

PART II

*Chapter 10*

**Health Spending  
by Beneficiary Characteristics**

## Introduction

This chapter provides an illustrative example of how SHA data can be used in conjunction with other data sources to further develop health accounts, in this case the allocation of current health expenditure for specific analyses according to classifications of beneficiary characteristics, such as disease, age, sex, region and economic status.

The chapter starts by reviewing the original recommendations in SHA 1.0 and the *Producers Guide*, and summarises some of the recent developments in this field, as well as some potential uses of such analyses. It outlines the possible approaches for developing a framework to organise such analyses for both international and national purposes and makes some broad recommendations for the different types of beneficiary classifications. There is also a discussion of some of the remaining methodological issues, which often have to be kept in mind when developing standard classifications.

## Background

As the use of the System of Health Accounts has increased the availability of comparable data on national health expenditures, there has been a growing interest in analysing the distribution of national expenditures across different population groups. This is being driven by three general motivations, namely concerns about social disparities in health outcomes, political and societal interest in the allocation of health care resources, and the need to improve the sustainability and planning of health care systems.

Health inequality is a concern for rich and poor countries alike. The existence of disparities in health outcomes naturally generates interest in knowing how these relate to disparities between population groups both in access to health care resources and in health care spending. This motivation is underlined by the Final Report of the World Health Organisation's Commission on Social Determinants of Health (WHO, 2008a), which stressed the need for countries to measure and monitor disparities in social determinants of health outcomes, such as health spending.

The distribution of resources within health care systems is a matter of political and social interest in all countries, whether it is related to issues such as fairness and equity, or other political, legal or administrative requirements. Ensuring the appropriate distribution of resources requires reliable information on how health care spending is being distributed. Such data are particularly relevant in a policy context where achieving universal coverage by health systems or improving social solidarity is guiding strategic goals, which is common in many countries.

Many analytical and planning activities also require data on the disparities in spending on individuals and different population groups. For example, data on the variation in spending by age group is a critical input into most exercises that attempt to project future health care expenditures or health care resource requirements (Rannan-Eliya and Wijesinghe, 2006). Such analyses are acquiring increasing importance as both developed and developing nations focus their attention on the financing and sustainability of health care systems.

Disparities in health care spending are found within populations along many different social dimensions that are potentially of policy and analytical interest. Dimensions of particular interest include the type of disease or health care condition, age, gender, geographic area and socioeconomic status.

There have been efforts since at least the mid-1960s to estimate variations in health care expenditures within national populations. Rice (1967) made the first attempts to measure the variations in spending by disease, age and gender in the United States. In developing countries, Meerman (1979) and Alailima and Mohideen (1983) pioneered the tracking of expenditures by socioeconomic groups with their estimations of how government and private health care spending varied by income and other groupings in Malaysia and Sri Lanka. However, few of these analyses linked their estimates to health accounts data, with the notable exceptions of the studies on Cost of illness performed in the Netherlands by the RIVM.<sup>1</sup> The most recent versions by RIVM also take account of the dimensions presented in SHA. In its most recent report (Poos et al., 2008), the data are reported according to six dimensions: health care provider, health care function, source of finance, age, gender and disease. For this exercise a mapping is made between the diseases on the one hand and the detailed data on expenditure on the other.

Despite the proliferation of similar studies in the past two decades, these analyses have generally produced results that are not comparable between countries or even between individual studies. Such comparisons are increasingly needed and requested. An important reason for the lack of comparability has been the lack of standardised statistics and definitions of health expenditures, but this problem could be largely resolved by the development and institutionalisation of SHA.

### **SHA 1.0 and the Producers Guide**

SHA 1.0 included two tables that present personal health expenditures cross-classified by patient condition or characteristics: firstly, by the chapters of the International Classification of Disease (ICD-10); and secondly, by broad age classes (0-4, 5-14, 15-44, 45-64, 65-74, 75-84 and 85+ years) and by gender.

The *Producers Guide* proposed some other distributions of expenditure on health in addition to those based on disease, age and gender. It looked at the possibility of allocating expenditures by household expenditure quintile, and by region. It pointed out the importance of socioeconomic inequalities in health spending. Tables 5.6 to 5.9<sup>2</sup> in the *Producers Guide* proposed matrices of financing agents crossed by the above-mentioned population groups. For expenditure by disease, it suggested using the Global Burden of Disease (GBD) classification for cross-classifying with financing agents. GBD<sup>3</sup> is a disease classification based on the detailed International Classification of Disease (ICD-10), and with the major cause subcategories of GBD closely aligned with the chapters of the ICD (Mathers et al., 2004).

### **International comparisons**

Although health accounts expenditures were already applied to studies on diseases over the past two decades, the use of standard classifications on expenditure has given an additional dimension to the value of the results (Heijink et al., 2006). A number of significant projects since 2000 have explored the feasibility of analysing health spending by beneficiary characteristics. In particular, Eurostat and OECD have jointly collaborated on projects to develop a set of guidelines, based on the pioneering work by RIVM, for the

distribution of spending by disease, age and gender, which were subsequently tested in a selection of member countries. WHO has also sponsored a number of such studies across developing countries. These have demonstrated that the general framework is feasible and able to generate broadly comparable data. In most of these country pilots, the age classifications used have been more detailed than those initially proposed in SHA 1.0, especially at the upper age limits. Moreover, in allocating spending by disease, most studies have been more successful in inpatient care settings than in outpatient or other settings. Such a distinction, particularly between estimations of inpatient and outpatient expenditures, appears to be both of policy interest and feasible. However, the work has also shown that there is a need for further methodological development in certain areas where allocation is more problematic, such as collective consumption (*e.g.* health promotion and administration), over-the-counter purchases and household spending more generally.

In addition to the studies of expenditure by disease, age and gender, several projects in recent years have also focused on the distribution of health spending by the socioeconomic characteristics of beneficiaries, and in particular income level. Few, if any of these studies have explicitly linked their estimates to health accounts data. Given the growing policy interest in such analyses, there is a need to provide guidelines for the future development of such estimates on a standardised basis linked to SHA and national health accounts statistics. One of the benefits of such SHA-linked estimates would be that they would be consistent with the overall estimates of national health expenditure, which is often not the case.

If SHA is to provide a basis for standardised comparisons of the distribution of expenditure by beneficiaries, a framework for such presentations must be provided. Comparability of results between different studies and estimates would require consistency in the following:

- The scope and types of health expenditures that are included in the comparisons;
- The schemes for classifying recipient or beneficiary groups along different social dimensions;
- The rules or basis by which expenditures are apportioned to individuals of different characteristics.

## **Analytical uses**

Breakdowns of expenditure by beneficiary characteristics are intended to provide policy-related information on variations in spending between population groups that are differentiated by their characteristics. In itself, these breakdowns depict differences between groups (*e.g.* expenditures on health between men and women, between different age groups, between income level groups, etc.). It is important to note that such data on inequalities in spending do not, by themselves, imply any unfairness in the distribution of expenditure, but merely report current resource allocations, and act as one of the inputs for analysis. Equity in spending must be determined by reference to some normative framework of what constitutes fairness and requires other information on relevant factors, such as health needs, disease burdens, or capacity to pay. Details on expenditure by beneficiary characteristics can provide real support for policy makers, who need to allocate scarce resources and to evaluate how resources are reaching various groups of the population. In order to plan for the future, it is imperative that policy makers understand the present, including how resources are currently distributed.

Expenditure breakdowns by beneficiaries, while important for meeting national needs, can also benefit from being comparable at the international level. There is no agreed normative framework that allows definitive assessment of the appropriateness or optimality of a given expenditure distribution, so in practice comparison between countries is an important means by which policy makers can assess whether expenditures should, or even could, be changed.

### ***Expenditure by disease***

Depending on the approach and scope of the studies, information on expenditure by disease can serve a number of purposes, such as monitoring and providing information about resource allocation by disease/priority area. Linked with health accounts, the information gained can help address the following questions for both temporal and spatial analyses:

- What diseases/conditions are consuming health care resources, and how much?
- Which schemes pay for the services that address these diseases or conditions, and how much?
- How is spending on certain diseases broken down according to types of care?

Health accounts contribute a useful input for the planning of resource allocation. However, expenditures per disease or per condition alone cannot evaluate or justify the allocation of resources for a disease/condition, and additional information is needed, such as on needs and costs.

There are important caveats that should be considered when measuring expenditure by disease or condition and analysing the results, or comparing results internationally. Because expenditure by disease is mainly estimated using information on reported cases by disease, the difference in reporting practices between countries affects the potential for comparability. For example, a patient could return to a provider for a follow-up visit related to the same disease for which the patient was earlier treated. Depending on the allocation methodology, this second visit could be recorded under the same disease case in one country, or as an additional disease case in another country. Such discrepancies could be large enough to explain variations in expenditure by disease between countries. Another cause for concern when using contact-based information is the lack of a full linkage between disease and spending, and more particularly the different allocation methods in cases of co-morbidity. Depending on whether spending is allocated solely to the primary diagnosis or pro-rated across diseases, then the effect on estimating the spending on certain underlying diseases or conditions, such as diabetes and mental health, can be significant and may lead to unfounded conclusions.

It has been suggested that expenditure by disease/condition analyses should be produced regularly, possibly every three to five years (BASYS *et al.*, 2006). Analyses of expenditure by disease or condition are highly resource-intensive and should preferably be more than ad-hoc studies or research initiatives so that they can serve as a regular monitoring tool for policy makers to assess expenditure levels and trends (trends should be linked to changes in disease burdens or epidemiological profiles).

### ***Expenditures by socioeconomic categories***

Estimating expenditure by socioeconomic categories addresses the issue of inequalities, in particular by exposing differences in the level and pattern of spending by the poorer and

the richer. This provides a better understanding of the possible reasons for, or consequences of, inequalities. In theory, expenditure distributions by socioeconomic (SE) groups could provide information on inequalities in sources of funding (for example, whether a contribution system is progressive or regressive), as well as on inequalities in payments (such as whether households' out-of-pocket spending is proportionate to ability to pay). In turn, expenditures on providers and functions per SE group would help design or monitor policies. For example, the data could inform as to what type of care is driving high household spending or how the allocation of public expenditures could be adjusted to better support the poorer sections of the population. In many low- and middle-income countries, data by socio-economic categories are of high policy relevance. These data can be used in studies on catastrophic spending and the impoverishment of certain population groups.

### ***Policy indicators for expenditure by beneficiary characteristics***

The following provides an illustration of the type of indicators that have been used to report expenditure distributions used by policy makers.

- Average per person expenditure in each region by provider (for example, per capita expenditure on health in each region for hospitals, ambulatory care providers, etc.);
- Expenditure by schemes in each socioeconomic group (for example, expenditure by government schemes, health insurance schemes, households out of pocket, and other, in the five income quintiles);
- Expenditure by disease for different types of care (for example, inpatient, outpatient and pharmaceutical expenditures for cardiovascular diseases, for respiratory diseases, for injuries, for neoplasms, etc.).

In addition, trends in expenditure by beneficiary characteristics such as age or disease are useful for projections of spending levels. Per capita spending in constant prices is best for comparisons of expenditure distributions and levels across time (comparison of volumes).

Finally, the following examples of beneficiary expenditure indicators, combined with other non-financial indicators, have also proven to be policy relevant:

- Expenditure per prevalence of a disease, over time;
- Expenditure per person at risk of a disease, over time;
- Expenditure per person correlated to unmet health care needs, by income quintile.

## **Possible framework for analysing expenditures by beneficiaries**

### ***Concept and definition of beneficiaries***

The analysis of variations in health spending explicitly recognises that health expenditures are not uniform across the population. When considering the possibility that expenditures do vary non-uniformly and there is an attempt to measure that variation, what this implies is that expenditures are measurably different between different units of the population. If such expenditure differences exist between different units and such units can be classified according to some criteria, then the possibility of breaking down expenditures according to some social dimension arises. This implies that for the classification of expenditure by beneficiary characteristics or population groups, the minimum requirements are that:

- Variations in health expenditure exist across units of the population;

- It is possible and feasible to measure differences in expenditure of different units of the population;
- The different units of the population can be distinguished and classified according to some measurable, definable and meaningful set of criteria.

The smallest statistical unit of the population is the individual. A beneficiary might be defined as an individual to whom health expenditures can be assigned individually or collectively, as definable groups, on the basis that they are deemed to benefit from such expenditures.

The basis for assigning expenditures to an individual should be that the individual concerned is the direct recipient or beneficiary of the particular good or service, either as an individual or as a member of a (small, selective) group of individuals. This would cover most individual patient treatment services that are given to individual patients. The receipt of services as a (large, impersonal) group arises when expenditures are incurred to provide collective or non-personal services that benefit groups of individuals. An example of this would be health education campaigns to discourage smoking that are targeted at a particular demographic group or the population as a whole. It would also include activities undertaken to administer the health system, since these are intended to improve the health of the population overall.

Although the identification of individual beneficiaries provides a clear basis for allocating expenditures, the concept of a beneficiary needs further elaboration to deal with all the likely dimensions of analysis. Most such dimensions are consistent with the mutually exclusive categorisation of all individuals, but not all are. For example, an individual cannot have more than one age or one gender at a time. However, when expenditure concerns characteristics of individuals that are not mutually exclusive or that can be coincident in the same individual, the individual is not ultimately the unit of analysis. This is the case when allocating expenditures by type of illness or disease. Although all illnesses are a personal or individual phenomenon, it is possible for individuals to experience more than one type of illness at the same time. Thus, in the expenditure by disease category, it is not possible to separate the population into mutually exclusive categories of individuals. It is meaningful in this situation to allocate expenditures by individual according to the diseases that each individual suffers from, and to sum these expenditures by type of disease, but it is not feasible or meaningful to sum these expenditures by groups of individuals.

Considering this issue, it is proposed that for the purpose of distributional analyses linked to SHA framework, beneficiaries are defined as consisting either of mutually exclusive groups of individuals each categorised by some unique individual characteristic or of non-mutually exclusive groups of recipients who benefit from mutually exclusive types of expenditures that can be each assigned to individuals. In the latter case, an individual can be a recipient of more than one type of expenditure, and in each instance can be assignable to a different group in relation to each type of expenditure.

### **Scope of health expenditures considered in analyses by beneficiary characteristics**

This illustrative framework is intended for use in extending the SHA framework to analyse variations in spending across beneficiaries in different population groups, with the ultimate objective being to facilitate comparisons between countries and between studies.

This requires that the scope of expenditures considered in the analyses be clearly articulated in relation to the overall SHA framework. At the same time, the expenditures must be of a type that can be assigned or allocated to beneficiaries along the possible dimensions of analysis. Finally, considerations of feasibility, reliability and reproducibility must be taken into account.

The boundary of what constitutes health care expenditures is defined in SHA according to the functional purposes of the spending, with the exact boundaries being based on the categories set out in the ICHA-HC functional classification. It follows that any analysis of health expenditure by beneficiary that is elaborated as an extension of SHA be also limited in its scope to expenditures falling within such boundaries. That being noted, it is still necessary to further narrow the scope of expenditures that are considered in analyses of expenditure by beneficiary. Since SHA itself defines the boundary of health care expenditures using a functional approach, it is sensible and appropriate to do this in a similar manner.

All expenditures according to the functional classification relate to the provision of health care services to individuals or groups of individuals (except parts of prevention and administration), and can therefore be considered as being potentially available for the distribution of expenditure by beneficiary characteristics.

Most health care goods and services benefit individuals as opposed to groups or society as a whole, and the receipt of a service by one individual usually means that the benefit cannot benefit another. This naturally lends itself to a breakdown of expenditure by beneficiary, since the recipient individual can be identified.

Expenditures recorded in the capital account (capital formation and related memorandum items) pose a different set of issues, as they consist of expenditures whose purpose is to finance the inputs that the health care system needs for the future provision of health care. The benefits of the services created with these inputs typically cannot be assigned to specific individuals or groups of individuals, since the inputs will be utilised for producing many different services. For example, capital formation includes investment in new hospitals, which will benefit a wide range of individuals over a long period of time. At the same time, some of these expenditures might be partially assignable to specific groups of individuals. For example, the building of a clinic for diabetes treatment will specifically benefit individuals with diabetes, although in many instances it might not be known whether the facility might be converted in the future to some other purpose.

Expenditures in health care reporting items and the health care-related functional categories (HC.RI and HCR categories) can usually be assigned to groups of individuals and could be presented in the distribution of expenditure. However, it is important to note that the majority of these are not routinely measured or reported in current SHA implementations. It is therefore not recommended that these be systematically analysed.

Consequently, it is recommended that analyses of expenditures per beneficiary be restricted in scope to current health care expenditures (HC.1-HC.9), with the option to also analyse and present separately capital expenditures per beneficiary. Some analyses will indeed need to consider the allocation of expenditures on investments for those investments that can be easily separated and assigned to specific beneficiary groups.

Health accounts-based analyses of the distribution of expenditure by disease should be distinguished from costing studies. A disease costing study might seek to analyse the full impact of a disease, including economic impact or impact on the quality of life. These



dimensions would not be included under expenditure by disease, as explained in earlier paragraphs. Expenditures broken down by beneficiaries, as by disease, will distribute current spending for health functions HC.1 through to HC.9. Expenditures related to a person can always be attributed to an individual with a specific condition or disease. Expenditures on groups whose health status can either be related to a disease (e.g. preventive care for diabetes) or to the whole population can be distributed equally across all persons. Therefore, expenditure by disease in this framework only classify direct medical costs, and exclude indirect and intangible costs that are also sometimes included in costing studies.

### **Linkage to main SHA estimates**

Calculating expenditure by beneficiary characteristics involves a consideration of the use and receipt of the associated services or goods. Ideally, this necessitates that expenditures be analysed at a detailed level of individual transactions at the point of provision. All such transactions can then be described according to the type of service involved, the provider generating the service and the type of financing used to cover the service. Consequently, the transactions can in theory be directly mapped or assigned to a provider, a function and a financing scheme. It would therefore be helpful to link analyses to at least one of the main SHA classifications (HC, HP, HF) to produce a matrix, rather than simply distributing current expenditure on health care according to the beneficiary characteristics. In particular, linking expenditure by patient characteristics to the functional classification facilitates comparability between health systems by ensuring neutrality from the point of view of provision and financing (even if data sources come from financing or provider sides).

The revenues of financing schemes (FS) classification provides information on the contribution mechanisms (premiums, social contributions, etc.) of the financing schemes (HF). The transactions involved with revenues and financing schemes normally do not occur at the same time as the transactions that take place between providers and patients, and, in fact, typically take place at a different level within the health care financing system. For example, the payments of premiums or social contributions by private enterprises and households to health insurance schemes take place at separate times than the use of the scheme funds to pay providers and involves separate transactions (in fact, the collection of funds by the scheme is administered separately both in time and space from the payments of benefits). In most cases, when a scheme's funds are used to pay a provider, the payment takes place only after the funds received have been pooled, thus making it impossible to directly identify the revenue source of the money spent to pay for service provision, unless it was targeted funding. This means that the distribution of expenditures by revenues of schemes can only be imputed by making a number of arbitrary assumptions about how pooled spending should be assigned, and as such, the validity of such a distribution is questionable. However, countries may be interested in making such estimations. For example, retracing the revenues of schemes' expenditure on health by region could be particularly interesting for countries that rely heavily on external funding.

### **Classifications of beneficiaries**

Taking recent experience into account and in light of the perceived demand for analyses by patient characteristics in an international context, the following are the

principal types of characteristics that a standard framework for a beneficiary classification might require:

- Age and gender;
- Type of disease or condition;
- Socioeconomic status;
- Geographical region.

Countries may wish to adopt other classifications based on their need for information and their particular policy needs. For example, some countries may be interested in comparing expenditures on health between the insured and non-insured populations. For each of the four proposed groupings, the guidelines below provide further details.

### ***Age and gender***

Expenditures by age and gender are probably the most established form of distributional or beneficiary expenditure. Expenditures in relation to age and gender have acquired increasing importance owing to the growing attention being given to the implications of population ageing for health care systems and health care financing. Such analyses require that expenditures be classified with sufficient detail in the age categorisation to show the significant variations in spending that exist, and to permit adequate modelling of the impact of future changes in age structure.

In recent years, several studies<sup>4</sup> have attempted to extend the health accounts framework to look at spending by age and gender. Many of these also incorporate expenditure by disease. These studies have demonstrated the general feasibility of estimating expenditures by age and gender in a wide range of national settings and data contexts.

Because of the importance of the impact of ageing and disease at opposite ends of the scale, it is suggested to include smaller age classes for the very young and the older population. Thus, when reporting expenditures by age and gender at the international level, it is suggested that 5 year age groups<sup>5</sup> up to 95 (with the 0 year age group separated) would allow for full coverage of most types of policy relevant groupings across the world. However, countries or regions are obviously free to aggregate these classes, or to break them down further, as is most relevant to their policies or corresponds best to the non-expenditure information with which the produced results may be used. This classification is primarily for use in inter-country comparisons, but countries or groups of countries should use other classifications that respond to country-specific policy needs or feasibility issues, or to facilitate comparison with particular countries, where appropriate.

### ***Disease***

Considerable work has been done in recent years on estimating expenditures by type of disease within SHA framework, both at a national level and in comparative analyses of countries.<sup>6</sup>

The OECD guidelines for the estimation of health accounts by age, gender and disease correspond closely to approaches also implemented outside the OECD – in Sri Lanka, for example – demonstrating their general applicability. These guidelines and country experiences provide a rich basis from which to develop a standard classification for analyses of expenditure by disease.

The internationally accepted standard for classifying diseases is the WHO-published International Classification of Disease (ICD), which is currently in its tenth revision (WHO, 2004). All recent work in the area of expenditure by disease utilises disease categorisations based on the ICD-10 (or the earlier ICD-9) classifications. The ICD has been developed to categorise diseases by diagnosis in order to collect mortality and morbidity information (i.e. on prevalence, incidence, etc.), which is used in a wide range of public health policy areas. This information supports decision makers with regard to disease prevention, public health programmes, treatment and reimbursement schemes. The ICD framework helps compare information across time and between countries. While ICD-10 is more frequently used in hospital settings than in outpatient settings, the 11<sup>th</sup> revision (in development) is seeking to adjust the classification to provide a better framework for primary care purposes.

However, the ICD-10 system in its full implementation defines more than 30 000 different disease classes and about 1000 agreed levels of classes for international reporting. The production of estimates according to this agreed level is impractical in terms of actual final presentation and often is not feasible given the sample sizes and level of disease coding of many primary data sources. These constraints necessitate the use of a more aggregated grouping of ICD classes. Countries that produced expenditure by disease have restricted themselves to expenditures by broad ICD-10 chapters (BASYS *et al.*, 2006), or have adopted nationally-specific groupings of ICD codes, as in the United States (Roehrig *et al.*, 2009), or they have used WHO Global Burden of Disease (GBD) categorisations (or a modified version of it), as in Australia or Sri Lanka. The GBD is itself a grouping or meta-classification of ICD classes.

A variety of other international classifications have also been used by countries to estimate specific areas of expenditure by disease. Some countries – mainly EU Member States – have used the International Shortlist for Hospital Morbidity Tabulation (ISHMT) to collect information on inpatient cases by disease (WHO, 2005d updated in 2008). The list, while very extensive, does not seek to be exhaustive. The ISHMT system is not widely used outside Europe, and reflects a bias that arises from its primary use in hospital settings.

Another major classification that is better adapted to health service transactions in the primary care setting is the International Classification of Primary Care (ICPC), currently in its second version (ICPC-2). The ICPC was developed to classify diseases, symptoms, conditions and reasons for a patient's encounter (including non-medical ones) with the general/family practice and primary care setting, as the ICD-9 system was found to be deficient in its descriptive scope owing to its focus on diseases and its roots in the classification of mortality statistics.<sup>7</sup> However, the ICPC, although WHO-endorsed, has not been universally adopted at the global level. Recent efforts have produced mappings of the ICPC to ICD-10, overcoming the problem of comparability (Lamberts and Wood, 2002). The ICPC may be useful as an intermediary classification when processing data for producing a full distribution of expenditure by disease, but is not recommended for purposes of international reporting of the full distribution.

One other classification that should also be mentioned is the Anatomical Therapeutic Chemical Classification (ATC), developed by WHO to classify medicines. Although it would lend itself for classifying expenditures on medicines, it cannot be mapped to the ICD, since it conceptually refers to quite different domains of analysis, and cannot easily be used for classifying expenditure by disease.

Any classification used in comparative analyses of the distribution of expenditure by disease/condition will inevitably be based on the ICD system, as it serves as a unique reference point for international classification to which almost all other international and national classifications are mapped (or can potentially be mapped). However, for reporting and comparative purposes, an international classification must provide a level of aggregation that is both feasible in a wide range of countries and useful from a policy perspective.

In the absence of a single international standard classification for collecting data, two alternatives are recommended: the GBD classification (slightly adapted) at a high level of aggregation and the ICD-10 main chapters. A categorisation of disease based on the GBD classification system is found to be most appropriate for international comparisons of expenditure by disease. While the ICD framework seeks to illustrate mortality and morbidity statistics, the GBD classification is geared towards epidemiological information and the reasons for disabilities or deaths. The WHO GBD classification also has the advantage of having primarily been developed for comparison of disease burdens in a wide range of both developed and developing countries. That said, it is important to reiterate that the GBD is an aggregated grouping of ICD classes, and so can be fully mapped to ICD classes.

In case the use of the adapted GBD is not possible (due to lack of detailed ICD second and third-digit level information), an alternative for international comparison can be found in the use of the ICD-10 at main chapter level. The prime advantage is the availability of data at chapter level and the widespread use of this classification, as well as the comparability across countries and over time.

In the tables below, the two classifications are presented: Table 10.1 presents the GBD two-digit groupings; Table 10.2 presents the ICD-10 main chapters. More information on the classifications of the GBD and the ISHMT can be found in Annex F.

A significant number of health system contacts and therefore expenditures are not linked to specific diseases, but to undefined conditions or to general health screening or investigations. An additional category should thus be introduced to the GBD to capture expenditures related to *Unspecified abnormal clinical and laboratory findings, symptoms, signs and ill-defined conditions and contacts with health services; factors influencing health status and contacts with health services* (GBD.nsk).

Ill-defined conditions refer to expenditures allocated to symptoms for which no diagnosis classifiable elsewhere is recorded. This “includes the more ill-defined conditions and symptoms that point with perhaps equal suspicion to two or more diseases or to two or more systems of the body, and without the necessary study of the case to make a final diagnosis. Practically all categories in this group could be designated as “not otherwise specified”. The conditions and signs or symptoms consist of: a) cases for which no more specific diagnosis can be made even after all facts bearing on the case have been investigated; b) signs or symptoms existing at the time of initial encounter that proved to be transient and whose causes could not be determined; c) provisional diagnoses in a patient who failed to return for further investigation or care; d) cases referred elsewhere for investigation or treatment before the diagnosis was made; e) cases in which a more precise diagnosis was not available for any other reason; and f) certain symptoms which represent important problems in medical care and which it might be desired to classify in addition to a known cause.”

Table 10.1. **Classification of disease/condition by Global Burden of Disease (GBD) category**

| GBD code               | Cause   | ICD-10 code  |
|------------------------|---|--|
| <b>GBD.1</b>           | <b>Communicable, maternal, perinatal and nutritional conditions</b>   | A00-B99, G00-G04, N70-N73, J00-J06, J10-J18, J20-J22, H65-H66, O00-O99, P00-P96, E00-E02, E40-E46, E50, D50-D53, D64.9, E51-64   |
| GBD.1.1 <sup>8</sup>   | Infectious and parasitic diseases   | A00-B99, G00, G03-G04, N70-N73   |
| GBD.1.2                | Respiratory infections  | J00-J06, J10-J18, J20-J22, H65-H66   |
| GBD.1.3                | Maternal conditions   | O00-O99  |
| GBD.1.4                | Perinatal conditions  | P00-P96  |
| GBD.1.5                | Nutritional deficiencies  | E00-E02, E40-E46, E50, D50-D53, D64.9, E51-E64   |
| GBD.1.9                | All other communicable, maternal, perinatal and nutritional conditions  |  |
| <b>GBD.2</b>           | <b>Non-communicable conditions</b>  | C00-C97, D00-D48, D55-D64 (minus D 64.9) D65-D89, E03-E07, E10-E16, E20-E34, E65-E88, F01-F99, G06-G98, H00-H61, H68-H93, I00-I99, J30-J98, K00-K92, N00-N64, N75-N98, L00-L98, M00-M99, Q00-Q99 |
| GBD.2.1                | Malignant neoplasms   | C00-C97  |
| GBD.2.2                | Other neoplasms   | D00-D48  |
| GBD.2.3                | Diabetes mellitus   | E10-E14  |
| GBD.2.4                | Endocrinal disorders  | D55-D64 (minus D64.9), D65-D89, E03-E07, E15-E16, E20-E34, E65-E88   |
| GBD.2.5                | Neuropsychiatric disorders  | F01-F99, G06-G98   |
| GBD.2.6                | Sense organ disorders   | H00-H61, H68-H93   |
| GBD.2.7                | Cardiovascular diseases   | I00-I99  |
| GBD.2.8                | Respiratory diseases  | J30-J98  |
| GBD.2.9                | Digestive diseases  | K20- K92   |
| GBD.2.10               | Diseases of the genitourinary system  | N00-N64, N75-N98   |
| GBD.2.11               | Skin disorders  | L00-L98  |
| GBD.2.12               | Musculoskeletal diseases  | M00-M99  |
| GBD.2.13               | Congenital anomalies  | Q00-Q99  |
| GBD.2.14               | Oral diseases   | K00-K14  |
| GBD.2.99               | All other non-communicable conditions   |  |
| <b>GBD.3</b>           | <b>Injuries</b>   | V01-Y89  |
| GBD.3.1                | Unintentional   | V01-X59, Y40-Y86, Y88, Y89   |
| GBD.3.2                | Intentional   | X60-Y09, Y35-Y36, Y870, Y871   |
| GBD.3.9                | All other injury conditions   |  |
| GBD.nsk.               | Unspecified abnormal clinical and laboratory findings and other ill-defined conditions and contacts with health services; factors influencing health status and contacts with health services | R00-R99, Z00-Z99   |
| <b>Reporting items</b> |   |  |
| GBD.RI.1               | Injuries to the head  | S00-S09  |
| GBD.RI.2               | Injuries to the neck  | S10-S19  |
| GBD.RI.3               | Injuries to the thorax, Injuries to the abdomen, lower back, lumbar spine and pelvis  | S20-S39  |
| GBD.RI.4               | Injuries to the shoulder and upper arm, Injuries to the elbow and forearm, Injuries to the wrist and hand   | S40-S69  |
| GBD.RI.5               | Injuries to the hip and thigh, Injuries to the knee and lower leg, Injuries to the ankle and foot   | S70-S99  |
| GBD.RI.6               | Injuries involving multiple body regions, Injuries to unspecified part of trunk, limb or body region  | T00-T14  |

Source: Global Burden of Disease 2008 Study, forthcoming.

Contacts with health services are not restricted to the treatment or investigation of current illness or injury. Episodes may also occur when someone who may not currently be sick requires or receives limited care or services.

Table 10.2. **International statistical classification of diseases and related health problems (ICD-10) 10th revision**

| ICD Chapter | Blocks  | Description   |
|-------------|---------|---|
| I           | A00-B99 | Certain infectious and parasitic diseases   |
| II          | C00-D48 | Neoplasms   |
| III         | D50-D89 | Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism |
| IV          | E00-E90 | Endocrine, nutritional and metabolic diseases   |
| V           | F00-F99 | Mental and behavioural disorders  |
| VI          | G00-G99 | Diseases of the nervous system  |
| VII         | H00-H59 | Diseases of the eye and adnexa  |
| VIII        | H60-H95 | Diseases of the ear and mastoid process   |
| IX          | I00-I99 | Diseases of the circulatory system  |
| X           | J00-J99 | Diseases of the respiratory system  |
| XI          | K00-K93 | Diseases of the digestive system  |
| XII         | L00-L99 | Diseases of the skin and subcutaneous tissue  |
| XIII        | M00-M99 | Diseases of the musculoskeletal system and connective tissue  |
| XIV         | N00-N99 | Diseases of the genitourinary system  |
| XV          | O00-O99 | Pregnancy, childbirth and the puerperium  |
| XVI         | P00-P96 | Certain conditions originating in the perinatal period  |
| XVII        | Q00-Q99 | Congenital malformations, deformations and chromosomal abnormalities                                |
| XVIII       | R00-R99 | Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified             |
| XIX         | S00-T98 | Injury, poisoning and certain other consequences of external causes                                 |
| XX          | V01-Y98 | External causes of morbidity and mortality  |
| XXI         | Z00-Z99 | Factors influencing health status and contact with health services                                  |
| XXII        | U00-U99 | Codes for special purposes  |

Source: WHO (2004).

There also needs to be some consideration regarding the classification of injuries. While the GBD framework proposes only a class by cause of injury (*e.g.* Road traffic accidents, Poisonings, Falls, Fires, Drowning, Self-inflicted injuries, Violence, War), the ICD offers both reporting by cause (ICD Chapter XX) and by nature or body region (ICD Chapter XIX; for example, injuries to the head, to the neck, to the thorax, to the abdomen, to the shoulder and upper arm, to the hip and thigh, and so on). It is important to understand this distinction. It is suggested that for policy information relating to public safety and prevention it is preferable that injuries be classified by cause (road traffic and others), but countries may choose to break down Injuries by body regions as Reporting Items, if that is more commonly used in their statistical reporting and analysis.

### Co-morbidity

Many patient contacts from which the necessary primary data are generated can also be related to secondary or underlying diseases and conditions, such as diabetes or mental disorders. The problem of co-morbidity and the allocation of expenditure by disease to the primary diagnostic approach is that it could underestimate the spending on some of these underlying diseases. In analysis of HIV/TB, allocation of resources by primary diagnosis may give an expenditure distribution that is misleading, depending on the policy perspective. For example, expenditures for an HIV patient treated for TB, and external resources allocated to HIV, which might cover spending on HIV patients with TB, would all fall under HIV. This would lead to an underestimate of TB expenditures.<sup>9</sup>

There are three potential options for dealing with this issue: i) to classify expenditures according to the primary diagnosis, ii) to equally pro-rate the expenditures over the applicable diagnoses and iii) to distribute expenditures across the applicable diagnoses using disease-specific weights that reflect the relative resource intensity involved.

Although the third is conceptually the most ideal and provides a clear link between disease and total spending, in practice the data requirements to support such an approach are immense and in most countries will not be currently met. The second option is more feasible, but in many situations the available data will only have recorded the primary diagnosis, and not all co-morbidities. Given this, it is generally agreed that the standard approach should follow the first option.<sup>10</sup> That is, to classify expenditures according to the primary diagnosis,<sup>11</sup> except in those instances where the primary diagnosis cannot be differentiated from other diagnoses in the available data, in which case the expenditures should be pro-rated equally across all relevant conditions.

### **Socioeconomic status**

Health outcomes vary in all countries by level of the socio-economic status of individuals, and such disparities are a major policy concern both within countries and at a global level. Consequently, policy makers and others are interested in understanding how health care resources and expenditures are distributed across people at different socioeconomic levels. The WHO Commission on Social Determinants of Health (WHO, 2008a) has called on all governments to routinely measure such disparities.<sup>12</sup>

Generally speaking, the results of such exercises can be presented either in the form of tables or as single statistics, such as the concentration index, that summarise the overall level of inequality in spending. However, in the context of extending SHA framework to analyse the distribution of spending by socioeconomic status, an approach that directly apportions health expenditure by different population groups and presents this in tabular form is desirable. To do this, beneficiaries need to be ranked and grouped according to their relative socioeconomic status, including potentially the levels of their living standards.

Taking into account the experience gained in past studies and their relative conceptual merits, as well as the frequently expressed needs of policy makers, it is recommended, in international reporting of the distribution of expenditure by socioeconomic status, that beneficiaries be classified according to quintiles of their relative socioeconomic level, as represented by levels of living standards.<sup>13</sup>

However, several alternative approaches are available and commonly used to measure relative affluence: income, expenditure and consumption, or wealth (stock concept as opposed to flow), or even a combination of several indicators such as income, education and occupation. In general, economic theory prefers consumption, as it is most correlated with long-term economic well-being and resources. However, consumption is often hard to measure, as it requires the imputation of the value of goods and services consumed which are not paid for or associated with measurable financial transactions, such as living in a self-owned house. In the absence of data to compute consumption, the next best alternative would in most cases be expenditure, and then income. In certain settings, where the relevant data sources do not permit computation of either household consumption or expenditure, a wealth index based on ownership of assets can be used. A wealth index correlates well in many surveys with consumption and expenditure measures, and wealth is also correlated with long-term living standards, so in practice it can be considered a better measure than income measures.

Income, expenditure and consumption are commonly measured in household surveys, which are the primary data source for this type of distributed expenditures. It should be noted at this point that these measures typically will require the use of household survey data and are not generally feasible using provider-generated data.

Household surveys typically provide a measure of the consumption of a household. The total aggregate consumption of a household is not by itself a good measure of the relative well-being of household members, since this also depends on how many individuals share this consumption. This points to the need to adjust household consumption for household size. Several approaches are available in the literature to do this. One is simply to take the value of per capita consumption, which is derived by dividing total household consumption by the size of the household. The weakness of this approach is that it takes into account neither the different consumption needs of adults and children, nor any economies of scale that households can achieve by pooling household consumption. In response, economists have proposed equivalence scales to adjust household consumption to take into account the actual size and age composition of the household. There is no standard equivalence scale that is widely used across different organisations or in the literature. Some equivalence scales are also specific to individual countries, and must be estimated separately by each. More detailed discussion of the different statistical computation methods that can be used and the issues involved is provided in recent World Bank guidelines (O'Donnell *et al.*, 2008).

So the first and preferred option to use as an instrument for classifying personal socio-economic status per person is consumption, followed by expenditure, income<sup>14</sup> and finally a wealth index. However, in view of the difficulties in estimating personal consumption, spending or income data, groupings per household are used instead.

### **Geographical region**

WHO has produced detailed guidelines for the estimation of the distribution of expenditure by geographical region (WHO, 2008b). In practice, the classification of areas must be done separately in each country, taking into account both policy needs and data availability and feasibility. Consequently, no standard classification of regions is feasible.

Nevertheless, two important issues are noted. The first concerns the basis on which expenditure should be assigned to an individual. Two alternatives are available. The first is to assign expenditures to regions according to the location where the medical service is provided, and the second is to assign expenditures according to the region of residence of the beneficiary. These guidelines recommend the latter for consistency with overall health accounts boundaries and principles (more information can be found on the former in the WHO guidelines). However, in practice, the data sources that are used to apportion expenditures often relate to where the expenditures were incurred, making this second approach not feasible. In these situations, it is often necessary to compromise and take a pragmatic approach.

The second issue is the treatment of collective health services expenditures. In most studies, collective services are ignored. It might be thought that this would have little effect on the expenditure by region of the beneficiary, since these expenditures can only be prorated across all individuals. However, in practice there can be variation in such expenditures across national regions, since in most countries the budgets for such services are to some extent separate for different regions. It is recommended that all such studies fully analyse such expenditures (HC.6-HC.7), apportioning them equally within relevant geographical populations.

All health account dimensions might be considered when building regional accounts. Policy makers might be interested in understanding the financing mechanisms in place in



each region in order to focus policies on the regions with more inequalities. Some regions may find that their households bear the largest share of funding or health care payments, or that financing schemes may be used more in some regions than in others. Where the resources are being spent also informs policy makers about the patterns of spending in regions, such as variations in providers or in functions (*e.g.* pharmaceutical goods), which can lead to creating policy incentives for a more efficient use of resources or a better redistribution of funds.

When developing expenditure by regions, actual accounts can be built. We would call these regional accounts. Health accounts dimensions are computed for each region and matrices are built per region (for example, crossing revenues by schemes, schemes by functions, etc.). These matrices are recommended for expenditure by regions, while they are not feasible for other beneficiary expenditure breakdowns.

Expenditure by regions can also be expanded to expenditure on the production of each region. This is particularly interesting when governments need to understand the production capacities of their regions, especially in relation to subsidies.

### Possible methodological approaches

In all cases, regardless of the type of classification, the estimation of expenditure by beneficiary characteristics requires additional data sources, beyond those used to construct the health accounts. Detailed guidelines on how different distributional analyses can be conducted are available in complementary guides on how to produce health accounts in various contexts/regions. Nevertheless, some basic principles and issues are described here. They serve to give indications on how to proceed in estimating expenditure by beneficiaries, for each type of beneficiary.

In contrast to studies that are not linked to the health accounts, SHA-based expenditure by beneficiary constrains estimates to the overall estimates of national health spending. Thus, SHA-based beneficiary analyses must generally adopt what is known as a top-down approach. In a top-down approach, the major components of spending in a health system are first identified (cost units), and then other data sources are used to distribute each component of spending across the population according to the beneficiary classification being used. The top-down approach can be contrasted with a bottom-up approach, which is usually used in specific disease cost-of-illness studies. The bottom-up approach depends on the availability of detailed patient-level data, which are used to directly estimate the expenditure by different patient characteristics. Such an approach may be desirable or even necessary in some situations, and should be adapted to support a top-down approach. This can be done by using the patient-level data to build up a picture of overall spending by patient characteristics, and then applying the resulting distribution to the estimates of national spending, thus combining a bottom-up approach with a top-down approach.

The general strategy adopted should proceed through the following steps:

- Identification of major spending areas or components within national health spending as reported in SHA accounts;
- Identification of suitable data sources that permit the breakdown of each identified major spending area by beneficiary characteristics;
- Use of the identified data sources as distribution keys to distribute spending across different beneficiary characteristics, for example, disease, age and gender, concurrently.

A spending area or component can be defined from a provider, a functional or a financing perspective. The choice of spending areas in this approach depends on the beneficiary characteristic and the availability of data. It will thus vary between countries, and no general recommendations are made here. For example, most of the countries participating in the Eurostat study of expenditure by age, gender and disease reported that estimates by type of provider were most feasible (BASYS *et al.*, 2006). This was because most relevant data consisted of patient records generated at the provider-level. However, in a comparable US study (Roehrig *et al.*, 2009), a large proportion of the estimates were developed by analysing person-based expenditures generated in a household survey, which allowed direct mapping to conditions and other personal characteristics.

In general, studies of expenditure by disease will mostly rely on provider-generated data, since these tend to be coded at the necessary level of detail with respect to diagnoses. However, analyses of expenditure by different socioeconomic status will generally rely on household survey data, as typically only household surveys collect and report data that allow the status of a household to be assessed.

Once a spending area is identified, a data source must be used to distribute the expenditure by beneficiary characteristics. Suitable data sources will act as distributional keys, which provide information on the proportionate distribution of spending. For example, if inpatient expenditures are the spending area, large samples of patient records can be used to distribute expenditure by diagnosis. In an ideal situation, these patient records would contain details of the actual expenditures incurred, but in other instances they will not. In the latter cases, the cost contribution of each patient might need to be estimated on the basis of other data, such as length of stay, medicines dispensed and other hospital facilities utilised.

The basic approach outlined above lends itself to expenditure by beneficiary characteristics and one ICHA dimension. Although desirable, in practice estimating a tri-axial distribution of spending by provider, function and financing scheme is more difficult and requires more detailed data. Specifically, it requires that the patient-level data used allow the coding of each transaction by all three dimensions. Certainly, at the current time this is often not feasible at the full level of detail used in the major ICHA classifications,<sup>15</sup> even in OECD economies (BASYS *et al.*, 2006). Nevertheless, this should be seen as the ultimate objective.

In situations where the primary data source does not support the coding of expenditure by all three dimensions of provider, function and financing scheme, an alternative approach is to use a second data source to impute the distribution of spending along the additional dimensions.

### **Estimation of expenditure by disease**

Most studies to date have used a prevalence-based method, in which all costs due to prevalent cases of disease in a given period are aggregated to total costs. This is the approach recommended here when reporting at the international level. There are various approaches to the allocation of expenditure to disease which, for example, may use different units of analysis, and thus are best adapted for different uses (Rosen and Cutler, 2009).

As soon as a definition study has been completed and utilisation data are obtained, the direct medical cost calculations by disease, using a prevalence-based method with a

top-down attribution of costs, is a fairly straightforward procedure. It can be divided into four steps:

- 1) Selection of a suitable year for analysis and assessment of national health expenditure;
- 2) Partition of national health expenditure into homogeneous cost-units – i.e. displaying similar characteristics across provider and function dimensions, for example;
- 3) Construction of a detailed probability map (that is, the proportional distribution across all combinations of all dimensions) based on health care utilisation data retrieved from the collected data sources;
- 4) Multiplication of health expenditure for a homogeneous unit (from step 2) with the probability map (from step 3) to establish a partial cost of illness table for this unit, and aggregate partial tables for each unit to establish the total cost of illness (OECD, 2008).

### **Estimation of expenditure by geographical region**

The methodology described here is to be used for distributing expenditure on health by region of residence. It is taken from the WHO *Guide to Producing Regional Health Accounts* and it is proposed for expenditures that are made by national agencies, and which should be apportioned to regions using a top-down approach. However, where expenditures are made by sub-national agencies and where the data are generated at the sub-national level, it is recommended to use bottom-up approaches to compile the necessary estimates.

When data are not available on a sub-national basis, the expenditures under consideration can be distributed using proxy variables (sometimes called “keys”) as indicators of the likely distribution. In some cases, the sum of region-based estimates does not equal the national total, which is presumed to be more accurate. Typically, one can assume that the “error” – the difference between the regional sum and the national total – is proportionate across the regions, and the regional figures can be adjusted accordingly. For example, a one-off survey of household spending on health in Mexico was calibrated to national estimates produced from other data, producing state-level figures consistent with the national total and reflecting regional variations as found in the survey itself. In other cases, a closely related expenditure figure can serve as a proxy. For example, in Sri Lanka, provincial governments have their own budgets for medical supplies. At the same time, the central health ministry, which purchases supplies and distributes them to the provinces, accounts for a large part of public spending on medical supplies. The central ministry does not maintain clear records of how its centrally procured supplies are distributed, so Sri Lanka’s health accountants distribute the central ministry spending among provinces by assuming that the ratio between provincial and central spending on supplies is identical across all provinces. In other cases, the proxy will be some measure of inputs or outputs. For example, because labour accounts for a large share of expenditure, regional estimates of spending on health personnel (preferably wages but, failing that, work hours) might be used to allocate a national total among regions. The number of inpatient days might be used to allocate a national estimate of ministry hospital spending if facility level costs are not known. Some proxy measures can be more elaborate than a single indicator. For example, if information exists regarding the prices of multiple inputs into a cell in the health accounts, a sort of market basket can be developed as a distribution tool.

Distributing spending equally on a population basis should be a last resort, except in the case of population health measures intended to protect the population on a collective basis. In practice, most health resources are not distributed according to the population to

be served, so the assumption of equal distribution per capita is unlikely to produce meaningful conclusions in terms of the equity, efficiency, or effectiveness of the financing flows. However, if no better proxy measure is available, this method can be used as a temporary solution, pending discussions with sub-national authorities about spending in their jurisdiction and the development of a more relevant tool for monitoring and assessment. Of course, using proxy measures limits the conclusions that can be drawn from the results. For instance, when per capita data are used to construct one of the dimensions, nothing can be concluded about per capita distributions. When resource indicators are used, a productivity analysis may be meaningless. In any case, the proxy measure must be chosen carefully, as an inappropriate proxy can distort the regional accounts to such an extent that they become meaningless (WHO, 2008b, 5.17-5.22).

### **Estimation of expenditure by socioeconomic status**

The following approach is based on work by the EQUITAP network and on analyses by the ECuity network. Health accounts statistics should be used to derive the total aggregates of spending by financing scheme, or by provider and function. Household survey data should then be used to distribute these expenditures by socioeconomic status (SES).<sup>16</sup> The main aggregates to distribute are the expenditures of households, government, insurance, NGOs and firms on health care.

- Household survey data are typically used for allocating health expenditure by quintile of socioeconomic status.
- Distribution of public subsidies for health care (using the benefit incidence analysis) is computed from estimates of government subsidies to outpatient and inpatient care. Where possible, the distribution is done at provincial or regional level using household data and hospital unit costs data. Only health services that potentially receive a subsidy from the state-controlled budget should be included (usually all publicly provided health care services).

### **Notes**

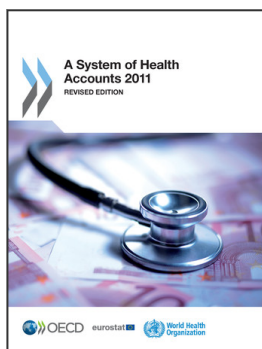
1. Polder was one of the first to try to link the data on disease, age and gender to the health accounts data. See Polder *et al.* (2002); Polder and Achterberg (2004).
2. Table 5.6 “Personal health expenditure by type of financing agent and by age and sex of the population”; Table 5.7 “National health expenditure by type of financing agent and by per capita household expenditure quintile”; Table 5.8 “National health expenditure by type of financing agent and by disease group”; Table 5.9 “National health expenditure by type of financing agent and by region”.
3. The GBD 1990 Study (1) classified disease and injury causes using a tree structure. The first level of disaggregation comprised three broad cause groups:
  - Group I: Communicable, maternal, perinatal and nutritional conditions;
  - Group II: Non-communicable diseases;
  - Group III: Injuries.

Group I causes consist of the cluster of conditions whose mortality typically declines at a faster pace than all-cause mortality during the epidemiological transition. In high-mortality populations, Group I dominates the causes of death, whereas in low-mortality populations, it accounts for only a small proportion of deaths. Each group is divided into major subcategories. For example, cardiovascular diseases and malignant neoplasms (cancers) are two major cause subcategories of Group II. Beyond this level, there are two further disaggregation levels. The major cause subcategories are closely based on the chapters of the International Classification of Diseases (ICD) (2), with some important differences. Whereas the ICD classifies chronic respiratory diseases and

acute respiratory infections into one chapter, the GBD classification included acute respiratory infections in Group I. Similarly, infectious diseases such as meningitis and cystitis included in the ICD chapters – neurological conditions and genito-urinary conditions, respectively – have also been moved to Group I.

4. Of particular relevance are national studies in Australia (AIHW, 2010), the Netherlands and the United States (Roehrig *et al.*, 2009), the Eurostat Feasibility Study of Health Expenditures by Patient Characteristics (BASYS, CEPS and IGSS 2006), WHO-sponsored pilot studies in Sri Lanka and Thailand, and the OECD Guidelines on Estimating Expenditure by Disease, Age and Gender under SHA Framework (OECD, 2008).
5. Five-year age groups: 0, 1-4, 5-9, 10-14, etc., up to 94, and finally adding 95+. An alternative can be a distinction in 10 year age groups: 0, 1-9, 10-19, etc., up to 99 and adding 100+.
6. See the Australian and US studies referred to in the footnote above. In addition, the Eurostat study of EU member states demonstrated the feasibility of distributing expenditure by disease categories, whilst two WHO-supported pilot studies have demonstrated the feasibility of comparable estimates in two developing countries.
7. "Recognising the problems of the ICD, and the need for an internationally recognised classification for general practice, the WONCA Classification Committee [now the Wonca International Classification Committee (WICC)] designed the International Classification of Health Problems in Primary Care (ICHPPC), first published in 1975, with a second edition in 1979 related to the 9th revision of ICD. Although this provided a section for the classification of some undiagnosed symptoms, it retained the basic ICD structure and was still inadequate. A third edition (ICHPPC-2-Defined) in 1983 had added to it criteria for the use of most of the rubrics, greatly adding to the reliability with which it could be used, but not overcoming its deficiencies for primary care. A new classification was needed for both the patient's reason for an encounter and the provider's record of the patient's problems. (...) A small working party was formed under the auspice of WHO (...). Over several years of work, this working party developed the Reason for Encounter Classification (R FEC), which, after extensive field trials involving many members of WICC, eventually evolved into ICPC." [www.globalfamilydoctor.com/wicc/icpcstory.html](http://www.globalfamilydoctor.com/wicc/icpcstory.html). N.B. The World Organisation of National Colleges, Academies (Wonca) and Academic Associations of General Practitioners/Family Physicians or in short World Organisation of Family Doctors is an international organisation of national colleges, academies and organisations concerned with the academic aspects of general family practice. Wonca was founded in 1972.
8. Infectious and parasitic diseases includes diseases such as tuberculosis, HIV/AIDS and malaria at the third-digit level, for which expenditure estimates are highly policy relevant in a large number of countries.
9. This touches upon the difference between expenditure by diseases and disease-specific accounts. In the example here, the same joint spending on HIV/TB would be accounted for under both disease-specific accounts. However, when distributing spending by diseases, double-counting is not possible, and either spending is allocated to one disease (risking over- and under-estimations), or a special combined class is created.
10. This is also the solution recommended in the OECD guidelines.
11. Here in the adapted GBD classification used in this chapter it is proposed to follow the convention that the primary cause is the leading cause in which the data should be classified, which is opposite to the choice made in the GBD classification.
12. There is a long history of analysing expenditures by the socioeconomic status of beneficiaries, and methods for the analysis of micro-data for this purpose are well developed. Of particular note is the work sponsored by the European Commission since the early 1990s to examine equity in health care financing and delivery in European countries, with a similar effort in the following decade in Asian countries. This work, led by the ECuity network in Europe has been examining disparities in health care spending in different European countries (van Doorslaer, 1993) for two decades, and in Asia the EQUITAP network, which has emulated ECuity in Asia since 2000, has been supporting similar work (Rannan-Eliya and Somanathan, 2006). At the same time, these efforts have rarely been directly linked to estimates of national spending as derived from the health accounts, although EQUITAP has done this in countries where the data permit.
13. Note that what is presented in subsequent paragraphs is only one dimension of socioeconomic status. SES is in fact a wider concept, potentially involving many dimensions other than income or consumption, such as education or work status.

14. Equivalence or economies of scale issues apply equally to the use of expenditure or income measures.
15. Sri Lanka's disease accounts project does estimate by three dimensions plus disease, however, there was a need to aggregate the classifications in at least one or two ICHA dimensions. See [www.ihp.lk/research/project.html?project\\_id=HA-009](http://www.ihp.lk/research/project.html?project_id=HA-009).
16. Where possible, aggregates should be at the sub-national level if there are significant variations in spending between regions.



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