



Extension of work on expenditure by disease, age and gender

EU CONTRIBUTION AGREEMENT 2011 53 01

December 2013

Contact David.Morgan@oecd.org



Health Division

www.oecd.org/health

Directorate for Employment, Labour and Social Affairs

EXECUTIVE SUMMARY

1. Following the successful completion of the joint work between Eurostat, OECD and WHO to publish *A System of Health Accounts 2011* (SHA 2011) in October 2011, the priority has been to help countries prepare for the implementation of the new system. Under the first work package of the Action (EU Contribution Agreement 2011 53 01): Getting international measures of health spending right, two separate work packages were identified:

1.1. Feasibility studies for future amendments to JHAQ (Joint Health Accounts Questionnaire);

1.2. Extension of work on expenditure by disease, age and gender.

2. In accordance with the operational actions, this final report provides an overview of the work completed under work package 1.2. A separate report details the work undertaken under work package 1.2.

3. The aim of work package 1.2 was to accelerate the process of deriving health expenditure data by disease categories for an expanded number of OECD/EU countries. Consistent and comparable expenditure by disease can lead to a better understanding of the drivers of past and future health spending, as well as changes in medical practice for specific disease areas. Such information, combined with data on outcomes, can be utilised in further types of analyses, including economic evaluation and cost-effectiveness analysis.

4. While countries had produced estimates of spending by disease, age and gender characteristics, these studies have not always been comparable both over time and between countries. A previous OECD project in 2007-08: *Estimating Expenditure by Disease, Age and Gender under the System of Health Accounts (SHA) Framework* developed and tested a set of guidelines to allocate health expenditures with the SHA health accounting framework.

5. The resources and data sources necessary to undertake such studies were quickly identified as a barrier to this expansion, such that it was decided that an initial focus should be made on the breakdown of (inpatient) hospital data by disease for an increased number of countries, reflecting the greater availability and comparability of detailed data sources in this sector.

6. In summary, the various steps of the project were to (i) increase the number of countries for which hospital (inpatient data) can be derived, and (ii) expand the data collection beyond hospital expenditures to include the other major health care expenditure categories, namely, outpatient (ambulatory) and pharmaceutical spending. The *Guidelines* were also reviewed and any outstanding issues, based on the experience of the data collection related to the pilot study and subsequent work to date, have been addressed.

7. In terms of data availability, the database of six countries that participated in the 2008 study has been expanded up to 16 countries for expenditure in the hospital inpatient sector. As envisaged, the coverage has been more difficult in areas of outpatient care and pharmaceutical spending. The problem has been exacerbated by the lack of, or reduction in, the available resources in statistical offices and ministries to carry out such work. In this regard, there was an early shift in focus to find ways to estimate expenditure by disease using more readily available data. This has centred on the use of activity data (e.g. discharge and length of stay in the inpatient sector) as a way to fill the gaps. Results suggest that this methodology is promising, but further work is required to finalize the methodology and determine the validity of the approach (Chapter 6). An inventory of physician activity data and pharmaceutical consumption and sales figures has also been compiled in order to advance the collection of data in these

areas (Chapters 7 and 8). In addition, the current best practices in these two areas e.g. Australia, the Netherlands and Germany can assist other countries in developing consistent methodologies to expand their disease account work beyond hospital spending.

8. That said, the comparative analysis of the available data (in Chapter 5) already provides some interesting comparisons and shows, for example, the high share of spending on circulatory diseases in the inpatient and pharmaceutical (medical goods) sectors in most countries (around 18% and 20% on average, respectively), the domination of digestive diseases (due to dental expenses within this chapter) in the outpatient sector (25% on average), as well as significant country differences.

9. The data collected is to be made available via the OECD.Stat data warehouse as summary tables. It is hoped that, much in the same way as the overall health accounts, the accessibility of the data and the transparency of the methodologies will act as a spur to improve the country coverage and comparability in the future.

10. In summary, the issues around the availability and limitations of many data sources mean that deriving fully comparable international results remains challenging. Thus, it is important that all methods and assumptions are made fully transparent. This will ensure that the highest degree of comparability possible. In regard to outstanding issues identified in the guidelines it has been recommended that:

- Data is allocated according to ICD-10 chapters at a minimum. Data should also be collected based on the International Hospital Morbidity Short List (ISHMT) as more granular data is required to properly analyse the expenditures associated with specific diseases;
- All attempts should be made to allocate as large a percentage of expenditures as possible, including the use of pro-rated data where feasible. However, where data is lacking expenditures should remain unallocated.

11. The real proof will be if their availability leads to meaningful comparisons of expenditure by disease, age and gender between countries. There should also be a focus on standardizing the frequency of reporting across countries. Detailed data produced on a three-year basis is likely to be frequent enough to provide relevant information for policy purposes, and may also balance the resource constraints that have been evident in all countries that has made the production of expenditure by disease data quite challenging.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	2
1. BACKGROUND AND PROJECT OVERVIEW	6
Stages of the project.....	7
Contents of the report.....	8
2. COST OF ILLNESS STUDIES	9
Background.....	9
Components of a cost-of-illness study.....	10
Prevalence-based and incidence-based COI studies	13
Estimation of direct costs: Bottom-up vs. top-down.....	13
Direct Costs and the System of Health Accounts	14
Co-morbidities and risk factors.....	15
Cost-per-case versus cost of disease	16
Indirect and Intangible Costs	16
Summary of Cost-of-illness studies.....	17
3. SHA AS A SUITABLE FRAMEWORK.....	19
Background.....	19
Functions and the Consumer Health Interface.....	20
Provision interface / Health Care Providers.....	21
Financing interface.....	21
4. REVIEW OF METHODOLOGY AND PROPOSED AMENDMENTS	23
Summary of methodological approach in 2008 Guidelines.....	23
Specific issues addressed in the review	24
Summary	27
5. CURRENT DATA AVAILABILITY	29
Summary and objective.....	29
Data availability.....	29
The challenges in comparative data by disease	36
Expenditure by specific diseases: The example of mental health.....	42
Dissemination of data on spending by disease (age and gender).....	44
6. USING ACTIVITY DATA TO ALLOCATE HOSPITAL EXPENDITURES.....	51
Introduction.....	51
Deriving hospital expenditure by disease	51
Modelling inpatient expenditures using activity data	52
Results.....	55
7. LINKING PHARMACEUTICAL DATA TO DISEASE AND DIAGNOSIS.....	58
Country experience	58
Mapping ATC to ICD	62
Summary	64
8. LINKING PHYSICIAN/OUTPATIENT SPENDING TO DISEASE.....	71

Identifying activity level data for the ambulatory sector	72
Summary	74
REFERENCES	75
ANNEX 1. SUMMARY RECORD OF DISEASE EXPENDITURES EXPERTS MEETING, 13-14 FEBRUARY 2012.....	77
ANNEX 2. SUMMARY RECORD OF DISEASE EXPENDITURES EXPERTS MEETING, 13 JUNE 2013	92

Boxes

Box 1.1. Questions which COI studies can address and the necessary costs components to be included.	13
Box 8.1. Allocating Out-of-hospital medical services using the Australian BEACH survey.....	71
Box 8.2. Allocating cost of physicians to disease categories in Germany	72

1. BACKGROUND AND PROJECT OVERVIEW

12. *A System of Health Accounts (SHA)*, published by OECD in 2000, put forward the allocation of health spending according to diagnostic categories, gender and age groups as an important extension of the health accounting framework. However, the manual itself contained little in the way of guidance to compilers in terms of methodologies and concepts beyond proposing a series of cross-classified tables.

13. Consistent and internationally comparable data on expenditure by disease is deemed important for a better understanding of the drivers of health spending, as well as examining changes in the patterns of medical practice in specific disease areas. While a number of countries had long experience in producing estimates of spending according to such characteristics, such studies were neither comparable nor embedded within an accounting framework, such as SHA.

14. In 2007-08, the OECD undertook an initial project part financed by a grant provided by the Directorate General for Health and Consumer Protection of the European Commission (EU contribution agreement 2006OECD01): *Estimating Expenditure by Disease, Age and Gender under the System of Health Accounts (SHA) Framework*.

15. This first project was two-fold. Under a first phase, a set of guidelines based on existing methodologies¹ was developed covering the main concepts and definitions and proposing a methodology to allocate health expenditures (as defined by SHA boundaries) according to classifications of disease, age and gender. A second phase consisted of testing the feasibility of implementing the draft guidelines under different health care system characteristics through a series of case studies in six countries (Australia, Germany, Hungary, Korea, Slovenia and Sweden). The countries were selected based on their varying degrees of experience in both health accounts and cost-of-illness studies. The conclusions and resulting refinements to the methodology provided a significant input into an expanded coverage of health expenditure by beneficiary characteristics in the subsequent revision: *A System of Health Accounts 2011*.²

16. As a follow up to the 2007/08 study, the main objective of this project has been to accelerate the process of deriving consistent and comparable health expenditure data by disease categories for an expanded number of countries. The resources and detailed data sources necessary to undertake such studies on a regular basis have rapidly been identified as one of the barriers to this expansion. Therefore, as an initial step, it was intended to focus on the breakdown of (inpatient) hospital data by disease for an increased number of countries, reflecting the greater availability and comparability of detailed data sources in this sector. In summary, the various steps of the project were to (i) increase the number of countries for which similar data can be derived, and (ii) expand the data collection beyond hospital expenditures to include the other major health care expenditure categories, namely, outpatient (ambulatory) and pharmaceutical spending. The later chapters of this report focus primarily on the work in these three areas. In addition to the overall expenditure by disease allocation, a particular focus on spending on specific

¹ The guidelines were based on similar guidelines developed for the Netherlands Cost-of-Illness studies by RIVM (The National Institute for Public Health and the Environment in the Netherlands). RIVM were commissioned under the project to adapt the methodology to the System of Health Accounts.

² *A System of Health Accounts 2011* was published in October 2011 under the joint copyright of OECD, Eurostat and WHO.

disease categories (e.g. mental health) was made as a measure of the potential input into some of the on-going disease-specific policy studies.

17. While the main focus of the project has been on allocating health expenditures by disease (i.e. the direct cost component in an overall COI study³), a large body of evidence suggests that the indirect costs associated with illness and injury can be quite substantial and possibly greater than the direct costs for some disease areas, such as mental health. Therefore, a supplementary objective of this project has been to assess the importance of including indirect costs and to examine possible methods and data sources for their consistent estimation and derivation. The work on this topic is to be more fully examined in a separate report and only a summary of the discussions and conclusions is presented in Chapter 2 of this report.

Stages of the project

18. Under the first stage of the project, the OECD convened an initial meeting of experts in February 2012. The meeting was open primarily to countries who had participated in the initial 2007/08 project, in addition to countries that had subsequently undertaken or planned to undertake similar studies. In all, thirteen OECD/EU countries were represented. A number of other experts from national and international organisations also attended.

19. The goal of the meeting was to review the current guidelines in the light of country experiences, assess recent developments since the project and guide the work towards tackling remaining methodological and data issues. The data collected as part of the previous project, together with available expenditure by disease for several other countries, were presented and reviewed. The main decisions taken for the work of the project were:

- Continue to explore and encourage additional OECD and EU countries to undertake and provide expenditure by disease studies, particularly, as a first step, in the area of hospital inpatient care.
- Provide guidance on some of the outstanding methodological issues, such as the allocation of non-disease specific expenditure within the boundary of current health expenditure (e.g. administration expenditure).
- Investigate the use of widely available hospital activity data (e.g. discharge and average length of stay (ALOS) data by diagnostic category) as a potential allocation mechanism to estimate expenditure by disease for an expanded group of countries in the absence of detailed expenditure data. Initial analysis comparing the results at ICD Chapter level for those countries with disease expenditure reports with estimates based on hospital activity data appeared promising. It was decided to develop further the feasibility of using activity data, including an investigation into the use of sub-chapter level information, and the effect of introducing additional variables.⁴
- For outpatient care and pharmaceutical expenditures, it was decided to further review current methodologies and determine which methods can be improved. Furthermore to investigate linkages between data classifications e.g. the use of pharmaceutical data classified by the ATC (Anatomical therapeutic Chemical Consumption) classification and diagnostic categories, or physician activity data in the outpatient sector.
- Work with selected countries and expert groups to obtain more detailed health expenditure data in the area of specific disease categories, e.g. mental health.

³ See Chapter 2 for an overview of the components of Cost-Of-Illness studies.

⁴ An overview of the study is presented in Chapter 6 of this and the full results and methodology are published in a forthcoming OECD Health Working Paper.

20. A second follow-up expert meeting was held in June 2013⁵ to review the progress on these objectives, discuss the preliminary recommendations as well as agree on the final steps towards the final report and dissemination of results. Thirteen countries attended the meeting together with experts from national and international organisations. The main decision points were as follows and are fully described in the chapters of this report:

- All efforts should be made to allocate as large a proportion of expenditures as possible. When reasonable, unallocated expenditures should be re-distributed on a pro-rata basis. It is important, however, that all methods employed should be transparent and properly reported.
- The results from the hospital expenditure modelling proved to be encouraging. The model employed in the analysis of hospital expenditure and the investigation of results will continue to be further refined. The final report contains a table of weights based on an expanded set of countries such that estimates for the full set of OECD/EU countries can be made.
- For pharmaceuticals it is the aim to further develop an initial mapping between the pharmaceutical ATC classification and disease categories as an example and assess to what extent this can be further applied to other countries. For out-patient, or primary care data it was clear that data availability is very system specific. However, it is expected that some rudimentary estimates of outpatient spending based on physician activity data can be made for sample of countries in the final report.
- In general, as many different country practices as possible should be documented, as well as an inventory of what data is currently available in both areas of outpatient and pharmaceuticals.

Contents of the report

21. The remainder of this report consists of the following chapters:

Chapter 2. An overview of the concepts and definitions of cost of illness (COI) studies as well as a discussion of their use. The chapter also describes the differences between direct, indirect and intangible costs;

Chapter 3. A brief contextual review of the System of Health Accounts 2011 to justify its use as a suitable framework for embedding disease accounts;

Chapter 4. A summary of the guidelines from the 2008 project incorporating the refinements and recommendations resulting from this study;

Chapter 5. A summary of overall data availability with comparative tables and charts, highlighting comparability issues, data gaps and future availability. The chapter also covers the plans for the dissemination of available data;

Chapter 6. An overview of the background, methodology and results of the hospital expenditure modelling using hospital activity data in the absence of detailed expenditure information, plus conclusions & next steps;

Chapter 7. Best approaches, data inventory and mapping exercises in allocating pharmaceutical data by disease;

Chapter 8. Best approaches, data inventory and mapping exercises in allocating ambulatory expenditure by disease.

⁵ The summary records from both meetings are presented in Annex 1 of the Final Report.

2. COST OF ILLNESS STUDIES

Background

22. It is important to place the scope of this project in the overall context of Cost-of-Illness (COI) studies. In essence, COI studies estimate the total costs associated with illness or injury. They differ from economic evaluation studies, such as cost-effectiveness analysis (CEA) in that rather than focus on an intervention or treatment, COI studies use the actual illness or disease as the starting point. As such, the COI associated with a particular disease can be thought of in terms of the counterfactual. That is, *ceteris paribus*, they can be viewed as the overall costs that could theoretically be saved if that particular disease was eliminated from society.⁶

23. One of the first COI studies was published by Rice (Rice, 1967). The methodology employed became the accepted general framework for cost-of-illness studies, and is still used in many studies today. Rice's analysis estimated the national economic burden of all illness in the United States for 1963 from a societal perspective. Her analysis focused on two main types of costs - those of health care resources (direct costs), and those of productivity losses resulting from illness (indirect costs). Rice also noted another cost component – the “intangible or psychic costs” of disease such as pain and grief. There have been modifications made to this approach in the many cost-of-illness studies that have been published over the years, either because of methodological refinements, the study perspective that determines relevant costs, the focus on a specific disease rather than on total disease burden (indeed most cost of illness studies now published are disease-specific), the study objective, or data availability.

24. Cost-of-illness studies themselves, can differ in their scope; they may be disease-specific or they may be general, whereby the impacts of all medical conditions (or diseases) occurring in a population are considered using a standardised approach. The inclusion of the specific cost components is dependent on the purpose of the study (i.e. what questions are we trying to answer?) and the viewpoint, or perspective, (e.g. societal, health care system, insurers, employers, patients, etc.) of the study. For some purposes the inclusion of only health care costs is sufficient while others should rely on a broader consideration of comprehensive costs.

25. There has been criticism about the usefulness of cost-of-illness studies over the years and their contribution to decision-making (Shiell *et al*, 1987, Wiseman and Mooney, 2000). The criticisms have focused mainly on their relevance in priority setting. Shiell *et al* (1987) in particular base much of their criticism on the basis that COI studies do not tell us anything about the effectiveness of interventions or programmes that can be used to reduce the prevalence of disease. They note that COI studies focus on the aggregate costs of particular diseases and can only show us what society could save if the disease were eradicated which they rightly note as being unrealistic. As such, they do not provide any information on marginal changes in prevalence or costs which are what is ideally needed for decision making. As will be

⁶ The point of the counterfactual is made for illustrative purposes only. It is understood that the issue is not quite as simple. Removing one disease from society, even if it was possible, would result in increased incidence and prevalence of other diseases, and the associated expenditures. Indeed COI studies may, in fact, be more useful not for the aggregate information provided, but for the estimates of the sub-components and in particular estimates of the separate costs for encounters with the health care system which can be employed as inputs into further analyses or modelling exercises.

shown, however, COI studies, particularly if undertaken in the context of national health accounts, can be used to obtain information on the costs per encounter with the medical system which can then be used in a marginal-type analysis which focuses on an intervention.

26. As will be discussed, cost-of-illness studies provide a lot of useful information. In fact, COI studies should be viewed as a piece of information, or an input, into the decision-making process. Rather, it can be argued that policy makers should not make decisions solely based on the results of COI studies. COI studies do not purport to focus on the interventions and their effectiveness. That is left to the field of economic evaluation. Cost-of-illness studies can, however, provide very valuable information for policy makers. In particular, the results from COI studies can be used as an input into further types of analyses such as cost-benefit or cost-effectiveness analysis.

27. Koopmanschap (1998) very thoroughly summarises some of the potential uses of COI studies:

- i. Providing information on the burden of specific diseases;
- ii. Estimating disease costs covering the entire classification of diseases, enabling mutual comparison of disease costs and putting these in perspective;
- iii. Prioritizing diseases or topics for future economic evaluation (i.e. by combining COI data with other information such as doubts about effectiveness of treatment);
- iv. Incorporating COI results in cost-effectiveness analysis, e.g. as a cost estimate of current treatment which can be compared with the programme studied;
- v. Clarifying the most important cost components of treating specific diseases; and
- vi. Explaining recent trends in costs and/or projecting future disease costs, based on demographic, epidemiological and technological change (i.e. when COI data are used as a component of scenario-analysis).

28. These aforementioned applications of COI results are that much more useful if the methodologies, and types of data sources, employed are consistent across countries and across time. This reinforces one of the main purposes of the project, which is not only to ensure consistent methodology in the derivation of, at the outset, direct costs, but also the consistent and regular collection of data using *A System of Health Accounts 2011* as a guiding framework. If valid international comparisons are to be made using the results of COI studies, it is imperative that they are undertaken using common methodologies such as that offered under the SHA framework. Indeed, a previous study comparing the results of direct costs from cost-of-illness studies from five countries concluded that 'the study's objectives can only be reached by a further improvement of the SHA, by international use of the SHA in COI studies and by a standardised methodology' (Heijink et al, 2008).

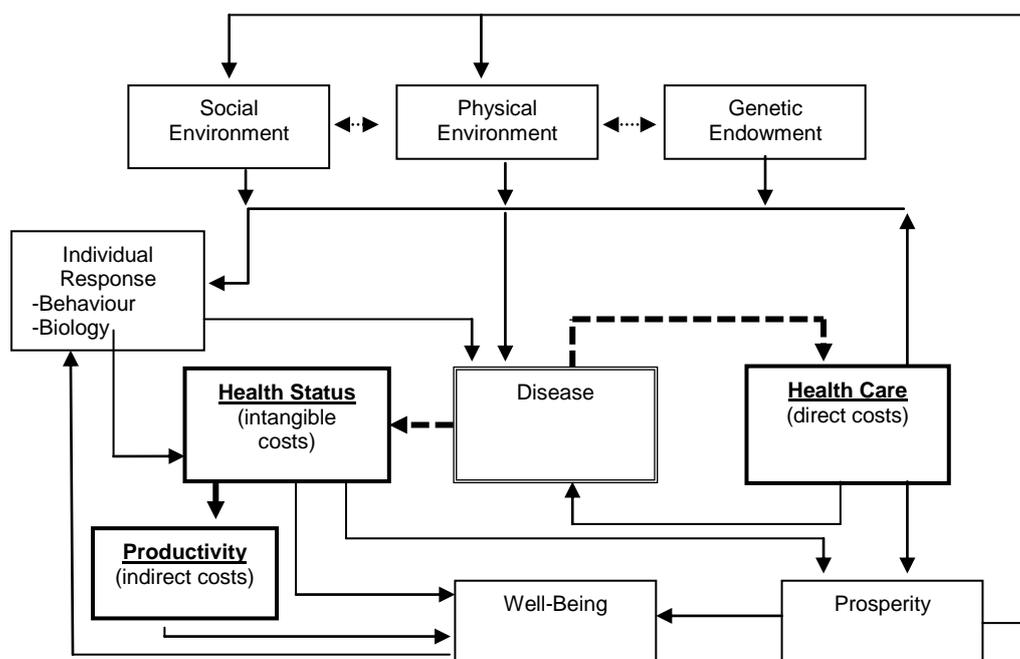
Components of a cost-of-illness study

29. The overall costs of illness are generally defined as the sum of the opportunity costs, or the foregone opportunities, associated with being ill and the associated psychosocial costs. The opportunity costs can be broken down into direct and indirect costs, while the psychosocial costs are often referred to as intangible costs as they are more difficult to estimate. Although, in recent years there have been numerous methodological advances allowing for their measurement and estimation, we will continue to refer to them as intangible costs as the term is commonly understood to refer to this cost component.

- $COI = \text{Direct costs} + \text{Indirect Costs} + \text{Intangible costs}$

30. Figure 2.1 provides a graphical representation of the costs-of-illness and their relationship within an overall determinants of health framework (Evans and Stoddart, 1990). This framework depicts the relationship between disease, social environment, physical environment, health care, health status, and well-being. The focus or starting point, of cost-of-illness is the existence, or prevalence, of disease. The existence of disease creates a need for health care (the direct costs), and causes a reduction in health status, or even death (intangible costs), which results in a decrease in productivity (indirect costs) due to disability or premature mortality.

Figure 2.1. The Determinants of Health: Focus on Cost of Illness



Source: Adapted from Evans and Stoddart (1990).

31. In order to be consistent with previous definitions and guidelines as well as being consistent with the definitions used in *A System of Health Accounts 2011*, the cost components can be defined as shown in Table 2.1.

32. In general, *direct costs* refer to those items for which some form of payment has been made. With reference to SHA boundaries, they can further be split into direct *health costs* and direct *social costs*.⁷ Health costs refer to those costs directly related to the detection, treatment, prevention, and rehabilitation of the disease. This includes medical care expenses such as hospitalisation, outpatient clinical care, care in rehabilitation and long-term care facilities, physician care, pharmaceuticals, medical care equipment and so on. Also included under direct costs is the household provision of health care services where they correspond to social transfer payments granted for this purpose, as well as items such as community care which are related to a health concern, even if not provided by a health care provider. Social costs would include, as defined by the SHA, those components of long-term care not directly related to health or additional social care for which payment has been made.

⁷ Direct health costs refer to those costs that are within the boundary of health care expenditure as defined by SHA 2011. Social costs refer to expenditures associated with “social care” as defined by SHA 2011. In other words, those goods and services indirectly related to the provision of health care which are outside of the health care boundaries.

Table 2.1. Components of Cost of Illness*

Direct	Transfer payments ¹	Indirect	Intangible
expenditure on healthcare goods and services following increased demand for healthcare due to the specific illness Includes: hospital services, doctors, nurses, drugs, diagnostics, ambulances, ambulatory care, rehabilitation, long-term healthcare, etc Household production of healthcare is included in SHA if payment is involved	Payments made for temporary absence from work due to illness (e.g. from employer or government or social insurance. Purpose is income maintenance) Payments made for inability to work due to illness (e.g. from government or social insurance. Purpose is income maintenance) Reduced payments (e.g. due to early death). May be netted off	Formal labour market effects (i.e. reduced supply of labour due to illness) Can arise through premature mortality, absence due to morbidity, and 'presenteeism' due to morbidity Expenditure on other goods and services - examples may include: fire damage (e.g. for fires caused by smoking); policing and criminal justice (e.g. when due to alcohol abuse or drug addiction) For net resource impact, should net off change in consumption	Pain and suffering and desire to avoid morbidity and premature mortality 'Caring externalities' Psychosocial costs
	Allowances paid for household production of healthcare (e.g. by government or social insurance) Included in SHA if purpose is healthcare	Household production of extra healthcare & of extra social care and other household services (when no payment involved) also includes lost household production due to illness	
Household production of social care	Allowances paid for household production of social care - e.g. by government or social insurance		
All other additional social care consumption due to the specific illness	Allowances may be paid to people who need to buy additional social care		

*Note that there still some grey areas may still exist, or the possibility of overlap, but by adhering to these definitions we hope that such instances will be minimized. In addition, these definitions have been employed for the purpose of increasing comparability of results and while being consistent with current data collection

¹Not included in COI from the societal perspective as these payments are transferred from one sector of the economy to another. This is included here for illustration purposes.

33. The *indirect costs* refer to other economic consequences attributable to disease, illness, or injury which result in lost resources, but do not involve direct payment related to the disease. This includes labour supply effects such as the value of lost production due to time in hospital, disability, and premature mortality or as a result of presenteeism. Indirect costs would also include the value associated with informal care – that is care provided by family members for which there is no direct or formal reimbursement. Nevertheless, there is still an opportunity cost associated with this activity which must be measured and valued.

34. The *intangible costs* refer to the reduced well-being, emotional distress, pain, and other forms of suffering attributable to disease and injury that are more difficult to quantify and monetize. It could also include the value of life itself. Although difficult to derive, in estimating the overall societal costs associated with disease and injury one should consider the intangible costs as they can be substantial. In fact, it has been argued that current methods used to estimate the COI likely underestimate true disease

burden (Hodgson and Meiners, 1982). In order to be included in a COI study these costs must first be measured and then valued in monetary terms.⁸

35. The cost components employed in a given COI study should be linked to the objectives of the COI and the perspective employed. For example, if the study was being conducted from a societal standpoint, it should include the direct, indirect and intangible costs. The transfer payments would not be included because, as their name implies they are considered a transfer from one sector of the economy (the government) to another (individuals). On the other hand, if the study was being conducted from the viewpoint of the government, any transfer payments should be included and the publicly financed portion of the direct costs would be included.

Box 1.1. Questions which COI studies can address and the necessary costs components to be included

- Which diseases currently have the greatest impact on GDP?
 - Indirect costs only (or a portion thereof)
- Which diseases currently have the greatest impact on social welfare?
 - All costs (direct, indirect, intangible)
- Which disease used the most resources of a particular health care provider
 - Direct costs only
- Which diseases cost the government the most.
 - Direct costs and government payments related to unemployment and disability.

Prevalence-based and incidence-based COI studies

36. COI studies can be conducted using either a prevalence-based or an incidence-based approach. A prevalence-based COI study estimates the annual costs of illness of all cases of illness existing in a given time period (usually one year). They provide a snapshot at a point in time (e.g. year). This was the approach used by Rice and in general COI studies (Rice, 1967; Cooper and Rice, 1976). In contrast, the incidence-based approach assigns a stream of lifetime costs starting from the original diagnosis of the disease, with the present-value of costs assigned to the year of incidence. As such it looks at the whole disease pathway. The development of the incidence-based approach to measuring the costs of illness dates back to the work of Smart and Saunders (1976) and Hartunian *et al.* (1980), who operationalized the method into four steps: 1) estimating the incidence of the condition, 2) estimating mortality rates and life expectancies of survivors, 3) estimating the direct costs of all patients in the first year as the future direct costs of the disabled, and 4) discounting future direct costs to their present value (Scitovsky, 1982). The data required to estimate costs using the incidence based approach are generally more difficult to obtain, possibly explaining why this methodological approach is used less often in cost-of-illness studies.

Estimation of direct costs: Bottom-up vs. top-down

37. In estimating direct costs, there are two general approaches: top-down and bottom-up. Utilising the bottom-up approach, one must first derive an average cost per case or encounter (e.g. physician visit, hospital stay, etc.). This can be done using survey, administrative data, or even as part of a micro-costing study where the costs for treating a specific patient in a hospital are derived by examining individual patient records to determine all resources used. The cost-per-case can be further refined using specific information on age, sex and even socio-economic status. To derive the costs to society, the cost-per-case is

⁸ These costs can be valued in utility terms (e.g. QALYs) or in monetary terms (e.g. willingness to pay). In fact the gain in well-being, valued in utility terms such as QALYs, due to a treatment or intervention, is often the outcome measure in cost utility analysis. In a COI they must be valued measured in dollar terms, which would then allow for their direct input into cost-benefit analyses.

then multiplied by the number of cases, which again can be determined from administrative data, or more likely surveillance data or general surveys. The result is thus an estimate of the costs associated with treating a specific disease. Note that the bottom-up approach is consistent with disease-specific COI studies rather than a general study which attempts to estimate the costs of all diseases.

38. In contrast to the bottom-up approach, the top-down method uses actual expenditure data, such as total hospital expenditures, and then attempts to allocate the expenditures across all diseases or diagnostic categories. This can be done using total hospital (or other health care facility) expenditures, physician expenditures or pharmaceutical expenditures and allocated according to primary diagnosis, using ICD codes, for example. Expenditure data comes from health accounts data such as that employed in the System of Health Accounts.

39. The top-down approach was operationalized and used by Rice in her numerous COI analyses. A top down approach assumes mutually exclusive and exhaustive disease categories. Thus a benefit of the top-down approach is that allocating total health expenditures across major diagnostic categories avoids the problem of individually-estimated disease groups summing to more than national expenditures (Tarricone, 2006). When more specific patient-level data, such as information related to disease related groups (DRG) or case-mix groups (CMG), is available it can also be employed in the cost estimation. Using such patient level cost data in a top-down framework increases the usefulness of the results as they better represent the actual resources, and economic costs, attributed to different diseases.

40. Deriving estimates of health care costs that are valid, reliable, and comparable is extremely challenging. As noted by Lipscomb *et al* (2009): “Health care costs are inherently difficult to measure, whatever the choice of data source(s).” In order to derive the costs associated with treating a specific disease the resources employed must be both measured and appropriately valued. Both of these tasks are inherently challenging. The data that are used for measuring and valuing health services are often not made for the purpose of costing. And where there are available prices, they do not necessarily convey accurate information about the economic cost of the associated services.

Direct Costs and the System of Health Accounts

41. Using a top-down approach in the context of a national health accounts framework mitigates many of the criticisms of COI studies. It allows for meaningful international comparisons of expenditures on disease assuming that consistent methodologies and definitions are employed. The benefits of linking expenditures by disease and cost of illness data to national accounts and national health accounts has been identified by various authors going back to the early 1980s (Hodgson and Meiners, Wiseman and Mooney, Wolfson), and most recently by Rosen and Cutler (2009) who recommend using the United States National Health Expenditure (NHEA) data to derive disease-based accounts.

42. Rosen and Cutler (2009) further note that the value of health account-based expenditure by disease data lies in their potential to better inform the policy process than either NHA data or disease-specific COI studies alone. While health accounts provide comprehensive information on health expenditures, they lack important health specific information useful for much policy analysis. Deriving expenditure by disease data that is constrained by national health account totals allows for side-by-side comparisons, and related analyses of health and spending.

43. Furthermore, potential policy uses for disease specific expenditure data, beyond assessing the financing allocations of different diseases, includes global resource tracking, increased understanding of cost drivers in expenditure growth and analysing financing and coverage of priority diseases.

44. *A System of Health Accounts 2011* provides a clear set of criteria and definitions for what should be considered health care costs and it is recommended that this definition be employed in the derivation of expenditures by disease. Based on different data sources and data collection techniques not all countries

will have access to data on all of the possible cost components, hence it is important to be transparent in what is included for each country.

45. The definition of direct costs employed for this project follows the boundaries defined under SHA which sets out four main criteria to determine whether an activity should be included within the core expenditure account of the SHA; these are presented below, in order of importance:

- The primary intent of the activity is to improve, maintain or prevent the deterioration of the health status of individuals, groups of the population or the population as a whole as well as to mitigate the consequences of ill health;
- Qualified medical or health care knowledge and skills are needed in carrying out this function, or it can be executed under the supervision of those with such knowledge, or the function is governance and health system administration and its financing;
- The consumption is for the final use of health care goods and services of residents; and
- There is a transaction of health care services or goods.

Co-morbidities and risk factors

46. One of the benefits of using a top-down approach is that all expenditures are allocated to different disease groups in a mutually exclusive manner. This, therefore, avoids the issue of double counting which can occur in bottom-up studies if the same transaction gets counted in two different studies (i.e. can be linked to two different diseases). The issue of co-morbidities, complications common to multiple diseases, and diseases which are also risk factors must still, however, be noted as an important concern, and potential limitation of the top-down approach. This issue was identified by Rice during her first COI studies as the presence of co-morbid conditions presents difficulties in measuring the economic impact of each contributing condition. Using a top-down approach in the SHA framework, it has been proposed that all of the expenditures associated with, for example, a hospital stay are generally attributed to the primary (or most responsible) diagnosis.⁹ This may lead to an overestimate of the medical care costs of the primary diseases. Hence, there is potentially a trade-off between overestimating the costs of certain conditions and ensuring that all costs are somehow allocated in a mutually exclusive manner

47. On the other hand, some diseases are considered to be risk factors for other diseases. For example, diabetes and obesity, which are both considered diseases and have associated ICD codes, are known to contribute to other diseases such as cardiovascular disease. Treating diabetes as a disease only, employing a top-down approach would result in an underestimation of the true costs associated with diabetes. Similar issues arise with co-morbid conditions and to conditions which can be considered sequelae of other health conditions. For example, sexually transmitted infections (STI) may lead to pelvic inflammatory disease (PID) in women, which may lead to infertility issues. Thus, when estimating the full costs associated with STIs one should also include the expenditures associated with treating the portion of PID cases that were caused by the STIs as well as the expenditures associated with fertility treatment which were ultimately caused by the STIs. Such an analysis can be done by employing population

⁹ Hospital expenditures are usually derived from hospital discharge databases that may list multiple diagnoses. In theory it is possible to allocate expenditures across different diagnoses using statistical techniques. However, this is likely to reduce the international comparability of the data. Weighting techniques such as those employed in the derivation of resource intensity weights and cost-per-weighted case, can take into account some of the concerns associated with co-morbidities. In some registries, such as those recording physician fee-for service visits, it is possible that only one diagnosis is recorded.

attributable fractions (PAF) estimated from epidemiological studies (Goeree and Gully 1992; Janssen and Diener 2009; Smylie *et al* 2011).

48. One must be careful to then not re-aggregate the costs from all of the different diseases as the total will be greater than the total of actual expenditures. That's not to say that it is incorrect to derive disease specific cost or expenditure estimates, rather it is important to be clear about the aims, and be transparent and clear in the methodology employed. By estimating disease specific expenditures in such a top-down approach (as opposed to employing bottom-up methods) it is possible to aggregate and disaggregate the various components to ensure that no double counting occurs. In fact deriving expenditures for diseases such as diabetes or STIs using only primary diagnoses, while underestimating the true costs of the diseases, provides an answer to a different question. By employing the PAF method one can derive the actual expenditures associated with a disease and this type of information can be used in economic evaluation studies which examine the effects of potential interventions and treatments. Using the expenditures associated with only primary diagnoses provides researchers and policy makers with useful comparative data which can be used to understand expenditure trends and changes in patterns of practices over time and across countries. Assuming similar risk profile and population distribution across countries allocating expenditures to primary diagnosis should not adversely affect the comparability of results.

Cost-per-case versus cost of disease

49. In general, COI estimates the overall total costs associated with a given disease as opposed to the cost-per-case of the disease, which can be viewed as a possible limitation of COI studies. This is because the underlying data employed in deriving the COI estimates provide no information about overall prevalence of the disease (although this may be obtained through other sources such as surveillance data are broader social surveys). However, deriving a cost-per-case (as opposed to cost-per-capita) is not a straightforward exercise.

50. Expenditure data is collected based on encounters with the health care system. For example, hospital expenditure data is likely to be based on a discharge database which will record each individual discharge but it may not be possible to link multiple hospital stays/discharges of one individual. Thus, for example, no information about re-admissions, within or across hospitals in a given country, may be available. In addition, it is even more unlikely that the hospital discharge data can be linked to, for example, physician visit data. Therefore, while it may be possible to derive an average cost (or more explicitly, expenditure) for a hospital encounter, physician visit, etc., ideally broken down by age group and gender, and other socioeconomic characteristics, it is problematic to estimate the cost-per-case of a particular disease. That does not necessarily impact the usefulness of the data. In micro-simulation models, for example, it is the cost-per-encounter with the health care system that is required. That said, based on knowledge of the prevalence of a disease, the epidemiology around the number, and timing, of encounters with the health care system and having good estimates of expenditure, or cost, per encounter, it may be possible to derive a valid estimate of the cost per case of a disease.

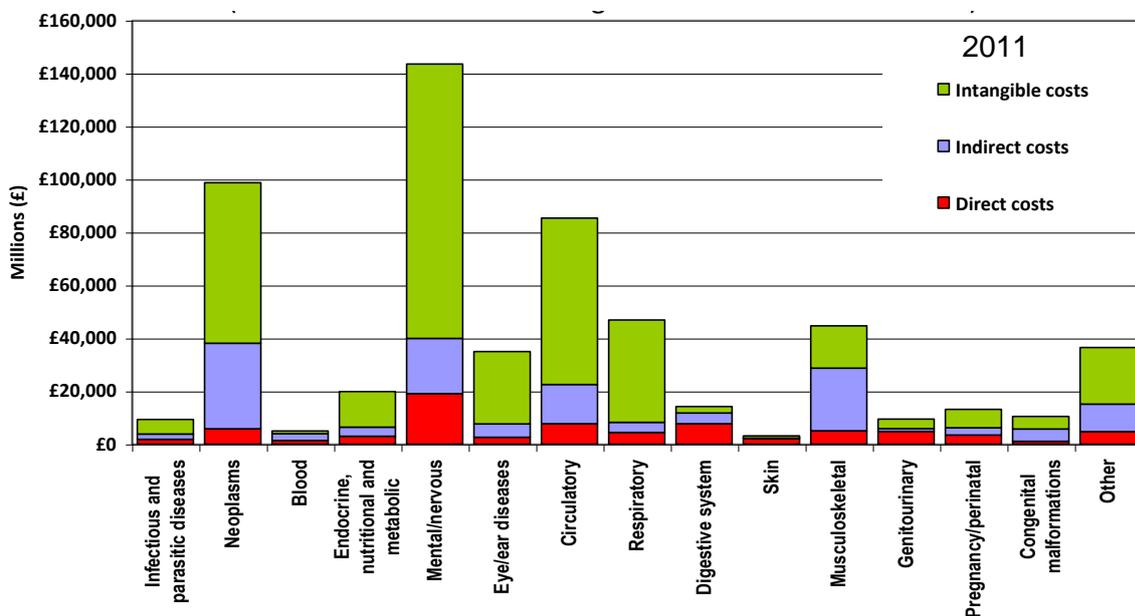
Indirect and Intangible Costs

51. Many COI studies focus only on the direct cost components. However, for many of the aforementioned uses, information on the indirect costs and intangible costs are often important, or even essential. For example, in order to properly understand the full societal disease burdens and relative magnitudes of diseases the full opportunity costs – i.e. a full COI – should be estimated and included. Setting priorities for future economic evaluation or research should ideally be based on a societal welfare approach (including societal costs and benefits), which would need a broad COI approach that includes both indirect and intangible costs. In particular, when making projections of potential impacts on the wider economy of diseases and potential treatments or programmes, it is necessary to use a full COI approach.

52. The indirect and intangible can be quite substantial, depending on the disease, and often outweigh the direct costs, and the intangible costs may exceed the indirect costs. The ratio of indirect costs to direct costs varies across disease categories, and is generally high for non-communicable diseases such as cardiovascular diseases, cancer, and mental illness. For example, according to the World Economic Forum the total costs associated with mental health conditions in 2010 was USD 2.5 trillion; the indirect costs accounted for 67% of the costs, or USD 1.7 trillion. Mental health has high disability effects causing a high level of attributable unemployment, absenteeism, and presenteeism (the loss in productivity that occurs when employees come to work even when unwell and consequently function at less than full capacity). Other diseases, such as cancer, may have greater levels of premature mortality.

53. A recent study for England (DH, 2013) estimated direct, indirect and intangible costs by disease. The direct costs reflected the costs borne by the National Health Service (i.e. public sector costs). The indirect costs used the same ratio of indirect to direct costs as found in the Economic Burden of illness in Canada (Health Canada, 2002). The intangible costs were first quantified using WHO Global Burden of Disease data, and then monetised at £60,000¹⁰ per DALY or QALY (Figure 2.2).

Figure 2.2. Economic Burden of Disease in England, 2011



Source: Department of Health, 2013

54. Given the importance of indirect and intangible costs, it is important to undertake a full COI study to properly evaluate the effects of general or disease-specific policies. While further details on these cost components are beyond the scope of this report, the reader is referred to Henderson and Diener (2013 forthcoming) for a more detailed review.

Summary of Cost-of-illness studies

55. Cost-of-illness studies can provide valuable information when common and consistent methodologies are employed, particularly in the area of direct costs. Deriving expenditure by disease under the SHA framework allows for comparisons of health expenditures between diseases, ages, over time periods, and between countries. As the costs of health care rise and the pressure to allocate scarce funds

¹⁰ This is a figure calculated to be compatible with the value used elsewhere by the UK government – e.g. in transport appraisals, for valuing the prevention of transport fatalities.

more effectively increases, such studies are an important resource as one of the inputs into economic evaluation and other tools such as scenario analysis and micro-simulation models (including the OECD's Chronic Disease Micro-simulation Model) in order to project future health care needs and the most efficient use of scarce resources. COI studies can contribute to the understanding of the determinants of these expenditures; they can provide information about which areas are growing the fastest and/or contributing the most to increasing health expenditures, and furthermore how that growth may be distributed across different diseases and age groups. When undertaken under the SHA framework the information can also be derived broken down by the providers of health care and the functions of health care further increasing their usefulness.

56. The data derived for COI studies can also be employed as an input into economic evaluations such as cost-effectiveness analysis (CEA) or cost-benefit analysis (CBA). In an economic evaluation the focal point moves from the disease to the actual program or intervention. The intervention can be a specific health care intervention, such a new technology, therapy, or pharmaceutical, or it can be a more general public health intervention such as a screening programme or a community-based programme to promote exercise or fitness. The intervention will cause a change in disease prevalence (either by reducing the overall prevalence, or by altering the severity possibly) which will result in a change in health status and thus a change in productivity. In an economic evaluation, the costs and outcomes, of the intervention, must be considered. The costs refer to the cost of the intervention, while the outcome is, in general, the change in health status. An intervention may increase overall health status and thus cause an increase in productivity. This increase in productivity can be deducted from the cost of the intervention (if, for example, a societal perspective being employed). Thus, if the change in health status and the change in productivity have already been valued in a cost of illness study the results will be readily available for use in an economic evaluation. It is important that each component is included in the appropriate place. For example, the indirect costs of the disease, or illness, will be a benefit of an intervention which causes a reduction in disability and this increase in productivity.

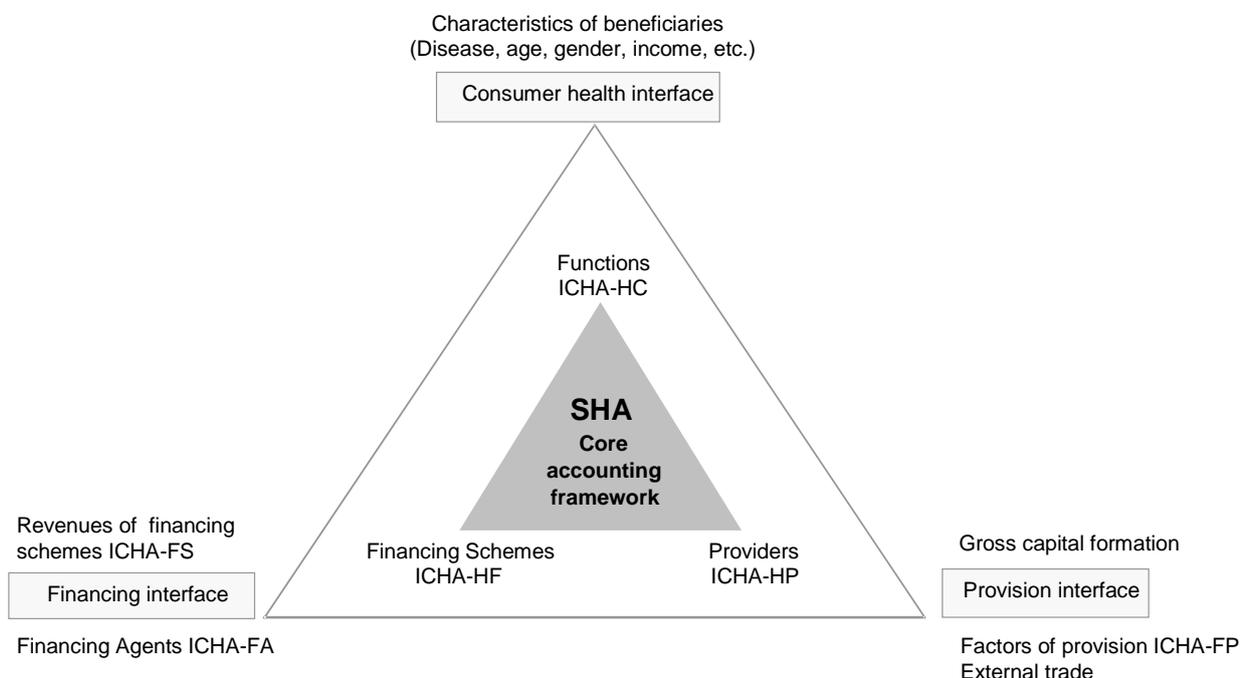
3. SHA AS A SUITABLE FRAMEWORK

Background

57. Health accounts are an application of an accounting framework for the purpose of monitoring the flow of expenditures related to the consumption of health care goods and services within a country. In 2000, the OECD published *A System of Health Accounts* (SHA 1.0), a manual which provided a standard framework for producing a set of comprehensive, consistent and internationally comparable health accounts. The SHA manual established a conceptual basis of statistical reporting rules compatible with other economic and social statistics. *A System of Health Accounts* has been subsequently revised as part of a joint project between the OECD, WHO and Eurostat culminating with the release of SHA 2011, providing a single global framework for producing health expenditure accounts that can help track resource flows from sources to uses.

58. *A System of Health Accounts* sets out in detail, the boundaries, the definitions and the concepts for producing health accounts. Individual countries (and data collections) can decide the type and detail of data that is relevant based on their specific requirements. For example, some countries may choose to focus on different aspects such as: tracking of domestic and external sources of financing, price and volume measures; international trade or indeed, allocation of spending by patients' characteristics. Countries producing health accounts according to SHA 2011 will be reporting in a standard internationally comparable way.

Figure 3.1. The core and extended accounting framework of SHA 2011



Source: SHA 2011

59. In summary, SHA is founded on a tri-axial relationship tracking the consumption (based on health functions), provision and financing of health care goods and services. This relationship assumes that

all health care goods and services that have been consumed have been provided (produced) and financed (purchased). Thus, SHA (potentially) allocates all health care expenditures according to these three classifications. The level of detail reported by each country will depend on its policy interest, as well as the availability of appropriate data sources. Figure 3.1 presents the relationship between the functions of health care (ICHA-HC), health care provisions (ICHA-HP), and financing schemes (ICHA-HF). In effect, these three core classifications address the three basic questions:

- What kinds of health care goods and services are consumed?
- Which health care providers deliver these goods and services?
- Which financing scheme pays for these goods and services?

Functions and the Consumer Health Interface

60. The key interface with regard to allocation of spending according to disease is the consumer health interface, that is, the interaction between the health care function or types of care (defined according to the functional classification (ICHA-HC)) and the individual or population groups (i.e. beneficiaries) consuming these goods and services. Beneficiaries can be described according to their characteristics such as age, gender, socio-economic, status, and perhaps most importantly their health status (which is ultimately the reason for their interaction with the health care system). A breakdown of expenditures by beneficiary characteristics is a key resource for policy analysis and can provide a better understanding into how resources, in terms of health care goods and services, are reaching various groups of the population. It is thus a key component of interest in the derivation of cost of illness studies.

61. The functional classification responds to the criteria laid out to define health care activities and thus delineates the boundaries of health care expenditure. The rationale of the classification refers to the health purpose of the goods and services being consumed. The basic dividing lines for structuring the health care functions are individual versus collective health care goods and services, the basic purposes of health care (e.g. curative, rehabilitative, and long-term care), and the modes of provision (e.g. inpatient, outpatient). Table 3.1 shows the classification of health care functions at the first-digit level. It is important to note that the compilation of data according to health care functions is challenging as national health statistical systems seldom provide data which corresponds to a classification based on health *purpose*.

Table 3.1. Classification of health care functions at the first-digit level

HC.1	Curative care
HC.2	Rehabilitative care
HC.3	Long-term care (Health)
HC.4	Ancillary services (non-specified by function)
HC.5	Medical goods (non-specified by function)
HC.6	Preventive care
HC.7	Governance and health system and financing administration
HC.9	Other health care services not elsewhere classified (n.e.c.)

Source: SHA 2011.

62. For the purposes of allocating expenditures under the health accounts framework, the distinction between individual versus collective consumption is a key consideration but poses a potential challenge to allocation by patient characteristics. While it may be possible, although not necessarily straightforward, to (partially) allocate some collective functions by disease (e.g. prevention or screening campaigns aimed at particular diseases or population groups) it may be more challenging to allocate other collective functions (e.g. administrative spending) to such characteristics.

Provision interface / Health Care Providers

63. Health care providers encompass the organisations and actors that deliver health care goods and services as their primary activity, as well as those for which health care provision is only one among a number of activities. They vary in their legal, accounting, organizational and operating structures. However, despite the huge differences that exist in the way health care provision is organised, there is a set of common approaches and technologies that all health care systems share and that helps to structure them. The classification of health care providers (ICHA-HP) therefore serves the purpose of classifying all organisations that contribute to the provision of health care goods and services, by arranging country-specific provider units into common, internationally applicable categories.

64. The principal activity exercised is the basic criterion for classifying health care providers. This does not mean, however, that providers classified under the same category perform exactly the same set of activities. Hospitals, which are major health care providers, usually offer not only inpatient health care services, but, depending on specific country arrangements, may also provide outpatient care, rehabilitation, long-term care services and so on. For the purpose of international comparisons, the value added of the ICHA-HP classification lies in two advantages: first, its connection with the functional classification, which gives an insight into the variety of country-specific settings for the provision of health care services, and second, its combination with the financing classification, which sheds light on the variety of health care funding mechanisms that exist across countries.

65. Often, the data sources required for an allocation to beneficiary characteristics are organised according to the provider classification (i.e. hospitals, physicians' offices, etc.) rather than a pure functional approach, such that often the main linkage with health accounts is via the provider dimension. That said, the methodology (outlined in Chapter 4) points to the identification of homogeneous units as sub-components of providers (e.g. hospital outpatient clinics) that are clearly linked to the SHA functions.

Financing interface

66. The financing interface, as its name implies, focuses on how, and by whom, the health system is financed. It covers the classification of financing schemes (ICHA-HF), the revenue of financing schemes (ICHA-FS) and financing agents (ICHA-FA) which focuses on the institutional units of health financing. The three classifications together provide the tools to comprehensively account for health care financing and describe the flow of financial resources in the health system. Health financing systems mobilise and

allocate money, within the health system, to meet the current health needs of the population (individual and collective), with a view to expected future needs. Individuals may have access to care by means of direct payment for services and goods or through third-party financing arrangements, such as with a National Health Service, social insurance or voluntary insurance

67. In terms of the focus on allocating health spending by disease categories, the financing interface may appear to be of lesser importance amongst the three dimensions of the health accounts. However, its significance should not be minimised. For example, from a societal point of view, it is important that all costs associated with the provision of health care are captured regardless of the type of financing, i.e. both private and public financing. However, there will likely be different data sources, of varying degrees of quality, covering the provision of publicly financed and privately financed (including out-of pocket expenditures) health care services. In fact, for some countries there may be a lack of high quality, or perhaps any, data for some privately financed services. This will severely limit the ability to conduct a thorough allocation of all expenditure by disease.

4. REVIEW OF METHODOLOGY AND PROPOSED AMENDMENTS

68. This chapter provides a brief review and summary of the methodological approaches recommended in the Guidelines. Based on the experience of the pilot studies and subsequent work some specific issues needed further clarification and these issues are identified and discussed. This includes the allocation of some of the costs components, the diagnostic categories employed, the appropriate age groups, and the axes of analysis (i.e. function versus provider) that should be included. It is important that the guidelines are flexible enough for countries to be able to follow them, yet comprehensive enough that they provide comparable results.

Summary of methodological approach in 2008 Guidelines

69. The direct medical cost calculation by disease, using a prevalence-based method with a top-down attribution of costs, is a fairly straightforward procedure. It can be divided into four steps. This section is extracted from the 2008 Report and briefly reviews the four steps. For further details the reader is referred to the full set of revised guidelines.

Step 1: Establish national health expenditure according to the SHA

70. The first step in undertaking a study to estimate expenditures by disease under the SHA framework is very simply to acquire the data and the health accounts (SHA) for the reference year selected. Ideally, this should be completed for the most recent year in which all necessary additional data exists and for which there are the necessary resources to complete the project.

Step 2: Partition of national health expenditure into homogeneous cost-units

71. Current health expenditure should be partitioned into homogeneous cost-units across the provider and/or functional dimensions. In producing the health accounts it is likely that costs will already have been split into different cost units, which quite often are already homogeneous across the provider or financing dimension. If this is not the case, it will often be possible to go back to the data sources and non-published information from the statistical office or institution which has compiled the national health accounts.

72. The main cost unit registers tend to be very country-specific, and dependant on the structure of the health care system and related health care registries. A country with provider-oriented registrations may have limited data on the expenditure for different functions and financing at the aggregate level. The reverse may be true for countries in which registrations are more financial oriented. From the provider-orientated perspective, often records of these are kept by individual provider-units (individual hospital, GP-practices etc.) and aggregated to total cost for a provider on a national or regional level. However, at the disaggregated provider cost-unit level there is often a clear link to the functional classification, e.g. hospital in-patient and out-patient departments. For the financing dimension, complementary registrations can exist, for instance for government financed health expenditure or insurance-financed expenditure. In practice both these sources are used in the construction of national health accounts, because they are often complementary. Obviously it would be best to link expenditure data to all SHA-dimensions simultaneously, but this requires very high health data registration standards. In a comparative analysis, such data sources may be seen as a kind of 'gold standard' to compare with on the one hand countries with a provider oriented approach, and on the other hand countries which have attributed costs primarily along the financial and functional dimension.

Step 3: Construction of a detailed probability map (or utilisation key)

73. After the decomposition of total health expenditure into more or less homogeneous units, a utilisation key should be constructed for every cost-unit in order to distribute costs. That is, the proportional distribution across all combinations of all dimensions) based on health care utilisation data retrieved from the collected data sources. For every key a fraction of total utilisation within the cost-unit is assigned. With up to six dimensions to consider (HC, HP, HF, ICD code, gender and age group), the size of keys can vary from a few combinations to many thousands. It is important that this key should be complete: fractions in the key must add up to 100% of all care delivered by the cost-unit. Furthermore, the distinct combinations of dimension-classes within a key should refer to the same unit of utilisation only once: no double-counting should occur.

74. The main properties of a good utilisation key for a cost unit are:

- it measures the bulk of total care delivered by the unit
- it is an accurate measure of health care utilisation within the cost unit: there is a clear relationship between units of the indicator used to estimate expenditure allocations and the resource costs of the associated health care services.

75. The methods used for the allocation of costs differ between the cost units, because they are dependent on the availability of health care utilisation data, but they can be broadly divided in six groups, the first being the most desirable method, the sixth the least desirable method:

1. Direct attribution or ‘bottom up’ allocation
2. Construction of a utilisation key from a single health registration
3. Combination of health registrations to construct a suitable utilisation key.
4. Fitting cost data to available registrations
5. Using a proxy key based on utilisation keys for other cost units or other allocation studies
6. Other methods

Step 4: Derivation of accounts tables

76. In this step the basic output table is created. This involves multiplication of health expenditure for a homogeneous unit (from Step 2) with the probability map (from Step 3) to establish a partial table for this unit, and then aggregate partial tables for each unit to establish the total spending allocation. The basic output tables consist of one column with expenditures and additional columns which describe every dimension in the study at the most detailed classification level. From this basic table all other aggregations of spending can be produced.

Specific issues addressed in the review

77. Based on results of the pilot study and the more recent work undertaken in this project, several outstanding issues, in need of clarification, were identified. Included were questions related to: where, and how, to allocate certain costs components; boundary issues (i.e. defining, and including all health care services); which diagnostic categories to employ; and the axes of analysis. The main consideration, in deriving final guidelines in these areas, is to remove ambiguities and derive consistent and standardised results. These issues will be reviewed in turn in this section.

Allocation of cost components and boundaries of health care

78. The Guidelines and SHA 2011 propose a more societal approach in that total *current* health expenditure is used as the boundary of health care expenditure to be then allocated across categories of disease, age and gender. This boundary includes not only personal health care, but also spending on community prevention programs, and administration of health care. However, this can pose problems due to a lack of a direct link to disease in some cases and also due to lack of data in other areas. In addition, some of these components may only account for a small percentage of the overall health spending and therefore may not warrant the additional resources required to properly attribute them to diagnostic categories. Problematic areas tend to be similar across countries and include: administration costs, public health and prevention expenditure, expenditures for private and out-of-pocket spending, long-term nursing care, transport, and sometimes out-patient curative care, and pharmaceutical expenditure.

79. However, to be able to reach valid conclusions from any cross-country analysis of distribution by disease it is important that countries include the same cost components in the expenditures that are allocated. This may mean that in the final analysis some data remain unallocated or excluded from the analysis for certain countries. All efforts should be made to allocate as large a proportion of current health expenditures as possible. When considered reasonable, unallocated expenditures can be re-distributed on a pro-rata basis. Items within a category (provider or function) that cannot be reliably allocated should remain unallocated (e.g. long-term care, public health spending). However, all methods employed should be transparent and properly reported. Moving forward, the improvement in the validity of cross-country comparisons is dependent on a reduction in the non-allocated share of total health care spending.

Administration

80. The inclusion of management and administration expenditure better represents the ‘real’ health care costs to society, influences the prices of health care services and therefore indirectly affects resource use. However, the uncertainty involved in the methodology led most countries in the pilot study to leave administrative costs unallocated. The costs associated with the overall administration of the health care system may remain unallocated if there is no valid method for their proper allocation. In such a case, for the calculation of overall or per capita expenditures, the unallocated administrative expenditures should be assigned to diagnostic categories on a pro-rata basis.

Public Health and Prevention

81. Countries have tended to take different approaches towards the inclusion or exclusion of collective services. Some prevention and public health activities and programmes (vaccination campaigns, cancer screening, etc) can be specifically linked to disease categories (or to a particular population group by age and gender) – either at an aggregate chapter(s) level or in some cases at a more detailed level. Other more general public health spending may be more difficult to allocate and in this case the residual spending should be treated in the same way as administrative spending and allocated on a pro-rata basis. For the calculation of actual spending by disease, it is recommended that this process be followed by all countries.

Financing Agents and Schemes

82. In several countries comprehensive data allowing expenditures to be allocated by disease are currently only made for public funded expenditures (for example, in the Czech Republic and Hungary). The profile across diagnostic categories for public and private spending on health is likely to be quite different and the application of the same profile is likely to diminish the validity of the disease accounts in any comparative study. The extent to which private financing plays a role in the overall health financing in a country is an important factor in this respect. In any case, the percentage of total expenditures allocated by function and provider should be clearly identified.

Other allocation challenges

83. On the same theme of comparability, the pilot and subsequent analysis studies also identified the following cost components for which it was generally difficult to allocate expenditures according to disease: long-term nursing care; transport; out-patient curative care; and out-of pocket expenditures. In many countries accessing data on long-term nursing care will be a problem due to both a lack of data and to different definitions for this type of care.

84. The exclusion of certain spending components can have a lesser or greater effect on specific disease categories. For example, the exclusion of expenditure on long-term care (function or providers) by one country will likely underestimate the allocation to mental health diseases, specifically dementia, making comparisons with countries fully distributing long-term care problematic. This example also raises more general questions of the health boundary of total health spending itself and the fact that country-specific interpretations of Long-term care - even if allocated - will also have detrimental effects on comparability. A narrower interpretation may exclude community and low-intensity residential care compared to another country.

85. Other problematic areas that require further methodological solutions and the identification of best practices include, for example, the allocation of pharmaceutical expenditures, in general, and over-the-counter medicines, more specifically, and outpatient care. These issues are covered in Chapters 7 and 8.

Disease Groups

86. For standardised comparisons consistent diagnostic categories must be employed across countries. The International Classification of Diseases¹¹ is the standard system used to classify diseases. At its most detailed level – with up to 16000 codes - ICD allows for a very fine and exhaustive classification of diseases and conditions. For policy relevance and analyses, however, the aggregation of detailed disease classes into much broader groupings needs to be taken into consideration. For example, the ICD-10 chapter level consists of 21 broad disease categories. An alternative regrouping of ICD codes which has also been used is the Global Burden of Disease (GBD) classification. GBD has the advantage over ICD Chapters by taking a more health-system wide approach and identifies separately some categories such as oral health, and communicable diseases. However, for more detailed disease-specific analysis – a halfway point between the individual codes and the chapter level might be necessary (e.g. for the identification of dementia costs as part of mental health, Chapter V of ICD-10).

87. The International Short List of Hospital Morbidity Tabulation (ISHMT) provides a useful categorisation of ICD groupings that many countries can employ and which can be used for comparisons across countries. The ISHMT consists of 130 groups defined by both ICD-9 and ICD-10 codes which allows for comparison between countries which use different ICD versions. It is grouped by epidemiologically relevant groups where patients have similar problems and share similar patterns of treatment. One of the features of ISHMT, which might be also considered as a shortcoming, is that, as the name implies, it was developed towards a specific tool for hospital procedures and inpatient cases. Therefore, this may lead to less comprehensive coverage of disease categories with regard to other sectors of the health care system components such as ambulatory care providers.

88. Countries may also include different disease groupings for national purposes. However, it is recommended that, at a minimum, countries report the expenditures by diseases at the ICD-10 chapter level.¹² A survey of available general COI analyses shows that it is very common to report disease-specific

¹¹ The 10th ICD Revision came into use in WHO Member States as from 1994. The 11th revision of the classification has already started and will continue until 2015. <http://www.who.int/classifications/icd/en/>

¹² The Guidelines provide further details on the use of ICD chapters and considerations for national disease lists.

cost data at least at the chapter-level of the ICD (infectious diseases, neoplasms etc.). Where available, further breakdowns according to the ISHMT categorization should be employed.

Age

89. Many health care registrations contain detailed age information on health care use. Health care use differs markedly with age, so it is important to use a classification which can identify age simultaneously with disease. Important groups to recognize separately in the analysis are:

- Newborn children (<1 year): this group has special health care needs.
- Adults in the reproductive ages (~20-40 women): this age group is also associated with use of specific health services.
- Middle age: The age of the onset of many diseases.
- Older citizens (>65): use of the health care system rises with age. A detailed breakdown in five year classes is recommended for this group, because health expenditure rises quite steeply with age, although in some countries it has been found that per capita expenditure reaches a peak in the 75-84 bracket and declines afterwards (BASYS, 2006). To capture this effect one should distinguish several strata for the 'oldest old'.

System of Health Accounts dimensions for analysis

90. The original draft guidelines focused on using the provider dimension (HP) as the main axis of analysis, which as noted reflected the country-specific experience of the Dutch experience that was the basis for the draft guidelines. The 2007-08 project report concluded that in other countries it is often more appropriate to use the functional (HC) or financial dimension (HF) as the main axis of analysis. In addition, the functional status is often a more useful classification for studying specific diseases. Thus, it is encouraged that countries provide expenditure by disease data according to functional class. As not all countries are capable to allocate expenditures across all of the HC categories, it is important that as much detail as possible is included so that data can be re-grouped if necessary, in order to maximize (guarantee) the international comparability of the results.

Summary

91. As noted in the Guidelines, the real proof of their usefulness will be if their application leads to meaningful comparisons of expenditure by disease, age and gender between countries. The previous guidelines contain some recommendations but they don't enforce these classifications. The same is true for this document. The recommendations in the guidelines and the follow-up work related to this project have outlined a hierarchy of methods based on the best methods that data will allow.

92. The availability of data is very much country specific and is often determined by the structure of the health care system. In the short and medium run it is important to focus on expanding the number of countries that can produce valid expenditure by disease data and at the same time expand the components available from those countries that are already able to provide some data. Due to data limitations, in some countries, there may remain times when not all guidelines can be followed. Such concerns should not hinder their production, and there will likely be important suggestions for methodological improvement with the regular production of expenditure by disease data.

93. Another long-term goal should focus on standardizing reporting years across countries. Detailed data produced on a three-year basis is likely frequent enough to provide relevant information for policy purposes, and may also balance the resource constraints evidenced in all countries making frequent derivation of expenditure by disease data quite challenging.

94. All efforts should be made to allocate as large a proportion of expenditures as possible. When reasonable, unallocated expenditures can be re-distributed on a pro-rata basis. Finally, the importance of

transparency in methodologies employed, and the reporting of results must remain a high priority. This will ensure the greatest degree of comparability possible. The Guidelines propose that countries produce a set of standardized tables and this recommendation is reiterated here.

5. CURRENT DATA AVAILABILITY

Summary and objective

95. The overall objective of the project has been to enlarge the country coverage of consistent and comparable health expenditure data according to disease (age and gender) categories and cross-classify these distributions with the health system dimensions of functions (types of health care) and providers as defined under the SHA framework. In the first instance, the focus has been to increase the coverage in the area of greatest availability, detail and coverage – namely, inpatient hospital expenditure. With that in mind, available data was identified and collected across OECD and EU countries.

96. This chapter presents a summary of the current data availability together with some comparative tables and charts broken down by disease categorised by function and provider. The subsequent part of the chapter discusses on-going data gaps and remaining challenges, highlighting issues that impede the expansion of the scope of the data collection and concludes with proposed work with the potential to increase the number of countries that are currently undertaking cost-of-illness studies outside System of Health Account Framework or with different disease perspectives. The chapter ends with the description of data dissemination plans through various on-line tools and forthcoming publications.

Data availability

97. From country experience, it is clear that deriving expenditure data by disease categories, as described earlier in Chapter 4 and using methodologies to estimate costs of illness as discussed in Chapter 2, requires significant resources and data sources in addition to the regular work on producing health accounts – even if it is only completed every two or three years. Similar to the institutionalisation of health accounts, it requires strong political support and the buy-in from a number of stakeholders.

98. More than one-third of OECD countries have submitted or are in the process of estimating expenditure data by disease groups – particularly in the area of hospital or in-patient spending. Overall, through the collection of data, at least 16 countries have produced or are in a position to produce expenditure data by disease groups: namely, Australia, Canada, Czech Republic, England, Finland, France, Germany, Hungary, Israel, Japan, Korea, the Netherlands, Slovenia, Sweden, Switzerland, and the United States. Because of growing need to produce such information by disease (for example, to develop indicators of spending under the Millennium Development Goals 4 and 5), non-OECD countries have also been active in producing expenditures by diseases and in particular the development of disease-specific sub-accounts (such as Tuberculosis and Maternal and Child Health) for resource allocation discussions. Examples of some of the non-OECD countries that have been moving forward in producing disease accounts under a health accounts framework are Bangladesh, Burkino Faso, DR Congo and Sri Lanka.

99. The countries at the forefront of expenditure by disease accounts, such as Germany, the Netherlands and Korea, also tend to be those that have long-standing experience in building health accounts and as such the work can more easily be embedded into the regular cycle of health accounts production.

100. From both the data collection done as part of the pilot study and data received subsequently, countries can generally be categorised into three groups:

- Countries that regularly produce expenditure by disease data (released in publications, or online e.g. Germany, Netherlands, Canada, Australia) in some form or another;
- Countries that have the capability of doing so, i.e. they have the necessary data, but don't regularly release this information – data is produced more on an ad hoc or needs basis. The coverage is often limited to a specific dimension corresponding to their particular research interests, for example allocating public health insurance or hospital only expenditures. Such countries include the Czech Republic, Hungary and Sweden;
- Countries for which data may exist but have not produced anything officially yet. There is the potential to develop a similar type of disease accounts or allocation by disease but not necessarily using the health accounts framework or standard disease classifications. For example, the use of programme budgeting information in the English NHS or the use of Medical Expenditure Panel Survey (MEPS)¹³ data in the United States.

101. Of those countries that have derived expenditure by disease data on a regular basis only Germany and the Netherlands have tended to derive the data in the context of the SHA framework, even if sometimes as an additional option to national specifications. Sri Lanka is another example of a country that has produced expenditure by disease data under the SHA framework. Australia and Canada, while producing regular expenditure by disease data (for at least some health components of the health care system) adopt a country-specific framework. However, both countries have shown that it has been feasible to adapt the national disease expenditure studies to allow reporting according to the SHA definitions and dimensions.

102. Since the 2008 pilot project, some additional countries, such as the Czech Republic and Japan have produced one or several rounds of expenditure by disease data. In other countries, there have been some ad hoc academic studies that have produced some figures (e.g. France, United States) but are not considered part of an institutionalised or regular production process. On the other hand, Hungary, which also took part in the original pilot study, has not been able to repeat the exercise for a second round. Australia, which also took part in the feasibility exercise and produced an SHA-based study, continues to estimate expenditure by disease periodically although their disease classification system currently differs.¹⁴ Australia does produce the basic data coded to ICD at a detailed level for internal use and could therefore aggregate to the ICD Chapters for international purposes.

¹³ www.meps.ahrq.gov

¹⁴ Australia has, in the past, used a disease classification based on the Global Burden of Disease classification.

Table 5.1. Summary of Availability of Disease Expenditure Data by Country

Country	Years Produced	Disease groups / Diagnostic categories*	Direct Cost Components Included	Website/Source
Australia	<ul style="list-style-type: none"> • 2004-05 (released in 2010) 	<ul style="list-style-type: none"> • GBD chapters • Possibly by ICD chapter in future 	<ul style="list-style-type: none"> • Direct costs 	http://www.aihw.gov.au/disease-expenditure/ http://www.aihw.gov.au/publication-detail/?id=6442468349&libID=6442468347
Canada	<ul style="list-style-type: none"> • 1986, 1993, 1998 (released 2002) • 2000 (available on request) • 2004-2008 data (released in 2013) 	<ul style="list-style-type: none"> • Country-specific categories (similar to GBD) 	<ul style="list-style-type: none"> • Direct costs – hospital, physician, pharmaceutical. (no long-term care) 	http://www.phac-aspc.gc.ca/ebic-femc/index-eng.php
Czech Republic	<ul style="list-style-type: none"> • Ad hoc analysis of 2006 data • 2006, 2009, 2011 (unpublished data) 	<ul style="list-style-type: none"> • ICD chapters • ISHMT 	<ul style="list-style-type: none"> • Hospital: HC1.1 x HF1.2 • HP.1-HP.9 (2009) • HC.1-HC6.9 (2006, 2009) • Public spending only • Only 20% of pharmaceutical expenditures allocated 	
England	<ul style="list-style-type: none"> • Produced annually in the “NHS Programme Budget” • Data available from 2003/4 to 2011/2 	<ul style="list-style-type: none"> • ICD chapters and selected sub-categories 	<ul style="list-style-type: none"> • Hospital (inpatient and outpatient) • Drugs 	http://www.networks.nhs.uk/nhs-networks/health-investment-network/news/2011-12-programme-budgeting-data-now-available
Finland	<ul style="list-style-type: none"> • 2006 • 2008, 2009, 2010 	<ul style="list-style-type: none"> • ICD 	<ul style="list-style-type: none"> • Hospital: HC1.1 • HC1.2 • HC1.3 	HIT
France	<ul style="list-style-type: none"> • Not regularly produced • 2002 results available in IRDES publication (Fenina <i>et al</i>, 2006) 	<ul style="list-style-type: none"> • ICD chapters 	<ul style="list-style-type: none"> • HP1, HP3, HP3.9, HP.4 	
Germany	<ul style="list-style-type: none"> • 2002, 2004, 2006, 2008 (not produced for 2010) • 2012 data due to be possibly released in 2014 	<ul style="list-style-type: none"> • ICD chapters and sub-chapters • Country-specific categories (not available by ISHMT for all ICD chapters) 	<ul style="list-style-type: none"> • Hospital: HP 1 • Others: HP.2-HP.9 	www.gbe-bund.de The information System of the Federal Health Monitoring
Hungary	<ul style="list-style-type: none"> • 2006 	<ul style="list-style-type: none"> • ICD chapters 	<ul style="list-style-type: none"> • HP.1-HP.9 • HC.1-HC6.9 	
Israel	<ul style="list-style-type: none"> • 2009 	<ul style="list-style-type: none"> • ICD 9 by age and gender (acute care public hospitals) • ICD 10 	<ul style="list-style-type: none"> • HC1.1 by ISHMT (all acute care public hospitals (HC1.1, HC1.2, HC1.3)) 	
Japan	<ul style="list-style-type: none"> • Produced annually • 2008, 2009, 2010 (released 2013) 	<ul style="list-style-type: none"> • ICD, fourteen disease groups • ICD 10 	<ul style="list-style-type: none"> • HC1.1xHP1 and HP3 by ICD 10 	http://www.e-stat.go.jp/SG1/estat/List.do?lid=000001082598 (Japanese only)

Table 5.1. Summary of Availability of Disease Expenditure Data by Country, Cont.

Korea	<ul style="list-style-type: none"> • 2006 (unpublished data) • 2009 (unpublished data) 	<ul style="list-style-type: none"> • ICD chapters and sub-chapters • ISHMT 	<ul style="list-style-type: none"> • HP.1-HP.9 • HC.1-HC6.9 • Hospital: HC1.1 by ICD10 	
Netherlands	<ul style="list-style-type: none"> • Every two to four years • 2007 data released in 2011 • 2011 data to be released in 2013 • Data available on-line: 2003, 2005, 2007 	<ul style="list-style-type: none"> • Unique classification • Can be converted to ICD-9 and ICD-10 	<ul style="list-style-type: none"> • HP.1-HP.9 • Hospital: HP1.1, HP1.2, HP1.3 by own classification 	www.costofillness.eu www.kostenvanziekten.nl/systeem/service-menu-rechts/homepage-engels/
Slovenia	<ul style="list-style-type: none"> • 2006 data released in 2008 • 2010 to be released in 2012 	<ul style="list-style-type: none"> • ICD chapters and sub-chapters 	<ul style="list-style-type: none"> • HC.1-HC6.9 	
Sri Lanka	<ul style="list-style-type: none"> • 2005(?) and 2006 data available • No specific timetable for future releases 	<ul style="list-style-type: none"> • ICD chapters and sub-chapters • GBD chapters • ISHMT 	<ul style="list-style-type: none"> • • HC1.1 	
Sweden	<ul style="list-style-type: none"> • Annually • 2006 • 2011 	<ul style="list-style-type: none"> • ICD chapters and sub-chapters • ISHMT 	<ul style="list-style-type: none"> • Inpatient hospital (HC.1.1) – acute only by ISHMT (2011) 	
Switzerland	<ul style="list-style-type: none"> • 2010 • 2011 	<ul style="list-style-type: none"> • ISHMT • ICD-10 GM based 	<ul style="list-style-type: none"> • HP.1 	
United States	<ul style="list-style-type: none"> • 1996-2005 results published in Roehring <i>et al</i> (2009) 	<ul style="list-style-type: none"> • ICD-9 chapters 	<ul style="list-style-type: none"> • Total expenditures only. Cannot breakdown by HC or HP. 	Roehring <i>et al</i> (2009)

Note that this does not include older studies such as those produced by Rice for the United States.

*Although data may be available by sub-chapter, it may not be regularly reported this way.

Source: Unpublished OECD data, 2013

Data availability by country

Australia

103. Australia publishes national reports on spending by disease, age and gender and took part in the previous OECD study reporting data for 2004/05 and an AIHW report was released in 2010¹⁵. The disease classification is a national version of the WHO Global Burden of Disease study and although based on ICD-10 codes cannot be exactly mapped to ICD 10 chapters. Around 70% of current expenditure was allocated to disease categories. The most recent data was published in Australia's Health 2012 for 2008-2009. The data is broken down by area of expenditure such as admitted patients, out-of-hospital-optometry and dental, prescriptions, and public health.

Canada

104. Canada has produced more extensive disease expenditure data in the past and plans to release more recent (2004-2008) expenditure by disease data in 2013.¹⁶ The last Economic Burden of Illness in Canada, 1998 was released in 2002 and Canada will be releasing the Economic Burden of Canada in later 2013 which include expenditures by disease (both direct and indirect costs) for 2005-2008 and by provider type (hospital, physician, pharmaceuticals). The expenditure is broken down by country-specific diagnostic categories but is also potentially available according to ICD-10 chapter and ISHMT.

Czech Republic

105. Data for the Czech Republic are available for (2006), 2009 and 2011 and broken down at the disaggregated ISHMT level. The information can be classified by HC and HP at the first and second digit level. The allocated amount of current health expenditure corresponds to the spending by the social health insurance (80%; HF.1.2). The unallocated expenditure is mostly explained by the part related to pharmaceutical expenditure (25% of CHE; HC.5.1) and payments covering GP's capitation payments (a part of HC.1.3) for which no disease breakdown is available.

106. For hospital expenditures, the effect of unallocated amount is reduced since the social health insurance finances around 95% of in-patient curative care expenditures. Data on expenditures by ISHMT is available for public hospitals only.

Finland

107. Finnish disease expenditure data currently covers hospital (HP.1) expenditure data for HC1.1 for 2008 to 2010 according to ISHMT categories and age categories. This is matched by discharge data and bed days. Data is also available for day care and outpatient care.

108. Finland is also expected to be able to derive expenditure by disease data for long-term care facilities and ambulatory health care centres.

¹⁵ <http://www.aihw.gov.au/publication-detail/?id=6442468349&libID=6442468347>

¹⁶ The Economic Burden of Illness in Canada provided COI data for 1986, 1993, and 1998. (Health Canada, 2002) In addition The Public Health Agency of Canada has produced results for the year 2000. (Public Health Agency of Canada, 2011) In addition to the Economic Burden of Illness reports the Canadian Institute for Health Information has produced results on expenditure by disease, in hospitals, for case mix groups. (Canadian Institute for Health Information, 2008)

France

109. Currently, France is not producing disease expenditure accounts on a regular basis. In 2006 a study somewhat comparable to the methodology proposed under the SHA framework was conducted using national health accounts data for 2002 (Fénina *et al.*, 2006¹⁷). However, the French National Health Insurance Fund (CNAMTS) is currently undertaking a comprehensive study based on linking health spending data from social security (HF.1.2) which only covers 75% of total health expenditures, to disease categories based on ICD-10 definitions.¹⁸

Germany

110. The German Statistical Office has produced a number of regular studies (2002, 2004, 2006 and 2008) distributing all health spending according to disease, age and gender linked to health care providers. The data are made available and can be downloaded from the website.¹⁹ Data are available by country-specific sub-chapters, ICD 10 codes, and age and SHA health care provider (HP) codes.

111. The release of data for 2012 data is scheduled for 2014.

Hungary

112. Hungary participated in the 2008 OECD Expenditure by disease, age and gender study and submitted data for 2006. The data was allocated across the functional (HC) and financing (HF) dimension within the SHA. The primary data source of information was the Hungarian Health Insurance Fund and in total around 70% of total health spending was attributed. By consequence, gaps compared to current health expenditure cover all health care functions but significantly in the area of private expenditure on pharmaceuticals and spending on collective health care services.

Israel

113. Israel provided 2009 data for both hospital expenditure and mental health hospitals according to ISHMT which was re-organised by ICD-10. Expenditure data was also available for acute care hospitals only (i.e. excluding mental health hospitals) by ICD 9 chapters causing some difficulties in reallocating to ICD 10 Chapters in some cases.

Japan

114. Japan regularly produces a breakdown of Japanese medical expenditures (which covers a large part of total spending) by disease categories. However, this is not linked to the health accounts framework, as such. Japan also releases such information annually and the most recent release of the data from the health insurance fund includes 2008, 2009 and 2010 for in-patient care by ICD 10 codes.²⁰ Discharge data and average length of data come from separately available statistics. Data are also available for outpatient care (HC.1.3).

¹⁷ Fénina A., Geffroy Y., Minc C., Renaud T., Sarlon E, Sermet C., (2009) Expenditure on prevention and care by disease in France. *Questions d'économie de la santé* n° 111.
<http://www.irdes.fr/EspaceAnglais/Publications/IrdesPublications/QES111.pdf>

¹⁸ Further details are available from the following web site: <http://www.ameli.fr/rapport-charges-et-produits-2013/appli.htm>.

¹⁹ www.gbe-bund.de

²⁰ It should be noted that there are no expenditures are allocated to Chapter XXI: Other factors.

Republic of Korea

115. Korea took part in the first OECD project and was able to provide a full breakdown of health spending for 2006 according to the guidelines covering the three main dimensions of SHA, namely providers, functions and financing agents. As part of this project, Korea was able to provide very detailed data for 2009.

Netherlands

116. The Netherlands has a well-established system to produce cost of illness studies both to their national and international (SHA) specifications. Data is available for download via a website²¹ and is broken down by disease, age, gender, provider and broad functional (curative, long-term and prevention) classification. Data are available by country-specific sub-chapters, ICD 10 codes. Data for 2003, 2005 and 2007 are currently available on-line.

Sweden

117. 2006 data are available from the original OECD study were used as well as an updated submission for 2011 for this project. The data are based on detailed data linking the National Patient Register (NRP) and Case Costing Database and cover hospital in-patient curative and rehabilitative care (HC.1.1 + HC.2.1). The National Board of Health and Welfare collect and manage the NRP. The Swedish Association of Local Authorities and Regions (SALAR) collect and manage the National Cost Database (Centre for Epidemiology, 2008).

Switzerland

118. The Swiss Federal Office of Statistics provided information on the average costs associated to disease groups by age and gender.. The coverage of the expenditure data is from a survey of hospitals covering 50 hospitals for 2010 data and 67 hospitals for 2011 data. The hospital data include all the acute care hospitals except for psychiatric and rehabilitation hospitals. The country has a national grouping of disease categories based on DRG used in Germany. However, it is possible to re-categorise this information to ISHMT and ICD-10. At the time of writing this report, the cost information for 2010 was only available by Swiss DRG (i.e. ICD-10 GM). Because the cost data was only based on about 40% of the total acute care hospitals in the country, the estimated amount of costs were adjusted to represent the country.

Other country data

119. Beyond the listed country data submissions above, a number of on-going national and international research projects to estimate the health expenditures by disease have been identified.

120. The Institute of Health Metrics and Evaluation in Seattle, the United States has launched a project to produce annual estimates of health expenditure by disease and injury for 187 countries using categories of Global Burden of Disease (GBD) study 2010. The objective of the project is to broaden the scope of GBD by including expenditure estimates for policy makers and health financing organisations to aid resource allocation decision process. The health expenditure data by disease and injury will be matched to the total health expenditure under the NHA Framework for each country. The IHME has found that there are 34 country-year reports across 125 countries from 1990 to 2010. Six countries are being piloted for the analyses. The project is on-going by taking five pilot countries, namely, Brazil, Kyrgyzstan, the

²¹ www.kostenvanziekten.nl/systeem/service-menu-rechts/homepage-engels/

Philippines, the United States (MEPS) and Zambia. The pilot study has data including patient-level hospital discharge data, ambulatory discharges, a health management information systems database, and household surveys. Where expenditure data are not available or accessible, a strategy has been under development to extrapolate relative cost ratios across countries.

121. Not all the countries have expenditure data by disease categorised by ICD 10 or ISHMT or within the SHA framework. Among the countries to our knowledge, there are a number that have conducted cost-of-illness studies and potential for inclusion in SHA form and ICD categorisation. Such countries include England and Estonia.

122. Data available for England, on an annual basis, for specific diagnostic categories, and across all providers, is based on around 75% of NHS expenditure which accounts for around 60% or more of total health expenditure. England has also derived the full economic burden of disease results, including direct, indirect, and intangible costs, for 2011. The diagnostic categories can be loosely mapped to ICD-10 chapters.

123. Estonia does not currently produce expenditure by disease data on a regular basis. Previous studies were completed in 2006 and 2007. Discussions are on-going to obtain approval and funding to produce such data in the future. Estonia uses ICD-10 data and can group data by ISHMT as well.

The challenges in comparative data by disease

124. The obvious benefits of having internationally comparable data are numerous and have been detailed in the preceding chapters. However, certain challenges remain regarding the wider use of data for health financing and health policy analyses. Examining and compiling the available data across countries has revealed differences in terms of comprehensiveness, coverage and available years.

125. Complete coverage in terms of number of countries and health expenditure components remains the ultimate goal. However, this remains to be achieved in both cases. Producing disease expenditure accounts is an intensive exercise both in terms of data availability and expertise. Many countries see this as an extension of the regular work programme, which implies that additional resources are needed to carry out this particular exercise, and thus has not been systematically programmed into the regular production processes. There needs to be a systematic approach that facilitates such estimations on a regular basis. Even countries such as Germany, where work on expenditure by disease estimates had been well-established have seen a necessity to postpone the production due to current resource issues. Others have only been able to produce studies on an ad hoc or needs basis.

126. Another issue relates to studies being completed outside the context of the SHA framework. This may be due to the use of different data sources for which it is difficult to allocate across the SHA classification categories. In addition, the agency or department responsible for producing the SHA data may not have been the same department responsible for the expenditure by disease data. That said, it is still feasible that data produced independently of the SHA collection can be reconciled with SHA figures. For example, in Canada the Economic Burden of Disease results were not derived under the SHA framework, nevertheless the totals by provider category were reconciled with official health expenditure data (Health Canada, 2002; Public Health Agency of Canada 2013). The differences between the totals is included as part of the unallocated expenditures. Thus, although countries may have produced expenditure by disease data outside of the SHA framework, it is not inconceivable that the results can be reconciled with the figures produced as part of the SHA data collection.

127. The degree of unallocated expenditure varies significantly from some countries where all health spending is distributed to disease categories (e.g. Korea and Germany) to others where as much as 30 to

40% remains unallocated. As noted above, some of the differences are due to the fact that not all financing agents or providers are captured. Some areas of health spending have a higher unallocated percentage than others; private households' spending, pharmaceutical spending and administrative costs are difficult to match. Countries such as Czech Republic and Hungary have a relatively high share of expenditures not allocated. For example, for outpatient or ambulatory services this can be as much as about 45% in Hungary or pharmaceutical spending in many countries where there is practically no information (e.g. Czech Republic) to be able to distribute across diseases.

128. Common with the general problems in producing overall health spending estimates, distributing private expenditure by disease is more challenging. In countries where private spending accounts for a sizeable proportion of overall spending this may be a concern and may introduce bias into the results depending on what type of expenditures are covered from public spending. This information should be clearly noted, and taken into consideration when deriving and presenting allocated expenditure by disease data.

129. The level of available data on expenditure by disease according to different functions, providers or financing agents also varies significantly and can limit the complete picture of international comparable data by disease categories. Some countries (e.g. Germany) allocate spending by provider categories, while others (e.g. Slovenia) may use the SHA functional dimension. Korea is one of the few countries that are able to produce according to all three main SHA dimensions with ICD sub-chapters.

130. As noted in the overall methodology, spending by disease totals should be reconciled with the aggregates (e.g. current health expenditure, in-patient curative care, hospital) coming from the health accounts. One point to bear in mind is that health accounts are often revised and this can have an impact on reconciling totals and calculating unallocated expenditures (as residuals) unless the revision is re-applied to expenditure by disease estimates.

Hospital and inpatient expenditure

131. Based on consultations with countries and at the meetings associated with this project, it was clear that the most promising avenue for comparable and more widely available data was related to in-patient hospital care. While for some countries spending in hospitals may be a close and acceptable proxy for in-patient care, in other countries hospitals play a more multi-functional role in the health care system and using HP.1 as a proxy will not be correct.

132. At the hospital or in-patient level, methods which employ actual cost data e.g. from Diagnosis Related Groups (DRG) or case-mixed classification, can provide accurate expenditure by disease with results incorporating the level of resource intensity in association with treatment. However, this is not the case in many countries.

133. A further complicating factor related to hospital spending is the inclusion or exclusion of specialised hospitals in the breakdowns – particularly mental health hospitals. This will affect not only the share, in this particular case, of spending on mental disorders (Chapter V) but by default, all other chapters. Any analysis of the breakdown should take into careful account the coverage of providers.

134. Another factor affecting comparability is that some countries provide some data allocated at the ICD 9 Chapter level. In order to redistribute between ICD-9 and ICD-10, information at a lower level is required. If submitted data in ICD 9 do not contain information at a more disaggregated level, it is not possible to regroup to ICD 10 Chapters. On the other hand, if data is submitted based on ISHMT, it is possible to regroup the data into ICD 10.

135. Most countries that were able to produce (inpatient) hospital expenditure by disease data indicated that that could provide data allocated by ICD chapter and sub-chapter or ISHMT disease categories, although this level of disaggregation was not made available in the 2008 pilot study, nor is it generally published at that level of detail.

136. The comparison of the latest years' data by country (Figure 5.1) for the five highest spending diagnostic categories shows that in all cases, bar one, diseases related to the circulatory system account for the highest share of hospital spending - ranging from below 15% in Australia and Korea to 25% or more in Japan and the Czech Republic and on average around 18% for the 12 countries. Only in Korea, does cancer account for a greater share of hospital inpatient spending. On average, cancer accounted for 13% of spending followed in sequence by expenditure related to injuries, musculoskeletal and then the digestive system.

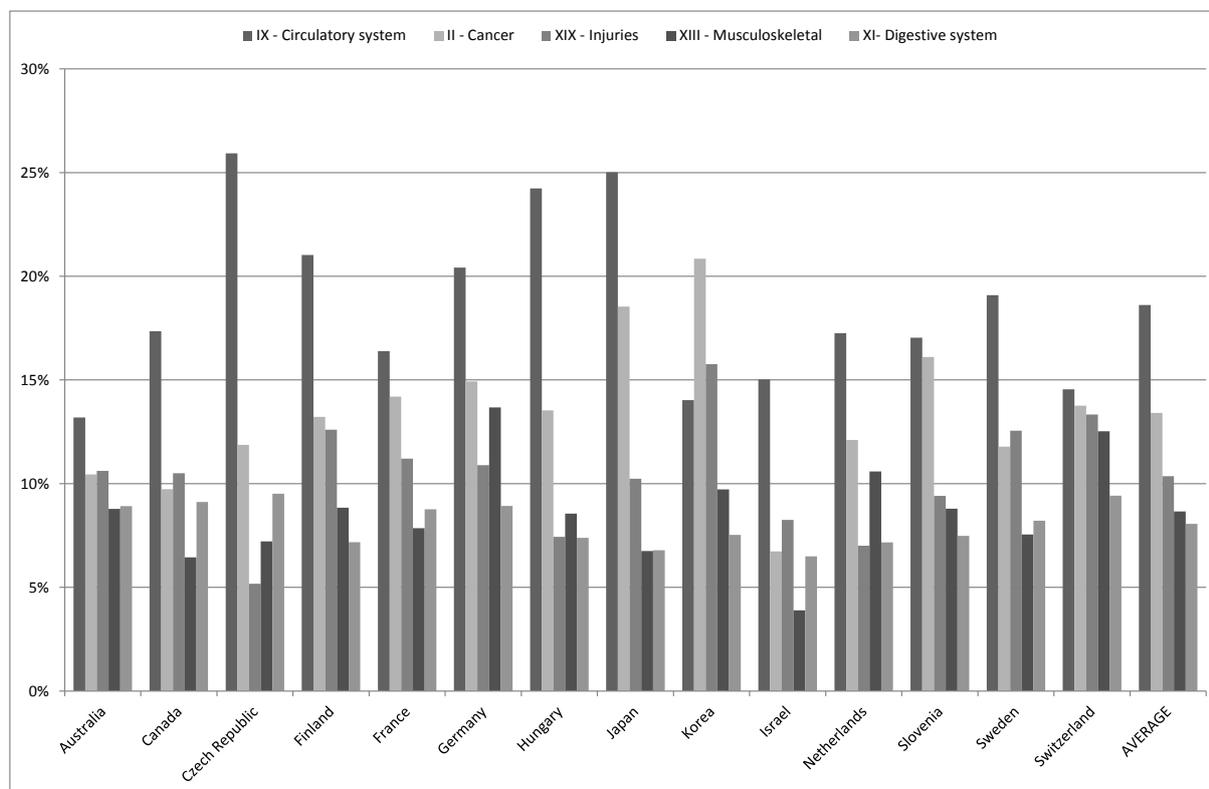
137. There are several adjustments made to the figures to improve comparability but that should nevertheless be noted. First, this relates to allocated expenditure only. In the cases where this is more significant, such as in Hungary and Czech Republic where most of the unallocated expenditure relates to private spending on health, we are generally assuming that the disease distribution of the unallocated expenditure is the same. Alternatively, the distribution for these countries can be considered as public expenditures only.

138. Second, because some countries include mental health hospitals in their data and others don't, this will distort the figures – this is the biggest spending category in the Netherlands for example. Therefore ICD Chapter V is excluded in Figure 5.1 and the shares are redistributed accordingly.

139. Finally, it should be noted that while some countries report clearly inpatient care in hospitals, others provide all hospital expenditure allocated by disease. This can affect the comparison where hospitals perform a significant amount of non-inpatient services (i.e. day-care and outpatient care) with different disease profiles. All these factors should be taken into account when analysing the results.

140. The full breakdown of inpatient/hospital spending by ICD Chapter is shown in Table 5.3.

Figure 5.1. Top five ICD-10 categories of spending in inpatient/hospital care (HC.1.1/HP.1), latest year



Note. Data are adjusted to exclude unallocated expenditure and expenditure on Chapter V: Mental and behavioural disorders.

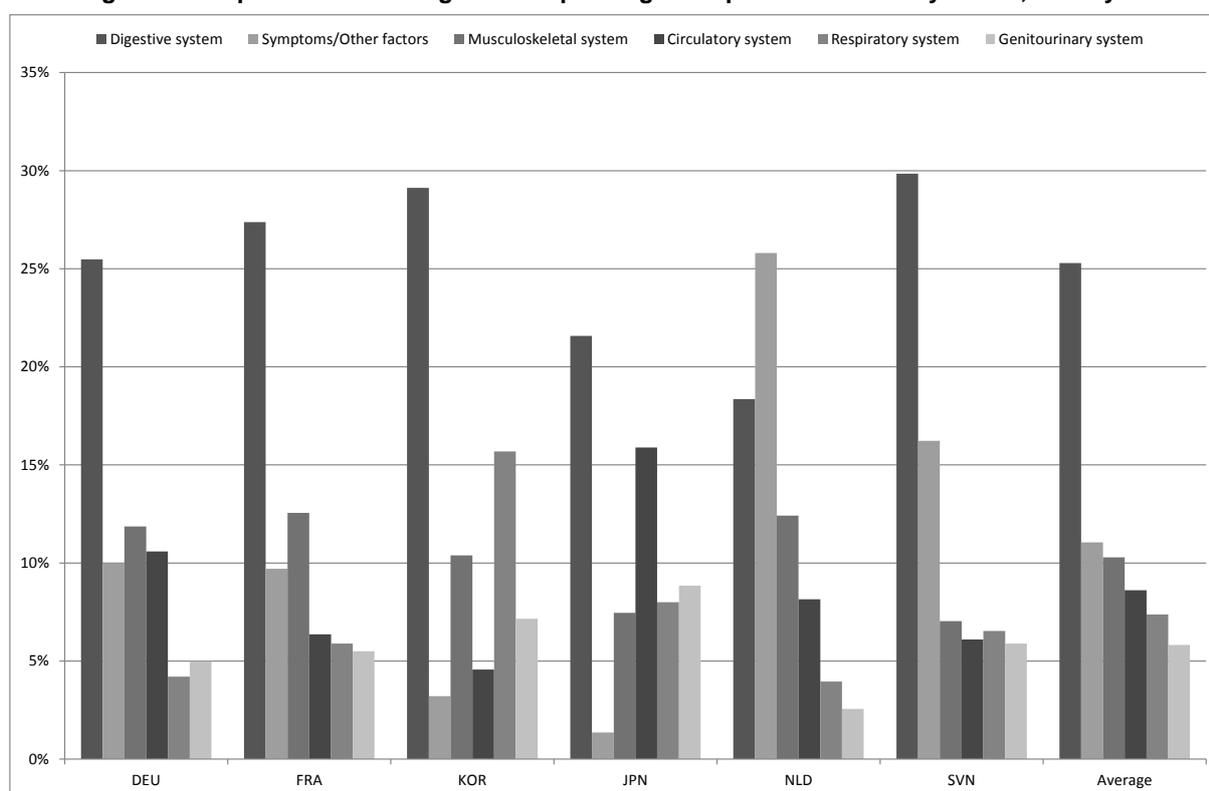
Ambulatory providers and outpatient care

141. Allocation by disease categories for outpatient and/or ambulatory provider care is less extensive than for inpatient/hospital care. There are a number of reasons for this. First, the ambulatory sector covers a multitude of providers from outpatient departments of hospitals to GP offices, dental surgeries and other specialists often requiring, in each case, separate data sources and allocation methodologies. Thus, often the complete coverage of the sector is made more difficult.

142. Second, the existence of detailed expenditure data and/or activity data by diagnostic category is much less available across countries and is very dependent on the payment and financing of care in the country. Therefore, where services are reimbursed and insurance records detail the service with diagnostic information – e.g. in the case of Korea – a large part of the total expenditure can be allocated. In situations where capitation payments are in place, such information is less likely to be available.

143. The greater role of private (out of pocket and insurance) financing (and private providers) is also a barrier to information sources necessary to distribute overall spending. This is particularly the case in dental and other specialist providers.

Figure 5.2. Top five ICD-10 categories of spending in outpatient/ambulatory sector, latest year



Note. Data are adjusted to exclude unallocated expenditure

144. Figure 5.2 shows the distribution of outpatient/ambulatory expenditure by ICD Chapter for available countries. It should be noted that because of the large unallocated share, the Czech Republic, Finland and Hungary are not included in the chart. Analysing these countries suggests that a large part of this unallocated relates to dental outpatient care. Indeed, on average 25% of outpatient spending among the remaining countries relates to Chapter XI (Digestive system) which includes expenditure on oral health. The second category combines Chapter XVIII (Symptoms, etc.) and Chapter XXI (Other factors) together since there would appear to be differences in recording such outpatient visits between countries. It is notable that a quarter of all outpatient expenditure for the Netherlands is allocated to these two categories of care, compared with an average of 10% in the other countries.

145. The other important categories in outpatient care, accounting for between 6 and 10% on average, relate to Chapter XIII (Musculoskeletal), Chapter X (Respiratory) and Chapter XIV (Genitourinary). Notable differences between countries are the relatively high expenditures in Korea for respiratory diseases and in Japan for circulatory disease. For the other disease categories not shown, Japan also has relatively high spending on endocrine, including diabetes, care.

146. The full breakdown of outpatient/ambulatory spending by ICD Chapter is shown in Table 5.4. Note that the data table includes unallocated expenditure.

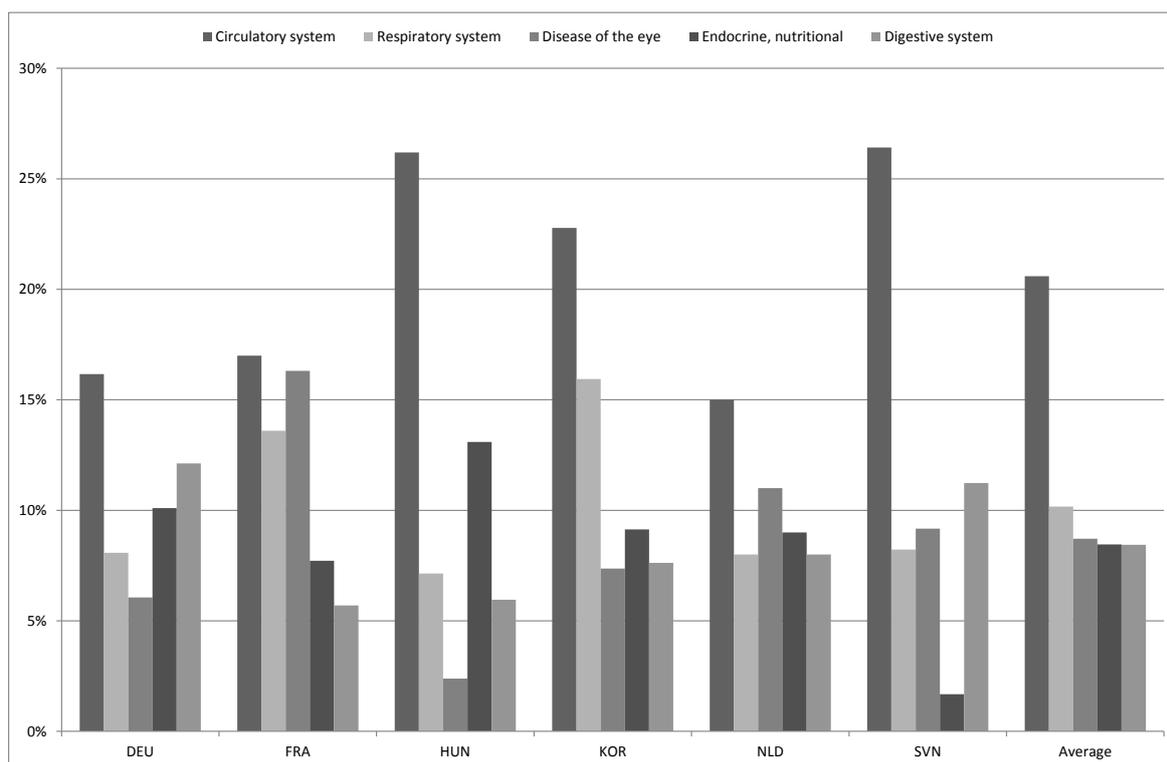
Medical goods / expenditure in retailers

147. Two main issues constrain the availability of medical goods (and particularly pharmaceuticals which typically account for around 90% of the category) expenditure by disease category.

148. First, there are difficulties to link the classification of pharmaceuticals to a disease category directly without diagnostic information from the prescribing physician. As can be seen in Chapter 7, countries that are able to do this often use survey information or detailed reimbursement data available to them. Pharmaceuticals themselves are usually classified to a classification system based on the active ingredient, which may be appropriate treatment for more than one disease category.

149. Second, a large part of medical goods spending is covered by direct payments by household for over-the-counter medicines and optical products (glasses, contact lenses, etc.)

Figure 5.3. Top five ICD-10 categories of spending on medical goods/retailers, latest year



150. Figure 5.3 shows medical goods expenditure according to ICD Chapter for a selection of OECD countries. The highest spending disease category for all countries relates to Chapter IX: Circulatory disease, accounting for 20% on average of pharmaceutical spending and more than twice the level of the next category, Chapter X: Respiratory system. However, this second category is relatively high in both France and Korea.

151. The first digit level captures not just pharmaceutical but other medical goods – hence, the third category of disease of the eye captures spending on glasses and eye products (contact lenses) - this is high in France at more than 15% of spending. The other main categories – at around 8% of spending on average – refer to Chapter IV (Endocrine/diabetes) and Chapter XI (Digestive system). Outside of these main categories, Germany allocates 11% of medical goods spending on musculoskeletal conditions, while Hungary and Slovenia allocate 10% on cancer and mental health respectively.

152. The full breakdown of spending by ICD Chapter is shown in Table 5.5.

Expenditure by specific diseases: The example of mental health

153. Under the study, expenditures on mental disorders were collected according to the ICD-10 chapter and ISHMT which allows some of the potential of the disease accounts to be explored as well as highlighting some of the deficiencies. While a full allocation by disease under SHA has the potential to provide detailed information about expenditures on mental health care, only a few countries are able to allocate *all* health care expenditures across disease categories. The most detailed and widely available data continues to be concentrated in the hospital/inpatient sector reflecting the available administrative data sources. Thus, any analysis has a strong bias towards hospital care and can miss the full perspective including community-based care.

154. If we stay with hospital care and compare mental health spending to the other main categories of illness, we can see that for a larger group of OECD countries spending on mental illness accounts for between 5% and 19% of total in-patient expenditures, typically behind circulatory diseases and cancer (Figure 5.1). It should be borne in mind that differences in the level of inpatient spending can reflect the organisation of a country's health care system and specific policies related to the treatment of mental health care. For example, variations between the countries in the way services are provided, differences in the boundaries of spending (e.g. between health and social care), and differences in included expenditures (e.g. excluding or including pharmaceutical spending) can create difficulties in interpretation.

155. While these figures point to the importance of mental health in health care spending, it is not necessarily the case that expenditure on mental health is high relative to the high prevalence and burden of disease presented by mental health. Indeed, the proportion of total *public* expenditure allocated to mental health care is often small. For example, mental illness is responsible for 23% of England's total burden of disease, but receives 13% of NHS health expenditures (Centre for Economic Performance, 2012).

Hospitals still consume the highest proportion of mental health expenditure, although spending on services outside hospitals is increasing

156. While there has been growing investment in mental health services in the community, figures suggest that spending in hospitals remains a dominant sector for mental health. This trend is largely consistent with the move towards de-institutionalisation seen in many OECD countries, but also underlines both the continued importance of hospital care, and the likely high-cost of the complex functions that hospitals perform.

157. Table 5.2 provides a comparison of mental health spending by type of provider in the health system. Analysing this data, we can see that while Korea and the Czech Republic spend significantly less than Germany and Netherlands, a much higher proportion is concentrated in the hospital sector.²²

²²

It should be noted that some of the differences may not be true differences in the patterns of provision in countries but may be attributable to data quality and the level to which data could be attributed across provider categories. For example, the Czech Republic was not able to allocate the majority of pharmaceutical expenditures, resulting in an under-estimation of the percentage of mental health expenditures attributable to pharmaceuticals, while Canada was unable to allocate long-term care expenditures according to disease. Work is ongoing to increase the comparability of the results.

Table 5.2. Total mental health expenditures by health care provider

	Germany		Korea		Netherlands ¹		Czech Republic ²	
	per capita US\$	%	per capita US\$	%	per capita US\$	%	per capita US\$	%
Hospital	146.7	33.0%	71.7	66.4%	294.6	45.4%	36.0	69.4%
Long-term care	117.2	26.3%	11.4	10.6%	237.4	36.6%	2.3	4.4%
Ambulatory	78.1	17.5%	14.7	13.6%	48.4	7.5%	11.7	22.6%
Pharmaceuticals	55.0	12.4%	6.9	6.4%	33.7	5.2%	0.1	0.2%
Other providers	48.1	10.8%	3.3	3.0%	34.3	5.3%	1.8	3.4%
All expenditures	445.0	100.0%	108.1	100.0%	648.4	100.0%	51.9	100.0%

1. NL: 89% of hospital expenditures are mental health and substance abuse hospitals

2. CZ: 75% of hospital expenditures are mental health and substance abuse hospitals

Source: OECD study (2013)

158. However, in a number of countries where expenditures by provider or by service category are available over time, we can observe a trend towards falling expenditures on inpatient or hospital care alongside an increase in spending on services delivered in the community (AIHW, 2012 and NCHS, 2013.). Nonetheless, spending in hospitals remains high even in countries which have developed community services, given that in countries where deinstitutionalisation is advanced the threshold for admission has risen and hospitals are typically dealing with the most complex and more resource intensive care episodes.

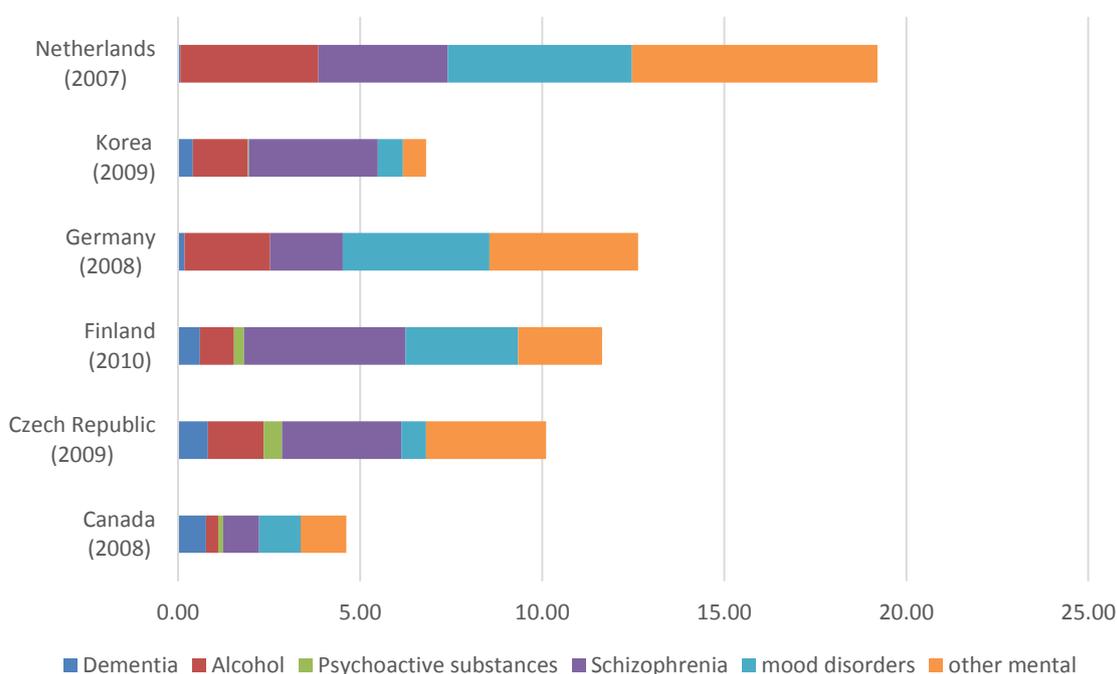
Severe and enduring mental disorders represent a small burden of disease, but a significant proportion of expenditure

159. Comparing expenditures only at the aggregate level of *all* mental illnesses is, however, rather restrictive. Mental and Behavioural Disorders as a grouping encompasses a wide range of conditions, from substance abuse to mood and depression to schizophrenia, as well as dementia. For further insight into the differences in expenditures by type of mental illness, a few countries are able to provide a more detailed breakdown of spending into these categories of mental illness.²³

160. Figure 5.4 reveals that severe mental illnesses (SMI) such as schizophrenia tend to account for a dominant proportion of acute mental health expenditure. Given the higher symptom severity and chronic nature of SMIs it is perhaps not surprising that inpatient expenditure is higher for these disorders. The dominance of expenditure on mental health in hospitals, and on highly specialised services, might suggest that these acute patients and severe mental illnesses account for the bulk of overall mental health spending.

²³ The International Short List of Hospital Morbidity Tabulation (ISHMT) provides a useful categorisation of ICD groupings that many countries can employ and which can be used for comparisons.

Figure 5.4. Percentage of acute in-patient expenditures by subcategory of mental illness



Source: OECD study (2013)

161. However, the lack of non-hospital data, i.e. on community and primary care-level services, and the inability to break down the data that is available by disorder category means that there is a lack of expenditure information on the mild-to-moderate mental disorders. In order to allocate primary care spending it is necessary to have detailed data on diagnoses in primary care settings. While in Korea, all primary care data includes a diagnosis in its coding; this is often not the case in other countries. This data gap represents a significant problem: it is understood that there is a high prevalence of mild-to-moderate disorders and a high treatment gap, as well as high associated indirect costs, but it is not possible to appraise the extent to which direct costs are or are not offsetting indirect costs, or get a picture of spending on improving treatment for mild-to-moderate disorders.

Dissemination of data on spending by disease (age and gender)

162. As part of the deliverables it is intended to start to disseminate available data of spending by disease category (age class and gender). Although there remain the comparability issues that have been raised through this chapter it is considered that the dissemination of the data in itself will act as a catalyst to expand the coverage – both in terms of countries and health care sectors. It is also hoped that the transparency of the methodology and gaps is a way to improve the overall comparability with time. This approach has been shown to have been successful in improving the overall reporting and comparability in the health accounts area.

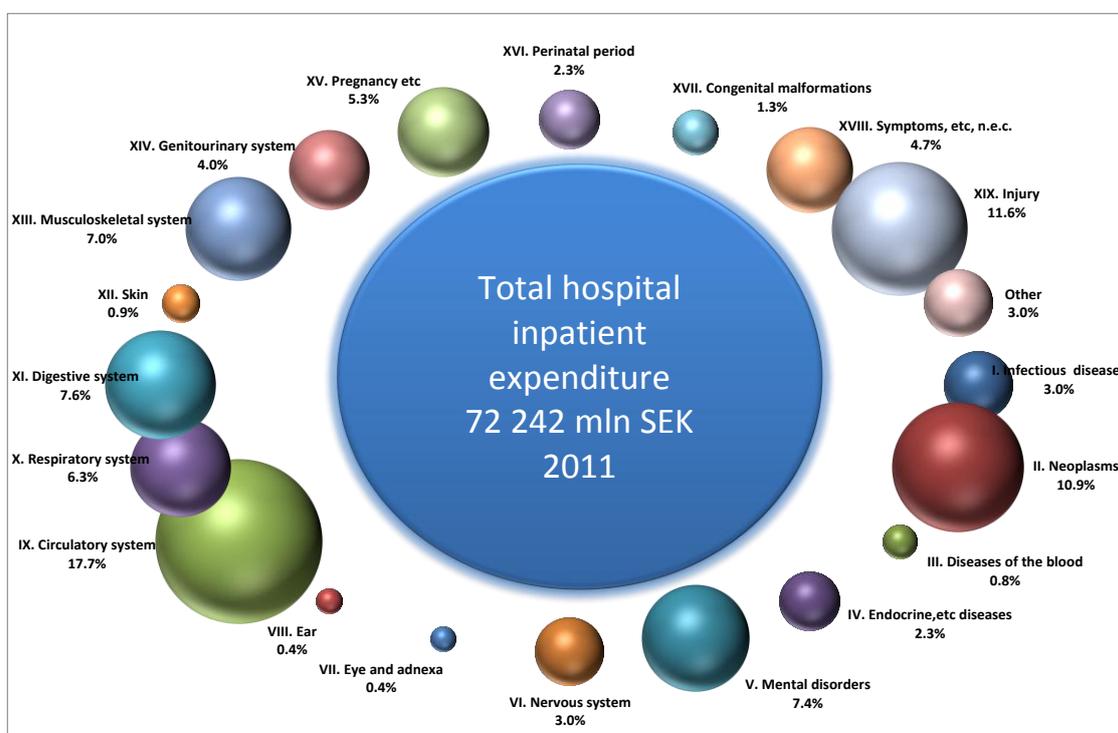
163. The following tables and charts are expected to be made available:

- Current health expenditure by ICD chapter (age, gender) - NCU, % current health spending, per capita spending;

- Hospital/inpatient expenditure by ICD chapter (age, gender) - NCU, % total hospital/inpatient spending, expenditure by discharge / bed day;
- Outpatient/ambulatory expenditure by ICD chapter (age, gender) - NCU, % total outpatient/ambulatory spending;
- Medical goods expenditure by ICD chapter (age, gender) - NCU, % total medical goods spending.

164. In addition to the standard charts and tables, a dedicated page for health spending by disease will be created as part of the OECD SHA website. As well as a platform for disseminating the guidelines and final project report, more innovative and dynamic charts for countries and changes over time, e.g. Fig 5.5 shows an example of hospital inpatient spending for Sweden for 2011 as a bubble chart will be produced.

Figure 5.5. Hospital inpatient expenditure for Sweden 2011 by ICD-10 Chapter



165. Finally, a Health Working Paper comparing the methodologies and results of the available country data is planned to be released by Q1 2014.

Table 5.3. Inpatient/hospital (HC.1.1/HP.1) expenditure by ICD-10 Chapter

ICD-10 Chapter	Canada					Czech Republic			Finland			France	Germany			
	HC.1.1					HC.1.1		HP.1	HC.1.1			HP.1	HP.1			
	2004	2005	2006	2007	2008	2009	2011	2009	2008	2009	2010	2002	2002	2004	2006	2008
I. Infectious and parasitic diseases	2%	2%	2%	3%	3%	3%	3%	2%	3%	3%	3%	2%	2%	2%	2%	2%
II. Neoplasms	9%	9%	9%	9%	9%	9%	10%	11%	11%	11%	12%	11%	12%	14%	13%	13%
III. Diseases of the blood	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
IV. Endocrine, etc diseases	3%	3%	3%	3%	3%	2%	2%	3%	2%	2%	2%	3%	3%	3%	3%	3%
V. Mental disorders	7%	7%	5%	5%	5%	8%	9%	4%	12%	11%	12%	15%	12%	12%	12%	13%
VI. Nervous system	2%	2%	2%	2%	2%	2%	2%	4%	5%	5%	4%	3%	3%	3%	3%	3%
VII. Eye and adnexa	0%	0%	0%	0%	0%	1%	1%	1%	1%	0%	0%	2%	1%	1%	1%	1%
VIII. Ear and mastoid process	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%
IX. Circulatory system	17%	17%	17%	17%	17%	18%	22%	14%	19%	19%	19%	13%	17%	17%	18%	18%
X. Respiratory system	8%	8%	8%	8%	8%	7%	7%	5%	6%	6%	6%	5%	5%	5%	5%	5%
XI. Digestive system	8%	8%	9%	9%	9%	7%	8%	5%	7%	7%	6%	7%	8%	8%	8%	8%
XII. Skin and subcutaneous tissue	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
XIII. Musculoskeletal system	6%	6%	6%	6%	6%	5%	6%	5%	9%	8%	8%	6%	13%	12%	12%	12%
XIV. Genitourinary system	4%	4%	4%	4%	4%	4%	4%	5%	3%	3%	4%	6%	4%	4%	4%	4%
XV. Pregnancy etc	5%	5%	6%	6%	6%	3%	3%	2%	1%	1%	4%	4%	4%	3%	3%	2%
XVI. Perinatal period	3%	3%	4%	4%	4%	3%	3%	2%	2%	2%	2%	1%	1%	1%	1%	1%
XVII. Congenital malformations	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
XVIII. Symptoms, etc, n.e.c.	4%	4%	4%	4%	4%	2%	2%	3%	4%	4%	3%	4%	2%	2%	2%	2%
XIX. Injury (external causes)	9%	10%	10%	10%	10%	5%	4%	4%	12%	12%	11%	9%	8%	8%	9%	10%
Other factors influencing health	8%	8%	8%	8%	8%	3%	3%	4%	1%	1%	1%	4%	2%	1%	1%	2%
Not allocated						16%	6%	22%	0%	0%	0%		0%	0%	0%	0%

Table 5.3. Inpatient/hospital (HC.1.1/HP.1) expenditure by ICD-10 Chapter (cont.)

ICD-10 Chapter	Hungary	Japan				Korea				Israel	Netherlands			Slovenia	Sweden	Switzerland
	HP.1	HC.1.1				HC.1.1		HP.1		HC.1.1	HP.1			HC.1.1*	HC.1.1	HC.1.1
	2006	2008	2009	2010	2006	2009	2006	2009	2009	2003	2005	2007	2011	2011	2011	
I. Infectious and parasitic diseases	1%	2%	2%	2%	3%	3%	3%	5%	1%	1%	1%	1%	3%	3%	3%	
II. Neoplasms	11%	17%	17%	17%	16%	19%	16%	17%	5%	9%	9%	9%	15%	11%	12%	
III. Diseases of the blood	1%	1%	1%	1%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
IV. Endocrine, etc diseases	2%	4%	4%	4%	2%	1%	3%	3%	2%	2%	2%	1%	2%	2%	2%	
V. Mental disorders	6%	10%	11%	10%	7%	7%	6%	9%	1%	18%	20%	22%	6%	7%	1%	
VI. Nervous system	3%	5%	6%	6%	3%	3%	3%	4%	1%	4%	4%	4%	2%	3%	2%	
VII. Eye and adnexa	3%	2%	2%	2%	3%	3%	2%	1%	1%	2%	2%	1%	1%	0%	1%	
VIII. Ear and mastoid process	0%	0%	0%	0%	1%	1%	1%	1%	0%	1%	1%	1%	0%	0%	0%	
IX. Circulatory system	20%	22%	23%	22%	14%	13%	13%	15%	11%	13%	12%	13%	16%	18%	13%	
X. Respiratory system	6%	6%	6%	6%	6%	8%	7%	8%	5%	5%	5%	4%	6%	6%	5%	
XI. Digestive system	6%	6%	6%	6%	7%	7%	8%	7%	5%	7%	6%	6%	7%	8%	8%	
XII. Skin and subcutaneous tissue	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	1%	1%	1%	1%	
XIII. Musculoskeletal system	7%	6%	6%	6%	9%	9%	9%	8%	3%	8%	9%	8%	8%	7%	11%	
XIV. Genitourinary system	8%	4%	4%	4%	4%	4%	7%	6%	3%	4%	5%	4%	10%	4%	4%	
XV. Pregnancy etc	4%	1%	1%	1%	3%	3%	2%	1%	9%	4%	3%	3%	5%	5%	6%	
XVI. Perinatal period	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%	
XVII. Congenital malformations	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	1%	1%	1%	2%	
XVIII. Symptoms, etc, n.e.c.	1%	2%	1%	1%	1%	1%	1%	2%	7%	10%	11%	7%	2%	5%	2%	
XIX. Injury (external causes)	6%	9%	9%	9%	18%	15%	13%	9%	6%	6%	5%	5%	9%	12%	12%	
Other factors influencing health	0%	0%	0%	0%	1%	1%	5%	1%	10%	5%	5%	5%	3%	3%	1%	
Not allocated	11%	0%	0%	0%	0%	0%	0%	0%	25%	-3%	-4%	0%		0%	9%	

Table 5.4. Outpatient/Ambulatory provider (HC.1.3/HP.3) expenditure by ICD-10 Chapter

ICD-10 Chapter	CZE			DEU				FIN			FRA	HUN		KOR			
	2009	2009	2011	2002	2004	2006	2008	2008	2009	2010	2002	2006	2006	2006	2009	2006	2009
	HC13	HP3	HC13	HP3	HP3	HP3	HP3	HC13	HC13	HC13	HP3	HC13	HP3	HC13	HC13	HP3	HP3
I. Infectious and parasitic diseases	1%	1%	1%	2%	2%	1%	1%	1%	1%	1%	2%	1%	1%	2%	2%	2%	4%
II. Neoplasms	12%	4%	14%	3%	4%	4%	4%	14%	16%	14%	4%	3%	4%	4%	6%	1%	3%
III. Diseases of the blood	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%	1%	1%	1%	1%
IV. Endocrine, etc diseases	3%	3%	3%	5%	5%	6%	6%	3%	3%	3%	4%	3%	2%	2%	3%	1%	2%
V. Mental disorders	3%	3%	3%	6%	6%	6%	6%	8%	8%	9%	4%	3%	3%	3%	3%	2%	3%
VI. Nervous system	4%	2%	4%	4%	4%	4%	4%	3%	4%	4%	3%	1%	1%	1%	2%	1%	1%
VII. Eye and adnexa	4%	2%	4%	3%	3%	3%	3%	2%	2%	2%	3%	2%	2%	3%	3%	4%	5%
VIII. Ear and mastoid process	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	1%	2%	1%
IX. Circulatory system	7%	6%	10%	11%	10%	10%	11%	5%	6%	6%	6%	9%	9%	5%	5%	5%	4%
X. Respiratory system	3%	4%	3%	5%	4%	4%	4%	3%	3%	3%	6%	4%	4%	12%	16%	12%	19%
XI. Digestive system	12%	11%	12%	27%	28%	26%	25%	4%	5%	5%	27%	8%	7%	29%	29%	30%	30%
XII. Skin and subcutaneous tissue	2%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	3%	2%
XIII. Musculoskeletal system	3%	6%	3%	12%	12%	12%	12%	5%	6%	7%	13%	7%	9%	14%	10%	18%	10%
XIV. Genitourinary system	3%	8%	3%	5%	5%	5%	5%	7%	7%	5%	6%	3%	3%	7%	7%	4%	5%
XV. Pregnancy etc	0%	1%	0%	1%	1%	1%	1%	5%	5%	2%	1%	0%	0%	0%	0%	1%	1%
XVI. Perinatal period	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
XVII. Congenital malformations	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%
XVIII. Symptoms, etc, n.e.c.	2%	3%	2%	6%	5%	6%	6%	5%	6%	6%	4%	2%	2%	1%	2%	1%	1%
XIX. Injury (external causes)	2%	2%	2%	3%	3%	3%	3%	4%	4%	4%	7%	3%	3%	7%	6%	11%	7%
Other factors influencing health	11%	12%	13%	2%	3%	4%	4%	8%	8%	8%	5%	2%	2%	5%	2%	1%	1%
Not allocated	26%	28%	19%	0%	0%	0%	0%	16%	12%	14%		45%	45%	0%	0%	0%	0%

Table 5.4. Outpatient/Ambulatory provider (HC.1.3/HP.3) expenditure by ICD-10 Chapter (cont.)

ICD-10 Chapter	JPN			NLD			SVN
	2008	2009	2010	2003	2005	2007	2006
	HC13	HC13	HC13	HP3	HP3	HP3	HC13
I. Infectious and parasitic diseases	3%	3%	3%	3%	2%	1%	2%
II. Neoplasms	7%	7%	7%	3%	4%	4%	2%
III. Diseases of the blood	1%	1%	1%	0%	0%	0%	0%
IV. Endocrine, etc diseases	9%	9%	9%	2%	2%	2%	3%
V. Mental disorders	3%	3%	3%	5%	5%	6%	4%
VI. Nervous system	2%	2%	2%	2%	2%	2%	1%
VII. Eye and adnexa	4%	4%	5%	2%	1%	1%	3%
VIII. Ear and mastoid process	1%	1%	1%	2%	1%	1%	2%
IX. Circulatory system	15%	15%	16%	6%	7%	8%	6%
X. Respiratory system	8%	8%	8%	4%	4%	4%	7%
XI. Digestive system	21%	21%	22%	21%	20%	18%	30%
XII. Skin and subcutaneous tissue	2%	2%	2%	3%	2%	2%	2%
XIII. Musculoskeletal system	7%	7%	7%	12%	11%	12%	7%
XIV. Genitourinary system	9%	9%	9%	3%	2%	3%	6%
XV. Pregnancy etc	0%	0%	0%	5%	5%	3%	0%
XVI. Perinatal period	0%	0%	0%	0%	0%	0%	0%
XVII. Congenital malformations	0%	0%	0%	1%	1%	1%	0%
XVIII. Symptoms, etc, n.e.c.	1%	1%	1%	16%	15%	15%	6%
XIX. Injury (external causes)	4%	4%	3%	3%	3%	4%	8%
Other factors influencing health				8%	11%	11%	11%
Not allocated				0%	1%	1%	

Table 5.5. Medical goods / Retailers of medical goods (HC.5/HP.4) expenditure by ICD-10 Chapter

ICD-10 Chapter	CZE			DEU				FRA	HUN		KOR		NLD			SVN
	2009	2009	2011	2002	2004	2006	2008	2002	2006	2006	2006	2009	2003	2005	2007	2006
	HC5	HP4	HC5	HP4	HP4	HP4	HP4	HP4	HC5	HP4	HC5	HC5	HC5	HC5	HC5	HC5
I. Infectious and parasitic diseases	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%	5%	5%	6%	6%	3%	1%
II. Neoplasms	0%	1%	0%	3%	3%	3%	4%	2%	8%	8%	4%	7%	3%	3%	5%	7%
III. Diseases of the blood	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	0%	1%	0%	0%	0%	4%
IV. Endocrine, etc diseases	1%	1%	1%	11%	11%	11%	10%	7%	11%	11%	9%	9%	6%	6%	9%	2%
V. Mental disorders	0%	0%	0%	5%	5%	6%	6%	7%	6%	6%	1%	2%	5%	5%	6%	10%
VI. Nervous system	0%	0%	0%	5%	5%	6%	7%	4%	3%	3%	3%	3%	2%	2%	3%	6%
VII. Eye and adnexa	0%	0%	0%	7%	5%	6%	6%	15%	2%	2%	8%	7%	11%	11%	11%	9%
VIII. Ear and mastoid process	0%	0%	0%	2%	2%	1%	1%	1%	1%	1%	2%	1%	2%	2%	3%	1%
IX. Circulatory system	0%	1%	0%	18%	18%	17%	16%	16%	22%	22%	22%	23%	14%	12%	15%	26%
X. Respiratory system	0%	0%	0%	8%	8%	8%	8%	13%	6%	6%	14%	16%	8%	8%	8%	8%
XI. Digestive system	0%	0%	0%	13%	14%	12%	12%	5%	5%	5%	9%	8%	10%	8%	8%	11%
XII. Skin and subcutaneous tissue	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%	3%	2%	3%	2%	2%	2%
XIII. Musculoskeletal system	1%	1%	0%	10%	11%	11%	11%	8%	6%	6%	10%	9%	7%	6%	9%	5%
XIV. Genitourinary system	0%	1%	1%	3%	3%	3%	3%	4%	3%	3%	5%	5%	5%	5%	5%	6%
XV. Pregnancy etc	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
XVI. Perinatal period	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
XVII. Congenital malformations	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
XVIII. Symptoms, etc. n.e.c.	0%	0%	0%	4%	4%	4%	4%	5%	2%	2%	1%	1%	10%	14%	6%	0%
XIX. Injury (external causes)	0%	0%	0%	2%	2%	2%	2%	1%	1%	1%	3%	2%	0%	0%	1%	1%
Other factors influencing health	0%	0%	0%	4%	4%	4%	5%		2%	2%	0%	0%	8%	9%	6%	0%
Not allocated	96%	93%	96%					6%	15%	15%	0%	0%	0%	0%	0%	

6. USING ACTIVITY DATA TO ALLOCATE HOSPITAL EXPENDITURES

Introduction

166. As shown in Chapter 5, data on hospital inpatient spending (HC1.1 and HP1 under the SHA framework) at disease level has been more widely available relative to other health care sectors such as outpatient care. The hospital inpatient sector is also the sector where information of activities at a disease level, such as discharges and average length of stay data is more systematically recorded. This raises the possibility to investigate whether such activity data can be linked sufficiently to expenditure data so as to accurately project estimates of spending by disease. The focus is therefore to determine if and how statistical analyses could provide ways to fill the information gaps in the absence of standard allocation mechanisms in order to derive expenditure data by disease.

167. This chapter first explains the methodologies used in cost-of-illness studies to derive hospital expenditure by disease. The subsequent section of the chapter discusses possible methodologies that could facilitate countries to produce expenditure information by disease in hospital in the absence of detailed expenditure studies. The latest results of the feasibility study using the available hospital expenditure data are then assessed. [The preliminary results are currently being further investigated and more country data are being incorporated into the model; the results of which will be included in the final report.]

Deriving hospital expenditure by disease

168. Methods to derive hospital expenditures by disease groups are generally case-based. The simplest technique to allocate expenditures across diseases would be to allocate expenditures using an average per diem cost multiplied by the days of stay for each patient with a particular diagnosis. Notwithstanding any other issues in how per diem rates may be derived, using them to allocate expenditures across disease groups does not take into account differences in resource intensity in the treatment of different diseases; all hospital days are costed equally thus assuming a similar average cost per day across diseases. This has been the approach used in studies in Sri Lanka, and also Canada for their 2000 data.²⁴ Thus, most countries have employed more sophisticated techniques.

169. The guidelines recommend the use of bottom-up calculations for costing by unit if data sources are good enough, meaning allowing a direct calculation of expenditure. While still under the top-down framework, this method attributes unit-level costs to disease dimensions.²⁵ The information needed to yield

²⁴ In previous years, and for the recent updated hospital data Canada is employing case mix group data in order to provide resource intensity weights.

²⁵ The key distinction between the top-down approach and the bottom-up approach is that the former is employed in a framework in which all expenditures are allocated according to a disease, or diagnostic category. This is the approach commonly used in general COI studies. The bottom-up approach is, more generally, applicable to disease specific COI studies. For consistency purposes we will refer to any studies that use actual expenditures as a starting point and attempt to derive expenditure by disease in such a framework (ensuring no double counting) as a top-down approach. This does not preclude the use of more

accurate and reliable estimates by disease include patient-level data with patient characteristics (i.e. gender, age, diagnosis) and treatments, resource use and per-diem (or unit) cost data.

170. Accounting for differences in resource intensity to treat different diseases can be made possible by using Diagnosis Related Groups (DRGs) reimbursement data or similar. DRGs are a classification system to catalogue (hospital) cases into homogeneous units based on primary diagnosis. They can include information on such items as procedures and services, length of stay, co-morbidities, and age. They intend to provide information on use of resources and are generally used in reimbursement systems.

171. In general, a case-costing database can be derived which provides information on average costs per case associated with a DRG or a similar types group such as the Case Mix Group (CMG) employed in Canada, or the DRG which is used by Australia and other countries. This ensures that complexities associated with certain conditions could be taken into account, thus diagnoses associated with those diseases that were more resource intensive were weighted appropriately providing a more accurate allocation of expenditures across disease groups than that obtained by employing only length of stay information and per diem costs. The 2008 project found that DRG-related information was widely used to derive an average cost per case to allocate hospital expenditures by disease, age and gender.²⁶

172. A top-down division of hospital costs using DRG registration information should give reliable results. Sweden provides a country example of applying such weighted costs and produced a compatible result to that of SHA data. The country compared the total expenditures derived using such case-costing technique for inpatient care to the total expenditures derived in their SHA totals for in-patient curative care (HC1.1) and in-patient rehabilitative care (HC.2.1). Both technique results in similar totals; Total expenditures using the case costing approach were lower than the health account total by only 2.9%.

173. In Canada, an average Resource Intensity Weight (RIW) was produced for each Case Mix Group (CMG). The derived weight is rooted in a cost reflecting the expected average resource use of a patient within a specific CMG. Then, each RIW was multiplied by the Cost per Weighted Case (CPWC), which is the average cost of treating a patient with a RIW equal to one for each patient. The result can then be totalled over all patients within a CMG, or with a specific diagnosis to derive the total expenditures for a CMG and, in turn, diagnosis group.

174. Yet, not all countries have such costing information readily available. To address this shortcoming, two steps are considered: firstly, estimating weights using available data such as utilisation data; secondly, projecting the estimates of hospital expenditures by disease by available data of OECD countries.

Modelling inpatient expenditures using activity data

175. As discussed, methods which employ case-costing information can provide accurate expenditure by disease results as they take into account the resource intensity associated with treating different diseases. However, many countries do not have such information readily available for various reasons. On the other hand, data related to hospital discharges, including bed days and average length of stay (ALOS) at a disaggregated level (e.g. ISHMT) are generally available for most OECD/EU countries. Hence, an

detailed data such as DRG registrations, claims data or patient specific data to derive more precise estimates of expenditure by disease. Such methodologies may be referred to as mixed methods.

²⁶ Note that at the workshop a table was presented in which some countries were noted to have employed DRG and some countries were noted as having employed “other” techniques. However, after reviewing the methods employed it could be argued that they were all ‘DRG-based’ using data on individual patients. And thus were more similar than dissimilar.

analysis was undertaken to compare the potential results of using bed days (and other information) as an allocation key versus the results obtained using more advanced methodological methods described above. The purpose of this analysis was to determine whether valid and meaningful expenditure by disease results can be derived from readily available discharge data both at an aggregate and a more disaggregated level.

176. A preliminary analysis was restricted to inpatient acute care (HC.1.1) as the available hospital discharge data, and the DRG-based expenditure data is generally restricted to this area. Given that this administrative data is broken down to the level of ISHMT, analyses were also undertaken using both ICD chapter level data and ISHMT code level data. It was felt that given the greater amount of information provided using ISHMT codes would produce more reliable results.

177. In order to validly compare the results using both ICD and ISHMT it was important to restrict the data to those countries for which data was available in both formats. In the first analyses, data was available for the following countries and years: Canada, 2004-2008; Finland, 2008-2010; Israel, 2009; Korea, 2009; Sri Lanka, 2005, and Sweden, 2011. Although Germany and the Netherlands regularly produce detailed expenditure by disease, they were not included in the analysis as they were unable to provide expenditure data according to ISHMT.²⁷

178. As explained in the previous section, using bed-days as an allocation key would, inherently, result in the share of expenditures for some diseases to be over-estimated and for others to be under-estimated. This is due to the fact that the treatment of some diseases, such as cancer, is more resource intensive and employing bed-days as an allocation method would underestimate actual expenditures for such diseases. On the other hand, employing share of bed-days would over-estimate the actual expenditures for those diseases, such as mental health, whose treatment is less resource intensive. Hence, it is necessary to derive a valid weighting that can be employed to adjust the bed-days according to resource intensity by diagnostic category. The diagnostic category employed can be as granular as a specific disease (based on single ICD code), or by ISHMT code, or a grouping of diseases such as an ICD chapter.

179. The weight is simply the ratio of the share of expenditures (as a percentage of all hospital spending) to the share of bed-days (as a percentage of all bed-days), by diagnostic category. The greater the weight, the more resource intensive is that particular ICD chapter or specific disease/treatment. For example, a weight of greater than one implies that that treatment of that particular ICD chapter is more resource intensive than the treatment of the average ICD chapter while a weight of less than one implies that it is less resource intensive than the average ICD chapter. In essence the analysis attempts to derive an average weight, for each diagnostic category (ICD Chapter, or ISHMT code) across all countries.

180. Note that for most of the ICD chapters the weights are in the same direction for all countries and years. However, for seven of the ICD chapters (Chapters I, III, IV, VII, XIV, XV, XVII) the results are mixed. Note, however, that each of these ICD chapters are responsible for a small percentage of expenditures or bed-days over all of the countries. For example, ICD Chapter I is responsible for only 3% of both expenditures and bed-days on average. Most of the ICD chapters with the weights moving in different directions across countries are responsible for less than 1% of expenditures and bed-days on average.

181. An ICD Chapter can cover a multitude of different types of diseases with potentially very different treatment and resource intensities. Therefore, analysing the weights by ISHMT codes may shed more light on the sources of such disparities. For example, examining ICD Chapter I, it can be seen

²⁷ Both Germany and the Netherlands derive data in more details than the ICD chapter level (available online), however, the categories employed do not perfectly match the complete ISHMT list. Data for the Czech Republic are also available and will be employed in future analyses.

specifically that it is ISHMT codes 104, 105, and 106 that are the source of this discrepancy. (Table 6.4) This may be an indication that using ISHMT data may produce more reliable results than using data on ICD chapters only.

Table 6.1. Expenditure to bed-day weighting by country and ICD chapter

ICD-10	CAN 2004	CAN 2005	CAN 2006	CAN 2007	CAN 2008	FIN 2008	FIN 2009	FIN 2010	ISR 2009	KOR 2009	SRI 2005	SWE 2011
I. Infectious and parasitic diseases	1.09	1.10	1.11	1.11	1.11	1.02	1.08	0.91	0.77	1.11	0.87	0.91
II. Neoplasms	1.13	1.14	1.15	1.16	1.17	1.32	1.38	1.34	1.14	2.75	1.08	1.07
III. Diseases of the blood	0.97	0.97	0.94	0.96	0.95	1.37	1.44	1.27	0.79	1.96	3.00	1.02
IV. Endocrine, etc diseases	0.97	0.96	0.93	0.91	0.92	1.04	1.20	1.10	1.11	0.65	0.96	1.13
V. Mental disorders	0.61	0.60	0.58	0.57	0.56	0.57	0.55	0.59	0.42	0.34	0.50	0.42
VI. Nervous system	0.84	0.85	0.83	0.83	0.81	0.56	0.48	0.53	0.97	0.66	1.08	1.03
VII. Eye and adnexa	1.45	1.42	1.32	1.31	1.27	2.41	2.38	1.82	0.97	8.74	0.97	1.52
VIII. Ear and mastoid process	1.80	1.73	1.76	1.84	1.89	1.90	1.93	1.73	0.84	1.67	0.98	1.77
IX. Circulatory system	1.19	1.20	1.18	1.19	1.19	1.10	1.09	1.06	1.43	1.10	1.19	1.14
X. Respiratory system	1.00	1.00	0.99	0.97	0.97	0.83	0.94	0.82	0.79	1.05	0.79	0.93
XI. Digestive system	1.03	1.03	1.03	1.04	1.04	1.51	1.55	1.44	1.03	1.58	1.31	1.21
XII. Skin and subcutaneous tissue	0.82	0.81	0.78	0.78	0.79	1.01	1.12	0.99	0.74	0.79	1.04	0.96
XIII. Musculoskeletal system	1.29	1.35	1.35	1.37	1.38	1.60	1.69	1.62	1.27	1.00	0.70	1.32
XIV. Genitourinary system	1.13	1.12	1.10	1.08	1.06	0.96	0.97	1.07	0.83	1.03	1.32	1.08
XV. Pregnancy etc	1.17	1.16	1.19	1.20	1.21	0.50	0.54	1.28	1.11	1.89	1.05	1.32
XVI. Perinatal period	1.13	1.13	1.10	1.10	1.09	2.16	2.30	2.00	1.12	1.81	1.00	1.15
XVII. Congenital malformations	2.31	2.17	2.12	2.16	2.17	2.44	2.82	2.76	1.60	3.03	1.60	1.98
XVIII. Symptoms, etc, n.e.c.	0.86	0.84	0.82	0.80	0.80	1.18	1.20	1.07	0.84	0.70	0.85	1.01
XIX. Injury (external causes)	1.15	1.15	1.13	1.12	1.11	1.27	1.25	1.14	0.95	0.71	1.10	1.17
XX. Other factors influencing health	0.69	0.69	0.68	0.67	0.69	0.85	0.84	0.76	1.10	0.77	0.74	1.00

Table 6.2. Expenditure to bed-day weighting by ICD Chapter, summary statistics

ICD-10	mean	se	95% C.I.	% exp.	% beddays
I. Infectious and parasitic diseases	1.0	0.03	0.94-1.09	3.1%	3.2%
II. Neoplasms	1.3	0.13	1.03-1.62	10.4%	8.0%
III. Diseases of the blood	1.3	0.18	0.91-1.7	0.9%	0.7%
IV. Endocrine, etc diseases	1.0	0.04	0.9-1.08	2.3%	2.4%
V. Mental disorders	0.5	0.03	0.47-0.58	6.8%	13.0%
VI. Nervous system	0.8	0.06	0.66-0.91	2.9%	4.2%
VII. Eye and adnexa	2.1	0.62	0.78-3.49	0.8%	0.4%
VIII. Ear and mastoid process	1.7	0.1	1.43-1.88	0.3%	0.2%
IX. Circulatory system	1.2	0.03	1.11-1.23	16.2%	13.9%
X. Respiratory system	0.9	0.03	0.87-0.98	7.3%	8.0%
XI. Digestive system	1.2	0.07	1.09-1.38	7.5%	6.4%
XII. Skin and subcutaneous tissue	0.9	0.04	0.8-0.97	1.2%	1.4%
XIII. Musculoskeletal system	1.3	0.08	1.16-1.5	6.4%	4.8%
XIV. Genitourinary system	1.1	0.03	0.99-1.14	4.2%	3.9%
XV. Pregnancy etc	1.1	0.1	0.91-1.36	5.7%	5.2%
XVI. Perinatal period	1.4	0.14	1.11-1.73	2.5%	2.0%
XVII. Congenital malformations	2.3	0.13	1.98-2.55	1.2%	0.5%
XVIII. Symptoms, etc, n.e.c.	0.9	0.05	0.81-1.02	4.0%	4.5%
XIX. Injury (external causes)	1.1	0.04	1.01-1.2	11.0%	10.3%
XXI. Other factors influencing health	0.8	0.04	0.7-0.88	5.4%	7.0%

Table 6.3. Expenditure to bed-day weighting by ISHMT code, ICD Chapter I, summary statistics

ISHMT Code	Heading	mean	se	95% C.I.	% exp.	% beddays
101	Intestinal infectious diseases except diarrhoea	0.8	0.05	0.735 , 0.949	0.3%	0.4%
102	Diarrhoea and gastroenteritis of presumed infectious origin	0.9	0.04	0.778 , 0.944	0.3%	0.4%
103	Tuberculosis	0.8	0.03	0.768 , 0.903	0.2%	0.2%
104	Septicaemia	1.2	0.09	0.973 , 1.386	1.0%	0.8%
105	Human immunodeficiency virus [HIV] disease	1.4	0.25	0.853 , 1.96	0.1%	0.1%
106	Other infectious and parasitic diseases	1.0	0.03	0.912 , 1.038	1.2%	1.3%

182. Specifically, two models were estimated. Model 1 employed ICD chapter level data and Model 2 employed ISHMT level data. Both models also included country specific demographic type variables (share of public health spending, incidence of cancer, prevalence of obesity, per-capita GDP, life

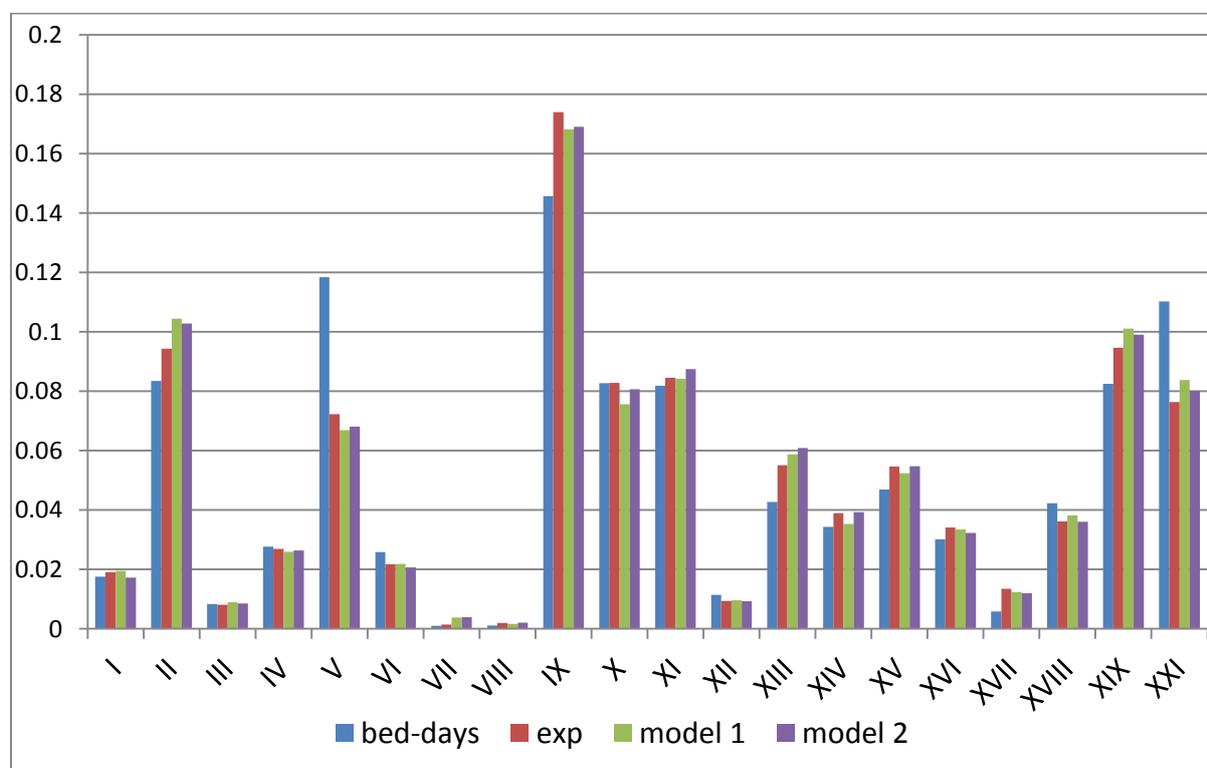
expectancy, and physicians per 1000 population). Although Model 2 used ISHMT codes as the unit of analysis, the results were aggregated by ICD Chapter.

Results

183. Both models performed fairly well. (Model 1 adjusted R^2 was 0.976 and Model 2 R^2 was 0.955). Average length of stay and bed days were significant in both models. With respect to the demographic variables only prevalence of obesity and physicians per 1000 population were significant.

184. Examining the results it is clear that the predicted expenditure values, as expected, perform better than using straight bed-days as an allocation key (an example is shown for Canada in Figure 6.1). There are, however, some cases where this was not the case. For example, for Israel, both models appeared to greatly overestimate the expenditure values for Chapter II, and under-estimated the expenditure values for Chapter XXI. There were a few similar examples in other areas for some of the other countries.

Figure 6.1. Estimating hospital expenditures for Canada, 2004



185. Although employing data at the level of ISHMT codes employed much more information than using ICD chapters, it was not clear that the results were more reliable (or better estimates were produced). The overall results were mixed. In some specific instances the ICD level model produced better results (i.e. closer to actual expenditures) than the ISHMT level model.

186. Based on these initial promising results it was decided to expand the country data as an input into the weights by using available data at the ICD Chapter level for the hospital inpatient sector matched with the appropriate discharge and length of stay data. Table 6.4 shows the data available for 12 countries with multiple years for some countries.

187. It was necessary to re-examine areas in which the underlying weights, at either the ICD or ISHMT level were significantly different for some countries and determine some potential causes. Further investigation, and analysis, was required to examine such specific causes to derive appropriate adjustments to the model, if necessary, to produce reliable results and predictions. Therefore, an investigation into the inclusion of further variables was undertaken to try to explain some of the cross-country differences in observed weights from the first round. Variables such as surgical rates, share of day cases, prevalence and mortality rates of specific diseases. From the testing of the set of variables it was found that the number of caesarean sections and rate of cataract surgeries performed as day surgery were both significant.

188. A full description of the process, methodology and final results are expected to be available in a forthcoming Health Working Paper.

Table 6.4. Summary of Expenditure Data, Discharge, Average Length of Stays by Disease

Country	Expenditure	Discharge	Average Length of Stay	Years	Source
Canada	HC.1.1 by HP.1 except for mental health hospitals and Quebec For analysis and data comparison, the data was adjusted incorporating mental health and Quebec	HC.1.1 by HP.1 except for mental health hospitals and Quebec For analysis and data comparison, the data was adjusted incorporating mental health and Quebec	HC.1.1 by ICD-10 except for mental health hospitals and Quebec. For analysis and data comparison, the data was adjusted incorporating mental health and Quebec	2004 - 2008	
Czech Republic	HC.1.1 by HF.1.2	hospitals and specialised therapeutic institutes	hospitals and specialised therapeutic institutes	2009, 2011	OECD Health Statistics
Finland	HC1.1 by ISHMT	HC1.1 by ISHMT	HC1.1 by ISHMT	2008, 2009, 2010	HIT
Hungary	HC.1.1	Itemised data of the inpatient care finance report submitted by the National Health Insurance Fund.	Itemised data of the inpatient care finance report submitted by the National Health Insurance Fund.	2006	
Germany	HP.1	HP.1.1, HP.1.2, HP.1.3 (in general hospitals, mental hospitals, prevention and rehabilitation hospitals. But includes day cases)	HP1.1, HP.1.2, HP.1.3 (in general hospitals, mental hospitals, prevention and rehabilitation hospitals. But includes day cases)	2002, 2004, 2006, 2008	The Information System of the Federal Health Monitoring, OECD Health Statistics
Israel	HC.1.1	HC.1.1	HC.1.1	2009	
Japan	HC.1.1xHP.1 and HP.3 by ICD 10	Discharges from Acute Care Beds (HC.1.1; acute psychiatric beds and mental health) by H.P.1 & 3	No compatible data available	2008, 2009, 2010	Ministry of Health, Labour and Welfare, Patient Survey (ALOS), OECD Health Data (Discharge).
Korea		Hospital (=or >30 beds) discharges only	Hospital (=or >30 beds) discharges only	2009	OECD Health Data (Discharge and ALOS)
Netherlands	HP.1 (excluding mental health hospitals)	HP1 included, HP1.2 (mental hospital not included HP1.3 long stay hospitals excluded)	HP.1 included, HP.1.2 (mental hospital not included HP.1.3 long stay hospitals excluded)	2003, 2005, 2007	http://www.kostenvanzen.nl/systeem/service-menu-rechts/homepage-engels/ OECD Health Data
Slovenia	HC.1.1 and HC.1.2 (includes public private inpatient acute and day acute care)	All private and public hospitals, all types (general and university - HP.1.1., psychiatric - HP.1.2., and specialty hospitals - HP.1.3)	All private and public hospitals, all types (general and university - HP.1.1., psychiatric - HP.1.2., and specialty hospitals - HP.1.3)	2011	OECD Health Data
Sweden	HC.1.1 by ISHMT	HC.1.1 by ISHMT	HC.1.1 by ISHMT	2011	Statistics Sweden
Switzerland	HC.1.1 and HP.1.1 & HP.1.3	The data cover all inpatient institutions (public and private hospitals) which are classifiable as HP.1 providers. However, military and prison hospitals are not included.	HC.1.1 and HP.1.1 & HP.1.3	2011	OECD Health Data

7. LINKING PHARMACEUTICAL DATA TO DISEASE AND DIAGNOSIS

189. Expenditure on medical goods (predominantly pharmaceuticals) is one of the three main functions of health spending among OECD and EU countries, along with in-patient and out-patient care. Medical goods account for around 23% of current health expenditure on average across EU Member States, but rises to around 37% in countries such as Bulgaria, Hungary and Slovak Republic. It is therefore important in any exercise allocating the spending to disease categories that sound data sources and methodologies are employed.

190. There are, however, a number of issues concerning the allocation of pharmaceutical spending that remain a challenge for a lot of countries. While administrative data from, for example, social insurance or reimbursements to pharmacies may be more readily available in the case of prescribed drugs, a significant proportion of total pharmaceutical spending is covered by private sources, notably household spending on Over-the-Counter medicines. Detailed information linking private out-of-pocket spending to disease, age and gender categories is limited.

191. The other main challenge in this area is being able to derive an allocation key which links information on pharmaceutical consumption and expenditure, which is usually reported according to a classification of its chemical characteristics, such as the ATC (Anatomic Therapeutic Chemical Consumption) Classification to specific disease categories. This chapter reviews the methodologies employed by the countries involved in the pilot studies and others who have derived pharmaceutical expenditure by disease estimates and explores available data sources and possible developments in this area.

Country experience

192. In Korea, total expenditures for prescription (reimbursed) drugs are retrieved from the health insurance (NHI) records. However, most of the reimbursement claims of prescription drugs filed by the pharmacies to the Korea Health Insurance Review Agency (HIRA) do not include any description about the disease concerned or diagnosis. Korea allocates drug expenditures to disease groups, age and gender based on information derived from a subsample of institutions which do collect such information. Expenditure on over the counter drugs not covered by the NHI and primarily financed directly out-of-pocket is derived from household survey data. The household survey provides the expenditure paid by the households for both prescription and non-prescription drugs separately. These total amounts are allocated according to the disease using a specific survey on the NHI-uncovered expenditure at health care providers, conducted by the National Health Insurance Corporation.

193. The Czech Republic has used aggregations of ATC codes based on meaningful groups of drugs usually used for some illnesses. The linkage between the ATC groups and disease groups was provided by physician expert opinion. The data also includes information on daily defined doses (volume indicator). A large proportion of drug expenditures, however, remain unallocated decreasing the usefulness of the data in this area.

194. In conducting their expenditure by disease studies, both Germany and Canada obtained pharmaceutical data from IMS Health, a company specialising in providing information to the health care

industry. IMS in both countries provided two distinct databases: One database with information on actual pharmaceuticals sold and associated expenditures, and another database which provided links between ATC codes and ICD codes based on physician surveys and their prescription practices. A fuller description of the methodology and extent of IMS information is provided later in this chapter.

195. In Australia, ATC codes were mapped using information from the BEACH surveys (see Chapter 8) to allocate the drugs to disease groups. A similar methodology, linking prescription data and physician survey data is used in the Netherlands COI study and detailed below.

Linking ATC and ICD codes in the Dutch Cost-of-Illness Studies

196. Two separate sources of information are used in the Dutch cost-of-illness studies to allocate pharmaceutical spending. First, data on costs by ATC, age and gender provided by the so-called 'SFK' (Foundation for Pharmaceutical Statistic, <http://www.sfk.nl/english>), which lists panel data for Dutch dispensing chemists. The database covers about 95% of all Dutch dispensing chemists. The records contain four information fields. However, this dataset does not contain a diagnosis.

- ATC-code
- Age (21 groups)
- Gender
- Total cost.

197. The information on the link between ATC and diagnosis is obtained through a second dataset which is a panel survey of Dutch GPs named 'LINH', and administered by NIVEL (Netherlands Institute for Health Services research <http://nivel.nl/en>). For each prescription they log:

- Age
- Gender
- ATC-code
- ICPC-2 (International Classification of Primary Care) code
- Number of prescriptions

198. Although this panel data is stratified, it is much smaller sample than the SFK panel, covering prescriptions for around half a million Dutch citizens. This can be linked to the SFK data, using age, gender and ATC-code as link-fields.

199. The 'number of prescriptions' field in LINH is used to proportionally distribute the total costs in the SFK-set, if an ATC-group links to multiple ICPC-diseases. For example: if 8 prescriptions link ATC group X to disease Y, and there are 10 prescriptions in total for ATC-group X, then 80% of the costs for this ATC group are attributed to disease Y.

200. GP's use the ICPC-code for coding diagnosis, so after linking up SFK and LINH (effectively linking ATC to ICPC) a second translation of ICPC to disease-groups (ICD-defined) is done. The ICPC to

disease-group translation is made by disease experts at RIVM, in collaboration with registration-holders of the data that have been used.

201. The total mapped expenditure from the combined datasets accounts for about 80% of all pharmaceutical costs provided by the social security (which covers 100% of population). There are a number of reasons for the difference: the SFK-panel does not cover all dispensing chemists, it does not cover all dispensing GP's (mostly in rural areas), and some specific medicines are not prescribed by GP's (these are adjusted for in the final result with the use of other data provided by the SFK)

Example of mapping A10: drugs used mainly in the treatment of diabetes to ICD-9 codes

202. The example in Table 7.1 shows the distribution of costs applied to one second-level ATC code - in this case A10: Drugs used in diabetes. Based on the number of prescriptions and ICPC code in the LINH survey, the ATC code is linked to many possible ICD codes. However, more than 90% are linked to a single group, diabetes including some diabetic complications. This is to be expected for this ATC-group which contains insulin and other glucose-lowering drugs. The broad spectrum of other disease groups can be explained by other, more rare indications for the use of these drugs, off-label use or incorrect or imprecise coding on the part of GP's. There is no possibility to distinguish, for example, off-label use from imprecise coding. Moreover, in some cases diabetes can be viewed as a secondary condition and the primary condition may have been logged. Given the distribution according to ICD-code, age and gender of each ATC-code, the total costs from the SFK database can then be attributed.

Table 7.1. Allocation of ATC A10; Drugs used to diabetes by ICD-9 code in the Dutch COI study

Diagnosis Label ICD-9	ICD-9 code	Attributable costs %
Diabetes mellitus including diabetic complications	250, 357.2, 362.0, 581.8, 582.8, 583.8	91.0819%
Hypertension	401-405	1.7473%
Symptoms, signs and ill-defined conditions	780-799	1.3499%
Other endocrine, nutritional and metabolic diseases	240-249, 251-279, V77	0.5947%
Unspecified musculoskeletal diseases or conditions	725-729	0.4246%
Coronary heart disease	410-414	0.3353%
Ear disorders	380-389	0.2992%
Other mental disorders	293-294, 299, 300.6-300.9, 302, 306-307, 309.0-309.7, 309.9, 310, 312-316, v79	0.2983%
Other diseases of the skin and subcutaneous tissue	680-690, 693-706, 708-709	0.2877%
Dorsopathy	720-724	0.2753%
Eczema	691-692	0.2589%
Stroke	430-438	0.2257%
Other infectious diseases	019-035, 037, 039-041, 045-046, 048-053, 055-069, 071-077, 079-089, 100-136, 138-139, v01-v07, v73-v75	0.2207%
Asthma and chronic obstructive pulmonary disease (COPD)	490-496	0.2021%
Other diseases of the nervous system and sense organs	323-330, 331.1-331.9, 333-339, 341-344, 346-356, 357.0-357.1, 357.3-357.9, 358-359, v80	0.1817%
Contraception	v25	0.1708%
Other diseases of the digestive system	530, 535-537, 577-579	0.1593%
Other diseases of the musculoskeletal system	710-713, 716, 718-719, 730-732, 733.2-733.9, 734-739	0.1489%
Decubitus	707	0.1456%
Other renal and urinary diseases	591-594, 596, 598, 599.1-599.9	0.1303%

Acute upper respiratory infections	460-466	0.1289%
Other heart disease, including pulmonary circulation	390-398, 415-427	0.1171%
Anxiety	300.0, 300.10-300.15, 300.2-300.3, 300.5, 308, 309.8	0.1039%
Heart failure	428-429	0.0900%
Diseases of arteries	440-448	0.0799%
Other respiratory diseases	467-479, 488-489, 497-519	0.0787%
Acute renal and urinary infections	590, 595, 597, 599.0	0.0768%
Blindness and low vision	369	0.0712%
Other circulatory diseases	451-459	0.0630%
Other injury	802, 805-809, 830-849, 855-909, 925-949, 952-999	0.0590%
Osteoporosis	733.0-733.1	0.0587%
Disorders of female genital organs	610-627, 629	0.0550%
Depression	296, 300.4, 311	0.0543%
Superficial injury	910-924	0.0522%
Not allocated	V10-V19, V21, V40-V57, V58.0-V58.4, V58.6-V58.9, V63-V64, V66-V68, V71-V72, V81-V82	0.0425%
Other intestinal diseases	557-569	0.0341%
Alcohol and drugs	291-292, 303-305	0.0265%
Other benign neoplasms	173, 210-216, 223-239	0.0233%
Rheumatoid arthritis	714	0.0215%
Pneumonia and influenza	480-487	0.0179%
Inflammatory intestinal disease	555-556	0.0178%
Breast cancer	174	0.0168%
Osteoarthritis	715	0.0168%
Other cancers	140-149, 152, 155-156, 158-161, 163-172, 175-178, 190-199, 209, v76	0.0160%
Abdominal hernia	550-553	0.0158%
Conjunctivitis	373-374	0.0148%
Other disorders of male genital organs	601-608	0.0147%
Other diseases of the eye and adnexa	360-361, 362.1-362.9, 363-365, 368, 370-372, 375-379	0.0133%
Esophagus cancer	150	0.0115%
Diseases of the blood and blood-forming organs	280-289, V78	0.0110%
Non-Hodgkin's disease	200, 202	0.0097%
Intestinal infectious diseases	001-009	0.0086%
Epilepsy	345	0.0061%
Prostate cancer	185	0.0057%
Other cancers genital organs	179, 181-182, 184, 186-187	0.0045%
Personality disorders	300.16-300.19, 301	0.0042%
Multiple sclerosis	340	0.0038%
Parkinson's disease	332	0.0036%
Appendicitis	540-543	0.0032%
Colorectal cancer	153-154	0.0030%
Hip fracture	820-821	0.0015%
Lung cancer	162	0.0015%
Hepatitis	070, 573.1	0.0010%
Other liver diseases	570, 572, 573.0, 573.2-573.9	0.0009%
Hyperplasia of prostate	600	0.0009%
Gastroduodenal ulcers	531-534	0.0005%
Other congenital anomalies, excluding Down's syndrome	743-744, 748-757, 758.1-758.9, 759, v28	0.0005%

Source: RIVM, unpublished

Mapping ATC to ICD

203. While most countries have detailed data on pharmaceutical consumption and sales, including price or cost data for each prescription drug, there is a common challenge in being able to link the spending on actual pharmaceuticals to a specific disease category. Drugs are, generally classified according to the Anatomical Therapeutic Chemical (ATC) Classification System. The ATC system divides drugs into different groups according to the organ system on which they act and/or their therapeutic, pharmacological and chemical characteristics.

204. However, as can be seen from the country experiences above and in particular the example in Table 7.1, there is often no complete one-to-one mapping from the ATC classification to disease categories of ICD, especially at a more aggregated level of the ATC. Pharmaceuticals may be prescribed to treat more than one condition – sometimes in different ICD groups or even chapters. In the absence of diagnostic information on prescription or reimbursement records, additional information is required to be able to separate the different conditions for which a drug was prescribed. Therefore, in order to accurately allocate pharmaceutical expenditures according to disease it is necessary to link the ATC code to one or more ICD codes.

205. A full mapping exercise will often necessitate working at the detailed level, since it is the active ingredient or molecule that will determine the specific link to disease categories. That is, working at a higher aggregate level of the ATC classification, where a class or group contains drugs with possibly very different ‘molecules’ it is unclear whether this could lead to biased results since all prescriptions within that ATC group would receive an equal weighting based on the number of prescriptions regardless of the price, dosage, or length of prescription. Without an initial study to test, it is unclear whether aggregating the data at the level of ISHMT will affect the final results.

206. As shown in the examples of the Netherlands and Australia, much of the information on prescribing practices to make the ATC-ICD link is generally obtained from different forms of physician survey. What is not clear at this stage is whether a generic or global mapping can be applied to other countries ATC-based data or whether the mapping is country-specific and influenced by such factors as drug availability, clinical and prescribing guidelines as well as perhaps cultural influences and indeed over time.

207. As mentioned above, some countries (e.g. Canada, Germany) use information from IMS Health in order to allocate pharmaceutical spending, for example, undertakes regular physician surveys for around 48 countries (including 24 OECD countries). The information obtained from the survey covers the type of product, diagnosis, ATC code (at the 4-digit level), dose, and quantity. The panel size, in terms of percentage of physicians surveyed, varies from less than 1%, in Mexico, to 8% in Ireland. The coverage also varies in terms of the number and types of different specialists included (i.e. several countries do not have any specialists represented in the sample). A consequence of the small sample sizes is that in some of the countries there are large confidence intervals associated with the results.

208. The OECD currently collects and disseminates pharmaceutical consumption and sales data according to a shortlist of ATC codes (Table 7.2). While the level of disaggregation and coverage is too limited to be of use in accurately allocating to ICD categories, the information available on the sources of the data, as well as the coverage and methodology could act as a starting point for countries wishing to apply a global (or country-specific) mapping to their data using a similar approach to the Netherlands. The data also raises some further points for consideration which are further explored below.

Table 7.2. ATC groups currently collected under OECD Health Data

Main groups / groups based on three levels	Codes (2012 Index)
A-Alimentary tract and metabolism	A
Antacids	A02A
Drugs for peptic ulcer and gastro-oesophageal reflux diseases (GORD)	A02B
Drugs used in diabetes	A10
B-Blood and blood forming organs	B
C-Cardiovascular system	C
Cardiac glycosides	C01A
Antiarrhythmics, Class I and III	C01B
Antihypertensives	C02
Diuretics	C03
Beta blocking agents	C07
Calcium channel blockers	C08
Agents acting on the Renin-Angiotensin system	C09
Lipid modifying agents	C10
G-Genito urinary system and sex hormones	G
Sex hormones and modulators of the genital system	G03
H-Systemic hormonal preparations, excluding sex hormones and insu	H
J-Anti-infectives for systemic use	J
Antibacterials for systemic use	J01
M-Musculo-skeletal system	M
Anti-inflammatory and antirheumatic products non-steroids	M01A
N-Nervous system	N
Analgesics	N02
Anxiolytics	N05B
Hypnotics and sedatives	N05C
Antidepressants	N06A
R-Respiratory system	R
Drugs for obstructive airway diseases	R03

Source: OECD Health Statistics 2013

209. The pharmaceutical sales data may not be consistent with the SHA-based expenditure on pharmaceuticals, for a number of reasons. Typically they may come from different data sources, but also the coverage may differ. While sales data may cover both prescribed and over-the-counter drugs, this can be linked to the functional categories under SHA. Similarly, sales may be restricted to a particular financing agent, e.g. social insurance reimbursed sales. However, the inclusion of sales to hospital pharmacies can complicate the linkage since this can add typically 10-20% on top of outpatient pharmaceutical expenditure, but the disease profile may be quite different to retail pharmacy sales.

210. Another important factor to take into account is the valuation of sales data. SHA-based data is based on purchaser prices whereas the pharmaceutical sales data can be a mix of wholesale prices and can often exclude any sales tax. Additionally the treatment of rebates along the supply chain can have an effect on the figures. That said, the data sources identified may provide more detailed information by ATC categories, which in turn can be linked to ICD categories and finally used as a key to allocate the SHA-based pharmaceutical expenditure data.

211. An alternative approach to derive an ATC to ICD mapping has been undertaken by researchers in Austria (Filzmoser et al, 2009). Data was used from multiple sources in order to link information on prescriptions to sick leave data and recent hospital admissions. From this, a mapping was obtained linking a patient who was prescribed a drug with the diagnosis indicated on the sick leave certificate or recorded as a primary diagnosis related to a hospital discharge. Bootstrap methods were then employed to obtain a complete mapping. While this was a novel approach, it was very much dependant on the specific data available in Austria and the possibility of linking the appropriate data sets.

Summary

212. There are currently only a handful of countries that are able to accurately derive estimates of pharmaceutical expenditures by disease: Australia, Canada, Germany, Korea, and the Netherlands. For the mapping from ATC to ICD, Australia and the Netherlands rely upon national physician surveys administered by national organizations, while Canada and Germany obtain similar data from IMS (although the IMS physician panels may be smaller and not as representative). Korea obtains data on both prescriptions and diagnosis as part of the reporting to their social insurance data system and therefore a separate mapping is not required.

213. While many countries have the necessary data on expenditures in the pharmaceutical sector, they lack the appropriate utilization key, or an appropriate mapping from ATC to ICD code that is required to allocate the expenditures by disease. Without such data, several options are available:

- i. Derive a general, or average, mapping based on the data that is currently available for Australia, and the Netherlands based on the national samples of physicians.
- ii. Derive a general, or average, mapping based on the data that is currently collected by IMS.
- iii. Use the country-specific data that IMS collects in the 24 OECD countries. Under this option there further exists the option of using IMS' data on expenditures or the available national data.

214. The most significant limitation associated with options (i) and (ii) is based on the assumption that the mapping from one country can be validly applied to other countries, given national prescribing guidelines. It would first be necessary to explore how similar the mappings are from some of the countries for which data currently exists. Only once we are confident that the mappings are potentially similar, or can be adjusted appropriately using statistical, or econometric, techniques could such approaches be considered.

215. As previously noted, prescription patterns may vary across countries for various reasons including, drug availability, clinical and prescribing guidelines as well as perhaps cultural influences and indeed over time. In addition, there may be large variations over time for some pharmaceuticals – for example, this becomes apparent in examining the Netherlands time series.

216. While option (iii) employs country-specific data the two main limitations are that not all OECD countries are covered (thus still requiring the use of data from other countries) and in some countries the coverage of the physician panels may not provide a representative sample of prescription and disease patterns.

217. Although, not necessarily feasible, the ideal solution would be for countries to implement surveys such as those used in Australia (BEACH) or the Netherlands (LINH).

218. It is recommended, that studies be undertaken to explore the differences amongst the mappings for the data which is currently available. This would be the first step in exploring whether mappings can be applied across countries, and if they can, what methods can be used to do so.

Table 7.3. Pharmaceutical consumption and sales data for OECD countries published in OECD Health Data

Country	Data source	Coverage	Methodology/Valuation
Australia	Commonwealth Department of Health and Ageing. Drug Utilisation Sub-Committee (DUSC)	Data do not include drugs dispensed in hospitals and do not include OTC drugs. Consumption data include non-reimbursed drugs, whereas sales data do not. Prescription medicines dispensed to in-patients is generally not included.	Two sources: (1) Records of prescriptions submitted for payment of a subsidy under the Pharmaceutical Benefits and Repatriation Pharmaceutical Benefits Schemes (PB S/RPBS). (2) An ongoing survey of a representative sample of community pharmacies, which provide an estimate of the nonsubsidised use of prescription medicines in the Australian community. Total cost includes wholesale costs, dispensing costs and patient contribution. There is no goods and services tax (GST) on pharmaceuticals in Australia.
Belgium	Pharmanet (RIZIV).	Covers distribution by retail pharmacies and hospital pharmacies, for both reimbursable and non-reimbursable medication.	DDDs/1000 inhabitants/day calculated as follows: Number of DDDs x 1000 / Total population / 365. Estimation at mean weighted sales price for the year concerned based on "ex-factory" prices.
Canada	Data are not available.		CIHI has adopted the Anatomic Therapeutic Classification System (ATC) for its national database on prescription drug utilisation, but has not yet started to compile national data according to ATC.
Czech Republic	State Institute for Drug Control. http://www.sukl.cz .	Data include drugs dispensed in hospitals, non-reimbursed drugs and OTC drugs.	Sales data express the volume and value of distributed medicaments at ex-factory prices, without VAT and without retail margin.
Denmark	Danish Medicines Agency. http://www.medstat.dk/MedStatDataViewer.php	Data include non-reimbursed drugs and OTC drugs.- Cover the primary sector and hospitals for all categories.	The prices are pharmaceutical retail prices. VAT is included.
Estonia	Source: State Agency of Medicines. http://www.ravimiamet.ee/762	Data represent sales from the wholesalers to general and hospital pharmacy and to other institutions. Data include OTC drugs, reimbursed drugs, non-reimbursed drugs and drugs dispensed in hospitals. National adaptation of the ATC Index.	Data expressed in DDD/1000 inhabitants/day, which is calculated as follows: total consumption measured in DDDx1000/number of inhabitants/365. Sales data in wholesale prices. VAT is not included.
Finland	FIMEA Finnish Medicines Agency	Sales from wholesaler to retail pharmacy and hospitals. Data are based on wholesale of pharmaceuticals, and they include non-reimbursed medicines and medicines sold over the counter.	Total consumption measured in DDD (Number of inhabitants)/1000 / 365. The figures show the drug sales expressed as numbers of DDD/1000 inhabitants/day (not only adults). Sales do not include VAT.

Table 7.3: Pharmaceutical consumption and sales data for OECD countries published in OECD Health Data (cont.)

Country	Data source	Coverage	Methodology/Valuation
France	Afssaps, <i>Les ventes de médicaments aux officines et aux hôpitaux en France</i> http://www.ansm.sante.fr/var/ansm_site/storage/original/application/849879f9b33f8a16c739d28da79cb1d9.pdf .,	Data include consumption both in hospitals and in pharmacies.	Sales figures are ex-factory prices.
Germany	AOK Research Institute (WIdO), German Drug Index http://www.wido.de .	Prescriptions of finished drugs covered by German Statutory Health Insurance. The database is a sample which is projected on the total expenditure for drugs of the official statistics (KV45). Data contain exclusively the drug consumption debited to the statutory health insurance (i.e. drugs reimbursed by German Statutory Health Insurance). Data cover only the ambulatory sector.	DDD/1000 insured persons in the German Statutory Health Insurance/day (instead of DDD/1000 inhabitants/day). Sales figures are based in principle on pharmacy sales prices including the discounts of manufacturers and pharmacies as well as the extra payments of the patients and the value added tax.
Greece	Institute of Pharmaceuticals Research and Technology - IFET	Data include drugs dispensed in hospitals, non-reimbursed drugs and OTC drugs.	Mixture of wholesale and retail prices. VAT only included in retail prices of pharmacies.
Hungary	Hungarian National Health Insurance Fund (OEP). http://www.oep.hu	Data include only pharmaceutical consumption subsidised by social health insurance in pharmacies, and do not include pharmaceutical consumption in pharmacies not subsidised by social health insurance nor in hospitals. Data do not include drugs dispensed in hospitals Data do not include non-reimbursed drugs. Data do not include OTC drugs.	Data expressed in DDD/1000 inhabitants/day. Sales data include all pharmaceutical purchases of pharmacies and hospitals (subsidised and not subsidised by social health insurance), in wholesale price
Iceland	Icelandic Medicines Control Agency.	Data include medicines dispensed in hospitals and non-reimbursed medicines, as well as OTC drugs (in volume).	Prices are retail prices according to the reference price list including VAT.
Ireland	HSE Primary Care Reimbursement Service http://www.hse.ie/eng/staff/PCRS/PCRS_Publications .	Data do not include drugs dispensed in hospitals and do not include non-reimbursed drugs nor OTC items	The data provided represent the value of all items reimbursed under the Public Health Primary Care Reimbursement Schemes to Primary Care Contractors who have a General Medical Service Contract with the Health Service Executive.
Italy	AIFA - Italian Medicines Agency, and AIFA internal data integrated with IMS Health databases.	Data for Italy include non-reimbursed drugs and OTC products.	Data are indicated in DDDs. Sales of the retail distribution are indicated at Pharmacy Retail Prices paid by the customer, including VAT. Sales of the hospital distribution are indicated at price based on the ex-factory price.

Table 7.3. Pharmaceutical consumption and sales data for OECD countries published in OECD Health Data (cont.)

Country	Data source	Coverage	Methodology/Valuation
Japan	Ministry of Health, Labour and Welfare, Survey of Pharmaceutical Industry Productions http://www.mhlw.go.jp/topics/yakuji/2009/nenpo/index.html	Data do not include drugs dispensed in hospitals. Data include non-refunded drugs. Data include OTC drugs.	Prices are selling prices of production or distribution facilities. VAT (consumption tax) is included.
Korea	Ministry of Health and Welfare, http://library.mohw.go.kr/SkyBlueOpen/Component/Search/SearchResultDetail.aspx?MasterId=65284	Data include drugs dispensed in hospitals, non-reimbursed drugs and OTC drugs.	The data covered from health insurance and non-covered portion are calculated by sampling analysis of the pharmaceutical consumption and sales. According to the sampling, the result has applied to the population level of total medical institutions and pharmacies. The VAT is included. Data are expressed in consumer prices.
Luxembourg	Caisse nationale de santé (CNS).	The data provided refer only to the insured resident population (annual average number) covered by the public health insurance regime (i.e. the insured resident population) and not to the total resident population. Data based on medication reimbursed by health insurance, not including hospital consumption or OTC drugs.	Data may be under-estimated due to the lack of information for all sub-groups at the third level of the ATC classification. Prices are neither ex-factory prices nor wholesale prices, but are public prices set up by the administration. VAT is included.
Mexico	National Institute of Statistics and Geography (INEGI).	Data include drugs dispensed in hospitals, in the ambulatory sector and others. - Data refer to national consumption.	
Netherlands	GIP (Drug Information System of the Health Care Insurance Board).	OTC drugs are not included. The register includes prescription-related data on drugs that are: - prescribed by general practitioners and specialists - dispensed by pharmacists, dispensing general practitioners and other outlets - reimbursed under the Health Care Insurance Act. - Medications given in hospitals are not included.	Data are given as the number of DDDs/1000 inhabitants per day, which is calculated as follows: Number of DDDs x 1000 / Total (yearly average) population / 365. The databases of the GIP contain data from nine health insurance organisations which has been extrapolated from a representative sample of more than 7.5 million insured persons (almost half of the Dutch population). Data refer to reimbursed pharmaceuticals as sold by pharmacies and GP's with pharmaceutical sales. - The price is the retail price, including VAT (6%).

Table 7.3. Pharmaceutical consumption and sales data for OECD countries published in OECD Health Data (cont.)

Country	Data source	Coverage	Methodology/Valuation
New Zealand	PHARMAC - Pharmaceutical management agency. Pharmhouse database.	The data provided do not cover hospital or outpatient or non-reimbursed pharmaceuticals.	<p>New Zealand does not collect pharmaceutical data in the form of DDD. Currently there are difficulties in mapping between the PHARMAC coding classification system for New Zealand's pharmaceutical products and the ATC classification.</p> <p>Costs are ex-manufacturer (Goods and Services Tax (GST) excluded). Costs to the patient vary as some pharmaceuticals are government-subsidised at various rates.</p> <p>The provided drug cost ex-manufacturer figures include full and partial subsidies set by PHARMAC. They exclude pharmaceuticals funded through hospital budgets, subsidies paid for compounded preparations, rebates, patient copayments, dispensing fees, mark-ups paid to pharmacies and GST.</p>
Norway	Norwegian Drug Wholesale statistics database, Norwegian Institute of Public Health	<p>Data include drugs dispensed in hospitals, non-reimbursed drugs and OTC-drugs.</p> <p>The Norwegian total sales figures also include veterinary medicines.</p>	<p>Total sales in pharmacy retail prices (AUP) are given per ATC main group (1st level). Sales given in DDD/1000 inhabitants/day are included for selected ATC groups.</p> <p>- Data are estimated retail prices.</p>
Portugal	Ministry of Health - National Authority of Medicines and Health Products (INFARMED).	<p>- Data do not include hospital consumption.</p> <p>- Data include both reimbursed and non-reimbursed products.</p> <p>- Data include OTC products sold in pharmacies only, but do not include OTCs sold outside pharmacies in authorised establishments.</p> <p>Dataset updated and reflecting the following data source: total ambulatory market for mainland Portugal.</p>	<p>Data refer to pharmaceutical utilisation by DDD/1000 inhabitants, by ATC group, calculated as follows: Total utilisation measured in DDD x 1000 / Number of inhabitants / 365.</p> <p>Sales based on the following price calculation: Ex-factory price + wholesaler mark-up + pharmacy mark up + VAT.</p>
Slovak Republic	MCR, limited company, Modra, Slovak Republic	Data include drugs dispensed in hospitals, non-reimbursed drugs and OTC drugs.	Ex-factory prices without VAT
Slovenia	National Institute of Public Health	<p>Data do not include drugs dispensed in hospitals.</p> <p>Data include all medicines with a medical prescription, regardless of the reimbursement.</p> <p>Data include only OTC drugs prescribed by a medical prescription.</p> <p>Data are required for all out-patient drug prescriptions issued.</p>	Retail value of product with the VAT (value when medicines delivered in a pharmacy)

Table 7.3. Pharmaceutical consumption and sales data for OECD countries published in OECD Health Data (cont.)

Country	Data source	Coverage	Methodology/Valuation
Spain	Ministry of Health, Social Services and Equality, Directorate General for NHS Basic Services Portfolio and Pharmacy	Data exclude non-reimbursed drugs, OTC drugs and drugs used in hospitals.	Prices are retail prices (VAT included). The information comes from the prescriptions of the National Health System in pharmacies billed.
Sweden	APOTEKET AB http://www.lakemedelsverket.se/english/overview/About-MPA/pharmacy-market/ .	Total sales from pharmacies to patients and hospitals. Data include drugs dispensed in hospitals and non-reimbursed drugs, as well as OTC drugs but only from Swedish Pharmacies.	The figures show the drug sales expressed as number of DDD/1000 inhabitants/day (not only adults). Pharmacy retail prices. VAT is not included.
Switzerland	Interpharma	Data include sales of all medicines, including non-reimbursed drugs and OTC drugs, delivered in pharmacies or drugstores and dispensed by physicians; data exclude sales in hospitals.	Sales for reimbursed medicines estimated to maximum retail price fixed by the Swiss Federal Office of Public Health (VAT excluded). Sales for non-reimbursed medicines estimated to recommended retail prices. The additional advice fee paid by patients in pharmacies is not included.
Turkey	IMS Health Dataview	Data include drugs dispensed in hospitals, non-reimbursed drugs and OTC drugs.	Prices represent sales from the wholesalers to the retail pharmacies in Turkey. VAT rates are not included.
United Kingdom	Information Centre for Health and Social Care http://www.ic.nhs.uk using data for England from the Prescription Statistics, Department of Health. PCA Data (http://www.publications.doh.gov.uk/prescriptionstatistics/index.htm).	Data for England only. Data do not cover drugs dispensed in hospitals, including mental health trusts or private prescriptions, only those drugs dispensed in the community. - Data only include those prescriptions submitted for reimbursement. If prescriptions were not submitted for dispensing or if the medicines were given to the patients by a route other than prescriptions (e.g. homecare or in hospital), they would not be included.	- The United Kingdom does not classify DDDs according to the Anatomic Therapeutic Chemical (ATC) classifications and instead uses the British National Formulary (BNF classification). Therefore BNF drug groups have been approximately mapped to ATC classifications, and each group may not strictly contain the same drugs. No information on why a drug is prescribed is available. Since drugs can be prescribed to treat more than one condition, it is impossible to separate the different conditions for which a drug was prescribed. - Data available in DDDs cover 78% of prescription items and 73% of Net Ingredient Cost. Net Ingredient Cost (NIC): the NIC is the basic cost of a drug. It does not take account discounts, dispensing costs, fees or prescription charges income. Data are priced at drug tariff (reimbursement price for generics) or manufacturer list price to NHS (for on-patent products). - The VAT is not included.

8. LINKING PHYSICIAN/OUTPATIENT SPENDING TO DISEASE

219. Expenditure on outpatient care covers a diverse range of services ranging from basic GP consultations, specialist visits and hospital outpatient appointments to outpatient dental care services. On average across OECD countries, outpatient care accounts for around 33% of current health expenditure. The diverse nature of outpatient care usually requires creating homogeneous units for each category of outpatient care and identifying distinct data sources and allocation keys for each. However, in contrast to in-patient care, there is likely to be less variation in the intensity of services according to disease, particularly for basic GP consultations. An allocation key should be an accurate measure of health care utilisation within the cost unit: e.g. if there is a clear relationship between number of consultations per disease category and the resource costs of the associated health care services. Therefore, in the absence of detailed costing data, the use of basic encounter information (i.e. number of visits by disease) can be used.

220. Reviewing the methodologies employed by countries to date, two general approaches were used by countries to allocate physician expenditures according to disease. Countries tend to rely upon physician surveys or have employed bottom up methods based on encounter data.

Box 8.1. Allocating Out-of-hospital medical services using the Australian BEACH survey

The Bettering the Evaluation and Care of Health (BEACH) programme continuously collects information about the clinical activities in general practice in Australia including:

- characteristics of the GPs
- patients seen
- reasons people seek medical care
- problems managed, and for each problem managed (direct link)
 - medications prescribed, advised, provided, clinical treatments and procedures provided
 - referrals to specialists and allied health services
 - test orders including pathology and imaging

The BEACH database currently includes about 1,400,000 GP-patient encounter records.

Data from BEACH were used to allocate private medical services provided by both GPs and specialists. The International Classification of Primary Care Version 2 codes used in BEACH were mapped to the disease costing groups (based on ICD-10) to enable out-of-hospital medical services expenditure to be allocated by disease.²⁸

Three years of BEACH data—2003–04, 2004–05 and 2005–06—were used in the 2007/08 pilot study,

²⁸ Full details of the methodology of the BEACH GP Survey is available at http://ses.library.usyd.edu.au/bitstream/2123/7772/4/9781920899868_CDROM.pdf

which had information from 297,000 encounters overall. The proportions of problems by disease were used to allocate out-of-hospital medical services expenditure based on the total medical expenditure available from Medicare data and the AIHW health expenditure database.

Expenditure for un-referred attendances, imaging and pathology was allocated to disease on the basis of the number of GP encounters requiring management of that disease, while expenditure for other medical services (mostly specialist services) was allocated to disease on the basis of the referral pattern in BEACH. Expenditure for optometry was allocated to the disorders of refraction disease group under nervous system and sense organ disorders.

Allocation of GP costs where there are multiple presenting conditions in the GP encounter was done on a pro-rata basis.

In-hospital medical expenditure for private patients was not included under medical services, but was allocated as part of inpatient hospital expenditure.

221. For the Australian pilot study, the Bettering the Evaluation and Care of Health (BEACH) was used to come up with the distribution by disease for expenditure on GPs and specialists (Box 8.1).

222. In Hungary, financing of GPs is based on per capita quotas. As such there is no utilisation key directly linked to costs. Data was, however, available from a 2007 GP survey/census in which they reported itemized ICD codes for each patient encounter. Expenditure by gender, age and disease for the year 2006 were thus allocated according to the utilisation ratios obtained in the 2007 survey.

223. Canada, Germany Korea, and Slovenia have all been able to use record level encounter and billing data to derive physician expenditures by disease. The methodology adopted by Germany is included in Box 8.2.

Box 8.2. Allocating cost of physicians to disease categories in Germany

In Germany, first of all, the benchmark from the Health Expenditure Accounts for Offices of Physicians is broken down into four cost units by kind of insurance (public/private) and region (East Germany or West Germany) on the basis of statistical and financial data collected by the Federal Ministry of Health and the Association of Private Health Insurances.

Then, these cost-units are distributed by specialties using the billing data of the National Association of Statutory Health Insurance Physicians (Key I). Finally, disease, age and gender have been assigned to these cost-units incorporating detailed billing data of the National Association of Statutory Health Insurance Physicians (Key II). The cost information is based on the German remuneration system of the ambulatory supply in terms of the so-called EBM-point-system, measuring (retrospectively) for each consultation the value of a specific treatment or service in points. For each consultation, these points have been summed up and assigned to all recorded diseases coevally. Then the points for each disease have been summed up and related to the total sum of points. The resulting share has finally been used as disease-based cost indicator. This method has been worked out together with the data owner, the National Association of Statutory Health Insurance Physicians.

Key I to split the total budget of the German Medical Association for the different specialist groups.

Key II to distribute the billing data of the German Medical Association to age, gender, disease and kind of insurance for every specialist group.

Identifying activity level data for the ambulatory sector

224. Table 8.1 provides examples of some of the country-level activity data available in the ambulatory sector. Currently, data collected as part of the annual OECD Health Database is restricted in

the ambulatory sector to total numbers of outpatient/ physician and dentist consultations. However, the associated sources and methodology highlights the existence of some possible databases that could be a source of more detailed information by specialty or diagnosis group. The table includes some examples. The list is not exhaustive but aims to give an idea of the sources of information that are available and that could be used to construct allocation keys. It can be observed that more often data is available in the hospital out-patient settings rather than in the primary care/GP sector. The other main limitation is that data may be available by specialty or broad disease group but not on a more detailed disease level, such as required by the ISHMT.²⁹

Table 8.1. Selected data sources on Physician activities for selected OECD countries

Country	Data source	Contents
Canada	CIHI National Physician Database (NPDB)	This database contains: Socio-demographic, payment and service utilization data of physicians; Service utilization data, by age group and sex, of physicians' patients; and Physician payment information at the individual, specialty and aggregate level
Finland	Statistics Finland - Outpatient Specialised Health Care http://www.stat.fi/til/essavo/index_en.html	Data on outpatient specialised health care are gathered from health service providers annually. The majority of the data are obtained as part of the Hospital Benchmarking data collection by National Institute for Health and Welfare, in addition to which National Institute for Health and Welfare separately collects statistical data from specialist-led health centres not covered by the benchmarking data collection. Between 1994 and 2001, the statistics on visits in outpatient specialised health care were compiled by the Association of Finnish Local and Regional Authorities. The data cover all outpatient specialised health care provided by municipalities and joint municipal boards, including data on service providers, patients and treatment received by them. Included are also outpatient services in three private hospitals.
France	SNIIR database (Système national inter-régimes) managed by CNAMTS. http://www.ameli.fr/l-assurance-maladie/statistiques-et-publications/donneesstatistiques/professionnels-de-sante-liberaux/donnees-geographiques/activite-prescriptions-des-medecins.php . SAE file (Annual statistics of health institutions) managed by Drees http://www.sae-diffusion.sante.gouv.fr/Collecte_2010/	Activity of self-employed physicians External consultations of physicians from all hospitals extracted from the SAE file (Statistique annuelle des établissements de santé/Annual statistics of health institutions) managed by Drees (Direction de la recherche, des études, de l'évaluation et des statistiques) from the Ministère du Travail, de l'Emploi et de la Santé (Secteur Santé). Coverage: Institutions included irrespective of their legal status, categories, financing (e.g. private financing contributing to public hospital services) or size.
Hungary	Central Statistical Office Yearbook of Health Statistics.	non-financial data of the outpatient health service, outpatient service by fields of specialization with information on: cases of attendances interventions working hours performed by specialists working hours performed by non-specialists
Slovenia	National Statistical Office	Slovenia has administrative data for the number of visits grouped by speciality type and for each of type also according to diagnostic categories (chapters from ICD 10) and ages. A similar set of data also exists for visits to primary care doctors. The problem is that there is only data for the first visit of patient of doctor and not for the

²⁹

This table will identify potential sources and best practices for each OECD/EU country in the final report.

		subsequent visits.
Sweden	National Patient Register (NPR). http://www.socialstyrelsen.se/register/halsodataregister/patientregistret/inenglish	Primarily inpatient information but from 2001, also outpatient visits including day surgery and psychiatric from both private and public caregivers. Primary care is not yet covered in the NPR. The information in NPR can be divided into 4 different groups. 1. Patient data, 2. Geographical data, 3. Administrative data, 4. Medical data
United States	AHRQ Medical Expenditure Panel Survey (MEPS) http://meps.ahrq.gov/mepsweb/data_stats/quick_tables_results.jsp?component=1&subcomponent=0&year=-1&tableSeries=2&searchText=&searchMethod=1&Action=Search http://meps.ahrq.gov/mepsweb/survey_component/mp/mpc.jsp	Nationally representative physician expenditure data by condition available. This survey of the U.S. civilian non-institutionalized population collects data on medical care utilization and expenditures and the conditions that are associated with that use. The MEPS website annually posts data on expenditures by condition for each type of service as well as in total and by source of payment. The Medical Provider Component (MPC) survey collects data from a sample of providers (physicians, hospitals, home health agencies, and pharmacies) who provided medical care to MEPS Household Component respondents. The MPC collects data on dates of visits/services, use of medical care services, charges and sources of payments and amounts, and diagnoses and procedure codes for medical visits/encounters.

Summary

225. Allocating expenditure on outpatient care has proved to be the most challenging of the major sectors of health expenditure. First, the sector covers a very heterogeneous collection of different services covering outpatient hospital, primary and specialist care which require to be dealt with separately in developing potential data sources and utilisation keys.

226. While some countries, typically with social insurance systems may be able to rely on administrative reimbursement or encounter records with patient characteristics as well as some diagnosis information (allowing a mapping to ICD) noted.

227. In the absence of such detailed information, the use of physician surveys - ideally performed on a regular basis - would appear to be the most promising avenue for countries to explore. The Australian BEACH survey is a prime and well-established example.

228. Finally, given that the cost per encounter by disease category in some outpatient areas, i.e. GP encounters, is likely to be less variable than, for example, inpatient care then the use of physician activity data may also be of use at an aggregate level to give some distribution between disease. However, the direct link to the age and gender of patients is usually missing from this type of data source.

REFERENCES

- Canadian Institute for health Information (2008) *The Cost of Acute Care Hospital Stays by Medical Condition in Canada, 2004-2005*, Ottawa, Canada, CIHI
- Cooper, Barbara S. and Dorothy P. Rice (1976), The Economic Cost of Illness Revisited, *Social Security Bulletin*.
- Evans RG, Stoddart GL. (1990) Producing health, consuming health care. *Social Science and Medicine*;31(12):1347-63.
- Fénina A., Geffroy Y., Minc C., Renaud T., Sarlon E, Sermet C., (2009) Expenditure on prevention and care by disease in France. *Questions d'économie de la santé* n° 111
- Filzmoser P., Eisl A. and Endel F. (2009), *ATC → ICD: Determination of the reliability for predicting the ICD code from the ATC code*. Department of Statistics and Probability Theory, Vienna University of Technology, Austria
- Goeree, R., and P. Gully (1992), The burden of chlamydial and gonococcal infection in Canada, *Research Studies of the Royal Commission on New Reproductive Technologies and Prevention of Infertility*, 8, 29-76.
- Hartunian, N.S., Smart, C.N., and Thompson, M.S. (1981), The Incidence and Economic Costs of Major Health Impairments: A Comparative Analysis of Cancer, Motor Vehicle Injuries, Coronary Heart Disease and Stroke, Lexington, Mass., Lexington Books.
- Health Canada (2002). *The Economic Burden of Illness in Canada, 1998*. Health Canada. Ottawa.
- Heijink R., Koopmanschap M., Polder J. (2006), *International comparisons of cost of illness*. RIVM Centre for Public Health Forecasting. The Netherlands.
- Heijink R., Noethen M., Renaud T., Koopmanschap M., Polder J. (2008), “Cost of Illness: An International Comparison: Australia, Canada, France, Germany and The Netherlands”, *Health Policy*, 88(1): 49-61
- Koehlin, F., L. Lorenzoni and P. Schreyer (2010), “Comparing Price Levels of Hospital Services Across Countries: Results of Pilot Study”, *OECD Health Working Papers*, No. 53, OECD Publishing. <http://dx.doi.org/10.1787/5km91p4f3rzw-en>
- Koopmanschap, M.A. (1998), Cost-of-illness studies, Useful for health policy? *Pharmacoeconomics*. 14(2):143-8.
- Lipscomb J, Yabroff KR, Brown ML, et al. Health Care Costing: Data, Methods, Current Applications. *Med Care*. 2009;47(suppl 7):S1-S6

- OECD (2008), Estimating Expenditure by Disease, Age and Gender under the System of Health Accounts (SHA) Framework.
- OECD (2011), A System of Health Accounts, OECD Publishing, <http://dx.doi.org/10.1787/9789264116016-en>
- Polder JJ, Meerding WJ, Bonneux L, van der Maas PJ. (2005) A crossnational perspective on cost of illness: a comparison of studies from The Netherlands, Australia, Canada, Germany, United Kingdom, and Sweden. *European Journal of Health Economics*. 6(3):223–32.
- Public Health Agency of Canada (2010). *The Economic Burden of Illness in Canada, 2000*. PHAC, Unpublished data.
- Rice, D.P. (1967), Estimating the cost of illness, *Am J Public Health Nations Health*, 57(3):424-40.
- Charles Roehrig, George Miller, Craig Lake and Jenny Bryant (2009) National Health Spending By Medical Condition, 1996–2005 *Health Affairs*, (28)2:w358-w367
- Scitovsky AA. (1982), Estimating the direct costs of illness, *The Milbank Memorial Fund Quarterly, Health and Society*, Spring;60(3):463-491.
- Shiell, A. and Gerard K. Donaldson (1987), Cost of illness studies: an aid to decisionmaking? *Health Policy*, 8:317-23.
- Smart, C.N., and Saunders, C.R. (1976), *The Costs of Motor Vehicle- Related Spinal Cord Injuries*. Washington, D.C.: Insurance Institute for Highway Safety.
- Smylie, L., P. Lau, R. Lerch, C. Kennedy, R. Bennett, B. Clarke, A. Diener (2011), The economic burden of chlamydia and gonorrhoea in Canada, *Public Health Agency of Canada*, Unpublished manuscript.
- Tarricone, R. (2006), Cost-of-illness analysis, What room in health economics? *Health Policy*, 77:51-63.
- Wiseman, V., and G. Mooney (1998), Burden of illness estimates for priority setting: a debate revisited, *Health Policy*, 43:243-51.
- Wolfson, Michael C. (1991), A System of Health Statistics: Towards a New Conceptual Framework for Integrating Health Data, *Review of Income and Wealth* 37(1): 81-104.

ANNEX 1. SUMMARY RECORD OF DISEASE EXPENDITURES EXPERTS MEETING, 13-14 FEBRUARY 2012

ITEM 1. Welcome and Introductions

229. The Secretariat (Luca Lorenzoni, who also chaired the meeting) welcomed the participants to the meeting. Participants included country representatives (Australia, Czech Republic, England, Finland, Germany, France, Israel, Japan, Korea, Turkey, Canada, Slovenia, Sweden), representatives from other international organizations (WHO, Eurostat, Fundación Plenitud), and expert consultants. Participants introduced themselves.

ITEM 2. Overview of the project:

230. The Secretariat (David Morgan) reviewed the previous OECD project, *Estimating Expenditure by Disease Age and Gender under the System of Health Accounts Framework*. The presentation focused on the issues raised during the study and its main conclusions. General results from the pilot study were presented, focusing on the large variation of unallocated expenditures across countries. Also presented were results of a preliminary analysis comparing bed-days as an allocation key for distributing hospital expenditures to diagnostic categories, with the expenditure results obtained in the pilot study (using Germany as an example). As expected, the results showed that the bed-days methodology over-estimated expenditures for diseases that are known to be less resource intense and vice versa. However, it was raised as a possible easily attainable first step in distributing hospital spending by disease for a large number of countries.

231. The aims of the current project were outlined:

- Update, accelerate and expand comparable health expenditure data by disease (age and gender)
- Fast-track breakdown of (inpatient) hospital data by disease for a greater number of countries
- Expand beyond hospital expenditures to include the other major health care expenditure categories, i.e. outpatient (ambulatory) and pharmaceutical spending.
- Examine expenditures in particular for specific diseases areas: mental health, cancer (and MCH).
- Assess the importance and methodologies of estimating indirect costs

232. Ravi Rannan-Eliya (Institute for Health Policy, Sri Lanka) gave a presentation on the policy uses of disease expenditure data. Potential policy uses for disease expenditure studies. Potential direct uses include: Data inputs for other policy-relevant analyses requiring information on costs/financing of diseases, and; Optimizing spending in combination with cost-effectiveness information. Direct uses include: Assessing relative financing allocations/cost burden of different diseases; Understanding cost drivers in expenditure growth; Analyzing financing and coverage of priority diseases; and Global resource tracking & MDG accountability.

233. It was noted that there was a lack of comparability across recent internationally-supported disease sub-accounts, and the lack of linkage to domestic expenditure tracking. There is a need for the enhanced

standardization of methods and increasing support for full disease analyses rather than single disease subaccounts. Expenditure data must also be complemented by other data and analyses.

ITEM 3. Review of what participating countries are currently producing

234. The Secretariat (Alan Diener) presented results from a survey that was distributed to the participants before the meeting outlining what each country is currently producing with respect to expenditures by disease. The following countries have produced health expenditure by disease data in the past: Australia, Canada, Czech Republic, Germany, Japan, Korea, the Netherlands, Slovenia, Sri Lanka, and Sweden (hospital expenditures only). Only four of the countries have produced this data under the SHA framework (Germany, Slovenia, Sri Lanka, and the Czech Republic). England produces data on expenditures by major disease groups for hospital inpatients and outpatients and prescribed pharmaceuticals, in its Programme Budget, on an annual basis. Finland and Israel also noted that they are able to allocate hospital expenditures by disease groups. Results were presented regarding to what extent countries are able to break down the data according to provider and health care functional categories of SHA 2011. With respect to deriving hospital expenditures by disease, most countries employ Disease Related Groups (DRG) or something similar, as an allocation key: Canada, France, England, Germany, Israel, and Slovenia. Sri Lanka employs days of stay as the allocation key while Australia, Finland, Korea, and Sweden employ alternative allocation keys.

235. Only Canada has derived data on the indirect costs, for all disease categories, valued in dollars (the value of lost production due to disability and premature mortality). Germany has regularly derived Years of Life Lost (YLL) due to disease.

ITEM 4. Hospital expenditures

236. Chris Kuchciak (CIHI, Canada) gave a presentation on the data sources and methodological tools for deriving hospital expenditures in Canada. The presentation focused on how they have uses a cost per weighted case (CPWC) and resource intensity weights (RIW) to derive cost estimates by case mix group (CMG).

237. Lisbeth Serden (National Board of Health and Welfare, Sweden) gave a presentation on the methods employed to derive hospital expenditures by disease for the 2008 study. They reviewed their case costing model which employed a bottom-up approach using DRGs to derive costs per patient.

238. Lany Slobbe (RIVM, The Netherlands) provided comments on the two presentations. An important point was that if good data was employed using either bottom-up or top-down approaches should yield similar results. Hence, there must be a focus on obtaining good patient-level data with sufficient information on patient and treatment characteristics, actual resource use and reliable price or cost data.

239. The methods to derive hospital expenditures by disease groups are all case based and that it is important to examine the different methods that can be used to distribute expenditures over patients. As we move along the spectrum of methods, from allocating expenditures based on discharges only, to incorporating length, or days, of stay, to more sophisticated techniques based on DRGs, for example, more information is required. How the various methods employed affect the final results is a methodological question. Thus, it would be an important exercise to compare methods in countries which have the data to determine the range in variation across approaches. Such an analysis will provide insight into whether meaningful and valid estimates can be derived for those countries that do not have the data required for the more sophisticated methods. The Secretariat stated that they would undertake this analysis working with selected countries where they have already implemented the various methodologies.

240. It is important to examine how LOS and expenditures have changed over time. Lany Slobbe (RIVM, Netherlands) noted that the Netherlands has done some analysis looking at costs over time, and changes due to an aging population. This stresses the importance to include information about age and gender along with disease.

241. The way in which the expenditures are values is an important consideration. For example, some countries may value cases using cost data while others use price/payment data (i.e. how they pay for services). This will be a problem for international comparisons if prices do not equal costs. Although there remain questions whether anything can be done to rectify this, at a minimum it needs to be flagged.

242. There was a discussion about the most appropriate and relevant disease groups, for policy analysis, that should be employed. The data in the 2008 project was broken down by ICD chapter; however, a further breakdown is required for expenditure by disease data to be more policy relevant. The International Shortlist for Hospital Morbidity Tabulation (ISHMT) was discussed as a possible useful grouping. The ISHMT consists of 298 groups defined by both ICD-9 and ICD-10 codes which allows for comparisons between countries using different ICD revisions.

ITEM 5. Physician expenditures (Outpatient)

243. Hyoung-Sun Jeong (Yonsei University, Korea) gave a presentation on how physician expenditures by disease were derived for Korea. Professor Jeong noted that Korea's National Health Insurance reimburses physicians on a fee-for service basis and that Korea's physician health registry contains data on approximately 1.3 billion claims per year. In addition to this register, data on out of pocket expenditures on physicians is obtained from a national survey.

244. Nick Mann (AIHW, Australia) presented on the data sources and methodology employed in Australia to derive physician expenditures by disease. Two sources of data are employed – Medicare claims and survey of general practitioners – in order to link charges to diagnoses according to disease.

245. Markus Schneider (BASYS, Germany) acted as a discussant on the aforementioned presentations. It was noted that the international comparison of physician services (outpatient) requires a clear definition of what is included as physician services and what is not.

246. The allocation of expenditures by disease for physicians is often dependant on combining various data sources, thus making it more difficult to derive an allocation key.

247. In the general discussion it was noted that different countries use slightly different definitions for physician visits and outpatient care, in general. Hence, it is important to be clear in what is precisely meant by a *physician visit* in a cost of illness study. Another issue that was raised was how some encounters should be coded. For example, physician visits may be symptom related and not diagnosis related. Physician visits may also include “well-patient” or preventive care encounters. We will need to be clear regarding how these types of encounters should be coded for comparability purposes.

248. In the area of physician encounter and expenditures, there is large variation in the types of data registries employed by different countries. Hence the need to collect additional information regarding how countries collect physician data was noted. Further details will be included in the next draft of project report.

ITEM 6. Pharmaceutical expenditures (Outpatient)

249. Michael Cordes (Germany) and Alan Diener (OECD) gave presentation on pharmaceutical expenditures in Germany and Canada, respectively. Both countries utilize data from IMS based on

physician surveys which provide information allowing for pharmaceuticals to be categorized by diagnosis (based on ICD codes), age and gender.

250. Ravi Rannan-Eliya (Institute for Health Policy, Sri Lanka) gave a presentation on a project being conducted to estimate pharmacy sales by disease, age and sex in Bangladesh. In collaborative work, a special survey of pharmacy customers was commissioned from IMS-Health, collecting data from their national pharmacy panel, on items such as age, sex and complaint of the customer, as well as the identity and sale price of medicines sold. The complaint data was then coded using ICPC2e, and then mapped to ICD-10, and reweighted to match IMS-Health's estimates of medicines sales by ATC group in Bangladesh and Bangladesh's SHA estimates. This provided an example of a possible technique for countries which do not have official registers of prescription sales.

251. Patricia Hernandez (WHO) provided comments. Issues raised included: the measurement of hospital pharmaceutical use; the valuation employed (i.e. consumer price vs. wholesale price, the effects of subsidies, different mark-up practices). Another issue that was raised was the challenge in matching of ICD and ATC codes for difficult cases such as the use of analgesic drugs, or drugs used for congenital diseases. The issue of separating price and volume effects was also raised.

ITEM 7. Review and summary of day one

252. The Secretariat provided a summary of the key discussion points that arose during the first day. A common point that came up several times was that one needs to be clear about the objectives for deriving expenditure by disease, or cost of illness, data. Clearly defining the objectives of the exercise will help us answer some of the questions, such as whether all costs/expenditures components need to be allocated to a disease (e.g. administration expenditures). As noted in a later session defining the objectives is also important in guiding which cost components should be included (i.e. direct and indirect) in a cost of illness study.

253. Given the challenges in deriving expenditure by disease data the need for better data was mentioned. It was questioned whether it was possible for countries to derive better data registries to facilitate such data collection. This was viewed as a larger, potential long-run issue. As data is collected from countries, on a voluntary basis, and - expenditure by disease data is derived in a consistent manner for a number of countries the uses and importance of this type of data will be more clear and thus possibly lead to better data availability in more countries in the future.

254. Several participants raised the issue of disease-specific cost of illness studies being undertaken by advocacy groups. These studies generally use bottom-up methodologies to estimate costs. Due to different methodologies employed results from such studies are often not comparable. This raises the importance of deriving expenditure by disease data in a consistent manner with a standard approach under the SHA framework.

ITEM 8. Costs of Mental Health

255. The Secretariat (Michael Borowitz) presented a summary of the OECD Mental Health Project.. Results from the 2008 OECD project showed wide variations in mental health spending, however, this may be due to differences in reporting and definitions used rather than true differences in spending on mental health. Thus, the need for comparable standardized data was stressed with clear definitions of which facilities and ICD sub-chapters are included.

256. The Secretariat (John Henderson) gave a presentation on Cost of Illness Indirect Costs and Mental Health. Results from various studies which estimated indirect costs associated with illness, with a focus on mental health, were presented. The relative importance of indirect costs varies by disease, but for

several diseases, especially chronic or non-communicable diseases such as mental ill-health, the indirect costs and intangible costs can be the largest part of overall social costs.

257. During the discussion it was noted that mental health expenditures may be underestimated in some countries due to under-reporting of mental health diagnoses. This is due to stigma associated with mental health in some countries. This is believed to be an issue in Sri Lanka and Korea. When deriving and comparing expenditures across countries it will be important to take this into account.

258. During the roundtable respondents were asked to comment upon the importance of estimating indirect costs and intangible costs. While there was agreement that the measurement and valuation of indirect costs was important, particularly from a social welfare perspective, the majority of participants noted that the short-term priority should be on the derivation of direct costs, in general, and hospital costs in particular as this is where the best available data exists across countries. It was noted that deriving a common methodology for estimating indirect costs may be challenging, but if a well-defined methodology can be developed it would facilitate the implementation across countries. It was generally agreed that more work was required in the area of intangible costs and this cost component should be left for future discussions. However, France reminded that given the costs pertaining to the project, France is not eager to collect expenditures by diseases data, and therefore, will not assess indirect costs.

259. It was agreed that as data is collected, from those countries that are able to provide more granular level data (e.g. ICD sub-chapters) than is currently available, the Secretariat will analyze the expenditure on mental health and will ascertain what further data would prove to be relevant to collect for this project

ITEM 9. Costs of Cancer

260. Rie Fujisawa (OECD) gave a presentation on the OECD Health Care Quality Indicator (HCQI) project on cancer care and data on cancer care cost. Data was collected from the HCQI questionnaire on spending on cancer care as a percentage of total health expenditure. These results are generally comparable to the data obtained in the 2008 project, but there are some differences due to different methodologies and sources.

261. Paolo Baili (Istituto Nazionale dei Tumori, Milan, Italy) gave a presentation summarizing two projects: The European Cancer Health Indicators Project (EUROCHIP) on the European Partnership for Action against Cancer (EPAAC), with a focus on the need for comparable cancer costs data. Dr. Baili noted that we should first focus on collecting direct inpatient hospital expenditures and pharmaceutical expenditures (both private and public). It was suggested that we first focus on all cancers with the possibility to focus on specific cancers in the future.

262. It was agreed that as data is collected from countries at a more granular level (e.g. ICD sub-chapters) than is currently available the Secretariat will analyze the expenditure on cancer and ascertain what further data would provide to be relevant to collect for these projects and which specific types of cancers further analyses should be focused upon.

ITEM 10. Wrap up and next steps

263. In the area of hospital expenditures, the Secretariat will investigate the results of using different methods, working with selected countries. The Secretariat will commence this work using the data collected for the 2008 project. The Secretariat will work with countries to obtain more recent expenditure by disease data. Given that this is the area in which methods are most advanced, and data is most available that we will work towards developing a protocol to derive hospital expenditure by disease data for as many countries as possible.

264. In the area of physician expenditures, the Secretariat will collect additional information on the methodologies currently being employed by countries and present this in the interim report.

265. In the area of pharmaceutical costs, the Secretariat will work with countries which have the available data on the issue of mapping between ATC and ICD codes. We will investigate different approaches used by the countries in an attempt to determine a common methodology, or mapping system.

266. The Secretariat will complete, and incorporate, as much of this work as possible in the Expenditures by Disease under the SHA Framework 2012 Project Interim Report. A draft will be sent to meeting participants for comments in mid March 2012, with the report being completed by the end of March 2012.

267. It was the consensus of the participants that in order to have reliable and comparable basic statistics on expenditures by disease across countries the SHA framework provides an important and useful, starting point and the collection of data under the SHA framework would be pre-condition to deriving expenditures by disease.

268. It is important to separate price effects from volume effects. Hence data on volumes should be included when and where possible.

Final Participants list for Health Spending by Disease Experts Group 13-14 February 2012

Australia/Australie

Mr. Nick MANN
Australian Institute of Health and Welfare (AIHW)
26 Thynne Street
Fern Hill Park
2601 Canberra
Australia

Email: nick.mann@aihw.gov.au

Canada

Mr. Christopher KUCHCIAK
Manager, Health Expenditures
Canadian Institute for Health Information
495 Richmond Road, Suite 600
K2A 4H6 Ottawa
Canada

Tel: +1 613 694 6266

Email: ckuchciak@cihi.ca

**Czech Republic/République
tchèque**

Ms. Helena CIZKOVA
First Secretary
Permanent Delegation
40, rue Boulainvilliers
75016 Paris
France

Tel: +33 1 46 47 29 54

Fax: +33 1 46 47 29 44

Email: helena_cizkova1@mzv.cz

Mr. Tomas ROUBAL
Analyst and advisor to the Minister
Ministry of Health
Palackeho nam. 4
12801 Prague
Czech Republic

Tel: +420 224 972 733

Email: tomas.roubal@mzcr.cz

Finland/Finlande

Dr. Nina KNAPE
Development Manager
National Institute for Health and Welfare
STAKES
P.O. Box 30
FIN-00271 Helsinki
Finland

Email: nina.knape@thl.fi

France

M. Olivier BONTOUT
Adjoint au Sous-directeur des Synthèses, des études économiques et de l'évaluation
Direction de la Recherche des études, de l'évaluation et des statistiques
Ministère du Travail, de l'Emploi et de la Santé
127 rue de Grenelle
75007 Paris
France

Tel: +33 (1) 40 56 88 73

Email: Olivier.BONTOUT@sante.gouv.fr

Mme Annie FENINA
Chargée des comptes de la santé
Direction de la recherche, des études, de l'évaluation et des statistiques
Ministère de la Santé, de la Jeunesse et des Sports
11, place des-5-martyrs-du-Lycée- Buffon
cedex 14 Paris
France

Tel: +33 1 40 56 81 72

Fax: +33 1 40 56 81 30

Email: annie.fenina@sante.gouv.fr

Mme Violette FISCHER
Chargée de mission
Direction de la Recherche, des Etudes, de l'Evaluation et des Statistiques
Ministère du Travail, de l'Emploi et de la Santé
11, rue des 5 martyrs du Lycée Buffon
75015 Paris

Email: violette.fischer@sante.gouv.fr

Mme Marie-Anne LE GARREC
Chargée des comptes de la santé
Direction de la recherche, des études, de l'évaluation et des statistiques
Ministère du Travail, de l'Emploi et de la Santé
Bureau Comptes et prévisions d'ensemble
11, place des Cinq Martyrs du Lycée Buffon
75696 Paris Cedex 14
France

Tel: +33 1 40 56 81 38
Email: marie-anne.legarrec@sante.gouv.fr

Germany/Allemagne

Mr. Michael CORDES
Head of Unit
Federal Statistical Office (Statistisches Bundesamt)
Graurheindorfer Strasse 198
D-53117 Bonn
Germany

Tel: +49 611 75-8116
Fax: +49 611 75-8996
Email: michael.cordes@destatis.de

Israel/Israël

Ms. Nava BRENNER
Head of Social Services Accounts Sector
Macro-Economics Dept.
Central Bureau of Statistics (CBS)
Kanfey Nesharim 66
95464 Jerusalem
Israel

Tel: +972 2 659 26 15
Fax: +972 2 659 26 52
Email: brenner@cbs.gov.il

Japan/Japon

Mr. Naohiro MITSUTAKE
Associate Director
Research Unit
Institute for Health Economics and Policy
No. 11, Toyo-kaiji Bldg
1-5-11, Nishi-Shimbashi, Minato-ku
105-0003 Tokyo
Japan

Tel: +81 3 3506 8529
Fax: +81 3 3506 8528
Email: mitsutake@ihp.jp

Korea/Corée

Professor Hyoung-Sun JEONG
Head
Center for Health Policy and Statistics
Yonsei University - Yonsei Institute for Health and Welfare
Yonseidaegil, Wonju
Gangwon-Do
Korea

Tel: +82 10 0879 6075
Fax: +82 33 960 2519
Email: jeonghs@yonsei.kr

Slovenia/Slovénie

Mr. Stane MARN
Statistical Office of the Republic of Slovenia
Vozarski pot 12
1000 Ljubljana
Slovenia

Tel: +386 1 2340 732
Fax: +386 1 2415-344
Email: stane.marn@gov.si

Sweden/Suède

Ms. Lisbeth SERDÉN
Department of Statistics, Monitoring and Evaluation
The National Board of Health and Welfare
Rålambsvägen 3
106 30 Stockholm
Sweden

Tel: + 46 75 247 30 78
Email: Lisbeth.Serden@socialstyrelsen.se

Mrs. Kristina STIG
Economist
Department of Statistics, Monitoring and Evaluation
The National Board of Health and Welfare
Rålambsvägen 3
106 30 Stockholm
Sweden

Tel: +46 75 247 3536
Fax: +46 75 247 3327
Email: kristina.stig@socialstyrelsen.se

Turkey/Turquie

Mr. Hakan Oguz ARI
Medical Expert
School of Public Health
Ministry of Health
General Directorate of Health Research, Rüzgarlı Caddesi, Ibrahim
Müteferrika Sok.
No:5 Kat:6
Ulus/ANKARA
Turkey

Tel: +90 312 309 12 24
Fax: +90 312 309 73 87
Email: hakan.ari@usak.saglik.gov.tr

**United Kingdom/Royaume-
Uni**

Mr. John HENDERSON
Economist
Health Protection & International Healthcare
Department of Health
3rd Floor (329), Wellington House
133-155 Waterloo Road
SE1 8UG London
United Kingdom

Tel: +44 20 79 72 12 04
Email: john.henderson@dh.gsi.gov.uk

EU/UE

Mr. Hartmut BUCHOW
International Statistical Cooperation
Eurostat
European Commission
L-2720 Luxembourg
Luxembourg

Tel: +352 4301 34990
Fax: +352 4301 32769
Email: hartmut.buchow@ec.europa.eu

**World Health Organization
(WHO)/Organisation
mondiale de la santé (OMS)**

Ms. Patricia HERNANDEZ PENA
Health Economist, National Health Accounts
Health System and Financing Department
World Health Organization
Office 1023
20 Avenue Appia
CH 1211 Geneva
Switzerland

Tel: +41 22 791 2328
Fax: +41 22 791 4328
Email: hernandezp@who.int

BASYS

Dr. Markus SCHNEIDER

Director
BASYS
Reisingersstrasse 25
86159 AUGSBURG
Germany

Tel: +49 821 257940
Fax: +49 821 579341
Email: mlas@schneider.a.shuttle.de

Fondazione IRCCS "Istituto Nazionale de Tumori"

Mr. Paolo BAILI
Fondazione IRCCS, Istituto Nazionale de Tumori
Descriptive Studies and Health Planning Unit
via Venezian, 1
20133 Milan
Italy

Tel: +39 02 2390 3527
Fax: +39 02 2390 3528
Email: lifetable@istitutotumori.mi.it

Fondazione IRCCS "Istituto Nazionale de Tumori"

Ms. Camilla AMATI
Descriptive Studies and Health Planning Unit
Fondazione IRCCS "Istituto Nazionale de Tumori"
via Venezian, 1
20133 Milan
Italy

Email: Eurochip@istitutotumori.mi.it

Fundacion Plenitud

Ms. Magdalena RATHE
Fundacion Plenitud
Dominican Republic

Email: mrathe@fundacionplenitud.org

Institute for Health Policy

Dr. Ravindra RANNAN-ELIYA
Director
Institute for Health Policy
72 Park Street
Colombo 2
Sri Lanka

Tel: +94 1 231 4041
Fax: +94 11 231 4040
Email: ravi@ihp.lk

**Ministry of Labour, Health
and Social Affairs**

Ms. Ketevan GOGINASHVILI
Health care Department
Ministry of Labour, Health and Social Affairs
30 Pekini str.
Tbilisi
Georgia

Tel: +99532384175
Email: kgoginashvili@yahoo.com

RIVM

Mr. Lany SLOBBE
Public Health Forecasting (VTV)
RIVM
Netherlands

Tel: +31302744315
Email: lany.slobbe@rivm.nl

Other/Autre

Dr. Susan O'CONNOR
Consultant, Mental Health
Yew Tree House
28 Brinsea Rd
BS49 5JQ Congresbury, North Somerset
United Kingdom

Tel: +44 75 011 99 45 43
Email: susanoconnor@tiscali.co.uk

Ms. Nora MARKOVA
Health expenditure and financing analyst
World Health Organization (WHO)
Barcelona Office for Health Systems Strengthening
Marc Aureli 22-36
08006 Barcelona

Tel: +34 932418270
Fax: +34 932418271
Email: NOM@euro.who.int

OECD/OCDE

President

Mr. Luca LORENZONI
Administrator (Health Accounts, Asian Health and Social Policy
Outreach)
ELS/HD
OECD
Annexe Monaco 425
2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 76 21
Email: Luca.LORENZONI@oecd.org

Mr. Michael BOROWITZ
Senior Health Policy Analyst (Health systems)
ELS/HD
OECD
Annexe Monaco 126
2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 92 55
Email: Michael.BOROWITZ@oecd.org

Mr. Alan DIENER
Consultant (Project on health spending)
ELS/HD
OECD
Annexe Monaco 404
2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 96 10
Email: Alan.DIENER@oecd.org

Ms. Rie FUJISAWA
Statistician (HCQI)
ELS/HD
OECD
Annexe Monaco 103
2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 14 09
Email: Rie.FUJISAWA@oecd.org

Mr. David MORGAN
Economist/Statistician (Health Accounts)
ELS/HD
OECD
Annexe Monaco 422
2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 76 09
Email: David.MORGAN@oecd.org

ANNEX 2. SUMMARY RECORD OF DISEASE EXPENDITURES EXPERTS MEETING, 13 JUNE 2013

ITEM 1. Welcome and Project Update

269. The Secretariat (Luca Lorenzoni, who also chaired the meeting) welcomed the participants to the meeting. Participants included country representatives (Australia (by telephone), Czech Republic, England, Estonia, Finland, Germany, France, Japan, Portugal, Slovenia, Switzerland, United States (by telephone)), representatives from other international organizations (WHO, Eurostat), and expert consultants. Participants introduced themselves.

270. The Secretariat (Alan Diener) provided an update, and current status, of the project. Results were presented exemplifying the use of the data in other projects, including the forthcoming OECD Mental Health Report. It was noted that expanding the data collection has been challenging, mainly due to resource constraints within countries; this point was reinforced by the participants.

271. There was a discussion relating to the remaining challenges which include allocation issues and boundary issues. It was agreed that where feasible (e.g. administrative costs within a provider category) unallocated expenditures should be assigned to diagnostic categories on a pro-rated bases. Items within a category (provider or function) that cannot be reliably allocated should remain unallocated (e.g. long-term care, public health spending). In addition, if expenditures from a specific financing scheme (e.g. private spending) cannot be reliably allocated they should also remain unallocated.

ITEM 2. Update on Data availability and Country Progress

272. The Secretariat (David Morgan) gave a presentation summarizing what data was currently available by country. Country participants provided updates regarding status of expenditures by disease data releases and availability, a summary of which is provided below.

273. Naohiro Mitsutake (Japan Institute for Health Economics and Policy) gave a presentation on “The Estimation of Japan’s Medical Expenditure by Disease, Age, and Gender.” Mr. Mitsutake reviewed the methodology employed to estimate expenditure by disease, age, and gender using the national insurance claims database in Japan, and presented initial results. The project estimated expenditures by disease using a bottom-up approach using data from the national insurance claims database. This database, developed in 2009, includes claims data at the individual patient level from the entire Japanese population. The Ministry of Health Labour and Welfare of Japan has also derived estimates of National Medical Expenditures (NME), since 1990 using a top-down attribution with expenditures allocated using parameters from medical insurance claims data collected from insurers. There were no significant differences in the results obtained in the current study in comparison with the NME estimated. It was noted that challenges remain in the estimation of pharmaceutical expenditures, specifically with linking the pharmaceutical data with outpatient claims data.

Updates from Other countries

Canada

274. Canada will be releasing the Economic Burden of Canada 2005-2008 in Q3 2013. This publication will include expenditures by disease (both direct and indirect costs) for the aforementioned years. Data will be available by provider type (hospital, physician, pharmaceuticals) broken down by country specific diagnostic categories. Data is also potentially available according to ICD-10 chapter and ISHMT.

Czech Republic

275. Data on expenditures by ISHMT is available for public hospitals only (***please confirm – is data also available for long-term care, or other, providers?***); it is not possible to get data on expenditures by ISHMT for general practitioners and pharmacies as they do not report the diagnosis.

England

276. Data is available, on an annual basis, for specific diagnostic categories, across all providers, based on the NHS programme budget. England has also derived the full economic burden of disease results, including direct, indirect, and intangible costs, for 2011. The diagnostic categories can be loosely mapped to ICD-10 chapters.

Estonia

277. Estonia does not produce expenditure by disease data on a regular basis. Previous studies were completed in 2006 and 2007. Discussions are ongoing to obtain approval and funding to produce such data in the future. Estonia uses ICD-10 data and can group data by ISHMT as well.

Finland

278. Finland does not regularly produce expenditure by disease data. The Health Economics Section does produce such data on an ad-hoc study-type basis. Data is regularly available for hospitals (HP.1) broken down by ISHMT. Data is currently being derived for primary care visit expenditures for 2011, broken down by ICD-10 and ICPC2.

France

279. DREES is not able to produce expenditures by disease for France on a regular basis. In 2002 IRDES conducted a study using data from the year 2000. In 2006 a study was completed using only data on hospital expenditures (HP.1) by ATIH (French agency in charge of hospital expenditures). CNAMTS is currently completing work based on linked data from social security expenditures (HF.1.2) which only covers 75% of total expenditures. Further details are available from the following web site: <http://www.ameli.fr/rapport-charges-et-produits-2013/appli.htm>.

Germany

280. Cost of illness data are available in Germany for the reporting years 2002, 2004, 2006 und 2008. It has yet to be determined whether estimates for 2012 will be derived. German cost of illness data are available by age group, gender and disease (136 categories, including all diseases chapters according to the ICD-10 classification) according to the SHA (version 1) HP classification (first digit).

Japan

281. The Ministry of Health Labour and Welfare data referred to in Mr. Mitsutake's presentation is available online. Hospital expenditures for in-patient and others is available, broken down by ICD chapter and gender. Most recent year of data available online is for 2009.

Netherlands

282. The Netherlands regularly produces expenditures by disease data. The most recent study published included data for 2007. The next release will be for reference year 2011 (to be published before the end of 2013) Data is available for HC1-HC9 (at least at first digit) and by provider type (*please confirm that data is available by HC – there are only three categories noted in online tool*). Data is available by ICD-9 chapter and for country-specific sub-chapter categories (includes some ISHMT groups)

Slovenia

283. While not regularly produced, Slovenia has all the necessary data for estimating health expenditure by disease, although there are gaps in some areas (dental medicine, part of prevention, OTC, etc.) Work is underway for estimating expenditures for 2011. The data derivation is expected to be finished by the end of August, 2013; a publication date has yet to be determined. Data is available according to functional classification, although it could be done also according to provider class.

Sri Lanka / Bangladesh

284. In Bangladesh and Sri Lanka data is available for HC1.1 for 2009/10 and 2005 respectively covering the public sector. Data is coded according to ICD-10. HC1.3.1 (: Basic medical and diagnostic outpatient) services is available for 2007 and 2012 in Bangladesh and Sri Lanka, respectively. In Sri Lanka data is only available for three districts which covers approximately 30% of the population. Expenditures can also be estimated for cost of doctor fee and drugs prescribed in Sri Lanka. All outpatient data is available according to ICPC-2.

Switzerland

285. Switzerland does not produce expenditure by disease data on a regular basis. There is insufficient data with diagnostic information for all providers, however, there is comprehensive data including cost and diagnosis information in the hospital sector. For in-patient hospital data, the Swiss statistical office publishes statistics on cost per case. However, this is based on a non-representative sample of hospitals covering approximately 20% of hospitals and 65% of inpatient cases (last available data), including mainly large public hospitals. A country-wide DRG-system was introduced in 2012 which may result in better data in the future. There is no data on diagnostic information for out-patient providers. Some ongoing projects may yield data from the out-patient hospital and the ambulatory sectors. All available diagnosis information uses ICD classification as input data, but the ICD-10 GM (German modification) variant, not fully compatible with ICD-10 WHO. The ISHMT classification can be used from ICD codes for the output data.

ITEM 3. Hospital Expenditures

286. The Secretariat (Alan Diener) presented results from an econometric analysis on estimating hospital expenditures using activity data. Based on the initial results the method appears to produce reasonable estimates. Next steps of the analysis were presented – these include adding data from more countries if available, and estimating different model specifications, including adding variables related to

surgical procedures. It was agreed that all results will be written up in a working paper which will be presented at the October meeting of health account experts.

287. There was general consensus that this analysis is important and provides useful results. It was also noted that the weight of expenditures to bed-days, in and of itself, may provide useful information in understanding the differences in resource uses of treating different diseases (or diagnostic categories) across countries.

ITEM 4. Primary Care / Physician expenditures

288. Nathalie Van de Maele (WHO) gave a presentation entitled “Tracking expenditure by Disease in Lower Income countries.” The presentation focused on WHO work in estimating outpatient, and inpatient expenditures. The data sources are quite country specific, and generally unique to lower income countries. The sources cover disease programmes, financial and technical partners, preventive care providers and central pharmacies. Estimates for about 15 countries are expected by the end of the year. Implementation guidelines are being developed in which expenditure by disease data can be gathered in conjunction with SHA data.

289. Lany Slobbe (RIVM, the Netherlands) gave a presentation entitled “Outpatient care in the Netherlands.” The presentation focused on the estimation of expenditures for outpatient curative care (HC.1.3), specifically composed of general practitioners, dentists, hospitals, and other (e.g. midwives, alternative therapy). Included in the presentation was a discussion on data sources and methods employed to construct utilisation keys. Mr Slobbe also noted that the mapping of ATC codes, for pharmaceutical prescriptions, to diagnostic categories can vary considerably from year to year reflecting the need to update allocation keys on a regular basis.

ITEM 5. Pharmaceutical Expenditures

290. The Secretariat (Alan Diener) gave a presentation outlining the issues related to obtaining pharmaceutical expenditure by disease estimates. For most countries, in order to allocate pharmaceutical expenditures by disease, generally two pieces of information are required: data on expenditures and a way in which to allocate those expenditures (i.e. the allocation key). Data on pharmaceutical expenditures is usually available by pharmaceutical type; pharmaceuticals are classified according to the Anatomical Therapeutic Classification (ATC) system. The ATC system codes pharmaceuticals based on the place in the body in which they work. Thus, there is no direct, obvious link between ATC code and diagnostic categories. While a country may have data on pharmaceutical expenditures according to ATC code, in order to allocate pharmaceutical expenditures, it is thus often necessary to also have information on a mapping from ATC to ICD codes. The exception includes countries, such as Korea, with detailed insurance registries, where for each prescription written there is a corresponding diagnosis. Thus the associated expenditure for that prescription can be linked to a diagnosis without the need of any ATC to ICD mapping.

291. The OECD currently collects pharmaceutical expenditure and consumption data, but only for a limited number of ATC codes at a rather high aggregated level. The possibility of employing such data on expenditures and using the mapping data from those countries that possess it was discussed; however, in order to properly map the pharmaceuticals to diseases more granular pharmaceutical expenditure data is likely required.

292. Peter Stephens (IMS) gave a presentation outlining the types of data that IMS collects and describing how it could be used for the purposes of this project. IMS currently has data from 48 countries (including 24 OECD countries) as part of their Worldwide Medical Audit System. Hence, it is possible that

ATC to ICD mapping could be obtained for those countries. These results can be compared across countries to determine whether an average mapping is feasible, which could then be applied to those countries that have detailed expenditure data but are lacking an allocation key. This type of analysis would have to be part of a future line of work.

293. Gottfried Endel (Main Association of Austrian Social Insurance Institutions) gave a presentation on a study being undertaken in Austria in which a mapping of ATC to ICD codes is being undertaken using hospital inpatient admissions data, and sick leave information, linked with pharmaceutical insurance claims. Using this approach they have been able to allocate a large proportion of pharmaceuticals to ICD codes. This approach does seem promising but may be dependent on the characteristics of the Austrian health care system and the corresponding data availability.

ITEM 6. Conclusions from the meeting and proposed next steps for the project

294. As previously noted, it was agreed that all efforts should be made to allocate as large a proportion of expenditures as possible. When reasonable, unallocated expenditures can be re-distributed on a pro-rata basis. It is important, however, that all methods employed are transparent and properly reported.

295. The model employed in the analysis of hospital expenditure will be revised as discussed and the investigation of results will continue. We will investigate options re the publication of final results.

296. With respect to data collection we will continue to explore what is available from countries specifically with respect to pharmaceutical and out-patient expenditures by disease. For out-patient, or primary care, data it is becoming clear that data availability is very system specific. We will include as many examples as possible in the final report, as well as an inventory of what is currently available. In terms of pharmaceutical data we will also include all possible sources in the final report and examples of available data mappings and linkages.

297. It was agreed that the draft of the final report will be disseminated in September for feedback and comments. The report will be presented at the health accounts and data correspondents meeting in October, and finalised by the end of the year. There was interest in maintaining an expert group to discuss ongoing work in this area of deriving health expenditures by disease.

Final Participants list for Health Spending by Disease Experts Group, 12 June 2013

- Czech Republic/République tchèque** Mr. Jan KVACEK
Analyst
Cabinet of the Minister
Ministry of Health of the Czech Republic
Palackeho Namesti 4
12000 Praha 2
Czech Republic
- Tel: +420 602 345 726
Email: jan.kvacek@mzcr.cz
- Ms. Blanka WEYSKRABOVA
Ministry of Health
Palackého nám 4
128 01 Prague
Czech Republic
- Email: blanka.weyskrabova@mzcr.cz
- Estonia/Estonie** Ms. Natalja EIGO
Health Statistics Department
National Institute for Health Development
Hiiu 42
11619 Tallinn
Estonia
- Tel: +3726593815
Fax: +3726593901
Email: natalja.eigo@tai.ee
- Mrs. Elin RAAPER
specialist
Department of Health Care
Estonian Health Insurance Fund
Lembitu 10
10114 Tallinn
Estonia
- Tel: +3726208430
Fax: +3726208449
Email: Elin.Raaper@haigekassa.ee
- Finland/Finlande** Dr. Nina KNAPE
Development Manager
National Institute for Health and Welfare
THL
P.O. Box 30
FIN-00271 Helsinki
Finland

Tel: +358 29 524 7683
Email: nina.knape@thl.fi

France

Mlle. Marion BOUVET
Chargée des comptes de la santé
Direction de la recherche, des études, de l'évaluation et des statistiques
Ministère du Travail, de l'Emploi et de la Santé
11, place des Cinq Martyrs du Lycee Buffon
75696 cedex14 Paris
France

Tel: +33 1 40 56 88 11
Email: marion.bouvet@sante.gouv.fr

Mme Marie-Anne LE GARREC
Chargée des comptes de la santé
Direction de la recherche, des études, de l'évaluation et des statistiques
Ministère du Travail, de l'Emploi et de la Santé
Bureau Comptes et prévisions d'ensemble
11, place des Cinq Martyrs du Lycée Buffon
75696 Paris Cedex 14
France

Tel: +33 1 40 56 81 38
Email: marie-anne.legarrec@sante.gouv.fr

M. Romain ROUSSEL
Direction de la sécurité sociale
DREES
11, place des Cinq martyrs du lycée Buffon
75014 Paris
France

Email: romain.rousseau@sante.gouv.fr

Germany/Allemagne

Mr. Michael CORDES
Head of Unit
Federal Statistical Office (Statistisches Bundesamt)
Graurheindorfer Strasse 198
D-53117 Bonn
Germany

Tel: +49 611 75-8116
Fax: +49 611 75-8996
Email: michael.cordes@destatis.de

Japan/Japon

Mr. Yohei ITO
First Secretary
Permanent Delegation
11, avenue Hoche

75008 Paris
France

Tel: +33 1 53 76 61 32
Email: yohei.ito@mofa.go.jp

Mr. Naohiro MITSUTAKE
Associate Director
Research Unit
Institute for Health Economics and Policy
No. 11, Toyo-kaiji Bldg
1-5-11, Nishi-Shimbashi, Minato-ku
105-0003 Tokyo
Japan

Tel: +81 3 3506 8529
Fax: +81 3 3506 8528
Email: mitsutake@ihp.jp

Portugal

Mr. Pedro LIBERATO
Conseiller
Permanent Delegation
10bis rue Edouard Fournier
75116 Paris
France

Tel: +33 1 45 03 31 00
Fax: +33 1 45 03 22 03
Email: pedro.liberato@ocde-portugal.com

Slovenia/Slovénie

Ms. Anita JACOVIC
Statistical Office of Slovenia
Litostrojska 54
SI-1000 Ljubljana
Slovenia

Email: anita.jacovic@gov.si

Mr. Stane MARN
Statistical Office of the Republic of Slovenia
Lifostrojska 54
1000 Ljubljana
Slovenia

Tel: +386 1 2340 732
Fax: +386 1 2415-344
Email: stane.marn@gov.si

Switzerland/Suisse

M. Christoph KILCHENMANN
Chef de la Section Statistique et Mathématique
Département Fédéral de l'Intérieur

Federal Office of Public Health (FOPH)
Hessstrasse 27E
CH-3003 Berne
Switzerland

Tel: +41.31.322.91.31
Fax: +41.31.323.00.60
Email: Christoph.Kilchenmann@bag.admin.ch

**United Kingdom/Royaume-
Uni**

Mr. John HENDERSON
Economist
Public Health Directorate, Health Protection & International Healthcare
Department of Health (DH)
6.016 Wellington House,
133-155 Waterloo Road
SE1 8UG London
United Kingdom

Tel: +44 20 79 72 12 04
Fax: +44 20 79 72 42 66
Email: john.henderson@dh.gsi.gov.uk

United States/États-Unis

Mr. Gregory GARRAMONE
Environment, Science, Technology and Health Councillor
Permanent Delegation of the United States to the OECD
12, avenue Raphael
75775 Paris
France

Tel: +33 1 43 12 74 94
Email: GarramoneGG@State.Gov

**AGENCY FOR
HEALTHCARE
RESEARCH AND
QUALITY**

Mr. Steven B. COHEN
Agency for Healthcare Research and Quality
540 Gaither Road
20850 Rockville, Maryland
USA

Email: scohen@ahrq.gov

**AUSTRALIAN INSTITUTE
OF HEALTH AND
WELFARE**

Dr. Adrian WEBSTER
Australian Institute of Health and Welfare
26 Thynne Street Fern Hill Park
Bruce, Australian Capital Territory 2617
Australia

Email: Adrian.webster@aihw.gov.au

CNAMTS - DDGOS/DAS

Mme Christelle GASTALDI-MENAGER
Department of Studies on Patients and Diseases
CNAMTS

50 avenue du Professeur André Lemierre
75986 Paris
France

Tel: +33 (1) 72 60 17 33
Email: christelle.gastaldi-menager@cnamts.fr

Ms. Claire MONTÊTE
Département des Pathologies Lourdes
CNAMTS - DDGOS/DAS

Email: claire.montete@cnamts.fr

IMS Health

Mr. Peter STEPHENS
IMS Health
210 Pentonville Road
N1 9JY London
United Kingdom

Email: pstephens@uk.imshealth.com

**Institute for Health Metrics
and Evaluation - University
of Washington**

Ms. Anne BULCHIS
Project Officer
Institute for Health Metrics and Evaluation - University of Washington
2301 5th Avenue, Suite 600
98121 Seattle
United States

Tel: +1 206 897 3849
Email: abulchis@uw.edu

Institute for Health Policy

Ms. Nilmini WIJEMANNE
Institute for Health Policy
72 Park Street
Colombo 02
Colombo
Sri Lanka

Tel: +94112314041
Email: nilmini@ihp.lk

**Main association of the
Austrian social insurance
companies**

Dr. Gottfried ENDEL
Researcher
EWG
Main association of the Austrian social insurance companies
Kundmannngasse 21
1031 Vienna
Austria

Tel: +43 1 711 32 3615
Fax: +43 1 711 32- 777

Email: Gottfried.Endel@hvb.sozvers.at

RIVM

Mr. Lany SLOBBE
Project Leader
Public Health Forecasting (VTV)
RIVM
Bilthoven
Netherlands

Tel: +31302744315
Email: lany.slobbe@rivm.nl

**Business and Industry
Advisory Committee
(BIAC)/Comité consultatif
économique et industriel
(BIAC)**

Dr. Petra KEIL
Head Global Public Policy
Global Public Policy
Novartis International AG
Forum 1 3.34 Mailbox
4002 Basel
Switzerland

Tel: +41 61 32 40 717
Email: petra.keil@novartis.com

Ms. Ann NORDAHL
BIAC
Paris

Email: NORDAHL@biac.org

Dr. Richard TORBETT
Strategy Director
European Federation of Pharmaceutical Industries' Associations (EFPIA)
Leopold Plaza Building
Rue du Trône 108 - Boîte 1
1050 Brussels
Belgium

Tel: +32 476841840
Fax: +32 02 6262 566
Email: richard.torbett@efpia.eu

Mr. Yves VERBOVEN
Senior Manager
Market Access and Economic Policies
Eucomed
2 Place des Maieurs
B-1150 Brussels
Belgium

Tel: +32 (0)479079414
Email: yves.verboven@eucomed.org

European Union (EU)/Union européenne (UE) Mr. Orestis TSIGKAS
Statistical Officer - Public Health administrative (expenditure) data
Unit F5 - Education, Health & Social Protection Statistics
European Commission - EUROSTAT
BECH B3/424
Luxembourg
Luxembourg

Email: orestis.tsigkas@ec.europa.eu

World Health Organization (WHO)/Organisation mondiale de la santé (OMS) Mlle. Nathalie VAN DE MAELE
Economiste/statisticien
OMS
20 avenue Appia
CH-1211 Geneva
Switzerland

Tel: 41 22 791 12 56

Email: vandemaelen@who.int

OECD/OCDE

Mr. Alan DIENER
Consultant (Project on health spending)
ELS/HD
OECD
Annexe Monaco 404
2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 96 10

Email: Alan.DIENER@oecd.org

Mr. Luca LORENZONI
Administrator (Health Accounts, Asian Health and Social Policy Outreach)
ELS/HD
OECD
Annexe Monaco 425
2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 76 21

Email: Luca.LORENZONI@oecd.org

Mr. David MORGAN
Economist/Statistician (Health Accounts)
ELS/HD
OECD
Annexe Monaco 422

2 rue André-Pascal
75016 Paris
France

Tel: +(33-1) 45 24 76 09
Email: David.MORGAN@oecd.org