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Background

The National Health Accounts produce annual information on health system expenditure and analyse this by source of funding and type of care. At the request of DREES, IRDES has developed and tested a method for producing health accounts by disease (QES 56) and a method for estimating expenditure on prevention (QES 68). DREES and IRDES have collaborated to apply these methodologies to the 2002 health accounts. The data sources are administrative files produced on a regular basis (PMSI, biology coding, medicine coding) and one-off or repeated surveys.

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Expenditure on prevention and care by disease in France

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This study is based on the 2002 National Health Accounts, and presents an estimation of the distribution of health expenditure by curative and preventive care, and distribution of curative expenditure by the main disease groups.

In 2002, France spent 10,5 billion Euros on prevention, i.e. 6.4% of current health expenditure, half of this on preventing disease or undesirable states, one quarter on disease screening and the remaining quarter on intervention in risk factors or early stage disease. Expenditure on prevention related to the Consumption of care and medical goods was 54.7 billion Euros. Consumption of care and medical goods excluding prevention has been allocated by disease. Thus, expenditure on cardiovascular disease is the highest (12.6%), greater than mental illness and musculoskeletal disease (10.6% and 9% respectively).

Infections of the mouth and teeth account for most ambulatory care expenditure (28.3%) and circulatory disease and mental illness together represent more than a quarter of hospital expenditure.

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Estimated total expenditure on prevention based on the 2002 National Health Accounts

Expenditure in millions of Euros	In CMT		In addition to CMT	In DCS
	CSBM (prevention separated in CSBM)	Outside CSBM (CNS "Individual prevention category")	CNS "collective prevention" category	Total prevention
A. Prevent disease or an undesirable state	1 096	2 121	2 233	5 450
B. Disease screening	2 089	390	0	2 478
C. Risk factors and early stage disease interventions	2 567	0	0	2 567
Total "prevention and public health programmes"	3 862	2 511	2 233	8 606
Total "excluding prevention and public health programmes"	1 889	0	0	1 889
Total expenditure on prevention (millions of Euros)	5 751	2 511	2 233	10 495
in % of	la CSBM	4,4 %	-	-
	la CMT	4,3 %	1,9 %	6,3 %
	la DCS	3,5 %	1,5 %	5,0 %
			1,4 %	6,4 %

CNS: National Health Accounts ; CMT : Total medical consumption ; CSBM : Consumption of care and medical goods; DCS : Current health expenditure

Source : DREES-IRDES *Estimation of prevention expenditure and expenditure by disease in the National Health Accounts*

The National Health Accounts enable us to assess total national expenditure on health each year and to analyse this by sources of funding and by categories of care. Until now it has not been possible to look at this distribution from a medical point of view. In order to do this DREES asked IRDES to carry out two methodological studies. The first aimed to establish whether disease - based health accounts are feasible in France, and developed a prototype for the year 1998 in order to establish a general methodology and identify sources (Paris *et al.*, 2002). The second, which focussed on preventive expenditure, explored the possibility of distinguishing curative and preventive activity and assessing relative expenditure on these types of care (Le Fur *et al.*, 2003). The third phase of work, presented in this study, consolidates and synthesises these methodological studies (See Box below).

2 This study based on the 2002 health accounts begins by discussing the boundary between preventive and curative services. It then analyses the distribution of resources between curative and preventive care, and finally develops an approach to assessing expenditure by disease after excluding preventive care. The standard classification of health accounts identifies only that preventive expenditure which can be separately identified in administrative and institutional expenditure, whether this is for individual prevention (occupational medicine, screening, etc.) or collective prevention (information campaigns, food hygiene, etc.). This study also identifies expenditure on preventive care activity in the daily practice of health professionals, which is included in the Consumption of care and medical goods (CSBM). It presents original data on prevention, by identifying in particular that part of this activity which constitutes public action through preventive or public health programmes. Finally it presents a

The methodology: a top-down approach using the framework of the National Health Accounts

The principle of the work is to identify preventive expenditure included in the Consumption of care and medical goods (CSBM) – to evaluate the total value of medical prevention in France – and then to deduct this expenditure from the CSBM in order to produce disease-based accounts for expenditure on curative care and medical goods. The methodology used to estimate preventive expenditure and then to breakdown curative expenditure by disease is broadly speaking the same. The general approach is one of top-down estimation based on the CSBM categories of care, to which are applied allocation keys calculated using medico-economic data sources. After identifying the data sources (Box p.3) which cover the different categories of care and which contain sufficient medical information to distinguish both preventive activity and the diagnoses involved, expenditure is identified separately for each category and sub-category of care, using the same working procedure. This procedure, whereby preventive and curative activity may be identified together with their corresponding expenditure, is applied in turn to each data source. It involves three stages:

1. Adjustment of data sources. This calculation produces a percentage called the "coverage rate", which when applied to the total for a category of care gives a sum to be distributed between preventive and curative care, and then by disease for curative expenditure

2. The identification of preventive activity and of diseases treated, on the basis of

available clinical information (diagnostic, comorbidities, types of medical goods consumed, specialty of the doctor etc.). The identification of preventive activity requires considerable medical expertise. In contrast, for disease - based accounts, this stage is automatic being based on the diagnoses attributed in most cases (where these are known). An important option here relates to the method of allocation where several diagnoses or indications for treatment are related to the same consumption of care. For short and medium term hospital stays, all expenditure is attributed to the principle diagnosis, this being considered the main reason for hospitalisation and most of the resource use.

In contrast, for ambulatory care and medicines prescribed for several diagnoses, we do not consider it possible to rank the diagnoses in order to decide which is the principle reason for treatment: in which case the expenditure is allocated equally across the diagnoses.

3. Monetary valuation. This stage is essentially based on official tariffs for medical goods (agreed tariffs for services and clinical activity, official drug prices, etc.). Disease - based accounts should be exhaustive and therefore applied as far as possible to the total CSBM excluding prevention. However, the analysis of preventive expenditure does not include all categories of care, either because the category of care is purely curative, or because this is not possible with existing data sources. Hence, given that prevention is negligible in certain types of expenditure, particularly medium term hospital stays, psychiatry, medical transport and medical equipment, 89% of potential prevention expenditure can be identified from the CSBM total using available data sources.

breakdown of CSBM expenditure on care excluding prevention, by major disease groups of the International Classification of Disease (ICD10).

The boundary between prevention and care

Prevention: a concept to be defined

Three distinct criteria have been used to define the field of prevention. To the extent that these criteria reflect

the complex issue of the nature of prevention and its boundary with curative care, the field as defined here and the nomenclature used are the result of discussions by an expert group¹ convened for this purpose by IRDES.

¹ The expert group consisted of Dominique Baubeau (Drass-Ile-de-France), Catherine Bismuth (Cnamts), Marc Brodin (Bichat Hospital), Roland Cash (Consultant), Marcelle Delours (Paris PMI), René Demeulemeester (INPES), Patrice Dosquet (ANAES), Nathalie Pelletier-Fleury (Inserm U537), Gérard de Pourville (Inserm U357).

The main criterion depends on the nature of the action of prevention targeted here, that is both the objectives and the measures available for this kind of intervention and type of population. This enables us to define a hierarchy of three principle homogeneous categories, distinguishing between individual and collective measures of prevention aimed at individuals on one hand, and on the other screening activities, the third dealing with risk factors and early stage disease surveillance.

Collective and individual prevention measures for individuals

This first category, which has something in common with primary prevention, encompasses those individual and collective activities which aim to prevent disease or poor health status in persons in good health. They comprise environmental measures (hygiene, health safety, combating harmful environmental or occupational exposures) as well as preventive measures in individual behaviour: awareness and healthy lifestyle campaigns (nutrition, physical exercise, oral and dental hygiene), anti-smoking and anti-alcohol campaigns, health education, etc. They also include preventive measures within the health system: individual preventive activity (vaccinations, contraception, antenatal care, preventing deficiencies etc.) carried out by individuals in order to avoid illness and involving contact with the health system (doctor, pharmacy, health centre etc.); PMI (motherhood and child care), family planning, school medicine, occupational medicine etc.

Screening

The second main category of prevention expenditure includes all those activities designed to detect a problem or disease (biological examinations, exploratory investigations, medical consultations) including follow-up visits to doctors

and dentists, postnatal care, consultations for socio-economic reasons, etc.

Intervening in risk factors and early stage disease

The third category which includes intervention in risk factors, groups together all those activities which aim to reduce risk factors, and also to combat addictive behaviour. We may note in particular action on simple cardiovascular risk factors

(Type 2 diabetes, arterial hypertension, hyperlipidity, obesity), on health risk behaviour (particularly sexual behaviour) and on addictions (smoking, alcoholism, drugs), whether this consists of medical consultations or medical treatments. Action on early stage disease groups together early interventions designed to prevent more severe disease (surveillance of cancers in situ, treatment of primary tuberculosis infections) or the development of related serious illnesses

Data sources

Most of the sources used are common to the work on estimating prevention expenditure and allocating expenditure to diseases.

Hospital care:

Short stay care: PMSI-MCO 2002.

Follow-up and rehabilitation care: PMSI-SSR 2002, used only for disease-based accounts.

For disease-based accounts, expenditure was directly allocated to diseases for dialysis centres (total expenditure allocated to diseases of the urinary system) and for hospital psychiatry (total expenditure allocated to mental illness). Long stay care and parts of medical cures have not been included in CSBM since 2000.

Overall, the coverage rate of hospital care is 100%.

Ambulatory care:

Activity of self-employed doctors: Permanent survey of medical prescribing (EPPM) 2002 produced by IMS-Health.

Technical and exploratory treatments: CCAM survey of the frequency of technical treatment for 2001 (Cnamts).

For prevention work, this survey was enhanced by data on mammographies produced by the French Observatory on Breast Examinations.

Midwifery activity:

Data of SNIR 2002 (Cnamts), and a 2004 publication of the National Observatory on the Demography of the Health Professions.

Medical auxiliary activity:

Survey of health and social protection 2000

(ESPS) and 2002 (IRDES) for nursing and orthophony ; survey of physiotherapy activity 2001 (Cnamts).

Biological analyses:

Biology coding data 2002 (Cnamts).

Hydrotherapy cures:

Data from the National Union of Hydrotherapy Establishments (UNET) have been used for the disease-based analysis but are not sufficiently precise for prevention analysis.

The prevention part of the study also used the 2003 "frequency of oral-dental activity" survey (Cnamts) for dentists' activity.

Overall, 85% of ambulatory care is included.

Drugs:

Prescribed drugs: EPPM 2002 (IMS-Health)

Self-prescribed drugs: ESPS 2002 (IRDES)

In the area of prevention (vaccines, anti-smoking drugs, contraceptives, etc.): French Agency for the Health Safety of Health Products.

Overall, 95% of drug expenditure is covered.

Other medical goods:

No data source has really been adapted, but 2002 Activity Report of the Economic Committee for Health Products enabled analysis of 55% of this category. Most of the expenditure has been allocated to diseases of the eye (in particular to glasses and vision products).

Patient transport:

Expert analysis applied to total expenditure on medical transport (coverage rate = 100%).

(treatment of dyslexia, of cross-eyed syndrome, of orthodontic conditions in children, reeducation of perineal etc.).

Defining the boundary between prevention and care...

The final main category of expenditure and activity is at the boundary between prevention and care and is therefore open to debate. In fact we have supposed that non-complicated forms of diabetes, arterial hypertension and hyperlipemia are not treated in themselves but rather to prevent more severe cardiac disease, which justifies their inclusion in the category of prevention. Using this logic, addiction withdrawal aims primarily to prevent future illness, such as cancer, this being more important than the short term reduction in harmful effects. We may also debate the inclusion of contraception expenditure, which is difficult to attribute either to prevention or care; and of follow-up of normal pregnancy (where the boundary between prevention and good medical practice is not obvious).

...and between public and personal activity

The other two criteria are more functional because they aim to understand how preventive activity is organised. One separates individualisable prevention expenditure from that which cannot be individualised. Individualisable expenditure includes all that incurred in interventions on individuals: vaccinations, mammographies, smoking cessation consultations, etc.. Non-individualisable expenditure relates to collective prevention activities: such as media campaigns. The second criterion identifies prevention expenditure incurred by pre-

vention or public health programmes. This last criterion is difficult to operationalise because it requires a precise definition of the notion of programme², and of the interventions which are included in the programme³.

Estimating prevention expenditure

Prevention expenditure included in the consumption of care amounts to 5.7 billion Euros

In 2002, expenditure on individual prevention included in the CSBM totalled 5.7 billion Euros (Table page 1), or 4.4% of the total. Of course this estimation reflects the definition of prevention adopted in this study. If we break down this total expenditure by type of activity we see that:

- intervening in risk factors, addictions and early stage disease (such as non-complicated forms of diabetes, arterial hypertension and hyperlipidemia) incurs the greatest costs, with expenditure of 2.6 billion Euros, or 45% of prevention expenditure identified in the CSBM;
- expenditure on screening is 2.1 billion Euros (36%) and,
- measures designed to prevent the appearance of disease in the population, 1.1 billion Euros (19%).

If we use a more restrictive definition of prevention, excluding intervention in risk factors and early stage disease, expenditure on prevention in the CSBM would not be more than 3.2 billion Euros. It is not surprising that the least debateable preventive activity (screening) is the least well represented here, because most of these activities or of those aimed at individual behaviour have already been allocated to the prevention categories in the National Health Accounts.

Half of total prevention expenditure is incurred through ambulatory care (2.9 billion Euros) and 45% through the purchase of drugs or medical goods (2.6 billion). Hence the hospital plays an insignificant role in individual preventive care in the health care system (4%).

According to the second definitional criterion used, about two thirds of prevention expenditure in the CSBM is directly or indirectly related to a public health programme. This proportion appears to be substantial, and is undoubtedly due to the relatively inclusive criteria used here. It differs according to the nature of preventive activity: 97% of expenditure associated with intervention in risk factors and early stage disease relates to an identifiable prevention or public health programme. This is the case for only 28% of expenditure on screening programmes.

In 2002 prevention accounted overall for 6.4% of current health expenditure in France

In this estimation institutional prevention expenditure already allocated to the categories "collective prevention" and "individual prevention" of the National Health Accounts is included, amounting to 4.7 billion Euros for 2002. Hence total expenditure on prevention in 2002 was 10.5 billion Euros. This represents 6.35% of current health expenditure (Table page 1).

² In our interpretation, we include all prevention and public health programmes in the widest sense carried out in 2002, whose objectives relate to one of the dimensions of prevention defined in our work, whoever is promoting the programme, however it is financed and whatever the precise implementation framework.

³ We chose to group preventive activity carried out within the specific framework of a prevention programme and similar activity carried out during a treatment episode (for example, screening mammographies performed under the FNPEIS – National Funds for Prevention, Education and Health Information – or those carried out directly.)

Estimation of prevention expenditure included in the Consumption of care and medical goods in the National Health Accounts

Individualisable expenditure only (total in millions of Euros)	A. Prevent disease or undesirable states			B. Disease screening	C. Risk factors and early stage disease interventions		TOTAL prévention
	A.1	A.2	A.3	B	C.1	C.2	
	Environmental measures	Individual behaviour measures	Preventive interventions within the health system	Disease screening	Risk factors and risky behaviour interventions	Early stage disease interventions	
Prevention & public health programmes	0	0	769	586	2 420	88	3 862
Excluding prevention & public health programmes	2	7	318	1 503	0	60	1 889
Total (programmes and excluding programmes)	2	7	1 087	2 089	2 420	147	5 751

Source : DREES-IRDES Estimation of prevention expenditure and expenditure by disease in the National Health Accounts

The final structure of expenditure by prevention category is logically different from the CSBM structure, because the prevention categories already included in the health accounts classification are principally based on measures designed to prevent disease in the population. Overall, these account for more than half of expenditure on prevention in France. The other half is spent equally on screening (2.5 billion) and other forms of prevention (2.6 billion).

Four-fifths of expenditure on prevention is individualisable i.e. related to preventive activity aimed at individuals and their behaviour. The remaining fifth relates to all collective interventions, in the form of health safety, preventive environmental measures and health education.

Finally, in line with the health priorities defined by the state, government-initiated preventive activities appear to predominate, given that 82% of expenditure (8.6 billion Euros) is

used either in directly allocated funds or on prevention activities initiated by existing prevention programmes.

Distribution of health expenditure by disease

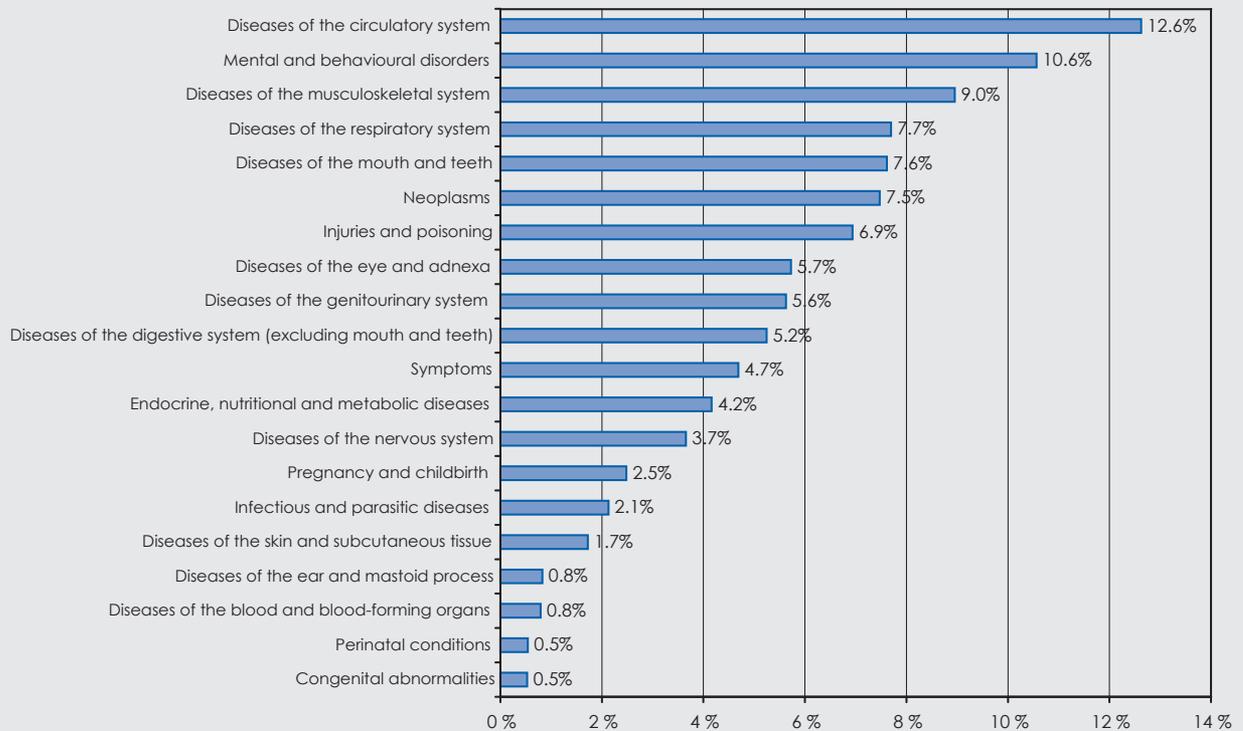
Diseases of the circulatory system and mental illness each account for more than 10% of expenditure on curative care

If we seek to establish curative care expenditure (strictly defined) by disease, i.e. the total for Consumption of care and medical goods after deducting prevention expenditure as defined above, using available data it has been possible to allocate 107.6 billion Euros from a total of 123.8 billion, namely 87% of the Consumption of care and medical goods excluding prevention. The remaining 16 billion cannot be allocated either due to lack of data (notably for a significant proportion of “other medicinal goods”), or because the data available do not enable allocation to one of the classification categories.

The International Classification of Diseases, Tenth Revision (ICD10) is the obvious choice of disease classification system, because it is reached by consensus and always used for diagnostic coding in the data sources. The classification used here to allocate expenditure by disease therefore corresponds to ICD10, with one exception: the codes for Chapter XXI (“Factors influencing health status and other general reasons for seeking care”) are attributed to the diseases which caused them and reclassified in the first 19 chapters of ICD10. Hence, consultations related to personal or family disease precedents are allocated to the disease in question.

Diseases of the circulatory system incur most of the allocated expenditure, 13.6 billion Euros, or 12.6% of expenditure in 2002 (Figure page ?). This is followed by mental and behavioural disorders (10.6% of allocated expenditure and 11.4 billion Euros), diseases of the musculoskeletal system (9.0%), then diseases of the respiratory system (7.7%) and infections of the mouth and teeth (7.6%). These

Distribution of health expenditure excluding prevention, by main diagnostic group



Source: DREES-IRDES Estimation of expenditure on prevention and by disease from the National Health Accounts

Note for the reader: Of the 107.6 billion Euros for care excluding prevention which could be allocated to diseases, diseases of the circulatory system represent 12.6% of expenditure

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are followed by neoplasms and injuries (7.5% and 6.9% respectively)

However it should be noted that the relatively high proportion of curative expenditure attributed to mental illness is partly because all expenditure on psychiatric hospitals has been allocated to “mental and behavioural disorders”, no data being available to analyse this further ⁴.

Expenditure in hospitals and the ambulatory sector varies greatly by disease

The allocation of expenditure between the hospital and ambulatory sectors (ambulatory care and drugs) appears to vary greatly between different diagnostic categories (see Figure page 7).

Certain diseases are treated for the most part in hospitals. Hence ex-

penditure on complications of pregnancy and delivery, congenital abnormalities and perinatal disease is largely hospital-based (more than 85%). The treatment of neoplasms also takes place mainly in hospitals (77%).

In contrast, expenditure on diseases of the mouth and teeth is largely related to ambulatory care (94%), and more precisely dental care. Ambulatory care is also important for diseases of the blood and blood-forming organs (45%).

Ophthalmic diseases have a unique structure of expenditure, concentrated on other medical goods, related to high expenditure on glasses and vision products (69% of the total). Expenditure on drugs and other medical goods is also significant for endocrine, nutritional and other metabolic diseases, for diseases of

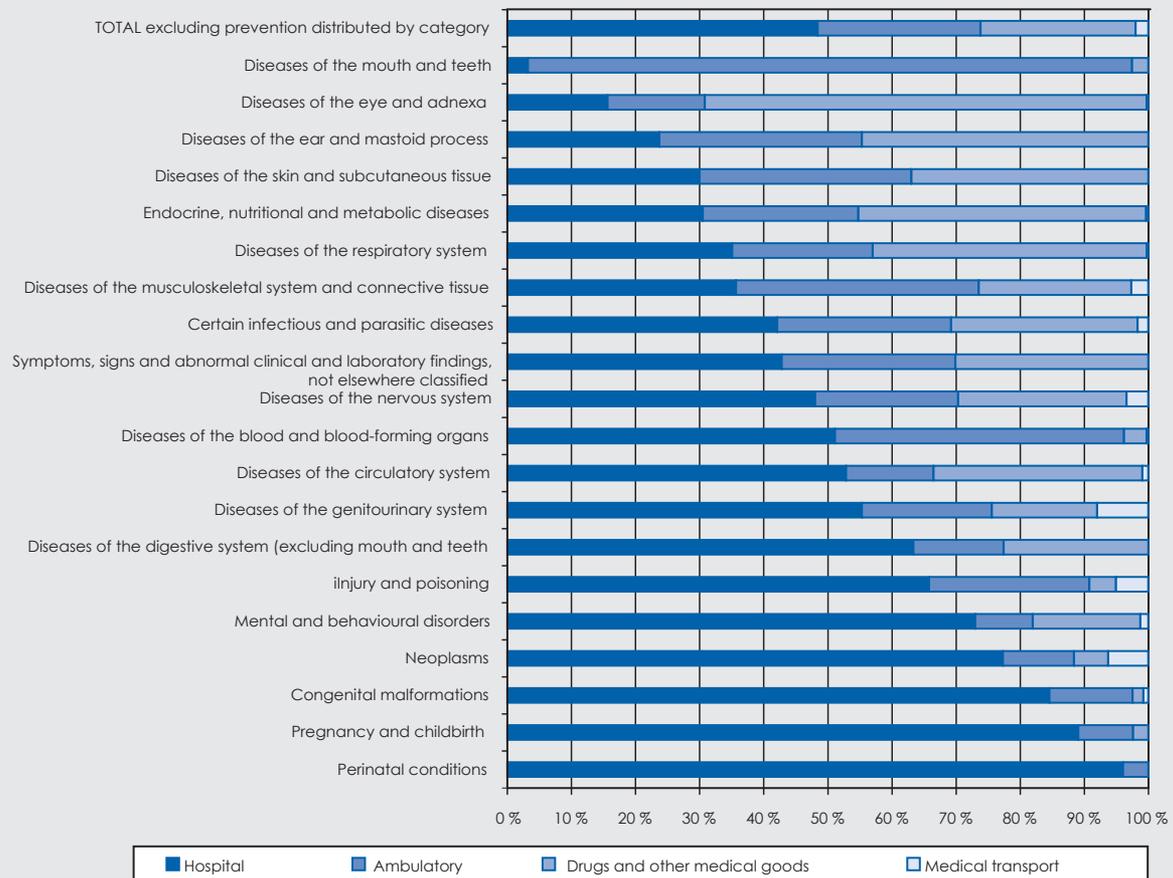
the ear and for diseases of the circulatory system (more than 40% of expenditure).

A high proportion of hospital expenditure for mental and behavioural disorders and circulatory disease, and of ambulator expenditure for diseases of the mouth and teeth

Within each type of expenditure, the distribution by disease is very different. Hence for the category “hospital care”, a high proportion of expenditure is for mental and behavioural disorders, this representing 15.9% of hospital expenditure in 2002. However this is probably an overestimate for the reasons given above. Diseases of the circulatory system,

⁴ These establishments also treat cases in other diagnostic categories such as diseases of the nervous system, injuries and poisoning.

Distribution of health expenditure, excluding prevention, by category of health care producer and diagnostic group



Source : DREES-IRDES Estimation of expenditure on prevention and by disease from the National Health Accounts

with 13.8% of hospital expenditure, are in second place, followed by neoplasms which account for 11.9%. Next are injuries and poisonings and diseases of the digestive system which account for 9.4% and 6.9% respectively of hospital care.

Expenditure on ambulatory care is dominated by infections of the mouth and teeth (28.3%). Diseases of the musculoskeletal system represent about 13.4%, followed by injuries, respiratory diseases and cardiovascular diseases with between 6.6% and 6.8%. No other category exceeds 5% of ambulatory care expenditure. Finally with regard to drug expenditure, diseases of the circulatory system predominate, with 17% of expenditure on drugs in 2002, followed by diseases of the ear (16.3%) and of the respiratory system (13.6%).

Limitations to note in the analysis

Although this analysis of health expenditure is interesting and informative, there are certain limitations in this new version of disease based health accounts. They concern first inadequacies in the data sources and related problems in distributing expenditure, and secondly, the need to infer a disease for certain types of care which initially lack a diagnosis or an associated intervention (drugs, biological examinations, technical interventions). Furthermore, ICD10 codes do not always capture the reality of certain types of intervention, particularly when socio-economic problems are the cause of hospitalisation rather than disease per se. Finally, using a single principle diagnosis to determine allocation keys with regard to hospital care can underestimate the importance of certain diseases, particularly for elderly persons or for follow-up care and rehabilitation.

Disease-based accounts throw new light on the resources invested in different diseases in the health system, for those involved both in financing and working in the system. However the impossibility of allocating expenditure to complications of a given disease must be taken into account when interpreting the results in terms of public health. We must avoid the temptation to assess them in terms of the care process or of "cost of illness" as defined by health economists. However, the medicalisation of health accounts can be regarded as the first step in a global process towards measuring the efficiency of the health system. Comparing expenditure with other health system performance indicators will open new lines of research and improve our understanding of how the system functions.

Further information

Fénina A., Geffroy Y. (2006) ; Les comptes de la santé en 2005, *Études et Résultats* n° 505, juillet, DREES.

Le Fur P., Paris V., Pereira C., Renaud T., Sermet C. (2003) ; Les dépenses de prévention dans les comptes nationaux de la santé : une approche exploratoire, *Questions d'économie de la santé* n° 68, juillet, IRDES.

Minc C., Renaud T., Sarlon E., Sermet C. (à paraître) ; *Les dépenses de prévention en France, Estimation à partir des comptes nationaux de la santé de 2002*, IRDES.

Paris V., Renaud T., Sermet C. (2002) ; Des comptes de la santé par pathologie, un prototype pour l'année 1998, *Questions d'économie de la santé* n° 56, septembre, IRDES.

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