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SOCIAL AND ECONOMIC DIMENSIONS OF AN AGING POPULATION

The Effects of Population Ageing on the Canadian Health Care System

Mark W. Rosenberg

SEDAP Research Paper No. 14

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The Effects of Population Ageing on the Canadian Health Care System

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Abstract

There is probably no policy-maker in Canada who has not heard Athe boom, bust and echo@ mantra of David Foot (1996) by now. Even those who have not fallen prey to Foot=s mantra are aware that between 2025 and 2031, the population aged 65 and over will reach between 20 and 25 percent of the total Canadian population. While the timing of this trend is somewhat later for Canada than it is for some northern and western European countries, policy makers in Canada and in many other countries of the Organisation for Economic Co-operation and Development (OECD) are receiving conflicting messages about what the future growth of the elderly population will mean for the provision of health care services and health care expenditures.

There are those who believe that because seniors account for a disproportionate part of health expenditures relative to their proportion of the population, that as this proportion grows health care expenditures will either explode or the health care system will have to be reconstructed in ways which are incompatible with the current values of health care systems in Canada as defined by the *Canada Health Act* **(i.e., public administration, comprehensiveness, universality, portability, and accessibility). Alternatively, there are those who believe that the growth in the seniors population is only one component which is driving costs and that those components are manageable.**

In this paper, the relationship between population ageing and future health care costs is assessed based on evidence from the Canadian and international literature on this topic. The contributing factors to health care system costs and how they interface with an ageing population are identified. The paper also assesses where new research is needed if the publicly-financed health care system is to evolve to respond to the needs of an ageing population in a fiscally and socially responsible manner.

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Executive Summary

There is probably no policy-maker in Canada who has not heard "the boom, bust and echo" mantra of David Foot (1996) by now. Even those who have not fallen prey to Foot's mantra are aware that between 2025 and 2031, the population aged 65 and over will reach between 20 and 25 percent of the total Canadian population.[1] While the timing of this trend is somewhat later for Canada than it is for some northern and western European countries, policy makers in Canada and in many other countries of the Organisation for Economic Co-operation and Development (OECD) are receiving conflicting messages about what the future growth of the elderly population will mean for the provision of health care services and health care expenditures.

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In this report, the relationship between population ageing and future health care costs is assessed based on evidence from the Canadian and international literature on this topic. The contributing factors to health care system costs and how they interface with an ageing population are identified. This report also assesses how the publicly-financed health care system can evolve to respond to the needs of an ageing population in a fiscally and socially responsible manner. The report is divided into 5 sections.

The work discussed in Section 1 reflects the two schools of thought on the role that the future elderly population will have on health care expenditures. Foot (1982, 1996), Gross and Schwenger (1981), Henripin (1994) and Marzouk (1991) are examples of the crisis theorists. Although the methodologies and projections may differ, the conclusions they draw are similar; that is, the future growth of the elderly population will generate major increases in health expenditures which are not likely sustainable given the current organisation and funding of health care in Canada. In contrast, Fellegi (1988) and Denton and Spencer (1985, 1995, 1997) are representative of the manageable theorists. Their projections suggest that health care expenditures will increase as a result of the growth in the elderly population, but most of the growth in health care expenditures will be manageable because of some combination of the reallocation of expenditures from the young to the old, concomitant increases in productivity

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and offsets resulting from new technologies and efficiencies improvements within the health care sector.

What is also apparent from the research reviewed is the sensitivity of the projections to the population scenarios chosen and assumptions about productivity in the economy and within the health care sector. An issue which deserves more attention is whether the population projections being used are consistently under-estimating the future total population. Related to this issue, is whether researchers tend to be too conservative in their choice of projections; that is, there tends to be a heavy reliance on Scenario 2 or a standard scenario regardless of the base year chosen. It follows that the outcomes based on the "middle of the road" assumptions are those that drive the projection of future health care costs as if they are more likely than other possible scenarios.

Several messages can be distilled from Section 2 which examines factors which treat the elderly population as only one component which drives health care spending. First, there is considerable evidence that the growth of the elderly population, in and of itself, is only one element (and likely not the major element) driving the growing expenditures in our health care systems. Secondly, the evidence to date indicates that new technologies, drug therapies and ways of delivering health care (e.g., home care) may be "add ons" not substitutes for current ways of delivering health care services (i.e., they are increasing the cost of health care not reducing the costs as hypothesised by some). Thirdly, the growth of the elderly population is likely to be highly differentiated across Canada and this will have attendant implications for the delivery of health care in different places across the country. Fourthly, how disability, health status and economic status are conceptualised needs to be carefully thought out as the nature of the economic life course of the current non-elderly changes as the Canadian economy restructures and finds its way in an increasingly global economy.

Section 3 examines the international efforts to project the future size of the elderly population and what it means for health care expenditures. In making comparisons, Canada currently sits at the high of end of health care spending and life expectancy, but at the low end in terms of the size of its ageing population in comparison to other OECD countries, but especially the United States, Western Europe, Scandinavia, Australia and Japan. Our methods for doing population and cost projections appear to be similar to those being used by the World Bank, the OECD and other OECD countries. The scan of the international literature leaves the impression that most countries and international organizations now believe that the growth of their elderly populations and the impact this will have on health care expenditures is manageable through a mixture of overall economic growth and prudent adoption of greater efficiencies and cost effective measures. Even in the case of the World Bank (1994) which continues to use "crisis" rhetoric, their message is that there is a window of opportunity to make changes which will avert "the old age crisis."

Section 4 is used to assess Canadian efforts on their own merits and in comparison to international efforts. What this assessment suggests is that the models we are currently using to project future population change and their implications for health care expenditures are on

a par or are even better than what other countries and international organisations are using. What is needed, however, are models which can take into account issues raised in this section such as the roles that technology, drug therapies and alternative care delivery systems will play, how to deal with the changing socio-economic profile of seniors and their growing ethnic diversity, and models which allow for forecasts at geographic scales smaller than the country, provinces and territories. As a precondition to the development of such models, there are many issues where we need to come to a better understanding. In the concluding section, some new directions which might be taken are suggested.

The list includes:

- At a minimum, more attention needs to be paid to the high population growth scenarios developed by Statistics Canada as part of their population projections.

- Preferably, a more "bullish" approach needs to be taken to developing higher population growth scenarios than those which are currently being used.

- Studies need to be carried out on major technological changes, drug therapies and alternative forms of service delivery to provide a more accurate understanding of their implications for changing health care costs.

- Projection models need to be developed which take into account the changing socio-economic and ethnic diversity of Canada's population. This will likely necessitate more research on persons of varying socio-economic characteristics and ethnic diversity and their use of health care services.

- Projection models need to be developed which take into account various mixes of public and private spending on health care.

- Projection models need to be developed which allow for better forecasts at the sub-provincial scale where policy and program delivery occurs to take into account the differential impacts that the future growth of the elderly population will have on communities across Canada.

A national longitudinal survey of the elderly population is needed to provide the kinds of data which are needed to understand how the elderly population is changing over time.

It is suggested that there is scope for supporting research and development of both comprehensive models which incorporate population and health care expenditure change and those which focus on a particular issue (e.g., the role of new medical technologies). Research and development on the latter is going to be needed to inform macro-modelling efforts.

There are two other issues which deserve considerable attention. Virtually all of the research reviewed takes as its starting point projections in the growth of the population and current

trends in utilisation as the basis for future utilisation of health services and consequently how much the system will cost in the future. No studies were found that take as their starting point the "end point" and work backwards. For example, imagine a research exercise which takes 2025 as the end point and asks the question, "If these are to be the goals of the health care system and this is how much of the GDP we wish to spend on health care, what would have to be done between now and 2025 in terms of the supply of various types of health care services, the supply and mix of health care personnel, and how and where to promote health to achieve these goals?" Such approaches shift policy development from reactive modes to proactive modes and lead to more integrative planning of programs (e.g., if we want to achieve a certain level of home care by 2025, how many trained home care workers will be needed and where will they be needed).

The second issue is to broaden the research and thinking on the private/public division of spending on health care. Most of the research and thinking to date has been influenced or is drawn from experience in the United States or the United Kingdom. Given the failure of both of these countries to achieve goals which are central to Canada's public health care system, more research needs to be carried out on other OECD countries. There are other OECD countries which mix public and private spending on health care, which are already ahead of Canada in terms of the size of their elderly population, which spend less on health care and achieve similar or better health outcomes than Canada. There is also the need for much more research which links the shift from public responsibility to private responsibility for health care to the impacts on macro and micro economies. For example, if people exit the labour force to provide home care for elderly parents, this may save public expenditure on health care, but what are the opportunity costs and the impacts on lost productivity and tax revenues? This type of research cries out for a multidisciplinary approach which combines demographic, health services and economic research.

If the tripartite goal of preserving a public health care system which is capable of providing high quality care to an elderly population at sustainable economic levels is to be achieved, first and foremost, the Canadian economy will need to continue to grow at rates similar or even faster than health care spending. Looking beyond this basic policy reality, models are needed which take into account how Canada's ageing population is going to grow and change over the coming decades and how policy choices will allow the achievement of this tripartite goal.

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Introduction

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In this report, the relationship between population ageing and future health care costs is assessed based on evidence from the Canadian and international literature on this topic. The contributing factors to health care system costs and how they interface with an ageing population are identified. This report also assesses how the publicly-financed health care system can evolve to respond to the needs of an ageing population in a fiscally and socially responsible manner.

The report is divided into five sections. In Section 1, the research on projected effects of a future seniors population on the Canadian health care system is reviewed. In Section 2, the focus is on non-demographic factors which contribute to increased health care costs in Canada. Section 3 is used to assess the Canadian findings and analytical techniques against international experience in addressing the issues of the projected effects of future senior populations on the Canadian health care system. Taking into account the discussion in Section 1 to 3, Canadian projections and projection models are assessed in Section 4. In the concluding section recommendations on the next steps that governments, health care

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providers, non-governmental organisations, and Canadians must take in order to ensure a sustainable, cost-effective health care system in light of population ageing between now and 2031 are suggested.

1 The Projected Effects of Future Seniors Populations on the Canadian Health Care System

Over the past 20 years, various demographers, economists, sociologists and other social scientists have projected the impacts of a growing seniors population on the Canadian health care system. In this section, their findings are reviewed to provide a sense of the range of predictions with respect to the size of the elderly population, health care expenditures, percentage of gross domestic product, regional variation, etc.

There are two competing schools of thought that will be evaluated. First, there are those who see the growth in the elderly population generating significant costs for the health care system as the 'baby boomers" cycle through the system. We can label these researchers the *crisis theorists*. Secondly, there are those who see the growth of the elderly population having a manageable impact on the costs of the health care system because of the growth in productivity which is likely to occur, the declines in expenditures in other sectors or new forms of health care delivery (e.g., home care and day surgery) which will mitigate against the growth in expenditures on a per capita basis. Also within this group are those that see health care costs growing significantly as a result of increased use of technology, physician behaviour and the growth of the elderly population. Among those who subscribe to this view, the argument is that the growth in the elderly population is only "one fraction" in the sum of factors that will drive the increase in health care expenditures, and the need is to take all components into account in devising policies to preserve the publicly funded, universal health care system as we know it. These theorists can be labelled the *manageable theorists*.

As a useful starting pointing, it is worthwhile to review where Canada stands in terms of its current population size and its expenditures on health care (see Tables 1 and 2) and what the future size of the Canadian population is likely to be (Table 3).

Virtually all of the health projection models developed in Canada rely on Statistics Canada population projections. Differences in projections by individual authors generally stem from two sources. First, Statistics Canada regularly updates the base year population data, fertility rates, mortality rates and net international migration rates from which the projections are made. Using the projections based on the 1971 Census compared to those based on the 1993 post-census estimates will yield different projections for 2011. Secondly, at least since 1971, for any set of projections, four scenarios are developed based on various assumptions about fertility, mortality and net international migration. For example, the choice of a scenario based on high net immigration rates will generate projections significantly different from a scenario based on low net immigration rates all other things being equal (see Table 4).

The first issue is illustrated and given substance by Gross and Schwenger (1981) who used projections based on the 1971 Census. The scenario they chose assumed a fertility rate of 2.2 by 1985, changes in life expectancy at birth from 69.2 to 70.2 for men and 76.1 to 78.4 for women, and a net international migration rate of 60,000 per year. Based on these assumptions, the projections they used showed Canada's seniors population at 3,341,800 in 2001. Using the medium-growth projections based on the 1993 population estimates, the projection for 2001 is that Canada will have approximately 4,030,700 seniors.

The second issue is illustrated and given substance by comparing the size of the elderly population in 2016 based on Statistics Canada's most recent series of projections (Statistics Canada, 1995). The size of the seniors population under Series No. 1 – Low Natural Increase/Immigration Medium Internal Migration is 5,637,600 or 15.6 percent of the total population. Under Series No. 2 – Medium Natural Increase/Immigration Medium Internal Migration, the seniors population increases to 5,894,300 or 15.9 percent of the total population. In Series No. 3 – High Natural Increase/Immigration West Internal Migration, the seniors population is 6,273,300 or 15.7 percent. Finally, using Series No. 4 – High Natural Increase/Immigration Central Internal Migration, the seniors population is virtually the same size and percentage as found in Series No. 3, but the population is distributed differently across Canada because of the differences in the internal migration assumptions (See Table 4 and Table 5).

These illustrations are presented, not to suggest the earlier projections were somehow wrong or that one projection series is better than another. We need to understand, however, that by the very nature of when the projections were done and the choices researchers made about which projection series they used determined some of the differences in projections both about the future size of the elderly population and indeed their projected contributions to health care spending.

The other side of the projection equation is how to project health care expenditures. As an early example, Gross and Schwenger (1981) again provide a useful illustration. Using constant 1976 dollars and data, they calculated age and sex specific utilisation rates for 5 types of institutional and 4 types of non-institutional health care services and age and sex specific average daily costs for those services. They then used a simple linear extrapolation formula:

Age and sex specific utilisation rate for $service_x$* age and sex average daily cost for $service_x$ * age and sex specific population group in $time_t$ = projected expenditure.

Gross and Schwenger (1981) showed that in Ontario in 1976, institutional costs were $2.113 billion and physician costs were $0.734 billion. Using their formula and population projections, their projected expenditures for 2026 were $4.572 billion and $1.194 billion for institutional and physician services respectively in 1976 constant dollars. To place their extrapolation in perspective, in its recently announced 1999 budget, the Ontario government is planning to spend $20.2 billion in current dollars. While there are obvious differences in

what Gross and Schwenger included in their institutional and physician costs compared to what is included in the current Ontario government budget for health, if we convert the Gross and Schwenger projected expenditures and the 1999 Ontario budget figures to 1992 constant dollars using the December Consumer Price Index, the Gross and Schwenger total for 2026 is approximately $7.87 billion and the 1999 Ontario health budget is equal to $19.23 billion in 1992 constant dollars.

First and foremost, what the Gross and Schwenger projections illustrate are the difficulties in projecting future expenditures. Secondly, they demonstrate the weaknesses of simple linear extrapolations and thirdly, how sensitive projections are likely to be to the assumptions which drive changes in population projections, utilisation rates and average costs per service.
Foot (1982) used Projection Series No. 1 and the 1972-2001 and the 1976-2001 series for his population projections. Although he does not specify what his health expenditure data looked like, Foot (1982, p. 222) suggests that between 1981 and 2001, real per capita costs for physician services will increase by 5.6 percent and by 15.9 percent for hospital services. These costs will continue to grow between 2001 and 2031 by 7.5 and 30.9 percent respectively. Foot (1982, p. 222) argues that over the period 1981 to 2031, there will be shifts from health resources for the young (e.g., maternity services) to health resources for the ageing population (e.g., geriatric services) and that even among the elderly population there will be a decrease in the ratio of physician to hospital costs and "the percentage of hospital services attributable to persons aged 65 and over will increase." The other element to his projections worth noting is that Foot argues that by 2011 all of the current hospital capacity will be required just to take care of the seniors population requiring hospitalisation.

In contrast to the early attempts by Gross and Schwenger and Foot at projecting the impact of the ageing population on future health costs, Denton and Spencer (1983) used what they called an economic-demographic model. The model incorporates the standard components of all population projection models (births, deaths, migration and immigration) and links them to health care costs. Where their efforts are different from earlier projection projects is that they then attach these components to a model of the economy which includes components describing the labour force, employment, capital stock, investment, output, taxes, disposable income, consumption and savings. They test 3 projections where the only values which vary are fertility rates. In the standard projection, the 1981 fertility rate of 1.8 births increases to 2.1 in 1991. In the low fertility projection, the 1981 fertility rate is assumed to fall to 1.5 births in 1991 and in the high fertility projection, the fertility rate rises to 3.0 in 1991.

On the demographic side, only Denton and Spencer's (1983) low fertility projection comes close to generating proportions of seniors which are close to those now projected for 2031, but in absolute numbers, only the high fertility projection is close to those in the most recent projections available from Statistics Canada. In the most recent population projections by Statistics Canada, the total population in 2031 is forecast to range from 35.5 million to 46.9 million and the elderly population is likely to range between 25 and 30 percent of the total population depending on which of the 4 projections one chooses. Using their standard projection, Denton and Spencer (1983) projected the total Canadian population at 33.9

million in 2031 and that 19.6 percent of the total population would be aged 65 and over. Their low fertility projection yielded a total population of 26.9 million and 24.8 percent would be aged 65 and over in 2031 and their high fertility projection gave a total population of 46.8 million, but only 14.2 percent would be aged 65 and over. On the health expenditure side of their projections, Denton and Spencer (1983) generate results where health care costs as a percent of Gross National Product (GNP) range from 8.9 to 9.2 percent of GNP in 2031 depending on the scenario chosen.

Among the early efforts at projecting the impact of the ageing population on future health care costs, Denton and Spencer (1983) represents a shift away from simple linear extrapolations. Their work also represents a shift in thinking away from the "crisis" view that the future growth in the elderly population will generate a substantial increase in the proportion of the GNP which will be required to cover future health care costs.

Fellegi (1988) uses the 1986 population projections, Scenario 2 and two assumptions about the economy. In the low projection case, unit cost per patient by age is assumed to remain constant based on 1984 prices. In the high projection case, expenditures per patient day and per visit to a physician's office are assumed to increase by 1.0 and 1.8 percent per annum respectively. In a very real sense, the low projection case demonstrates the impacts of demographic change with everything else remaining constant. In contrast, the high projection case demonstrates average growth similar to those experienced within the health sector between 1975 and 1984.

Fellegi's (1988) findings and the arguments which underlie them support the views of Denton and Spencer (1983). The low projection case demonstrates that the increase in the elderly population has only a modest effect on the increase in future health care expenditures. The high projection case demonstrates that rising health care costs have a much greater impact on future health care costs than demographic forces. If the unit costs of health care grow at a similar rate to the rate of growth in the economy, then the working age population's ability to carry the costs of the health care system will not change in the future.

A useful starting point for examining more recent views on the impact of the ageing population on future health care costs is Foot (1996). While Foot provides little in the way of data to support his views, *Boom, Bust & Echo* has had a profound effect on the thinking of decision-makers and policy-makers across all sectors of the Canadian economy. Foot has not changed his view from his more analytical work of the 1980s that given the size of the baby boom cohort, it is a mistake to close hospitals now that will be needed in the coming decades to accommodate baby boomers especially after they reach the age of 75.

But beyond this argument, Foot (1996) raises a number of other issues which ought to be considered in any new projection models which might be developed. First, does the shift from institutional care and shorter average lengths of stay to care within the community (e.g., home care) lead to reduced health care expenditures or does it just shift the expenditure from the health care sector to the private sector? Secondly, does the shift to the private sector achieve

improved health outcomes? Thirdly, if the shift is to the private sector in the form of individuals forgoing paid employment to stay at home as caregivers, what is the impact on overall productivity? Fourthly, Foot argues that fee-for-service payment systems are unsustainable with the growing size of the elderly population and that we will have to shift to some form of capitation system of physician payment.

In contrast to Foot, Denton and Spencer (1995, 1997) have continued to develop integrated models of demographics and the economy to project the impact of the future growth of the elderly population on health and social expenditures. There are several messages which come out of Denton and Spencer's more recent work. First, health care and social security expenditures will absorb an increasing share of Gross Domestic Product (GDP) while education expenditures as a percentage of GDP will decline in the future (Denton and Spencer, 1995). Secondly, social security expenditures will absorb a greater percentage of GDP than health care expenditures between now and 2041 (Denton and Spencer, 1995). Thirdly, the relative decline in education expenditures and improvements in health care technology and efficiency will only offset some of the increases in health care expenditures (Denton and Spencer, 1995). Fourthly, population ageing relative to population growth is seen to be more responsible for the growth in expenditures (Denton and Spencer, 1995). Fifthly, "the population-related cost increases should be of manageable proportions overall, in spite of the major shifts in age distribution that are likely." (Denton and Spencer, 1997, p. 495). Sixthly, the policy challenge is, therefore, how to re-allocate resources which reflect the changing population distribution in the future.

Denton and Spencer's more recent work represents an increasingly sophisticated approach to projecting the future impacts of population change on the health care sector. One of their key messages has not changed; that is, the future growth in health care expenditures which are due to population ageing should be manageable. What has changed, however, is that they are increasingly concerned that the level of manageability will be dependent to some extent on the offsets from declining education expenditures and savings in the health care sector resulting from new technologies and internal efficiencies.

Marzouk (1991) focuses on the importance of taking into account the age composition of the elderly population and their differential rates of utilisation of health services to project the impacts of the elderly population on future health care expenditure. In his model, Marzouk distinguishes between the population aged 65 to 74 and the population aged 75 and over. Two processes are at work. First, are the changes in the ratio between the population aged 75 and over compared to the population aged 65 to 74. Secondly are the differences in utilisation rates of health care services between these two age cohorts. Since the 75 and over cohort uses more services per capita, if the ratio of those 75 and over compared to those 65 to 74 increases over time, expenditures will increase more rapidly for the elderly population than if the ratio decreases which will tend to slow the rate of expenditure increase for the elderly population.

What Marzouk (1991, p. 501) concludes is that if the elderly population is treated as only one cohort and one only takes into account the changes in utilisation patterns, then the increase in the percentage of health care spending to GDP is relatively modest. If you link the changes in utilisation patterns to the demographic shifts, however, the increase in health care expenditure to GDP is much more substantial. For example, using constant 1985 dollars in 2000, the costs due solely to shifts in utilisation range from a low of about $1 billion to a high close to $7 billion. The effect of incorporating the demographic shifts increases the range from a low of $3 billion to a high of $10 billion. Expressed another way, "[T]he order of magnitude of the increase in HC/GDP ratio due to [the] combined effect is roughly three to fourfold the increase due to aging alone." (Marzouk, 1991, p. 501).

Henripin (1994) is particularly critical of those researchers (e.g., Denton and Spencer) who have argued that impacts on future health care expenditures resulting from the growth in the elderly population will be manageable. The difference in Henripin's projections result from a fundamental difference in one assumption; that there will be "equivalent productivity increases in the total economy and the health sector." (Henripin, 1994, p. 92). While granting it is possible, Henripin is convinced that it is most unlikely.

Using Québec data, but arguing that the results would be similar for all of Canada, Henripin (1994, p. 80) employs what he terms a "parsimonious framework". Using three different population projections, he applies a "production function and three 'need' functions: expenditures on children, on health care and on pensions". For various time periods up to 2040, he then derives quantitative estimates expressed as the percentage of net domestic product (NDP) required for expenditures on children, health care and pensions.[3]

Even with replacement level fertility rates, Henripin estimates that in 2040 there will be almost a doubling of the percentage of NDP spent on health care from 6.6 to 12.8 resulting from the growth in the elderly population. With lower levels of fertility which are in fact more likely, the percentage of NDP which will be have to be dedicated to future health care expenditures is even greater.

An unique element to Henripin's analysis is that he simulates what it will take to reduce the cost of health care by 10 percent by changing women's life-time employment, postponing retirement or increasing current fertility rates. He shows that government policies would have to increase women's life-time employment by 6.3 years, increase the official mandatory retirement age to 68 or increase fertility rates by 0.2 children; the point being that none of these options would be easy to accomplish.

The work discussed in this section reflects the two schools of thought on the role that the future elderly population will have on health care expenditures. Foot (1982, 1996), Gross and Schwenger (1981), Henripin (1994) and Marzouk (1991) are examples of what was previously labelled the crisis theorists. Although the methodologies and projections may

3 Net domestic product is defined as gross domestic product minus depreciation.

differ, the conclusions they draw are similar; that is, the future growth of the elderly population will generate major increases in health expenditures which are not likely sustainable given the current organisation and funding of health care in Canada. In contrast, Fellegi (1988) and Denton and Spencer (1985, 1995, 1997) are representative of the manageable theorists. Their projections suggest that health care expenditures will increase as a result of the growth in the elderly population, but most of this will be manageable because of some combination of the reallocation of expenditures from the young to the old, concomitant increases in productivity and offsets resulting from new technologies and efficiencies improvements within the health care sector.

What is also apparent from the research reviewed is the sensitivity of the projections to the population scenarios chosen and assumptions about productivity in the economy and within the health care sector. An issue which deserves more attention is whether the population projections being used are consistently under-estimating the future total population. Related to this issue, is whether researchers tend to be too conservative in their choice of projections; that is, there tends to be a heavy reliance on Scenario 2 or a standard scenario regardless of the base year chosen. It follows that the outcomes based on the "middle of the road" assumptions are those that drive the projection of future health care costs as if they are more likely than other possible scenarios.

We will return to these issues and others raised throughout this section in later sections of this report.

2 Health, Socio-Economic and Non-Demographic Factors Contributing to Increased Health Costs Canada

In this section, the various components of health care delivery (e.g., home care, technology, drugs, physician behaviour, etc.) are examined to consider how they are theorised or taken into account in projecting future health care costs. For example, do the projection models take into account the shift from acute care to home care, and if so, do they treat such substitution effects as cost-saving or cost-increasing?

In addition, the literature on health and disability, trends in family formation, pensions, retirement and other socio-economic factors are reviewed to see whether they are taken into account in projection models. If not, how they might be conceptualised or what their potential impacts might be are assessed and discussed.

A starting point for this section is McDaniel's (1987) seminal paper, "Demographic aging as a guiding paradigm in Canada's welfare state". McDaniel argues that in the 1970s and 1980s health care costs increased far more rapidly than did the elderly population. This suggests that the focus should be on the non-demographic issues that drive up health care costs. At the time, McDaniel and others pointed to the use of acute care beds for chronic care patients (mainly seniors) among other issues as an example of the misallocation of resources which

drove up health care costs. The increasing costs of health care were, therefore, not a result of an ageing population, but the result of a failure to plan the health care system appropriately.

Marshall (1994) aligns himself with those researchers who see the growth in the elderly population and the implications for future health care expenditures as manageable. He warns against what he calls "demographic determinism" and points to a study by Auer (1987) as counter-evidence to those who argue that the growth in the elderly population will be the main driver of future health care costs.

> He [Auer] has shown that, while hospital operating expenditures in Canada increased at an annual rate averaging 14.9 percent over the period 1961-1980, only 1.6 of the increased percentage points could be attributed to population growth. The net effect of changes in the age composition of the population was essentially zero. The largest proportion of the increase was in per capita expenditures (12.7 percent); higher hospital wage rates accounted for two-thirds of the increase, while increased service intensity accounted for one-quarter. (Auer, 1987 as cited by Marshall, 1994, p. 236).

Using data from British Columbia (BC), Barer et al. (1995, p. 218) make a convincing argument that disproportionate utilisation of health services by the elderly population is "driven by changes in patterns of health care practice, not in the numbers and ages of elderly people in the population." Between 1969 and 1986, the total BC population grew by 38.6 percent while the increase in hospital days grew by 45.8 percent. Only 8 percent of the increase in utilisation can be explained by changes in population age structure and –2.6 percent of the change in use is associated with age-specific changes in rates of utilisation. This negative aggregate figure reflects negative change for all age cohorts from 0 to 74 years of age, but large positive increases for those aged 75 to 84 (54.6 percent) and 85 and over (224.8 percent).

Barer et al. (1995) provide a number of explanations for these surprising findings including the declining number of acute care beds, reduced average lengths of stay, increasing rates of surgery among seniors and the increasing use of acute hospital settings for specific health conditions mainly associated with growing old (i.e., senility, senile dementia, Alzheimer's disease and other degenerations of the brain, chronic sequelae of stroke, heart disease, arthritis and hemiplegia and quadriplegia). What they cannot find in these explanations is evidence that increased hospitalisation of the elderly led to better outcomes or can be explained by changing patterns of morbidity. This leads them to argue that the greater relative consumption of hospital resources by the elderly population is in response to changing system priorities.

The analysis by Barer et al. (1995, p. 210) of the utilisation of physician services shows that fee-for-service payments to physicians increased by 75.9 percent between 1974/75 and 1985/86 adjusting for changing fee levels over time. While the total population increased by 21.3 percent during this period, only 4.4 percent of the increase in physician expenditures can

be explained by changes in population age structure. Increases in age-specific changes in rates of utilisation only explain 38.8 percent of the increase in physician expenditures even though changes in age-specific rates of utilisation increased with age but especially among the population aged 75 to 84.

Two sets of data explain the increased utilisation of physician services beyond the demographic changes. One set of data is the growth in the physician supply and the other is the rapid growth in the use of specialist services "strongly suggesting changing clinical standards of investigation and intervention." (Barer et al., 1995, p. 212).

There are widely held beliefs among some policy-makers that future health expenditures might decline as the result of improved technology, drug therapies or the substitution of home care services for institutional care. The difficulty has been finding any data or research to support these beliefs.

One of the technologies which is often mentioned theoretically as cost-saving is screening technologies. The argument goes that improved screening technologies (e.g., magnetic resonance imaging (MRI)) should lead to earlier detection of diseases which should result in less hospitalisation and thus lower health expenditures. This does not *appear*, however, to be the case. Take the example of breast screening for cancer. Early detection is likely to mean more intervention over a longer period of time and thus greater overall expenditures. The other reason for doubting that new technologies are likely to be cost-saving is that they come with high capital and overhead costs. For example, consider the costs associated with transplant surgery. Not only does the technology come with a high price tag, but the costs of supporting a transplant team of specialist physicians, nurses and technologists is also very high. [4]

There is lots of evidence that the introduction of new drugs has therapeutic value. What is far from clear is that the introduction of new drugs is reducing costs in other parts of the health care system. The costs of operating provincial drug benefit plans which are mainly targeted at seniors has been an area of budget increase for virtually every province. The nature of drug pricing (i.e., the high research and development costs, the nature of patent legislation and the desire of pharmaceutical firms to make a return on their investment) would suggest that in the near future new drug therapies are not likely to lead to reduced health care costs in other parts of the health care system.

Similarly, it is difficult to find definitive evidence that home care services offer a cost-effective means of reducing expenditures in institutional care. Coyte and Young (1997, p. 3) make four critical points come in their review: first, that there is a "lack of compelling evidence that home care services are a cost-effective alternative for institutional care"; secondly, some studies show "a small to moderate reduction in the need for, or use of, hospital days"; thirdly,

4 These examples should not be construed as an argument against screening for breast cancer or transplant surgery for therapeutic reasons. It is just to illustrate that improved technology does not necessarily lead to overall cost-savings.

other studies show this relationship to be weak and that home care services are "an add-on, and not a substitute, for acute care" and fourthly, "[I]t is difficult to rule out the possibility that individuals discharged to self care were also those progressing best following hospitalization, with resultant lower lengths of stay (LOS) and limited needs for home care."

Hollander (1999, 2) makes similar comments, but also argues "that home care may be a cost-effective alternative to residential care in a Canadian model of service delivery." Preliminary findings from his study on cost-effectiveness seem to support this view when home care costs are compared to other forms of facility care by level of care using data from British Columbia.

Hollander's preliminary findings should, however, be treated with caution. The analysis does not take into account the shared costs of home care attributable to families and partners and Hollander also notes that the condition of the patient makes a dramatic difference in whether home care or facility care is more cost effective. For those in stable conditions, home care appears to be more cost effective while for those in transition, facility care may be more cost effective (Dedyna and Watts, 1999).

Wilkins and Adams (1992, p. 59) noted that "[W]ith advancing age, the percentage of persons disabled increased rapidly, and a higher proportion of the total fell into the more severe categories of disability." If indeed, their analysis holds true for the future and the oldest age cohorts will grow most rapidly in the medium term, this would imply a growing demand for home and facility care.

Taking into account Wilkins and Adams, Moore and Rosenberg (1997) use Projection Series Number 2, based on the 1993 post-census estimates (Statistics Canada, 1994), to show how the elderly population will be distributed by census division across Canada. Then, they take the age and sex-specific disability rates from the 1986 Health and Activity Limitation Survey (HALS) and apply these rates to the projections for 2011.

> Of the 4.98 million people aged 65 and over in 2011, about 1.04 million living outside institutions are projected to have some level of disability. Almost 300,000 are projected to have a severe disability….100,000 people 65 and over will need help with activities of daily living and 300,000 will need help with instrumental activities of daily living. (Moore and Rosenberg, 1997, p. 178).

Moore and Rosenberg (1997) also show how the size of the disabled population in institutions would grow assuming no reduction in the number of places occurs between 1991 and 2011. As they point out, if the de-institutionalisation trend continues,

> this would mean a significant increase in the percentage of the elderly population with severe disabilities living outside institutions who would need a great deal of support for activities of daily living and instrumental activities of

> daily living. Many would be women 85 and over, without a spouse and with incomes below the low-income cut-off. It will take an enormous commitment of either voluntary support from other elderly people or a mixture of publicly and privately funded formal support services to maintain this part of the elderly population in the community should institutionalization rates be much lower in the future (Moore and Rosenberg, 1997, p. 178).

One of Moore and Rosenberg's (1997) major contributions is to highlight how the effects of an ageing population will be felt differently from place to place across Canada and that the health profile of seniors will vary from place to place because of how this complex geography will evolve.

Ultimately, Moore and Rosenberg (1997) do not fit easily into any of the three positions outlined in Section 1. They argue that the future may be one of service-rich and service-poor seniors and service-rich and service-poor communities across Canada. The service-rich communities will attract service-rich seniors while service poor-seniors will concentrate in service-poor communities challenging the federal and provincial governments to find ways of sustaining health care systems at the local level.

The population health model makes a strong case for the link between socio-economic status and health status. Longer life expectancy and increased years of disability-free living referred to above are manifestations of the links between socio-economic status and health status. Myles and Street (1995), as indeed do others, point to the success of the period from the end of World War Two until the early 1970s which resulted in the decline of (but not totally eliminated) poverty among the elderly and the long-term employment and wealth creation for those who are now entering retirement. Since the mid-1970s, the "economic life course" has changed. Increasingly, those entering the labour force have more difficulty finding employment, spend more time unemployed and under-employed and are likely to acquire fewer assets than the current cohorts of the elderly population.

Why this is important to the current discussion is that it potentially challenges several notions about the future. First, if we accept the link between socio-economic status and health status, then there is no reason to assume that it will continue in a positive direction if indeed a significant proportion of the future elderly have an economic life course which is radically different from those who are currently part of the elderly population. In other words, the assumptions of Wilkins and Adams may not turn out to be the case. Secondly, depending on how the other forms of social support are redesigned (e.g., public and private pension plans), this too has far-reaching implications for the future of how the costs of the health care system are covered.

In summing up, there are several messages which can be distilled from this section. First, there is considerable evidence that the growth of the elderly population, in and of itself, is only one element (and likely not the major element) driving the growing expenditures in our health care

systems. Secondly, the evidence to date indicates that new technologies, drug therapies and ways of delivering health care (e.g., home care) may be "add ons" not substitutes for current ways of delivering health care services (i.e., they are increasing the cost of the health care system not reducing the costs as hypothesised by some). Thirdly, the growth of the elderly population is likely to be highly differentiated across Canada and this will have attendant implications for the delivery of health care in different places across the country. Fourthly, how disability, health status and economic status are conceptualised needs to be carefully thought out as the nature of the economic life course of the current non-elderly changes as the Canadian economy restructures and finds its way in an increasingly global economy.

3 What Can We Learn from the International Literature

To place Canadian projections and projection models into a wider context, this section explores the international literature. The international literature is used to answer: whether Canadian projections and projection models fit with expectations and modeling efforts in other OECD countries; and is the conceptualization of the future of ageing and health care expenditures different outside of Canada. Focusing mainly on the United States, Japan and western European countries, questions to be answered are: how are these countries anticipating the effects of the growth of the elderly population on their health care systems; and what are these countries currently doing to control their costs?

To provide a context for the discussion in this section Tables 6,7, and 8 have been constructed from the latest data available from the OECD. Table 6 shows that Canada remains a relatively "young" country in comparison to many of the countries in western and northern Europe. For the European Union (EU) countries as a whole, 15.5 percent of the population was aged 65 and over in 1996, and in countries like Sweden and Belgium, 17.3 percent and 16.1 percent of the populations were aged 65 and over in 1996. This compares to Canada where 12.2 percent of the total population was aged 65 and over in 1996.

Table 7 can be used to make comparisons about life expectancy among OECD countries. Life expectancy for Canadian women and men who were 60 in 1995 is 24.3 years and 19.9 years respectively. In countries like Japan and Switzerland, life expectancy for this cohort in 1996 was even greater than it is for Canada, while in countries like the United States and the United Kingdom life expectancy was less compared to Canada.

Table 8 shows how much money on a per capita basis and as a share of gross domestic product (GDP), OECD countries are spending on health care. On a per capita basis in 1996, Canada ranked fifth in the amount spent on health care behind the United States, Switzerland, Germany, and Luxembourg. In terms of the percentage of GDP spent on health care, Canada again ranked fifth with the United States, Germany, Switzerland and France ahead of it. Many of the countries which have equivalent or better life expectancy rates compared to Canada, however, spend significantly less than Canada on both a per capita basis and as a percentage

of their GDP (e.g., Sweden or Italy). The other information in Table 8 is on average annual real growth in health care spending. There appears to be a division between those countries which began to slow their spending on health care between 1983 and 1989 and those who began to slow spending between 1990 and 1996. Again, one can contrast Canada which falls into the latter group with countries like Sweden or Italy which fall into the former group. One can also speculate that Canada may quickly fall out of the group of countries which are controlling their health care costs as provincial governments have begun to inject new money into their health care systems since 1998 and some have made election promises of significantly more spending.

Taken together what these tables indicate is that there are countries whose elderly populations are significantly larger than Canada's in relative terms, who achieve similar or even better results than does Canada in terms of life expectancy and who spend significantly less than does Canada on their health care systems. There are also countries spending more than Canada which achieve similar outcomes or in the case of the United States poorer outcomes than does Canada.

Table 9 provides a set of projections showing the percentage of males and females aged 65 and over for a selection of OECD countries between 1995 and 2040 (World Bank, 1999). These projections were produced by Bos et al. (1994) and are widely used in the international policy community. For the countries in Table 9, the data for the projections come from Statistics Canada, the Australian Bureau of Statistics, Eurostat, the US Bureau of the Census and the Japan Statistical Agency. Bos et al. (1994, p. 14) describe their methodology as a "cohort-component" method which is in many respects similar to Statistics Canada's methodology with two exceptions:

> Future fertility trends are specified by age-specific fertility schedules, which together constitute the total fertility rate, and by a year when the net reproduction rate (NRR) reaches unity (the "replacement year"). When the NRR is equal to 1, women have, on average, exactly enough surviving daughters to replace themselves. Separate procedures are applied, depending on whether a population has started the so-called "fertility transition."

Secondly, they use a "sub-routine" to take into account HIV/AIDS for those countries "with a measurable level of HIV infection" (Bos et al., 1994, p. 17). If applied at all to the countries identified in Table 9, it would have only a minor impact on mortality relative to the impact it has on mortality in countries especially within Africa.

From a scan of the international scene, several points can be made. With the exception of the United States and those international organizations which have a strong attachment to market-driven solutions (e.g., the World Bank), there does not appear to be the same level of concern that the future elderly population will force health care spending to unsustainable levels in many of the countries with which Canada likes to compare itself. For example, in the case of Australia, Kendig and Russell (1998, p. 32), using a study by Clare and Tulpule

(1994), report that the expectation is that the future growth of the elderly population will increase public expenditure on health care until approximately 2050. They see this as manageable based on more private financing and "modest increases in economic productivity" overall.

The likely explanation for this lesser concern is some combination of the facts that OECD countries are ahead of Canada in terms of the aging of their elderly populations and they are finding it manageable (e.g., Sweden), that they are achieving equivalent outcomes while spending less on health care (e.g., Italy), they are spending significantly less on their health care systems (United Kingdom), or they brought their health care costs under control sooner than has Canada (e.g., Sweden). The other part of the explanation is that some of the countries are much farther along in the development and use of chronic care and non-medical care systems for reducing their health care expenditures. Linked to this, then, is the issue of how countries account for their health care costs, and whether some of the low cost countries are accounting some health care costs in other social expenditure envelopes.

Even in countries like the United States, views are shifting. Serow et al. (1990) demonstrate the increasing role that the public sector plays in the provision of health care for the elderly population through Medicare. In their analysis, the "crisis" period will not occur until after 2025 when the population aged 85 and over will be the fastest growing cohort and there will be slow growth or even decline in all other adult age cohorts. Referring to this period, Serow et al. (1990, p. 188) write "the dramatic aging of this population produces a scenario that will require an extraordinary level of foresight and an extraordinary set of policies that will have to be determined and set into place before these long-run changes are well underway."

Disney (1996) presents a far less pessimistic view. He argues that "the prospect of a 'financing crisis' [in public health care] induced by aging has drawn attention to deficiencies of the program unrelated to aging *per se*" (Disney, 1996, p. 267). Disney (1996, p. 280-281) goes on to argue that the growth in the elderly population and the belief in greater public support of health care might add 2 percent to the share of GDP allocated to health care, but that his reading of international experience would suggest it could be less depending on the mix of public to private support and changes in the form of health care delivery (i.e., the use of more residential and domiciliary care).

In their analysis, the OECD (1998, p. 95) pegs health care spending in a range between 8 and 10 percent of GDP and suggests that seniors account for 30 to 40 percent of all spending on health care costs. As do many others, the OECD points out that much of the consumption of health care services by seniors takes place after the age of 70, but tapers off among the very oldest age cohorts. This leads the OECD (1998, p. 95-97) to project that health care costs will increase by 10 to 20 percent over the next 10 to 15 years. They term the increase "important" but not "an explosion." They also believe that these increases might be mediated by a combination of cost-saving new medical technologies and reforms to health care systems which promote greater efficiency and cost effectiveness.

The OECD draws a distinction between health care costs and the costs of long-term nursing care. With the exception of the Scandinavian countries, the OECD estimates that the remainder of the member countries spend less than 2 percent of GDP on long-term care (OECD, 1998, p. 98). They project that these costs will increase by 50 percent over the next 20 to 30 years which will be equivalent to 1 or 2 percent of GDP. They see this as adding to the costs of health care not as a substitute, but note such increases are similar to those which took place in social spending between 1980 and 1985.Their projections on the costs of long-term nursing care are driven by purely demographic factors (OECD, 1998, p. 82).

Summing up, Canada currently sits at the high end of health care spending and life expectancy, but at the low end in terms of the size of its ageing population in comparison to other OECD countries, but especially the United States, Western Europe, Scandinavia, Australia and Japan. Our methods for doing population and cost projections appear to be similar to those being used by the World Bank, the OECD and other OECD countries. The scan of the international literature leaves the impression that most countries and international organizations now believe that the growth of their elderly populations and the impact this will have on health care expenditures is manageable through a mixture of overall economic growth and prudent adoption of greater efficiencies and cost effective measures. Even in the case of the World Bank (1994) which continues to use "crisis" rhetoric, their message is that there is a window of opportunity to make changes which will avert "the old age crisis."

4 Assessing Canadian Projections and Projection Models

Based on the literature reviewed and the analysis of it in Sections 1 to 3, this section provides an assessment of Canadian projections and projection models. The assessment provides a guide to where there is consensus, where there are disagreements, and what is lacking in projections and projection models as they are currently employed.

In addition, the models and their projections are assessed for their policy implications for the Canadian health care system in the future. Alternative conceptual models of population ageing will also be presented in this section as a contrast to those which already exist and suggestions made as to how these alternative conceptualisations might be developed or augment current projection models.

Canadian researchers have generally relied upon Statistics Canada population projections to drive the demand side of the models they have developed to forecast future health care expenditures. Statistics Canada is considered by many to be among the leading if not the global leader among national statistical agencies. The population projection techniques that they use are similar to those used by other national and international statistical agencies.

There are, however, two levels of conservatism which are implicit in the use of the Statistics Canada projections. First, it *appears* that Statistics Canada consistently errs on the low side in making assumptions about the future. When one goes back to earlier projection series and

checks the projections for 1991 and 1996 against actual counts from those census years, the projections tend to be low. This is the result of cumulative differences between the components and the actual counts on a year-to-year basis.

This is compounded by most researchers who impose a second level of conservatism on the process by consistently choosing Projection Series No. 2, "the middle of the road" scenario for their research. Even where Projection Series No. 1 and No. 3 are also used to provide contrasts, the focus of the analysis is usually on the results generated using Projection Series No. 2.

The under-estimation of the future total population, ironically, works in favour of those who argue that the future growth of the elderly population will not significantly increase future health care costs. If, in fact, the actual population is larger than the forecasted population, it is most likely to mean that there are more young and working age people relative to the size of the elderly population which will increase overall productivity all other things being equal.

With a few notable exceptions on the "supply side", the models used in Canada to project future health care costs have relied heavily on age and sex standardised utilisation rates and costs where change over time is driven mainly by changes in the projected size of the elderly population. Where population projections and utilisation and costs are integrated into more complex models which integrate the economy into the analysis, the results demonstrate that the changing age structure is just one component driving future health costs. More importantly, these models demonstrate that the growth in future health care costs is manageable as long as the economy grows at a modest rate. Indeed, even the OECD sees general economic growth significantly mediating the impact that an ageing population will have on future health care costs.

Even among those who have forecast future health care expenditures and argue that they are manageable, there is less consensus about what role re-allocation of resources from the young to the old might play in this process and what the implications are of new technologies, drug therapies and alternative methods of delivering care. The majority view is that re-allocation of resources would be difficult to accomplish because of the nature of fixed assets (i.e., schools cannot be easily converted into health care facilities). While in relative terms the young will make up a smaller proportion of the dependency ratio, in absolute terms they will continue to generate significant demand for resources and ultimately, even among the seniors there is no political consensus for re-allocation of resources.

None of the work reviewed seemed to take into account the role that new technologies, drug therapies and alternative methods of delivering care will have on health care expenditures. Although there are some who hold the view that new technologies, drug therapies and alternative methods of delivering health care will reduce overall expenditures, the evidence is scant and mixed (i.e., there is evidence that demonstrates that new technologies, drug therapies and alternative methods of delivering care actually increase health expenditures because they are "add-ons").

While it is impossible to forecast the development of specific new technologies, drug therapies and alternative methods of delivering care, there is no reason to perpetuate trends which are likely to be incorrect. For example, if the OECD view is accepted that home care will consume between an additional 1 and 2 percent of GDP, this needs to be taken into account in the analysis of projections. There still may be many good reasons from a policy perspective to want to shift people from hospital care to home care. For example, increasing the proportion of seniors who remain in their homes and are treated using home care services would reduce capital expenditures required to accommodate the needs of ageing baby boomers within institutional settings and the potential glut of unneeded capacity beyond the post baby boom bulge in 2031. What should be avoided is the building into projection models a measure which assumes such shifts will help control or reduce health care spending, if indeed the evidence suggests the opposite.

The models that we currently use work best at the national, provincial and territorial levels. While this may be useful for policy development at these geographic scales, policy and program implementation typically play themselves out at smaller geographic scales. At the present time we have only a few examples of models which provide population and potential utilisation projections at sub-provincial scales (e.g., Moore and Rosenberg, 1997; Naylor et al., 1994).

At the individual scale of analysis, the models assume that only age and sex differentiate cohorts. There is also a sense in which those who use the projections, assume that the future cohorts of seniors will have the same socio-economic and health status profile of the current elderly population. The changing nature of labour markets and pension reform will likely have broad implications for the resources among the future elderly. While the reduction of poverty among the elderly population since the 1950s is one of the great success stories of social policy in Canada, there remains wide variation among today's seniors, and it is likely that this variation will increase among future seniors. It is also likely that the changing social profile of Canada's population will have implications for changing health status and attitudes towards health care spending and delivery.

External forces are also likely to affect the future of health care spending in Canada. There is growing pressure at the institutional level to change the public/private mix of spending on health care. As Canada continues its integration into a North American and indeed global economy, the pressure to change the public/private mix of spending on health care will only increase.

What this assessment suggests is that the models we are currently using to project future population change and its implications for health care expenditures are on a par or are even better than what other countries and international organisations are using. What is needed, however, are models which can take into account the issues raised in this section. As a precondition to the development of such models, there is much where we need to come to a

better understanding. In the concluding section, some new directions which might be taken are suggested.

5 Conclusions

The projections of Canada's ageing population and what they mean for future health care spending have generated two general debates. The first debate is whether Canada will be able to afford its public health care system after 2025, and the second debate is what role Canada's ageing population will play in generating the costs of the health care system over the coming decades.

Section 1 shows that virtually all of the research carried out in Canada has depended on the population projection models of Statistics Canada as a basis for these debates. The disagreements are, therefore, not about the size or age-sex composition of the elderly population in the coming decades, but about what this means for health care spending. Those who argue that the future health care system will be in crisis tend to focus on the relatively higher utilisation rates of health care services by seniors as the basis for their extrapolations without taking into account either how the economy overall might grow relative to health care spending in the future and/or the other cost drivers in the health care system. In contrast, those who argue that future health care costs will be manageable have tried to demonstrate that either the elderly population represent only one of the cost drivers which will lead to increased health care spending and/or that changes in the future will generate savings to offset the growth in the elderly population (e.g., inter-generational transfers, savings through new technologies, drug therapies or more home care). While overall there appears to be a growing body of evidence to support the argument that with modest economic growth the increases in health care spending are manageable, there is far less evidence or the evidence is very mixed which supports arguments that the future "offsets" will be of a magnitude to reduce health care spending in a significant manner (see Section 2).

In addition, two other issues are raised in Section 2 which deserve more attention. The projection models used assume that the socio-economic profile of today's seniors will remain constant over time. With the changing nature of the labour force and changing patterns of immigration to Canada, the profile of Canada's seniors is changing . Secondly, the models operate best at the national, provincial and territorial scales of analysis. While this may be satisfactory for broad macro-scale policy development, the models tend to have far less utility for policy and program implementation which takes place at smaller geographic scales (e.g., at the scale of regional health authorities).

The basic message of Section 3 is that the projection models being used in Canada compare favourably to those used internationally. Not surprisingly then, the issues being debated about the implications of growing elderly populations for financing health care are similar to those being debated in Canada. Much of the international evidence reviewed indicated that modest growth in economies should insure that most countries are able to manage the growth in their

elderly populations and increased health care spending in the future. It is also worth remembering that there are countries which already have significantly larger elderly populations than Canada, spend significantly less and achieve similar health outcomes in comparison to Canada. These countries provide a "practical" demonstration that a larger elderly population does not necessarily lead to unsustainable health care spending.

Out of Section 4, two conclusions can be drawn. First, our modelling efforts to date are comparable if not ahead of those being used in other countries and international organisations. There is, however, scope for improvement. Secondly, there is a range of issues on both the demand and supply side which are currently taken into account on the basis of no or mixed evidence or which have not been taken into account at all.

The following list represents those areas where research and development would lead to improved models for projecting the impacts of the ageing population on health care spending:

- At a minimum, more attention needs to be paid to the high population growth scenarios developed by Statistics Canada as part of their population projections.

- Preferably, a more aggressive approach needs to be taken to developing higher population growth scenarios than those which are currently being used. New scenarios ought to be tested where it is assumed that even lower fertility will remain the norm, that life expectancy will increase and that net immigration will grow.

- Studies need to be carried out on major technological changes, drug therapies and alternative forms of service delivery to provide a more accurate understanding of their implications for changing health care costs.

- Projection models need to be developed which take into account the changing socio-economic and ethnic diversity of Canada's population. This will likely necessitate more research on persons of varying socio-economic characteristics and ethnic diversity and their use of health care services.
- Projection models need to be developed which take into account various mixes of public and private spending on health care.

- Projection models need to be developed which allow for better forecasts at the sub-provincial scale where policy and program delivery take place to take into account the differential impacts that the future growth of the elderly population will have on communities across Canada.

While it might be possible to achieve success in some of these areas with existing data or through micro-level projects, there is a need for very large data sets which will allow researchers to capture both national, provincial, territorial and sub-provincial/territorial trends cross-sectionally and longitudinally. It seems paradoxical that federal, provincial and territorial governments are most concerned about the growth in the elderly population and its

implications for future health care expenditure, yet the focus of data collection is on youth through the National Longitudinal Survey of Children and Youth (NLSCY) and the working age population through the National Population Health Survey (NPHS). While theoretically, the NPHS can be used both cross-sectionally and longitudinally to inform some of the above issues raised, it has neither the scope of questions nor the number of observations required to cover the dynamics of the ageing population, especially those aged 75 and over who are/will require health services. Only a national longitudinal survey of the ageing population can meet this data requirement.

On the supply side, utilisation and cost data can be found through national bodies such as the Canadian Institute for Health Information (CIHI) and provincial administrative databases (e.g., the Ontario Health Insurance Plan), these databases rarely contain significant detail about the users. They do, however, have the potential to provide useful data for the question of the role that technological change is playing. What is more problematic is the lack of national or even sub-national databases which can provide the kind and scope of information required to examine the roles that new drug therapies and alternative service delivery is playing.

There is scope for supporting research and development of comprehensive models which incorporate population and health care expenditure change and those which focus on a particular issue (e.g., the role of new medical technologies). Research and development on the latter are going to be needed to inform macro-modelling efforts.

There are two other issues which deserve considerable attention. Virtually all of the research reviewed takes as its starting point projections in the growth of the population and current trends in utilisation as the basis for future utilisation of health services and consequently how much the system will cost in the future. No studies were found that take as their starting point the "end point" and work backwards. For example, imagine a research exercise which takes 2025 as the end point and asks the question, "If these are to be the goals of the health care system and this is how much of the GDP we wish to spend on health care, what would have to be done between now and 2025 in terms of the supply of various types of health care services, the supply and mix of health care personnel, and how and where to promote health to achieve these goals?" Such approaches shift policy development from reactive modes to proactive modes and lead to more integrative planning of programs (e.g., if we want to achieve a certain level of home care by 2025, how many trained home care workers will be needed and where will they be needed).

The second issue is to broaden the research and thinking on the private/public division of spending on health care. Most of the research and thinking to date has been influenced or is drawn from experience in the United States or the United Kingdom. Given the failure of both of these countries to achieve goals which are central to Canada's public health care system, more research needs to be carried out on other OECD countries. There are other OECD countries which mix public and private spending on health care, which are already ahead of Canada in terms of the size of their elderly population, which spend less on health care and

achieve similar or better health outcomes than Canada. There is also the need for much more research which links the shift from public responsibility to private responsibility for health care to the impacts on macro and micro economies. For example, if people exit the labour force to provide home care for elderly parents, this may save public expenditure on health care, but what are the opportunity costs and the impacts on lost productivity and tax revenues? This type of research cries out for a multidisciplinary approach which combines demographic, health services and economic research.

If the tripartite goal of preserving a public health care system which is capable of providing high quality care to an elderly population at sustainable economic levels is to be achieved, first and foremost, the Canadian economy will need to continue to grow at rates similar or even faster than health care spending. Looking beyond this basic policy reality, models are needed which take into account how Canada's ageing population is going to grow and change over the coming decades and how policy choices will allow the achievement of this tripartite goal.

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Table 1 - Canada and Provinces, Population 1994 to 1998

	1994	1995	1996	1997	1998
	thousands				
Canada	**29,036.00**	**29,353.90**	**29,671.90**	**30,004.00**	**30,300.40**
Newfoundland	574.8	568	560.6	554.4	544.4
Prince Edward Island	133.7	134.8	136.2	136.8	136.4
Nova Scotia	926.3	927.7	931.2	934.8	934.6
New Brunswick	750.9	751.8	753	754	753
Quebec	7,207.30	7,241.40	7,274.00	7,307.60	7,333.30
Ontario	10,827.50	10,964.90	11,100.90	11,260.40	11,411.50
Manitoba	1,123.90	1,129.80	1,134.30	1,136.80	1,138.90
Saskatchewan	1,009.70	1,014.20	1,019.50	1,022.20	1,024.40
Alberta	2,704.90	2,739.90	2,780.60	2,837.80	2,914.90
British Columbia	3,681.80	3,784.00	3,882.00	3,959.30	4,009.90
Yukon	30	30.9	31.9	32.2	31.7
Northwest Territories	65.2	66.6	67.6	67.8	67.5

1. On July 1 of each year.

Source: Statistics Canada, CANSIM, Matrices 6367-6379

	1994	1995	1996	1997	1998
	percent				
Canada	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Newfoundland	1.98	1.94	1.89	1.85	1.80
Prince Edward Island	0.46	0.46	0.46	0.46	0.45
Nova Scotia	3.19	3.16	3.14	3.12	3.08
New Brunswick	2.59	2.56	2.54	2.51	2.49
Quebec	24.82	24.67	24.51	24.36	24.20
Ontario	37.29	37.35	37.41	37.53	37.66
Manitoba	3.87	3.85	3.82	3.79	3.76
Saskatchewan	3.48	3.46	3.44	3.41	3.38
Alberta	9.32	9.33	9.37	9.46	9.62
British Columbia	12.68	12.89	13.08	13.20	13.23
Yukon	0.10	0.11	0.11	0.11	0.10
Northwest Territories	0.22	0.23	0.23	0.23	0.22

1. On July 1 of each year.

Source: Statistics Canada, CANSIM, Matrices 6367-6379

Table 2 - Provincial Government Health Expenditures, by Province, 1994-95

	$'000,000	Percent
Newfoundland	949	1.96
Prince Edward Island	199	0.41
Nova Scotia	1,320	2.72
New Brunswick	1,172	2.42
Quebec	11,616	23.96
Ontario	18,452	38.05
Manitoba	1,820	3.75
Saskatchewan	1,534	3.16
Alberta	4,406	9.09
British Columbia	6,742	13.90
Yukon	53	0.11
Northwest Territories	225	0.46
Total	48,488	100.00

Source: Health Canada (1994)

Table 3 - Population Estimates for 1996 and Projections for the Years 2001, 2006, 2011, 2016

	1996			2001				2006			2011		2016		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
	Thousands														
All ages	29,969.20	14,847.30	15,122.00	31,877.30	15,781.20	16,096.10	33,677.50	16,674.30	17,003.20	35,420.30	17,541.80	17,878.50	37,119.80	18,387.50	18,732.20
0-4	1,951.30	1,000.20	951.1	1,924.30	988.2	936.2	1,924.60	988.4	936.2	1,980.10	1,017.00	963.1	2,052.80	1,054.40	998.4
5-9	2,016.70	1,031.80	984.9	2,082.20	1,069.00	1,013.10	2,016.00	1,035.90	980.1	2,016.60	1,036.40	980.3	2,072.20	1,065.00	1,007.20
10-14	2,020.40	1,032.30	988.1	2,124.80	1,089.20	1,035.60	2,170.10	1,115.00	1,055.20	2,104.80	1,082.30	1,022.50	2,105.70	1,082.90	1,022.80
15-19	2,003.70	1,026.70	977	2,124.50	1,088.00	1,036.40	2,213.70	1,135.80	1,078.00	2,259.20	1,161.60	1,097.60	2,194.80	1,129.50	1,065.40
20-24	2,037.40	1,033.90	1,003.50	2,115.20	1,080.10	1,035.00	2,242.90	1,144.30	1,098.60	2,332.30	1,192.20	1,140.10	2,378.20	1,218.30	1,159.90
25-29	2,225.40	1,122.30	1,103.10	2,177.70	1,103.00	1,074.70	2,265.90	1,151.50	1,114.50	2,392.80	1,215.30	1,177.50	2,482.20	1,263.30	1,218.90
30-34	2,633.30	1,335.00	1,298.30	2,366.40	1,192.90	1,173.40	2,328.30	1,177.50	1,150.80	2,416.10	1,225.80	1,190.30	2,541.40	1,288.90	1,252.50
35-39	2,668.20	1,344.90	1,323.30	2,723.40	1,376.10	1,347.30	2,479.50	1,248.00	1,231.50	2,443.00	1,233.40	1,209.60	2,530.40	1,281.50	1,248.90
40-44	2,388.80	1,192.50	1,196.40	2,716.30	1,363.90	1,352.30	2,782.90	1,403.00	1,379.80	2,544.50	1,278.20	1,266.20	2,509.90	1,264.80	1,245.10
45-49	2,159.90	1,085.20	1,074.70	2,399.60	1,193.90	1,205.70	2,734.20	1,370.20	1,363.90	2,801.90	1,410.10	1,391.80	2,569.50	1,289.10	1,280.40
50-54	1,672.60	838.5	834.1	2,140.10	1,069.80	1,070.30	2,391.10	1,185.40	1,205.70	2,722.00	1,359.60	1,362.40	2,791.40	1,400.60	1,390.80
55-59	1,333.10	662.4	670.8	1,651.40	820.1	831.3	2,113.80	1,048.20	1,065.70	2,362.20	1,162.60	1,199.60	2,688.70	1,334.10	1,354.50
60-64	1,214.60	597.1	617.5	1,300.90	636.8	664	1,615.30	791.5	823.7	2,063.60	1,011.00	1,052.60	2,308.20	1,123.70	1,184.50
65-69	1,130.30	536.9	593.4	1,154.00	554.2	599.7	1,244.60	597	647.6	1,544.50	742.8	801.7	1,971.60	949.4	1,022.20
70-74	981.4	433.9	547.5	1,027.10	470.6	556.6	1,054.00	490	564.1	1,142.50	531.6	610.8	1,420.60	664.2	756.4
75-79	704.9	289.3	415.6	831.9	345.9	486.1	877.1	380.4	496.7	906.1	400.1	506	989.8	439	550.7
80-84	467.6	174.8	292.8	541.8	201.3	340.5	644	244.1	399.9	685	272.9	412.1	714.1	291.2	422.9
85-89	239.5	77.6	161.8	308.5	98.3	210.2	361	116.4	244.6	433.2	143.7	289.5	466.5	164.4	302
90 and over	120	31.9	88.1	167.4	39.8	127.6	218.5	51.9	166.6	269.9	65.1	204.8	331.7	83	248.7

	1996			2001				2006			2011		2016		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
	Percent														
All ages	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0-4	6.51	6.74	6.29	6.04	6.26	5.82	5.71	5.93	5.51	5.59	5.80	5.39	5.53	5.73	5.33
5-9	6.73	6.95	6.51	6.53	6.77	6.29	5.99	6.21	5.76	5.69	5.91	5.48	5.58	5.79	5.38
10-14	6.74	6.95	6.53	6.67	6.90	6.43	6.44	6.69	6.21	5.94	6.17	5.72	5.67	5.89	5.46
15-19	6.69	6.92	6.46	6.66	6.89	6.44	6.57	6.81	6.34	6.38	6.62	6.14	5.91	6.14	5.69
20-24	6.80	6.96	6.64	6.64	6.84	6.43	6.66	6.86	6.46	6.58	6.80	6.38	6.41	6.63	6.19
25-29	7.43	7.56	7.29	6.83	6.99	6.68	6.73	6.91	6.55	6.76	6.93	6.59	6.69	6.87	6.51
30-34	8.79	8.99	8.59	7.42	7.56	7.29	6.91	7.06	6.77	6.82	6.99	6.66	6.85	7.01	6.69
35-39	8.90	9.06	8.75	8.54	8.72	8.37	7.36	7.48	7.24	6.90	7.03	6.77	6.82	6.97	6.67
40-44	7.97	8.03	7.91	8.52	8.64	8.40	8.26	8.41	8.11	7.18	7.29	7.08	6.76	6.88	6.65
45-49	7.21	7.31	7.11	7.53	7.57	7.49	8.12	8.22	8.02	7.91	8.04	7.78	6.92	7.01	6.84
50-54	5.58	5.65	5.52	6.71	6.78	6.65	7.10	7.11	7.09	7.68	7.75	7.62	7.52	7.62	7.42
55-59	4.45	4.46	4.44	5.18	5.20	5.16	6.28	6.29	6.27	6.67	6.63	6.71	7.24	7.26	7.23
60-64	4.05	4.02	4.08	4.08	4.04	4.13	4.80	4.75	4.84	5.83	5.76	5.89	6.22	6.11	6.32
65-69	3.77	3.62	3.92	3.62	3.51	3.73	3.70	3.58	3.81	4.36	4.23	4.48	5.31	5.16	5.46
70-74	3.27	2.92	3.62	3.22	2.98	3.46	3.13	2.94	3.32	3.23	3.03	3.42	3.83	3.61	4.04
75-79	2.35	1.95	2.75	2.61	2.19	3.02	2.60	2.28	2.92	2.56	2.28	2.83	2.67	2.39	2.94
80-84	1.56	1.18	1.94	1.70	1.28	2.12	1.91	1.46	2.35	1.93	1.56	2.31	1.92	1.58	2.26
85-89	0.80	0.52	1.07	0.97	0.62	1.31	1.07	0.70	1.44	1.22	0.82	1.62	1.26	0.89	1.61
90 and over	0.40	0.21	0.58	0.53	0.25	0.79	0.65	0.31	0.98	0.76	0.37	1.15	0.89	0.45	1.33

1. Figures represent a medium-growth projection and are based on 1993 population estimates.

2. Post-censal estimate of 1996 population.

Source: Statistics Canada, CANSIM 6367 (estimates) and 6900 (projections).

Table 4: Component Assumptions Underlying the Four Population Projections for Canada, Provinces and Territories, 1993-2016: Canada

Components:	Mortality (Eo in years) M	F	Fertility (Births per Woman)	Immigration (1)	Emigration (1)	Returning Canadians (1,2)	Non-Permanent Residents (3)	Net Interprovincial Migration (1,4)
Estimates								
1991	74.6(5)	80.9(5)	1.70	219,300	43,700	18,500	381,000	Interprovincial
1993	74.8(5)	81.3(5)	1.70(5)	257,500	46,400	21,800(5)	208,500(5)	Scenario
Projections			**Assumptions**					
			Low Natural Increase/Immigration Medium Internal Migration					
No.1								
2001	75.6	81.7	1.53	180,000	48,160	23,100	149,600	Medium
2016	77.0	83.0	1.50	150,000	49,560	25,630	149,600	Medium
No.2			**Medium Natural Increase/Immigration Medium Internal Migration**					
2001	76.2	82.1	1.70	250,000	48,760	23,100	149,600	Medium
2016	78.5	84.0	1.70	250,000	53,970	25,630	149,600	Medium
No. 3			**High Natural Increase/Immigration West Internal Migration**					
2001	77.2	82.9	1.87	310,000	49,370	23,100	149,600	West
2016	81.0	86.0	1.90	330,000	58,320	25,630	149,600	West
No.4			**High Natural Increase/Immigration Central Internal Migration**					
2001	77.2	82.9	1.87	310,000	49,170	23,100	149,600	Central
2016	81.0	86.0	1.90	330,000	57,560	25,630	149,600	Central

Source: Estimated: Vital Statistics and Quarterly Demographic Statistics, July 1, 1971 to July 1, 1993.
Projected: Population Projections Section, Demography Division, Statistics Canada, April 1994.

Notes: (1) Flow data on Immigration, Emigration, Returning Canadians and Net Internal Migration refer to the following periods: 1990-91, 1992-93, 2000-01 and 2015-16.
(2) The number of returning Canadians are derived using 50% of emigrants over a ten year period based on medium assumption.
(3) The stock number of non-permanent residents is kept constant after 1995 (i.e. net flows equal zero from 1995-96 onward).
(4) Western Scenario: Westward migration, mainly to British Columbia, which is currently (1993) major destination of interprovincial migrants. Most favourable scenario for Atlantic, Alberta, British Columbia, Yukon and Northwest Territories.
Central Scenario: Ontario main destination of interprovincial migrants, return to mid-to-late 80's. Most favourable scenario for Quebec, Ontario, Manitoba and Saskatchewan. Medium Scenario: generally average of Central and Western Scenarios.
(5) Estimated by the Population Projections Section, Demography Division, Statistics Canada, March 1994.
(6) Eo = life expectancy at birth.

Table 5 – Comparing Canada's Elderly Population in 2016 under Three Different Scenarios

Projection Series Number	Population Aged 65 and Over	Percentage of the Total Population
1	5,637,600	15.6
2	5,894,300	15.9
3	6,273,300	15.7

Source: Statistics Canada (1995)

Table 6 – Population and Age Structure of Countries in the OECD, 1996

Country	Population thousands		Age Structure of Population % of total population		
			Under 15	15-64	65 and over
Australia	18,289		21.2	66.7	12.1
Austria	8,060		17.6[b]	67.4[b]	15.0[b]
Belgium	10,157		17.9[c]	66.0[c]	16.1[c]
Canada	29,964		20.0	67.8	12.2
Czech Republic	10,316		18.1	68.5	13.4
Denmark	5,262		17.6	67.3	15.1
Finland	5,125		18.9	66.7	14.4
France	58,380		19.3	65.4	15.3
Germany	81,877		15.9[c]	68.2[c]	15.8[c]
Greece	10,465		16.6	67.6	15.8
Hungary	10,193		17.8	67.9	14.2
Iceland	270		24.2	64.3	11.4
Ireland	3,621		23.9	64.7	11.5
Italy	57,473		15.3[b]	68.9[b]	15.8[b]
Japan	125,864		15.9[c]	69.4[c]	14.5[c]
Korea	45,545		22.9	71.1	6.1
Luxembourg	418		18.5	67.3	14.2
Mexico	96,582		36.2[c]	59.1[c]	4.8[c]
Netherlands	15,494		18.4	68.3	13.3
New Zealand	3,640		23.0	65.5	11.6
Norway	4,370		19.5	64.6	15.9
Poland	38,618		22.2	66.5	11.3
Portugal	9,935		17.5	67.7	14.8
Spain	39,270		16.2	68.2	15.6
Sweden	8,901		18.8	63.8	17.3
Switzerland	7,085		17.6	67.5	14.9
Turkey	62,695		31.7	63.5	4.8
United Kingdom	58,782		19.3	64.9	15.7
United States	265,557		21.7	65.5	12.8
G7	677,897		18.9	66.9	14.2
EU-15	373,220		17.4	67.1	15.5
OECD Total	1,092,208		21.5	66.9	12.6

Source: Labour Force Statistics: 1976-1996, OECD, Paris, 1997

Notes:
b. Based on 1994 data.

c. Based on 1995 data.

Table 7 – Life Expectancy Among OECD Countries in 1996

Country	Life Expectancy Years					
	at birth		at age 40		at age 60	
	Women	Men	Women	Men	Women	Men
Australia	81.1	75.2	42.3	37.4	23.8	19.6
Austria	80.2	73.9	41.3	35.9	23.0	18.9
Belgium	80.2	73.5	42.2	36.4	24.0	19.0
Canada	81.3[a]	75.3[a]	42.5	37.5[a]	24.3[a]	19.9[a]
Czech Republic	77.6[a]	70.5[a]	38.4	32.3[a]	20.4[a]	16.0[a]
Denmark	78.0	72.8	39.0[a]	34.6[a]	21.4[a]	17.6[a]
Finland	80.5	73.0	41.5	35.1	23.1	18.3
France	81.9	74.0	43.2	36.4	25.0	19.7
Germany	79.9	73.6	41.1	35.5	22.8	18.5
Greece	80.3	75.0	41.6	37.4	22.9	19.9
Hungary	74.7	66.6	36.6	28.8	19.4	14.9
Iceland	81.9[a]	76.4[a]	41.8[a]	38.3[a]	23.6[a]	20.5[a]
Ireland	78.5	73.2	39.1[g]	34.6[g]	21.1[g]	17.1[g]
Italy	81.3	74.9	42.0[b]	36.6[b]	23.5[b]	19.0[b]
Japan	83.3	77.0	44.6	38.5	25.9	20.8
Korea	76.0[a]	70.0[a]	37.9[h]	30.9[h]	20.1[h]	15.5[h]
Luxembourg	80.0	73.0	40.8[g]	35.0[g]	22.7[g]	17.8[g]
Mexico	76.5	70.1	40.0	35.3	22.6	19.1
Netherlands	80.4	74.7	41.0	35.8	22.8	18.1
New Zealand	79.5[a]	74.2[a]	41.1[a]	36.7[a]	23.0[a]	19.1[a]
Norway	81.1	75.4	42.0	37.1	23.7	19.3
Poland	76.4[a]	67.6[a]	38.3[a]	30.8[a]	20.5[a]	15.8[a]
Portugal	78.5	71.2	40.2	34.6	21.9	17.9
Spain	81.6	74.4	42.9	36.7	24.2	19.5
Sweden	81.5	76.5	42.4	37.9	24.0	20.0
Switzerland	81.9	75.7	43.1	37.8	24.6	20.2
Turkey	70.5	65.9	35.4[j]	31.5[j]	18.1[j]	15.8[j]
United Kingdom	79.3	74.4	40.6[b]	35.9[b]	22.4[b]	18.3[b]
United States	79.4	72.7	40.7	35.9	22.9	19.2

Source: OECD Health Data 98, OECD, Paris, 1998.

Notes:
a. Based on 1995 data.
d. Based on 1985 data.
g. Based on 1991 data.
h. Based on 1993 data
j. Based on 1990 data.

Table 8 – Total Expenditure on Health, 1996 and Trends 1976 to 1996

Country	Per capita expenditure	Share in GDP	Average annual real growth rate (%)		
	$PPP	(%)	1976-82	1983-89	1990-96
Australia	1,775	8.5	2.3	4.6	4.0
Austria	1,748	8.0	-1.5	2.4	1.0
Belgium	1,708	7.8	4.3	2.7	-0.1
Canada	2,065	9.6	3.7	3.7	1.3
Czech Republic	904	7.2			..
Denmark	1,802	8.0	6.8	1.8	2.6
Finland	1,380	7.4	3.3	3.6	-2.7
France	1,983	9.7	5.7	4.9	2.7
Germany	2,278	10.5	1.8	2.6	6.3
Greece	888	6.8	4.4	4.9	6.9
Hungary	602	6.7			..
Iceland	1,893	8.2	6.9	4.3	0.5
Ireland	1,276	7.0	4.8	-1.6	2.5
Italy	1,584	7.8	5.2	2.9	1.3
Japan	1,677	7.2		1.5	4.2
Korea	537	4.0	11.8	13.6	8.2
Luxembourg	2,139	6.8	6.3	3.8	0.0
Mexico	358	4.6			..
Netherlands	1,766	8.6	2.0	2.7	2.5
New Zealand	1,270	7.3	0.0	0.0	0.4
Norway	1,928	7.9	5.2	2.4	2.3
Poland	371	5.0			..
Portugal	1,071	8.3		7.1	4.8
Spain	1,115	7.4	2.9	6.4	2.7
Sweden	1,675	8.6	3.1	1.9	-0.3
Switzerland	2,499	10.2	1.9	4.2	2.3
Turkey	232	3.8			..
United Kingdom	1,317	6.9	1.8	2.0	2.5
United States	3,898	14.0	3.9	3.7	2.0
Average OECD		8.2	3.9	3.6	2.4

Source: OECD Health Data 98

Notes:
1. The annual rates of increase are measured in constant prices and in the national currency units of each country.
2. The average excludes the Czech Republic, Hungary, Mexico, Poland, and Turkey.

Table 9 - Population Projections for Selected OECD Countries, 1995 to 2041

Country	Projection with Net Reproduction Rate = 1 by 2035 % of the Population Aged 65 and Over									
	1995	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Australia										
Males	10.2	10.5	10.9	11.9	13.9	15.7	17.6	19.3	20.5	21.6
Females	13.3	13.3	13.6	14.5	16.5	18.7	21.1	23.3	24.8	26.2
Canada										
Males	10.4	10.8	11.3	12.7	15.0	17.4	20.3	23.0	24.0	24.3
Females	13.9	14.1	14.6	15.7	18.0	20.8	24.2	27.3	28.8	29.5
France										
Males	12.5	12.9	13.1	13.4	15.3	17.2	18.9	20.2	21.3	22.2
Females	17.8	18.3	18.6	18.7	20.6	22.6	24.6	26.5	27.8	28.7
Germany										
Males	11.2	12.5	15.1	16.8	17.8	19.4	21.7	25.1	28.0	28.5
Females	19.1	19.3	21.2	22.3	23.1	24.7	26.7	29.8	32.8	33.5
Italy										
Males	13.4	14.8	15.9	16.6	18.1	19.3	21.0	23.6	26.4	28.6
Females	18.5	20.2	21.5	22.3	24.0	25.3	27.1	29.8	32.7	35.1
Japan										
Males	12.2	14.6	16.9	19.4	22.7	24.3	24.7	25.1	25.8	27.6
Females	16.8	19.3	21.7	24.4	27.9	29.8	30.5	31.0	31.8	33.6
Sweden										
Males	14.9	14.7	15.0	16.8	19.1	20.5	21.5	22.5	23.4	23.7
Females	19.8	19.4	19.5	20.8	23.1	24.5	25.6	26.7	27.7	28.3
United Kingdom										
Males	13.3	13.7	14.1	15.0	16.8	17.9	19.2	20.8	22.0	22.4
Females	18.2	18.0	18.0	18.7	20.5	21.9	23.5	25.6	27.2	27.6
United States										
Males	10.5	10.1	10.1	10.7	12.4	14.5	16.9	18.7	19.4	19.3
Females	14.6	14.0	13.7	14.3	15.9	18.1	20.6	22.7	23.6	23.8

Source: World Bank (1999)

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