,501	3,160,181	3,526	4,997
10-19	2,128,150	1,642,941	3,771,091	1,010	1,049
20-29	1,967,110	1,450,550	3,417,660	1,599	1,977
30-39	2,118,205	1,019,015	3,137,220	4,333	3,300
40-49	1,691,033	1,139,065	2,830,098	8,312	6,903
50-59	1,200,412	1,396,080	2,596,492	14,896	16,739
60-69	921,072	1,380,709	2,301,781	24,191	32,443
70-79	404,304	670,133	1,074,437	23,706	38,872
80+	175,238	291,062	466,300	25,909	49,561
TOTAL	12,406,204	10,349,056	22,755,260	107,482	155,841

From Figure 6.1, the crude death rate for the age group 0-9 years in urban areas is:

$$\text{CDR} = 1000 \times \frac{\text{number of urban deaths 0-9 years old}}{\text{number of urban 0-9 years old}} = 1000 \times \frac{3,526}{1,800,680} = 1.96$$

Using the same method, the CDR for the age group 0-9 years in rural areas would be 3.68. The weight for this age group is 3,160,181, the total (urban plus rural) population of 0 – 9 year-olds. In the same way we could compute the CDR for each age group.

Once we have the CDR for all age groups in urban and rural areas we can calculate the SDR for the two areas separately, but, as mentioned, using the

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same overall population-weighting factor. This allows us to 'adjust' every CDR for the age structure of the whole population.

SDR (Urban) =

$$\frac{(1.96 \times 3,160,181) + (0.49 \times 3,771,091) + \dots + (147.85 \times 466,300)}{22,755,260} = 11.24$$

SDR (Rural) =

$$\frac{(3.68 \times 3,160,181) + (0.64 \times 3,771,091) + \dots + (170.28 \times 466,300)}{22,755,260} = 11.99$$

Note that the sum of the weights of each age group is equal to the total population of Romania: 22,755,260.

What do we notice in comparing the crude death rate and the standardized death rate?

Figure 6.2: Crude death rate vs. Standardized death rate

	Urban	Rural
Crude death rate	8.66	15.06
Standardised death rate	11.24	11.99

First of all, the CDRs in the urban and rural areas differ substantially. However, the population structure of the two areas is also quite different. From Figure 6.1 we notice that in rural areas the proportion of older people is higher. This goes a long way toward accounting for the higher crude death rate.

Calculating the SDR removes the effect of the differences in the age distribution in urban and rural areas. In this example, as shown in Figure 6.2, the SDRs are quite similar, suggesting that it is indeed the age difference that accounts for the difference in crude death rates. In this way, standardizing allows us to better monitor and predict the impact of policies in different areas.

Ratios

A ratio is the relationship between two quantities measured in the same unit. It is expressed as one value divided by another. The result has no unit – the unit in the denominator and numerator cancel each other out. One common ratio is that of girls to boys in primary, secondary and tertiary education. Let us consider primary education:

$$\text{Ratio girls to boys in primary education} = \frac{\text{total no. girls in primary education}}{\text{total no. boys in primary education}}$$

Using TSED (Tanzania Socio-Economic Database) as a source, the number of boys and girls of all ages enrolled in primary schools in mainland Tanzania in the year 2000 is provided in Figure 6.3:

Therefore:

$$\text{Ratio girls to boys in primary education} = \frac{2,164,333}{2,206,167} = 0.98$$

Figure 6.3: Number of girls and boys of all ages enrolled in primary schools – Tanzania, mainland, 2000

Sex	Number of pupils enrolled
Female	2,164,333
Male	2,206,167

That is, in Tanzania in 2000, for every 100 boys enrolled, there were 98 girls enrolled.

When using ratios, it is important to be aware that any change over time of the value needs to be examined very carefully, as it may be due to changes in the numerator, changes in the denominator or both. In our Tanzania example, if the ratio of girls to boys in primary education in mainland Tanzania were to increase from 0.98 to, say, 0.99, how would we know whether this was due to a real increase in girls enrollment, a decrease in boys enrollment, or rather some other movement of each? We would have to know the change in number enrolled of each category – girls and boys – in absolute terms.

Finally, to interpret this ratio further, we need to compare the ratio of girls to boys in primary education with the ratio of girls to boys of primary-school age in the

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population. The more the two ratios diverge, the more one group is underrepresented and the other overrepresented. Let us consider the following four scenarios, using our example of a ratio of girls to boys in primary education equal to 0.98.

1. If the ratio of girls to boys of primary-school age in the population was also equal to 0.98, then we would observe that girls and boys had equal access to primary school.
2. If the ratio of girls to boys of primary-school age in the population was equal to 1.0, then we would see that girls were slightly underrepresented in primary school.
3. If instead the ratio of girls to boys of primary-school age in the population was equal to 0.94, it would mean that boys were underrepresented in primary school.
4. Finally, if the ratio of girls to boys of primary-school age in the population was equal to 1.05, we would observe that girls were even more significantly underrepresented than in scenario 2.

Proportions

When a ratio takes the form of a part divided by the whole it is called a proportion. A proportion is a special type of ratio in which the denominator is a quantity that represents the whole of a given group under investigation, and the numerator is a subset of it. For example, to look at the proportion of primary-school-age children who are girls, the numerator would be female primary-school children and the denominator would be all primary-school children (both boys and girls). Like ratios, proportions have no units.

Let us consider an example from Uganda.³⁰ According to the 1991 census, the total population of Uganda was 16,671,745, of which 1,889,622 lived in urban areas and the rest in rural areas. What was the proportion of rural dwellers in Uganda? First, we have to compute the population living in rural areas. This is calculated by subtracting the population living in urban areas from the total population:

$$\text{Rural population} = 16,671,745 - 1,889,622 = 14,782,083$$

Then the proportion of rural dwellers is computed by dividing the rural population by the total population:

$$\text{Proportion of rural population} = \frac{14,782,083}{16,671,705} = 0.89$$

³⁰ Uganda Bureau of Statistics (2003). *Statistical Abstract 2002*, Kampala. <http://www.ubos.org/>

That is, about 0.9 or $\frac{9}{10}$ of the entire population lives in rural areas.

Percentages

A percentage is simply a proportion multiplied by 100%. So, in 1991, 89% of the total population of Uganda was living in rural areas while 11% was in urban areas.

$$\text{Percentage of people living in urban areas} = 100\% \times \left(\frac{1,889,622}{16,671,705} \right) = 11\%$$

Rates

When a relationship between two quantities is measured by a quotient, and the numerator and denominator are expressed in different units, then the quotient is called a rate. We usually express rates in terms of numerator-units per denominator-units. For example, 'kilometres travelled per litre of fuel' is calculated by dividing the number of kilometres travelled by the number of litres of fuel consumed over that distance.

A good example of a rate is the infant mortality rate (IMR). This indicator is calculated by dividing the number of infant deaths in a given year by the number of live births in the same year, and multiplying that quotient by 1000.³¹ Let us take the case of Uganda. For 1991, based on estimates obtained using UgandaInfo, we have the following data:

Number of live births = 866,929

Infant deaths = 105,765

$$\text{IMR} = 1000 \times \frac{105,765}{866,929} = 122$$

That is, for every 1,000 live births, there were 122 infant deaths.

Quantiles³²

Quantiles are points taken at regular intervals from a set of ordered data that divide the distribution into 'n' equal-sized subsets. In this way, quantiles are the data values that mark the boundaries between those subsets.³³ For example, 'n' can take the value of 10, which is to say that the set of values is divided into ten subsets. In this case, the quantiles are called deciles. Following the same logic, quintiles divide a set of values into five subsets, and percentiles into one hundred.

³¹ The use of the 1000 multiplier in this case is not related to the definition of a rate. It is used simply because the raw rates (that is, the rates before multiplying by 1000) are very small, and larger numbers are easier to interpret. This is the usual practice with rare events (e.g. maternal mortality rate is multiplied by 100,000).

³² For a more thorough examination consult: <http://mathworld.wolfram.com/Quantile.html> or <http://en.wikipedia.org/wiki/Quantile>

³³ 'n' is a positive integer greater than 1.

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Particularly when dealing with economic issues, it is useful to look at ordered groups of data. For example, to compute the share of the poorest quintile in national consumption, we need to identify the income level below which lies the poorest 20% of the population.

To generate quantiles, we follow three steps:

1. Order the data, usually from smallest to largest
2. Divide them into 'n' equal groups
3. Identify the quantiles.

A simple example will clarify the concept. Let us say that we want to find the tertiles (n=3) of the following set of numbers:

9,6,2,14,8,15,7,3,14,11,12,5,10,1,17,12,13,8

Note that two points are needed to divide this set into three groups. First we order the 18 values and we divide them into groups of size 6.

{1,2,3,5,6,7} {8,8,9,10,11,12} {12,13,14,14,15,17}

T1

T2

Here, $T1 = 7.5$

$T2 = 12$

where T1 is the first tertile and T2 the second.

In this case, to obtain three equal-sized subsets, the size of each group must be equal to 6. Since the total size of the set is 18, we cannot single out any number from the list, but rather we attribute to the tertiles a midway value. Since the value of the first tertile (T1) falls midway between the top of the first subset (7) and the bottom of the second (8), we attribute to it the value 7.5, the average of the two boundary numbers.³⁴ Similarly, the second tertile (T2) will be the average of the top of the second group and the bottom of the third group.³⁵

6.3 Measures of dispersion and variability

An important characteristic of any data set is how data are distributed, or how far each element is from some measure of central tendency, such as the mean. This

³⁴ $\frac{(7+8)}{2} = 7.5$

³⁵ $\frac{(12+12)}{2} = 12$

characteristic is called **variability**. There are several ways to measure the variability of a set of data. Below, we describe several of the most common ways.

Range

The **range** is the difference between the 'highest', $\max(x)$, and the 'lowest' element, $\min(x)$, of a dataset. For example, if we take the height, in centimetres, of the people in a room, and we record the values 150, 160, 170, 155, 147 and 153, the range would be equal to 23.

$$\text{Max}(x) = 170$$

$$\text{Min}(x) = 147$$

$$\text{Range} = (170-147) = 23$$

This is not the best measure of dispersion. It is a raw measurement, but it can offer a first glance of the phenomenon without complex calculations.

Standard deviation

The **standard deviation** is a measure of dispersion around the mean of a data set. It is calculated by taking the square root of the variance:

$$s = \sqrt{\frac{\sum_{i=1}^n (\bar{x} - x_i)^2}{(n-1)}} \quad 36$$

The standard deviation can be interpreted as the average distance of each data point from the mean. As such, it tells us how widely distributed the values in a data set are. Assume, for example, that we have two data sets of men's heights, and both have means of 168 cm. If we calculate a standard deviation of 8.2 cm for the first set, and 4.0 cm for the second, this means that the heights of the first set are on average more widely varied, while in the second they are more tightly clustered around the mean.

Confidence intervals

A **confidence interval** (CI) is a quantitative expression of the uncertainty in a measurement. They are usually reported as a 95% CI, which is the range of values within which we would expect that in 95 times out of 100 the true value for the whole population would lie. For example, if from a single sample we compute a mean height of 159 cm and a 95% CI of +/- 8, we are saying that 95 times out of 100 the true value of the mean height for the whole population would fall between 151cm (159-8) and 167cm (159+8).

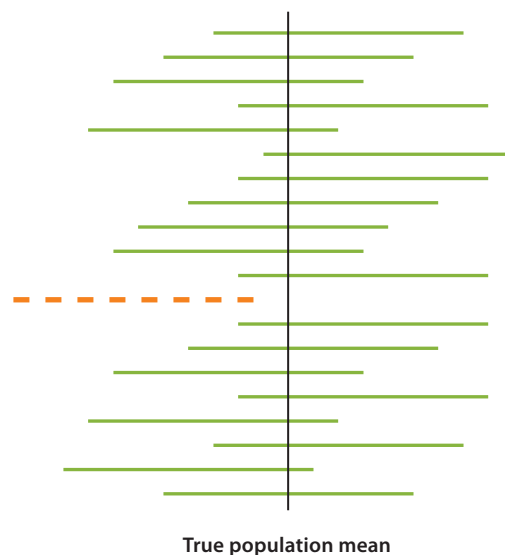
³⁶ The formula refers to the sample standard deviation.

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If samples of the same size are drawn from a single population, and a 95% CI is calculated from each sample, then 95 out of 100 of these CIs should contain the true value for the population. For example, if we take 20 samples to estimate a population mean, we would expect 19 of the CIs should contain the true population mean. This concept is depicted in Figure 6.4, which shows 19 confidence intervals containing the true population mean, and one missing it.

The width of the confidence interval gives us some idea about how certain we are about the true value we are trying to estimate. Wider confidence intervals imply more doubt; narrower ones imply more certainty.

Figure 6.4: 95% confidence interval, pictorial representation



Gini coefficient

The **Gini coefficient** is a measure of dispersion that most commonly is used to describe the income distribution within a population. While it is not an MDG indicator, the Gini coefficient is often used alongside other indicators to monitor income inequality and complement other tools for monitoring poverty-reduction policies and strategies.

To compute the Gini coefficient, we plot the **line of equality**, which assumes that everyone has an equal share of national income.³⁷ On the same graph, we trace

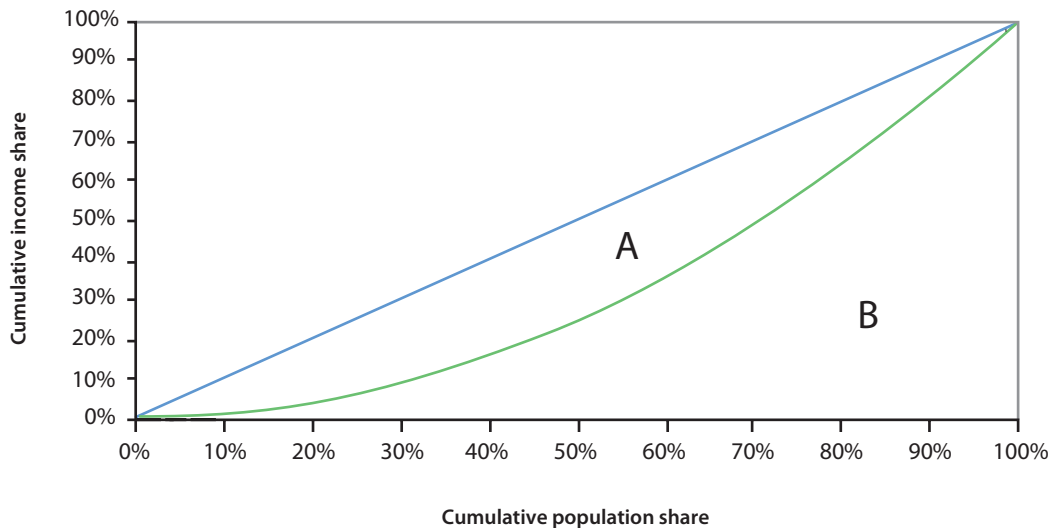
³⁷ A more thorough explanation can be accessed at http://en.wikipedia.org/wiki/Gini_coefficient

the **Lorenz curve**, which plots the cumulative share of the population against the corresponding cumulative actual share of income. The Lorenz curve always lies to the right of the line of equality.

The Gini coefficient is the ratio of the area (A) between the curve and the line of equality and the area (A+B) under the line of equality. Thus:

$$\text{Gini coefficient} = \frac{A}{(A+B)}$$

Figure 6.5: The Lorenz curve and the line of inequality



If income were evenly distributed, the area A would be null, hence the Gini coefficient would be equal to 0. At the other extreme, complete inequality, the area B would be equal to 0 and the coefficient would be equal to 1. Thus the Gini coefficient is a number that lies between 0 and 1, where 0 corresponds to perfect equality (everyone has the same income) and 1 corresponds to perfect inequality (one person has all the income). The farther to the right from the line of equality the Lorenz curve is, the higher is the inequality – and the higher the Gini coefficient.

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6.4 Assessing and using information on variability

An indicator value gives a 'snapshot' of the process it measures. Almost all MDG indicators are calculated from sample data, which produce estimates of the true values of the population.

Intuitively, we can say that an indicator value has greater credibility as its variability decreases. Therefore, if we were able somehow to measure this dispersion, we would be in a better position to say how good individual estimates are.

Variability is an important factor when we want to compare two estimates (for example, estimates related to two sub-populations or the same variable at different points in time). We can only accept an observed difference in values as real if it is beyond the range of random fluctuation. Thus if we can measure this random fluctuation, we would be able to compare two estimates. The concept of confidence intervals can help us in this exercise.

For example, from TSED, we find that the HIV/AIDS prevalence in Tanzania in 2001 was 10.4% for males and 13.7% for females. These estimates were obtained from a sample of blood donors.

One obvious shortcoming of this technique is that the HIV prevalence among blood donors is likely to be lower than among any higher-risk group. In addition, even if the sample were unbiased, a sample will never be the same as the whole population from which it is extracted. Consequently, there is no guarantee that the estimated values would reflect the true prevalence.³⁸

The HIV prevalence of women donors in this example appears to be higher than that of men. However, to support this finding we need some information about the variability of the estimates. Let us consider the variability of the HIV prevalence estimates obtained from a small sample and a large sample of blood donors, and produce 95% confidence intervals of the HIV prevalence estimates for both women and men donors for each sample.

First, let us consider a small sample of 100 men and a small sample of 100 women. From these samples, our 95% confidence intervals are:

Men donors : 4.4% to 16.4%
Women donors : 8.1% to 19.3%

Thus we are 95 percent certain that the true HIV prevalence of men lies between 4.4 and 16.4 percent; similarly, we are 95 percent certain that the true HIV preva-

³⁸ We will cover this topic in greater detail in chapter 7.

lence of women lies between 8.1 and 19.3 percent. As the two intervals overlap significantly, we cannot confidently say that there is a difference between men and women's prevalence.

If we consider a larger sample, for example one composed of 5000 men and 5000 women, we would have a much more accurate estimate. The new computed 95% confidence intervals are :

Men donors : 10.3% to 10.5%
Women donors : 12.8% to 14.7%

This time, the 95% confidence intervals are very narrow, and do not overlap. Therefore, we can be reasonably confident when stating that women donors have a higher HIV prevalence than men donors.³⁹

DevInfo and Variability

Only a few functions of the DevInfo software address the issue of variability. DevInfo has a 'statistics' button, which produces some information (count, min, max, mean and standard deviation) about the range of values contained in each individual indicator. Though very useful, this doesn't take account of the underlying variability of the data upon which the estimates are produced. The measures of variability provided by the software address only the range of actual values in the database itself.

There are two other issues that DevInfo users need to be aware of when using the 'statistics' button. All the values for an estimate are treated as equal, whether or not they come from the same source, and values from different sub-populations are treated as separate values, even when the sub-populations overlap.

Trend

Even without any information about the variability of the underlying indicator values, if we can identify a clear trend in a sequence of values, we can be more confident in the accuracy of our estimates.

Figure 6.6 shows the number of public and private schools in mainland Tanzania from 1994 to 2003. These data have been produced from administrative sources.⁴⁰

From these data, we can observe that the numbers of both public and private schools have steadily increased over time.⁴¹ In addition, if we compute the ratio of

³⁹ Confidence intervals can also be useful for planning purposes, as they can be used to help identify 'worst and best case' scenarios.

⁴⁰ This is not to say they are 100% correct – some schools may have been omitted or double-counted. However we can be quite sure that the numbers are very close to the true values.

⁴¹ Since private schools are few, the ratio has been expressed as the number of private schools per 1000 public schools.

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private to public schools, we can see quite clearly that the size of the private sector relative to the public has been increasing over time as well.⁴² The constant upward movements of the three variables not only inform us as to the direction of the trends, but also give us confidence about the accuracy of the underlying data.

In conclusion, the methods to compute variability are well established, and simple enough to be carried out with a simple spreadsheet. Therefore it should be possible to produce estimates of variability from sample survey data.⁴³

Figure 6.6: Number of public and private schools & ratio of private to public schools - Tanzania mainland, 1994 to 2003

Year	N. Public Schools	N. Private Schools	N. Private per 1000 Public
1994	10878	13	1.2
1995	10908	19	1.7
1996	11110	20	1.8
1997	11270	20	1.8
1998	11306	33	2.9
1999	11377	32	2.8
2000	11608	46	4.0
2001	11799	74	6.3
2002	12152	134	11.0
2003	12649	166	13.1

Source: TSED

⁴² If we were to plot the ratio using a simple spreadsheet, it would be clear that the number of public schools increased linearly, while the number of private schools and the ratio of private to public increased exponentially.

⁴³ When neither estimates of variability nor trends are available, a good rule of thumb is: the larger the sample size, the more reliable the estimate.

exercises

Exercise 6.1: Construction of indicators

With a group or partner, consider the following questions:

1. From the data in the file 'sample HH data.xls' on your Resource CD, calculate the following:
 - The ratio of women to men age 15 to 64 in non-agricultural wage employment
 - The proportion of 1 year old boys immunized
 - The ratio of girls to boys in primary school
2. Why are quantiles useful as indicators of national and sub-national development?
3. Why do we use rates as indicators rather than absolute numbers?
4. Why is standardization useful for comparing the situation across sub-populations?

Exercise 6.2: Assessing differences and change over time

Look at the following examples, and discuss whether, given the information provided, it can be concluded that a real difference exists over time, or if instead the differences are to be attributed to random fluctuation.

1. Ratio of girls to boys in secondary school:
 - 1995: 0.94 95% confidence interval (0.93,0.95)
 - 2000: 0.95 95% confidence interval (0.88,1.02)
2. Percentage of population below the food poverty line:
 - 1992: 21.6 95% confidence interval (20.5, 22.7)
 - 2000: 18.7 95% confidence interval (17.7,19.7)
3. The following sequence of infant mortality rates:

Year	IMR
1990	30
1994	28
1997	22
2000	21
2003	18

Explain your reasoning in each case.

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The background of the slide is a complex, layered map. It features various contour lines and color-coded regions in shades of green, blue, yellow, and red. Some of the visible text on the map includes "1996", "1995-00", "1990-95", "1985-90", "0-85", "60", "55", "50", and "45".

Living with error

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7.1 What is covered in this chapter?

This chapter covers the issue of error in statistics. We discuss the main types of error and provide some examples, focusing particularly on sampling error and bias error. We describe different causes of error and how different types of error can affect different classes of data sets. Finally, we discuss common ways of dealing with error.

7.2 Types of error

The MDG indicators are affected mainly by three types of error: **computation error**, **bias error** and **sampling error**.

Computation Error

Computation error arises during the calculation of an indicator or its components and originates from mistakes that can be easily prevented by careful computing. Although it is less common when calculation is automated, in many cases computation error is still a large source of error.

This may occur when using the wrong sampling fraction to 'gross up' sample survey results, for example. Therefore, for instance, if we take a 10 percent sample (1000) of the 10,000 businesses in a country and find that 300 are trading establishments, to estimate the total number of trading establishments we would use the formula:

Total trading establishments =

$$\frac{\text{no. of trading establishments in the sample} \times \text{total no. of businesses}}{\text{total sample size}}$$

Thus the correct estimate of the number of trading establishments would be 3,000.⁴⁴

But if in this calculation we mistakenly use a total sample size of 500, rather than the correct 1,000, our estimate of the total number of trading establishments would stand at 6,000 – a doubling of the correct estimate due only to computation error.

Bias Error

Bias error is a systematic error that causes all measured values to deviate from the true value in a consistent direction, higher or lower. It arises when the characteristics of the population from which the sampling frame is drawn differ from the characteristics of the target population.

⁴⁴ $300 \times \frac{10,000}{1,000} = 3,000$

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Bias error is always an issue when **administrative data** are used as the coverage of a given population is usually incomplete some sub-populations are likely to be either over or under-represented in the data.

Survey data are vulnerable to bias error as well. Let us take a very simple example – estimating the average height of the people in a room. Look at the schematic diagram in Figure 7.1. The true **mean** of the population (all people in the room) is denoted by 'X'. Then suppose that five samples of a given size are taken from the male subset (1) of the whole population. Five samples are also drawn from a subset composed only of women (2).

Figure 7.1: Bias Error



Not surprisingly, in the first case, where only men are included, the sample means (x) tend to be higher than the true mean of the population (X); in the second, where only women are included, the sample means tend to be lower. Of course this is because men tend to be taller than women. Therefore, the bias in the first case leads to overestimating the true average height. Similarly, sampling only women leads to underestimating it. To avoid bias, we must select random samples of the whole population. Our example indicates that selecting a random sample (3) yields sample means that tend to be spread closer around the true mean of the population (X).

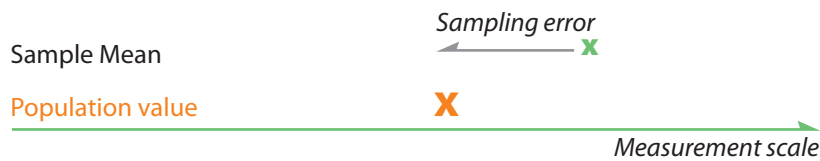
Sampling Error

Sampling error can be thought of as ‘the difference between a sample and the population from which the sample is derived’. Sample surveys are nearly always affected by sampling error.

Let us go back to the height example and take a sample comprising half of the people in the room. This is a large sample and should yield a good estimate of 'X'. As a rule, sample estimates are most likely to differ from the true population value

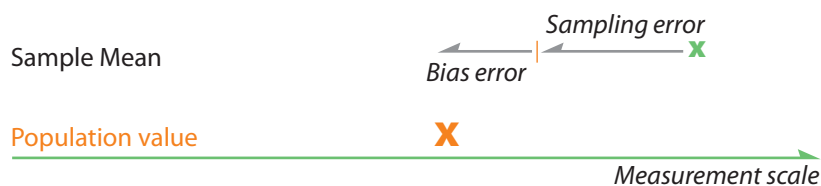
simply because the sample and the population are not the same. Note that unless there is bias, the sampling error is equally likely to lie on either side of the true value. That is, the average height of the sample could be greater or less than the average height of the whole population. In the schematic diagram in Figure 7.2, the sampling error, by chance, lays to the right of 'X'.

Figure 7.2: Sampling error



Bias error and sampling error can both affect the same estimation. Let us go back to our example, and draw a sample composed only of men – let's take half of the men in the room. In this case, the average height of our sample will not be the same as the average height of all the men (sampling error).⁴⁵ Plus, the true value for all men will be greater than the average height of all people in the room (bias error). Figure 7.3 shows the cumulative effect of bias and sampling error.

Figure 7.3: Cumulative effect of bias and sampling error



⁴⁵ Again, in the diagram the sampling error is positive only by chance.

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7.3 Sampling error: further examples

In this section we deal more extensively with the issue of sampling error. First, a simple example:⁴⁶

Dozenland is the world's smallest country. It has only 12 households, each of which includes only a single person. Now, let us assume that we want to know the average household income (D\$). Let us consider three approaches:

1. Computing the true value using census data
2. Estimating the true value using a sample of four households
3. Estimating the true value using samples of any size

Census data

First let us look at the census data. As a census includes all households, we can calculate the population's true average income.

Figure 7.4: Households and Income

<i>H H (initials)</i>	<i>Income (D\$)</i>
WJK	4200
RNC	7500
MM	4700
JHR	6900
HR-P	5900
KP	6400
IMW	4300
RDS	3100
DGN	4700
DC	4500
MGK	7000
DJP	6400
Total	65,600
Average	5,466.7

⁴⁶ Adapted from: Woodward M., Lecture notes: Umfuzu example. School of Applied Statistics, University of Reading, Reading, UK.

The average income is computed by dividing the total income by twelve – that is, the total number of households.

Sample of four households

The Dozenland government does not have sufficient funds to run a census, so instead it decides to produce estimates based on a sample of four of the twelve households. Randomly, the households headed by WJK, MM, DC, DJP are selected. Thus, the values included in the sample are: 4200, 4700, 4500, and 7000, which yield an average of D\$5100.⁴⁷ Since we know the true value from our census, we can compute the exact size of error from our sample-based estimate. The result tells us that we have underestimated the average income by about D\$367, or 7%.⁴⁸ Remember, in any real-life case, we would not know the true average income of the population.

By chance, we randomly sampled three households with relatively small incomes. Since the sample was chosen completely at random, this was not bias error. The error is purely the result of the sample being different from the population. This is a crucial distinction. We can identify bias only if after repeated sampling all the sample-based estimates tend to move in the same direction.

Using samples of different sizes

Can we improve our estimates? Can we get closer to the true value of the population? Of course we can. The easiest way to do so is to use a larger sample, making the sample more similar to the population from which it is drawn. To better understand the relationship between sampling error and sample size, we will now look at the summary results from all possible samples of size n (ranging from 1 to 12).

⁴⁷ $\frac{(4200+4700+4500+7000)}{4} = \text{D\$ } 5100$

⁴⁸ $(5100-5466.7) = -\text{D\$ } 366.7$

Figure 7.5: Sampling error vs. Sample size

Sample size (n)	Number samples of size "n" (S)	Mean	Variation ⁴⁹
1	12	5466.7	1327.5
2	66	5466.7	895.0
3	220	5466.7	693.3
4	495	5466.7	566.0
5	792	5466.7	473.6
6	924	5466.7	400.3
7	792	5466.7	338.3
8	495	5466.7	283.0
9	220	5466.7	231.1
10	66	5466.7	179.0
11	12	5466.7	120.7
12	1	5466.7	0.0

We have only one sample that includes all 12 households: this represents the census. At the other extreme we have 12 possible samples made up of only one household. In between we have a great variety of combinations.

The mean and standard error were computed for each set of sample means – one for each value of 'n'. If we average these means and compute their deviation, we obtain the value shown in the 'Mean' column, and the standard error in the 'Variation' column. For example, there are 495 possible samples of four, and each of them has a specific mean value. Then if we average all 495 means and we compute the variation, we would obtain the values 5466.7 and 566.0 respectively, as shown in Figure 7.5.

What can we conclude? Whatever the sample size, the mean of the means is identical and equal to the true mean, or the population mean. This is the statistical definition of being unbiased. At the same time, the variation decreases as the sample size, (n), increases – that is, as the sample size increases, the sample means are more likely to provide a good estimation of the true population mean.

⁴⁹ Variation = observed 'standard error' from sample-to-sample.

In practice, however, we take only one sample and the true value of the population is unknown. Thus we cannot compute the standard error for any given sample size. To deal with this, we have to rely on statistical theory, which tells us how to estimate the sampling error.

The estimated standard error is a measure of sampling error. Usually, to facilitate its interpretation, it is expressed in a 95% confidence interval (CI).⁵⁰

Let us return to the Dozenland example, and consider the sample of four households as previously identified. The values in the sample are: 4200, 4700, 4500, and 7000. This yields:⁵¹

- Mean = 5100
- Standard Error = 524
- 95% CI = 5100 ± 1666 = [3434 to 6766]

That is, using a sample of four, our best estimate is an average income of D\$5100 per capita, and we are 95% sure that the true mean income is somewhere between D\$3434 and D\$6766.

Using confidence intervals to identify real differences

The example in figure 7.6 on the following page, shows how CIs might be used in practice. At a first glance, if we look at the 1990, 1995 and 2000 estimates of MMR the differences may look important, leading us to conclude that MMR in Bangladesh was markedly reduced during the 1990s. However, since the confidence intervals overlap, the difference across years may be due only to chance.⁵²

7.4 Bias Error; further examples

Many factors can be behind bias. Usually bias arises because the sample has been extracted from a faulty population – one that is not representative of the target population. Of course, the size of the bias will depend on the extent of the difference between the target population and the population from which the sampling frame is drawn.

⁵⁰ Any high level of confidence could be chosen – 95% is a conventional choice.

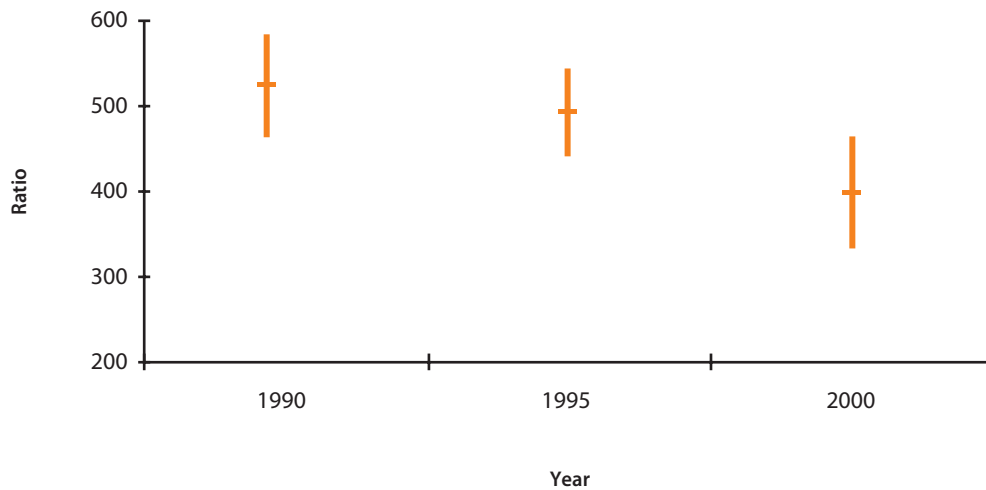
⁵¹

Variance = $[1 - (n - N)] \frac{S^2}{n} = \frac{2}{3} \frac{S^2}{4}$ (including finite population size correction, where 's' is the standard sample survey)

Standard error = $\sqrt{\text{variance}}$

95% CI = $\bar{x} \pm (3.182SE)$ (where 3.182 is the Student's t with 3 degrees of freedom at the 5% significance level)

⁵² With the original data, we could fit a trend line to test whether there had been a significant decrease over the period 1995 to 2000.

Figure 7.6: Maternal mortality ratio, Bangladesh (95% confidence intervals)

Let us consider how we would estimate IMR. What we want to know is the total number of children below one year of age that died in a given time period. If the vital registration system of a country is comprehensive – covering both rural and urban areas effectively – our chances of incurring bias error would be small. However, if the vital registration is incomplete, perhaps due to limited coverage in rural areas for example, bias error is inevitable and the magnitude of this bias would depend on the difference between infant mortality in rural and urban areas. In low-income countries, where infant mortality is likely to be highest in rural areas, a lack of comprehensive data from rural areas would imply a downward bias on estimates - that is, infant mortality rate would be understated.

Sources of bias

The most common sources of bias are: deliberate selection, errors in defining the population, non-response and human fallacy.

Deliberate selection

Deliberate selection occurs when some members of the target population have a greater chance of being selected than others do.

Suppose we want to estimate the average income of a region using a household survey. An enumerator may intentionally avoid visiting isolated, hard-to-reach households. In low-income countries, such households are likely to have a lower income than other households. If households like this are not taken into account, the estimated average income will be upwardly biased.

Alternatively, let us suppose an enumerator is questioning people in a shopping centre about their spending habits. He or she might only interview those people who are perceived as more likely to respond, or with whom he or she feels more comfortable interacting. Inevitably this will lead to under-representation of certain categories. Different categories of people are likely to have different spending habits, so their omission would lead to bias.

It is worth noting that bias error often arises due to under-representation of those relatively deprived. This is a major problem when estimating income or expenditure. Ethnic minority groups are frequently under-represented.

Errors in defining the population

Errors in defining the population occur when the population has been incorrectly specified. Telephone surveys are a typical example; since the poorest are less likely to own a telephone, they are likely to be under-represented in telephone-based surveys. Therefore telephone surveys tend to yield biased estimates of any wealth-related indicator.

In random sample surveys, error may arise because the sampling frame (the list of households) is inadequate. It may omit entire sections of the population, or it might cover all sections of the population, but omit some important units. For instance, a frame of businesses might not include businesses started during the last year, simply because they have not yet been listed. This can be important, particularly if these new businesses have atypical characteristics. Error can also occur when the frame includes some 'foreign' elements that are not part of the population considered. For example, a frame of children might mistakenly include some adults, or the list of the inhabitants of a town might include some people who have moved away since the list was prepared. Moreover, some units in the population might appear twice (or more) in the sampling frame. For example, if plots of land are sampled from the ownership lists and two villagers claim the same plot of land, the plot may be duplicated in the records.

Administrative records, such as rating lists, taxpayers' lists, land registers, company registers, voting registers or street maps, can be a good source of data and can provide a good sampling frame. Clearly, the quality of such records is a major concern. Sometimes the perceived utility of being listed leads to opportunistic behaviour. This was the case in a small-island state where a finance department offered fertilizer subsidies for every registered piece of land. It was eventually discovered that the department was paying subsidies for an area greater than the size of the entire island!⁵³

⁵³ Casley, D.J. and Lury, D.A. (1981). *Data Collection in Developing Countries*. Clarendon Press, Oxford.

Chapter 7

Non-response

There are three categories of non-response: inability to respond, absence, and refusal.

- ▶ **Inability to respond:** Some potential respondents, such as refugees, ethnic minorities, and others, may be illiterate, or may not understand the language used in the survey questionnaires. Unless these obstacles are dealt with by arranging personal interviews or translation, bias could result, as those unable to answer may have characteristics that, if accounted for, would affect results. In other cases, a representative may respond on behalf of the intended interviewee, giving rise to bias if the proxy respondent incorrectly estimates the characteristics of the person he or she is representing.
- ▶ **Absence:** If a person is absent because he or she has changed residence, bias will arise if the move was prompted by the issue under investigation. Let us consider a case in which several people in poor health leave a region due to water contamination. If a survey investigating the relationship between the health conditions of the population and the region's water quality is unable to capture those people who have migrated, the result will be biased.

In many circumstances, absences can be explained by the timing of interviews. For example, calls made during weekday mornings will inevitably miss the households of which every member is out working. If the subject of the enquiry is income and expenditure, then by not including the households where all members work, we are likely to be excluding households with higher-than-average income, thus generating downward bias. To minimize bias, when door-to-door or telephone enquiries are made, it is best to stop by or call back at least twice.

- ▶ **Refusal:** People may refuse to answer survey questionnaires for several reasons. Let us consider the following example. A manual reports the case of a mail survey targeting farms in a given country. The survey asked the number of trees per farm. Three consecutive mailings were used. Here are the results:

Mailing	Average number of trees per farm
1	456
2	382
3	340

Probably only relatively big farms, those with more trees, replied to the first mailing; small farms failed to respond, perhaps because farmers were

too busy and had no administrative staff. After the second and third round, however, probably because of the reminders and the extra time, smaller farms gave their responses as well. If the result had been compiled after the first mailing, it would have resulted in a serious over-estimate.

In other cases, only people with strong views will make the effort to reply. If so, the survey results may tend to go in one direction, unless strong 'positive' and 'negative' views cancel one another out. However, measurements other than the mean (e.g. variance) could be biased.

Encouraging cooperation, perhaps by explaining in a covering letter or at the beginning of the interview how the survey will benefit the community, can reduce refusal.

Human fallacy

Influenced responses occur when respondents are encouraged to answer in a certain way. For example, farmers might inflate their reported land holdings because they believe that the survey results will be used for allocating state aid. Or they might deflate them if they believe that by doing so they will minimize taxation.

Sometimes response bias is caused by leading questions, such as, 'Do you agree that eating meat is barbaric?' Many people will refrain from disagreeing out of embarrassment or even because they hope that by agreeing they will avoid further questioning.

The following questions and results were shown by a survey conducted in the USA:

	<u>% 'Yes'</u>
Have you ever heard the word AFROHELIA? (No such word!)	8
Have you ever heard of the famous writer, John Woodson? (No such writer!)	16
Have you ever heard of the Midwestern Life Magazine? (No such magazine!)	25
Do you recall that, as a good citizen, you voted last December in the special election for your state representative? (No election!)	33
Have you ever heard of the Taft-Pepper Bill concerning veteran's housing? (No such bill!)	53

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How can these results be explained?⁵⁴ Nobody has full knowledge about all matters, but still many people do not want to appear uninformed. We can avoid the problem by redrafting the questions, seeking details rather than a simple 'yes or no' response.

Responses can also be influenced by the enumerator's appearance. Respondents may even give quite different answers according to the sex of the enumerator. Similarly, if the setting of the interview is inappropriate we may obtain a biased response, as in the following example. A survey performed in Australia asked three different groups of women about the number of sex partners they had had. These were the results reported:

1. By women who were watched as they filled in the answer forms: 2.6
2. By women who knew they were completely anonymous: 3.4
3. By women who thought they were attached to a lie detector: 4.4

We can assume 4.4 is closest to the true value.

Finally, respondents may not be able to recall past events. This is most common in household expenditure surveys. When respondents are asked to recall the purchases made in a past time period, many tend to overlook a fair number of them.

7.5 Total error

We have seen that sampling error decreases as the sample size increases. Unfortunately the reverse is generally true about bias error. In the case of large surveys or censuses, for example, it is always difficult to give adequate attention to each individual response and provide adequate and homogenous training to all enumerators. Thus bias is more likely to emerge in large-sample surveys.

The **total error**, sampling and bias error combined, can be measured by the root mean square error (RMSE). This is defined as:

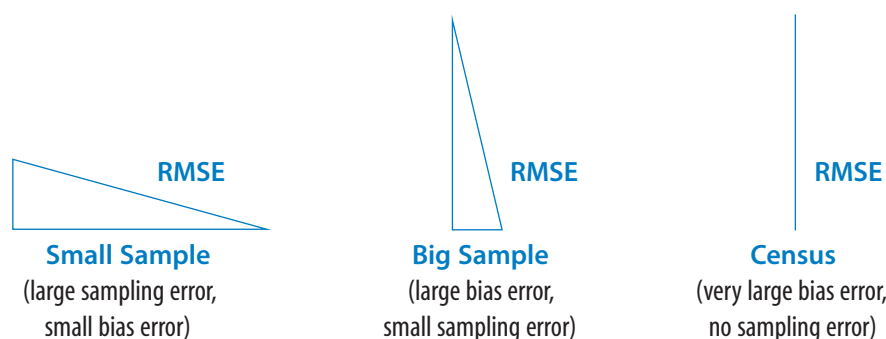
$$RMSE = \sqrt{(\text{Sampling Error})^2 + (\text{Bias})^2}$$

⁵⁴ Sometimes this type of bias is referred to as 'prestige error.'

The RMSE can be also thought of as the hypotenuse of a right-angled triangle, and bias and sampling as the two sides that make the right angle:



Let us consider the following three cases:



Note: although the census, owing to its 100% coverage, is not affected by sampling error, the bias may be so large that the RMSE may be greater than the RMSE of a sample survey of moderate size.⁵⁵

7.6 Dealing with error

The fact that error is so common in dealing with statistics does not mean that indicators are not useful. Clearly, with finite resources, we cannot expect to obtain 'perfect' estimates of true population values. But we can do our best to ensure that MDG and other indicators express the best estimates possible. Having an awareness of the basic principles of error, attempting to minimize its effect, and communicating about it clearly are fundamental to the production and use of reliable estimates.

Some common ways to reduce error include: using a larger sample size, managing the survey more carefully (to minimize non-response and computation mistakes, for example), increasing the coverage of administrative data, and using statistical models to estimate averages across time and sub-populations. Also, other sampling techniques, such as 'stratified sampling' and 'cluster sampling', can be used.

⁵⁵ Casley, D.J. and Lury, D.A. (1981).

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In stratified sampling, important groups of the population, or 'strata', are sampled independently. The advantage is that, generally, the sampling error decreases at minimal extra cost. In cluster or multi-stage sampling, entire groups of the population, or 'clusters', are sampled. This generally increases sampling error, but it can be a convenient time-saving option.

Shall we acknowledge error? The debate is open, and while some argue for giving everyone access to full information, at least in the **metadata**, others advocate for suppressing any mention of error so as to avoid confusion or impair credibility. Both positions have a clear rationale and, depending on the target audience, one approach may be more appropriate than the other. In most cases, however, it is beneficial to acknowledge error, even if in descriptive form only, and to provide some indication of the quality of the data (e.g. sample size, coverage).

Finally, the discussion on error yields a very important lesson: when comparing the values of indicators across countries, regions, or over time, we must interpret small differences with caution - they may be due only to error.

exercises

Exercise 7.1: Discussing error

With a group or partner, consider the following questions:

1. List three ways by which bias error may arise.
2. List two methods which can be used to reduce sampling error.

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Data sources and metadata

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8.1 What is covered in this chapter?

In this chapter we consider different sources of quantitative data used to produce indicators, and we compare their strengths and weaknesses. We also introduce the concept of metadata, which is information that helps us interpret data.

8.2 Sources of data

Four main classes of data sources are used to compile indicators: administrative data, census data, survey data and **surveillance data**. Some MDG indicators can be calculated using more than one data source, and in some cases, different sources may lead to different values. Comparing the results obtained using different sources is a good way to validate values.⁵⁶

Administrative data

Administrative systems (e.g. vital registration or business registration) are primarily established to manage processes (e.g. tax collection), however the data they generate can be useful in a number of other ways. Most administrative systems, like birth or business registries, update data on a 'live' basis and dissemination occurs at regular intervals (e.g. quarterly or annually), though usually with a delay of up to two years.

Two common examples of processes that generate routine data are birth registration and measles immunization. As a birth is registered, a record is created, comprising information on the date and location of birth, sex of the newborn, and some details about the parents. Similarly, records are created as immunizations are performed. These records are created to maintain data on the respective processes, but they are also useful in other monitoring efforts.

The most common sources of administrative data are:

- ▶ **Vital registration systems:** These collect information about birth, death, marriage, migration and other vital statistics. In many countries, vital registration systems are generally up-to-date and data are usually available within a year after the recorded event. If nearly complete, vital registration systems are useful for short- to medium-term policy-making.

Vital registration systems are insufficient in many developing countries. Many events are not registered in these systems or are generally registered only after a significant delay, so these systems cannot be used to produce reliable indicators. In such cases, estimates of basic indicators such as IMR and MMR are obtained from survey data instead.

⁵⁶ Carraro, L. et al (2004). 'Monitoring the Millennium Development Goals – Current weakness and possible improvements.' DFID, London.

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- ▶ **Health services or facility-based data:** These cover various events such as immunizations and clinic visits. As use of health services can vary greatly between sub-populations, it is often difficult to reliably estimate the coverage of an entire population through health-services data. District health managers often compute population coverage using data from the national census. Such calculations, however, can be prone to error, especially when the census data are old and there have been large population shifts. Health systems tend to measure provision and uptake rather than need or effectiveness, and data dissemination may be limited. Indicator definitions can vary across and within countries, hampering comparability and reducing the scope for the reliable aggregation of indicators.
- ▶ **Education records:** Education records cover information on enrollment, completion, school facilities, and financing. Data are usually reported by the education ministry, although in some cases responsibility lies with the national statistics office. In theory, administrative systems for education provide complete coverage of both private and public education facilities, but typically the public system is covered more effectively. Administrative data are also often used to create models for indicators that cannot be directly observed – for example, the proportion of students starting grade 1 who reach grade 7.

In many countries where administrative systems are weak, household surveys play an important complementary role. For the 'net enrollment rate', for example, vital statistics on the school-age population and enrollment may be sought from the administrative system. If unavailable there, attendance rates can be obtained from household-survey data. However, survey data are not a perfect substitute for administrative data.⁵⁷ One reason is that surveys, as they are expensive and infrequent, cannot provide the data needed for annual or more frequent monitoring. National survey data are also not reliable for small area estimations, and thus often cannot be used for planning at local level.

- ▶ **Employment records, benefit systems, tax and social security records:** While in developed countries such sources provide a wide variety of measures regarding employment, the labour market, and workers' welfare, in many developing countries they are largely ineffective due to the large size of the informal sector. In these cases, labour statistics are generally generated from survey data.
- ▶ **Business registers:** These cover a number of business characteristics, such as business name, address, size and sector. Depending on the coverage

⁵⁷ For more on this topic, see: Unesco Institute for Statistics (2003). 'Proposed further development of Millennium Development Indicators – Goals 2 and 3, Education.' Montreal.

and type of information collected, business registers can provide important aggregate data to assess the business environment in a given country. They are also very useful for generating sampling frames for business surveys.

In developed countries, data tend to be updated on a continuous basis and cover all but very small businesses in every sector of the economy. Not so in many developing countries, where the large size of the informal sector limits the scope of business data.

Provided that the relevant administrative systems are in place, administrative data are easier to obtain and more cost-effective than surveys and census data. Administrative data are usually available 1 or 2 years after collection and are relatively up-to-date. If the system is comprehensive and sub-population identifiers (e.g. sex, age or business sector) are collected, administrative systems can produce a large number of indicators disaggregated across sub-populations.

Often, administrative data systems are managed by agencies that have a stake in the outcome of policy processes, such as education authorities or manufacturers' associations. Such groups have an incentive to ensure that data collection is timely and complete. However, in some circumstances entities may have an incentive to inflate or deflate numbers (for example, if the budget is allocated among schools according to the number of children enrolled, over-reporting of the number of pupils enrolled may be common).

Administrative systems are often incomplete in developing countries. For example, business registration systems tend to exclude the informal sector, and often private schools do not share data with the national education administration. Moreover, much administrative data relates to service provision rather than demand, and uptake rather than impact. The health system, for instance, may record clinic visits but not the impact of medical treatment. In light of these potential shortcomings, administrative data should always be crosschecked and, when available, complemented by survey and census data.

Census data

A census is a vehicle for collecting data from every member of a given population. Whether targeting all the people living in a country (population census) or businesses (establishment census), censuses are time consuming and expensive, as they require enumerators to collect information for every unit of the population. Consequently, information is usually collected on a limited range of issues.

Prior to carrying out a census, the whole population must be identified and a set of questions developed. To allow changes in the basic characteristics of the popula-

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tion to be traced over time, a limited core set of questions is repeated while special modules related to particular topics may be added each time.

Population censuses are carried out in most countries once every 10 years and the first results are released 1 or 2 years after data collection. Inter-censal estimates are produced to keep track of changes in the population in the period between censuses. However, since censuses are carried out infrequently, estimates may be inaccurate, particularly when external events such as natural or humanitarian disasters lead to large sudden changes or movements of the population.

Establishment censuses follow the same principles as population censuses. The potential for bias increases, however, because many small or informal businesses tend to be excluded. Moreover, businesses, especially small ones, tend to have a more irregular life-cycle and relocate more frequently than households, and therefore it is much more difficult to estimate changes between these censuses.

The main advantage of a census is that, at least in theory, everyone is included. This means that censuses provide a comprehensive picture of certain characteristics of a population. Additionally, censuses generate a sampling frame for future household surveys while also providing the denominator for the calculation of many indicators that are beyond the scope of the census itself.

There is potential for bias in censuses, however, as it can be very difficult to include some sub-populations, cover certain regions, or give adequate attention to each individual response.

Survey data

A survey involves identifying and collecting data from a randomly selected subset (sample) of the population under investigation. The sample is drawn from a national sampling frame developed from the latest census. Unlike administrative systems, the primary purpose of surveys is to collect data. They can also be thought of as a cheaper and convenient alternative to the census. As surveys require significantly fewer respondents than censuses, comparatively they can be carried out more frequently and yield results more quickly, even when covering a larger number of issues.

As surveys deliberately omit the majority of the population, sampling error is unavoidable. However, if properly designed, a survey can be less biased and produce better estimates than administrative data or a census.⁵⁸

Surveys may be quite specific, like household-income and expenditure surveys, or may be more general and have a number of modules covering several areas such

⁵⁸ This is covered in greater detail in Chapter 7.

as education, health, community facilities and infrastructure. Increasingly, efforts are made to ensure that common definitions and standards are used consistently to allow for comparison. Here we provide a brief description of the most common surveys:

Household Surveys

Household surveys are multi-purpose surveys carried out by national statistical institutes and/or international organizations to collect information from people living in private households. The most common topics surveyed include housing tenure and household accommodation; employment; education; health and use of health services; and income and consumption. The most common household surveys are described below:

- ▶ **Multi Indicator Cluster Surveys (MICS)**⁵⁹ are household surveys developed by UNICEF to help countries monitor the situation of children and women as prescribed at the World Summit for Children in 1990. They tend to include standard modules covering health, education and demographic issues.
- ▶ **Demographic and Health Surveys (DHS)**⁶⁰ are household surveys with large sample sizes. They provide a wide range of data on population, health and nutrition. A standardized core questionnaire is used, and special modules may be added. The standard survey generally consists of a household questionnaire and a women's questionnaire.
- ▶ **Living Standard Measurement Surveys (LSMS)**⁶¹ were introduced by the World Bank to improve the quality of household data collected by National Statistics Offices in developing countries. The main objective was to develop new methods for monitoring progress in living conditions in order to estimate the impact of policies on households' welfare. Besides income, education, health and employment, LSMSs seek information about prices and facilities. To capture seasonal patterns in income and expenditures the surveys are often conducted over an entire year.
- ▶ **Core Welfare Indicator Questionnaires (CWIQ)**⁶² are sample surveys promoted to monitor social conditions in Africa by measuring access to, use and satisfaction with public services. Generally, sample sizes are large and questionnaires are short.

⁵⁹ See <http://www.childinfo.org> for more information.

⁶⁰ <http://www.measuredhs.com>

⁶¹ <http://www.worldbank.org/lsm>

⁶² <http://www.worldbank.org/afr/stats/cwiq.cfm>

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- ▶ **Household Budget / Income and Expenditure Surveys** are mainly carried out by National Statistics Offices to compile national accounts, generate CPI weights, and measure welfare and poverty. In many countries, they have gradually expanded to become multi-purpose household surveys.
- ▶ **Labour Force Surveys** (LFS) are intended to collect information relevant to labour-market policy.⁶³ The survey collects information on respondents' personal circumstances and their labour-market status (e.g. industry, occupation, hours worked, wage rates and workplace size) during a specific reference period. Labour force surveys are common in industrialized countries, but less so in developing countries. Countries with large informal economies can enhance the relevance of these surveys by adding a few pertinent questions. Often, though, it might be more effective to conduct a separate informal-sector survey.⁶⁴

Surveillance data

In the area of public health, surveillance is defined as the ongoing, systematic collection, analysis, interpretation, and dissemination of data on health-related events.⁶⁵ Traditionally, surveillance was focused on infectious diseases, with systems designed to identify epidemic diseases such as HIV/AIDS, measles, polio and, most recently, avian influenza. Over time, however, surveillance within the field of public health has expanded to also encompass non-infectious conditions such as chronic diseases and injuries, as well as personal habits. Surveillance data from all of these areas are essential for developing public health policies and programmes and evaluating their effectiveness.

Demographic Surveillance Systems (DSS)⁶⁶ are longitudinal studies⁶⁷ that aim at following every member of a 'sentinel' population – a cluster that includes every member of the population in a certain geographical area.⁶⁸ Within each cluster every event of interest is recorded, such as vital events, contact with health and education services, and migration.

As such, a DSS establishes a reliable information base taking in a wide variety of attributes of the complete population living in a specific geographical area. A second

⁶³ Employment surveys are also an important source of labour statistics as they provide data on employment status, hours and earnings from the employer perspective.

⁶⁴ Hussmanns, R. (2004). 'Measuring the informal economy: From employment in the informal sector to informal employment.' ILO, Geneva.

⁶⁵ Chin, P (2002). "Analysis, Reporting and Feedback of Surveillance Data," Center for Disease Control and Prevention, Atlanta.

⁶⁶ DSS studies are currently underway in 40 countries. For further information, see: <http://www.indepth-network.net>

⁶⁷ Longitudinal studies are investigations where data about the same individuals are collected two or more times over a given period of time.

⁶⁸ A typically-sized sentinel population is composed of 60,000 to 100,000 people.

strength is that these surveys usually produce data relatively quickly. Of course, due to the narrow geographical focus, a DSS cannot be used to compute national indicators. Nevertheless, a DSS provides accurate information that is very useful for developing policies and programmes and evaluating their effectiveness.

Comparing data sources

The table below compares the characteristics, advantages and disadvantages of the four data collection tools considered.

Figure 8.1: Characteristics of data sources

CHARACTERISTIC	ADMIN	SURVEY	DSS	CENSUS
<i>INCLUSION CRITERION</i>	All events registered	All sampled units	All units in specified clusters	All units (i.e. 100% coverage of the population)
<i>BIAS</i>	They can be biased if incomplete	Usually there is bias, but if well designed bias is minimal	Bias can be large as cover is only small geographical areas. Even when an urban and a rural sentinel population are monitored, still is not sufficiently representative.	Theoretically there is no bias, but lack of coverage may lead to it
<i>COST</i>	Low	Medium	Medium	High
<i>FREQUENCY</i>	Ongoing	3-5 years	Ongoing	10 years
<i>DISSEMINATION – YEARS AFTER COLLECTION</i>	1-2 years	1 year	Less than 1 year	1-2 year
<i>POTENTIAL FOR POLICY MAKING AND ADVOCACY</i>	Very good but limited by poor coverage	Good, but not in the short run	Very good, even in the short-run as well, but only for the clusters and similar populations	Good, but not in the short run

8.3 Metadata

Metadata provides information on the content, quality and other characteristics of a dataset. Metadata should:

- Specify what kind of data collection vehicle was used (e.g. survey, census);
- Indicate precisely where and when the collection took place (e.g. Country 'X' 2003 household survey);
- Indicate the sample size and sampling technique;
- Provide definitions of all the items collected; *and*
- Make clear who collected the data, and who is responsible for their management.

Metadata information might refer to relevant documents, specify methods used to impute missing values, or describe the methods applied to analyze the data.

If sufficiently specific, metadata can be extremely useful. It reduces ambiguity and facilitates comparison. For instance, the datasets of two countries may contain estimates of net enrollment in primary education. Suppose that one country uses yearly enrollment data from administrative sources, while the other uses data collected through household surveys. In this case, it would be clear that the two datasets must be compared with great caution. Metadata ensures a correct interpretation of indicators. If we know, for example, that the estimated proportion of businesses owned by women is derived from a survey of only major business establishments, we understand not to make inferences about business ownership among women overall.

exercises

Exercise 8.1: Data sources

1. Which of the surveys discussed in this chapter are carried out in your country? How frequently? What have been their weak points and strong points?
2. Look at all of the available data on primary school enrollment in your national DevInfo software or any other report. Using the metadata, identify what data sources have been used to compile this indicator. Are there any limitations using together data from different sources?
3. Looking at your country's DevInfo, MDG Reports or other statistical reports, summarize the progress toward MDG3. Include in your assessment a discussion of the strengths and limitations of the data used to produce the related indicators. Use the metadata to inform this discussion.

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Use of indicators

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9.1 What is covered in this chapter?

This chapter is focused on the use of indicators. We explain why MDG indicators are used, and consider other national indicators as well. We define and explain the use of proxy indicators. We describe the importance of consistency in indicator use. We also consider the implications of using indicators at different levels. Finally, we summarize the strengths and limitations of indicators.

9.2 Why use MDG indicators?

MDG indicators are perceived as objective, 'hard' evidence of the progress made, and can help bring development priorities to the forefront of national debate. They can also be useful in raising public awareness, both within and beyond a given country.

Nevertheless, it is important to keep perspective, and to use indicators responsibly. Indicators provide needed information about a process, but we must guard against drawing from them unwarranted conclusions or rushed inferences of causality. Despite their simplicity, indicators can be misleading if not treated with due care.

Where are we today?

The current value of an indicator tells us 'where we are now,' or the current status of the process in question.⁶⁹ It is important to be aware, however, that the latest value of an indicator is only a snapshot of a single point in time and alone reveals nothing about progress.

What progress is being made?

We need to set a **baseline** in order to be able to describe the direction and pace of change. Once a baseline is established, countries can monitor their achievement, or lack thereof, over time, and generate evidence to guide action. The global MDGs use the year 1990 as the baseline, but many countries have established their own.

Let us consider the following example. In 1989/90, the Maternal Mortality Rate (MMR) in Uganda was 523, and the 2015 target was set at 131, calling for a reduction of approximately 75%. By 2000/01 the MMR stood at 505, just below the 1989/90 level. The need for action was clear. This is just one simple example of how knowledge of past progress can inform policymakers.

Fitting a trend

A clearer picture emerges when we can estimate a trend over a number of points in time.

⁶⁹ Indeed, 'current' estimates actually refer to the recent past, due to the reporting time lag.

Figure 9.1: Progress toward the goal, Tanzania

Figure 9.1 shows contraceptive use among Tanzanian women between 1992 and 1999. It is clear that there has been progress over time, and the repeated upward movements are much more compelling than a single increase would be.

With access to information on the variability of the baseline value and of the most recent values, we can derive a good estimate of overall progress. Nevertheless, even with only four data points over time, we can estimate a trend and the average annual change. This estimation, provided the sample is reasonably large, can be used to monitor policy effectiveness, to decide whether to maintain current policy, and to help quantify any additional inputs that might be required.

In any situation, however, it is important to bear in mind that the further the trend is extrapolated beyond the most recent data point, the less reliable predictions become. That is, data on the past four years are helpful for making predictions for the next year or two, but not very useful for predicting the situation in ten years' time.

9.3 Conditions for correct and effective use of indicators

To use indicators correctly and effectively, we must ensure that the indicators selected reflect the process we want to measure. For example, to gain a more comprehensive picture of health care during pregnancy, we should supplement

data on the proportion of births attended by skilled health personnel with indicators monitoring the quality of service supplied prior to the delivery.

It is important that each measurement considered be appropriate for its application. The proportion of mothers who had access to skilled health care while giving birth, together with indicators on the number of skilled health workers per district, would be useful for identifying any need for skilled health workers. Similarly, the proportion of literate adults aged 15 and above would be useful as a basis to allocate funds for adult literacy courses.

Figure 9.2 shows the poverty gap across districts and between urban and rural areas in Uganda.

Figure 9.2: Poverty gap (%) - Uganda 2002/03

Area Name	Rural	Urban	Total
<i>Central Uganda</i>	6.9	1.6	5.5
<i>Eastern Uganda</i>	14.9	4.8	14.1
<i>Northern Uganda(*)</i>	24.2	n.a.	23.4
<i>Western Uganda</i>	8.2	4.5	7.9
(*) Kitgum and Pader district are excluded			

Figure 9.2 is a good example of data that highlights disparities across spatial areas. In this case the table shows the differences in the poverty gap across provinces and between urban and rural areas. This is very useful for encouraging and guiding national debate on the focus of poverty-reduction policy.⁷⁰

It is not sufficient to define and produce the right indicators. They must be communicated effectively as well, and a clear presentation tailored for the target audience is critical. Comprehensive information about the data (specification of the source, responsible agency, etc.) and methodology must be available in the metadata. For example, in the data in Figure 9.2, the Northern Uganda Urban category excludes two towns where data collection was impossible due to conflict, and thus the 'total' poverty for Northern Uganda could be higher than stated. This sort of information reduces the likelihood of incorrect inferences.

⁷⁰ Additional complementary indicators should also be employed before drawing any conclusion.

9.4 Proxy indicators

Even when we identify the appropriate indicator for monitoring a given process, it may not be possible to produce it, because recent data may not be available or may be of poor quality. In these circumstances, we can use one or more alternative indicators closely related to the process we are investigating. These are called 'proxy' indicators.

The first requirement is that the proxy's underlying data be available. Proxies must also be consistent with the indicator that is unavailable – that is, the proxy and the unavailable indicator must move at a comparable rate. Often, two or more complementary proxies are employed, each one measuring a different dimension of the process in question.

Proxy variables are used in a wide range of statistical analyses. For example, the level of chlorofluorocarbons (CFCs) is used as a proxy for ozone depletion. In the past, educational attainment was commonly used as a proxy for literacy rates – people who had completed a pre-determined level of primary education were assumed to be literate.⁷¹

As for the MDG indicators, one common example of the use of proxies relates to HIV/AIDS. As data to compile 'condom use in high-risk population' are not available, the indicator 'condom use among 15-24 years old by sex' has been proposed as a replacement. This is the percentage of young men and women ages 15-24 who said that they used a condom the last time they had sex with a non-marital, non-cohabitating partner. As one can see, the proxy does not perfectly match the indicator it replaces, nonetheless it is very useful for gauging the issue in question.⁷²

Proxy indicators must be selected carefully. One common mistake is using expenditure data as a proxy for service delivery. The problem is that the link between the two is not strong enough. For example, health expenditure does not tell us much about the delivery of health services.

9.5 Consistency

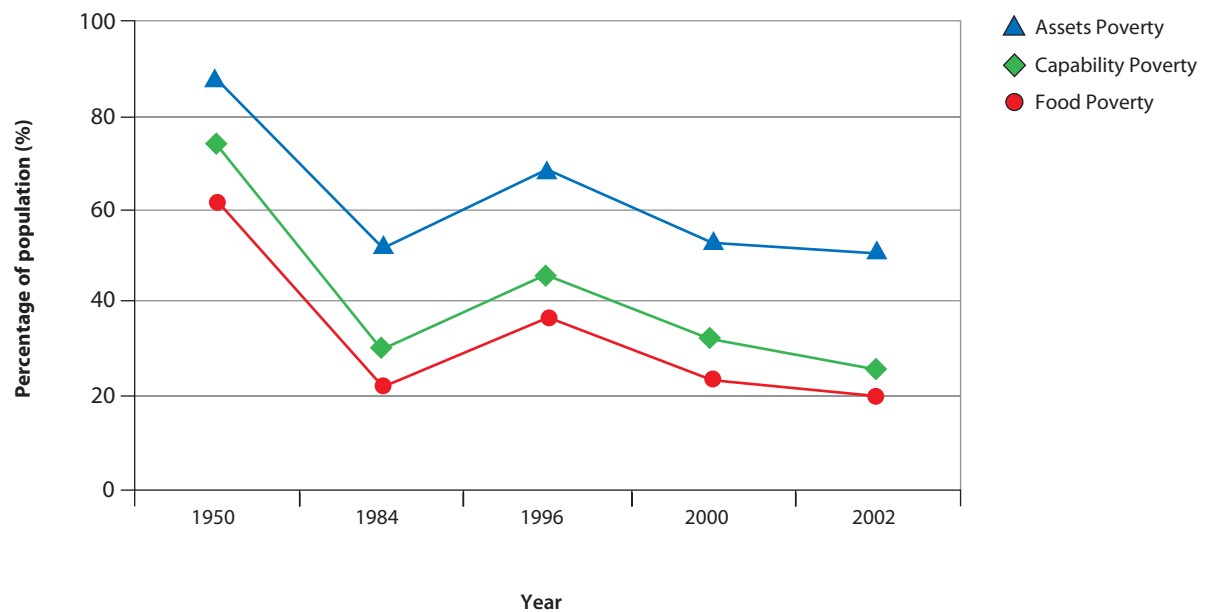
Indicators must be consistent to ensure effective comparability. Consistency is achieved if the same methodology is applied over time and across populations. If data are consistent then we can be more confident when comparing over time and across sub-groups. In general, every attempt should be made to ensure that common definitions, data sources, computation techniques and time periods are applied.

⁷¹ Nowadays, however, the recommendation is to use reading and writing tests administered as part of household surveys or censuses.

⁷² For more on the use of proxies for health-related indicators, see: http://w3.who.sea.org/LinkFiles/Health_Situation_indicators04-mdg.pdf

It is also important to check for consistency in trend across related indicators. This crosscheck helps with validation and strengthens our analysis by showing the same issue from different perspectives. In Figure 9.3 we consider an example:

Figure 9.3: Comparing different indicators of poverty in Mexico



Three different long-term measures of poverty in Mexico are shown.⁷³ The levels of the three measurements are different due to their definitions. The trends are consistent, though, as all show similar fluctuations across time. This is strong evidence that the trend captured by the three indicators accurately reflects the broad change in poverty levels in Mexico over the period examined.

9.6 Application of indicators

To grasp how indicators are used to inform policymakers, let us consider the example shown in Figure 9.4.⁷⁴ The current level of the infant mortality rate (IMR) across wealth quintiles in country X is shown in the second column. Let us assume that the government in country X set as the target a reduction of the infant mortality rate below 25 deaths per 1000 births.

⁷³ Alarcon, D. (2004). 'Effective use of data for policy-making, monitoring and advocacy - MDG Training Development Workshop.' 12 July, 2004, UNDP, New York.

⁷⁴ Gwatkin, D.R. (2000). 'Beware of Averages.' The Rockefeller Foundation. Paper presented at the International Conference on Health Research for Development, Bangkok, November 2000.

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Figure 9.4: Comparing alternative strategies

Wealth quintile	Current level	Strategy 1	Strategy 2
<i>Top 20%</i>	25.5	7.0	20.7
<i>Next highest 20%</i>	38.6	12.1	22.3
<i>Middle 20%</i>	75.5	11.9	37.5
<i>Next lowest 20%</i>	85.0	29.0	20.1
<i>Bottom 20%</i>	106.5	62.5	21.9
<i>Population average</i>	73.5	24.5	24.5

To see how data can be used to inform policy choices, let us consider the possible outcomes of two hypothetical strategies for addressing an infant mortality rate. ‘Strategy 1’ reflects the outcomes if the government were to prioritize the top quintiles. Given the existing budget constraints, few resources are left for the poor households of the bottom quintile, which see a reduction in IMR that is less than that of the higher wealth quintiles. In contrast, ‘Strategy 2’, where the government prioritizes the two bottom quintiles, results in a marked reduction in IMR at the bottom, while among higher quintiles the rate is only marginally reduced. Both strategies meet the overall national target, though each misses some groups.

9.7 Indicator levels

The United Nations Statistics Division (UNSD) maintains a database of global MDG indicator values, as is shown in Appendix 3. These indicators were included mainly for global monitoring purposes, and are computed periodically either by national or outside agencies.⁷⁵ Many countries have used global definitions, but others, to suit their countries’ own circumstances and needs, have altered definitions or developed their own **national indicators**.

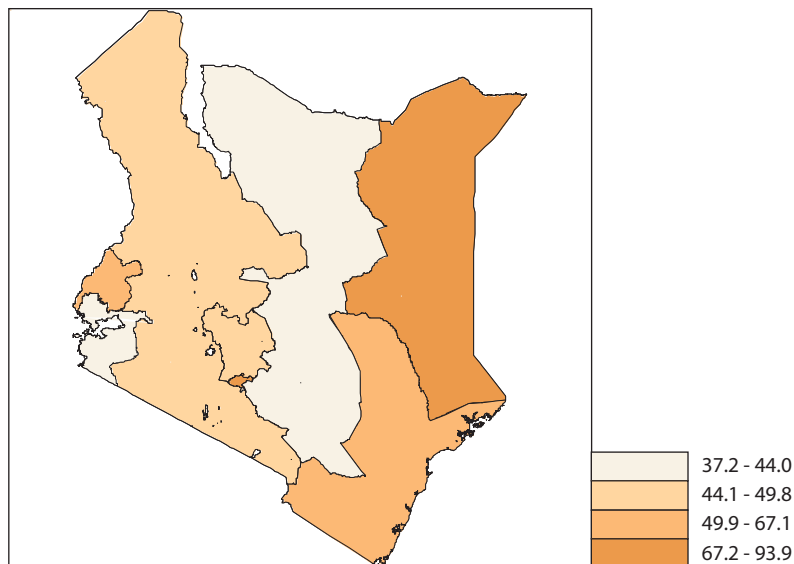
Countries produce data for their national needs, and sometimes these are shared with international agencies. When necessary, international agencies adjust the data provided by countries by changing definitions to allow for cross-country comparisons and regional or global aggregation. When country data is not available, international agencies in some cases create estimates. Similarly, countries sometimes use data from international agencies – these data are referred to as

⁷⁵ The World Bank produces MDGi1 - proportion of population living below \$1PPP per day - while FAO computes MDGi5 - proportion of the population below the minimum level of dietary energy consumption.

'global' estimates. Due to changes in definitions or estimation methods, or differences in sources, these 'global' estimates often differ from estimates produced by national institutions.

When data from national datasets include identifiers of sub-populations such as district, sex, age group and employment status, and samples are sufficiently large, national indicators can be disaggregated. This allows policies and action to be targeted more appropriately. Figure 9.5, for instance, depicts access to safe water in Kenya in 2000 and shows clear regional disparity.

Figure 9.5: Access to safe water in Kenya, 2000, % households



It is important to use global and national indicators in their appropriate contexts, and when large differences between global and national values or trends emerge, verification is necessary.

For example, according to the Tanzania Socio-Economic Database (TSED), in 1999, 48.8% of births in Tanzania were attended by skilled health professionals, while for the same indicator, however, the global value reported by UNSD for 2000 is 36%. A number of tangible reasons may account for parts of this difference, but certainly not a drop of 13% in a single year. Instead, the discrepancy is likely to be due mostly to differences between the way the two organizations produced the data.

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For example, for the denominator, TSED measures ‘births’ while UNSD considers ‘deliveries’. The definition of skilled health personnel used in Tanzania may also differ from that adopted by WHO, leading UNSD to make adjustments.

9.8 Strengths and misuse of indicators

The major strength of indicators is their ability to condense a broad range of information into a single and well-defined value that can be easily disseminated and interpreted by a broad audience. Indicators allow us to track changes over time and make comparisons across sub-populations using objective evidence of progress. Any indicator, however, is only as good as the data from which it is derived, the methodology used to compute it, and the use to which it is put.

The following are some of the most common misuses of indicators:

- Using the wrong indicators (e.g. hospital admission to measure demand for services);
- Comparing unlike scales (e.g. comparing the CPI of countries that apply different consumer baskets); ⁷⁶
- Faulty analysis or presentation (e.g. forgetting to multiply MMR by 100,000 to obtain the actual number of maternal deaths);
- Using poor-quality, out of date or erroneous values;
- Extrapolating too far beyond the last data value available;
- Ignoring variability; and
- Using incorrect proxies.

It is also important to stress that global and national indicators may not be comparable to one another – they may be defined or produced inconsistently. Finally, changes in national values might not be attributable to policies, but rather to exogenous forces, such as global or regional economic trends. Therefore, when interpreting indicators we need to be cautious when suggesting any relation of causality.

⁷⁶ A ‘basket’ is a standard set of consumer goods. The price of this basket of goods is used in the calculation of the Consumer Price Index, so CPIs from countries that use different baskets would not be comparable.

exercises

Exercise 9.1: Interpreting and using indicator values

1. Look at all the MDG indicators included in your national DevInfo dataset. Choose one indicator for which data are present in your dataset, and describe briefly how it could be used either to support policy development or to advocate for policy change. What are the strengths and limitations of this particular indicator for this purpose? How could it subsequently be used to monitor change over time?
2. How would you interpret the following information?

Year	Ratio of girls to boys in secondary school	Ratio of boys 10-14 to girls 10-14
1990	0.67	0.99
1995	0.72	0.98
2000	0.80	0.95

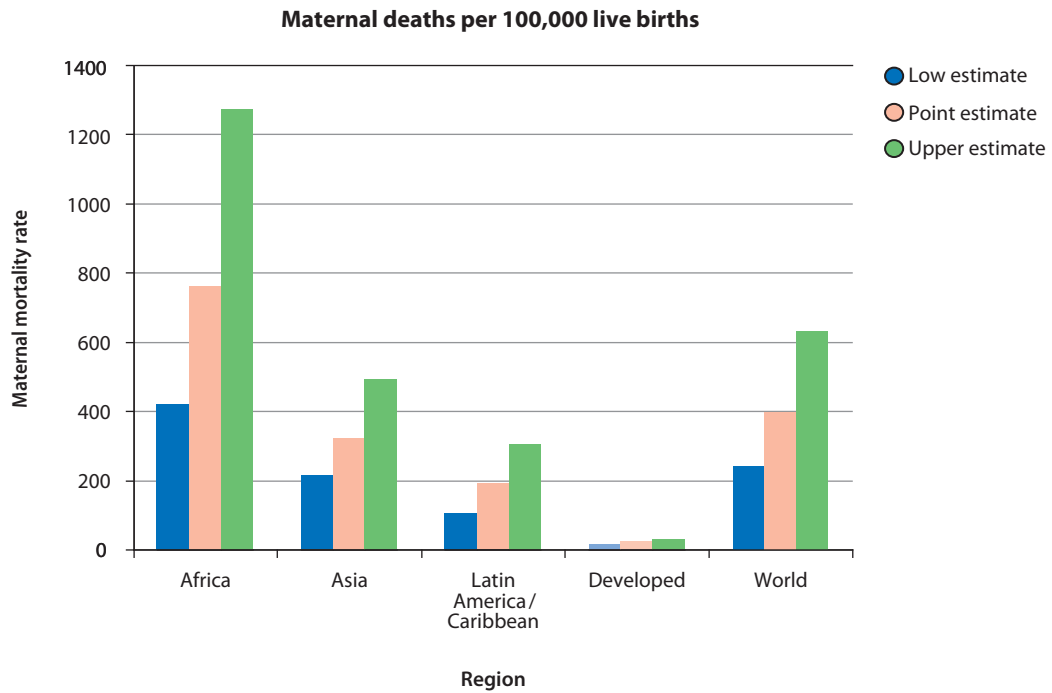
3. Is there any further information that would help you interpret the indicators in question 2?
4. Look at the data in your DevInfo package relating to MDG indicators 30 and 31 as listed in Annex 2. Consider the values recorded in urban and rural areas. Summarize these data very briefly. How could this information contribute to develop your country's environment policies?

Exercise 9.2: Uses and abuses of indicators

Look at the chart on the next page.

1. Compare the indicators amongst the five regions, and discuss any differences.
2. Why are confidence intervals wider for some regions than others?

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Exercise 9.3: Uses and abuses of indicators

Read the newspaper article in Appendix 5 and consider the following questions:

1. What indicators are being discussed here?
2. Which groups do you think the two agencies are targeting?
3. How does each agency calculate the indicators' values?
4. Why do you think they chose the indicators they did?
5. Why are the two indicators different?
6. How do they differ?
7. Which data provide the most accurate picture?

The background features a collage of semi-transparent maps and line graphs. The maps show various geographical regions in different colors (green, blue, yellow, red). The line graphs have axes with numerical values (45, 50, 55, 60) and time periods (1985-90, 1990-95, 1995-00).

Using MDGs and indicators in policy-making

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10.1 What is covered in this chapter?

In this chapter we discuss how the MDGs are operationalized and integrated into policy-making, how they are adapted to a country's particular needs and how targets are established. The issue of costing is also introduced.

10.2 Operationalizing the MDGs

In order to make the MDGs operational, targets and indicators must be adapted to country conditions, baselines must be established, and needs prioritized. This exercise is most effective when conducted as part of formulating a long-term national development strategy or modifying an existing one. Once the targets have been adapted, long-term goals must be broken down into achievable interim targets. The cost of reaching these interim targets must then be carefully assessed and integrated into a medium-term (3-5 year) strategy and budget. Some countries formulate a Poverty Reduction Strategy (PRS); others approach poverty reduction through a national medium-term policy process.

The immediate task is to integrate the MDGs into the national medium-term strategy and into the monitoring system. To be operational, however, the MDGs need to be integrated throughout the full range of national and sectoral plans and strategies. By measuring and monitoring a single set of outcomes, the MDGs can help to integrate separate strategies into a coherent whole.

10.3 Adapting the MDGs

The MDGs can be adapted in order to fit specific country conditions. In some countries, certain global targets may be within close range while others may be overly ambitious. For example, Thailand and Vietnam have set targets that go beyond the global targets, while others have set targets that are closer to their current status. The process of adapting the global MDGs at country level is known as '**nationalization**'.

In some circumstances, governments may wish to include additional goals or indicators, perhaps emphasizing particular sectors or groups with unique challenges. In Brazil, for example, besides national MDG targets, regional and other specific targets for some vulnerable groups have been set. The process of setting regional (or any sub-national spatial area) targets is often referred to as '**localization**'.

10.4 Ownership

Adapting the MDGs to the country context is the first step in establishing national ownership, and an essential element for mobilizing public support to achieve

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them. Civil society will only become the driving force behind the MDGs if the goals are seen as useful tools that are meaningful for daily life.

To strengthen ownership, every stakeholder must be engaged and all must be encouraged to work together to generate social and political pressure for change. To this end, press coverage and publicity are important factors in placing the MDGs at the centre of the policy debate.

10.5 Costing the MDGs⁷⁷

Once the MDGs have been adapted, a baseline set, and interim targets established and prioritized, a sound and realistic estimate of the cost of striving for the targets is required. As the MDGs measure outcomes, which are the cumulative result of many policies and processes which require direct inputs – goods, services and infrastructure – it is not possible to determine the exact cost beforehand. Nonetheless, enumerating the necessary inputs and estimating their cost is essential for planning and budget negotiations.

10.6 Why do we set targets?

A target is a pre-determined value of a specific indicator that a government intends to achieve by a specific date. Setting targets helps to mobilize resources and to prioritize their allocation. Moreover, they provide measurable benchmarks against which to hold governments accountable. To be effective, targets must be: specific, measurable, achievable, relevant and time-bound.

Input/output or outcome/impact targets?

As mentioned earlier, many monitoring systems tend to focus on outcomes and impacts rather than inputs and outputs – the so-called ‘missing middle’. This is partly because most monitoring systems have been designed to monitor PRSPs, which are supposed to be results-oriented and focus on impacts.

However, an effective monitoring system should cover a range of indicators from inputs through impacts. The time lag between inputs and outputs is not as great as the lag between inputs and outcomes or impacts. In addition, inputs and outputs are more firmly within government control. Therefore, by monitoring inputs and outputs we are in a position to provide more timely information on progress to assist policymakers in adjusting policies as they unfold.

⁷⁷ For a discussion of approaches to MDG costing, see: Vandemoortele, J. and Roy, R. (2004). ‘Making Sense of MDG Costing’, UNDP, New York.

Aggregate or disaggregated targets?

Equity considerations provide a strong argument for ensuring that the same targets are met by all sub-groups of the population. In the absence of disaggregated targets, however, budget and efficiency considerations may lead governments to ignore the interests of marginalized groups. Setting specific targets for different sub-populations can help direct attention to disadvantaged groups.

Short, medium, or long run targets?

The time path to achieve a target needs to be thought through. Medium-term strategies should reflect long-term (MDG) goals, but progress should be monitored using intermediate indicators. Short-term or annual targets are also important.

For example, two countries may share the same long-term target for reducing poverty. One country may enjoy stability and a high rate of growth, and therefore it may opt to strive for more rapid progress in the short-run. A second country may be less stable, due perhaps to recent political or military turmoil, and therefore might set less ambitious intermediate targets.

Setting realistic targets

Three techniques can be used to set realistic targets:

- ▶ **Historical benchmarking:** Historical benchmarking involves setting targets according to historical experience, using past performance to make projections as to the near future. The projected rate can then be compared with the progress required to reach the targets.
- ▶ **Macrosimulations:** Outcomes are the result of a number of factors including economic growth, urbanization and the level of inequality. Multivariate regression techniques, for instance, can be applied to simulate future poverty measures based on growth estimates and current inequality and poverty levels.
- ▶ **Microsimulations:** The macro approach can be complemented by microsimulations based on household data. The resulting coefficients can be used to predict the effect of new policies and inform policymakers as to the best mix of interventions. As more household data become available in developing countries, these techniques are applied more frequently. However, it is important to note that relevant variables that cannot be quantified are left out.

exercises

Exercise 10.1: Localizing the MDGs.

Read the document “Strategic Planning for Poverty Reduction in Vietnam” on localizing the MDGs in Viet Nam, located on the Resource CD.

1. How does the Comprehensive Poverty Reduction Strategy fit into Viet Nam’s planning framework?
2. How did the Government of Viet Nam go about prioritizing Viet Nam’s development goals in the CPRS?
3. Why did the government of Viet Nam decide to adjust the global MDGs?
4. How did the MDG framework help Viet Nam in identifying its own Development Goals?
5. From Table 2, give examples of how Viet Nam has adapted the MDG goals and indicators.
6. What development goals did they adopt that are not in the Global MDGs?
7. How do Viet Nam’s targets compare with the global MDG targets?

The background features a collage of various data visualization elements, including line graphs with multiple colored lines (blue, green, orange, red) and semi-transparent overlays. Some elements resemble bar charts or area plots. The overall aesthetic is modern and analytical, with a focus on data trends and patterns.

Using indicators to reflect diversity

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11.1 What is covered in this chapter?

In this chapter we explain the benefits of disaggregating indicators by sub-population. We name the most common criteria used to identify sub-populations, and describe how to use disaggregated indicators to develop targeted policies and strategies for advocacy. We then discuss how to mainstream gender considerations into statistics. Finally, we consider the concept of 'pockets'.

11.2 What is a sub-population?

A sub-population is a subset of the target population that has been identified for the description or measurement of a shared attribute that distinguishes the subset from a population as a whole. Sub-populations are usually defined in pairs or sets – in identifying an urban sub-population in a country, we acknowledge a rural sub-population as well, for instance. Here are some common sub-populations:

- ▶ **Spatial:**
 - Regional
 - National
 - Sub-National (e.g. province, district, urban / rural, etc.)

- ▶ **Individual characteristics:**
 - Sex
 - Age group
 - Ethnic group

- ▶ **Income:**
 - Wealth quintiles (top 20%, second-highest 20%... bottom 20%)
 - Poverty line (above poverty line / below poverty line)

- ▶ **Education:**
 - Attainment (primary school, secondary school, university education)
 - Literacy

- ▶ **Employment:**
 - Sector (agriculture, industry, services)
 - Status (formal, informal)

11.3 Why disaggregation?

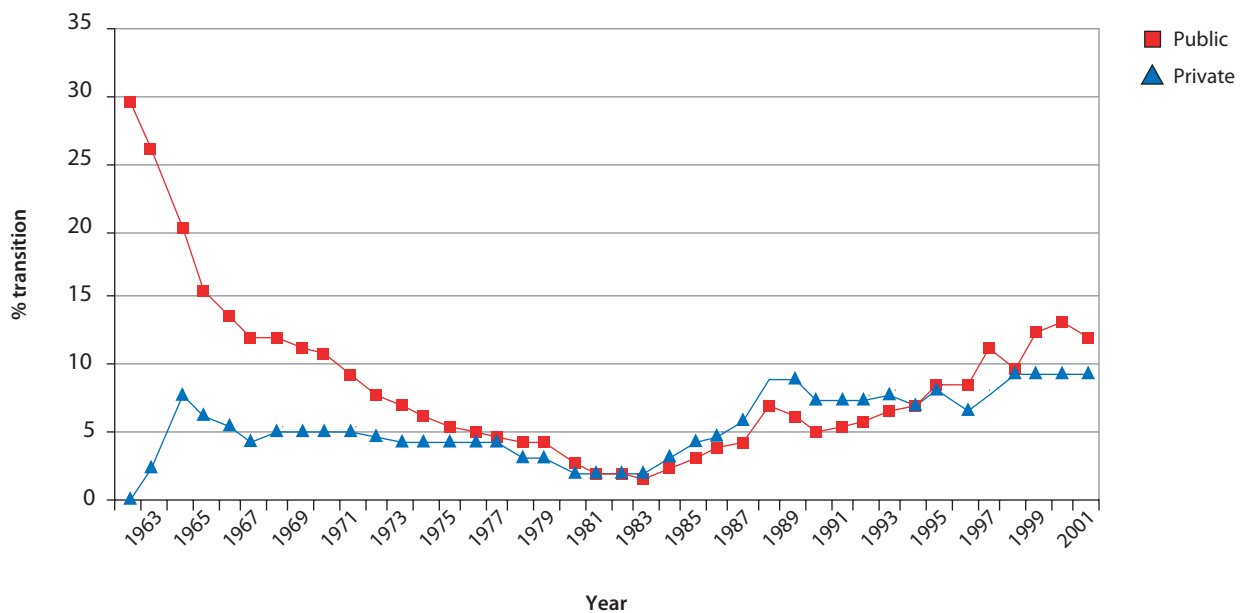
National indicators are very helpful in understanding the current status and the trend of a particular issue related to the country as a whole. However, to see a more detailed picture, we have to break down national values by sub-populations. This process is referred to as disaggregation.

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For example, we might look at immunization rates in urban and rural areas to identify the coverage and progress of immunization programmes in the two areas. With this disaggregated information, we can channel attention towards specific issues or areas.

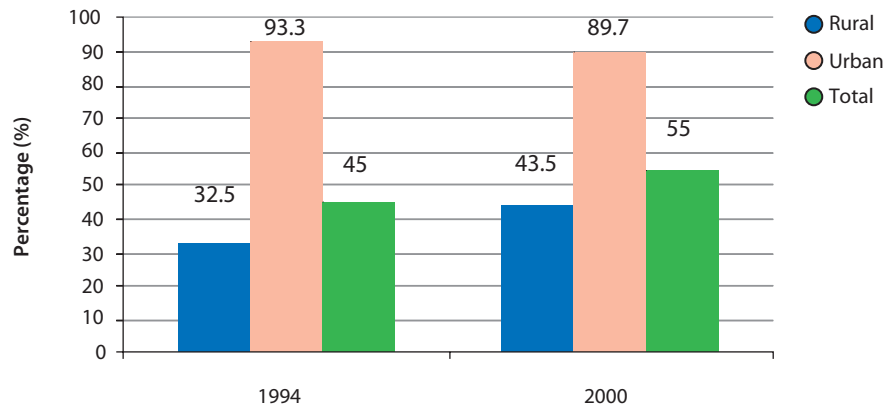
Figure 11.1 shows the rates of transition from primary to secondary school in Tanzania for two sub-populations: those attending private schools and those attending public schools. The chart shows that in 1963, children in public school had a 30 percent chance of continuing to secondary school, while those in private school had virtually no chance. By the mid-70s, children from public and private school had an approximately equal, low, chance. The lowest transition rate for both groups was from 1981-83 at around 2 percent. Following that period, there was a slow increase in transition rates, which reached about 10 percent by 1991 for both groups. Recently, the parity has broken, with public school children having a higher chance of moving on to secondary school. Even with this simple analysis, we improve our understanding of the issue at stake.

Figure 11.1: Transition from primary to secondary school, Tanzania mainland



A second example also shows how disaggregation can help us understand how policies have different effects across sub-populations.

Figure 11.2: Access to safe water, Kenya



We can see that overall between 1994 and 2000 the government successfully increased access to safe water from 45% to 55% of the total population. However, this overall picture misses important differences that emerge only if we disaggregate these values for the rural and urban populations.

In 1994, access to safe water in urban areas was very high, at 93% – almost three times the access of higher rural areas, which stood at 32%. This discrepancy stimulated the government to focus on increasing access in the rural areas. By 2000, rural access had increased to 43%, but still much needed to be done. Urban access to safe water fell slightly to 90% of households during the same period. Disaggregation shows us that lack of access to safe water is for the most part a problem in rural Kenya, and, consequently, rural areas should be the focus of ongoing water-access policy. More data – demographic data, for example – would be needed in order to devise effective policy, but the simple rural-urban disaggregation goes a long way toward describing the nature of water-access issues.

A third example, in Figure 11.3, shows that disaggregation can still add relevant information even when we have data for only one point in time.

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Figure 11.3: Adult literacy rate, Uganda 2002/03⁷⁸

Female	Male	Rural	Urban	Total
59	80	65	87	69

In 2003, the adult literacy rate in Uganda stood at 69%. If we break this statistic down by sex, we can see that the rate among men was much higher. It was also higher among urban-dwellers than among those living in rural areas. This suggests that further investigation into the pattern of inequality would help to understand the nature of illiteracy in the country.

11.4 Does the average suggest the right policies?

Consider the following example. The data refer to a set of results from the 8th-grade mathematics examination from two regions of a given country. The numbers in Figure 11.4 show the average aggregate scores of students in the two regions:

Figure 11.4: Average aggregate scores

	Average aggregate
Region A	277
Region B	271

At a glance, the results show that overall children in Region A have an average score higher than children in Region B. Now, let us consider how the scores vary across areas.

Figure 11.5: Scores by areas

	Rural	Urban slum	Other urban
Region A	281	236	259
Region B	283	242	260

⁷⁸ Source: Uganda Bureau of Statistics (2003). 'National Household Survey 2002/03, Mid-term report.' Kampala

If we look at the average score across all areas, Region B records higher average scores throughout. This may appear to contradict the data in Figure 11.4.

Figure 11.6: Population share by areas

	Rural	Urban slum	Other urban
Region A	87%	5%	8%
Region B	66%	15%	19%

However, when we consider the distribution of the student population across regions and areas, as in Figure 11.6, it is clear that the distribution in the two regions is very different. This suggests why the national average shows that region A did better overall, but yet region B did better than region A in every area.

We can verify this apparent anomaly by examining how the average aggregate scores are computed. The score of each area is weighted by the share of the student population living in that area:

$$\begin{aligned}
 \text{Score region A} &= \text{Rural score} \times \% \text{ Rural Pop.} \\
 &\quad + \text{Urban slum score} \times \% \text{ Urban slum Pop.} \\
 &\quad + \text{Others score} \times \% \text{ Other Urban Pop.} \\
 &= 277
 \end{aligned}$$

The same procedure is applied for Region B. Basically, as rural students score significantly higher than those in urban slums and other urban areas, and as region A has significantly more students in rural areas than region B, region A's score, as a whole, is pushed upwards.

If policymakers had used the data in Figure 11.4 only, they may have decided to prioritize intervention within Region B. Backed by additional information, however, it is clear that, regardless of the geographical region, urban slums and other urban areas are the sub-populations that most need attention.

An additional example pertains to literacy in Kenya. The overall literacy rate was 73.4 – however, if we disaggregate this value by sex and age group, a more complex picture emerges.

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Figure 11.7: Literacy rate. Kenya, 1989

Age group	Female	Male
<i>10-14 years</i>	85.0	85.4
<i>15-19 years</i>	88.0	91.8
<i>20-24 years</i>	82.6	91.0
<i>25-29 years</i>	72.5	88.6
<i>30-34 years</i>	59.5	84.1
<i>35-39 years</i>	51.2	81.2
<i>40-44 years</i>	39.5	77.7
<i>45-49 years</i>	30.5	70.2
<i>50-54 years</i>	23.7	63.9
<i>55-59 years</i>	19.2	57.0
<i>60+ years</i>	11.2	39.2
<i>Not Stated</i>	32.7	54.7
Total	73.4	

With the exception of the youngest cohort, literacy declines as we move to older age groups. This reflects the general increase in literacy over the last 50 years. Besides that, men's literacy rate is higher than women's across all age groups. However, if we consider the magnitude of the gap across age groups, it appears that it had been decreasing over time.

11.5 Challenges to disaggregation

While disaggregation can provide relevant information about particular groups or areas, the process has some limitations that must be kept in mind.

Naturally, disaggregated datasets are smaller than the datasets from which they are extracted. Consequently, if we are dealing with a sample, the sampling error will inevitably be larger, and, as a consequence, it will be more difficult to assess differences and trends. All else being equal, an indicator calculated from a disaggregated sample that is a third the size of the original can be expected to have a confidence interval some 3.5 times as wide as that computed for the original sample.

Additionally, if the original sample is biased, sub-populations from the sample may be biased to a greater or lesser degree. Take as an example a sample survey where rural areas have lower coverage than urban areas. If a rural sub-population is extracted, data will be more biased than the whole population, and the opposite will be true if an urban sub-population is extracted.

Collecting data that allow for disaggregation will inevitably be more costly. If it is only a matter of collecting one or a few additional variables, the incremental cost will be very small. But it will be much more expensive if the sample size has to be increased significantly.

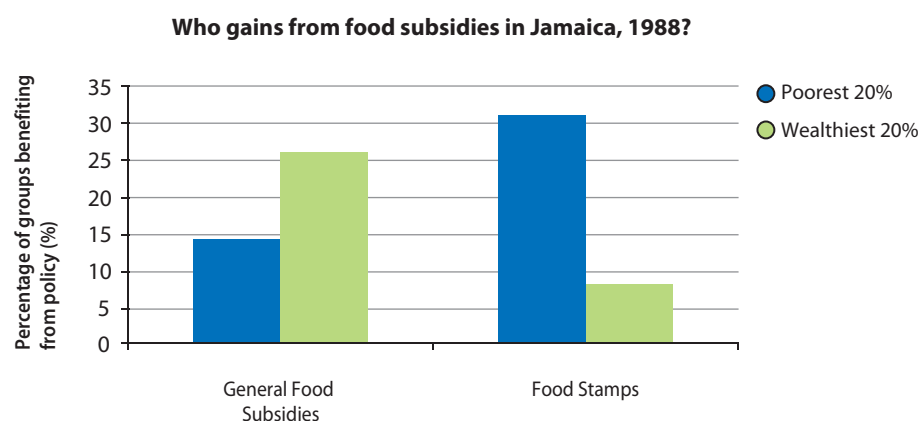
11.6 Which dimension is best to disaggregate?

There are no prescriptions as to which dimensions are more suitable for the disaggregation of indicators. Some of the most commonly applied dimensions are: poverty, sex, urban/rural, geographical and administrative areas, age, educational attainment, ethnic group, employment status, industrial sector and business size.⁷⁹

Poverty

Sub-populations are identified either by wealth quantiles (quintile or decile) or by socio-economic group. Wealth is usually measured by income or expenditure, while socio-economic groups can be defined by the employment status of the head of the household.

Figure 11.8: Wealth quintile disaggregation



⁷⁹ The technologies (e.g. GIS) to cheaply and easily identify and record the geographical location of every household and service provider (e.g. health facilities, schools) are available. Therefore, it is possible to disaggregate indicators down to the smallest geographical units, and plot them on maps. This is a very powerful way to identify the dispersion of the population and services provided across regions.

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For example, if we disaggregate data on the benefits of different food access policies in Jamaica by wealth quintiles, we can see that general food subsidies benefited the wealthiest quintile more, while food stamps were more effective in benefiting the poor. If indeed the government wishes to help the poor gain access to food, this type of analysis is essential.

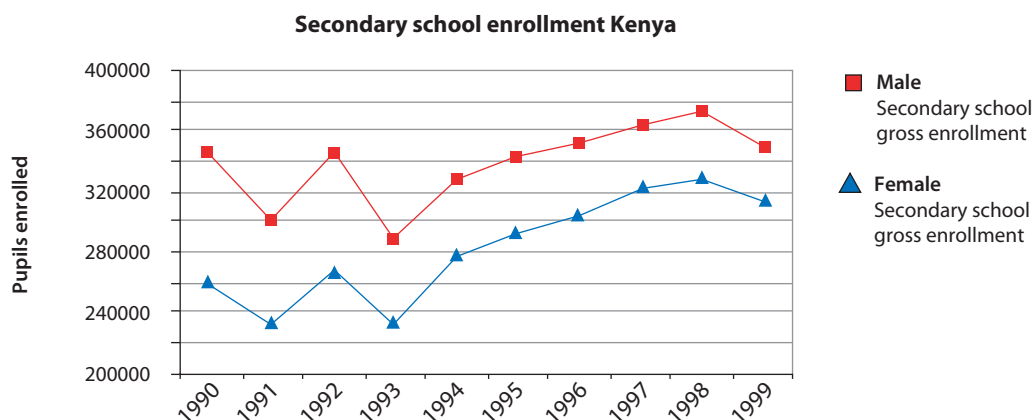
Urban/rural

The divide is large, in most developing countries, between rural and urban areas in terms of poverty, access to health and education, and several other dimensions of well-being. Therefore, it is always advisable to compute values for both urban and rural areas.

Sex

In order to disaggregate by sex, we simply have to extract two datasets, one for men and the other for women.

Figure 11.9: Sex disaggregation



For example, if we disaggregate Kenya secondary-school enrollment data by sex, it is evident that there has been a consistent and long-standing gap between boys and girls for which policymakers may wish to tailor specific initiatives. Let us look in greater detail at the relationship between monitoring and sex and gender issues.

Sex and gender issues

Over the last years, there have been increasing efforts to incorporate a gender perspective in all domains of policy-making.

Mainstreaming a gender perspective into statistics means that the different socio-economic realities faced by women and men are taken into consideration in the production and dissemination of statistics. This means that all data are collected, compiled and analyzed taking into account the way gender-based factors influence women and men's social conditions, relations, economic activity, and access to resources.

Sex is one of the more common personal characteristics by which data is disaggregated, but mainstreaming women's view into monitoring and policy requires a step beyond simple sex disaggregation. Sex refers only to fixed biological differences between men and women, whereas gender refers to socially-constructed differences between the sexes and to the relationship between women and men. These differences are shaped over time and vary across cultures.

Mainstreaming a gender perspective in statistics involves integrating gender issues and concerns into the overall production of all official statistics. These statistics are not necessarily, and not only, statistics disaggregated by sex. They not only provide a comparison between women and men, but also an analysis of women and men's participation in and contribution to all social and economic areas, as well as a measurement of the outcome of this participation.

Here are two examples:

Figure 11.10: Gender mainstreaming into statistics

ISSUE	CONVENTIONAL STATISTICS	GENDER ISSUES TO CONSIDER	GENDER MAINSTREAMING
Land holders by sex	Only land-holdings above a certain size are considered in the sample	Women more often than men hold plots of small size	All holding sizes are included in the sample
Economic activity by sex	No specific precautions are taken for the measurement of unpaid work	A number of productive activities carried out by women are unpaid	Questionnaires explicitly refer to specific unpaid activities such as threshing, food processing or poultry rearing, water carriage, fuel collection

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We can see that conventional statistics would not provide adequate information on the situation of women, whereas the second data set, by covering a fuller range of landholding status and economic activity, provides more helpful and comprehensive information on both sexes, and thus gives a better picture not only of the situation of women but indeed of the situation of the country or sub-national unit as a whole.

The following aspects should be taken into account in order to determine the most effective way to mainstream gender into monitoring:

- ▶ **Unit of analysis:** Ensure that the unit chosen to carry out the analysis adequately represents gender-based differences.
- ▶ **Target groups:** Consider how experiences of women and men may vary in different social or ethnic groups, geographical areas, etc.
- ▶ **Framework for analysis:** Consider and examine underlying causes and consequences, including those pertaining to areas different from the specific issues studied, as causes and consequences of gender differentials and inequality are all interrelated and pertain simultaneously to different spheres.
- ▶ **Information needed:** Identify all the necessary information needed to examine gender-based differences, including both statistical data and background information on existing gender issues and concerns, sex-based stereotypes and cultural norms and values.

11.7 Pockets

In demographic terms, 'pockets' are groups of people or households sharing a number of defined characteristics. Because of the plurality of identifying characteristics, it is not possible to identify these groups by a single dimension.

'Slum dwellers' is a frequently quoted example of a pocket, as it is a condition of living associated with several characteristics: poverty, poor health, low educational attainment and other disadvantages. UN-Habitat defines a slum-dwelling household as a group of individuals living under the same roof lacking one or more of the following conditions:⁸⁰

- Access to improved water
- Access to improved sanitation facilities

⁸⁰ UN-Habitat, (2003). 'Slums of the World: The face of urban poverty in the new millennium,' Nairobi.

- Sufficient living area, not overcrowded
- Structural quality/durability of dwellings
- Security of tenure

Specific ethnic groups or minorities are other examples of pockets. In some cases, pockets may be self-identified. In other cases, it is left to analysts to select a number of relevant variables to identify them. For example, we may wish to define 'rural disadvantaged' households using the following criteria: distance from the nearest clinic, distance from the nearest primary school, income quantile and employment status.

Pockets are important because they allow us to be attentive to people who share specific characteristics as a group. Their identification is the first step toward forming appropriate policy to meet their often-distinct needs.

exercises

Exercise 11.1: Disaggregation

Find in your country DevInfo dataset an indicator which has been recorded for two or more sub-populations on at least three time points. For example, you might have the Poverty head-count index disaggregated by urban and rural for 4 different years. You should use the metadata in your dataset to ensure that the indicators you select are comparable.

1. Use DevInfo to produce a table showcasing sub-population values by time.
2. Produce a graph which illustrates the values, by sub-population, over time.

What do these analyses tell you?

Exercise 11.2: Targeting

Use the information available in your DevInfo dataset to draw a detailed profile of poverty in your country.

1. Construct a brief summary of your country profile using available poverty data.
2. How has poverty data changed over time?
3. What can you say about the regional distribution of poverty in your country?
4. Are there differences across other sub-populations? If so, what are these differences? What explains the differences?
5. Are there any other quantitative or qualitative indicators that would help to explain the patterns you have observed?
6. How would you use this information:
 - a. To feed into national poverty reduction policies and programmes?
 - b. To target interventions towards specific sub-populations?

Exercise 11.3: Gender Mainstreaming

What are the gender implications of indicators 29, 30 and 31? The indicator numbering refers to the full list of indicators that you can find in Appendix 2.

The background features a collage of various statistical visualizations, including line graphs with data points, bar charts, and pie charts. The colors are muted and semi-transparent, creating a layered effect. Some visible numbers include 60, 55, 50, 45, 1985-90, and 1995. A red horizontal line is positioned above the text.

Effective communication of statistics

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12.1 What is covered in this chapter?

This chapter covers how producers and users of statistics can improve their ability to communicate about statistics. It is arranged in four distinct parts, each describing a different tool employed to report statistics: tables, diagrams, maps and text. The sections are not exhaustive. The aim is to provide the reader with an overall view of the best ways to present statistics.⁸¹

12.2 Some basic principles

Decisions as to which tool to use depend on the main objective and target audience of the presentation in which they appear. Each tool has its own specific goal, but its usage depends as well on the context within which it is presented. A given diagram may omit certain annotations, for instance, if it is coupled with a table that presents them more effectively. Consistency of style and logical flow of ideas are vital to a strong presentation. The goal of any presentation is to make the reader want to read and get the most out of it with minimal effort. To that end, it is essential that a presentation be informative, self-explanatory and pleasant in appearance.

12.3 Tables

There are two main types of tables: **reference tables** and **investigative tables**. Reference tables prioritize accuracy in order to allow users to make the best possible use of raw data. They generally appear in technical reports, and are usually made available in electronic format as well. A table containing the historical values of the variables used to compute the MDG indicators is an example.

In contrast, investigative tables tend to sacrifice accuracy to better reach non-technical audiences. Numbers are often rounded and supporting statistics, such as percentages or averages, may be added to help the reader find patterns in the data. Typically, investigative tables accompany descriptive presentations that target broad audiences.

Which type of table is best depends on the main goal of the presentation and what type of target audience it is intended for. Thus, newspaper articles may include investigative tables, while a technical presentation targeting statisticians would use reference tables instead.

⁸¹ This chapter draws significantly on the following works:

Chapman, M., Mahon, B. (1997). 'Plain figures.' HNSO, London.

Cleveland, W.S. (1985). 'The Elements of Graphing Data.' Wadsworth, Murray Hill.

Schid, C. F. (1983). 'Statistical Graphics.' John Wiley, New York.

Woodward, M., Report writing lecture notes. DFID, London.

Chapter 12

Designing a table

When we design a table, we define the layout of rows and columns, establish the content of the cells created by the intersection of rows and columns, and decide on annotations and labelling.

The title is the main reference for the table. It should be concise but, for the sake of interpretation and record-keeping, both informative and meaningful. The title should include a date, place or any other attribute that is common to all the entities in the table.

Rows need a heading that functions as a brief description of the variables that change value from row to row. The same should be done for the columns. A heading is also required for each individual row and column: these should describe the value, or level, held by the variable concerned in that specific row or column.

A unit of measure, such as mg/ml or US\$, should be given for every entry in the table, either in the title or in the heading. The precise use of units is essential for the correct interpretation of tables. Different units have different interpretations and while within the country of origin a convention is maintained, readers from elsewhere may employ different conventions. Each MDG indicator has a specific unit of measure, but often they are not well known—help readers by being explicit about the unit of measure applied.

Figures should be given only to the degree of accuracy that is appropriate for the goal of the presentation. When rounding the data, superfluous trailing zeros should be removed and the units of measure altered accordingly. Rounding can be done either:

- To a certain number of digits – e.g. to the nearest thousand, so 45,647 becomes 46,000; or to the second decimal place, so 45.647 becomes 45.65.
- To a certain number of significant, non-zero, digits – e.g. to the 2nd significant digit, so 343,833 becomes 340,000 and 4,564 becomes 4,600.

In some cases, we may want to write 46,000 as 46 and note the recording convention (*'numbers in thousands' or '000'*) in the title or the appropriate row or column heading.

Footnotes provide important information for understanding tables. Common types of footnoted information include: conventions used (e.g. *"The seasonally adjusted figures do not always add to the calendar year total, which is the sum of unadjusted quarterly figures"*); if necessary, any further explanation of terms used in the table;

amplification of row or column headings or the title, if too cumbersome to print in full in the main body of the table (e.g. *ICD = International Classification of Diseases*); any change in coverage, definition or conventions used elsewhere in the table (e.g. *"Figures for 2004 include still births, previously omitted from the statistics"*); differences in status of some entries in the table (e.g. *"Figures for 2003 onwards are provisional"*); source of the data, which enables interested readers to pursue extra information and estimate the quality of the data; and any other exception/deviation from the stated norm.

The layout is another important feature of any table. One popular style is the two-way layout.

Figure 12.1: Template for a two-way layout

Geographical and time coverage, (units)

FACTOR "A"	FACTOR "B"			TOTAL
	Category B1	Category B2	Category etc.	
Category A1				
Category A2				
Category ect.				
TOTAL				

Source

Footnotes

In this case, data refer to a single variable. Factor A and B are subgroups. Factor A might include a list of countries, for example, or regions within one country, and factor B might refer to age-groups. For example, the variable considered could be girl-to-boy school-attendance ratios. In this case, each cell would contain a value of the ratio for a specific age group in a specific country or region. Another example is shown below.

Figure 12.2: Two-ways layout: an example

Literacy among 15 - 24 year-olds: by region and sex
Country "X", 2004 (%)

REGION	SEX		
	MALE	FEMALE	TOTAL
ALPHA			
BETA			
GAMMA			
TOTAL			

Source: National Household Survey, Country "X", 2004

We refer to the year 2004 in this example. If we want to consider the data from more than one year in the same table, one way to do so would be to adjust the layout so the table would read, for instance, "Country 'X', 2000-2004"; the column heading would read "Year" and each column would correspond to a specific year; within each year there would be two sub-columns, females and males; while the rows would be unchanged.

The ordering of rows and columns is critical for clarity. As a general rule, rows and columns should be arranged following a natural or logical order, ranked by alphabetical order, geographical location, or magnitude. Alphabetical and geographical ordering are both useful for reference, whereas ordering by magnitude makes the ranking of the different entities immediately obvious.

Different font styles, such as **bold** or *italic*, may be used to highlight specific items of a table that require special attention. Also, numbers are easier to compare when the table has a vertical orientation. The eye can make comparisons more easily when reading down the page than across.⁸²

The example shown in Figure 12.3 has a number of problems – let's take a closer look. First, it is difficult to scan across rows to compare minimum, median and maximum values of the variables. Second, it is hard to decide how to align the numbers in the columns – shall we right-justify or centre them? Third, the column ordering is not straightforward. Fourth, the row heading could be improved – it is barely legible. Fifth, units of measure are not stated. Sixth, the cited source is incomplete and incorrect.

⁸² Sometimes vertical orientation may be impossible to achieve because of limitations due to the size of the page. Occasionally, such limitations can be overcome by turning the page to the side in 'landscape' format.

Figure 12.3: Natural ordering (1) (Minimum, Median and Maximum Values for Selected variables in a developed country, 1970)

VARIABLE	MINIMUM	MEDIAN	MAXIMUM
GROSS NATIONAL PRODUCT PER PERSON (US\$)	1949	4236	6652
POPULATION PER KM ²	1.6	77.2	324.2
CIGARETTE CONSUMPTION PER PERSON PER YEAR	630	2440	3810
INFANT MORTALITY PER 1000 BIRTHS	11.0	18.2	29.6

Source: A.L. Cochrane, A.S. St. Leger and F. Moore, Journal of Epidemiology and Community Health, 1978

Now, let us consider Table 12.4. By switching rows and columns, we fixed the first two problems. We re-ordered the columns, now rows, following a more logical order. We renamed the column headings and used the footnotes to amplify them. We quoted the correct source.

Figure 12.4: Natural ordering (2) (Minimum, Median and Maximum Values for Selected Variables in a developed country, 1970)

	AV. GROSS NATIONAL PRODUCT ¹	POPULATION DENSITY ²	AV. CIGARETTE CONSUMPTION ³	INFANT MORTALITY RATE ⁴
Maximum	6652	324.2	3810	29.6
Median	4236	77.2	2440	18.2
Minimum	1949	1.6	630	11.0

Source: Woodward M. Epidemiology: Study Design and Data Analysis. 2nd ed. Chapman and Hall/CRC, 2005.
1. per person; 2. per Km²; 3. per person per year; 4. per 1000 births.

Tables should have a consistent appearance throughout the report. For example, conventions for labelling and ordering rows and columns should be kept unchanged if possible. This will make the presentation easier to follow, facilitate comparison across tables and reduce the chances of misinterpretation. A common mistake is to mix up the rows and columns' labelling across tables within a report. For instance, if a table in the report uses the variable 'sex' to label rows and 'age group' to label columns, similar tables that follow should maintain that convention. Otherwise, readers may be misled.

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Tables should be properly numbered for ease of reference. In long reports, the best way is to use a two-part number linked to the chapter numbering – for example, ‘Table 12.2’ would be the second table in chapter 12. Using three levels, as in ‘Table 10.5.3’, may work when a section has a large number of tables.

Unnecessary distractions from the narrative should be avoided. Any large set of tables that should logically appear together should be placed in the appendices, as should any important table that does not follow the text.

Frequently the first draft of any report contains many more tables than the final version. Revision will usually result in some tables being combined. For example, a table that originally separated data for men and women may merge the two. Such amendments are perfectly acceptable provided that no important features are hidden. Some tables will be removed altogether, because the information they contain is not relevant to the report or because, for small tables, the results can be included in the written text. It may also be that in the final version of a report, tables from the first draft are replaced by diagrams, or that reference tables are converted into investigative tables.

12.4 Diagrams

Although tables are the most complete way to present numerical data, diagrams are easier to understand and more useful in describing the story behind large datasets. Diagrams are very useful for showing and comparing trends.⁸³ Also, they are usually more attractive than tables, and therefore more effective for dissemination purposes. On the other hand, diagrams are not suitable for communicating exact levels and may be time-consuming and expensive to design.

Diagrams should have a title; axis labels, including the units of measures; tick marks on axes; and, when appropriate, labels for some tick marks and subgroups. A reference to the source of data should be provided. Ordering is important for some kinds of diagrams. The bars in a bar chart may be arranged according to their size, for instance.

Comparing Diagrams

Now let us compare two different diagrams. The source is the same but the issues covered are different.⁸⁴

⁸³ When the orders of magnitude are different, however, it is not possible to show and compare trends of related variables in the same graph.

⁸⁴ WHO Regional Office for Africa (2003). ‘HIV/AIDS Epidemiological Surveillance Update for the WHO African Region’, 2002. Harare.

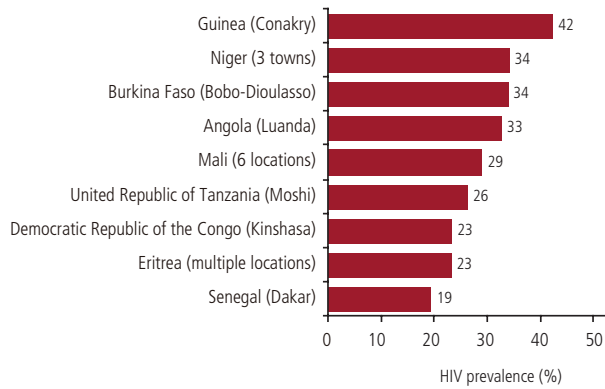
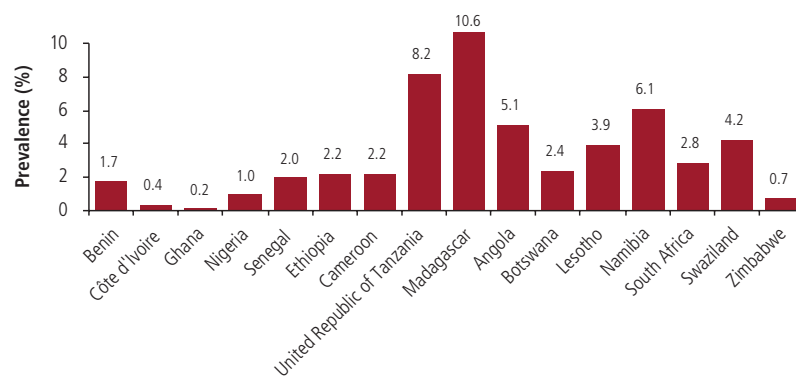
Figure 12.5: Comparing Diagrams (1)**HIV prevalence among female sex workers in selected countries, 2001-2002**

Figure 12.5 is very easy to read, and its message is clear.

This second graph, Figure 12.6, could be improved if the bars could be ordered in some way, either by size or alphabetically.

Figure 12.6: Comparing Diagrams (2)**Prevalence of syphilis among women attending antenatal care clinics at selected sites, by country, 2000-2002**

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The typology of diagrams is very wide, and some specific training can help clarify distinctions. Let us consider an example from Uganda.

Figure 12.7: Emergencies in Uganda*, 1998-2000

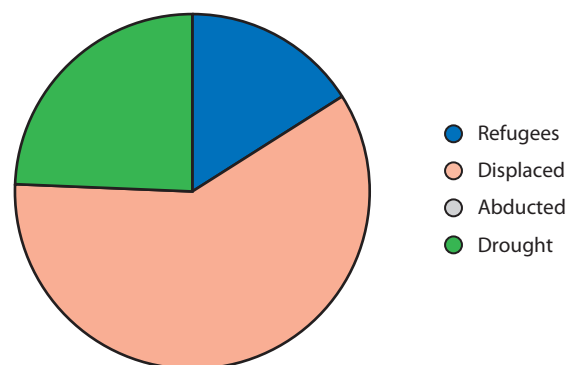
	NOV 1998	SEP 1999	MAY 2000	SEP 2000	NOV 2000
Refugees	183,695	196,251	201,427	202,000	213,872
Displaced	469,525	529,215	736,004	639,760	610,240
Abducted	0	4,804	4,804	5,044	6,063
Drought	0	0	300,200	190,000	190,000
Total	653,220	730,270	1,242,435	1,036,804	1,020,175

* Refers to the number of people displaced, seeking refuge, abducted or affected by drought.
 Source: Ministry of Finance, Planning and Economic Development (2002). Ugandan Poverty Status Report, 2001, Kampala

Figure 12.7 shows the number of people affected by four types of emergency between November 1998 and November 2000. Trends are visible; however, it is difficult to single them out. A diagram would be helpful. Let us use this example to learn about several types of diagrams.

Figure 12.8: Pie chart

Emergencies - Uganda (May 2000)

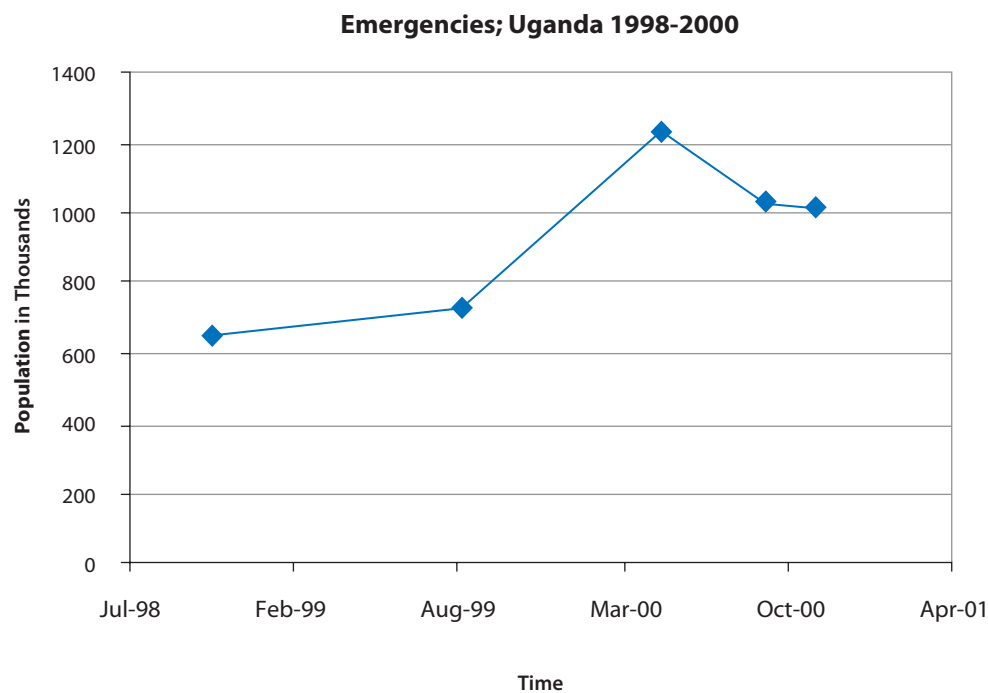


A pie chart is a very simple but powerful graphical representation of events. The area of each slice is proportional to the relative frequency of the event the slice refers to. But pie charts lack accuracy. This shortcoming emerges in particular when the events considered have somewhat similar frequencies or one or more events have a very low frequency – in our example, this is the case for ‘abduction’. To show changes over time, we need multiple pie charts, where each pie shows the frequency distribution of the events at one point in time. If we want to show the change in the population size from one point in time to the next, we have to adjust the diameters of the pies accordingly. We will return to this later.

Sometimes, to improve its accuracy, it might be useful to insert on the slices or just beyond the edges the appropriate and most relevant values, such as percentages. Annotations can add great value, however it is important to be aware that including many annotations may overload the diagram and limit its effectiveness.

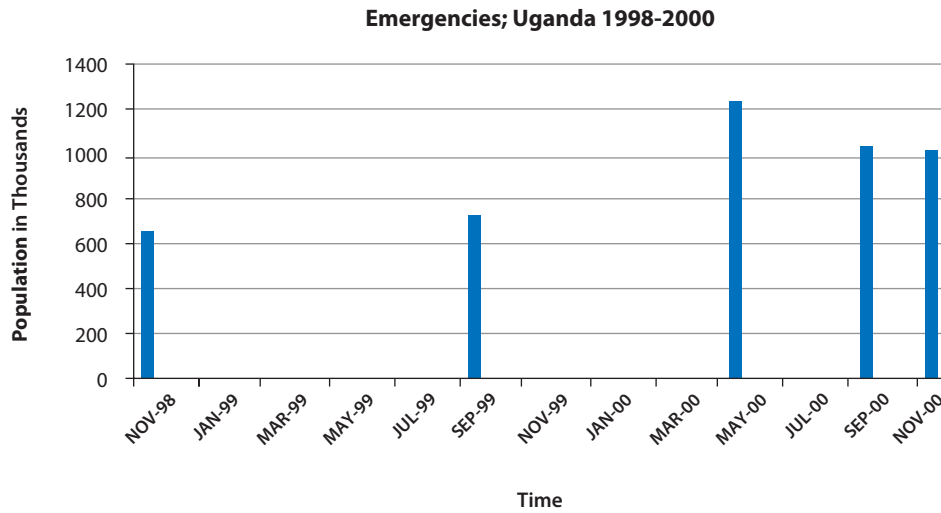
A line graph is the simplest way to show a time series, and the same graph can host multiple lines, one for each variable or sub-population. The horizontal grid-lines help to identify the y-values. We could have vertical grid lines too, although they may clutter the display. Adding data values in the display is generally not advisable unless it is important to show precise values that are not quoted in the accompanying text.

Figure 12.9: Line graph



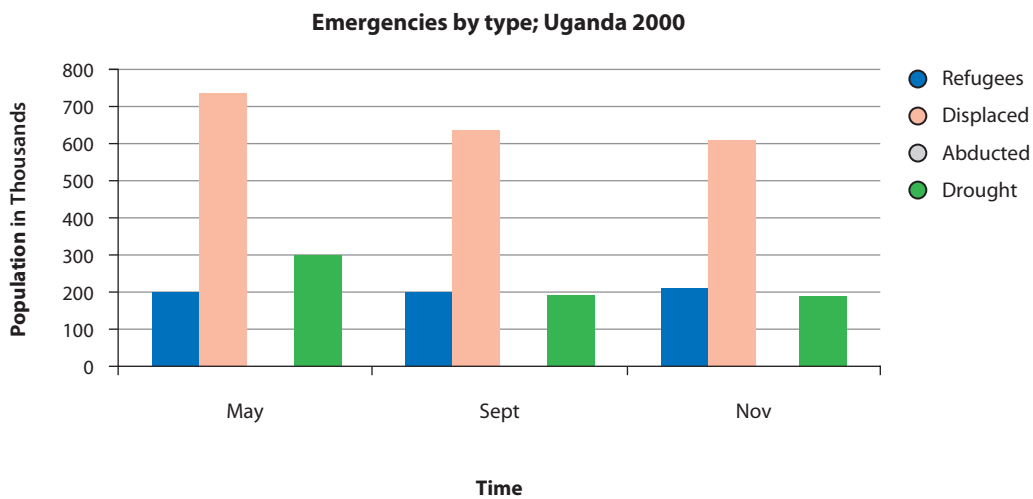
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Figure 12.10: Bar chart



Bar charts are simple to draw and interpret – the height of each bar is proportional to the magnitude of the related event. Except in histograms, the width of the bars is kept fixed. On the x-axis, the distance between each bar is proportional to the actual time difference between data points. This feature is important as it allows for a better interpretation of the pace of changes over time.

Figure 12.11: Grouped bar chart



A limit of the bar chart in Figure 12.10 is that only one event can be displayed at a given point in time. This can be avoided by using a grouped bar chart. For simplicity, in this case, only three points in time are shown and the total number of emergencies has been omitted. From the chart we can see clearly the variation of each type of emergency. The exception is “abduction,” which tells us that the scale applied is not appropriate. Also, the scale limits the overall level of accuracy and the accurate time representation of the previous diagram has not been maintained. Finally, this type of diagram, when the number of bars in each group rises, does not show changes over many time periods.

The chart in Figure 12.12 is useful for displaying changes in totals and the distribution of each component. But it has some limitations. In particular, except for the ‘lowest’ (the component at the bottom of the bar, refugees in this example), it does not show neatly the absolute level for each component. Note also that the time scale is incorrect.

Figure 12.12: Component bar chart

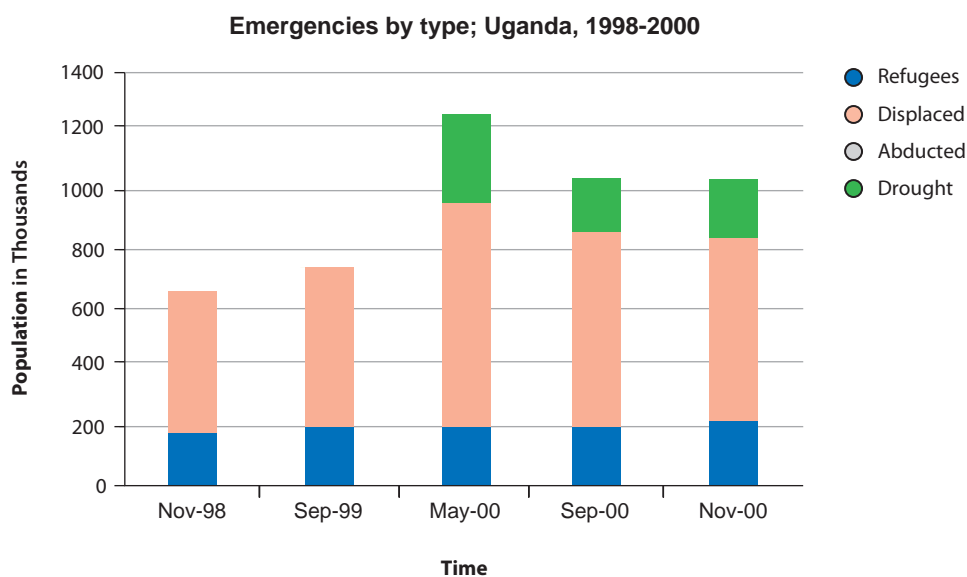


Figure 12.13 shows a percentage component bar chart. Note the y-axis scale – instead of absolute values, percentages are indicated. This element makes this type of chart ideal for showing the variation of contribution, in relative terms, of each component to the total, and how this has changed over time. Of course, this graph cannot provide information about the variation, in absolute terms, of the total population and its sub-components. Note that the time scale is correct.

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Figure 12.13: Percentage component bar chart

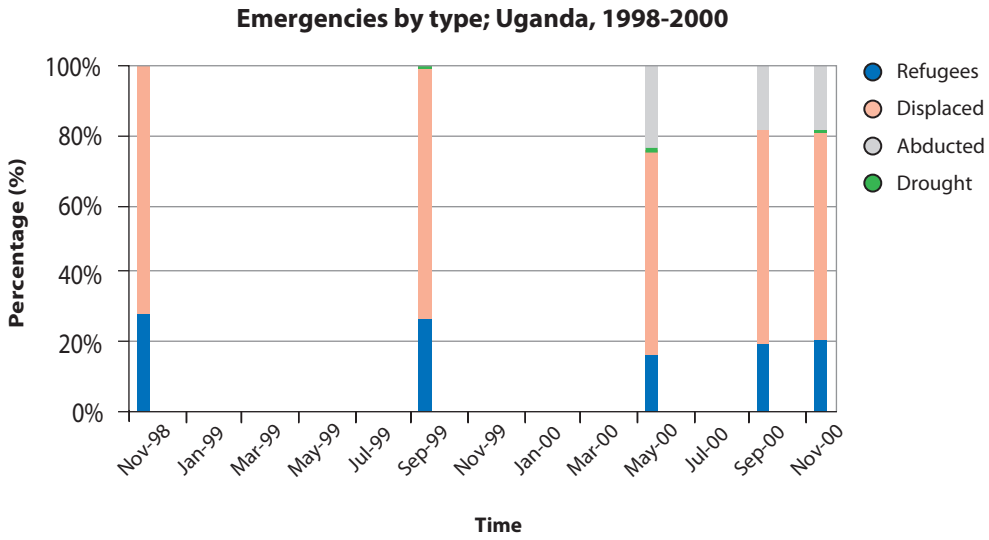
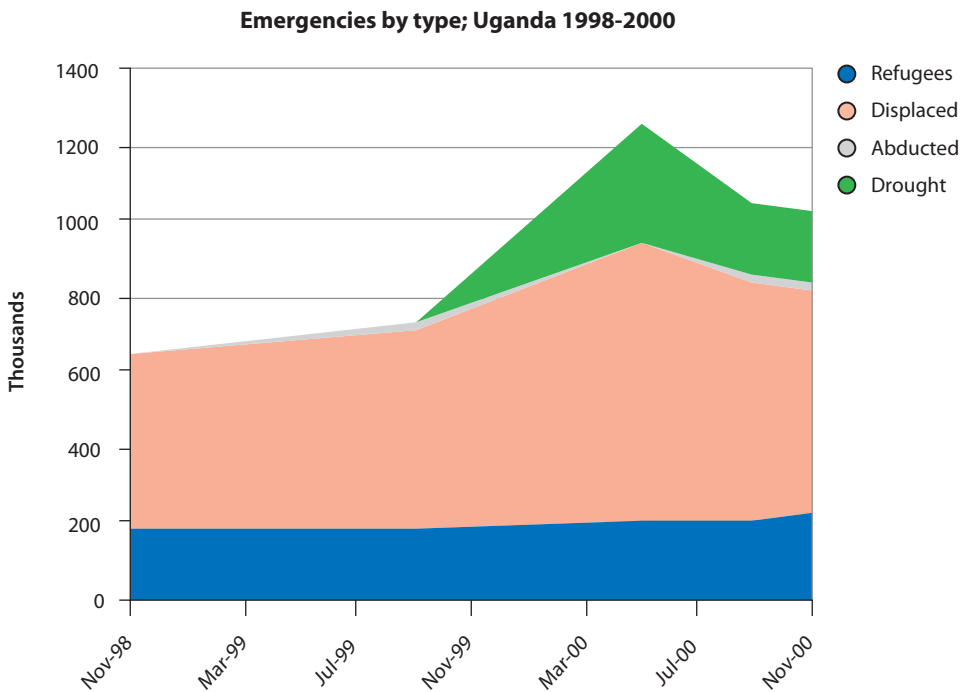


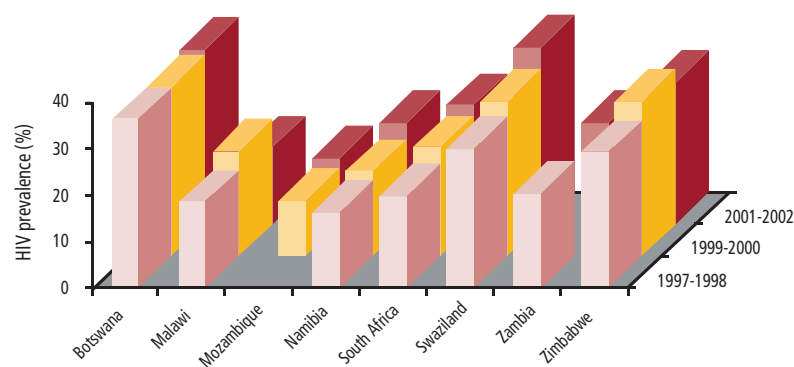
Figure 12.14: Layer graph



This Figure 12.14 is an alternative to the component bar chart, and it shares some of its advantages and disadvantages, but some differences should be highlighted. The time scale would always be drawn correctly, assuming a linear and steady change between points in time. Besides that, note the y-axis scale – it provides information about the variation, in absolute terms, of the total population and its sub-components.

Figure 12.15: 3-D bar chart⁸⁵

Trends in median HIV prevalence among women attending antenatal care clinics in southern Africa, data from the same clinics, by country, 1997-2002



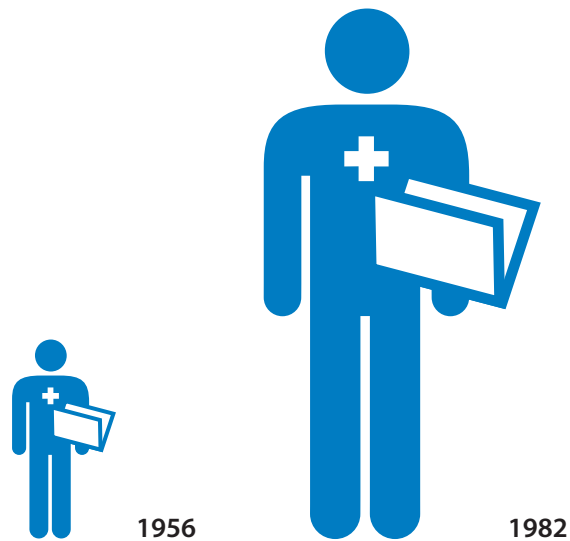
The 3D bar chart shown in Figure 12.15 can be very useful for showing how two factors interact over time. However, it can become overly complex and difficult to interpret, in particular when not well designed. In our example, the design and clarity would be improved if we were to swap the time-axis with the country-axis and re-order the countries based on the size of the bars for the year 2001-02.

Figure 12.16 presents the number of nurses employed in an unspecified country at two points in time. The sizes of the two figures reflects the relationship between the magnitudes of the two variables. In 1982, there were three times as many nurses as in 1956. This type of graph is easy to interpret, but it doesn't help us appreciate small differences.

⁸⁵ WHO Regional Office for Africa (2003).

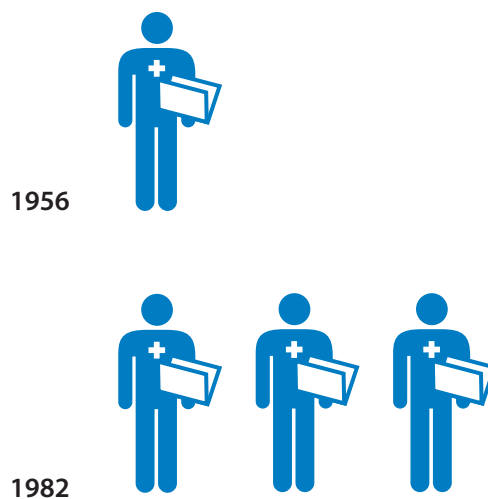
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Figure 12.16: Size-proportional pictogram



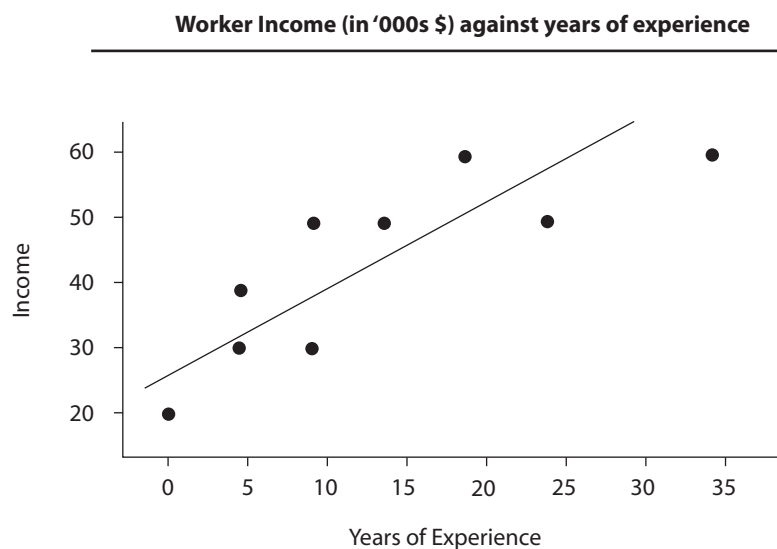
Compared to the pictogram above, figure 12.17 makes it easier to get an idea of the relationship between variables. Even so, pictograms should be used sparingly. They may be acceptable for enlivening a report for a non-numerate audience, but they lack scientific credibility and statistical accuracy.

Figure 12.17: Size-constant pictogram



A scatter plot is very useful for showing the relationship between two variables. This example shows that as a worker's experience increases, so does income. The optional fitted line can help us estimate the magnitude of the relationship between the two variables.

Figure 12.18: Scatter-plot (with a fitted line)



12.5 Maps

A map is an abstract, simplified representation, drawn to scale, which highlights relationships between objects within the drawn space. Usually they are two-dimensional representations. They typically emphasize, generalize, or omit certain features from the display to meet specific design objectives by using signs, symbols, colour and many other graphical conventions.

Maps are an excellent medium for displaying the distribution of data across geographical areas. Many software packages, including DevInfo, have automatic plotting procedures and extensive map portfolios from which to select.⁸⁶ Here are some examples.⁸⁷

⁸⁶ e.g. DevInfo

⁸⁷ Source: WHO Regional Office for Africa (2003).

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Figure 12.19 is a standard geographical map showing spatial relationships but not statistics. The map identifies, according to WHO standards, the African region and the location of prenatal clinic sentinel sites. Using colour, the map also shows which countries have been included in specific surveys. Note the scale at the bottom.

Figure 12.19: Map 1

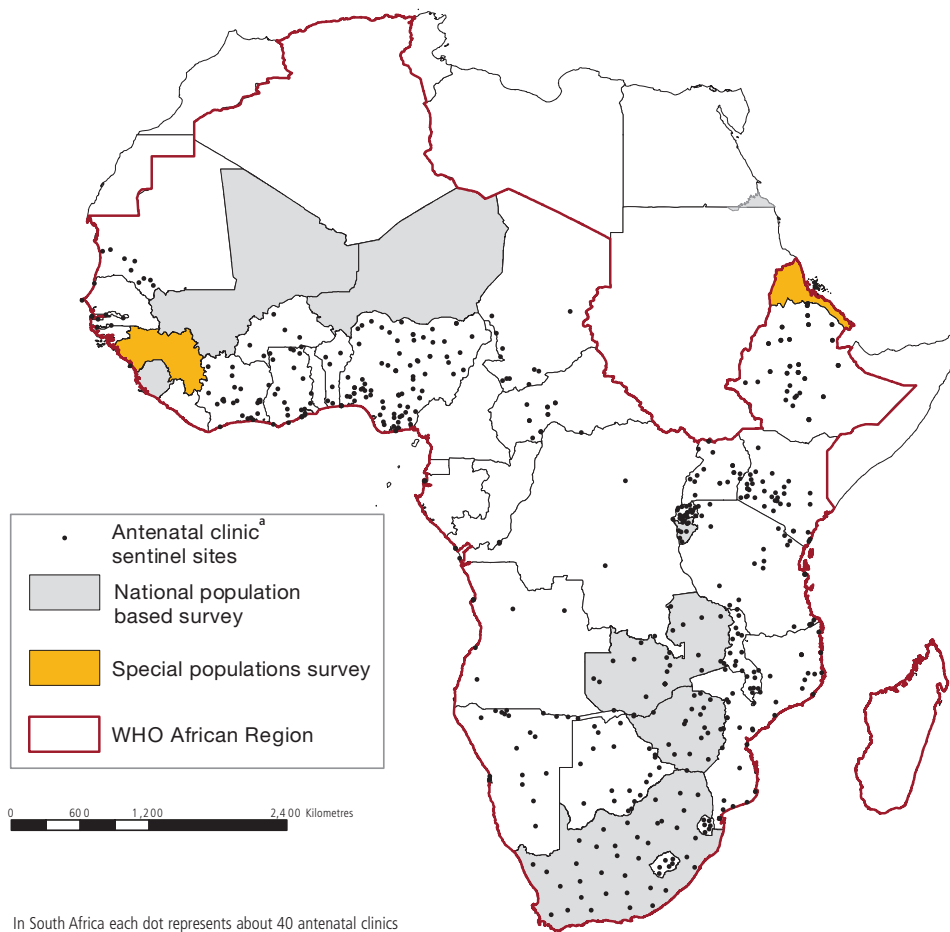
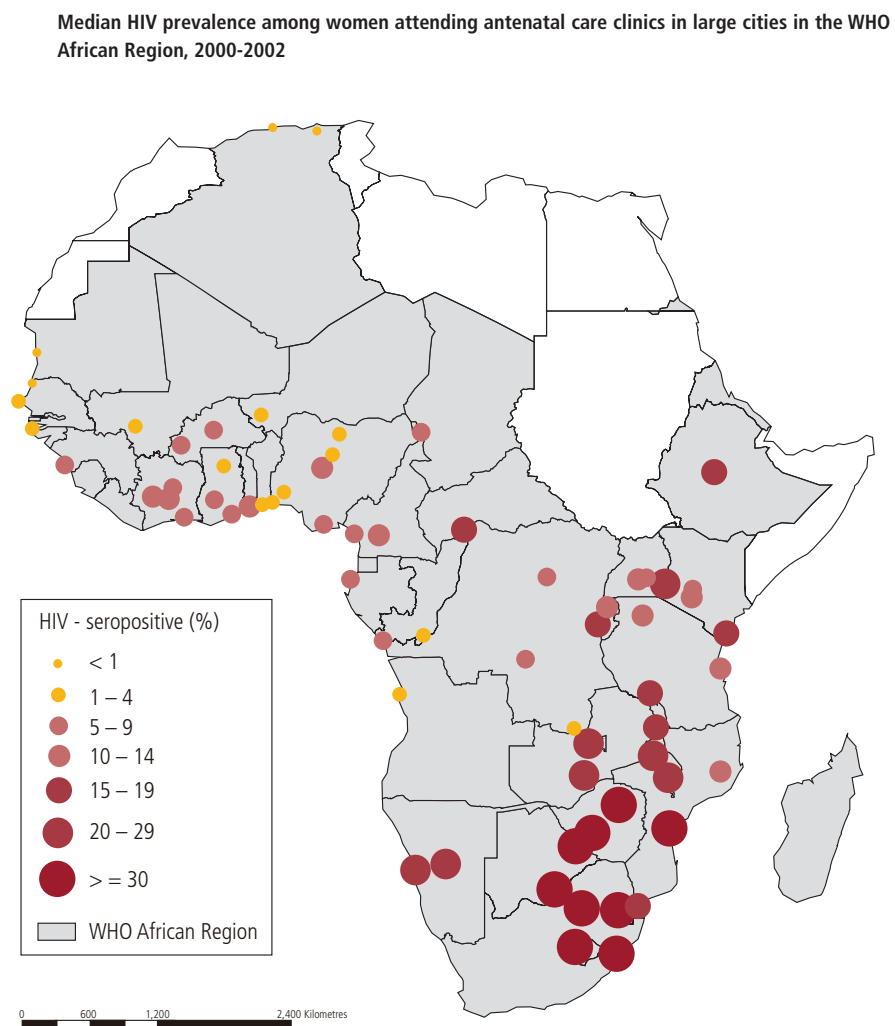


Figure 12.20 depicts the magnitude of HIV prevalence in the African region. Statistics are presented using circles of different colour and size, where the size is scaled to the relative magnitude of the phenomenon. Colours are used to make it easy to identify the smallest circles.

Figure 12.20: Map 2



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Figure 12.21 represents the distribution of the HIV-1 subtype in the WHO African Region by sub-regions. In this case, pie charts rather than circles are used to convey the statistical information. Pie charts have two important features. The diameter reflects the magnitude of the overall phenomenon - in our example, the number of HIV-1 infected people in each region. The area, or arc, of each slice of the pie is proportional to the relative frequency of each sub-component, in this case the HIV-1 subtypes, of the main phenomenon under investigation. Together, with the assistance of the legend, these two features provide us with relevant information.

Figure 12.21: Map 3

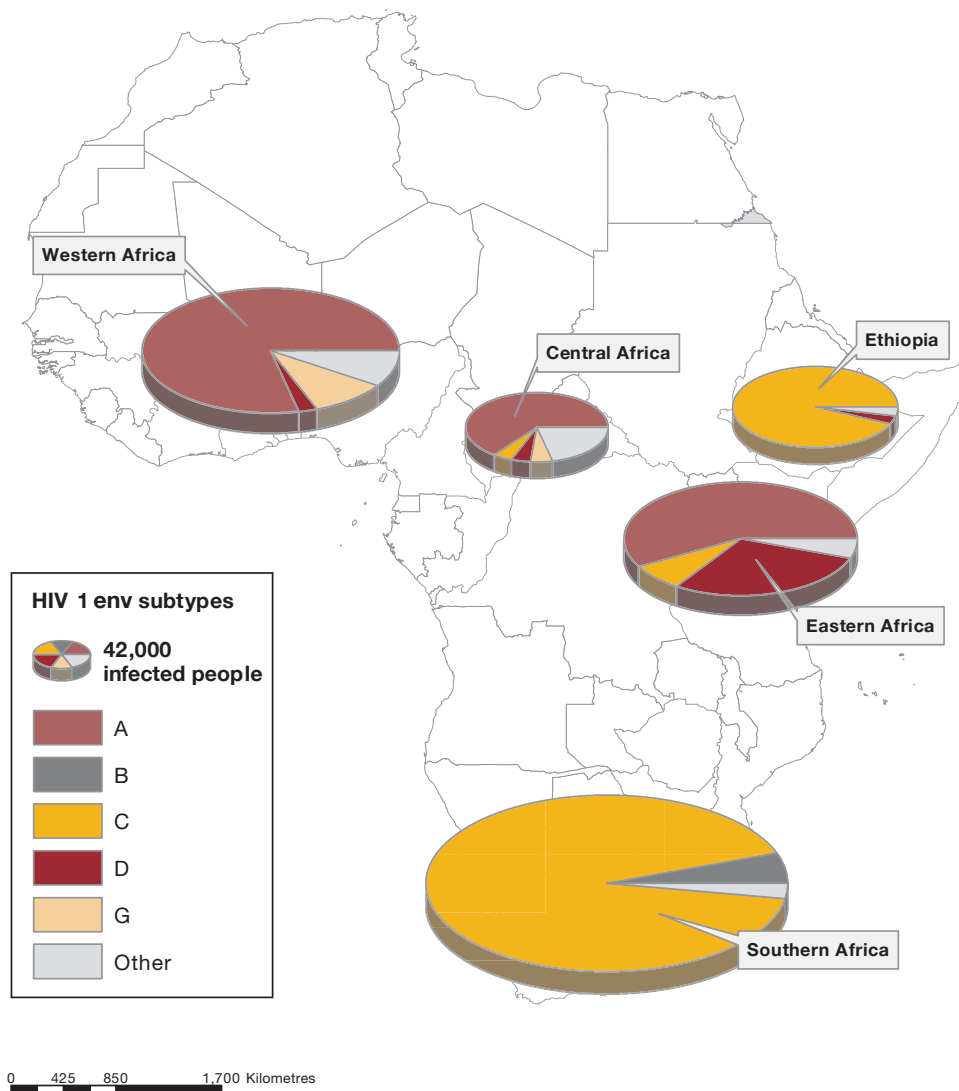
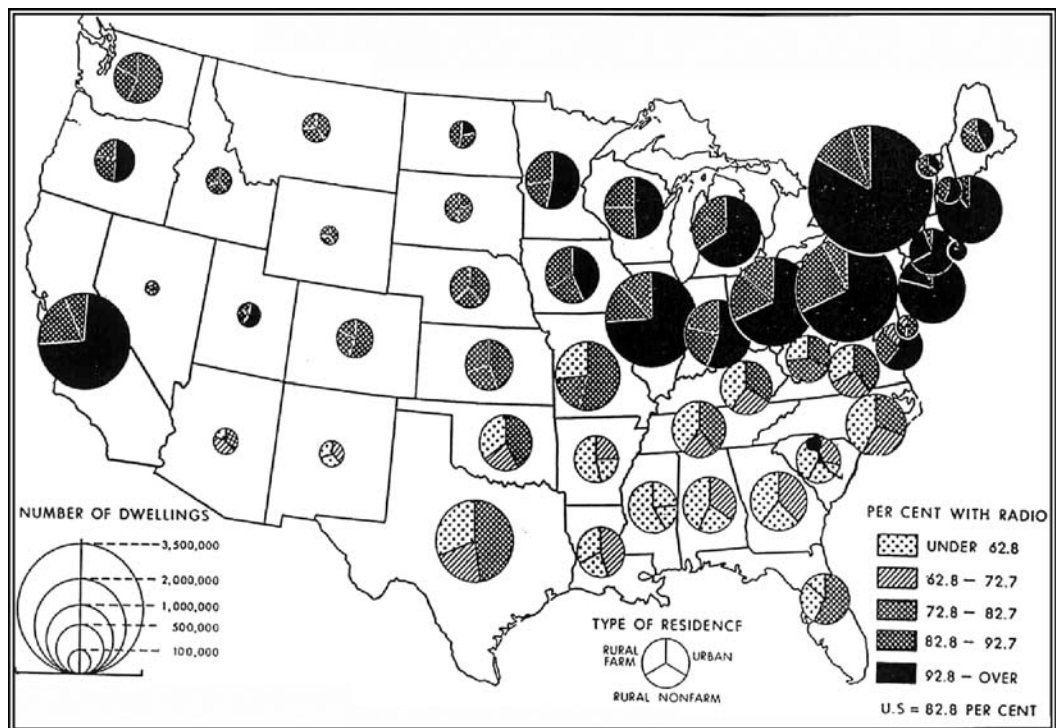


Figure 12.22 shows a map-graph combination that provides a significant amount of information. Besides showing standard geographical relationships, the graph shows the number of dwellings in each state (pie charts); the size, both absolute and relative, of each sub-population (slices within pie charts); and, for each sub-population, the percentage that has a radio (shaded area in pie chart). The graph achieves this by adjusting the diameter of the pies, the angle and size of the slices, and the shading of each slice. However, it takes a bit of time to get the full picture, and may be too complex for some users not familiar with this type of presentation.

Figure 12.22: Map 4



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Which chart for which comparison?

The following table describes the relationship between users' needs and chart typology. Designed for the sake of synthesis, the table has some obvious limits. Nevertheless, it provides some useful general guidelines – in practice, charts should be selected on a case-by-case basis.

Type of comparison	Chart
1. Components as part of a whole	Pie chart, Component bar chart
2. Differences in composition of a whole	Component bar chart, Layer graph, Multiple pie charts
3. Sizes of related measurements	Grouped bar chart
4. Changes over time in one or more related measurements	Line graph, Vertical bar chart, Pictograms
5. Change in ranked order of a set of measurements	Grouped bar chart
6. Relationship between two sets of measurements	Scatter diagram

12.6 Text

The final part of this chapter considers how statistics should be expressed in writing. It goes without saying that the prose plays a crucial role in almost every kind of presentation. Many people prefer plain language to tables and diagrams, or need clear explanations to take them through.

When drafting a text, three basic rules should always be kept in mind. First, try to capture the reader's interest throughout. While staying within the confines of the scientific approach, writers should strive to enliven the text. Second, good writing is hard work and requires a considerable amount of time. This should be taken into account when planning for writing. Drafting and re-drafting is almost always necessary. Third, often sections of a single piece are written separately, so a final check throughout to ensure consistency is advisable. In particular, keep an eye on conventions and try to avoid unnecessary repetition.

Some general guidelines to keep in mind when writing:

- ▶ **Avoid long sentences.** Short, sharp sentences are more effective;
- ▶ **Paragraph breaks** provide the reader with a short rest, and are necessary to maintain the reader's alertness. On the other hand, having too many short paragraphs may ruin the flow of the text and make it unattractive;
- ▶ **Commas** provide pauses within a sentence, but, if over-used, may be confusing or bothersome;
- ▶ **Minimize the use of brackets.** When several pairs of brackets are used in the same sentence or section, the reader may be confused and lose track of the central theme;
- ▶ **Avoid repeating** the same wording in close proximity. It looks careless and may be distracting. To avoid this problem, try to use words with equivalent meanings;
- ▶ **Avoid unnecessary words and phrases.** These give the reader extra work and may deviate the reader from the central theme;
- ▶ **Keep things simple.** The reader would likely be more informed and impressed by clear language than by words that he may not understand;
- ▶ **Be logical.** Ensure that conclusions reflect the body of the text and the structure is sequential. This reduces the chances of reader confusion;
- ▶ **Ensure that articles are clear.** Whenever words such as 'it' or 'that' are used, we have to be sure that the reader has no doubt about what these pronouns refer to;
- ▶ **Adopt conventions and keep them throughout.** Conventions can include headings and numbering, use of abbreviations and acronyms or other matters of style such as the use of digits and written numbers.⁸⁸ If necessary, these should be spelled out by the writer or writing team. If conventions are maintained throughout, a report will be clearer and better received.

⁸⁸ For instance, a writing team can agree that numbers below 11 and all rounded multiples of ten below one hundred should be written as words, while all others numbers should be expressed in numerical notation.

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Verbal summaries

One important function of text is to provide verbal summaries of tables or diagrams – escorting users, in particular those who have difficulties with other types of presentations, through numerical or graphical presentations.

A summary should not dwell on other issues, or repeat what is in a table or diagram. It should simply accompany them and explain what the data reveal. Sometimes a verbal summary is all that is included in a presentation, particularly when the findings are so simple that any other summarized display is not justified, or also when numerical or graphical presentations are so complex that it is better to include them in the appendices. Following are some basic rules:

- ▶ **Keep the summary short.** Never allow the verbal summary to expand into an itemized account of each entry in the table or diagram. Link the summary closely to the table or diagram to which it refers. Quoting reference numbering directly is the best way. For instance:

“From Figure 9.4 we can see that 29 percent of households had access to improved water in 1993.”

- ▶ **Use ‘emotional’ wording sparingly and only with the right audience.** It can be effective with a non-technical audience, but it can impart a biased message or induce biased interpretations.

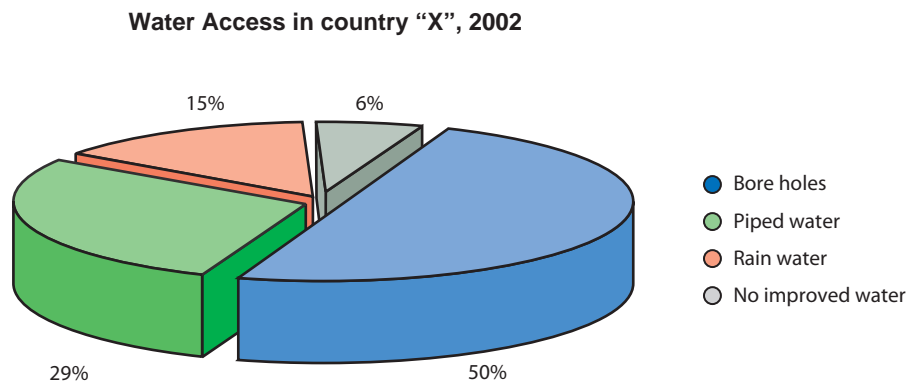
“GDP rose by 7 percent” may be better than “GDP shot up by 10 percent”

- ▶ **Unless you are specifically writing for expert readers, avoid using unnecessary technical terms.**
- ▶ **Be cautious in ascribing causation.** For example, movement in a data series may be attributed to changes in definitions rather than variation in the underlying event.

Now, we consider some examples of verbal summaries. Each example includes a diagram and a verbal summary. In each case the verbal summary is quite complete, though rarely, in a real presentation, are both diagrams and the complete verbal summaries included.

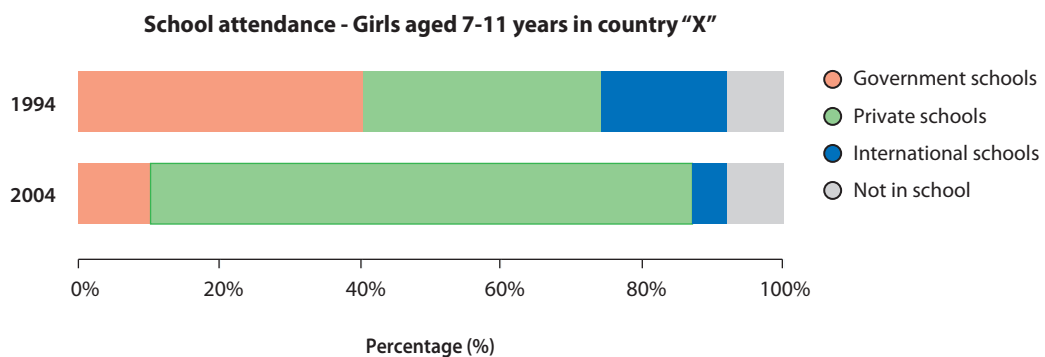
In 2002, 50 percent of rural households had access to boreholes or wells and 29 percent had access to piped water. Fifteen percent of rural households were able to collect rainwater; the remaining 6 percent had no provision of improved water.

Figure 12.23: Components of the whole



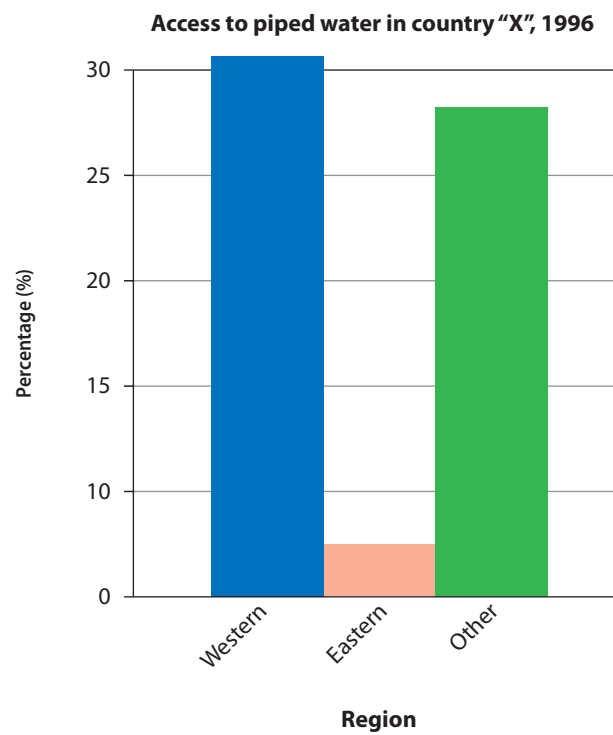
In 1994, almost 40 percent of girls aged 7-11 attended government schools, 34 percent private schools and 18 percent international schools. About 8 percent did not attend any type of school. By 2004, the pattern had changed noticeably. About 77 percent of girls aged 7-11 attended private schools, 10 percent government schools and only 5 percent international schools. Still unchanged, about 8 percent did not attend any type of school.

Figure 12.24: Change in the composition of a whole



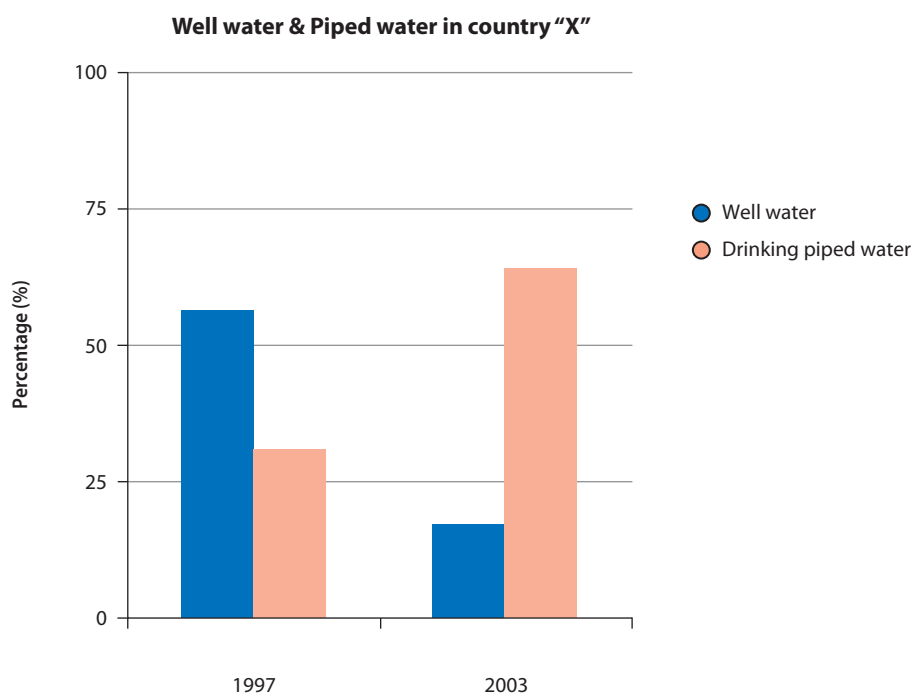
In 1996, piped water was accessed by over 30 percent of those surveyed living in the Western region of country "X". By contrast, the figure falls to only 5 percent in the Eastern region while, in all other regions, approximately 28 percent of people had access to piped water.

Figure 12.25: Comparative sizes of related measurements



In country "X", between 1997 and 2003, the percentage of people with access to well water declined from 56 percent to 17 percent. Over the same period, the percentage with access to drinking piped water roughly doubled, from 31 percent in 1997 to 64 percent in 2003.

Figure 12.26: Change in the ranked order of related measurements



exercise

Exercise 12.1: Communicating with Figures

1. From your DevInfo data set or any MDG Report, select data on population size by:

- sex
- age group
- urban/rural
- total

And create tables of :

- total population over time
- age group by sex
- population over time and urban/rural

2. Produce a graph showing change in population over time separately by urban and rural.

3. Produce a map of your country's regions showing differences in infant mortality (or another indicator, if data on IMR are not given by region).

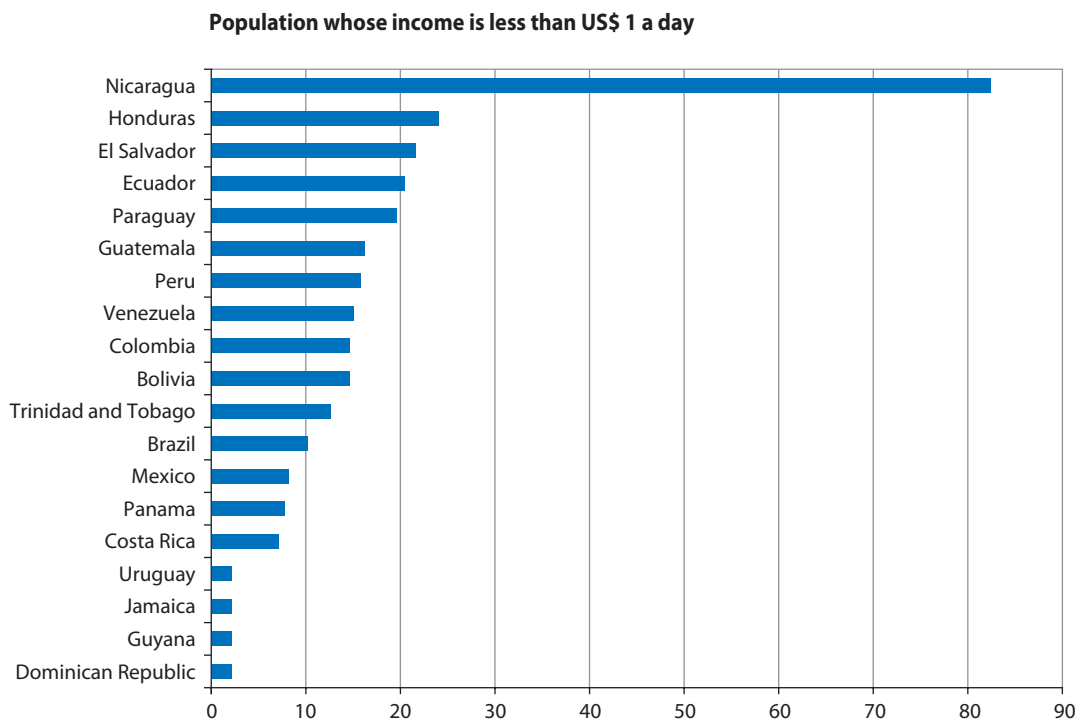
4. Produce a composite index of water and sanitation for each year for which you have data in your DevInfo dataset. If you do not have data for this target, choose another target (such as immunization) and produce a composite index relating to this. Use weights that you feel reflect the relative importance of the component indicators.

12.2: Reading diagrams and tables

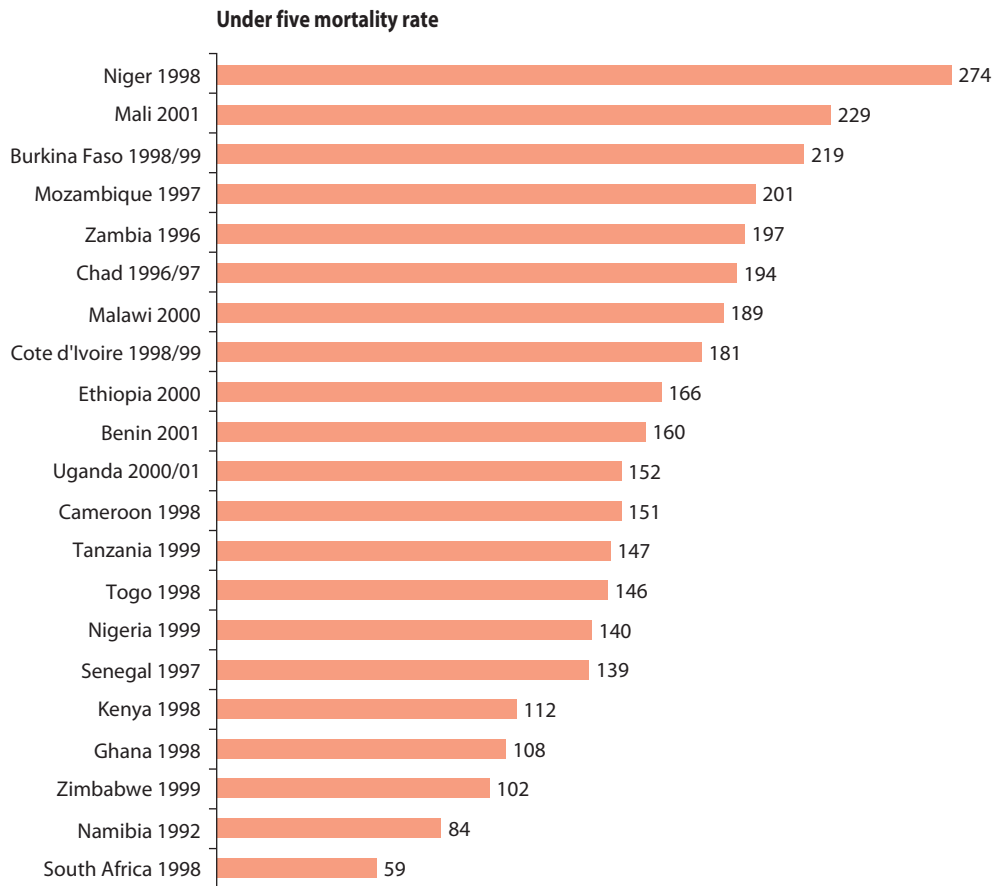
The following diagrams and tables are all taken from presentations made by members of international organisations during the “Millennium Development Training Workshop” in New York, 12-16 July 2004.

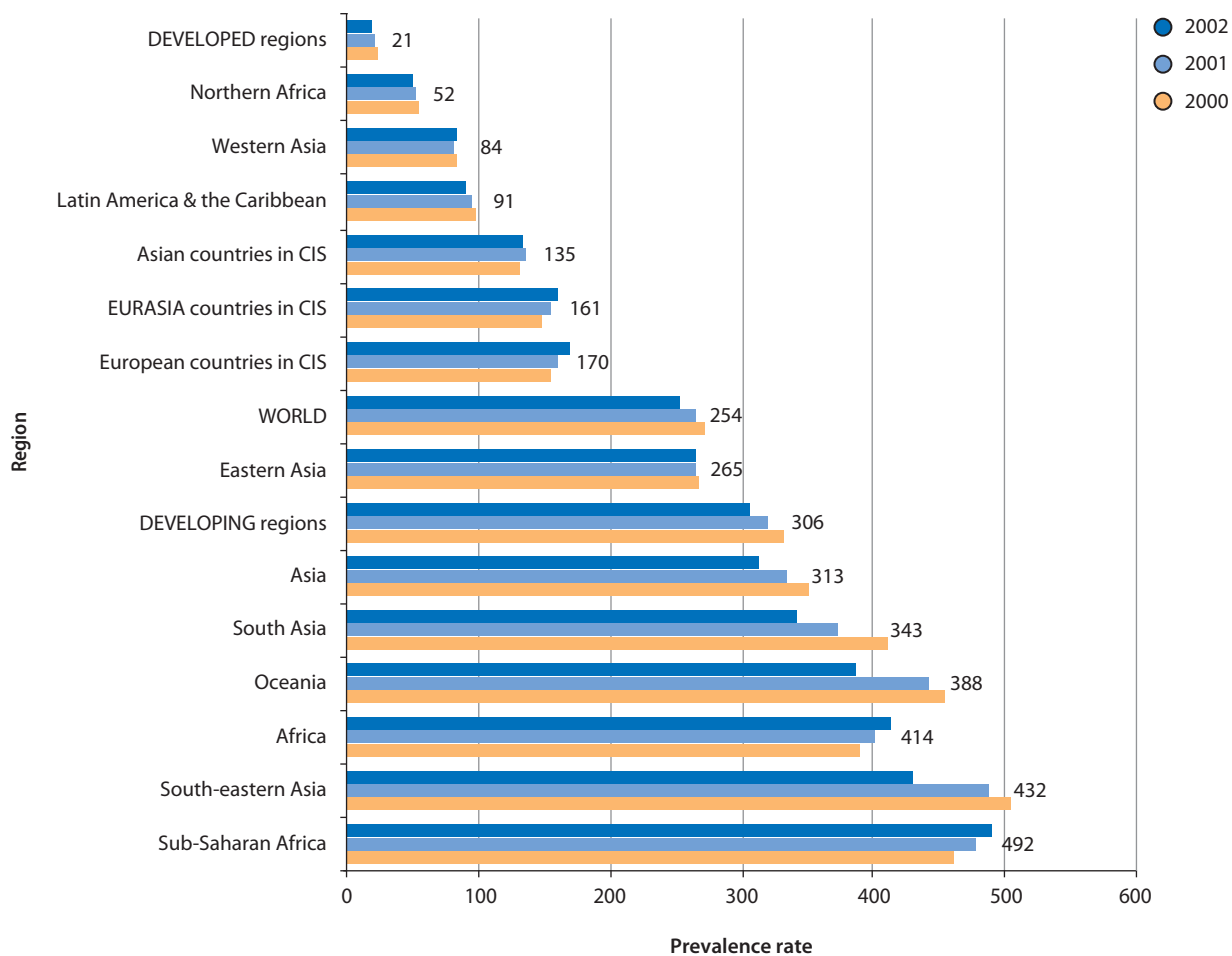
For each of the diagrams in turn,

1. Write down one or two major messages that the diagram conveys to you.
2. Make brief notes about the good and bad points of the diagram, assuming it were designed for use in a written report.



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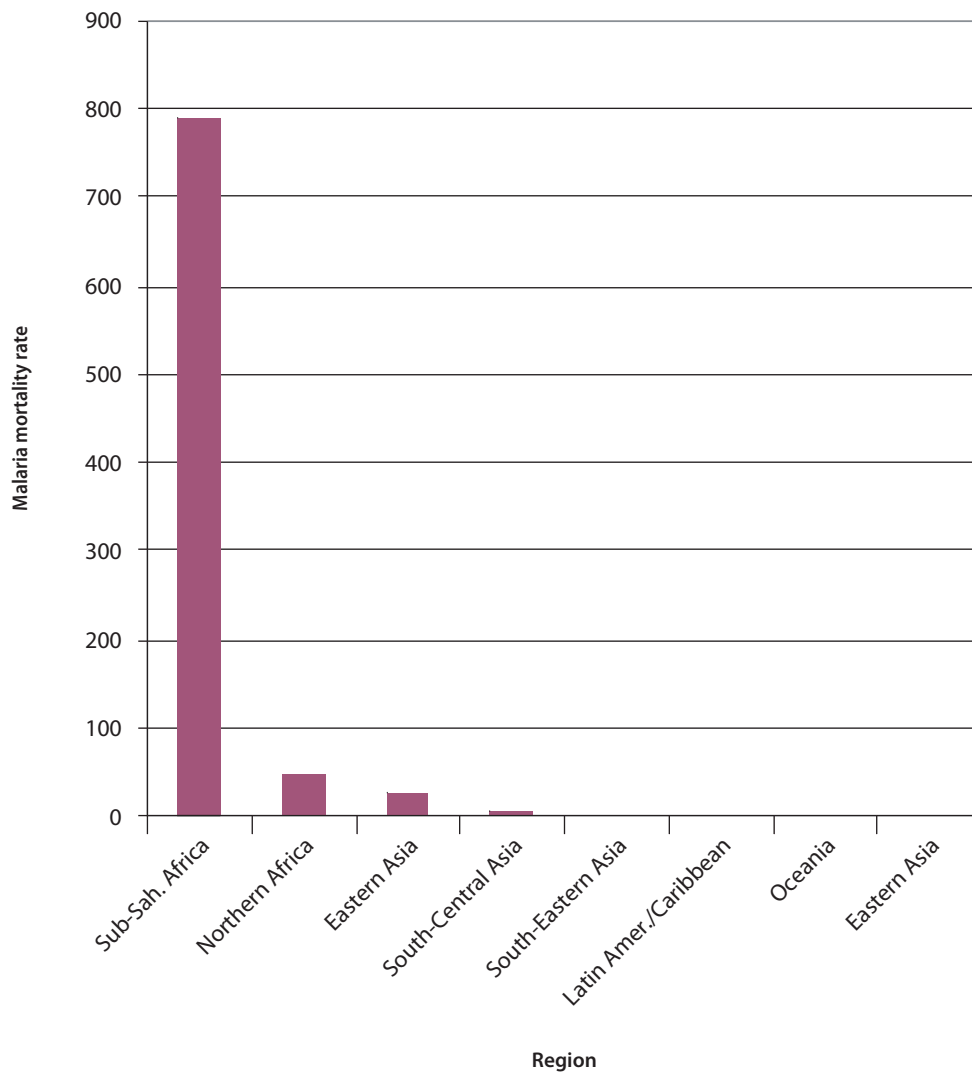


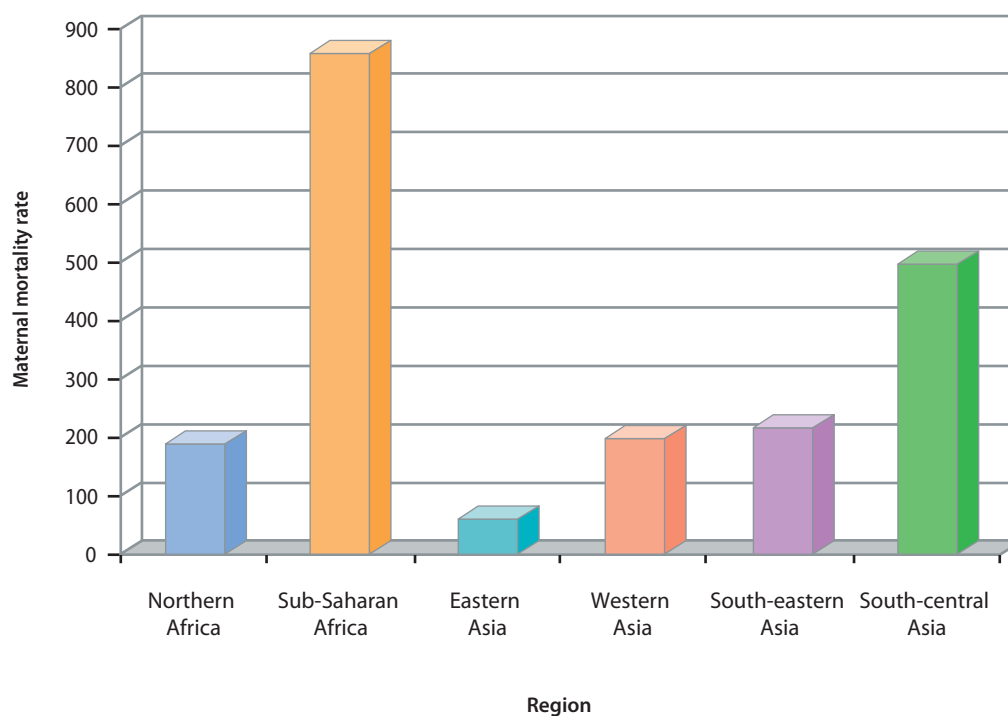
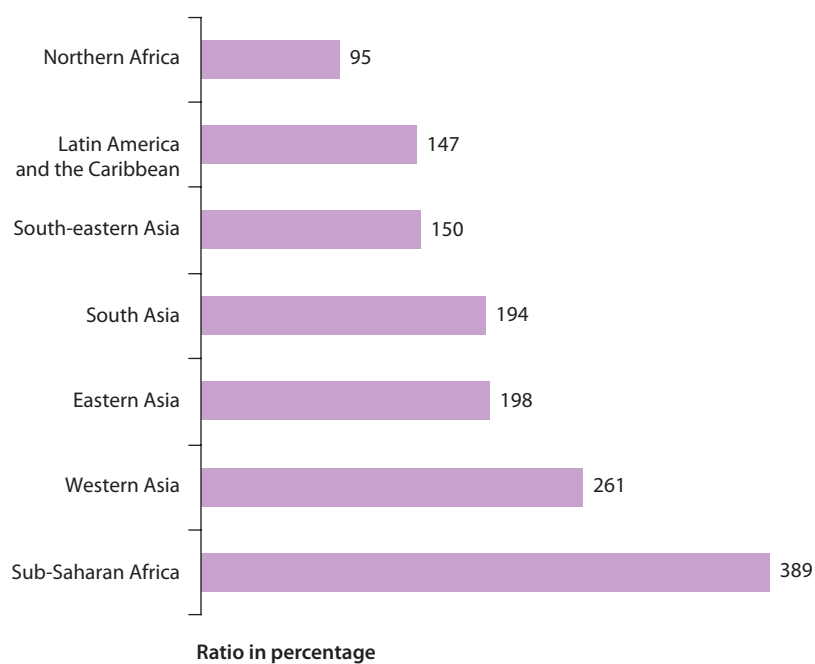
Prevalence of tuberculosis per 100,000 population in 2000 - 2002

Source: Millennium Indicators Database, UNSD, 2004

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Malaria mortality in under fives by MDG region per 100,000

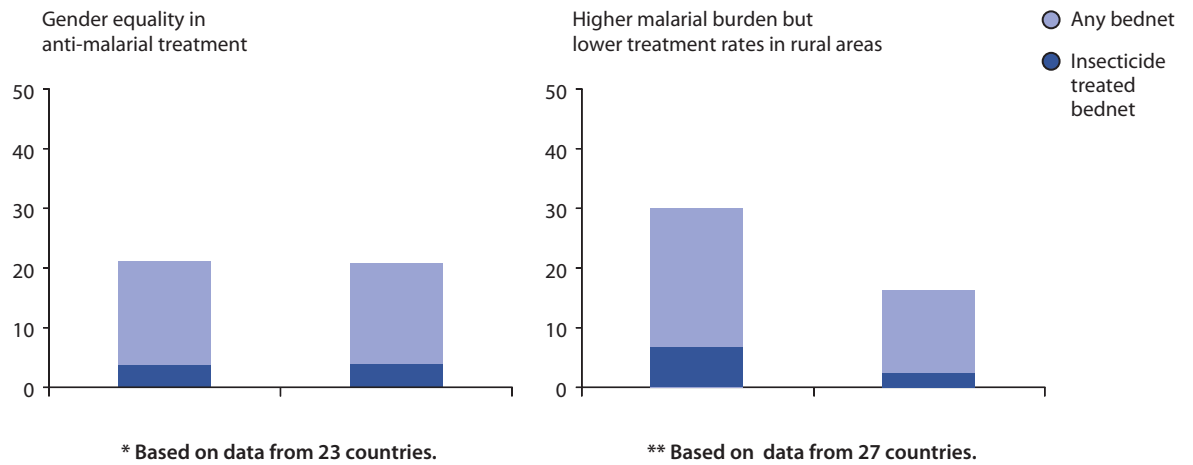


Interregional variations in Maternal deaths per 100,000 live births in 2000**Ratio of slum population (2020 forecast, 1990)**
(no intervention)

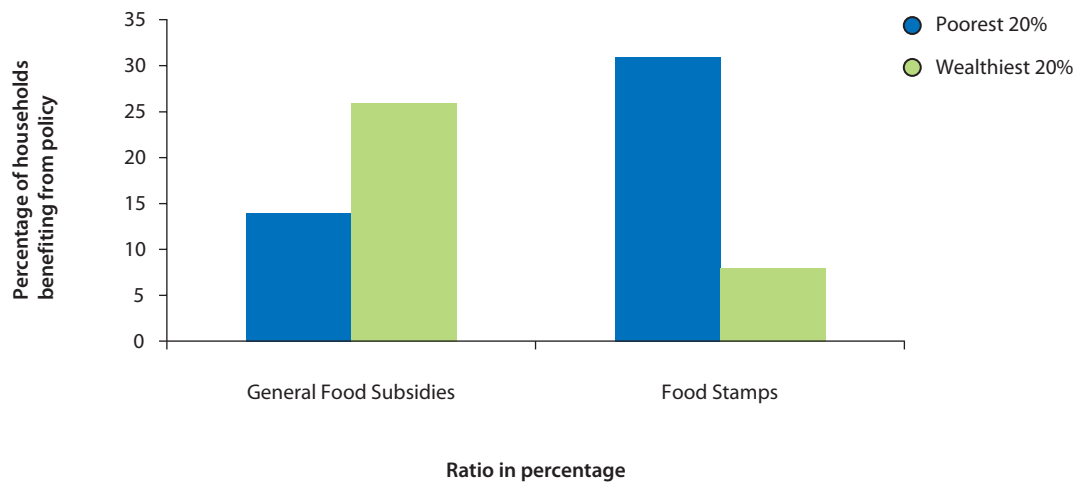
Source: UN - HABITAT

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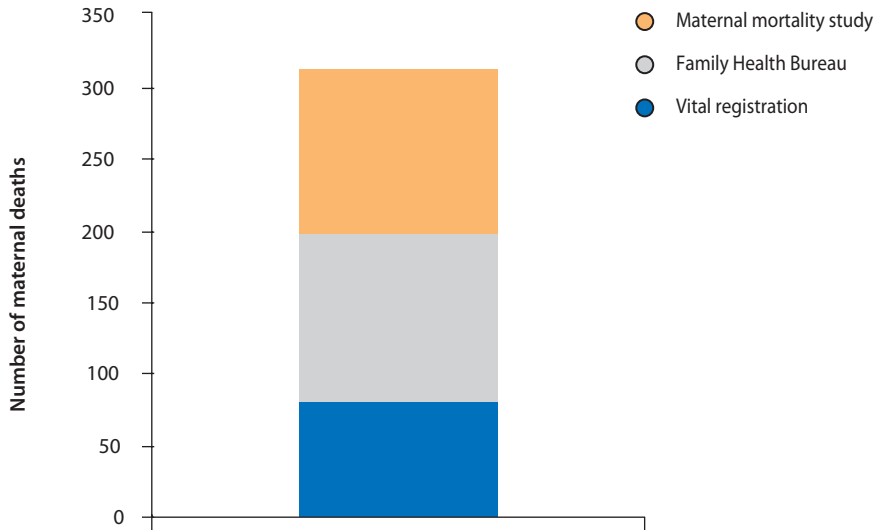
Bednet coverage of under-fives by gender* and urban-rural, Sub-Saharan Africa**



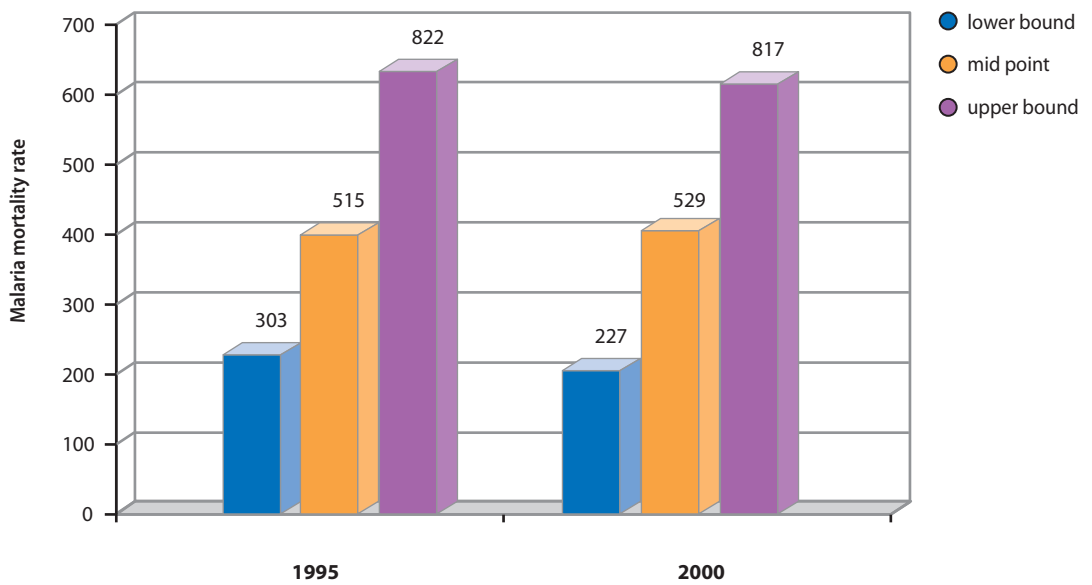
Who gains from food subsidies in Jamaica, 1988?



Underreporting and misclassification in data from vital registration



Why maternal mortality estimates cannot be used to monitor trends



Maternal Mortality Ratio by countries

Country	Year*	Reported maternal mortality ratio (maternal deaths per 100,000 live births)	Adjustment factor**	Adjusted maternal mortality ratio (maternal deaths per 100,000 live births)
Argentina	2000	43	1.9	82
Australia	2000	5	1.5	8
Austria	2000	3	1.5	4
Bahrain	2000	19	1.5	28
Barbados	2000	64	1.5	95
Belarus	2000	23	1.5	35
Belgium	2000	7	1.5	10
Bosnia and Herzegovina	2000	21	1.5	31
Bulgaria	2000	21	1.5	32
Canada	2000	4	1.5	6
Chile	2000	21	1.5	31
Costa Rica	2000	36	1.2	43
Croatia	2000	5	1.5	8
Cyprus	2000	31	1.5	47
Czech Republic	2000	6	1.5	9
Denmark	2000	3	1.5	5
Estonia	2000	42	1.5	63
Finland	2000	6	1.03	6
France	2000	8	2.0	17
Germany	2000	5	1.5	8
Greece	2000	6	1.5	9
Hungary	2000	11	1.5	16
Iceland	2000	0	1.5	0
Ireland	2000	4	1.5	5
Israel	2000	11	1.5	17
Italy	2000	4	1.5	5
Japan	2000	7	1.5	10
Kuwait	2000	3	1.5	5
Latvia	2000	28	1.5	42
Lithuania	2000	9	1.5	13
Luxembourg	2000	18	1.5	28
Macedonia, the former Yugoslav Republic	2000	15	1.5	23
Malta	2000	14	1.5	21
Mauritius	2000	16	1.5	24
Mexico	2000	60	1.4	83
Moldova, Republic of	2000	24	1.5	36
Mongolia	2000	75	1.5	110
Netherlands	2000	11	1.4	16
New Zealand	2000	7	1.0	7
Norway	2000	11	1.5	16
Panama	2000	108	1.5	160
Poland	2000	9	1.5	13

Country	Year*	Reported maternal mortality ratio (maternal deaths per 100,000 live births)	Adjustment factor**	Adjusted maternal mortality ratio (maternal deaths per 100,000 live births)
<i>Portugal</i>	2000	4	1.5	5
<i>Puerto Rico</i>	1999	16	1.5	25
<i>Qatar</i>	2000	5	1.5	7
<i>Romania</i>	2000	33	1.5	49
<i>Russian Federation</i>	2000	45	1.5	67
<i>Serbia and Montenegro</i>	2000	7	1.5	11
<i>Singapore</i>	2000	20	1.5	30
<i>Slovakia</i>	2000	2	1.5	3
<i>Slovenia</i>	2000	12	1.5	17
<i>Spain</i>	2000	3	1.5	4
<i>Sweden</i>	2000	1	1.5	2
<i>Switzerland</i>	2000	4	1.5	7
<i>Trinidad and Tobago</i>	2000	103	1.5	160
<i>Ukraine</i>	2000	23	1.5	35
<i>United Kingdom</i>	2000	7	1.7	13
<i>United States of America</i>	2000	11	1.5	17
<i>Uruguay</i>	2000	18	1.5	27
<i>Venezuela</i>	2000	64	1.5	96

Median HIV prevalence^a among women attending antenatal care clinics, by location of clinics and age, 2000-2002

	Year	All locations				Capital city		Other urban locations		Rural locations			
		N	HIV prevalence (%)		N	HIV prevalence (%)		N	HIV prevalence (%)		N	HIV prevalence (%)	
			Age (years)			Age (years)			Age (years)			Age (years)	
			15-49	15-24		15-49	15-24		15-49	15-24		15-49	15-24
Southern Africa													
Angola	2002	10	2.4	—	5	3.2	—	—	—	—	—	—	
Botswana	2002	22	35.4	31.1	3	40.2	31.2	8	32.8	29.6	11	37.0	34.0
Lesotho	2000	6	20.9	—	1	42.2	—	2	22.5	—	3	19.0	—
Malawi	2001	19	16.9	17.2	1	28.5	—	10	18.6	20.2	8	11.3	9.2
Mozambique	2002	36	13.7	13.1	3	18.0	14.7	—	—	—	—	—	—
Namibia	2002	21	22.5	17.9	1	26.7	—	1	25.0	—	19	22.0	—
South Africa	2002	400	26.5	23.7	40	31.6	—	—	—	—	—	—	—
Swaziland	2002	17	38.6	39.4	1	41.2	—	—	40.6	40.6	—	35.9	37.1
Zambia	2002	24	20.4	18.8	4	26.9	20.9	8	27.7	21.8	12	9.9	8.4
Zimbabwe	2001	19	30.4	25.2	1	30.4	—	8	29.7	30.1	10	29.7	23.7
Eastern Africa													
Burundi	2001	7	5.6	—	1	16.0	5.9	3	8.7	9.8	2	1.6	1.9
Ethiopia	2001	34	11.2	12.1	4	16.2	—	24	12.0	—	6	1.7	—
Kenya	2002	34	6.5	9.8	6	14.2 ^b	—	—	14.3	12.0	—	6.3	8.6
Rwanda	2002	24	4.2	—	2	13.0	—	9	6.7	—	13	3.0	—
United Republic of Tanzania	2002	24	8.1	6.1	4	11.5	7.3	5	9.8	7.0	14	4.2	5.3
Uganda	2001	17	5.6	—	2	10.0	—	—	—	—	—	—	—
Central Africa													
Cameroon	2000	27	10.3	11.9	3	10.3	—	3	5.0	—	21	11.1	—
Central African Republic	2002	48	14.8	—	11	15.0	—	14	12.8	13.9	23	16.5	13.3
Chad	2002	11	5.3	5.3	1	7.5	7.3	6	4.7	—	4	5.5	4.8
Congo	2002	5	4.3	3.5	3	3.6	2.9	2	5.2	3.7	—	—	—
Democratic Republic of Congo	2002	4	3.6	—	1	2.9	—	3	3.7	—	—	—	—
Gabon	2002	—	—	—	2	9.0	—	—	—	—	—	—	—
Western Africa													
Algeria	2000	5	0.2	—	—	—	—	—	—	—	—	—	—
Benin	2002	36	1.9	1.7	3	2.3	—	—	2.5	—	—	1.4	—
Burkina Faso	2002	5	4.6	—	1	4.7	—	—	—	—	—	—	—
Côte d'Ivoire	2002	28	7.3	5.8	1	7.4	5.8	7	10.3	7.6	20	5.8	4.8
Gambia	2001	4	1.3	—	—	—	—	—	—	—	—	—	—
Ghana	2002	24	3.4	1.5	4	4.1	2.3	8	3.4	2.7	12	3.2	1.4
Guinea	2001	5	2.8	2.7	1	1.9	—	—	—	—	4	2.8	2.4
Mali	2002	9	3.4	3.2	3	3.4	2.6	6	3.5	2.4	—	—	—
Mauritania	2000	13	0.4	—	1	0.3	—	—	—	—	—	—	—
Niger	2000	6	2.3	—	1	2.0	—	4	2.2	—	1	5.5	—
Nigeria	2001	86	5.1	6.0	3	2.6 ^c	—	—	4.5	—	—	5.3	—
Senegal	2002	11	1.1	0.8	—	1.1	—	—	1.2	—	—	—	—
Togo	2000	—	—	—	—	—	—	—	—	—	2	2.2	—

—, no data available.

^a HIV prevalence is measured as the percentage of women screened who were seropositive for HIV; the value used is the median of reporting sites.

^b HIV prevalence for Nairobi, 2001

^c HIV prevalence for Lagos. HIV prevalence for Abuja is 11.0%.

Source: HIV/AIDS Epidemiological Surveillance Update for the WHO African Region 2002 HIV/AIDS (2003)

Maternal Mortality Ratio by regions

	Maternal mortality ratio Maternal deaths per 100,00 live births	Number of maternal deaths	Lifetime risk of maternal death: 1 in:	Range of uncertainty on MMR estimates	
				Lower estimate	Upper estimate
Sub-Saharan Africa	940	240,000	16	400	1,500
Eastern and Southern Africa (ESARO)	980	123,000	15	490	1,500
Western and central Africa (WCARO)	900	118,000	16	310	1,600
Middle East and North Africa	220	21,000	100	85	380
South Asia	560	205,000	43	370	760
East Asia and the Pacific	110	37,000	360	44	210
Latin America and the Caribbean	190	22,000	160	110	280
CEE/CIS and the Baltic States	64	3,400	770	29	100
Industrialised countries	13	1,300	4,000	8	17
Developing countries	440	527,000	61	230	680
Least developed countries	890	236,000	17	410	1,400
World	400	529,000	74	210	620

Source: Department of Reproductive Health and Research, WHO (2004). Maternal Mortality in 2000.

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The background features a collage of semi-transparent financial charts and maps. On the left, a map of the United States is visible. In the center and right, there are various line and bar charts with axes and data points. Some charts have labels like '1985-90', '1990-95', and '1995-00'. The overall color palette is muted, with greens, blues, and greys, overlaid with semi-transparent white and light blue shapes.

Appendices

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appendix 1 glossary

Administrative Data: Data derived from administrative records of procedures such as birth registration, businesses registration or measles immunization.

Baseline: A measurement used as a basis for comparison.

Bias error: A systematic error in a process that causes all measured values to deviate from the true value by a consistent amount in a consistent direction, higher or lower than the true value. Arises when the characteristics of the population contained in the sampling frame used for data collection differ from the characteristics of the target population.

Census: A vehicle for collecting data from every member of a given population. Intended to provide 100% coverage.

Confidence interval (CI): Gives an estimated range of values that is likely to include an unknown population parameter, with the estimated range being calculated from a given set of sample data.

Core Welfare Indicator Questionnaires (CWIQ): Sample surveys promoted to monitor social conditions in Africa by measuring access, use, and satisfaction with public services.

Demographic and Health Surveys (DHS): Household surveys that collect a wide range of data on population, health and nutrition. A standardized core questionnaire is used, and special modules may be added. The standard survey generally consists of a household questionnaire and a women's questionnaire.

Demographic Surveillance Systems (DSS): Special studies that aim to follow over time every member of a 'sentinel' population—a cluster that includes every member of the population in a designated geographical area.

Disaggregated data: Data related to population sub-groups defined by sex, age, rural or urban residency or any other attribute. Help to explore and understand development patterns across and within diverse population groups.

Appendix 1

Dispersion: The variation between values in a sample.

Evidence-based policy-making: A policy-making approach that helps planners make better-informed decisions by putting the best available evidence at the centre of the policy process. Evidence may include statistics, academic research, practice-generated impact evidence and 'best-practice' information.

Household survey: Multi-purpose surveys carried out by national statistical institutes and/or international organizations to collect information from people living in private households.

Indicators: In the context of the MDGs, indicators are variables used to measure progress toward a target.

Final indicator: An indicator used to measure the effect of an intervention on individuals' well-being. Two main types of final indicator are *outcome* indicators and *impact* indicators.

Gini coefficient: A measure of inequality most commonly used to describe a country's distribution of wealth. It contrasts actual income and property distribution with perfectly equal distribution. The value of the coefficient can vary from 0 (complete equality) to 1 (complete inequality).

Household Budget/Income and Expenditure Surveys: Surveys mainly carried out by National Statistics Offices to compile national accounts, generate CPI weights, and measure welfare and poverty. In many countries, they have gradually expanded to become multi-purpose household surveys.

Impact indicator: A final indicator that measures an intervention's impact on the dimension of well-being that a policy is intended to affect. An example is the literacy rate.

Input indicator: An intermediate indicator that measures the financial and physical resources used in a process, or human resources dedicated to a process.

Intermediate indicator: An indicator that measures a factor that determines an outcome or contributes to the process leading to an outcome. Input indicators and output indicators are two main types.

Labour-force survey: A household survey intended to provide information relevant to labour-market policy. Seeks information on respondents' personal circumstances and labour-market status (e.g. industry, occupation, hours worked, wage rates, workplace size) during a specified time period.

Line of equality: In graphical depictions of income inequality, the line of equality is a 45-degree line depicting a situation of complete income equality.

Living Standard Measurement Surveys (LSMS): LSMSs seek information about income, education, health and employment, prices and household and community facilities. To capture seasonal patterns in income and expenditures the surveys are often conducted over an entire year.

Localizing: The practice of tailoring the MDGs at the sub-national level (e.g. regional, district or community levels) to include targets and indicators that are more appropriate for the given country or sub-national area than those contained in the global MDGs. Locally tailored targets and indicators should be both challenging and achievable given the local context.

Lorenz curve: The Lorenz curve is a part of graphical depictions of a country's income distribution. The horizontal axis measures the percentages of the population while the vertical axis shows the percentage of the national income that they receive.

Mean: The average of two or more values.

Metadata: Information on characteristics of a data set such as its period of reference, sample size, and collection methodology. Helps users to interpret data effectively.

Multi Indicator Cluster Surveys (MICS): Household surveys developed by UNICEF to help countries monitor the situation of children and women. Tend to include standard modules covering health, education and demographic variables.

National indicator: An indicator that measures a process at the national level, as opposed to the global or sub-national level.

Nationalizing: The practice of tailoring the MDGs at the national level to include targets and indicators that are more appropriate for the given country than those contained in the global MDGs. Nationally tailored targets and indicators should be both challenging and achievable given the national context.

Outcome indicator: A final indicator measuring access to and satisfaction with services. An example is the primary-school enrollment rate.

Output indicators: Intermediate indicators that measure the goods and services produced by a given input.

Appendix 1

Policy cycle: The interconnected steps through which a policy is created, developed, implemented and reviewed.

Poverty-gap ratio: A measure that captures the mean aggregate income or consumption shortfall relative to the poverty line across the whole population.

Proportion: A type of ratio in which the denominator is a quantity that represents the whole of a given group under investigation, and the numerator is a subset of the same.

Proxy indicators: An alternative indicator used to measure a process. Used when the most direct indicator is either unavailable or impractical.

Quantile: Quantiles are points taken at regular intervals from a set of ordered data that divide the distribution into 'n' equal-sized data subsets. Some examples are quintiles (which divide the distribution into five subsets), deciles (ten subsets) and percentiles (100).

Range: The difference or interval between the smallest and largest values in a frequency distribution.

Rates: A quotient expressing the relationship between two quantities, where the numerator and denominator hold different units. 'Kilometres travelled per litre of fuel' is an example.

Ratio: The relationship between two quantities measured in the same unit, expressed as the quotient of one quantity divided by the other.

Sampling error: The error that results from using information from a sample to make conclusions about the characteristics of the population from which the sample was selected. Occurs because a sample gives incomplete information about a population.

Simple mean: Sum of all the values (x) in a given set of values divided by the number of these values (n).

Standard deviation: A measure of dispersion around the mean of a data set. It is calculated by taking the square root of the variance.

Target: In the context of the MDGs, targets define the time-bound desired outcomes related to a given goal. Each goal has a subset of related targets, while progress toward each target is measured through the use of indicators.

Surveillance data: A type of data used in the area of public health, and defined as the ongoing systematic collection, analysis, interpretation, and dissemination of data on health-related events in a population.

Survey: A data collection process involving identifying and collecting data from a randomly selected subset (sample) of the population under investigation.

Total error: The sum total of sampling error and bias error.

Variability: The characteristic of a data set that describes how data are distributed, or how far each element is from some measure of central tendency, such as the mean.

Weighted mean: An average of means calculated by weighting each individual mean according to the number of data points that make up that individual mean. If all the weights are equal, the weighted mean is the same as the simple (unweighted) mean.

appendix 2 list of MDGs

GOALS AND TARGETS (FROM THE MILLENNIUM DECLARATION)	INDICATORS FOR MONITORING PROGRESS
GOAL 1: ERADICATE EXTREME POVERTY AND HUNGER	
TARGET 1: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	1A. Proportion of population below \$1 (PPP) per day ^a 1B. Poverty headcount ratio (% of population below the national poverty line) 2. Poverty gap ratio [incidence x depth of poverty] 3. Share of poorest quintile in national consumption
TARGET 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger	4. Prevalence of underweight children under five years of age 5. Proportion of population below minimum level of dietary energy consumption
GOAL 2: ACHIEVE UNIVERSAL PRIMARY EDUCATION	
TARGET 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	6. Net enrollment ratio in primary education 7A. Proportion of pupils starting grade 1 who reach grade 5 7B. Primary completion rate 8. Literacy rate of 15–24 year-olds
GOAL 3: PROMOTE GENDER EQUALITY AND EMPOWER WOMEN	
TARGET 4: Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015.	9. Ratios of girls to boys in primary, secondary and tertiary education 10. Ratio of literate women to men 15–24 years old 11. Share of women in wage employment in the non-agricultural sector 12. Proportion of seats held by women in national parliament
GOAL 4: REDUCE CHILD MORTALITY	
TARGET 5: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate	13. Under-five mortality rate 14. Infant mortality rate 15. Proportion of 1 year-old children immunised against measles
GOAL 5: IMPROVE MATERNAL HEALTH	
TARGET 6: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio	16. Maternal mortality ratio 17. Proportion of births attended by skilled health personnel
GOAL 6: COMBAT HIV/AIDS, MALARIA AND OTHER DISEASES	
TARGET 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS	18. HIV prevalence among 15–24 year old pregnant women 19. Condom use rate of the contraceptive prevalence rate ^b 19A. Condom use at last high-risk sex 19B. Percentage of population aged 15–24 with comprehensive correct knowledge of HIV/AIDS ^c 19C. Contraceptive prevalence rate 20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10–14
TARGET 8: Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases	21. Prevalence and death rates associated with malaria 22. Proportion of population in malaria risk areas using effective malaria prevention and treatment measures ^d 23. Prevalence and death rates associated with tuberculosis 24. Proportion of tuberculosis cases detected and cured under directly observed treatment short course (DOTS)
GOAL 7: ENSURE ENVIRONMENTAL SUSTAINABILITY	
TARGET 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	25. Proportion of land area covered by forest 26. Ratio of area protected to maintain biological diversity to surface area 27. Energy use (kg oil equivalent) per \$1 GDP (PPP) 28. Carbon dioxide emissions (per capita) and consumption of ozone-depleting CFCs (ODP tons) 29. Proportion of population using solid fuels
TARGET 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation	30. Proportion of population with sustainable access to an improved water source, urban and rural 31. Proportion of urban and rural population with access to improved sanitation
TARGET 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers	32. Proportion of households with access to secure tenure

Source: Indicators for Monitoring the Millennium Development Goals: Definitions, Rationale, Concepts and Sources. United Nations, New York, 2003

GOAL 8: DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT	
<p>TARGET 12: <i>Develop further an open, rule-based, predictable, non-discriminatory trading and financial system</i></p> <p><i>Includes a commitment to good governance, development, and poverty reduction both nationally and internationally</i></p>	<p><i>Some of the indicators listed below are monitored separately for the least developed countries (LDCs), Africa, landlocked countries and small island developing States.</i></p> <p>Official development assistance</p> <p>33. Net ODA, total and to LDCs, as percentage of OECD/DAC donors' gross national income</p> <p>34. Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation)</p> <p>35. Proportion of bilateral ODA of OECD/DAC donors that is untied</p> <p>36. ODA received in landlocked countries as proportion of their GNIs</p> <p>37. ODA received in small island developing States as proportion of their GNIs</p> <p>Market access</p> <p>38. Proportion of total developed country imports (by value and excluding arms) from developing countries and LDCs, admitted free of duties</p> <p>39. Average tariffs imposed by developed countries on agricultural products and textiles and clothing from developing countries</p> <p>40. Agricultural support estimate for OECD countries as percentage of their GDP</p> <p>41. Proportion of ODA provided to help build trade capacity</p> <p>Debt sustainability</p> <p>42. Total number of countries that have reached their HIPC decision points and number that have reached their HIPC completion points (cumulative)</p> <p>43. Debt relief committed under HIPC initiative, US\$</p> <p>44. Debt service as a percentage of exports of goods and services</p> <p>45. Unemployment rate of 15-24 year-olds, each sex and total^a</p> <p>46. Proportion of population with access to affordable, essential drugs on a sustainable basis</p> <p>47. Telephone lines and cellular subscribers per 100 population</p> <p>48A. Personal computers in use per 100 population and Internet users per 100 population</p> <p>48B. Internet users per 100 population</p>
<p>TARGET 13: <i>Address the special needs of the least developed countries. Includes: tariff and quota free access for least developed countries' exports; enhanced programme of debt relief for HIPC and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction</i></p>	
<p>TARGET 14: <i>Address the special needs of landlocked countries and small island developing States (through the Programme of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly)</i></p>	
<p>TARGET 15: <i>Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term</i></p>	
<p>TARGET 16: <i>In co-operation with developing countries, develop and implement strategies for decent and productive work for youth</i></p>	
<p>TARGET 17: <i>In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries</i></p>	
<p>TARGET 18: <i>In co-operation with the private sector, make available the benefits of new technologies, especially information and communications</i></p>	

The Millennium Development Goals and targets come from the *Millennium Declaration* signed by 189 countries, including 147 Heads of State, in September 2000 (www.un.org/documents/ga/res/55/a55r002.pdf - A/RES/55/2). The goals and targets are inter-related and should be seen as a whole. They represent a partnership between the developed countries and the developing countries determined, as the Declaration states, "to create an environment – at the national and global levels alike – which is conducive to development and the elimination of poverty."

- a For monitoring country poverty trends, indicators based on national poverty lines should be used, where available.
- b Amongst contraceptive methods, only condoms are effective in preventing HIV transmission. The contraceptive prevalence rate is also useful in tracking progress in other health, gender and poverty goals. Because the condom use rate is only measured amongst women in union, it is supplemented by an indicator on condom use in high-risk situations (indicator 19a) and an indicator on HIV/AIDS knowledge (indicator 19b).
- c This indicator is defined as the percentage of population aged 15-24 who correctly identify the two major ways of preventing the sexual transmission of HIV (using condoms and limiting sex to one faithful, uninfected partner), who reject the two most common local misconceptions about HIV transmission, and who know that a healthy-looking person can transmit HIV. However, since there are currently not a sufficient number of surveys to be able to calculate the indicator as defined above, UNICEF, in collaboration with

- UNAIDS and WHO, produced two proxy indicators that represent two components of the actual indicator. They are the following: a) Percentage of women and men 15-24 who know that a person can protect herself from HIV infection by "consistent use of condom". b) Percentage of women and men 15-24 who know a healthy-looking person can transmit HIV. Data for this year's report are only available on women.
- d Prevention to be measured by the percentage of children under 5 sleeping under insecticide-treated bednets; treatment to be measured by percentage of children under 5 who are appropriately treated.
- e An improved measure of the target is under development by ILO for future years.

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appendix 3 UNSD MDG indicator database

	A	B	D	F	H	J	L	N	P	R	T	V	X	Z	AB	AD	AF	AG	AH	AI	AJ	
1	Millennium Indicator: Poverty, percentage of population below national poverty line, total (WB)																					
2																						
3	Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004						
43	Kenya			42																		
44	Kyrgyzstan				45				51	38.6	64.1											
45	Lao People's Democr			49.2																		
46	Lesotho								73.3	65.3	71.3											
47	Madagascar											46.3										
48	Malawi		54																			
49	Mauritania																					
50	Mauritius			10.6				50														
51	Mongolia						36.3				19											
52	Morocco		13.1																			
53	Mozambique																					
54	Nepal				50.3			42		47.9												
55	Nicaragua				63																	
56	Niger				34.1																	
57	Nigeria				28.6																	
58	Pakistan																					
59	Panama																					
60	Papua New Guinea							37.5														
61	Paraguay		21.8																			
62	Peru																					
63	Philippines					53.5		49														
64	Poland					40.6			36.8													
65	Republic of Moldova					23.8																
66	Romania																					
67	Russian Federation																					
68	Rwanda																					
69	Senegal																					
70	Sri Lanka																					
71	Swaziland																					
72	Thailand					18																
73	Trinidad and Tobago					21																
74	Tunisia					7.4																
75	Uganda																					
76	Ukraine																					
77	United Republic of Tai																					
96																						
97																						
98																						
99																						
100																						
101																						
102																						
103																						
104																						

United Nations Statistics Division – Millennium Development Goals Indicators Database

As referred to in Chapter 9, The United Nations Statistics Division maintains a database of MDG indicator values at country level. These indicators are calculated primarily for global monitoring purposes, and are computed periodically by national or other agencies. At printing, the database was current to April 2005. Above is a screenshot of one window of the database.

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appendix 4 resources

⊙ denotes materials that are available on Resource CD

chapter 1 : introduction

- ⊙ **United Nations** (2003). *'Indicators for Monitoring the Millennium Development Goals: Definitions, Rationale, Concepts, Sources.'* New York.

chapter 2 : what are the MDGs?

Carraro, L. et al (2004). *'Monitoring the Millennium Development Goals – Current weakness and possible improvements.'* Department for International Development, London.

- ⊙ **Food and Agriculture Organization** (2005). *'FAO and the challenge of the Millennium Development Goals, Annex – Responding to the Millennium Declaration.'* Rome.

Millennium Project – Home Page
<http://www.unmillenniumproject.org>

- ⊙ **Millennium Project** (2005). *'Investing in Development – A Practical Plan to Achieve the MDGs.'* New York.
<http://www.unmillenniumproject.org/documents/MainReportComplete-lowres.pdf>
 - ⊙ **Uganda Ministry of Finance, Planning and Economic Development** (2003). *'Ugandan Poverty Status Report, 2001.'* Kampala.
 - ⊙ **UNCT Kenya** (2003). *'MDGs – Progress Report of Kenya.'* Nairobi.
 - ⊙ **UNCT Uganda** (2003). *'Uganda MDG Report. 2003.'* Kampala.
- UNDP – Home Page**, <http://www.undp.org/>

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- ⊙ **United Republic of Tanzania** (2001). *'IDT/MDG Progress: International/Millennium Declaration Development Goals.'* Dar es Salaam.
- ⊙ **United Nations** (2003). *'Implementation of the United Nations Millennium Declaration – Report of the Secretary General.'* New York.
- ⊙ **United Nations** (2001). *'Road Map toward the implementation of the United Nations Millennium Declaration.'* New York.
<http://www.un.org/documents/ga/docs/56/a56326.pdf>
- ⊙ **UN-HABITAT** (2003). *'Slums of the World: The face of urban poverty in the new millennium.'* Nairobi.
<http://www.unhabitat.org/publication/slumreport.pdf>
- UNDP - Millennium Development Goals – Home Page**
<http://www.undp.org/mdg/abcs.html>
- ⊙ **United Nations** (2002). *'The United Nations and the MDGs – A Core Strategy.'* New York.
<http://www.undg.org/content.cfm?id=496>
- ⊙ **United Nations** (2002). *'United Nations Millennium Declaration.'* New York.
- World Bank – Millennium Development Goals Home Page**
<http://ddp-ext.worldbank.org/ext/MDG/home.do>
- ⊙ **All UNSD MDG values.xls** (for Exercise 2.2)

chapter 3 : MDGs and the policy cycle

- Davies, P.T.** (2003). *'The challenge of getting evidence into policy: lessons from comparative experience.'* Strategy Unit, Cabinet Office, London.
- ⊙ **Millennium Project** (2004). *'Millennium Development Goals Needs Assessments –Methodology.'* New York.
<http://www.unmillenniumproject.org/documents/MDG%20needs%20assessment%20methodology%20Nov%2007-04.pdf>
- Poulsen, N.** (2004). *'INSPIRE to inclusive and accountable policies.'* Department for International Development, London.

- ⊙ **Scott, C.** (2005). *'Measuring Up to the Measurement Problem.'* PARIS21, Paris.
<http://www.paris21.org/documents/1509.pdf>

chapter 4 : MDGs and PRSPs

Booth, D. ed (2003). *'Fighting Poverty in Africa: Are PRSPs Making a Difference?'* Overseas Development Institute, London.

- ⊙ **Booth, D. and Lucas, H.** (2005). *'Good Practice in the Development of PRSP Indicators and Monitoring Systems.'* Overseas Development Institute, London.

Harrison, M., Klugman, J., and Swanson, E. (2003). *'Are poverty reduction strategies undercutting the Millennium Development Goals? An empirical review.'* World Bank, Washington DC.

- ⊙ **IMF** (2004). *'Report on the Evaluation of PRSPs and PRGF - Summary of Major Findings, Lessons and Recommendations.'* Washington DC.
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appendix 5 exercise material

see: chapter 9, exercise 9.3 *page 108*

House price fall: real data reveals rout

By Alan Kohler
September 4, 2004

Friday's headlines were pretty clear about it: "House prices decline sharply" and "Bubble deflating as house prices fall for the first time in four years".

Those stories were based on the Australian Bureau of Statistics house price indices for the June quarter. Unfortunately for the mental stability of those who watch these things, two days earlier the Real Estate Institute of Australia had reported something entirely different.

In places where the ABS says prices went up in June quarter, the REIA said they went down. And where the ABS said they had fallen, the REIA said they had gone up.

So on Thursday the ABS reported that house prices in Sydney had slumped 5.4 per cent in the June quarter; on Tuesday the REIA had reported that Sydney prices were steady. The ABS said Melbourne prices had gone up 1 per cent; the REIA said they were down 2.7 per cent. The ABS said Perth prices had gone up 2.1 per cent; the REIA said they were down 1 per cent.

The funniest thing about all this nonsense is that the ABS and the REIA get their data from exactly the same sources - state governments. Why are they different? That's a bit hard to fathom, although the ABS figures are an index, whatever that means, and the REIA figures are median prices. Maybe that's it. Yes, say the researchers and statisticians involved, that must be it.

So the two questions still to be answered about the Australian property market are: Is the collapse on? When are all these statisticians going to get their act together?

Answers: yes and soon (they've even had a meeting to talk about getting their act together).

Appendix 5

I think property prices are definitely falling because the research house with the best data – Australian Property Monitors – says so. APM is the only outfit that sends staff to auctions with notepads to take down the prices, and it's the only one that uses contract of sale dates rather settlement dates, which are an average of 60 days later.

Most of the sales included by both the ABS and REIA for the June quarter actually took place in the March quarter. APM includes sales only in the period when the buyer and seller actually shook hands. That, as everyone knows, is when the real deal took place; the settlement date is irrelevant.

On APM's data, so far unreported, Sydney values fell 7.8 per cent in the June quarter, Melbourne fell 2.6 per cent, Perth fell 0.7 per cent, Canberra fell 1.2 per cent, Adelaide rose 3.6 per cent and Brisbane rose 1 per cent.

Most economists reacted to the ABS data yesterday by opining that the property market is in an "orderly decline", but a fall of nearly 8 per cent per quarter, if sustained, is anything but orderly. It is an absolute rout.

APM also collects other data worth knowing about. Auction clearance rates around the country are now 50 per cent or less, compared with about 70 per cent a year ago; the average number of days it takes to sell a house has blown out to 69 days in Sydney, up from 49 days last year and 36 days in 2002; the average discount off the advertised price that it takes to sell a house in Sydney and Melbourne has gone up to near 8 per cent, compared with the long-term average of about 4.8 per cent.

A month ago, in response to a series of articles by your columnist on this subject, the research staff from the RBA, Treasury, the ABS, APM, Residex and all of the state real estate institutes met in Canberra to discuss what to do.

They all agreed that using settlement data was not a good idea and that the ABS and the REIA and the state institutes would work towards basing their figures on contract dates. Separately the ABS is working on some statistical adjustments to the data to move away from median prices and adjust house prices for the size and type of houses, their location and, importantly, renovations.

So tick two issues as being tackled at least: out of date data and the use of median prices.

Two more issues remain to be tackled: the fact that we're using quarterly figures and the fact that buyers don't have free, useful, independent data on sales in the areas in which they are looking for houses.

Everyone I spoke to yesterday moaned about the difficulty of getting real estate agents to report their sales more frequently to a public data base.

They should just be told to do it - on the day the sale is made. The problem is not that they can't - they don't want to. Knowledge is power, or, in this case, money.

Source: Sydney Morning Herald, September 4-5, 2004

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appendix 6 course project

You will need the following resources for the project that you will have brought with you to the course:

- Your country's DevInfo containing the latest MDG data
- The latest version of your country's medium-term strategy (Poverty Reduction Strategy Paper or equivalent if there is one)
- Any other sectoral or national strategy documents that are relevant to the MDGs (like the National Sustainable Development Strategy)
- The latest annual MDG progress report for your country

This project is designed to be worked on in stages throughout the whole of the course with the final presentation being made in the session on day 7: MDGs in your country.

You are to undertake the following project in your country teams. The aim of the project is to **develop a profile of the state of the MDGs in your country**, using the available material.

Each team is required to produce a single report, in Microsoft Word, no longer than 10 pages in total that will be presented by the team on the last day of the course. The presentation should be made using PowerPoint and last no longer than 15 minutes.

It is recommended that each country team spend at least an hour a day preparing the project on days 2-6. The presentation takes place on day 7.

Appendix 6

Day 2 : Introduction

1. Read through the tasks outlined below and make sure you understand the steps.
2. Draw up a brief heading outline of the report that you will produce for this project.
3. Assign key roles amongst your team members.
4. Familiarize yourselves with the materials: DevInfo; the medium-term strategy (or PRSP); other relevant sectoral strategies; and, the MDG country report.

Day 3 : Prioritizing development goals in your country

5. Explain briefly what process your government followed in order to identify the priority areas/goals for the medium-term strategy or PRSP.
6. Was there a major stakeholder involvement in this process in identifying priorities?
7. Did your country adopt all the MDG goals and indicators in their internationally agreed form?
8. Which ones were missed out?
9. Were they missed out because they had already been achieved or for other reasons?
10. What missing MDG goals and indicators do you think are the biggest priority for inclusion? Why? Say how you would advocate for their inclusion.

Day 4 : Meeting the MDGs

11. Which goals do you think your country is most likely to meet? Will any be difficult?
12. If you have the data available, select 3 key indicators and plot on graphs the progress in each indicator from 1990 to the present. Use the metadata in DevInfo, and any similar information in your country report, to ensure that the selection of data points you use is appropriate.
13. Based on the trend that you observe, how feasible is it to meet the national target for these indicators?
14. Are there data problems that make it difficult to monitor progress towards

the MDGs (lack of data, old data, poor quality data, inconsistent data, consistency of indicator definitions etc)?

15. Do you know if the cost of meeting specific MDGs has been estimated? Has this cost been included in the budget?

Day 5 : Localizing the MDGs/regional comparisons

16. Where the MDGs have been adopted by your country, what additional, country-specific indicators have been identified that will support the monitoring of this goal? Can you think of others that could be included?
17. What development goals are included in addition to the ones outlined in the MDG framework?
18. Give examples of where disaggregated targets have been set for MDGs (for example, gender or regional targets).
19. Is it possible to make comparisons between the levels of MDG indicators in your country and regional averages or neighbouring countries?

Day 6 : Finalizing the report

20. Review, and if necessary modify, your project report in the light of what you have learned from the session on effective presentations.
21. Write the final sections of your project report.
22. Submit the report.
23. Plan the PowerPoint presentation.

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