

Cost of illness in the Netherlands

Highlights

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INTRODUCTION

In 1999 the Netherlands spent about 9.6% of its Gross Domestic Product (GDP) on health care. This is about 36 billion Euro in total and 2300 Euro per capita for 16 million inhabitants.

This report deals with questions like: *'Which diseases are the most expensive in the Netherlands?' 'Do Dutch elderly use much more health care than younger people do? Which type of care is used most and for which diseases?'* In order to address these questions all health care costs in the Netherlands were simultaneously attributed to health care sectors, diagnoses, ages and gender (*table 1*).

Table 1. Summary of dimensions and divisions of Dutch health care costs.

Dimension	Subdivision	Main division
Care Sector (original)	21 sectors; 70 subsectors	9 main sectors
Care sector (ICHA-HP)*	24 sectors (sublevel one)	9 main ICHA-HP sectors
Diagnosis	96 diagnostic groups	17 Chapters of ICD-9
Age	21 groups: 0, 1-4, 5-9,...., 95+	8 groups: 0, 1-14, 15-24, 25-44, 45-64, 65-74, 75-84, 85+
Gender**	men, women	men, women

* ICHA-HP: international classification of health care providers (OECD, 2000).

** Costs of reproduction, pregnancy and childbirth were attributed to the mother.

Six *Highlights* are presented in this summary:

- **Costs of diseases**
Description of Dutch health care costs in 1999 by health care sector, disease category, age and gender.
- **Costs of risk factors**
Attribution of health care costs to risk factors and some kinds of unhealthy behaviour.
- **Costs of health care in the last year of life**
Description of health care costs in the last year of life by age and causes of death.
- **Trends**
Description of trends in health care costs between 1994 and 1999.
- **Projections**
Demographic forecasts of future health care costs
- **Cross-national comparisons**
Comparison with cost of illness data from other countries and a discussion about the comparability of these figures.

More details can be found in the study report *'Kosten van ziekten in Nederland – de zorgeuro ontrafeld'* (in Dutch). All figures - with a short explanation in English - are available on: www.costofillness.nl.

COSTS OF DISEASES

Health care sector

In 1999 health care costs in the Netherlands amounted to 36 billion Euro. Most costs were made in hospitals (see *table 2*). The Dutch health care system comprises a large variety of long-term care provisions, of which nursing homes and homes for the elderly take a large share of the total health expenditure. Compared to other countries pharmaceutical costs were relatively low in the Netherlands.

Table 2. Dutch health care costs in 1999 by sector (million Euro, share in %).

Sector (ICHA-HP)	Million Euro	%
HP.1: Hospitals	12,364	34.3
HP.2: Nursing and residential care facilities	8,556	23.7
<i>Of which</i>		
Nursing facilities	3,034	
Community care for the elderly	2,961	
HP.3: Providers of ambulatory health care	5,962	16.5
<i>Of which</i>		
General practitioners	1,050	
Dentists	1,029	
Home care	1,815	
HP.4: Retail sale and other providers of medical goods	5,204	14.4
<i>Of which</i>		
Pharmaceutical care	3,175	
Retail sale and other suppliers of optical glasses	539	
HP.5: Provision and administration of public health programs	1,781	4.9
HP.6: General Health administration and insurance	1,129	3.1
HP.7: Other industries (rest of the economy)	773	2.1
HP.9: Rest of the world	264	0.7
Total	36,033	100.0

Gender and age

Dutch women used more care than men. The costs for women represented 58% of total health expenditure in 1999, while 42% was spend on men. The difference is mainly caused by the higher life expectancy of Dutch women as compared to men (see *figure 1*, left panel). Women live longer than men do while they also spend more years in ill health. The gender difference resulted furthermore from the costs of reproduction, pregnancy and childbirth which have in this study been attributed to the mothers.

As in other Western countries, costs per inhabitant increased more or less exponentially with increasing age. This pattern was more or less similar for men and for women (*figure 1*, right panel). Costs for newborn children were relatively high because of intensive and expensive care for a small group of newborns with a weak condition. During childhood and adulthood costs were low and stable. From the age of 60 onwards the costs of care are rising fast up to more than 30.000 Euro per inhabitant for people 95 years and older.

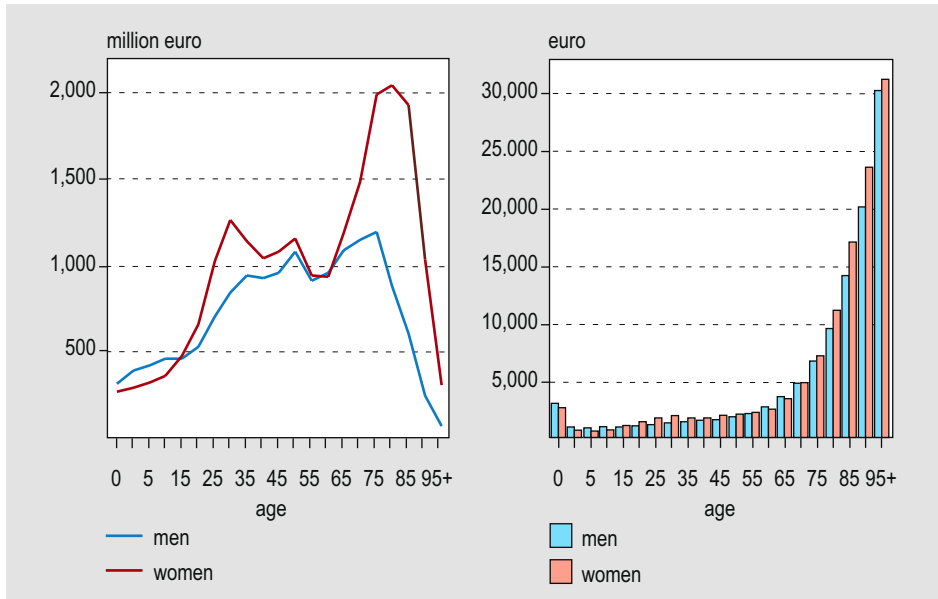


Figure 1. Costs of health care in the Netherlands in 1999 by age and gender. Total costs in millions of Euro (left panel) and average costs per inhabitant in Euro (right panel).

Diagnosis and gender

Of the 36 billion Euro that were spent on health care in the Netherlands in 1999 a mere 82% could be attributed to the specified disease categories. Not attributed were those costs that have no relationship with specific diseases, such as costs of medical-social support and costs of living in some institutions ('not disease related'), nor the costs for which no adequate data about the use of care were available ('not yet attributable').

Health care consumption and the resulting costs were quite different for the 17 chapters of the ICD-9: high costs for mental illness, cardiovascular disease and for diseases of the digestive system; low costs for diseases of the blood, for congenital malformations and for infectious diseases (see figure 2). Rather surprising were the relatively low costs for cancer, one of the major causes of death. Despite the higher costs for women, the overall distribution of costs among the ICD-chapters was more or less the same for both sexes.

After a further division of costs into specific diseases it appeared that the 10 most costly diseases together made up about 40% of total Dutch health care costs. This is slightly different for men (39.9%) than for women (36.7%). The ranking of these 'top-ten' diseases is quite different, however, for men and women (see table 3). For men, intellectual disability (mental retardation) was top of the list with 10.3% of total costs. For women, mental retardation ranked third (5.9%). For women most costs were associated

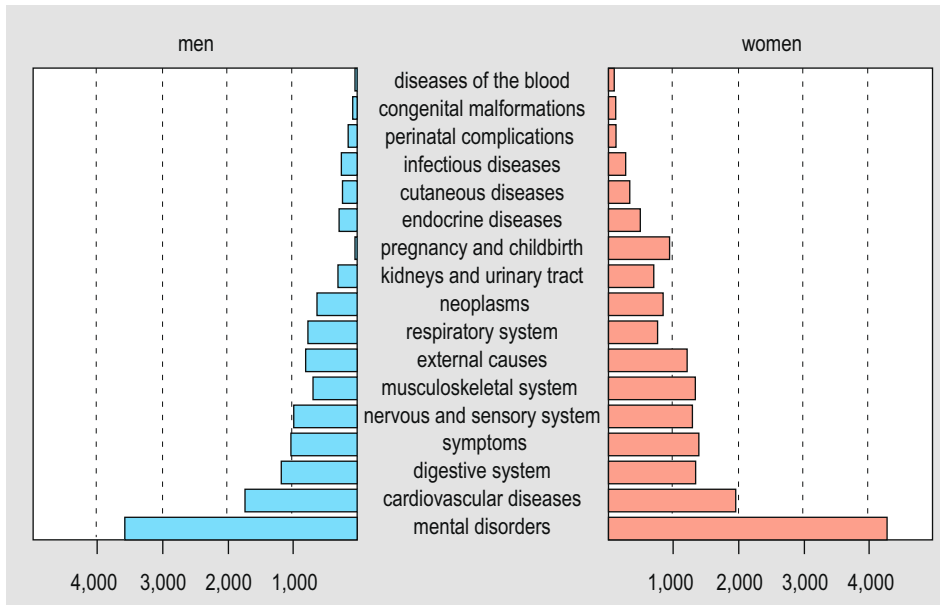


Figure 2: Costs of Dutch health care in 1999 by ICD-chapter and gender (millions of Euro).

with dementia and with symptoms and ill defined conditions. The costs for coronary heart disease are much higher for Dutch men than for women (3.9% and 1.6%, respectively).

The costs for intellectual disability are high in the Netherlands, because the health care system comprises living arrangements as well as provisions related to social-welfare.

Symptoms constitute a large cost category for both Dutch men and women. This involves, for instance, many of the first visits to GP's or to acute care facilities, when no diagnosis is available yet.

Table 3: Top-10 of disease categories by cost and by gender in 1999 (costs in millions of Euro, share in total costs per gender as percentage).

rank	Men	million Euro	%	Women	million Euro	%
1	Intellectual disability	1,554	10.3	Symptoms	1,352	6.5
2	Symptoms	1,030	6.8	Dementia	1,313	6.3
3	Coronary heart disease	584	3.9	Intellectual disability	1,226	5.9
4	Dental problems	568	3.8	Pregnancy	763	3.7
5	Dementia	448	3.0	Stroke	612	2.9
6	Visual impairment	441	2.9	Dental problems	603	2.9
7	Stroke	417	2.8	Visual impairment	579	2.8
8	Complications and violence	333	2.2	Accidental fall	471	2.3
9	Asthma en COPD	328	2.2	Complications and violence	405	1.9
10	Neck and back complaints	236	1.6	Coronary heart disease	345	1.6
	Total	5,940	39.3	Total	7,668	36.7

Diagnosis and age

The costs of diseases are strongly interrelated with age. Within nearly all ICD-chapters most care was used by elderly people (see figure 3). For pregnancy, congenital malformations and for perinatal complications a different pattern emerged, of course. Pregnancy related costs for 0-year olds pertain to hospital costs for healthy babies. Similarly, the costs of infectious diseases have been attributed for a substantial part to the youngest age groups, among others because of the costs of the National Vaccination Programme. For diseases of the digestive system, the share of children and adults is relatively high because of the costs for dental care. For adults this disease category also includes the costs of acid reducing pharmaceuticals.

Health care sector and age

Figure 4 shows for each age group the distribution of costs among different health care provisions. For newborn children the major contribution was by hospital care. During adulthood the relative use of hospital care and pharmaceuticals increased, while for the elderly nursing care was the major contributor. This figure gives an impression of health care needs during course of life, given the age pattern of per capita costs in figure 1. Figure 4 is based on definitions for health care provision that are used in the Dutch health care system. In addition to this Dutch care sector division we translated the cost figures into the classification of the Systems of Health Accounts (ICHA-HP). The results are available from www.costofillness.nl.

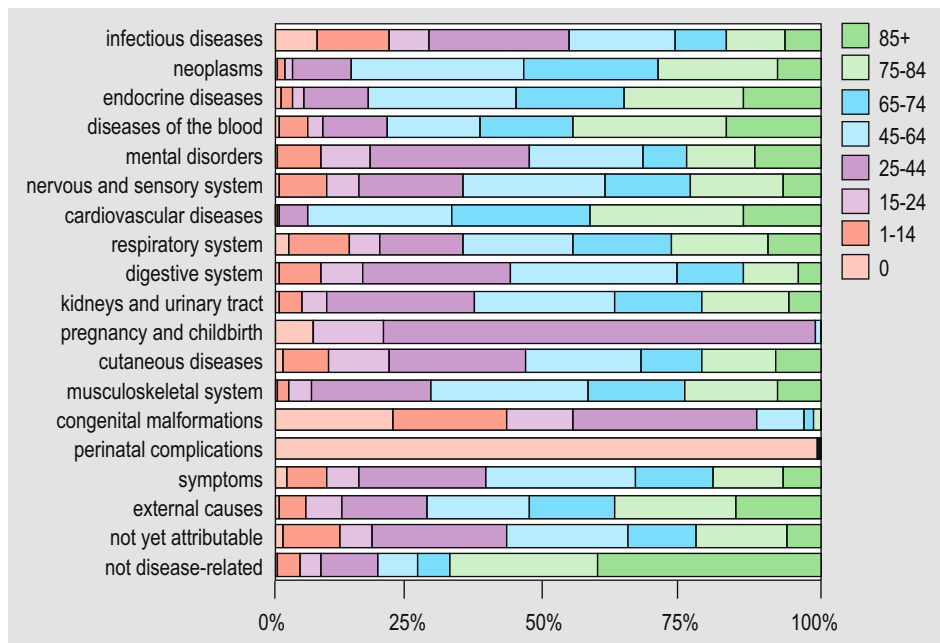


Figure 3: Share of age groups in total health care costs per chapter of the ICD-9 in 1999 (%).

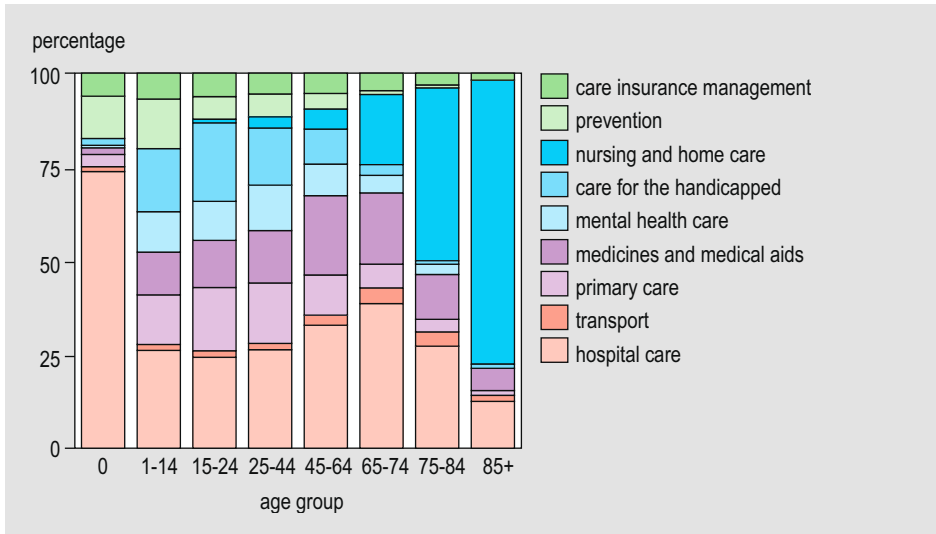


Figure 4: Share of health care sectors in total health care costs per age group in 1999 (%).

COSTS OF RISK FACTORS AND UNHEALTHY BEHAVIOUR

Smoking, alcohol abuse, overweight, high blood pressure, unsafe sex and air pollution are examples of a lot of factors that contribute to the burden of disease. Smoking, for instance, causes 87% of lung cancer mortality and about 60 – 70% of all new cases of diabetes are attributable to serious overweight in the Netherlands. The Dutch cost of illness data enabled us to attribute costs of diseases to certain risk factors.

Below we present results from a pilot study using population attributable risks (PAR's) for the Dutch population of 20 years and older. Risk factors were divided into biological risk factors and more behavioural factors.

For the year 1999 more than 1.5 billion Euro could be attributed to three biological risk factors (table 4). This amounted to about 4.8% of all health care costs for people over 20 years of age. The major part of these costs was caused by hypertension. Preventive medicine played a major role here, which was also the case for cholesterol and the costs of statines.

Table 4: Costs of health care in the Netherlands attributed to biological risk factors and gender in 1999 for people aged 20 years and older (million Euro).

Factor	Men	Women	Total
Blood pressure	359	353	712
Cholesterol level	195	122	317
Obesity	258	247	505
Total	812	722	1,534
Share of health care costs	6.2%	3.8%	4.8%

A smaller amount, almost 1.4 billion Euro, could be attributed to behavioural risk factors, especially smoking (see *table 5*). It is clear that this will be caused by the relatively high risk taking behaviour of Dutch men as compared to women. As there are interrelationships between the various person related and behavioural risk factors, for instance physical inactivity and overweight, the figures from both tables cannot be added up.

Table 5: Costs of health care in the Netherlands attributed to behavioural risk factors and gender in 1999 for people aged 20 years and older (million Euro).

Factor	Men	Women	Total
Smoking	334	175	509
Physical inactivity	111	89	200
Too little fruit/vegetables	87	55	142
Alcohol or drug abuse	226	86	312
Saturate fat consumption	127	74	200
Total	884	479	1,363
Share of health care costs	6.8%	2.5%	4.2%

Given the current state of epidemiological knowledge it was not possible to address all costs of all diseases to risk factors. For many diseases the contribution of risk factors to their incidence or prevalence is still uncertain or unknown. We therefore only included the eight factors for which sufficient quantitative data was available about prevalence of the disease in the Netherlands and as well as about the magnitude of the relative risks. We also selected risk factors that could be influenced by prevention, either fully or partially. Risky and unsafe driving behaviour, for instance, was not included in the analysis. It is clear that a part of all accidents might be attributed to unsafe driving, but the amount is not known.

Due to these limitations the costs of risk factors were underestimated as well as the costs of prevention. We cannot estimate, therefore, the cost savings of an optimal lifestyle. This has several reasons:

- Replacement or postponement of disease: by taking up a healthier lifestyle people will on average live longer, but later in life they might severe from other, even more costly, diseases.
- The biological risk factors are only partially amenable to prevention.
- Population Attributable Risks (PAR's) are based on observational research and it is therefore not certain that the effect of eliminating the risk factor will have an effect that is equal to the PAR.

COSTS IN THE LAST YEAR OF LIFE

Health care costs not only depend on age but also on the phase of life. For some people costs of birth are high (see above). For most people health care needs and costs are high in the last year of life. There is a popular hypothesis that *figure 1* is dominated by costs in the last year of life. In this view costs among the elderly are high because mortality rates are high in the older age groups.

For the calculation of health care costs prior to death a different approach is needed than is used for the cross-sectional Cost of Illness (COI) methodology. We used health insurance data of 2.1 million inhabitants, representing 13% of the total Dutch population. At the individual level we paired cost data with official mortality data from Statistics Netherlands, resulting in 16,702 unique matches of people who died in 1999. We calculated the costs in the last year of life as the costs made in the 365 days prior to death. The cost figures comprised all somatic care, as well as nursing homes and home care.

On average health care costs in the last year of life were 11.5 times higher than in other life years. Costs summed up to 15,000 Euro including all somatic care, nursing homes and home care. There were no significant differences between men and women. Costs for heart attacks and injuries were relatively low (see *table 6*) due to the unexpected character and high fatality of these events. Costs also differed between the other causes of death, but on average the differences were small. It is obviously the proximity of death that induced the need for care rather than the specific disease. Many elderly people are frail and suffer simultaneously from several diseases.

Table 6. Average health care costs in the last year of life by gender and cause of death. Costs in Euro. Added are number of deaths and share of different causes in total mortality in this sample.*

	men	women	Total	Number of deaths	%
Infectious diseases	24,884	18,072	21,698	201	1.2
Cancers	17,835	19,679	18,669	4,981	29.8
Diabetes	17,034	19,002	18,280	425	2.5
Mental disorders	13,095	11,997	12,341	435	2.6
Nervous system	20,978	13,950	17,088	365	2.2
Heart attack	7,256	9,074	8,068	1,740	10.4
Stroke	14,181	13,461	13,747	1,470	8.8
Other cardiovascular	12,732	12,452	12,586	2,946	17.6
Pneumonia	15,934	12,560	13,954	680	4.1
Asthma and COPD	15,888	19,163	17,126	865	5.2
Digestive tract	16,617	16,491	16,543	623	3.7
Musculoskeletal system	22,459	19,800	20,686	108	0.6
Urinary tract	25,047	20,015	22,211	362	2.2
Injuries	7,897	10,747	9,400	436	2.6
Other	10,013	12,017	11,193	1,065	6.4
Total	14,761	15,044	14,906	16,702	100.0

* Somatic care, nursing homes and home care

Health care costs in the last year of life also depend on age. *Figure 5* shows a sharp contrast with the average costs of the whole population as depicted before in *figure 1* (right panel). Costs were high for people who died at relative younger ages, and turned out to decrease with increasing age of death, mainly due to a decrease in hospital care. The comparison of both figures shows also that elderly people consume a lot of long term care, mainly provided by homes for the elderly, that does not depend on the approaching death. We conclude that health care costs in the last year of life play an important role, but do not dominate the age patterns in total health care costs. Especially among the elderly costs were high due to the use of long term care more or less independent from the time to death.

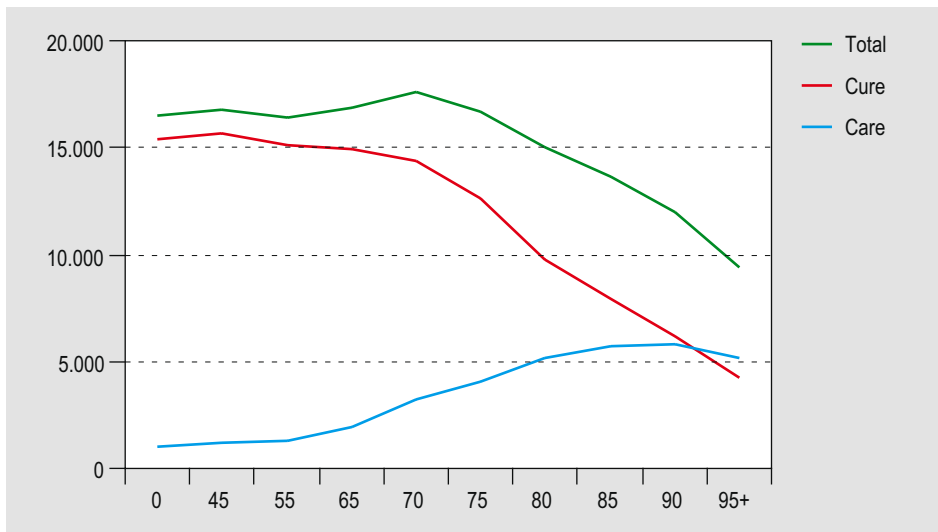


Figure 5: Health care costs in the last year of life by age and type of care (cure versus nursing homes and home care). Average costs per deceased in 1999 (N=16,702).

TRENDS

In an earlier study we collected the Dutch cost of illness data for 1994. Combining those data with the newer data for 1999 enabled us to analyse trends over this period in some detail. The actual comparisons were complicated, however, by the fact that definitions of certain care sectors had changed within this period and also because both studies occasionally used different data sources. We have corrected as much as possible for these differences. Incomparable sectors were excluded, for instance. With regard to age and gender about 88% of total expenditure in both years could be compared. For comparisons of costs by diagnosis this share was 84%.

Between 1994 and 1999 the total comparable health care costs have increased by 4.5% per year. This growth rate contains price effects, demographic changes and other developments. These other developments include a variety of different factors, such as

medico-technological changes, which lead to replacing older, mostly cheaper, technologies with better and more expensive ones as well as cultural changes, such as increasing demands for health care at lower complaint levels.

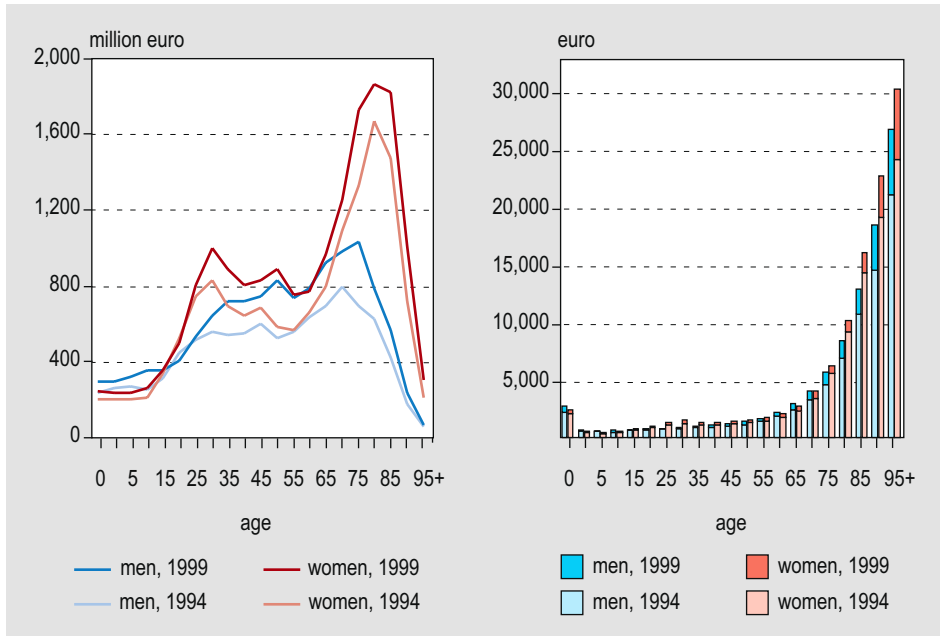


Figure 6: Trends in Dutch health care costs (comparable sectors) by age and gender. Total costs in million Euro (left) and average costs per inhabitant in Euro (right).

Trends by age and gender

Over the period 1994-1999 the total costs increased for nearly all age groups (see figure 6, left panel). The increases appeared to be highest for the larger cost groups in 1994. The cost increase, therefore, reinforced the existing age profiles per inhabitant, both for men and for women (figure 6, right panel). In the left panel of figure 6 developments in total costs are shown, including demographic changes. The post-war baby boom causes a peak in total costs that has shifted from ages 45-49 in 1994 towards the age group 50-54 in 1999. The total demographic changes caused a cost increase of 1.1% per year. Costs for men increased slightly more than for women, which is in line with the relatively stronger increase in life expectancy for men in the Netherlands over this period.

Trends by diagnosis and gender

The cost development also differed for the various diseases. *Table 7* presents a detailed picture of the major trends by diagnosis and gender, both for the total costs and the costs per inhabitant.

The costs for female cancers increased more than average and for male cancers less than average. Both trends were mainly determined by the epidemiology of lung cancer, where the prevalence among women increased and decreased among men.

The big cost increase for endocrine disorders originated nearly completely from the increase in the number of patients with diabetes and more specifically from higher expenditure for pharmaceutical care. Men experienced an even higher increase than women did, especially caused by increases in hospital care. Demographic changes such as population growth and ageing have caused an increased prevalence of diabetes and an increase of people with obesity in the Netherlands, a known risk factor for diabetes.

Table 7: Cost development in the period 1994-1999 by ICD-chapter and sex. Total costs in 1999 in millions of Euro. Annual growth rate of total costs and of costs per capita as percentages.

ICD-9 Chapter	Men			Women		
	Costs 1999*	Growth rate	Growth per capita	Costs 1999*	Growth rate	Growth per capita
Infectious diseases	202	7.1	6.3	210	5.0	4.3
Cancers	515	4.3	2.7	694	5.3	4.0
Endocrine system	218	11.7	10.1	344	6.2	4.9
Diseases of the blood	42	7.6	6.1	63	7.1	5.9
Mental health	3,402	5.1	4.6	3,986	3.5	2.5
Nervous system and senses	592	1.3	0.3	746	1.6	0.6
Cardiovascular system	1,596	5.1	3.3	1,628	3.7	2.3
Respiratory system	599	3.1	1.9	546	4.4	3.4
Digestive tract	1,079	2.1	1.0	1,177	1.6	0.7
Urinary tract	221	2.3	0.9	477	5.0	4.1
Pregnancy and fertility	32	5.8	5.2	807	14.9	15.6
Skin	169	2.3	1.6	216	- 13.1	- 13.2
Musculoskeletal system	532	- 0.1	- 1.1	970	1.5	0.4
Congenital anomalies	61	- 1.3	- 1.7	63	- 0.6	- 0.8
Perinatal conditions	117	8.4	7.8	100	7.8	7.2
Symptoms	834	15.4	14.1	1,067	11.3	10.2
External causes	521	4.8	4.0	805	4.6	3.3
Not yet attributable	558	2.4	1.5	612	3.0	2.2
Not disease related	406	4.7	3.0	1,446	4.7	2.8
Total	11,691	4.6	3.5	15,955	4.0	2.9

* These cost figures may differ slightly from those in other tables and figures as different health care sectors have occasionally been selected.

The costs of pregnancy and childbirth and diseases of the perinatal period increased considerably, especially for hospital care. Several interacting factors could be mentioned here: increasing costs for fertility treatments, a higher fertility rate, increasing numbers of premature births and multiples, caused, among others, by an increasing

average age at birth of Dutch mothers. Striking, although relatively unimportant from a cost perspective, is the huge decline in costs for skin diseases among women. This was mainly caused by a decrease in hospital care for these diseases.

The annual growth rate for symptoms was considerably higher than average. Two possible explanations can be mentioned: patients went earlier to the medical system resulting in the registration of less specific diseases, or registering practices changed for the various health care sectors over the years, especially in primary health care. This phenomenon needs further investigation.

PROJECTIONS

Since average health care costs increase with age, total health expenditures will increase by ageing. We made some projections based on the cost of illness data and reckoning with the different pattern of the health care costs in the last year of life. Five effects could be distinguished: more people, more elderly people, longevity, higher age of death and increasing health care use (see *table 8*).

Table 8: Projections of future health care costs (fixed prices) in 2002-2010 and 2010-2020 based on demographic changes and major trends in health care use (annual growth rate in %).

	2002-2010			2010-2020
	men	women	total	total
Growth of the population	0.6	0.6	0.6	0.4
Ageing	0.8	0.4	0.6	0.7
- more elderly people	0.42	0.43	0.43	0.58
- longevity	0.40	-0.04	0.14	0.15
- higher age of death	-0.06	0.02	-0.02	-0.04
Trends in health care use *	2.3	1.8	2.0	2.0
Total	3.6	2.8	3.1	3.0

* Based on the increase in the use of care per inhabitant by age and gender in 1994-2002, resulting from, among others: epidemiological change, changing demands, new technologies, changes in supply and governmental policies.

Growth of the population

In 2002 the Netherlands counted 16.1 million inhabitants. According to demographic forecasts of Statistics Netherlands this number will increase to 16.9 million in 2010 and 17.5 million in 2020. More inhabitants imply higher health care costs. With all other factors fixed we estimated that in 2002-2010 health care supply needs a 0.6% increase to maintain the care on the levels of 2002. Subsequently for 2010-2020 and increase of 0.4% will be required. Price developments are additional.

Ageing

All other factors, however, are not fixed and will change as well. The most important demographic development is the relative increase of elderly people. In 2002 13.6 percent of the Dutch population was 65 years and older. This share will increase to 14.8% in 2010 and 20% in 2020. As a result the need for care will increase yearly by 0.43% in 2002-2010 and even more in the next decade.

In addition to changing cohorts ageing also comprises the effects of longevity. It is assumed that life expectancy at birth of Dutch men will increase to 77.0 and 77.9 years in 2010 and 2020, respectively. For women a slight decrease is expected followed by an increase to 81.1 years in 2020.

Given the shape of *figure 1* (right panel) an increase in life expectancy will be followed by increasing health care costs. In our projections this effect requires a 0.14-0.15% annual increase in health care supply during the whole period, with substantial differences between men and women. Again this figure assumes fixed prices and maintaining the levels of care in 2002. Investments for reducing waiting lists and improving quality of care are additional.

Last year of life

Due to longevity people will on average die at higher ages. Given the shape of *figure 5* this phenomenon has a declining effect on the cost development. The estimated effect on total health care costs turned out to be very small, mainly as result from the relative small changes in life expectancy.

Trends in health care use

In all projections we assumed equal care as in 2002. We know, however, that this 'business-as-usual' hypothesis is not valid. Everything will change and it is likely that health care costs per inhabitant will increase. However, we do not know the magnitude. We only might suppose that trends in the previous decade would pertain in the next one. If that is the case, health care costs will increase further by an annual rate of 2.0%. This trend comprises a mix of intertwined effects, such as epidemiological and technological change and governmental policies. We know that the actual cost development will be different, but the main lesson here is that demographic effects are rather modest compared to changes in health care use. Because the latter effects can, at least partly, in principle be influenced, this imposes a strong responsibility on the Dutch government for a sustainable health care system.

CROSS-NATIONAL COMPARISONS

Several countries carried out a more or less comparable cost of illness study. Of the studies mentioned in the OECD Health Data we selected six countries for which a detailed background report was available (see *table 9*). More details about the selection and more elaborate comparisons can be found in the PhD-thesis of Johan Polder (2001).

Table 9: Cost of illness in six countries. Share of ICD-9 chapters in the total costs with variation.

ICD-9 Chapters	AUS ^a 1993	CAN 1993	ENG 1993	GER 1994	NET 1994	SWE 1991	Variation coefficient ^b
Infectious diseases	2.7	1.8	3.7	1.9	1.3	2.0	36%
Cancers	6.1	7.3	8.3	5.2	3.9	5.6	26%
Endocrine system	3.1	3.0	2.9	3.9	1.9	3.4	23%
Diseases of the blood	0.6	0.6	1.6	0.6	0.3	0.5	71%
Mental health	8.4	11.4	14.4	10.9	23.1	18.4	38%
Nervous system and senses	7.4	5.1	3.4	8.4	5.2	5.8	31%
Cardiovascular system	11.7	16.7	25.7	12.4	10.5	16.9	36%
Respiratory system	8.0	8.6	9.8	5.2	4.0	7.7	30%
Digestive tract	11.8	7.5	8.3	15.9	7.8	4.6	43%
Urinary tract	5.3	5.1	6.8	5.0	2.8	3.8	29%
Pregnancy and fertility	3.3	4.6	-	2.5	2.6	1.6	38%
Skin	3.0	2.0	3.1	2.3	1.6	2.0	26%
Musculoskeletal system	9.5	5.6	7.3	12.6	6.0	5.4	36%
Congenital anomalies	0.6	0.7	-	0.4	0.5	1.2	44%
Perinatal conditions	0.8	1.2	-	0.3	0.6	0.6	43%
Symptoms	4.3	4.2	-	4.7	4.8	5.6	13%
External causes	8.3	7.1	-	7.9	4.2	5.6	26%
Not attributed	5.1	1.2	-	0.0	18.8	9.2	111%
Total costs	100.0	93.8	95.3	100.0	100.0	100.0	

a) AUS = Australia, CAN = Canada, ENG = England, GER = Germany, NET = Netherlands, SWE = Sweden

b) Variation coefficient = standard deviation/average

From this table we conclude that:

- The global distribution of costs among the chapters of the ICD-9 was more or less similar for these 'western' countries: high costs for mental illness, cardiovascular diseases and diseases of the gastrointestinal and musculoskeletal systems; low costs for congenital malformations, perinatal conditions and infectious diseases.
- There were huge differences between countries for some major disease groups, especially mental illness, cardiovascular diseases and diseases of the gastrointestinal and musculoskeletal systems.
- In the English study some ICD groups were lacking.
- There were substantial differences in the part of costs that could not be attributed to any disease category.
- The total figures for Canada and the UK did not add up to 100%.

Three important factors appeared to be responsible for these international differences: a) different definitions of health care; b) different methods of cost attribution; c) differences in populations and treatment practice.

Different definitions of health care

- Health care facilities that exist in one country do not exist in other countries. Examples are homes for the elderly, which, as such, only occur in the Netherlands and health resorts, which occur in some other countries but not in the Netherlands.
- Health care facilities differ between countries. A nursing home, for instance, is quite different in the UK compared to the Netherlands.
- The definitions of the health care system differ between countries. Some, even comparable, facilities can be found in all countries, but are considered as a part of the health care system in some countries while they are excluded in others. An example is the care for people with disabilities, which falls outside the health care definition in for instance Australia.
- The extent in which care sectors were included in the COI study differs between countries. The figures of 100% in *table 9* comprise different sets of facilities in the different countries.

Different methods

All studies in *table 9* used top-down methods. However, within this approach, large differences existed in data and methods. In the English study, for instance, the costs of pharmaceutical care were attributed to diseases by expert opinions, while in the Dutch and other studies data on prescriptions was used.

Differences in populations and treatment practice

Health care utilisation and expenditure differ as a consequence of international differences in health status and health care demand. Demographic and epidemiological variations play an important role here.

Finally, health care utilisation and costs differ as a result of international differences in treatment and the provision of care. Medical practice variations play a role, but also attitudes and cultural differences. An interesting example of such differences is, for instance, the observation that in the Netherlands the rate of Caesarean sections is the lowest in the European Union. At the same time we know that certain indicators for potential complications of pregnancy, such as the average age of a mother at birth, are high in the Netherlands as compared to most other countries.

General methodological conclusions and recommended checklist

In general, cost of illness figures can not be compared between different countries. Standardisation of methods and definitions will be the way to improve the comparability of cost of illness studies. For better cross-national comparisons it is required that all countries use a ‘common comparable package’ approach at a level of detail that allows for flexible reconstruction of different sector definitions. Adopting the System of Health Accounts approach may be a first step in a longer process of harmonisation. In the meantime we advise the following checklist when comparing cost of illness figures (see *table 10*).

Table 10: Checklist for interpretation and comparison of cost of illness data

1. Which type of costs are included? Only health care costs or also other costs as productivity losses and absence from work?
2. Are all sectors of the health care system included or are some left out?
3. What is the definition of the disease and how is it classified?
4. Are the costs calculated bottom up or top down?
5. Are productivity losses based on the human capital or the friction costs methodology?
6. What is the year for which data are collected?
7. Have foreign data been used and how?
8. Is the study population representative for the national population and is the treatment practice representative for the generally acknowledged way of treatment?
9. Are the diagnoses well reported?
10. How has been dealt with co-morbidity?

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As the references in the original Dutch report are mainly to articles and reports in Dutch, it would be best to contact one of the authors at the RIVM for further information.

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