

Cost-of-Illness Studies: a Five-Country Methodological Comparison

Australia, Canada, France, Germany and the Netherlands

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Produced in different countries from the National Health Accounts* (NHAs), cost-of-illness* (COI) studies estimate the distribution of health care expenditure across major diagnostic categories.

The use of equivalent methodologies permitted a comparative COI study between the five countries retained (Australia, Canada, France, Germany and the Netherlands) but differences in health care system structures and national accounting rules somewhat jeopardised total comparability.

In all five countries studied, health care expenditure (hospitals, physicians, dentists and prescribed medicines) is predominated by three major diagnostic categories: cardiovascular diseases, digestive diseases and mental disorders.

If in the future these comparative studies are to become effective tools in the understanding and improvement of health systems and provide meaningful international comparisons of health system performance, it would be advisable to adopt a common NHA accounting nomenclature and to elaborate institutionalised and standardised methodological rules for national COI studies.

The constant increase in health spending, essentially under public financing, faces the majority of developed countries with the challenge of economic sustainability. Each year, these countries produce National Health Accounts (NHAs) that enable them to evaluate and monitor total health expenditure, and analyse sources of financing and their distribution by production sector. These accounts equally allow cross-country health expenditure comparisons, notably with a view to evaluating

the performance of different health care systems.

Over the last few years, decision-makers have shown a growing interest in the production of NHA-based *cost-of-illness* (COI) studies. This medicalized approach to accounts distributes health care expenditure across major diagnostic categories and thus makes it possible to determine which diseases are treated and by which health care provider. The outcome in France is the publication of the Health Accounts by Disease ('Comptes de la

santé par pathologie') (Paris *et al.*, 2003). If the initial purpose of these COI studies is to satisfy national objectives, they can also prove useful in the framework of international comparisons. In effect, by supplying more detailed data on the distribution of health care expenditure by disease, they contribute in refining

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accounting methods and enable a comparative reading of the organisation of health systems in different countries.

To guarantee the pertinence of international health expenditure comparisons however, and more particularly national COI studies, they must be based on homogenous fields which implies the use of comparable methodologies.

In this perspective, we conducted a comparison of COI studies in five countries (Australia, Canada, France Germany and the Netherlands) between 1998 and 2004. These countries are all faced with the challenge of controlling health expenditure amounting to between 9 and 11% of GDP (Cf. table 1) and continuously rising. Per capita health spending, expressed in Purchasing Power Parity (PPP) (Cf. Definition insert p. 5), amounted to around 2,300 or 3,000 US dollars.

By analysing the methodological similarities and differences in national COI studies, it is possible to assess the degree of comparability of results and thereby deliver an initial interpretation of the differences observed. Our prime ambition is to provide recommendations in order to improve the international comparability of COI studies, thereby provide effective health system assessment and monitoring tools for the future.

Equivalent methodologies...

In the five countries under consideration, COI studies are based on a certain number of common methodological choices authorising a comparative study.

In all cases, the distribution by diagnostic category concerns exclusively expenditure on medical goods and services (representing between 89% and 95% of current health expenditure according to country, Cf. Methods insert p. 3).

In addition, the same approach is used by all five studies in estimating health costs; the *top down* method. This cost-analysis model progressively breaks down total expenditure on medical goods and services into parts attributable to each

illness. Working with the expenditure published in NHAs, the major expenditure aggregates are allocated to specific diagnostic categories through the use of distribution keys. In using the inverse *bottom-up* approach, where overall cost is the sum of the estimated costs for each disease, it would have been impossible to guarantee an exhaustive representation of costs by disease or to ensure the coherence of cost estimates with those published in NHAs.

Whatever the sources of information, all five countries equally use the International Classification of Diseases 10th revision (ICD 10) as their standard nomenclature in coding the diagnostic categories to which expenditure is allocated. In most studies, the allocation of expenditure through ICD is possible at detailed level (Germany, the Netherlands) but for some of them, it is only possible at ICD chapter level: this is notably the case for France (Paris *et al.*, 2003).

Finally, the sources of information used to produce these studies are globally

BACKGROUND

This publication, adapted from an article published in Health Policy (Heijink *et al.*, 2008), is the outcome of an international comparison of COI studies initiated by Richard Heijink and conducted with the help of experts in Germany and the Netherlands. This project was made possible by the comparison of different studies undertaken during the annual Meeting of Experts in National Health Accounts coordinated by the OECD. In France, it falls within the framework of research aimed at enriching the Health Accounts – notably in the form of the ‘Health Accounts by disease’ conducted by the Institute for Research and Information in Health Economics* (Irdes), in partnership with the Ministry of Health Directorate for Research, Analysis, Evaluation and Statistics* (Drees).

similar from one country to the next. In France, Health Accounts by disease are created through different sources: for the hospital sector, essentially by the Medical Information Systems Program*, and for the ambulatory sector, by various surveys and medical activity panels, notably the Permanent Survey on Medical Prescription* conducted by IMS-Health.

T1 The weight of health expenditure in Australia, Canada, France, Germany and the Netherlands

	Australia 2000	Canada 1998	France 2002	Germany 2004	Netherlands 2003
National Currency Unit (NCU)	AUS \$	CAN \$	€	€	€
Total health expenditure (NHAs field)					
In billions of NCU	61.66	83.74	165.21	233.98	57.51
National health expenditure (OECD field)					
In billions of NCU	60.37	82.48	155.04	233.98	45.11
As a percentage of GDP	9.0%	9.2%	10.0%	10.6%	9.9%
As a <i>per capita</i> value, US \$ PPA	2,406\$	2,291\$	2,886\$	3,043\$	3,022\$
Health expenditure as bounded in the COI surveys					
Total health expenditure, in billions of NCU	60.90	74.25	129.55	224.94	45.11
Percentage of total expenditure that cannot be allocated by disease	12.5%	27.2%	8.0%	0.0%	9.3%

Reading guide: for France, the 2002 current health expenditure as published in the NHA amounted to 165.21 billion Euros. Calculated according to the OECD classification, national health expenditure amounted to 155.04 billion Euros which represents 10% of the Gross Domestic Product or 2,886 US \$ per inhabitant in Purchasing Power Parity (PPP) [Cf. Definitions insert p. 5]. Finally, in the COI study, expenditure only concerns medical goods and services: it amounts to 129.55 billion Euros, 8% of which could not be allocated to specific disease group.

Source: table adapted from Heijink *et al.* (2008).

This combination of administrative and survey data is equally used in the other countries to elaborate their COI studies.

... but significant differences that bias comparability

To guarantee the coherence and comparability of health expenditure at international level, standard international rules for the production of health accounts data is indispensable. To this effect, the System of Health Accounts (SHA), set up by the OECD, provides a referential nomenclature for NHA reporting. Based on a series of common concepts, definitions and accounting rules, the SHA provides a framework for the standard reporting of health expenditure. Its aim is to progressively harmonise NHAs and thereby improve their international comparability (Cf. Method insert opposite).

In the five countries retained here, comparability was nevertheless hampered by certain structural differences between the NHAs. Not all countries produce their NHA in conformity with SHA boundaries and structure. The field covered by health spending thus differs from one country to the next, and the health care providers defined in the Health Accounts and COI studies consequently express different realities. Essentially, these structural differences can be explained by disparities in the organisation and financing of health care.

As an example, the exact line that separates health care from social care remains ambiguous and thus varies from country to country. In the Netherlands, expenditure on nursing care for the elderly dependent is included in the NHA whereas it falls outside the SHA perimeter. Similarly, and again contrary to SHA's accounting perimeter, the French NHAs include wage-loss compensations paid for sickness and occupational injury leaves.

There is another important factor rendering international comparison difficult: in the five studies, the percentage of health care expenditure that cannot be

METHOD

National Health Accounts (NHA)

Each country has a national accounting system through which the production, consumption and financing of health care is traced back. The French NHAs, produced and published yearly by the Ministry of Health Directorate for Research, Analysis, Evaluation and Statistics* Drees (Fénina *et al.*, 2008), present two main monetary aggregates:

- total health expenditure (THE) that provides the total sum of expenditure committed by all the public and private financers to the health function on the national territory;
- expenditure on health care which refers to the consumption on tradable and non-tradable medical goods and services.

The expenditure on health care is broken down by sector (hospital, ambulatory care, drugs and medical goods, etc.) and by financer (National Health Insurance, complementary insurance schemes, households, etc.).

In order to reason on comparable data in these international comparisons, the OECD recommends an alternative aggregate, the national health expenditure (Cf. table 1): this differs somewhat from the THE in that it equally includes investments in public sector hospitals, as well as disability and dependency spending, but excludes daily sickness benefit allowances, research and medical training expenditure.

The SHA nomenclature (System of Health Accounts)

The SHA proposes a common grid for the production of Health Accounts based on identical accounting rules and a breakdown of monetary aggregates on the basis of three criteria: health care function, health care provider and source of financing.

Few countries produce their NHA in conformity with the SHA nomenclature directly, but for the majority it is possible to reclassify health expenditure using this nomenclature. The typology by health care provider is particularly operational in the homogenisation of both NHA results and COI by disease studies with a view to effectuating international comparisons:

- HP1. Hospitals;
- HP2. Nursing and residential care facilities;
- HP3. Providers of ambulatory health care;
- HP4. Retail sale and other providers of medical goods;
- HP5. Provision and administration of public health programmes;
- HP6. General health administration and insurance;
- HP7. Other industries (rest of the economy);
- HP9. Rest of the world.

allocated to a diagnostic category varies significantly from one country to the next. In effect, and taking into account the available sources of information, the total expenditure is in general impossible to allocate down to a specific disease or group of diseases. In the 2002 French Health Accounts by Disease, for example, the expenditure distribution by disease concerned 119.2 billion Euros out of a total 129.6 billion, or in other words 92% of the expenditure on medical goods and services. The remaining 10 billion Euros were unallocated for lack of data.

In the COI studies retained here, the percentage of unallocated expen-

diture is extremely variable from one country to the next: it amounts to zero in Germany and ranges from 9% of expenditure on medical goods and services in the Netherlands to 27% in Canada. In France, it amounts to 8% and in Australia, 12.5%. The higher this percentage, the lower the robustness of the COI study results: these significant variations represent a serious handicap to comparative accuracy.

In order to make the comparison possible, it is thus necessary to classify COI study results using the SHA nomenclature categories on the one hand, and on the other, to restrict the expenditure

perimeter retained in order to work in a homogeneous field with truly comparable data.

We opted for the SHA nomenclature so as to obtain a comparable distribution of expenditure by health provider across the five countries. The methodological compatibility of SHA with the different national accounting systems allowed us to reclassify the results of expenditure distribution by disease using the SHA nomenclature

categories. In the Netherlands, both the COI study and the NHA are systematically available in SHA format.

In addition, we chose to restrict the health care providers to be included as to render the comparative field more homogeneous: it was limited to hospitals, physicians, dentists, and prescribed medicines (corresponding respectively to SHA codes HP1, a fraction of HP3 and HP4, Cf. Method insert p. 3).

Common trends: the predominance of cardiovascular and digestive diseases, and mental disorders

The results observed in the five countries studied reveal strong common trends (Cf. table 2). In all the countries, three main groups of diseases are responsible for the highest health costs: cardiovascular diseases, mental and behavioural

T2

Expenditure by disease in the five countries for hospitals, physicians, dentists and retail sale of medical goods

Disease category	Australia 2000		Canada 1998		France 2002		Germany 2004		Netherlands 2003	
	%	Cost per capita ¹	%	Cost per capita ¹	%	Cost per capita ¹	%	Cost per capita ¹	%	Cost per capita ¹
Diseases of the circulatory system (cardiovascular)	11.3	175	12.6	191	13.6	226	15.1	273	12.2	210
Diseases of the digestive system	14.7	227	18.2	275	13.4	222	18.6	336	13.9	240
Mental and behavioural disorders	6.1	95	8.7	132	10.9	181	7.5	135	13.1	225
Neoplasms	6.3	97	4.5	67	7.1	118	8.1	146	6.0	103
Diseases of the respiratory system	7.7	118	6.4	97	7.1	119	6.0	108	5.6	96
Diseases of the musculoskeletal system	8.0	124	4.9	74	7.1	118	9.8	177	7.6	131
Diseases of the nervous system	4.5	70	5.2	79	6.1	102	6.4	115	5.9	101
Injury, poisoning	9.1	138	6.1	91	6.0	99	4.8	86	4.1	70
Factors influencing health status and contact with health services	-	-	10.8	163	5.9	97	2.9	52	-	-
Diseases of the genitourinary system	4.9	76	4.8	73	5.3	89	4.5	82	4.0	69
Symptoms, signs and abnormal clinical and laboratory findings	12.4	191	3.3	50	4.4	73	3.2	57	10.8	186
Endocrine, nutritional and metabolic diseases	5.3	82	2.9	44	4.3	71	6.0	109	2.9	50
Pregnancy, childbirth and puerperium	3.2	50	2.4	37	2.8	46	1.7	30	3.3	57
Certain infectious and parasitic diseases	2.6	39	1.6	25	2.4	39	2.0	36	3.0	51
Diseases of the skin	2.6	40	2.7	42	1.6	27	1.9	34	2.4	41
Diseases of the blood	-	-	0.4	6	0.5	8	0.6	11	0.6	11
Congenital malformations	0.4	7	0.3	5	0.5	8	0.6	10	0.7	11
Certain conditions originating in the perinatal period	0.9	13	0.6	9	0.5	9	0.3	11	1.1	19
Unallocated expenditure	-	-	3.6	54	0.5	8	-	-	2.7	47
Sub-total: expenditure relating to the four functions retained (A)	100.0	\$1,543	100.0	\$1,512	100.0	\$1,659	100.0	\$1,808	100.0	\$1,719
Total expenditure on medical goods and services (B)		\$2,262		\$2,211		\$2,817		\$2,924		\$2,874
Percentage of COI expenditure included in the comparison (A/B)		68%		68%		59%		62%		60%

¹ Costs are expressed per capita, in US\$ Purchasing Power Parity (PPP).

Source: table adapted from Heijink *et al.* (2008).

disorders and diseases of the digestive system, followed by diseases of the musculoskeletal system and neoplasms. Another point in common, the low level of expenditure relative to two other diagnostic categories: obstetric conditions and diseases of the blood.

Apart from these similarities, the results equally reveal significant differences between the five countries. In Germany, for example, diseases of the circulatory system and diseases of the musculoskeletal system generate costs that are significantly higher than in the other countries: respectively 15.1% and 18.6% of expenditure relative to the four health care providers retained. The same applies for diseases of the respiratory system in Australia and mental disorders in the Netherlands that represent a relatively high percentage of health expenditure.

These results should, however, be interpreted with caution for two reasons.

In the first place, disaggregating NHA data to SHA nomenclature can partially bias the comparability of certain studies when national accounting standards significantly diverge from SHA standards.

Secondly, the four health care providers retained (hospitals, physicians, dentists, and prescribed medicines) only partially cover the total expenditure on medical goods and services: 68% in Australia and Canada, 62% in Germany, 60% in the Netherlands and 59% in France. For certain diagnostic categories, this restriction can lead to a substantial percentage of expenditure not being taken into account. Certain mental disorders, such as dementia for example, are often treated by home

nursing services and were not retained in this study because of significant cross-country variations in the distribution of costs by disease. Consequently, health expenditure concerning mental disorders is only partially covered in the comparison presented in table 2. As an example, the percentage of total expenditure allocated to mental and behavioural disorders which is included in the comparison only amounts to 55% for Germany and 48% for the Netherlands.

Differences which are not easily explained

The discrepancies in the results obtained for the five COI studies can be explained by the differences in the organisation and performance of the different health systems, or by the epidemiological and demographic profile proper to each country.

Comparable international indicators were thus mobilised to describe the differences in the results obtained in the five countries: the prevalence and the mortality associated with different diseases, and the population's age and gender composition.

Unfortunately, this approach did not permit us to draw satisfactory conclusions (*Cf.* Heijink *et al.*, 2008). In effect, the methodological disparities from one study to the next prevented us from interpreting the differences in the results in an accurate manner or to impute them with certainty to specific epidemiological or demographic causes. The breakdown of expenditure by diagnostic category, for example, is distributed by age and gender in a very precise manner in the Netherlands or Australia, but no such detail is available in the French COI study.

Adjustments are necessary to improve global comparability

To improve the comparability of COI studies and to really turn them

into tools to compare and monitor health care systems' performance, certain conditions are required. It would be advisable that each country institutionalise and update these COI studies that shed new light on the resources allocated to different diseases within the health care system. In this perspective, common accounting rules and a referential nomenclature should be adopted so as to produce NHAs and national COI studies in conformity with the SHA.

In the 1990's, an increasing number of countries decided to revise their health statistics systems and improve them with the aid of increasingly comprehensive information systems. In time, the progressive build-up of vast data bases should allow the improvement of national accounting systems by providing a more exhaustive coverage of the multiple aspects underlying health spending.

By thus taking advantage of the spread of information sources, it will be possible to further refine the results published in COI studies. It will consist not only in producing highly detailed results by specific disease rather than broad diagnostic categories but also systematically introducing a breakdown of expenditure by age range and gender.

Finally, it should be noted that at this stage, we limited the health expenditure comparison to four health care providers. In the future, it would be particularly instructive to use the other classifications of expenditure proposed by the SHA and notably, to break down expenditure by disease according to source of financing (public and private health insurance, Government funding, households, etc.)

The process of harmonising NHAs and the convergence of COI studies can only occur progressively however: prior experimentation and international cooperation will be indispensable in the consensual development of concepts and methods. ♦

DEFINITION

Purchasing Power Parity (PPP): monetary exchange rate expressing purchasing powers of different currencies in a standard unit of measure. It not only integrates the exchange rate between currencies but also the number of monetary units necessary to buy the same « shopping basket » of goods and services in the different countries.

GLOSSARY

- [Drees] Ministry of Health Directorate for Research, Analysis, Evaluation and Statistics: Direction de la recherche, des études, de l'évaluation et des statistiques (Drees)
- [Irdes] Institute for Research and Information in Health Economics: Institut de recherche et documentation en économie de la santé (Irdes)
- [OECD] Organisation for Economic Cooperation and Development: Organisation de coopération et de développement économique (OCDE)
- [COI] Cost-of-illness: Coûts par pathologie
- Expenditure: Dépenses
- [GDP] Gross Domestic Product: Produit intérieur brut (PIB)
- Health Accounts (by Disease): Comptes de la santé (par pathologie)
- Medical goods and services: Soins et biens médicaux
- [MISP] Medical Information Systems Program: Programme de médicalisation des systèmes d'information (PMSI)
- [NHA] National Health Accounts: Comptes nationaux de la santé
- Permanent Survey on Medical Prescription: Enquête permanente sur la prescription médicale (EPPM)
- [PPP] Purchasing Power Parity: Parité de pouvoir d'achat
- [THE] Total health expenditure: Dépense totale de santé

FURTHER INFORMATION

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