

# Estimating out-of-pocket spending for national health accounts



World Health  
Organization

Ravi P. Rannan-Eliya  
Institute for Health Policy  
Colombo 2  
Sri Lanka

World Health Organization  
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## Foreword

National Health Accounts has highlighted the unexpected high level of out of pocket expenditures (OOPs) in many low and middle income countries. High levels of OOPs lead to catastrophic spending and impoverishment of households. Societies and governments need to set strategies to decrease high levels of OOPs and provide financial protection, and to monitor the impact of their strategies. Comprehensive measurement of the level and distribution of OOPS across time is mandatory.

OOPS however, has proved to be one of the components with least reliability in most health accounts. Guidance is required to promote best practice in the identification of the available data sources, assessment of the advantages and limitations of these sources and the estimation of OOPs, maximizing the information presented in the different data sources.

Reflections contained in this document are expected to inform country experts who are also invited to share further experiences linked to this subject and to promote a collective learning process.

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**ABBREVIATIONS USED IN THIS DOCUMENT**

GDP	gross domestic product
ICHA	International Classification for Health Accounts
MOH	Ministry of Health
NGO	nongovernmental organization
NHA	national health accounts
OECD	Organisation for Economic Co-operation and Development
ONS	Office for National Statistics
OOPS	out-of-pocket spending
SHA	system of health accounts
SNA	system of national accounts
UNDP	United Nations Development Programme
WB	World Bank
WHO	World Health Organization

# 1. INTRODUCTION

## 1.1 Background

More and more countries around the world are producing and using national health accounts (NHA). A number of useful guides have already been published in support of these activities, such as WHO's *Guide to producing national health accounts* (WHO, 2003), and *SHA guidelines: practical guidance for implementing a system of health accounts in the EU* (ONS, 2004).

Despite the existence of these guides, estimation of private expenditures, and specifically out-of-pocket spending (OOPS), continues to present difficulties in many countries. This is typically the largest or second-largest source of health care financing in developing countries, as well as the largest source of error in estimates of national health spending. The estimation difficulties not only frequently undermine the credibility of the health accounts, with the result that policy-makers may doubt the validity of the resulting policy implications, but also make international comparisons extremely problematic.

The different approaches used by health accountants in different countries may explain a large part of the reported differences in private expenditure. There is an increasing need for better and more standardized methods, as well as more detailed data on private spending, to permit valid intercountry comparisons of health expenditure.

These guidelines review and assess current approaches to estimation of household expenditure on health, in order to identify best practices. They also provide practical guidance aimed at improving existing methods and strengthening international comparability. They should be read in conjunction with the two more general guides mentioned above.

This document should not be viewed as the definitive guide to how these expenditures should be estimated. Methods are likely to continue to improve as more experience is gained in different countries around the world. Nevertheless, it does provide useful guidance, for both the producers and the users of health accounts, on judging whether a particular method meets current international best practice standards and whether appropriate approaches have been used.

## 1.2 The importance of improving estimates of private expenditure

Private expenditure consists of expenditure by households (out-of-pocket spending), firms, non-profit organizations and medical insurance schemes. Except in a few high-income countries, household out-of-pocket spending is the predominant component, and the one that poses the biggest challenges in estimation.

While most national estimates of private expenditure are not reliable, the relative size of private expenditure in relation to overall national health expenditure is fairly clear. On average, private expenditure on health accounts for 1.5–3.0% of gross domestic product (GDP) in most countries, and represents a higher share of overall spending on health in poor countries than in rich ones (Table 1).

**Table 1. Levels and share of private expenditure on health in countries at different income levels, 2003**

<b>GDP per capita (US\$)</b>	<b>Private expenditure on health, as % of GDP</b>	<b>Private expenditure on health, as % of total expenditure on health</b>	<b>Out-of-pocket spending, as % of private expenditure</b>
<1000	2.7	52	86
1000–9999	2.2	35	80
≥10 000	2.4	31	74

*Source: WHO, 2006.*

In most low-income and lower-middle income developing countries, private expenditure accounts for 25–60% of total expenditure on health; in most high-income economies, private expenditure accounts for only 15–25% of total expenditure on health. Moreover, most private expenditure is out-of-pocket spending, and this proportion is higher in poorer countries. This has an important consequence. In the richest countries, the size and trend of private expenditure have far less policy significance than in poorer countries and, consequently, obtaining accurate estimates of private, out-of-pocket expenditure is often not a priority for policy-makers or statisticians. A key implication of this is that the methods used in many developed countries may not be rigorous enough for poorer countries, which need more accurate estimates.

Difficulties in obtaining reliable estimates of private expenditure often undermine efforts to establish health accounts. Recent experiences in Asia, Africa and the Eastern Mediterranean have shown that national authorities may refuse to accept the first NHA estimates, or to permit their publication, because of the lack of credibility of the estimates of household spending and the associated ratio of household to public sector spending. Although in many of these instances the producers of the health accounts felt that this reaction was unfair, in almost all these cases the estimation methods did not meet best practice standards.

## 2. MEASURING PRIVATE EXPENDITURE: APPROACHES AND ISSUES

### 2.1 Definitions

#### *Private expenditure*

Private expenditure is expenditure incurred by private financing agents, i.e. organizations or individuals outside the public sector. There are four types of private financing agents: (i) private enterprises or firms, (ii) households, (iii) private health insurance schemes, and (iv) non-profit institutions serving households (or nongovernmental organization (NGOs)).

#### *Household out-of-pocket spending*

In health accounts, out-of-pocket spending by households typically comprises direct spending after deduction of third-party payments, such as insurance. However, it is often necessary to estimate the gross direct spending, not taking into account reimbursements by third-party sources. The measurement approaches described in these guidelines apply to measurement of any household spending, whether it is later adjusted for third-party payments or not.

#### *Financing agents*

Financing agents are institutions or entities that channel the funds provided by financing sources, and use those funds to pay for, or purchase, the activities covered by the health accounts. For the most part, when the term out-of-pocket spending is used, it is referring to spending by households in their role as financing agents.

#### *Financing sources*

Financing sources are institutions or entities that provide the funds used by financing agents. The use of the term is relevant when the prior origin of the funds of the financing agents is considered. For the most part, these guidelines do not focus on the problem of measuring expenditure by financing sources, as these are either simply the equivalent of the corresponding financing agent amounts, or can be directly estimated using administrative data to determine what proportion of funds flowing to a financing agent is from households. For example, when considering the household financing of social insurance premiums, it is usually easy to obtain the amount of household payments by examining administrative data of the social insurance scheme. For the most part when households act as financing agents, they are also acting as financing sources. However, there are instances when households may act as financing sources but not be financing agents; these most commonly occur when households pay contributions to either social health insurance schemes or private insurance schemes. In these cases, such household spending is not termed out-of-pocket spending.

#### *International Classification for Health Accounts (ICHA) and System of Health Accounts (SHA)*

The ICHA is the tri-axial system for classifying health expenditures proposed by the Organisation for Economic Co-operation and Development in its *System of health accounts* (SHA) (OECD, 2000). In this classification, expenditures are categorized by function, by provider and by financing agent. The SHA itself is a statistical framework or standard, proposed by the OECD as a basis for internationally comparable reporting of health accounts, and recommended by WHO in the NHA Guide (WHO, 2003).

### *National accounts*

National accounts are the statistics that describe production and consumption in the overall national economy; they are the macroeconomic equivalent of health accounts. The international standards for national accounts are provided in the *System of national accounts* (United Nations, 1993).

### *Other terms*

For more detailed definitions and discussion of the above and other terms used in these guidelines, see the NHA Guide (WHO, 2003) and the SHA (OECD, 2000).

## **2.2 Current approaches**

National health accounts commonly use one or more of four different approaches to estimate household out-of-pocket spending for health:

- (i) direct derivation of estimates from data reported in surveys of household expenditure;
- (ii) indirect derivation of estimates from data reported in surveys of household expenditure, by reference to national accounts estimates of household consumption;
- (iii) indirect derivation of estimates by triangulating and integrating different data sources, such as household surveys and surveys of economic enterprises;
- (iv) use of estimates of household spending reported in the national accounts (which may themselves be based on one of the above approaches).

It is currently difficult to assess how common each of these approaches is, as many published health accounts do not indicate which data sources and methods were used. There has also been no inventory of methods used, except in the OECD countries.<sup>1</sup> However, a review of a number of estimates suggests that direct derivation is commonly used in many developing countries and in a few developed countries in Europe. Indirect derivation using national accounts is used in a smaller number of countries. Indirect derivation with triangulation and integration is used in a large number of both developed and developing countries, and is often applied to specific components of household spending.

Box 1 gives some specific examples from countries. As can be seen, many countries do not rely on one method, but use a mix of methods to estimate household spending, depending on the availability of data. This approach is often preferable, because estimates of spending derived directly from household surveys often need to be treated with caution (see Section 2.3).

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<sup>1</sup> A detailed description of the methods used for the health accounts of several OECD countries can be found in the country reports on the first implementation of the SHA ([http://www.oecd.org/document/49/0,3343,en\\_2649\\_33929\\_32411121\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/49/0,3343,en_2649_33929_32411121_1_1_1_1,00.html)).

## **Box 1. Methods used to estimate household out-of-pocket spending on health in various countries**

### **Canada**

Out-of-pocket spending for hospitals and residential care facilities was calculated from a national database of hospital returns and a survey of the facilities. Expenditure for retail purchases of drugs and personal health supplies was obtained from industry sources, including retail trade data. The remaining items of out-of-pocket expenditure were derived from household survey data.

### **Denmark**

Household purchases of pharmaceuticals were estimated from the national Medicinal Products Statistics Register, which electronically tracks all pharmaceutical sales at pharmacies. Household expenditure on physicians, dentists, glasses, hearing aids, hospitals and sanatoriums was derived directly from the national accounts estimates of private consumption.

### **India (Karnataka)**

Household spending on health was derived from the state sample of a national survey of health care utilization and expenditure, conducted over a period of one month by the National Council for Applied Economic Research (NCAER), a national research organization.

### **Jordan**

Estimates of spending were obtained by multiplying the per capita health care utilization by an adjusted estimate of the mean price of a visit, both of which were derived from the Jordan Living Conditions Survey. This is computed separately for six different ranges of episode costs as reported in the same survey.

### **Kenya**

Estimates of household spending were based on the data from a nationally representative household consumption survey. As the data were thought to include payments that were later reimbursed by third-party financing schemes, as well as some over-reporting, the estimates were reduced by 25% in the final accounts.

### **Philippines**

Household spending estimates were taken directly from the Family Income and Expenditure Survey of the National Statistics Office for the years in which the survey was conducted (once every three years). For intermediate years, the share of household expenditure going to health (estimated by linear interpolation between successive surveys) is multiplied by the national accounts estimates of household consumption.

### **Note**

*The above examples are intended to illustrate the methods that have been used for estimating household expenditure. They are not necessarily used currently in the countries. The methods described for Canada and Denmark were used in their first implementation of the SHA standard for 1999. The Indian example is taken from a study of health accounts in Karnataka by Garg (1998), that for Jordan from its first NHA estimates for 1998 (Brook et al., 2000), that for Kenya from its first NHA estimates for 1994 (Ministry of Health, 1999), and that for the Philippines from its annual NHA publications released by the National Statistical Coordination Board (2001).*

## **2.3 Problems in the use of household surveys to estimate household out-of-pocket expenditure**

In the past, health accountants have often based their estimates of household out-of-pocket spending directly on the results of a household survey. However, in most situations, even in low-income developing countries, this approach is not recommended. Even if the sample is reasonably representative, the results will not necessarily correspond closely with the actual level of household spending. Household surveys are associated with two types of error that are important when the volume of health spending is being measured: sampling error and non-sampling error. The first of these is generally well understood, but the second is often under-appreciated, and is usually responsible for the most important errors in estimates of household spending.

In addition, in many countries, household surveys are not carried out every year, which means that they cannot be relied upon for annual national health accounts.

### **2.3.1 Sampling error**

Sampling errors arise from factors related to the sampling design – in particular, the extent to which the sample frame is representative of the overall population – and from the inherent variation between individuals in a population. The first type of sampling error is fixed, in the sense that, if a section of the population is not surveyed, the error will have the same impact in all samples taken. The second type of sampling error will vary from one sample to another.

A fixed sampling error will introduce a bias in the results, which will be present even in repeated samples. Common examples of such an error occur when a survey does not cover all areas of the country, or does not adequately cover rural areas, or excludes high-income households. These types of problems are usually self-evident from the survey design, and potentially affect all household surveys.

One problem of specific relevance to health surveys is the use of a population sample that excludes people living in institutions, such as hospitals, nursing homes and prisons. Such individuals may well have above-average health expenditures. Studies in some countries have suggested that people living permanently in institutions may account for 5–10% of overall health care use. Health accountants may, therefore, need to conduct separate small surveys of the institutionalized population's health care use and expenditures. However, this problem is likely to be less important in most developing country settings than in developed countries, as the percentage of the population in hospitals or other institutions is usually lower. The error can be minimized if the survey collects data on all health expenditure by all members of the household, including those not present at the time of the interview.

Another type of sampling error can arise if there is significant seasonal variation in health care use and expenditure, and if the survey is not designed to collect data for all periods in the year. This problem must be dealt with at the design stage, either by arranging to collect data on the expenditure of households over a full year, or by spreading the interviews over a year.

Sampling error is relatively well understood and can be easily quantified. It is covered in most standard statistical texts, and is discussed further in the NHA Guide (paragraphs 8.17–8.21) (WHO, 2003), and in a useful guide on design of household

surveys in developing and transition economies (Department of Economic and Social Affairs, 2005). It will tend to decrease with increasing size of the survey sample, and can be a significant problem if the survey sample is less than say 3,000 households. The impact of sampling error will also be greater for expenditures that occur less frequently, are more variable between individuals, or account for a smaller proportion of overall health spending, and when the reference period in the survey is short. Finally, it should be noted that, if stratification is used in a sample surveys, it is usually designed to optimize efficiency or reduce sampling error with respect to specific items, and this may not apply to the health components.

### **2.3.2 Non-sampling error**

In practice, the main problem that affects the reliability and comparability of health accounts estimates is non-sampling errors. The significance of this type of error tends to be under-appreciated in health accounts work in many countries (see the NHA Guide, paragraphs 8.22–8.29 (WHO, 2003)).

Non-sampling errors or biases are associated with most surveys, and can arise from defects in the design and implementation of the survey, or from the inherent limitations of responses to survey questions. Individuals are rarely able or willing to recall accurately exactly what they did in any given time period. They may not recall exactly when an event occurred, or forget that a certain event occurred in the period in question. They may not remember correctly the number of times an event occurred in a given time period, or incorrectly report the expenditure associated with a particular event.

An additional problem is that, for practical reasons, most surveys must rely on proxy respondents, i.e. individuals who provide information on behalf of other individuals who are not interviewed directly. This is normal in most surveys when dealing with children, as adults typically provide information concerning them. Whenever proxy respondents are used, there is a greater chance that the respondent will fail to recall a pertinent event, since they did not experience it directly themselves, or simply because they do not know about it. The choice of adult proxy respondent can significantly affect the size of any non-sampling errors. For example, in many societies fathers often have less knowledge about events involving their children than mothers.

These types of errors all occur with cooperative respondents, without any deliberate intent to mislead the interviewer. However, in addition, errors may arise as a consequence of embarrassment or a wish to conceal information. This can be a problem, for example, when surveys seek information about the use of traditional healers, which may be associated with social stigma, or when the illness or health care use itself is considered private or sensitive. Alternatively, if the survey instrument is too exhaustive, some respondents may not report certain events simply in order to shorten the interview.

These errors can introduce significant bias (see Box 2), which tends to have the following patterns:

- (i) the number of events forgotten increases proportionately with the length of the recall period;
- (ii) events with less relevance or impact on the individual are more likely to be forgotten;
- (iii) proxy respondents tend to report 20% fewer events.



In general, surveys of inpatient health care that use recall periods of twelve months and surveys of outpatient care that use recall periods of more than 2–3 days will be associated with significant forgetting of events.

### **Box 2. Non-sampling error and response bias in the USA**

In the 1960s, the National Center for Health Statistics in the USA conducted a considerable amount of research into the problems of non-sampling error and response bias in health interview surveys (Cannell, Fisher & Bakker, 1965; Cannell & Fowler, 1965; Cannell, Marguiz & Laurent, 1977). The researchers surveyed large samples of individuals about their health care visits and spending in communities where reliable data on actual visits were available from the administrative records of the providers. The communities chosen were stable and relatively culturally homogeneous and educated, and could be considered to be a population where recall errors would be low. The investigators were also able to test the impact on responses of changes in the instrument design and in recall periods.

The researchers found that respondents were liable to forget, or fail to report, events that took place in a given recall period, and to report events that had not taken place in the recall period. The net impact tended to be an underestimation of events. The bias was found to be affected by a number of factors, including design of the questions, whether a proxy respondent was used and his or her relationship to the individual of interest, the length of the recall period, the type of event, the age, sex, education and sociocultural characteristics of the respondent, and whether the illness was acute or chronic. For example, the total number of inpatient admissions reported by adult respondents on behalf of other family members was underestimated by 18% when the events took place 1–20 weeks before the interview, and by 45% when the recall period was 40–53 weeks.

Significant recall loss was found with recall periods of more than one week for outpatient events, and more than six months for inpatient events. In general, the size of the recall loss increased as the recall period increased. There has been no substantial equivalent research in developing countries, but evidence from several surveys (Ross & Vaughan, 1986) and other health accounting studies has confirmed that the US results can be generalized to other settings (Data International, 1998).

At the same time, it is frequently found that specialized surveys that focus only on health events and health expenditure result in over-reporting of events and expenditure. Household budget surveys, which collect data on all items of household expenditure, tend to result in lower estimates of health spending. Nevertheless, the general household budget survey will tend to provide a less biased estimate of the proportion of overall household spending that goes to health (Box 3).

### **Box 3. Recall bias in Sri Lanka**

Three nationally representative surveys, carried out in Sri Lanka between 1987 and 1991 by government agencies, collected information on health care expenditure. These were: (1) a national household income and expenditure survey (CFS 1987) conducted in 1987 by the Central Bank of Sri Lanka; (2) a national household income and expenditure survey (HIES 1990) conducted in 1990 by the Department of Census and Statistics; and (3) a specialized household health utilization and expenditure survey (HHUES 1991) conducted by the Department of Census and Statistics in 1991. All three surveys involved samples of between 9000 and 10 000 households, drawn from the same national sampling frame maintained by the Department of Census and Statistics.

According to the three surveys, the annual per capita expenditure on health care goods and services, adjusted for inflation and expressed in 1990 rupees, was Rs 316 (CFS 1987), Rs 395 (HIES 1990) and Rs 1676 (HHUES 1991). The 1991 estimate from the specialized health survey caused considerable controversy and disbelief in the sponsoring agency, which was the national health ministry. Many of the key policy-makers felt that the estimate was too high and not consistent with their own experience of the system. Consequently, the report from the survey was never authorized for official publication.

Clearly, the differences in the survey estimates could not be explained by changes in the health care system, the economy or general living standards during this period. They could be explained largely by non-sampling errors or bias in the three surveys. In brief, since the objective of the two household income and expenditure surveys was to obtain data on household spending in general, they tended to result in under-reporting of specific expenses, as close attention to individual items, including health care, was not feasible. On the other hand, the HHUES 1991 survey specifically examined health care use and employed a much longer and more detailed set of questions, which would have reduced under-reporting. In addition, both the survey interviewers and the respondents were sensitized to the fact that the survey was specifically concerned with health care, and this is likely to have resulted in over-reporting.

It is worth noting that non-sampling errors are almost universal, affecting both well designed and not-so-well designed surveys. For example, the discrepancy between the estimates by the US National Medical Expenditure Panel Survey of certain out-of-pocket spending items and those in the final national health accounts is as much as 100%.

Many countries now use diary methods to collect data on expenditure, but these have not proven effective in eliminating non-sampling error. For example, the use of diary-based methods in household budget surveys in Hong Kong SAR, China – a highly literate society – still results in a 20–30% underestimation of overall household consumption.

It is not possible to design and implement a survey with no non-sampling bias. It is therefore prudent to assume that such biases exist, and to use a methodology that explicitly takes this into account. In practice this will mean complementing household surveys with other sources of data.

### **2.3.3 Non-regularity of household surveys**

An important consideration when using household surveys in estimating health accounts is their availability over time. Household surveys are expensive, and consequently in most countries are not conducted every year. In some instances, household surveys are commissioned on a once-only basis, as part of the project to develop health accounts, with no prospect of follow-up surveys. In addition, the time needed to process and make available the data collected by household surveys is typically quite long.

If the health accounts system relies predominantly on household survey data for estimating private expenditure, then the lack of such data for the year in question will make it difficult to produce meaningful estimates. It is of value to observe that most internationally funded health accounts projects that have conducted large household surveys for the specific purpose of estimating household health expenditure have not been able to make the health accounts system sustainable. For this reason, it is important to identify alternative data sources and methods for estimating household expenditure.

### **2.4 Boundary issues**

There are a number of household expenditures that may be of interest for the health accounts, but that fall outside the boundary of what is considered health expenditure in the SHA framework. The major ones are household expenditure on nonspecialized patient transport, and the use of non-reimbursed household time and services for providing health and nursing care. These expenditures are not included in international comparisons of health expenditure using the SHA standard.

In the case of household expenditure for travel to health care facilities, this is not normally included, unless it involves the use of specialized transport, such as ambulances, or there is a special programme to reimburse the patient's travel costs. In these cases, the expenditure would need to be measured.

In the case of services produced within households, these are not counted in the SHA framework, and can normally be ignored. If there is, nevertheless, interest in measuring these activities, the health accountant should consult the technical literature, such as Ironmonger, D.S. (2001), as this type of measurement involves a number of methodological challenges that lie beyond the remit of this paper.

### **3. THE INTEGRATIVE APPROACH TO MEASURING HOUSEHOLD EXPENDITURE**

This section presents an approach to estimating household expenditure that takes into account data from both the funding side and the provider side. It is recommended in preference to approaches that rely on data only from the funding side.

#### **3.1 The integrative approach**

Health expenditure flows can be tracked from two different perspectives: (i) that of the financing agent, and (ii) that of the provider. When considering household out-of-pocket spending, household survey data represent the first perspective. An example of the second perspective is the use of data on the revenue of private physicians (e.g. as reported in their tax returns), to estimate household out-of-pocket spending for private physician services. Taken alone, each of these perspectives is inadequate for estimating a health account. The best solution is to combine both perspectives in an integrative approach (see the SHA Guide, section 10.4 (ONS, 2004)).

In the integrative approach, expenditure flows are examined from the perspectives of the different agents in the system. The different estimates are then weighed against each other. The integrative approach can be used to estimate all expenditure flows in a health account, and can also be used to link, for example, the estimates of household spending with estimates of other funding flows.

At the household level, the integrative approach involves looking at expenditure from the perspectives of providers (via data on their receipts or costs) and of households (via data on their out-of-pocket spending). The different data sources should then be reconciled, taking into account their respective strengths and weaknesses, in order to obtain a composite estimate of actual expenditures, which reflects all the available information. This will necessarily entail more effort than relying on a single data source, but the results will be more robust, consistent and comprehensive, and of higher quality.

#### **3.2 Compilation of data sources**

The first step in the process is to compile and assess the available, immediately relevant data sources. When multiple data sources are available for a particular item, the data they contain usually differ to some extent. These differences are normal. The quality and nature of any biases associated with each data source should be assessed before it is used. In general, the more different data sources that can be assembled for a particular expenditure item, the better.

Household spending consists of many different categories of expenditure, e.g. medicine, doctors' services, hospital fees, etc. For each of these expenditure flows, there may be different available and relevant data sources, and a different set of estimation problems. Total household spending is the sum of all such categories of spending, so the task of estimating household spending can be usefully broken down into a number of smaller discrete tasks, many of which can be managed, to some extent, independently of the others. At the end of the process, the overall validity of the total household health spending estimate should be assessed in relation to other expenditure flows.

In many instances, it is also useful to think of the problem of estimating an expenditure item as consisting of three different aspects:

- (i) the absolute level of expenditure at a given time or during a particular period;
- (ii) the composition of the expenditure flow; for example, the percentages spent on drugs, doctors' fees, medical supplies, etc.;
- (iii) the trend in an expenditure flow over a given period; for example, the percentage change in actual expenditure in each year of a ten-year period.

Some data sources may provide information on just one or two of these aspects. They can still be valuable, as this information can be combined with that from other data sources to give an overall description of the expenditure flows.

Thus, not all data sources will be used directly to make estimates. Some may not provide any information about actual expenditure, but may be used to characterize, for example, annual trends or composition. Others may provide additional corroborative evidence to validate or support estimates based on other data sources. This confirmation may relate to the level of expenditure, the ratio of one expenditure aggregate to another, or the pattern and trend in expenditure. For example, data on pharmaceutical imports can usually not easily be used to generate estimates of pharmaceutical spending, but they might be used to confirm trends in pharmacy sales.

### 3.3 Common data sources relevant for estimation of household spending

Chapters 6–9 of the NHA Guide provide a detailed and comprehensive review of data sources (WHO, 2003). In particular, Chapters 6 and 7 indicate the types of data that are relevant for estimation of household spending and why. The following is a listing of the data sources commonly used for estimation of household spending.

- **Household budget surveys.** These are general surveys of household consumption or expenditure. They are available in most countries on a regular basis (annual to five-yearly is the most common pattern), and are most often conducted with the primary purpose of constructing consumer price indices and examining the distribution of consumption and income.
- **Specialized surveys of household health care use and expenditure.** These special surveys usually link questions on expenditure to the responses indicating some health care use. They are usually conducted singly as part of a special project or research study, although a few are done routinely in some countries. Sometimes, a general household budget survey may contain a special module devoted to health care use and expenditure.
- **Specialized surveys of household health care use only.** These differ from the previous category in that they collect information only on health care use, and not on expenditure. However, as discussed below, these surveys can still be useful for estimating health expenditure.
- **Routine business surveys and economic censuses.** National statistical offices often conduct routine general business surveys and economic censuses of businesses for the purpose of estimating national accounts, collecting information on inputs and revenues. These may not be focused specifically on health care providers, but it is sometimes possible to obtain data on subpopulations of relevant enterprises. However, care must be taken in using these surveys, as the output of the surveyed businesses may not completely correspond to output of interest to the health accountant; for example, pharmacies may sell products other than health-related ones.

- **Other routine surveys of health care providers and institutions.** In addition to routine business surveys, there may be other routine surveys of health care institutions conducted by the government or the private sector. These can often be very useful.
- **Tax data.** Tax data are a potential source of information on the revenues of private health care providers. However, in many countries access to these data may be difficult, even for other government departments, as a result of confidentiality restrictions. In addition, the tax authorities may not routinely classify and disaggregate revenue data specifically for health providers. Furthermore, the quality of tax data in many countries is affected by significant tax evasion.
- **Administrative data on user charges collected by public sector providers.** In most countries, user charges collected by public sector institutions must be reported in public sector financial accounts. These are often a reliable source of information on user charges paid by households.
- **Industry market data on retail sales of pharmaceuticals and other medical goods.** These may be generated on a routine basis by industry associations or market research firms.
- **Specialized surveys of private providers conducted for research purposes.** These tend to be small-scale surveys and not representative of the whole country, but can provide useful information on the financial characteristics of private providers. Health accountants should investigate whether such surveys are available.

### 3.4 Assessing data sources

In assessing the quality of a data source, the health accountant needs to understand its origins, how the data were processed, and the purposes for which the data were collected. All these factors can influence the quality of the data (see the NHA Guide, paragraphs 6.30–6.60 (WHO, 2003)).

In the case of survey data, the health accountant should collect information on at least the following aspects (ONS, 2004; section 5.1):

- (i) The agencies that designed and executed the survey. Sometimes it will be necessary to contact the agencies to obtain additional information about the data source. The identity of the survey agency may be a clue to the quality of the field work: work done for a specific project by an agency that does not regularly conduct surveys may be very different from that done by a full-time survey agency with substantial experience and statistical expertise. The identity of the survey agency may also influence the reliability of responses relating to sensitive information. For example, in some countries, private firms will report accurate data on their financial operations to an interviewer from the national statistical office, as they are used to providing them with data and are comfortable that confidentiality will be respected.
- (ii) The primary purpose for which the survey was conducted. The objective of the survey will influence the focus and phrasing of the questions, the terms and classifications used, the responses, and hence the quality and reliability achieved. It is also important to know whether the focus of the survey was on health, as intense questioning about individuals' health care behaviour can result in over-reporting.
- (iii) The intended scope of the survey. Most surveys conducted by other non-health sector agencies do not cover the full range of respondents of interest to the health accountant, and this needs to be taken into account. For example, household surveys often exclude individuals who live in

institutions, including hospitals, who may have above-average levels of health care use. Similarly, industry surveys of retail pharmaceuticals may omit certain types of pharmaceuticals, such as vaccines or vitamins, or certain geographical areas.

- (iv) The sample size and sampling design of the survey. These must be evaluated in order to assess the likely impact of sampling errors. In addition, many surveys are stratified and are not self-weighting, so this information is important to avoid making invalid generalizations from sample data.
- (v) The periods to which the survey pertains. Health expenditures are never constant, and an estimate for one period cannot simply be applied to another. In the case of household surveys, it is important to note the months to which the survey refers. If the survey did not cover a twelve-month period, there may be a seasonal bias in the data. In many parts of the world, there are substantial seasonal variations in illness and health care use, and surveys will produce different estimates at different times of the year. In addition, even if a survey was conducted over twelve months, it may not match the calendar year, and adjustments may be necessary to match the estimates to the periods to which the health accounts apply.
- (vi) The exact wording of questions. This can significantly influence the responses, and may also indicate differences between the scope of the survey items and those of interest to the health accountant. It is important to be alert to the possibility that some questions may have been misinterpreted by respondents.
- (vii) Whether proxy respondents were used, and the recall periods for previous health care use and expenditure. These factors will influence the degree of recall bias that occurs (see section 2.3.2).
- (viii) Whether any of the information collected can be cross-validated using other independent data sources. Such an exercise can help to gauge the bias in a survey, and can be applied to any items, not just those related to health expenditure.
- (ix) In the case of surveys of business enterprises, whether the activities of the enterprises are exclusively health-related. For example, many pharmacies may sell products other than health-related ones, such as food, groceries and stationery.

For each data source, the health accountant needs to assess whether there is a bias, in which direction the bias may lie, and how big it is likely to be. Relevant questions include the following.

- (i) Does this data source correspond exactly to the items that I am trying to measure, or are there differences in scope?
- (ii) Is the sample representative of the population that I am interested in? Does it omit or include specific populations? (See the NHA Guide, paragraphs 6.38–6.39 (WHO, 2003).)
- (iii) Did respondents have incentives to over- or under-report certain items? For example, providers often have an incentive to under-report revenues and profits, for fear of arousing the interest of the regulatory or tax authorities.
- (iv) Did the survey agency have incentives to over- or underestimate some items? (See the NHA Guide, paragraph 6.42 (WHO, 2003).)
- (v) Are the recall periods in a household survey likely to be associated with significant recall loss or under-reporting of events? This can occur with recall periods longer than one month in the case of inpatient events, and 2–3 days for outpatient events.
- (vi) Is it possible that this survey may have resulted in over-reporting of events? This can occur with surveys that focus only on health events, or where the

- respondents believe that over-reporting might have a beneficial effect for themselves or their community.
- (vii) If the data source is an administrative one – for example, hospital statistics of activities and revenues – what is the quality of the administrative information system, and are there likely to be systematic biases in one direction or another?

It is not possible to indicate exactly how much the above factors will influence the quality and bias of a survey; qualitative judgements will be an important element in the overall assessment.

### **3.5 Cross-validation of data sources**

An initial assessment, combined with prior experience, will provide a first impression of the potential errors, biases and weaknesses in each data source. The next step is to estimate, where possible, the potential size of such errors or discrepancies between data sources. This is done by systematically comparing the data sources with each other or with other independent data sources. It is advisable to start by examining discrepancies in aggregate health care expenditure, and then doing a more detailed evaluation of discrepancies in estimates for specific items.

#### **3.5.1 Cross-validation using national accounts estimates**

Many household surveys that record expenditures on health care also record expenditures on other goods and services. A useful starting-point is to assess the consistency of the figures produced by such surveys.

- (i) Compare the total expenditure on all goods and services (or the per capita mean expenditure) reported by the survey with household consumption as reported in the country's national accounts. In some countries, household consumption is not identified separately in the published national accounts, but is reported together with consumption by non-profit institutions as *private consumption*. In these cases, household consumption is usually 95–99% of private consumption, but the exact ratio can usually be obtained from the national accounts team.
- (ii) Compare the mean per capita household expenditure for health care reported in the survey with that reported in general expenditure surveys and in other specialized surveys of health expenditure.

It is normal to find discrepancies between household budget survey estimates of expenditure and those reported in the national accounts. Table 2 illustrates this with some examples of household budget surveys taken from a review of several Asian countries. In the examples in Table 2, the household survey estimates are lower than the national accounts estimate. However, this is not always the case, and the opposite may be more commonly seen in other regions, such as Africa (Deaton, 2003). The main point to note from the table is that, not only do household budget surveys frequently not match national accounts estimates of household expenditure, but the size of the discrepancy is highly variable between countries and cannot easily be predicted. This might be explained by different patterns of consumption in different countries, differences in the survey methods and questions used, and the extent to which the national accounts use integrative methods. At the same time, the discrepancy is often consistent over time within a country, indicating that systematic errors play a significant role in the differences observed.



In the case of these Asian countries, we can conclude that either the household budget surveys tended to underestimate household expenditures, or the estimates of household spending based on production data and commodity flow methods, as favoured by national accountants, tended to be higher than those obtained by interviewing households directly.

**Table 2. Comparison of national accounts and household survey estimates of household expenditure in selected Asian countries**

Country	Household survey	Year of survey	Household expenditure according to survey	Household expenditure according to national accounts	Discrepancy
Bangladesh	Household income expenditure survey	2000	1 249 025	1 838 528	-32%
China	Urban and rural household surveys	2000	4 241 929	4 289 560	-1%
Kyrgyzstan	Household budget survey	2000–2001	33 552 678	56 028 200	-40%
Malaysia	Household expenditure survey	1998–1999	78 760 000	124 751 000	-37%
Thailand	Socioeconomic survey	2001	54 977	206 668	-73%

*Note:* Various units and currencies are used in the table – the absolute numbers are therefore not comparable between countries.

*Source:* Data provided by members of the Asia–Pacific NHA Network ([www.apnhan.org](http://www.apnhan.org)).

For most countries, the national accounts estimate of aggregate household consumption should be taken as the best estimate of household expenditure, since national accountants should have taken into account all the available information, from both the consumption and the production side. This will also ensure that the health accounts are consistent with the national accounts, which can be important, since a key function of most health accounts is to relate total expenditure on health to the gross domestic product. However, the reliability of the national accounts estimates should always be verified by asking the national accountants what methods were used to prepare the estimates of household consumption. In some countries, these are derived solely from the household expenditure survey, without reconciliation with any production data. In these cases, there should be no discrepancy (this was the case for China (Table 2)).

Similarly, the survey's estimate of total health care spending should be compared with those reported in other surveys. Often, other surveys will have been carried out at different times, and the figures will not be directly comparable because of inflation and changes in income levels. In this situation, the numbers must first be adjusted using an appropriate deflator, such as nominal GDP per capita or nominal private consumption per capita.

Any difference between the estimates from the survey and from the national accounts should alert the health accountant to potential biases in the survey estimates. Clearly, if the survey estimate of overall household expenditure is different from that in the national accounts, then the survey estimate of health expenditure is likely to be

affected by the same bias. In this situation, two different estimations of household health care expenditure can be made using the survey data:

- (i) a *direct estimate*, which is simply the per capita expenditure reported in the survey;
- (ii) an *indirect scaled estimate*, which is obtained by scaling the household survey estimate to match the national accounts estimate of household consumption. This is done by multiplying the survey figure for health spending by the ratio of the national accounts estimate of household expenditure to the survey estimate of household expenditure.

If there are significant discrepancies between the national accounts and the household survey, the indirect scaled estimate should be preferred for further analysis, as it is based on weaker assumptions than the direct estimate. The direct estimate is based on the assumption that the reporting of all spending on goods and services was biased, but that this bias did not apply to expenditure on health care goods and services. The indirect scaled estimate makes the weaker assumption that the bias in the reporting of health care expenditures is the same as the bias in the reporting of all household expenditures.

### 3.5.2 Cross-validation using utilization rates

Some household health care surveys link the utilization of health care services to the related expenditures. In these surveys, the estimate of expenditure can be decomposed into two elements – *volume* and *price*. Volume is the number of visits made to any health care provider in the survey recall period, and price is the average amount paid by the household for a visit. Expenditure is the product of the mean number of visits made to all health care providers and the mean cost of each visit, i.e.:

$$\text{expenditure } (E) = \text{price } (P) * \text{quantity of visits } (Q)$$

With these surveys, three aspects of the expenditure can potentially be cross-validated:

- (i) total health care expenditure;
- (ii) quantity or number of visits;
- (iii) price of visits.

Total health care expenditure should be validated using the procedure described earlier for any household expenditure survey. Total spending can be compared with that from other available household expenditure surveys.

The number of visits might be validated by referring to reliable administrative data. If such data are not available, then in line with the recommended integrative strategy, the health accountant might assess all the data sources, and determine a balanced estimate of the actual number. In most countries, reliable administrative data generated by health care facilities exist for at least some types of provider, typically in the public sector. In a few countries, the national social health insurance system is also a source of reliable data. It does not matter if the available administrative data do not cover all types of provider, as long as the household survey data on visit numbers distinguish between types of provider, and numbers of visits for one or more types in the two data sources can be compared. Care should be taken to distinguish between ambulatory and inpatient visits.

Validation of the price of visits is generally more difficult, except where national social health insurance systems have good data on fees paid. In some countries, it is

possible to compare the average price of a visit to a physician's clinic with data collected from surveys of such providers.

If the estimates of number of visits are significantly different from those derived from independent data for one or more types of provider, this is strong evidence that the overall number of visits reported in the survey is biased, and thus that the overall expenditures reported are also biased. However, in many instances, the average price per visit is not subject to such a large bias as the numbers of visits.

The procedure just described, of estimating the expenditure flow for a particular health care service by balancing household and provider data on the volume of health care services produced or consumed, is conceptually consistent with what national accountants refer to as the "commodity flow method". This method is the international standard for estimation of national accounts according to the SNA (United Nations, 1993), and relies on balancing estimates of the production of goods and services with data on intermediate, final and private consumption. Adopting this approach in health accounts, where appropriate and relevant, has the advantage that methodological standards in the health accounting work are close to those of the national accounts.

## 4. ESTIMATING SPECIFIC ITEMS OF HOUSEHOLD SPENDING

### 4.1 Introduction

In most situations, household spending comprises several different expenditure flows. In practice, each of these can be estimated largely as separate statistical exercises, from different data sources. Each data source will be associated with its own specific errors and biases, but these are generally independent of each other. For example, the errors associated with data on pharmacy sales obtained from industry sources will be independent of the errors associated with the reporting of income for tax purposes by physicians. Each item of spending can thus be estimated separately.

The decomposition of household spending into different components to be estimated individually should be based on the availability of data and the organization of health care services in the country. However, the following list, which is based on country experiences, provides a good starting-point:

- (i) public sector user charges;
- (ii) public sector informal payments;<sup>2</sup>
- (iii) outpatient services from physicians and dentists;
- (iv) private hospital services;
- (v) pharmaceutical products;
- (vi) preventive health services;
- (vii) insurance-reimbursed expenditures;
- (viii) other ambulatory care services and residual items.

### 4.2 Public sector user charges

Many countries have reliable administrative data on revenues collected by public sector facilities from patients in the form of official user charges, particularly countries where all user charges are transferred to the central finance ministry. Of course, the reliability of the data should be assessed by the health accountant. Where there is no centralized reporting of facility revenues from patient charges and facilities are allowed to retain the income, an acceptable alternative is to obtain information through sample surveys of the facilities.

Where reliable data exist, it is usually best to use these data, rather than estimates based on household surveys, as the basis for the estimates of such spending in the health accounts. The error associated with household surveys is typically much greater. In addition, the use of administrative data (or regular surveys of public

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<sup>2</sup> Informal payments are only one component of the non-observed economy. Informal activity occurs in both the public and the private sector. In its most widely used statistical application, the non-observed economy has a specific meaning in the national accounts:

- underground production (legal activities that are deliberately concealed from public authorities);
- informal activities (legal activities with a low level of organization with little or no division between labour and capital as a factor of production);
- illegal activities (activities forbidden by law or which become illegal when carried out by unauthorized persons).

For training material on estimating the extent of the non-observed economy, see <http://www.unece.org/stats/documents/2007.04.noe.htm>.

facilities) has the advantage that equivalent data will be available every year for updating the health accounts.

### 4.3 Public sector informal payments

Health accountants should not confuse official fees collected by public sector facilities with other payments incurred by patients using the facilities. Such other payments may consist of officially recognized and accepted expenses incurred by patients to cover aspects of their treatment, and unofficial fees paid to personnel working in the facilities. The first type of expense is a form of legal cost-sharing, while the second type of expense is by definition illegal, and is termed “informal” by some authors.

An example of the first type of expense is when patients must purchase medicines or pay for laboratory tests in the private sector as part of their treatment in a public sector facility. This may be necessary because the public sector facility is out of stock of the necessary medicines or because it does not provide the relevant services. Often these payments are made at the same time as other legal payments made to government medical personnel who engage in officially sanctioned private practice, usually in their off-duty hours. These household payments can usually be estimated using the data sources used to estimate expenditures for the relevant private provider (see sections 4.4 and 4.6), and should be classified as household out-of-pocket payments to private providers. For example, in Sri Lanka, where official policy encourages public sector patients to purchase medicines that are in short supply, and where government doctors are allowed to engage in private practice, these payments are estimated as part of the general estimation of retail sales of medicines by private pharmacies, and of revenues of private clinics.

The second type of expense relates to private and informal payments made to employees in public institutions, usually in order to obtain preferential access to services. Such fees are not paid to the facility. Payment of such informal fees is, in fact, a private market transaction, and should be treated in the health accounts as out-of-pocket spending on private providers, since the personnel concerned are acting in a private capacity, even though they are public sector employees.

To the extent that such transactions are voluntary interactions between a patient and an individual member of staff, they can be treated as a private market transaction between individuals, and not as part of the government’s non-market production. However, there is no definitive guidance on how such transactions should be reported in the context of the SHA framework. The general problem of how to report bribes and other illegal private payments to public sector employees is the subject of continuing debate in the national accounts field. National accounts experts from international agencies, such as the World Bank and the International Monetary Fund, have taken the position that these transactions should be reported as private sector payments, and should not be considered as related in any way to public sector production.

As might be expected, it is often difficult to estimate these payments reliably, since by their nature, they are unlikely to be properly reported in household surveys or by the personnel concerned. It may be necessary to conduct a special household survey of payments associated with visits to public sector facilities. This is more likely to produce reliable responses than a survey of patients at the facilities or of the providers themselves. In any case, estimation of informal payments remains a challenge, and it may well prove impossible to capture fully such expenditure flows.

#### 4.4 Outpatient services from private physicians and dentists

Estimation of household expenditure at the clinics of physicians and dentists is challenging when these providers are largely financed by out-of-pocket payments by households (see the NHA Guide, paragraph 7.55 (WHO, 2003)). Most household survey estimates of household payments to private practitioners for ambulatory services tend to be subject to significant non-sampling error.

In a small number of countries where such services are financed by public insurance schemes, reliable data on almost all such transactions may be available from the records of the insurance agencies. Unfortunately, this situation is extremely rare in low-income developing countries. In a larger number of countries, the tax authorities will have data on the income reported by such providers, but such data are often unreliable, and generally tend to underestimate revenues. In addition, in order to use tax data effectively, it is important to have access to the detailed records, since taxable income does not correspond to the actual revenues, which is what health accountants are interested in. In order to translate data on taxable income into an estimate of actual revenues, it will often be necessary to add in or estimate the production costs.

Alternatively, production-side data can be collected directly from the providers. In some countries, private clinics are included in regular business or enterprise surveys and economic censuses, which are typically conducted by the national accounts or national statistics agencies. If the surveys contain a large enough sample of medical and dental clinics and the data are considered reliable, they may be used. If not, it may be necessary to conduct a survey of private practitioners to directly estimate their revenues. However, these surveys are difficult to do well, as they frequently face obstacles such as lack of cooperation from practitioners, lack of reliable sampling frames, and incentives for respondents to misreport. However, if best practice principles in survey design are followed, it may be possible to obtain useful data from such surveys. Such design considerations include minimizing respondent burden, providing credible guarantees of data confidentiality, asking for information in a way that the respondent can understand, and paying attention to questionnaire design. For an example of a private practitioner survey that was able to meet some of these challenges, see Rannan-Eliya, Jayawardhane & Karunaratne (2003).

General household expenditure surveys tend to substantially under-report such payments, while some health-specific household surveys have been found to over-report. It is difficult, if not impossible, to overcome these errors through survey design, so the integrative approach relies on supplementing household survey data with other data collected from providers. The two methods described below have been used in various countries, but there may be other potentially reliable methods.

**Note:** Whatever methods are used, care should always be taken to take account of payments to private practitioners that are not assigned to households as the financing agent. If payments are made directly by third parties, such as insurance schemes or employers, or if payments made by households are later reimbursed by an insurance scheme, these must be subtracted from the gross revenues of private providers (and also from household survey estimates of out-of-pocket spending) in order to obtain the correct estimate of household spending (see the NHA Guide, paragraphs 7.38–7.39 (WHO, 2003)).

#### 4.4.1 Price and quantity (PQ) method

The PQ method relies on the fact that expenditure is the product of the mean number of visits made to all health care providers and the mean price of each visit. This can be expressed using the formula that was introduced in section 3.5.2:

$$\text{expenditure } (E) = \text{price } (P) * \text{quantity of visits } (Q)$$

This method can be applied when the available household survey data can be decomposed into visits made to providers and the amounts paid for each visit, and when the providers are identified by type. In this scenario, health accountants can separate the task of estimation into two parts: (i) estimating the number of visits, and (ii) estimating the mean price of visits. This is advantageous since it can be assumed that the errors associated with the first are different from the errors associated with the second.

To apply this method, the health accountant must have other independent and more reliable data on the number of ambulatory care visits made to various types of provider. Other data sources might include: (i) administrative data produced by public sector providers, (ii) administrative data produced by public insurance schemes on visits to providers included in the insurance scheme, and (iii) surveys of the providers themselves. If the number of actual visits to a given set of providers is reliably known, then the number of visits to other types of provider can be estimated by simply scaling the household survey estimates of visit numbers by the ratio between the two data sources. So:

Visits to provider B = Visits to provider B as reported in survey \* (Visits to provider A as reported from other independent provider data/Visits to provider A as reported in survey)

This method is based on the assumption that the non-sampling errors in the household survey affect the reporting of visits to all types of providers equally.

Validation of the household survey data on the price of visits is generally more difficult, except where public insurance schemes have good data on fees paid by patients. In some countries, it is possible to estimate the average price of a visit to a physician's clinic using data collected from surveys of such providers. In doing so, it is important to focus on the concept of mean price, which is not the same as the typical or median price. Failing this, one assumption that can be made is that much of the error associated with reporting of household health care expenditure in the household survey involves the misreporting of how many visits took place. When individuals do recall that a visit took place, they tend to recall fairly reliably how much it cost. The health accountant might then simply assume that the estimated mean price reported in the household survey is correct. The caveat to this assumption is that the visits that survey respondents forget may tend to be less costly than average.

Once the estimates of price and quantity have been obtained, the estimate of household expenditure is derived directly as the product of the two. The health accountant can then try to validate these estimates using other data sources and common sense.

#### 4.4.2 Aggregate scaling method

This method might be applied when the available household survey data provide estimates of the aggregate expenditures on different types of provider, and where the

gross payments made to one or more types of provider are known from other independent and more reliable data sources. In this case, the ratio of the figures from the more reliable data source to the household survey estimate of aggregate payments to a particular type of provider is used to adjust the household survey estimates of aggregate payments to other types of provider.

For example, suppose there are three types of provider, A, B and C, and that more reliable administrative data on gross revenues are available for provider type C (estimate  $C_x$ ). Estimates of aggregate expenditure on all three types of provider are available from the household surveys (estimates  $A_H$ ,  $B_H$ ,  $C_H$ ). If the independent estimate of gross revenues for provider type C is considered reliable, then the estimates of gross revenues for provider types A and B could be calculated by:

Expenditures on provider types A and B =  $(A_H + B_H) * (C_x / C_H)$

#### **4.5 Private hospital services**

For estimation purposes, private hospital spending is distinguished from public hospital spending because, in most countries, reliable administrative data are available for the latter. Estimation of household spending at private hospitals using household survey data faces similar challenges to estimation of household spending on ambulatory care services. However, it is often easier to obtain reliable estimates of private hospital expenditures. Private hospitals are more likely to produce accessible administrative data (see the NHA Guide, paragraph 7.54 (WHO, 2003), and the SHA Guide, sections 5.35–5.36 (ONS, 2004)), their responses in surveys tend to be subject to less bias and misreporting, and non-sampling errors associated with household survey reporting of inpatient episodes tend to be smaller than for outpatient treatment.

The two methods described above (the price and quantity method, and the aggregate scaling method) can also be applied to estimation of private hospital expenditures. However, it is often feasible to obtain estimates of private hospital revenues directly by means of surveys. Suitable surveys may be carried out routinely for other purposes by, for example, licensing authorities or industry associations of private hospitals. If not, the health accountant should consider conducting a survey for the health accounts. Surveys of private hospitals are usually easier to implement than surveys of private medical and dental clinics. If reliable data are available directly from private hospitals, in general they should be used in preference to household survey data.

One complication that may be encountered in estimating expenditures at private hospitals is when private doctors admit and treat patients at these hospitals, and bill for their services independently. Such a situation is found in many countries, and in these cases the patient's payments for the physician's time do not pass through the hospital's financial accounts, and are not reported as hospital revenues. In the SHA framework, such payments can be considered expenditures for inpatient care, but the provider is the medical specialist or doctor, not the hospital. Health accountants should be aware of this possibility, as it both complicates the interpretation of data, and adds to the challenges for estimation. First, household surveys of health spending often do not distinguish between payments to hospitals and payments to independent doctors working at the hospitals. Thus, household data may overestimate the payments made to the hospitals. Second, it can be difficult to obtain data on the payments made to doctors in this situation, as the problem is analogous to the problem of estimating revenues of private clinics, with added complications. In this situation, one option is to rely on the household survey data to estimate the likely level of payments. Alternatively, insurance claims data, if available, can be used to estimate the proportion



of hospital expenses incurred directly with doctors, or experts can be asked for their opinion on the proportion of a typical hospital bill that is paid directly to the doctors.

#### **4.6 Pharmaceutical products**

The retail sale of medicines from pharmacies and shops corresponds to the category HC-5.1 in the ICHA classification. In most countries, it accounts for a large proportion of household out-of-pocket spending.

In both low- and high-income countries, the most reliable and efficient method of estimating these expenditures is to use existing provider-side data sources. In many countries, these expenditures are routinely tracked and monitored by the pharmaceutical industry, as they are considered vital marketing data (see the NHA Guide, paragraph 7.56 (WHO, 2003)). In some countries, private firms collect and publish these data on a routine basis, and they usually have reliable information on sales, collected through large networks of data providers. A distinct advantage of these commercial data for health accountants is that they are available on a regular basis, often with a short time-lag. Health accountants in many countries will find the data of IMS-Health useful (<http://www.imshealth.com>). Their data are normally sold on a commercial basis, and in some countries, such as the USA, are purchased by health accountants. However, health accountants in several developing countries have been granted access to a certain amount of non-commercially sensitive data free of charge.

When using these industry data, as with any data source, the health accountant should determine how the data were collected and identify any limitations. Even where industry data are of high quality, they may still need to be adjusted to take into account non-coverage of certain pharmaceutical products and certain sales channels. In some cases, the size of the samples used to produce the estimates may be associated with significant sampling error. It should be noted that the commercial firms that produce this type of data can often supply comprehensive information on their quality assurance procedures and assessment of their own data.

If high quality industry data are not available, the health accountant can estimate pharmacy sales using data on the manufacture, import and export of pharmaceuticals in the country. Such alternative estimations may also be done to corroborate the estimates obtained from the industry sources. However, such an exercise is not easy to do well, as it requires knowledge of the mark-ups at various points in the distribution system, as well as the ability to adjust for unrecorded flows of pharmaceuticals, for example, linked to smuggling or unregulated production (see the NHA Guide, paragraph 7.57 (WHO, 2003)). In general, the difficulty of making such estimates reliably is often underestimated, and health accountants are advised to approach such an analysis with care.

#### **4.7 Preventive health services**

In most countries, preventive health activities are largely financed by the public sector. This is spending characterized by function, rather than by type of provider, as discussed earlier. Nevertheless, part is privately funded in all countries, and in some poor countries the proportion may be significant. In general, these expenditures can be estimated in parallel with those to specific provider types, as described above. If the preventive health spending is part of an expenditure flow to private doctors, private hospitals, government health facilities or pharmacies, the goal should be to estimate first the overall expenditure flow, and then the proportion that goes to preventive

activities. In estimating this proportion, it may be useful to look at health surveys that have measured the composition of household out-of-pocket spending. In addition, in a few countries the Demographic and Health Surveys have collected expenditure data, and may be a useful source of information.

#### **4.8 Insurance-reimbursed expenditures**

Health accountants should be aware of the potential for double-counting, which can occur when insurance schemes reimburse patients for medical expenses rather than paying the provider directly. In this case, the financing agent for the expenditure should be recorded as the insurance scheme. However, in a household survey or even in information given to the provider, the patient may report the expenditure as out-of-pocket spending.

It is best first to estimate separately the gross household out-of-pocket spending on each type of provider and the volume of insurance reimbursements made to households. Having done that, the household out-of-pocket spending can be calculated as the gross payments minus the insurance reimbursements. At the same time, the expenditure flow from the insurance scheme to the provider should be recorded.

An additional complication may arise if the insurance reimbursements are made in a different accounting period than the original household out-of-pocket payment. In principle, all the payments should be counted as occurring in the period in which the actual medical service was provided, but it may be difficult to determine from the insurance data the period to which insurance payments relate. In practice, this may not be a significant problem, as any errors are likely to cancel each other out, but there may be a small discrepancy from year to year. In low-income developing countries, where overall insurance expenditures are small, it is usually not worth making significant efforts to resolve this problem. However, in richer countries, the health accountant may need to obtain more detailed data on the timing of medical claims reimbursed by the insurance scheme.

#### **4.9 Residual items**

##### **4.9.1 Extending the integrative approach to estimate residual items**

The preceding sections have covered the items most frequently estimated using non-household-survey data. The list is not intended to be exhaustive, and health accountants around the world are continually finding other useful data sources. Examples include industry data on long-term care or on purchases of optical goods (see the SHA Guide, section 5.3.6 (ONS, 2004)).

It is not possible to find reliable provider-side data for all items of household expenditure. Types of expenditure that commonly cannot be estimated with available data include spending on traditional medical providers, goods and services, dentists, services of paramedical practitioners, unqualified modern medical practitioners and purchases of medical durables. In these cases, household surveys may be the only available data source.

As has already been mentioned, the main problem with the use of household survey data is the existence of bias due to non-sampling error. A large part of this bias is systematic and will affect all items of expenditure in a survey to a similar extent. Thus,

if the integrative approach has been used to obtain more reliable estimates for some items of household spending, this information can be used to make reasonable inferences about the size of the bias affecting the other items. The larger the number of items of household expenditure that the health accountant has been able to estimate using other independent data sources, the more reliable and robust this approach will be.

#### 4.9.2 Assumption of equal bias in household survey estimates

This approach can be illustrated in the following way. Consider five items of household expenditure,  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$  and  $X_5$ . A household survey reports expenditure levels for these items of  $h_1$ ,  $h_2$ ,  $h_3$ ,  $h_4$  and  $h_5$ . However these household survey estimates are considered unreliable. Using a combination of data sources and the integrative approach, reliable best estimates of the first three of these expenditures can be obtained:  $x_1$ ,  $x_2$  and  $x_3$ . However, there are no independent data sources available to measure the last two items. In this situation, the information obtained in estimating the first three items can be combined with that in the household survey to obtain a more reliable estimate of the last two items. This can be done by assuming that the average bias, or level of over- or under-reporting, in the household survey data is the same for all five items. The best estimates for the last two items are then given by:

$$x_4 = h_4 * \frac{(x_1 + x_2 + x_3)}{(h_1 + h_2 + h_3)}$$

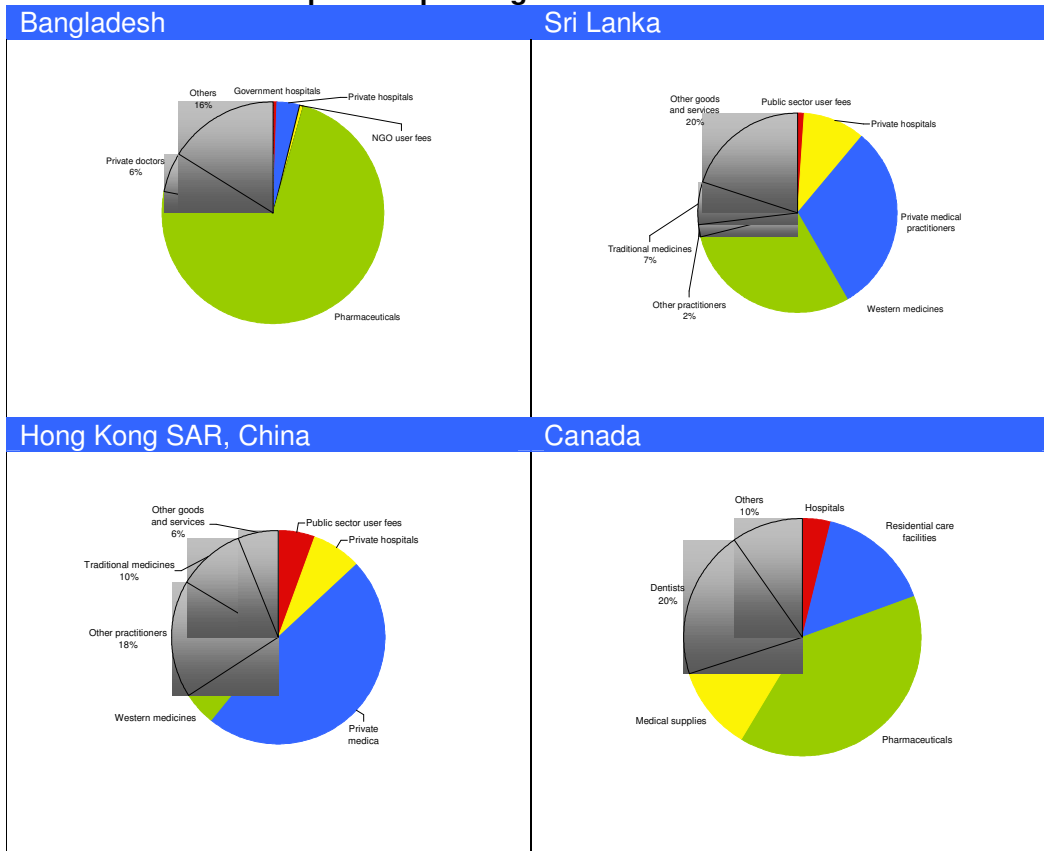
and

$$x_5 = h_5 * \frac{(x_1 + x_2 + x_3)}{(h_1 + h_2 + h_3)} .$$

The critical assumption here is that the bias for each item in the household survey is the same. In practice, the bias usually varies systematically between different items. However, in the absence of any information about the relative size of the bias for different items, this approach should result in the best possible estimates for the other items. If, on the other hand, there is some information on the relative size of the biases, the estimates might be adjusted accordingly.

Using this approach, it is often possible to estimate 60–75% of overall household expenditure without relying on household survey data as the primary source of information) (Figure 1).

**Figure 1. Extent of use of non-household survey data in estimation of out-of-pocket spending in various countries**



*Note.* The pie charts represent the composition of out-of-pocket expenditure in the various health accounts. The coloured segments represent items for which the primary data source is from the provider side, while the grey segments represent items of expenditure estimated predominantly from household survey data.

## 5. RECONCILING AND INTEGRATING ESTIMATES TO PRODUCE FINAL ESTIMATES

This chapter provides some tips on how individual estimates of expenditure and other relevant data might be combined and reconciled to produce a final estimate of overall household expenditures. (See also paragraphs 12.25–12.62 of the NHA Guide (WHO, 2003).)

### 5.1 Estimation of expenditures as a time series

A common error in many initial efforts to compile a national health account is to focus the data collection and estimation exercise on only one or two years. This approach is not optimal for two key reasons:

- (i) Many data sources that provide information on household spending will not be available for the years of interest. The data thus cannot be directly compared to data for those years from other sources. In order to make full use of all available data, it is best to look at a number of consecutive years.
- (ii) Different data sources are updated with different frequencies. If estimates are based only on the information available for a particular year, the numbers will fluctuate from year to year, simply because different data sources are used. This introduces a variation in spending that is simply a statistical artefact.

For these reasons, it is strongly recommended that the household expenditure should be estimated as a time series of linked individual year estimates, rather than as a single, isolated year estimate. This represents best practice. In addition, most policy-makers and users are more interested in trends in spending than in the actual level.

When expenditure flow is estimated as a time series, data sources can be valuable in two different ways: (i) they can provide information about trends in expenditure; and (ii) they can provide information about the level of expenditure. Even if data are thought to be biased – for example, tax data for doctors in the private sector may underestimate their real revenues – they can provide useful information on the upper and lower bounds of expenditure.

### 5.2 Organization of data

Most health accounts are organized and compiled using either a spreadsheet or a database package. It is recommended to start with a commonly used spreadsheet software, rather than a database package. Most estimates of household spending cannot be based on administrative or transactional data, and must be derived through a process of reconciliation. It is easier to do this in a spreadsheet than in a multidimensional database application. In countries where estimation of household expenditure is a major component of the health accounts, it is recommended that a separate set of spreadsheets should be maintained for this purpose.

Most of the initial data collected for a health account will relate either to sources of funding or to providers, depending on which approach was chosen. This will tend to dictate the general organization of a spreadsheet (see the SHA Guide, section 4.5.2 (ONS, 2004)). However, in the case of household expenditure, where it is important systematically to reconcile data from the two sides, it is often better to organize the

spreadsheets according to the major components of expenditure, for example, private hospital spending, purchases of medicines from pharmacies, government user charges, etc. The other dimension of the spreadsheet is most usefully reserved for organizing the data by year. This allows easy visual comparison of data for different years, and by component of spending. Table 3 illustrates this.

**Table 3. Organization of data in a spreadsheet**

Item	Data source	Comments	Year 1	Year 2	Year 3	Year 4
<i>User charges at government facilities</i>	Treasury records	Believed to be accurate	\$100	\$105	\$107	\$102
	Household survey	Small amounts – large sampling error		\$220		
<i>Pharmacy sales at retail price</i>	Market research firm	Reliable, but excludes vitamins	\$900	\$920	\$925	\$940
	Industry association	Estimated from wholesale data	\$850	\$870	\$890	\$880
	Household survey	Subject to non-sampling bias		\$1200		

### 5.3 Reconciliation and integration of the estimates

As suggested earlier, it is best to estimate individual components of household spending separately. The first step should be to prepare final estimates for expenditure items that are known with high reliability. This can be followed by estimation of those for which some data are available, and finally items for which few data are available. Start by entering estimates for which there is a high degree of certainty, and for which data reconciliation is not necessary.

If there are gaps in the time series for the initial items, because of missing data or unavailability of the data source for that year, these can be filled using interpolation or extrapolation (see the NHA Guide, paragraphs D.02–D.21 (WHO, 2003) for a more detailed description of methods). This process should be carried out whenever any set of numbers is finalized for a particular set of years. The health accountant should be consistent in making underlying assumptions and in choosing control variables, indicator series and inflation measures, to ensure consistency between estimates for different expenditure items. The appropriate set of indicator series or inflation measures will depend on the expenditure item and specific circumstances of the country. Examples that are commonly used include nominal private consumption as reported in the national accounts, nominal GDP, and the GDP deflator or equivalent price measure. Note that none of these are simply population measures. When dealing with trends in household spending, the most relevant macro variable is not the size of the population but its overall purchasing power, which reflects real income levels, the composition of the population and other factors.

The process of interpolation is also important in allowing data for different years to be combined to produce an integrated estimate. This is illustrated in the following schematic example, which presents a hypothetical estimation of household

expenditure on private dentists. As shown in Table 4, there are four data sources available to estimate this expenditure item, but they are not available for all years. By a process of interpolation using appropriate indicator and inflation measures, it is possible to extend each of the original estimates to produce the parallel estimates shown in Table 5.

**Table 4. Estimation of private dentists' revenues by integrating multiple data sources: original data**

Data source	Comment	Year 1	Year 2	Year 3	Year 4	Year 5
General household expenditure survey	Underestimate compared with national accounts	\$500				\$900
Specialized household health expenditure survey	Possible overestimate according to key informants		\$1200			
Tax department data	Likely to be under-reported	\$260	\$285	\$345	\$410	\$470
Dental Association Survey	Excluded dentists who not members	\$700			\$1100	

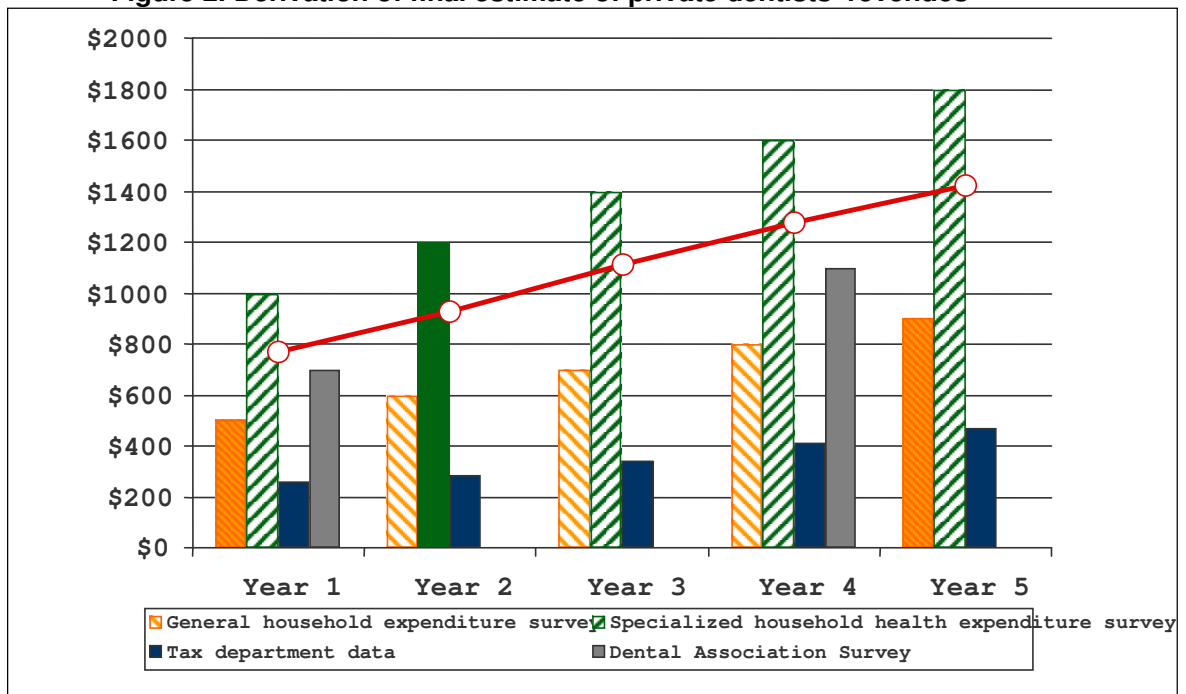
**Table 5. Estimation of private dentists' revenues by integrating multiple data sources: original data plus imputations**

Data source	Comment	Year 1	Year 2	Year 3	Year 4	Year 5
General household expenditure survey	Underestimate compared with national accounts	\$500	\$600	\$700	\$800	\$900
Specialized household health expenditure survey	Possible overestimate according to key informants	\$1000	\$1200	\$1400	\$1600	\$1800
Tax department data	Likely to be under-reported	\$260	\$285	\$345	\$410	\$470
Dental Association Survey	Excluded dentists who are not members	\$700			\$1100	

As noted in the comments, the tax data and general household expenditure survey data are thought to be underestimates. However, they provide good information on the trend in expenditure. On the other hand, the figure from the specialized household survey is thought to be an overestimate. The estimates from the Dental Association are thought to be of high quality, but subject to a small amount of underestimation since they do not include dentists who are not association members. Taking all these into

account, the final estimate is derived, and shown as a thick red line in Figure 2. The level of the final estimate is based on the inferences made about the relative biases of the different data sources, and its trend is based on those of the tax and general household expenditure data.

**Figure 2. Derivation of final estimate of private dentists' revenues**



*Note:* The solid colours show the original data, and the hatched columns show the estimates obtained by imputation. The thick red line shows the final estimates.

For some expenditure items, it will be relevant to apply the method described in section 3.5.2, i.e. by multiplying price and volume. In these cases, it is useful to enter separately the data used to estimate price and volume, so that the steps taken to finalize these elements are also shown. This is illustrated by the example in Table 6.



**Table 6. Estimation of household spending at private practitioner clinics, Hong Kong SAR, China**

Data source	Item	1996	1997	1998	1999
Administrative data of government	<i>Visits to public hospital clinics (A1)</i>	11 337 548			13 091 650
General household survey	<i>Visits to public hospital clinics (A2)</i>	291 900			285 200
	<i>Visits to private practitioner clinics (B2)</i>	920 200			746 500
	<i>Ratio of A1 to A2</i>	38.84			45.90
Final estimates	<i>Visits to private practitioner clinics [Q=(A1/A2)xB2]</i>	35 741 047			34 266 889
	<i>Gross revenues [E=Q x P]</i>	7484.04			7221.06

*Note.* The mean price (*P*) of a visit to a private doctor was estimated separately using survey data and interpolation.

*Source:* Leung G, Tin K, Hong Kong University Domestic Health Accounts Team, personal communication.

By proceeded sequentially, it is often possible to build up estimates for a large percentage of overall household health expenditure (see Figure 21). There will, inevitably, remain some household survey data for which no corroborating data exist. In these cases, the second-best solution is to modify the estimates using the average discrepancy between the household survey estimates and the final health accounts estimates for those expenditure items where corroborating data exist. This approach was described in section 4.9.2.

## 6. CONCLUSION

Reliable and accurate estimation of the private expenditure component of health accounts is a major challenge, particularly in developing and transitional economies. Major differences in the way different countries estimate private expenditure result in significant differences in the reported levels, and make it difficult to compare national estimates of health spending. Household out-of-pocket spending accounts for the largest part of private expenditure in most countries, and often presents the most problems for health accountants.

Current approaches to estimation can be significantly improved by drawing on emerging international best practices. In particular, health accountants need to be aware of the dangers of relying on household survey data. Many decades of experience with both national accounts and health accounts have demonstrated that household surveys are usually subject to significant sampling and non-sampling error.

It is recommended that health accountants adopt an integrative strategy to estimate all expenditure flows in a health account. This strategy involves examining all available data sources and balancing estimates of expenditure flows from different perspectives. In the case of household spending, data from both providers and households should be used. Adoption of an integrative strategy not only represents current international best practice for estimation of household health expenditures, but also brings health accounting practice more in line with best practice in national accounts.

In applying the integrative approach, the health accountant should invest time and resources where they are most cost-effective. Given that private expenditure estimates will often be subject to considerable unavoidable error, it is not wise to spend a lot of time on minor components of spending with little policy significance. For example, trying to correct for the errors that arise because insurance payments are not made in the same year as the relevant medical expenditure is unlikely to be an efficient use of resources in most low-income developing countries, where insurance is not a major source of financing. Similarly, the health accountant should first seek to improve estimates for the major items of household spending that are of policy importance and for which data are plentiful. In many instances, more attention will need to be given to estimation of expenditures at private clinics and private hospitals than to estimation of expenditures for traditional providers and purchases of over-the-counter medicines.

Nevertheless, estimation of household spending will remain a challenge, and estimates will continue to be subject to considerable error. It is important therefore that estimation methods continue to be developed and improved. Health accountants are encouraged to document the methods they use, to increase international understanding and allow other countries to learn from their experiences. It is only with such transparency and communication that national and global estimates of private spending will improve in the future.

## REFERENCES

- Brook H et al. (2000) *Jordan National Health Accounts*. Bethesda, MD: Partnerships for Health Reform Project, Abt. Associates Inc. (Technical Report No. 49).
- Cannell C, Fisher G, Bakker T (1965) *Reporting of hospitalization in the Health Interview Survey*. Washington, DC: Government Printing Office (Vital and Health Statistics, Series 2, No. 6).
- Cannell C, Fowler F (1965) *Comparison of hospitalization reporting in three survey procedures*. Washington, DC: Government Printing Office (Vital and Health Statistics, Series 2, No. 8).
- Cannell C, Marguiz K, Laurent A (1977) A summary of studies of interviewing methodology. Washington, DC: Government Printing Office (Vital and Health Statistics, Series 2, No. 69).
- Data International (1998) *Bangladesh National Health Accounts 1996/97*. Dhaka, Bangladesh: Health Economics Unit, Ministry of Health and Family Welfare.
- Deaton A (2003) Measuring poverty in a growing world (or Measuring growth in a poor world). Cambridge, MA: National Bureau of Economic Research (Working Paper 9822).
- Department of Economic and Social Affairs (2005) *Household sample surveys in developing and transition countries*. New York: United Nations (Studies in Methods, Series F. No. 96; ST/ESA/STAT/SER.F/96).
- Garg, C (1998) National health accounts for India: a case Study for Karnataka. Boston: Takemi Program, Harvard School of Public Health (Takemi Program Research Papers, No. 145).
- Ironmonger, D.S. 2001. "Household production", in N.J. Smelser & P.B. Baltes (eds) *International Encyclopaedia of the Social and Behavioural Sciences*, Volume 10. Oxford, England: Elsevier Science.
- Ministry of Health and Partnerships for Health Reform (1999). *Kenya National Health Accounts 1994*. Nairobi: Ministry of Health.
- National Statistical Coordination Board (2001) *1991-2000 Philippine national health accounts*. Manila: National Statistical Coordination Board.
- OECD (2000). *A system of health accounts*. Paris: Organisation for Economic Co-operation and Development.
- ONS (2004) *SHA guidelines: practical guidance for implementing "A system of health accounts" in the EU*. London: Office for National Statistics and Eurostat ([www.icon-statistics.net/Phare2002/ documents/SHA%20Guidelines1.pdf](http://www.icon-statistics.net/Phare2002/documents/SHA%20Guidelines1.pdf)).
- Rannan-Eliya RP, Jayawardhane P, Karunaratne L (2003) Private primary care practitioners in Sri Lanka. In: Yazbeck AS, Peters DH, eds, *Health policy research in Asia: guiding reforms and building capacity*, Washington, DC: World Bank.
- Ross DA, Vaughan JP (1986) Health interview surveys in developing countries: a methodological review. *Studies in Family Planning*, 17(2):78-94.
- United Nations (1993) *System of national accounts*. New York: United Nations.
- WHO (2003) *Guide to producing national health accounts: with special applications for low-income and middle-income countries*. Geneva: World Health Organization.

National health accounts are widely recognized as a valuable tool in the stewardship of a country's health system. Such accounts provide a systematic compilation and display of health expenditure, tracing how much is being spent, where, on what and by whom. As such, they can play an essential role in efforts to assess the performance of the system and identify opportunities for improvement.

Household out-of-pocket spending generally accounts for a large proportion of total expenditure on health, especially in developing countries, and is particularly difficult to estimate accurately. As a result, the usefulness and credibility of health accounts may be brought into question.

This publication, therefore, describes a method for measuring out-of-pocket spending on health, using an integrative approach that looks at expenditure from the perspectives of both the households and the providers. The different data sources are then reconciled, taking into account their respective strengths and weaknesses. Such an approach yields more robust, consistent and comprehensive results than other commonly used methods.

With extensive practical examples, this guide represents an important contribution to efforts to improve the accuracy, reliability and comparability of national health accounts.