Chapter 3. Re-examining the cost pressures on health systems[1]

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3.1 Introduction

Policy-makers and lay-people alike know that health-care costs have risen considerably and continue to rise. However, myths and misunderstandings often shape any debate as the underlying factors, their effects and interactions may not be well-understood. Ageing or (more broadly) the demographic transition, is the most often quoted driver although economic growth and the resulting higher incomes; medical progress through innovation and new technologies; health-care organization and financing; higher relative prices for health-care inputs; and the increasing expectations of citizens can all lead to higher expenditure. This chapter reviews recent research and evidence in order to provide an assessment of the present and potential future impacts of these drivers on health expenditure.

Before more detailed examination of the evidence from studies on the different drivers, it is useful to clarify the different (but closely related) concepts of health-care costs, expenditure and public or quasi-public spending. Higher expenditure may result from higher unit costs for the existing volume of services or from increases or changes in patterns of service use. Public or quasi-public funding agencies (including social health insurance funds) typically focus more on their own expenditure and may be less concerned about costs to patients and their families. Macroeconomic policy-makers may be concerned about the extent to which health spending (by anyone) may crowd out spending on investments associated with increased economic growth. The policy debate is not always clear about what are the main concerns.

The first, and largest, section of this chapter examines the role of the main drivers of health expenditure outlined above. The latest evidence on current health care expenditures and projections is presented and assessed in the second section. The chapter concludes with a summary of our findings and their policy implications

3.2 Drivers of health expenditure growth

When examining the determinants of health expenditure, international literature groups itself roughly around the following "culprits":

- ageing and demographic change;
- economic growth and higher incomes;
- improvements in technologies and medical understanding and new opportunities for effective interventions;
- organization and financing of health-care systems;
- higher relative prices for health-care inputs;
- increasing expectations of populations.

[1] In: MCKEE M, FIGUERAS J (eds.) (2012) Health Systems: Health, Wealth and Societal Well-Being. Maidenhead: OUP, p. 37-60

These determinants are addressed below in light of recent evidence. This chapter focuses primarily on external cost pressures, therefore the determinant organizations and financing of the system are not discussed here.

3.2.1 Ageing and demographic change

There is a widespread belief that health care costs rise steeply with age. Services for elderly people absorb between 35% and 50% of total health expenditure (*1*). This concern is heightened because European populations are likely to change dramatically in the next decades, as shown in various projections undertaken by the European Union *(2,3)*, Organisation for Economic Co-operation and Development (OECD) *(4)* and the World Bank *(5)* .

A recent European Commission publication (Economic Policy Committee and European Commission) *(3)* highlights three major demographic trends in the EU25:

1. Fertility rates are projected to remain well below the natural replacement rate.

2. Life expectancy at birth is projected to rise by six years over the next five decades.

3. Inward migration will add 40 million people between 2002 and 2050. This will only partially counterbalance the two former trends therefore the total population of the EU25 will drop slightly from 457 to 454 million between 2004 and 2050 *(3)*.

These trends will result in dramatic changes in the age structure of the population. The working age population (15–64 years) is projected to fall by 48 million (or 16%) between 2010 and 2050. In contrast, the population aged 65+ will rise sharply by 2050 (58 million or 77%). More significantly, the numbers in the very old age groups will rise even more rapidly. The old-age dependency ratio (the number of people aged ≥65: number of people aged 15–64) is projected to double, reaching 51% in 2050. Assuming no change in the current age of retirement, EU25 countries will move from the current situation of four people of working age for every elderly citizen to a ratio of two to one by 2050 *(3)*.

In the same way, a World Bank study *(5)* contains very striking projections for the countries of central and eastern Europe (CEE) and the Commonwealth of Independent States (CIS). By 2025, the median age will rise by 10 years in about half of these countries and the population will shrink in 18 of the 28 countries in this region. The population of the Russian Federation fell from 149 to 143 million between 1990 and 2005 and is projected to fall even further – to 111 million by 2050. The share and number of people over the age of 65 will continue to rise, reaching one person in every five in most of the region's countries by 2025. The combination of rapidly ageing and relatively poor populations is unique to this region.

Both ageing per se and new treatment options will have a significant impact on the health needs of the population and related patterns of disease. This is likely to increase, and certain to change, demand for health services and require changes to their organization and structure. For instance, as higher numbers of people live to over 80 and 90 years, more people will need long-term health-care services and specialized social services.

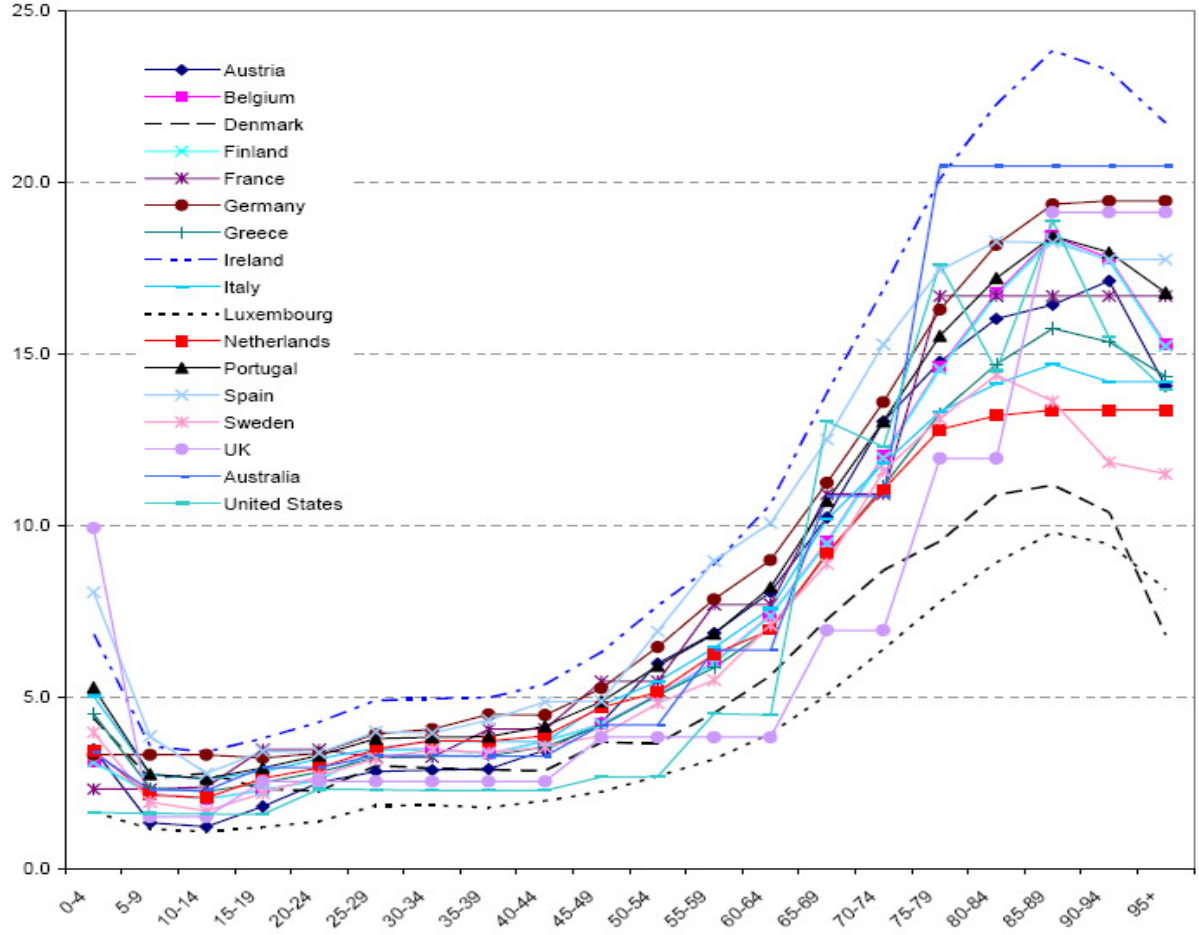
Ageing and health-care financing

Ageing poses two (potential) sets of pressures for financing the health-care system: (i) decreasing income, and (ii) increasing utilization and health service expenditure. The former

is a particular concern since the total dependency ratio will rise (i.e. fewer persons will bear the costs of funding the system). In other words, intergenerational transfers from the younger to the older generations will continue to increase. Although an increase in retirement age may ease funding problems, it is unlikely that this will completely address the problem of high intergenerational transfers that some authors consider to be a form of inequity *(6)*.

Health-care utilization and costs are even more difficult to project than future dependency ratios. Current per capita expenditure on health care increases with age, i.e. a larger proportion of older people will substantially increase health-care costs if this relationship remains unchanged. The current relationship between age and health-care expenditure is shown in Fig. 3.1.

Fig 3.1 Public spending on health in each age group, share of GDP per capita (%)



Source: OECD *(4)*

Conversely, older people are now healthier than ever and will most likely be even healthier in the future (see discussion on longevity hypotheses below). At any given age, being healthier than the previous generation may well result in fewer health-care needs and reduce utilization or (at least) postpone them, i.e. shift the cost-by-age curve to the right. Thus, the simple belief that an ageing population is automatically leading to increased health expenditure is being questioned by a growing body of evidence that supports a more complicated picture. Increased age may be a useful indicator of the health status of a particular population but it is not the cause. A number of interrelated issues need to be considered as possible explanatory factors. The most relevant of these are: (i) the relationship between increasing life

expectancy, morbidity and health-care expenditure, and (ii) the cost of dying or, rather, proximity to death (rather than age).

Compression of morbidity versus expansion of morbidity

The main question is whether increased and increasing life expectancy (rather than high age) will increase or decrease morbidity and thus health expenditure? Three theories have emerged over the last 30 years.

1. *Compression of morbidity* hypothesizes that morbidity and disability will be gradually compressed at very old age and the years spent with disability and disease decrease *(7, 8, 9, 10)*. Furthermore, humankind is approaching its genetically determined lifespan limit although life expectancy still grows. This part of the hypothesis has been rejected by several authors *(11, 12, 13)*, some recent approximately linear patterns of increasing life expectancy in developed countries suggest that we remain some way from any genetically determined limit to survival *(14)*.
2. *Expansion of morbidity (15, 16, 17)* is a much bleaker hypothesis. In line with popularly held belief, this argues that as life expectancy increases, older people become more vulnerable to chronic diseases. This results in more time spent in ill health, based on the following assumptions: (i) medical interventions prolong the survival of people with chronic illness but do not improve their health state; (ii) increased survival means that a larger part of the population is elderly and more vulnerable to chronic disease; and (iii) chronic disease can act as a risk factor for other illnesses.
3. *Dynamic equilibrium* can be seen as a compromise between the expansion and compression scenarios. Proposed by Manton *(18, 19)*, it suggests that healthy life expectancy grows at the same rate as total life expectancy *(healthy ageing*) and the number of years spent in ill health remains constant. However, it is important to note that as the years in ill health remain constant, the time spent in ill health decreases as a share of total life expectancy.

Although there is no critical body of evidence for any of these three hypotheses, a certain picture emerges. Studies which measure morbidity in terms of self-reported health or health-related quality of life in e.g. Austria *(11)*, Denmark *(20)* or Germany *(21)* tend to confirm the compression of morbidity hypothesis. However, this does not necessarily translate into lower health care expenditure per age group as other factors (such as increased medical possibilities to treat healthier older persons; increased expectations of older persons) may outweigh potential savings.

Given the methodological complexities (such as measuring changes in morbidity, technological possibilities, expectations and differences in health systems) studies in this area are likely to remain difficult. Most studies that project future health-care spending, such as those by the OECD *(4)*, the European Commission *(2, 3)* or the World Bank *(5)*(see discussion below), encompass multiple scenarios which incorporate these hypotheses.

Proximity to death, not age per se

Fuchs *(22)* was the first to point out that the relationship between age and health-care utilization (or costs) is biased by the fact that the percentage of people in their last year of life increases rapidly with age, and that this is a period when people use more services. He hypothesized that if mortality in all age groups above 65 were constant, health-care costs with

age would also be constant. If this is true, then policy-makers' and scientists' attention is being diverted from more significant causes of health expenditure growth.

This view was first supported by Medicare data for 65+ citizens in the United States that also demonstrated two additional complicating factors. First, health-care costs for persons in their last year of life reach a maximum at about the age of 70 (later shown to be even lower in other countries) after which it falls with higher age. Second, health-care costs for the group of survivors rise until the age of about 85 and fall with higher age *(23)*. The marginal increase in lifetime costs associated with an additional year of life decreases as the age at death rises *(24)* However, these studies left a number of questions on the generalizability of these findings given the particular characteristics and incentives in the American health system.

Nevertheless, studies from other countries such as Canada *(25, 26)*, the Netherlands *(27)*, Switzerland *(28, 29)*, Germany (for statutory health insurance: *(30)*; for private health insurance: *(31))* and France *(32)* have generally confirmed the United States' findings and extended this knowledge to younger age groups. Using Italian data, Aprile *(33)* confirmed that the costs of death tend to decline steadily after young and prime ages. More recently, Niehaus *(31)* analysed German private health insurance data for deceased persons over a ten-year period prior to death. These were highest for persons dying at between 50 and 60 years. Evidence from all available sources thus suggests that the costs of dying decline with older age as older people tend to be treated less intensively as they near death *(34)*.

On the basis of the Medicare data, Stearns and Norton *(35)* concluded that "time to death" should be included as an explanatory variable in individual health-care expenditure. This was underscored by a study carried out by Zweifel *et al. (29)* based on Swiss data, which covered a broad age-range (age 30+) as well as various health-care expenditure components. Using the same Swiss data set, Werblow *et al. (36)* also concluded that most components of health-care expenditure are driven not by age but by "closeness to death".

More recently, attention has turned to individual components of health-care expenditure, such as *ambulatory care*, *hospital care*, *drugs* and, perhaps most importantly, *long-term care*. Spillman and Lubitz *(37)* found a continuing shift from acute to long-term care late in life in Medicare data from the United States. They concluded that ageing is the main driver for the demand for long-term care, leaving the acute sector unaffected. This is supported by the finding that nursing-care costs in the last year of life rise with age and this rise almost offsets falling hospital-care costs *(26, 38)*.

Seshamani and Gray *(39, 40)* found that proximity to death is strongly associated with hospital costs for as long as 15 years before death, with age playing a much smaller role. Furthermore, younger decedents do not only incur higher costs shortly before death. The peaks in hospital days for persons in their last year of life are shifting to younger age groups *(26; 41)*.

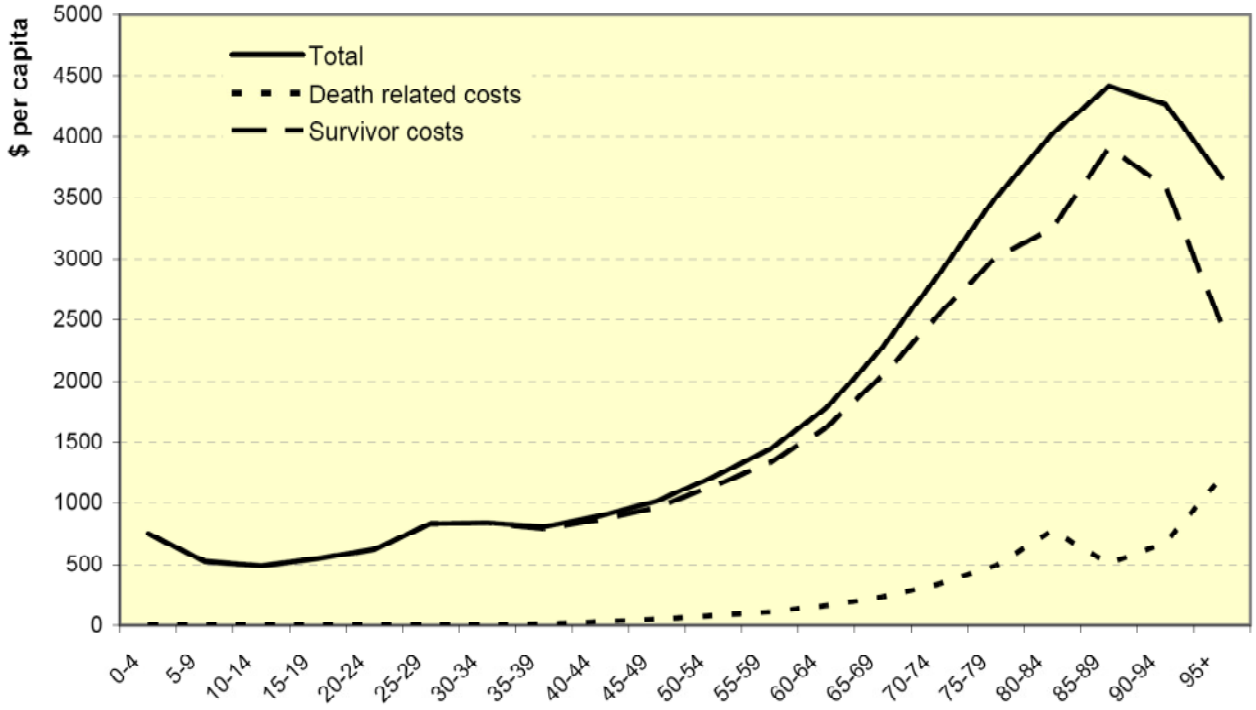
A recent study from Denmark showed a clear rise in the costs of drugs prescribed in primary care as people approach the end of life *(42)*. However, age per se has no effect on the cost of general practitioners when controlling for time to death *(43)*. Dormont *et al. (32)* studied the age effect on health-care expenditure, controlling for health status in a French data set. They found that pure age effects vanish in the case of ambulatory care, pharmaceutical and hospital expenditures and concluded that changes in practices for a given morbidity are more important drivers, most of which can be ascribed to technological innovation.

All these theories related to the cost of death imply that longevity gains will lead to more years in good health, i.e. healthy ageing; rightward shifts to the cost curve for survivors; progressively postponing the age-related increase in expenditures *(4)*. However, Gerdtham

(44) pointed out that health-care expenditure per capita had risen much faster in older than in younger age groups based on Swedish data. This is supported by data from other countries, in seeming contradiction to the last year-of-life effect and can be explained only by additional factors.

Taken together this evidence seems to underline Fuchs' hypothesis on the cost of dying. This is well-illustrated in Fig 3.2 which shows that the effect of dying accounts for an ever-increasing share of average costs by age – i.e. around one third of total costs for persons aged 95+ are attributable to death-related costs. It is likely that this high percentage is primarily due to the high percentage of dying persons in this age group and because of the higher costs of dying per deceased. If this is deducted (i.e. by calculating only the costs of survivors) the increase by age is more moderate and shows a peak.

Fig. 3.2 Expenditure per capita in each age group, separating the costs of dying from overall health-care costs



Source: OECD *(4)*

The Survey of Health, Ageing and Retirement in Europe (SHARE) *(45)* encompasses 20 000 continental Europeans older than 50. This confirmed the United States' Medicare trends and found that higher utilization among older people (for ambulatory medical consultations, medication, hospital admissions and surgery) peaked at around 80–85 years before falling again.

However, even increasing life expectancy will only postpone death. The key question is whether the lower costs of dying in older age will offset the additional costs incurred due to more time spent in good health. There are few data regarding this issue. A model calculation with the German data showed that the number of days spent in hospital over the whole lifespan are directly proportional to the number of years lived, as the higher numbers of hospital days for (surviving) older people are compensated by lower numbers of hospital days in the last years of life (compared to younger decedents) *(30)*. If these findings are generalizable in other countries and health-care sectors, ageing would not increase health-

care costs – an average person who lived for 88 years rather than 80 would simply incur 10% higher lifelong costs. Per year of life the costs would remain constant.

The role of ageing in health-care expenditure

These findings are underlined by the OECD analysis of past trends in health expenditure which reveals that ageing explains only a very small part (one tenth on average) of the total increase in health expenditure over the period 1970–2002 (see Table 3.1). In European countries it ranges from virtually zero in Luxembourg to an average of 0.7% per year in Italy. In OECD countries the age effect averages around 0.4%, significantly less than both the income (2.5% average annual growth) and the residual effect (1.5% average annual growth).

Table 3.1 Decomposing growth in public health spending[1]: average expenditure growth rates per year 1971-2002[2]

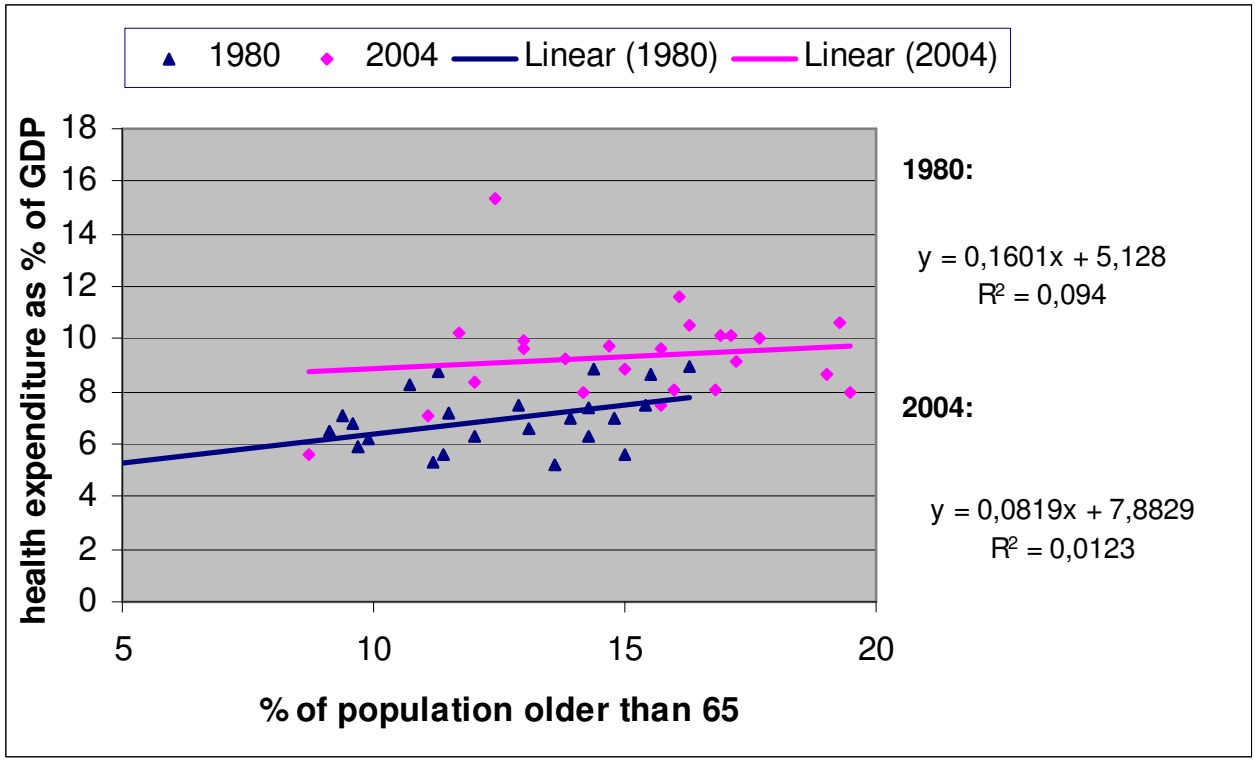
	Age effect	Income effect[3]	Residual, i.e. other factors	Total spending
Australia (to 2001 only)	0.5	1.7	1.7 *(1.4)**	4.0 *(3.6)**
Austria	0.2	2.5	1.5 *(0.0)**	4.2 *(2.2)**
Belgium (from 1995 only)	0.4	2.2	0.6	2.9
Canada	0.6	2.1	0.4 *(0.6)**	3.1 *(2.6)**
Czech Republic (from 1993 only)	0.4	2.8	-0.4	2.7
Denmark	0.2	1.6	0.1 *(-0.5)**	1.9 *(1.3)**
Finland	0.6	2.4	0.5 *(0.2)**	3.4 *(2.6)**
France	0.3	1.9	1.6 *(1.0)**	3.9 *(2.8)**
Germany	0.3	1.6	1.9 *(1.0)**	3.7 *(2.2)**
Greece (from 1987 only)	0.4	2.1	0.8	3.4
Hungary (from 1991 only)	0.3	2.8	-1.5	1.5
Iceland	0.1	2.7	3.2 *(1.9)**	6.1 *(3.5)**
Ireland	0.0	4.4	0.9 *(-1.0)**	5.3 *(3.9)**
Italy (from 1988 only)	0.7	2.2	-0.1	2.1
Japan (to 2001 only)	0.6	2.6	1.8 *(1.1)**	4.9 *(3.8)**
Republic of Korea (from 1982 only)	1.4	6.0	2.4	10.1
Luxembourg (from1975 only)	0.0	3.3	0.7 *(-0.1)**	4.2 *(3.8)**
Mexico (from 1990 only)	0.7	1.7	2.4	4.5
Netherlands (from 1972 only)	0.4	2.0	0.9 *(0.3)**	3.3 *(2.6)**
New Zealand	0.2	1.2	1.4 *(1.0)**	2.9 *(2.7)**
Norway	0.1	3.0	2.2 *(1.5)**	5.4 *(4.0)**
Poland (from 1990 only)	0.5	3.2	-0.6	3.1
Portugal	0.5	2.9	4.4 *(2.8)**	8.0 *(5.9)**
Slovak Republic (from 1997 only)	0.5	4.2	-1.5	2.1
Spain	0.4	2.4	2.5 *(0.8)**	5.4 *(3.4)**
Sweden	0.3	1.6	0.7 *(-0.4)**	2.5 *(1.5)**
Switzerland (from 1985 only)	0.2	0.9	2.9	3.8
Turkey (from 1984 only)	0.3	2.1	8.3	11.6
United Kingdom	0.1	2.1	1.5 *(1.0)**	3.8 *(3.4)**
United States	0.3	2.1	2.7 *(2.6)**	5.1 *(4.7)**
Average	0.4 *(0.3)**	2.5 *(2.3)**	1.5 *(1.0)**	4.3 *(3.6)**

[1.] Total public health spending per capita.
[2.] Or the longest overlapping period available (see years behind country name).
[3.] Assuming an income elasticity of health expenditure equal to one.
* Average annual growth rate for the period 1981–2002 only; data for age and income effect not shown for individual countries as they are in line with 1971–2002 figures.
Source: OECD *(4)*

These calculations confirm Gerdtham's *(44)* earlier data from Sweden which showed that changes in population ageing accounted for only 13% of the total increase in health-care expenditure during the period 1970–1985.

The results from the above-mentioned studies are supported by a cross-country perspective that takes account of the percentage of the population aged over 65 and the health expenditure as a percentage of gross domestic product. As shown in Fig. 3.3, the percentage of older people in a country correlated only very weakly with the percentage of gross domestic product spent on health in 1980. By 2004, the link had vanished. However, an alternative reason for this analysis showing so little effect may be the relative unimportance of 65 as an age cut-off point. Even in crude comparisons of expenditure by age the increases tend to occur rapidly only at older ages.

Fig. 3.3 The link between ageing and health expenditure



Source: OECD *(4)*

Four main preliminary conclusions can be drawn from this review of the evidence.

1. Time of death is a more important explanatory variable for health-care expenditures than age.

2. Cost of dying (i.e. most expensive in the time before death) declines with age and is higher for those who die prematurely. When people live longer, this implies that the average costs of dying will decline.

3. Utilization rates (and therefore acute health-care expenditures) do not increase continuously with age. They peak at around 80–85 years and then start to fall.

4. Although none of the longevity theories reached a critical mass, there is growing evidence to support the dynamic equilibrium theory, i.e. a constant time spent in ill health or, in other words, a declining percentage of the average lifespan spent in ill health. Survey data provide some support for the compression of morbidity scenario, i.e. shorter periods in ill health as life expectancy increases. However, this does not necessarily translate into lower expenditure, as other factors (such as medical progress or increased expectations) may lead to higher utilization rates for healthier persons.

3.2.2 Economic growth

It seems logical that health-care costs increase in line with a country's economic growth (or rather, gross domestic product). With an increasing gross domestic product health-care personnel are better paid, health-care facilities have more sophisticated medical technologies available and the population is likely to have higher expectations. Income or economic growth is therefore widely regarded to be the main non-demographic driver *(2, 4, 46, 47)*.

While health care expenditures seem substantial, it should be remembered that increasing expenditures in line with income (or gross domestic product) growth alone would keep health expenditure as a percentage of gross domestic product constant, i.e. only the other factors produce an increase above gross domestic product growth and therefore a higher share of it.

It is therefore interesting to know whether increasing income/gross domestic product acts as a cost driver beyond the additional resources produced; whether the growth in health-care expenditure is in line with the growth in gross domestic product; or whether this expenditure may even increase less steeply than the gross domestic product.

Many studies since the 1960s have examined this relationship between gross domestic product and health-care expenditure (income elasticity) by trying to establish whether demand for health care, and thus expenditure, increases *more than proportionally* as income rises. In economic terms this would imply that health care is a luxury good. Alternatively, health care may be a necessity good if demand increases *less than proportionally* as income rises. Most studies have used inadequate cross-sectional designs, others used pooled data (i.e. from several countries and several points in time) and a few used proper longitudinal designs *(48, 49)*. It has not been settled whether health care is a luxury (elasticity greater than one) or a necessity (elasticity between zero and one) *(4)*. However, the studies suggest that there may be a correlation between the level of analysis and the measured income elasticity. Generally speaking, the higher the level of aggregation (e.g. national versus individual, macro versus micro) the higher the estimated income elasticity of health-care spending. Getzen *(50)* argued that health care is both a necessity and a luxury since the income elasticity varies with the level of analysis. With insurance, individual income elasticities are typically near zero, while national health expenditure elasticities are commonly greater than one. Furthermore, the high income elasticities found in macro studies may result from the failure to control true price effects *(4)*, especially in cross-sectional designs.

Studies with designs that were more methodologically sound produced more mixed results. They suggest that growth in gross domestic product is closely related to health expenditure growth but may not be the determining factor and cannot explain the variations. The increased implementation of cost-containment policies could explain the apparent decrease in estimated elasticity since the beginning of the 1980s *(3, 51)*. More recent studies using pooled

time-series cross-section data and a wider range of explanatory variables suggest elasticities around or below one *(52, 53)*.

The OECD calculations (see Table 3.1) are therefore based on the assumption that income is equivalent to growth in health-care expenditure. According to these calculations, public health expenditures in OECD countries in the period 1971–2002 (1981–2002) grew by 4.3% (3.6%) per year. Almost two thirds of this – 2.5% (2.3%) – was accounted for by income effects (assuming income elasticity equal to one) and 0.4% (0.3%) by demographics (see Table 3.1).

The remaining (residual) health-care expenditure growth is often ascribed to technology and rises in the relative prices of health-care goods *(4)*. The residual growth is higher for the extended period 1971–2002 (1.5% annually) than for 1981–2002 (1%). This reflects the implementation of cost-containment policies in the 1980s and 1990s that sought to curb the strong residual growth *(4)*. Data in Table 3.1 show that this cost-containment effect may be attributed mainly to European countries where the residual increase since 1981 is visibly smaller (e.g. Germany, Portugal, Spain); no longer existing (Austria); or even negative (e.g. Denmark, Ireland, Sweden). No effect can be observed in countries such as Australia, New Zealand or the United States.

In conclusion, it should be taken for granted that health-care expenditure grows in line with economic growth, i.e. policy-makers should not expect that health-care costs will rise less than their gross domestic product. Where this has happened over the last decade (e.g. in Hungary, Slovak Republic [cf. Table 3.1], Estonia), they should critically examine whether underinvestment in health care has led to lower population health (than otherwise achievable) and therefore less economic growth.

3.2.3 Changes in technologies and medical progress

It is often asserted that new technologies and medical progress (such as new drugs and medical devices; organizational innovations) drive up the costs of health services. Conventional economic thinking suggests that advances in technology in themselves should reduce the costs of any given package of care (in the same way that advances in computing technology have lowered the costs of computing) *(54)*. However, this overlooks the fact that the relationship between progress and costs is more complicated, e.g. because the "product" is also changing through advances in technology (i.e. computers are much more powerful now).

The relationship between changes in medical technologies and health-care expenditure is even more complicated as medical progress can have multiple effects. To disentangle them, it is crucial to distinguish between (i) effects on the provision of a particular service to an individual patient from effects on overall costs, and (ii) costs (or rather health-care expenditure) and value for money or cost effectiveness.

New technologies such as drugs can be expensive, but may have the potential to reduce the need for hospital admission (e.g. the use of preventive medication in asthma management), or allow safe earlier discharge (e.g. as a result of modern antibiotics). Minimally invasive surgery may take longer than conventional surgery, but with the right preparation and support the patient recovers more quickly and spends less time in hospital. Some medical advances reduce the unit costs of providing particular treatments and may also reduce the need for continuing the treatment altogether. For example, the discovery that acid-related ulcers may

be healed by eliminating a gastric bacterium has reduced the need for long-term drug therapy for peptic ulcers.

In other instances, new technologies (e.g. in imaging diagnostics) are additions and their costs must be added to those of the existing technology. Other technical and medical progress may (and often does) provide opportunities for new effective interventions and thus may raise total costs. In the same way, the availability of more effective (and potentially lower cost) treatments may create or increase demand and total costs. In some other instances, technological progress could lower the demand for future health care if early or less invasive treatments improve health status and lower future health-care needs that may have higher costs. Conversely, it can increase future health needs by increasing the survival probabilities of people with chronic or multiple health conditions.

In general, medical innovations in the last decades have improved effectiveness and (frequently) lowered unit costs but often have not reduced overall costs at aggregate level. There are a number of reasons for this. On a positive note, medical innovations have extended the scope and range of treatments available, addressed previously unmet health needs and extended the quality and length of life. Less appropriately, some treatment has been extended to a wider set of indications even when this does not add to the overall health gain of society. This is the case when new technologies offer only marginal improvements over previous therapies and when medical progress is applied inappropriately, for example to patients or conditions where there is no extra marginal effect or real cost benefit (most widely cited: Weisbrod) *(55)*. This is typically associated with perverse *supply-side* economic incentives such as skewed payment systems that create supplier-induced demand. In addition, this technology-push effect is encouraged by the propensity to pay for those innovations among governments and sickness funds.

The increasing tendency for funding agencies to apply economic criteria as a hurdle for new technologies suggests that there will be increasing reluctance to support innovations of limited advantage *(56)*. However, it is currently beyond the scope of most health-care systems to steer and control indications for the use of new treatments. Even if technologies are assessed in medical trials, their subsequent use often includes other patient groups *(57)*. Policy-makers are therefore advised to examine whether this approach should be extended beyond a yes/no decision. The use of (new) technologies could be steered by tying reimbursement to certain patients, defined by a particular indication, severity grade or similar. This will require smart use of documentation and information systems in order to avoid lengthy and resource-intensive control mechanisms.

Demand-side factors (i.e. treatable morbidity and/or patient expectations) also affect the extent to which new technologies are adopted into routine practice, and may even spur research and innovation *(58, 59, 60)*. That is – in some instances higher costs cause technical progress rather than vice versa. How important is this factor in explaining expenditure increases? Clearly, it is hard to untangle the interplay between these mechanisms and determine their net effect on costs. This is illustrated by the fact that many studies use a residual approach, estimating more easily identifiable factors (e.g. demographics, income, growth in gross domestic product) and then ascribing residual growth to technology. In addition, study results also depend on the scope and design of the research and whether total health-care expenditures or components of health-care spending (ambulatory care, hospital care, household spending etc) are included. Thus, results vary significantly and must be treated cautiously.

Newhouse *(61)* presented a health expenditure growth analysis for the United States (1950–1989). He concluded that about 50% of the increase in costs could not be explained by

traditional factors and was attributable to progress. Barros's *(46)* estimation was 30%. A study by Shactman *et al. (62)* attributes 43% to new technologies in American hospitals; Hay *(63)* found 19% growth in inpatient expenditures at state level in the United States to be due to hospital technology; Goethgebeur *et al. (64)* estimated a 22% impact on overall health-care spending between 2001 and 2002.

Although the evidence on the impact of adopting technical and medical developments is not clear cut, it suggests that increased utilization has outweighed unit cost savings *(3)*. Thus it is a significant but controllable driver on the rise of health-care costs and expenditures. This is further supported by various literature reviews *(4, 47, 64, 65, 66)*. However, the aforementioned decrease in the residual over time in many (especially European) countries indicates that medical progress does not necessarily lead to higher health-care expenditure.

This suggests that the policy focus should shift from the cost of technological developments per se towards ensuring that new technologies are appropriate and cost effective. Health systems need to become more effective in managing the continuing challenge presented by the introduction of new technologies – identifying and adopting those that offer real benefits while discouraging the less cost effective. Health Technology Assessment (HTA) programmes aim to ensure that significant new medical advances are assessed properly before widespread uptake and that specialist advice is available to help clinicians make best use of them. It is important to note that HTA's primary objective is to improve the effectiveness and cost effectiveness of health systems, even if costs increase (at least in the short-term) when new and effective technologies are added to the benefit basket.

3.2.4 Relative prices/costs

The relative prices of key components of health-care expenditures (e.g. wages, capital investments and drug prices) are a frequently cited but not well quantified influence. There are good reasons to expect wages in health care to rise more rapidly than productivity, since a considerable part of the services has the characteristics of a handicraft industry *(67)*. Labour productivity growth is generally slower than for other industries as in many cases health-care provision does not lend itself to labour-saving technical developments. Workers in industries with high productivity growth enjoy higher rewards and increases in wages are needed to retain good workers in the health sector *(67)*. In addition, the high income elasticities found in macro studies may result from the failure to control true price effects *(4)*. Baumol's model of unbalanced growth *(68, 69)* identified nominal wage growth in excess of productivity growth as the main determinant of the rise in health-care expenditure. This is supported by Hartwig's study *(70)* which found empirical evidence in 19 OECD countries that health-care expenditure is indeed driven by wage increases that exceed the productivity growth in the general economy.

Policy-makers should carefully examine whether productivity growth within health care can be brought in line with general economic growth. Medical technology than can contribute to such a development should be adopted in order to avoid the effect of an above average growth of labour costs. In some areas (especially long-term, mental-health and palliative care) this will not be possible in the foreseeable future and relatively increasing labour costs will drive up health-care expenditure in these sectors. If inputs other than labour (e.g. drug prices) increase more rapidly than gross domestic product, policy-makers should critically evaluate whether such increases are justified. The growing role of economic evaluation of (new) drugs testifies that countries have taken up this challenge.

3.2.5 Increased expectations

The need for health services to respond increasingly to people's expectations and concerns is frequently cited as a factor in increasing health-care costs. The importance of a responsive health system is undisputed and supported by empirical evidence. For example, in an International Alliance of Patients' Organizations (IAPO) survey of patients from 10 EU Member States, respondents rated timely access to the best treatment and information; the right to participate in decisions at the individual patient level; and patient involvement in policy-making among their top priorities *(71)*.

However, it is much less clear whether people's expectations are measurably increasing or whether such an increase in expectations leads to higher health-care costs. Several arguments suggest that this is (and will be) an increasingly important factor.

- As countries and their citizens become richer they develop higher expectations of the range of treatments and the quality of services available.
- Richer countries can afford to offer more and newer technologies and provide more opportunities for their delivery. Manufacturers of drugs and medical devices may push for such a development by means of lobbying and support from patients' groups (see below).
- Health policy-makers in many, if not most, countries have ensured sufficient responsiveness in health-care systems through greater choice of both primary care and hospital providers; purchasers too in some countries. This may have contributed to the significance of this growth pressure factor, especially if increased choice is introduced at the price of less gate-keeping, i.e. if citizens can act directly on their higher expectations by visiting specialists and demanding particular (new) technologies.

To our knowledge no robust quantitative studies have assessed the impact of expectations. This may be due to the methodological problems of separating the overlap with other factors such as increased incomes, technical developments and the organization of the system (e.g. gate-keeping versus free access to specialists). Arguably, the observed higher expenditures in social health insurance (SHI) countries (rather than tax-funded systems) are the result of systems that are more responsive to people's expectations (see Chapter 8 on responsiveness). However, health-care expenditure growth rates in SHI countries have been smaller (cf. data in Table 3.1), possibly reflecting some catching-up in tax-funded systems.

There is a lack of data on the exact degree to which expectations impact on health-care costs. Nevertheless, it is clear that they pressurize health-care professionals and decision-makers to adopt the latest available medical innovations, adopt a broader range of services and implement more choice. Patients have become more involved in the choice of treatment and have can access an almost limitless amount of medical information, mainly through the Internet. Patients in some countries (e.g. the Netherlands) are empowered by a policy emphasis on consumer choice and have better organized patient organizations that find ways to exert influence in the decision-making process. A newer development in Europe (but well-known in the United States) is patient groups funded by pharmaceutical and medical technology companies. Although this might seem a strange alliance, it is a logical partnership between two actors with a shared interest – access to the newest treatments (which benefits patients) for which positive reimbursement decisions (which benefit the pharmaceutical industry) are prerequisite. However, this relationship often has an information asymmetry which the industry could use to distort the reimbursement debate. Policy-makers are therefore well-advised to inform citizens and engage them in the policy-making progress, i.e. by

inviting them to participate and by providing funding for patients' organizations. This will enable them to reach a common understanding and encourage realistic expectations of the cost effectiveness of treatments and the sustainability of health systems.

3.3 Forecasting future health-care expenditure

In the last twenty years several cross-country studies have sought to forecast future expenditures on health care. For Europe, most were carried out by national governments, the OECD, the European Commission and the World Bank. With methodological progress, these projections have become more sophisticated and increasingly cover demographic as well as non-demographic factors. The aim of this section is to briefly outline some of the results and particularly to discuss some of the methodological complexities.

The OECD *(4)* projections for the period 2005–2050 include separate examinations of long-term care and health care. The drivers for health care encompass demographic factors and non-demographic factors. The exercise does not seek to disentangle the non-demographic factors, but adopts two scenarios: (i) cost-pressure (expenditure growth 1% per year faster than income); and (ii) cost-containment (expenditure growth eliminated by the end of 2050). This approach is similar to the various scenarios in the Wanless reports *(72, 73)*in the United Kingdom.

Demographic factors are also included in the prediction for long-term care. This is likely to rise as the share of older people increases but will be mitigated to a certain extent by "healthy ageing". Non-demographic factors assume that expenditures are likely pushed up by relative prices of long-term care. This increases in line with average productivity growth in the economy because the scope for productivity gains is more limited.

These projections result in a cost-pressure scenario in which the average health- and long-term care spending across OECD countries is projected to almost double from close to 7% of gross domestic product to 13% by 2050. The cost-containment scenario estimates growth to increase from 7% to 10% by 2050 (see Table 3.2). Non-demographic factors (including technology and relative prices) exert significant upward pressure on long-term care expenditures and form the most important driver.

These results show significant variation among European countries. In the cost-containment scenario, countries expected to experience increases in health expenditure of more than 4% include countries that are ageing rapidly (Italy, Spain); those expected to see dramatic changes in their population structure (Slovak Republic); and those with currently low labour participation that are likely to face substantial increases in the demand for *formal* long-term care (Italy, Ireland, Spain). Sweden is in an advanced phase of its ageing process and already spends a relatively high share of its gross domestic product on health. Yet it shows an increase of only 1.5% to reach 10.1% in 2050, i.e. the OECD average for 2050.

Table 3.2 OECD projections: public spending on health and long-term care 2005–2050

	Health care			Long-term care			Total		
		2050			2050			2050	
	2005	Cost pressure	Cost containment	2005	Cost pressure	Cost containment	2005	Cost pressure	Cost containment
Australia	5.6	9.7	7.9	0.9	2.9	2.0	6.5	12.6	9.9
Austria	3.8	7.6	5.7	1.3	3.3	2.5	5.1	10.9	8.2
Belgium	5.7	9.0	7.2	1.5	3.4	2.6	7.2	12.4	9.8
Canada	6.2	10.2	8.4	1.2	3.2	2.4	7.3	13.5	10.8
Czech Republic	7.0	11.2	9.4	0.4	2.0	1.3	7.4	13.2	10.7
Denmark	5.3	8.8	7.0	2.6	4.1	3.3	7.9	12.9	10.3
Finland	3.4	7.0	5.2	2.9	5.2	4.2	6.2	12.2	9.3
France	7.0	10.6	8.7	1.1	2.8	2.0	8.1	13.4	10.8
Germany	7.8	11.4	9.6	1.0	2.9	2.2	8.8	14.3	11.8
Greece	4.9	8.7	6.9	0.2	2.8	2.0	5.0	11.6	8.9
Hungary	6.7	10.3	8.5	0.3	2.4	1.0	7.0	12.6	9.5
Iceland	6.8	10.7	8.9	2.9	4.4	3.4	9.6	15.2	12.3
Ireland	5.9	10	8.2	0.7	4.6	3.2	6.7	14.5	11.3
Italy	6.0	9.7	7.9	0.6	3.5	2.8	6.6	13.2	10.7
Japan	6.0	10.3	8.5	0.9	3.1	2.4	6.9	13.4	10.9
Republic of Korea	3.0	7.8	6.0	0.3	4.1	3.1	3.3	11.9	9.1
Luxembourg	6.1	9.9	8.0	0.7	3.8	2.6	6.8	13.7	10.6
Mexico	3.0	7.5	5.7	0.1	4.2	3.0	3.1	11.7	8.7
Netherlands	5.1	8.9	7.0	1.7	3.7	2.9	6.8	12.5	9.9
New Zealand	6.0	10.1	8.3	0.5	2.4	1.7	6.4	12.6	10.0
Norway	7.3	10.7	8.9	2.6	4.3	3.5	9.9	15.0	12.4
Poland	4.4	8.5	6.7	0.5	3.7	1.8	4.9	12.2	8.5
Portugal	6.7	10.9	9.1	0.2	2.2	1.3	6.9	13.1	10.4
Slovak Republic	5.1	9.7	7.9	0.3	2.6	1.5	5.4	12.3	9.4
Spain	5.5	9.6	7.8	0.2	2.6	1.9	5.6	12.1	9.6
Sweden	5.3	8.5	6.7	3.3	4.3	3.4	8.6	12.9	10.1
Switzerland	6.2	9.6	7.8	1.2	2.6	1.9	7.4	12.3	9.7
Turkey	5.9	9.9	8.1	0.1	1.8	0.8	6.0	11.7	8.9
United Kingdom	6.1	9.7	7.9	1.1	3.0	2.1	7.2	12.7	10.0
United States	6.3	9.7	7.9	0.9	2.7	1.8	7.2	12.4	9.7
Average	5.7	9.6	7.7	1.1	3.3	2.4	6.7	12.8	10.1

Source: OECD *(4)*

In its 2006 impact of ageing projection exercise for the EU25 2005–2050, the European Commission looked at the effects on pensions, health care, long-term care, education and unemployment transfers. Multiple scenarios capturing all demographic and non-demographic factors were developed, distinguishing between health and long-term care. The working group on ageing populations (AWG) scenario takes account of the effects of ageing, the health-care status of elderly citizens and the income elasticity of demand. Under this main

scenario most EU Member States will expect an increase of public expenditures on health care of between 1% and 2% of gross domestic product. This figure is between 0.1% and 1.8% for long-term care. The combined effects of health and long-term care range from 1.1% to 3.8% of gross domestic product until 2050. The projections show that non-demographic factors are relevant drivers of spending.

The World Bank study, *From Red to Gray (5)*, uses the same approach as the European Commission *(3)* study and seeks to shed some light on future spending in the CEE (which includes some EU Member States) and the European newly independent states of the former Soviet Union. The study contains four health-expenditure scenarios (pure ageing; constant morbidity; compressed morbidity; pure ageing adjusted for death-related costs) and two long-term care scenarios (pure ageing; constant disability), all based on different basic assumptions related to the longevity scenarios.

All these studies should be interpreted with caution. All the projections are based on various assumptions regarding e.g. (constant) utilization levels (which may change when new technologies become available or the benefit package is broadened or narrowed); age-related public expenditures on health- and death-related costs (which may not be available, especially in non-EU Member States); and gross domestic product growth rates. The latter is an important (as explained above) but very hard to forecast determinant, especially in transition countries. This can be illustrated by the projections for the new Member States included in both the European Commission *(3)* and the World Bank *(5)* studies. Although both organizations use the same approach, the World Bank uses different data sources and makes different assumptions (e.g. regarding future population and health spending). This produces widely diverging results: in its version of the pure-ageing scenario for EU Member States the World Bank projects lower changes in health expenditure as a percentage of gross domestic product between 2010 and 2050 – for example, Lithuania (-0.30% versus +0.6%) and the Czech Republic (+0.18% versus +1.5%). The main cause of these huge variations lies in the widely different projections of gross domestic product growth rates (i.e. level, fluctuating or constant) in the two studies *(5)*.

Pragmatic policy-making should simply assume that health-care expenditure growth is at least in line with gross domestic product growth. There is also a modest additional effect from demography (as shown above, less than 0.5% annually in the past) and other effects (medical progress, relative prices, increased expectations) that are all more amenable to policy-makers' actions. If these can be managed successfully (for example by achieving efficiency gains wherever possible e.g. in diagnostics such as imaging or by replacing inpatient treatment with ambulatory procedures) and allowing for any necessary increasing labour costs (e.g. in long-term care), then this residual does not need to be larger than 0%. Taken together, these results show that countries should expect health-care expenditure growth to be somewhere between the two OECD projections.

3.3 Policy implications

This review enables us to draw some conclusions and policy lessons.

- Ageing explains only a small part of increasing health-care expenditures. Income growth as well as technology, relative costs and other difficult to quantify determinants have made a larger contribution to increases in health-care expenditures over the past few decades.

- The observed stagnating and falling level in utilization rates at older ages (approximately after 80 years of age) shows that policy-makers may have to refocus. There is an increasing number of much older people (80 years and over) but this may not have as many financial implications as is often believed. Instead, policy-makers should be aware that increased numbers of people aged 65–79 will require greater resources than they may have anticipated. This also challenges the belief that longer life expectancy automatically results in higher total lifetime expenditures. Longer life expectancy decreases death-related costs that in turn offset the added health costs incurred as a result of the gains in life expectancy. Policy-makers should therefore focus on establishing an effective health system with active policies to facilitate healthy ageing, enabling older people to remain economically active.

- Evidence suggests that proximity to death is a more important predictor for increasing health-care expenditures than ageing. Time to death should therefore be included in ageing studies that aim to project future health-care costs (as in the projections reviewed here). However, good data on spending per age group are prerequisites for achieving a meaningful analysis and projection. Countries should ensure the collection of such data as they are not always available in Europe (especially in some CEE and CIS countries).

- The policy focus should be on adopting cost-effective technology and ensuring appropriate use – i.e. technology is given only to those with the "right" (positively evaluated) indication – rather then absolute costs of technological innovations. Policy action should therefore encourage and incorporate the use of HTA in its reimbursement systems and aim to develop innovative policies that control the indications and appropriate use of these new treatments.

- Policy-makers should strive to engage citizens and patient groups in an independent debate on evidence and to enable their participation in the decision-making process. Also, the provision of funding would enable better organized patient groups that could contribute effectively to the policy debate (rather than a fragmented landscape or patient groups funded by industry). The aim of this debate should be to reach a common understanding and ensure realistic expectations of the cost effectiveness of treatments and the sustainability of health systems.

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