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STRENGTHENING THE POLICY–RESEARCH CONNECTION

VOLUME 1, ISSUE 1

Health Policy Research Bulletin

Message from the Deputy Minister

Welcome to the first issue of Health Canada's new *Health Policy Research Bulletin*.

As Deputy Minister of Health, one of my priorities is to ensure that policy makers have access to the evidence they need for effective decision making. To accomplish this, the department has been taking steps to strengthen its research and analytical capacity, and developing mechanisms to make the results of this research more accessible to policy makers, researchers and other interested audiences in a range of sectors, including health.

As the complexity of health research increases, so too does the challenge of distilling and packaging research findings. The *Health Policy Research Bulletin* will provide Health Canada with a vehicle for profiling policy research activities and getting research findings out into the public domain. This and future issues of the bulletin will focus on policy areas of national importance and present evidence that contributes to a better understanding of these areas. Each issue of the bulletin will focus on a key policy theme, selected based on its importance to the national

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Canada

health policy agenda, as well as on the availability of sound policy-relevant research in the area.

Health system reform is one of the overarching policy issues facing all levels of government in Canada today. In this issue, we are pleased to present several special articles on the Implications of Aging for the Health Care System. The articles explore this theme in light of currently available evidence and identify areas where further research is needed.

In addition to these special articles, the bulletin includes several regular features showcasing Canada's policy research community and highlighting some of the techniques used in analyzing and interpreting health data.

We hope this bulletin contributes to the knowledge base on health issues and stimulates discussion within the health policy research community. We welcome your comments on this and other issues of the *Health Policy Research Bulletin*.

Ian Green, Deputy Minister

Our mission is to help the people of Canada maintain and improve their health.

Health Canada

About the Health Policy Research Bulletin

Health Canada's *Health Policy Research Bulletin* will be published three times a year. The bulletin is part of a larger policy research communication program, including working papers, technical notes, seminars and Internet pages, which is currently being developed to strengthen Health Canada's policy relevant evidence base.

A departmental steering committee, chaired by Cliff Halliwell, Director General of the Applied Research and Analysis Directorate (ARAD), is guiding development of the bulletin. The Research Management and Dissemination Division (RMDD) within ARAD is coordinating the bulletin's development and production. RMDD would like to thank the members of the steering committee, as well as RMDD staff, for their contributions, in particular, Nancy Hamilton, Managing Editor, and Marilyn Ryan, Production and Distribution. We welcome your feedback and suggestions. Please forward your comments to bulletininfo@hc-sc.gc.ca or phone (613) 954-8549 or fax (613) 954-0813.

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Aging and Health Care Reform

The following article is based on an interview with Abby Hoffman, conducted by Nancy Hamilton, Managing Editor of the Health Policy Research Bulletin. *Over the past 18 months in her capacity as Senior Policy Advisor in the Deputy Minister's Office at Health Canada, Ms. Hoffman led a project examining the health and health system impacts of Canada's aging society. She was recently appointed to the position of Director General, Health Care at Health Canada. Among other duties, Ms. Hoffman will continue to guide horizontal work on aging and the health system.*

Q *Before discussing Health Canada's recent work in this area, I'd like to ask you about the competing points of view that seem to be at play about whether the aging population poses a financial threat to the health care system. In your opinion, does existing research support these different points of view?*

While some very useful research has been done, there is an ideological cast to much of it. For example, those who project dramatic growth in health spending as a result of population aging do so without considering either the projected fiscal capacity of governments or those areas of social investment that may decline in relative terms. They may confuse — or perhaps obfuscate — health costs associated with aging and health costs associated with dying. Or they suggest that the significant impact of the Baby Boom generation's old age will take effect much sooner than it will, taking little or no account of the fact that age-related morbidity and disability rates are declining and could decline still further if we had the right policies in place. Unfortunately, population aging is sometimes used as a fear-mongering tactic in support of the assertion that publicly-financed systems are unsustainable over the long term.

On the other hand, those whose research suggests the impacts of aging are quite manageable may, in their desire to demonstrate the long-term viability of the basic values and architecture of our health system, overlook some important considerations. For example, if Canadian medicare provided access to home care, long-term care, pharmaceuticals and preventive health services under the same conditions as currently apply to physician and hospital services, costs — at least to governments — would be considerably higher.

We have to be very careful about the assumptions we make about the future. The demographics are predictable and, to a point, so are patterns of morbidity and mortality. However, when it comes to determining how our health system should adapt to the realities of an aging society and what will be demanded of the system by citizens, we should be considerably less sanguine. One thing is very clear: we could be doing a much better job of supporting the health needs of older people. That includes not only managing acute episodes or treating chronic illness, but also providing primary and secondary preventive services, and the mix of social and health services that help people maintain independence and a high quality of life for as long as possible.

Q *I'd like to ask you about the specific research conducted by Health Canada that is presented in this bulletin. What was the nature of the research? What were the objectives and what did Health Canada hope to accomplish?*

The "aging and health" project started with a fundamental question: Is population aging a threat to the long-term sustainability of Canada's health system? To respond fully to that question, we felt we needed to pursue two broad questions: (1) what are the likely

patterns of health and ill health that will accompany population aging? and (2) what health system adaptations will be needed to address the needs and expectations of an aging society?

These questions represent vast subject areas which could easily occupy many researchers and analysts for years to come! In any event, we know there is only a very loose connection between the health status of the population, what the health system provides and how much it will cost. For better or worse, the evidence suggests that it is the strength of a nation's economy and its fiscal capacity that are the stronger determinants of overall public spending on health.

Nonetheless, it was clear that the following specific areas should be prime targets of research: how much of past growth in the health sector is attributable to population aging and, by extrapolation, what might this tell us about the future growth trajectory, taking into account past fertility and future life expectancy; and is health improving and, if it is, to what extent will this so-called compression of morbidity help offset the demands for (and costs of) services for an aging society?

In the initial phase of analysis, the primary research focus has been on trying to figure out whether there is any basis for the overriding concern about aging and the health system. The research described in this bulletin addresses this area in some detail. Ultimately, however, what we want to get at is how the health system should respond to the health needs of an aging society and, in particular, how health and other social resources can best be mobilized to support healthy aging.

Given the intense dialogue on renewal of the health care system, an important theme is how to link general modernization of our health system with the likely demands of an aging society. So far, we have pursued these themes by casting a wide net across existing Canadian and international literature and experience.

Q What are the major conclusions of the research conducted so far?

I believe the research puts health system pressures associated with population aging in their proper perspective. Unquestionably, as the peak of the Baby Boom generation passes through the 75+ years — that is, in the 2025-2045 period — aging will be a very significant pressure. But other factors such as population growth, health-sector inflation, new drugs, treatments and technology, and public expectations, along with the prevailing service delivery and financing architecture itself, are also very significant drivers of growth in health spending. What we hope is that concerns about aging as the undoing of our health system can be set aside because there is no evidence for it. That will permit us to move ahead on a more constructive phase of the work — that is, looking at how we can put the "aging and health" and overall "health system modernization" agendas on a convergence course.

Q How was the research agenda shaped to help address the key policy issues?

A project like this one easily yields a prodigious research agenda. It would be a mistake to think that we could ever pose all the right research questions so that analysts and policy makers would have substantial and unequivocal evidence with which to respond to every policy question. There was an iterative process between people working on the aging project who wanted to get on with figuring out how best to support healthy aging and the need to quantify "aging-related pressures" on the health system. Financing of the Canadian health system was one of the major issues of public debate for the entire duration of this project. Within that debate, aging was consistently identified as one of the critical pressures and threats. It was absolutely imperative that the research program tackle that concern head on.

So, it might be more accurate to say that the policy debate unfolding in the public domain shaped the research agenda, rather than the other way around!

However, now that some good evidence has been marshalled about the magnitude of the so-called threat, we can move on to our consideration of public policy in support of "healthy aging." What will be key here is not just that some good research has been done, but that the results are communicated so we aren't continually pushed back to the "aging as threat" question.

And, of course, we will have to be realistic about the completeness of our evidence. The research has provided some solid signposts, but we can never say we have irrefutable and incontrovertible evidence.

Aging and Financial Pre$$ures on the Health Care System

Seamus Hogan

Director, Health Demand and Supply Analysis, Applied Research and Analysis Directorate, Health Canada

While governments need to provide for temporary, albeit long-lasting, increases in health care costs as the Baby Boom generation moves into its senior years, these pressures themselves do not necessitate a comprehensive restructuring of the health system. Instead, the focus of health sector reform should shift to ensuring that appropriate structures and services are in place to efficiently address the needs of an increasingly elderly population.

As people age, their health status tends to deteriorate, with a corresponding increase in the health care costs they incur. When a country's population as a whole is aging, as is the case in Canada, the relationship between age and health outcomes has implications for that country's health care system.

For this reason, most discussions about renewal of Canada's health care system give a prominent role to the aging Canadian population. There are two main concerns. The first, and most obvious, is that an increasingly elderly population will place substantial financial pressures on the health care system, particularly starting around 2010 when the post-World War II Baby Boom generation reaches the 65+ age group. The second concern is whether the health care system in Canada is appropriately structured to deal with the special needs of a large elderly population including, for example, greater requirements for long-term care and home care, and a strong focus on encouraging healthy aging.

These issues can be presented as two separate questions:

- How significant will financial pressures be on the health care system as a result of population aging?
- What does population aging imply for structuring the health care system at a given level of health care spending?

Concern about financial pressures has dominated popular discussions about aging and the health care system, and is the focus of this series of special articles. The main conclusion of these articles is that financial pressures from aging need not threaten the long-term sustainability of the health care system as these pressures are linked to the temporary, albeit long-lasting effects of an aging Baby Boom generation. Therefore, future analysis of health policy related to aging should shift the focus from the overall financial sustainability of the health care system to how the system might best be structured to meet the health needs of this aging population.

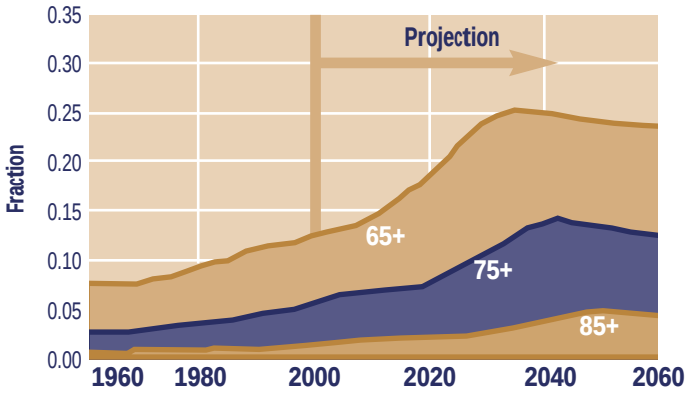
Some Facts about Aging in Canada

There are many ways to measure population aging, but the most common is to consider the proportion of the population older than a certain age. Figure 1 illustrates how the Canadian population is aging by this measure, showing what has happened to the proportion of the

population in the 65+, 75+ and 85+ age groups over the past 40 years and projecting how this distribution is likely to evolve in the future.

Three points stand out in this graph. First, the Canadian population has been aging steadily for some time. Second, the rate at which the population will age will soon increase rapidly, bringing the fraction of the population who are elderly to a peak before the middle of this century. Third, following this peak, by 2060 the population will still be much older than it is now; comparatively speaking, the Canadian population is still relatively young.

Figure 1: **Elderly as a Fraction of the Canadian Population Over Time**



As shown in the graph, the aging process is affected by two separate factors: *increases in life expectancy*, which imply that, on average, Canadians are living longer than in the past; and *past cycles in fertility*. The most notable example of the latter is the post-World War II Baby Boom. It is not so much the increase in fertility during a baby boom that leads to an aging population, but the subsequent decline in fertility. At first, the increase in births during the boom leads to a general lowering of the age of the population. The subsequent fertility decline, however, means that as the Baby Boom generation ages so does the population in general, until such time as fertility rates increase once again.

It is because the oldest members of the post-World War II Baby Boom are not yet 65 that the Canadian population is still relatively young, as shown by the measures in Figure 1. The relative youth of this generation also means that most of the increase over the past 40 years in the fraction of the population older than 65 has largely been the result of increased longevity rather than a fertility effect. In the next 40 years, however, the relative importance of these two effects will reverse as the post-war Baby Boom enters the 65+ age group.

In any discussion of the implications of aging for the health system, it is important to distinguish between the effects of fertility and life expectancy on aging. A *permanent* increase in life expectancy will have a permanent effect on the fraction of his or her life that *each individual* can expect to spend in the older age groups, whereas past cycles in fertility have only a *temporary* (although possibly long-lasting) effect on the fraction of the *overall population* in those age groups. As will be seen, this distinction has implications for whether population aging will constitute a substantial financial pressure on the health care system.

Aging and Health Care Expenditure

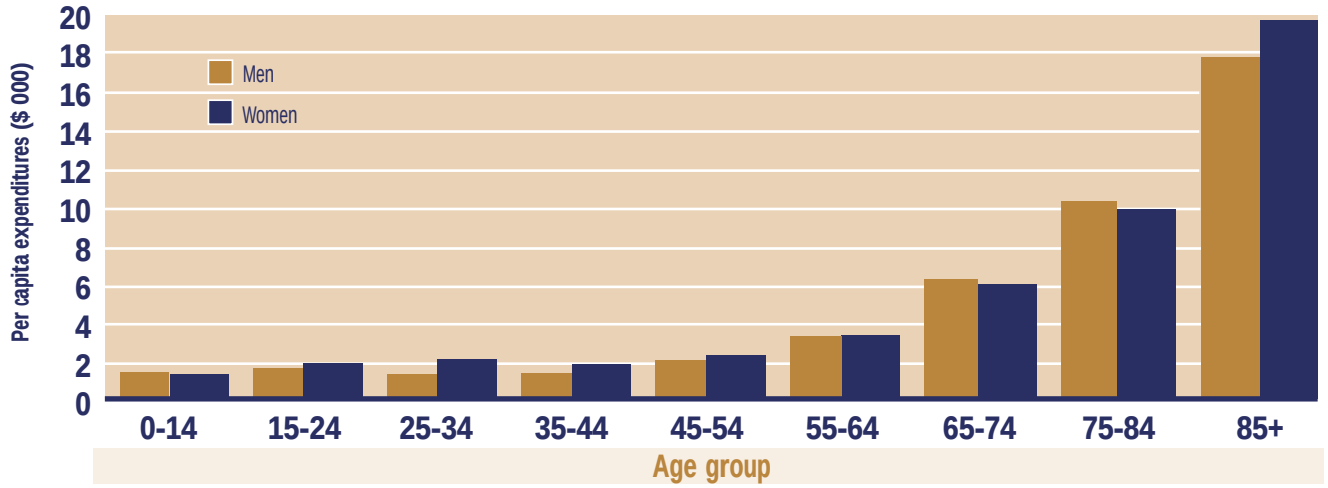
Figure 2 illustrates the relationship between age and per capita expenditure by showing the estimated total (public and private) expenditure on health per person by age and sex in 1997. As one would expect, expenditure rises with age. More importantly, the increase in expenditures becomes substantial after age 65.

It is the large increases in expenditure per person over the age of 65, combined with the projected increases in the fraction of the population who are older than 65, that are the source of concern about the financial pressures of aging.

Indeed, if there were to be no change in the per capita health expenditure from that shown in Figure 2, but the population were to age as projected in Figure 1, total real per capita health expenditure in Canada would be 31 percent higher in 2030 than it is now (see "Aging as a Health Care Cost Driver" on p. 10). That is, health expenditure could be expected to increase by almost a third over the next 30 years *from the effect of aging alone*. Other drivers of health care expenditure such as changing technology, and wage and salary increases for health care workers will likely add to this increase.

However, there are two reasons why this simple projection should not necessarily be taken as an indication that the current health care system in Canada is unsustainable and therefore in need of urgent reform. First, large projected increases in health expenditure do not necessarily imply a need to reform the system. Second, the above projection assumes that the extent to which health expenditures increase with age will

Figure 2: **Health Care Expenditures by Age, 1997**



remain constant into the future and so does not allow for the possibility that improvements in population health will mitigate the financial effects of aging. Each of these reasons is considered in turn below.

Financial Pressures and the Health Care System

Four questions — summarized in the technical box on p. 9 — should be asked when assessing the implications of expenditure growth for the health care system.

The first two suggest that the financial pressures that are likely to arise from aging have serious public policy implications. Specifically, expenditure increases due to aging represent an increase in the cost of maintaining a given level of health services; and aging is an expenditure driver that does not bring an offsetting increase in incomes and government revenues.

The third and fourth questions in the expenditure-driver framework, however, suggest less pressure for health system reform. With respect to the third question, clearly, aging is not the result of people responding to incentives in the health system. For the fourth question — whether the pressure is ongoing or not — it is important to distinguish between the two factors contributing to population aging. Most of the projected increases in expenditure due to aging are the result of the aging of the post-war Baby Boom generation. This will not be an ongoing driver of growth in expenditure. Indeed, much of its effect on the level of expenditure will eventually reverse, although the reversal will not be complete since, as seen in Figure 1, the fraction of the Canadian population in the high expenditure age groups is expected to remain permanently higher than it is currently.

Because the projected expenditure growth arising from the aging of the Baby Boom generation involves a one-off change that will partially reverse and is not caused by inherent design flaws in the health care system, there is no particular imperative to deal with the financial pressures by reforming the system, rather than simply choosing to devote a larger share of the economy's resources to health.

This analysis of the effect of an aging Baby Boom generation does not necessarily apply to aging pressures that arise from increases in longevity. Increased expenditure arising from ongoing increases in life expectancy represents an ongoing driver of health expenditure. It is not clear, however, that this has been or will continue to be a significant driver. This brings us to the issue of whether the relationship between expenditure and age is stable over time.

Offsetting Changes in Population Health

Population aging is one of two age-related factors that can bring about a change in health outcomes over time. The other is changes in the relationship between age and morbidity, which affects what health outcomes are likely for people at different ages.

A particularly important question in this regard concerns whether increases in life expectancy will be associated with similar improvements in the general health of the population. The presumption that

increases in the fraction of the population in the older high expenditure age groups automatically lead to increased per capita expenditure implicitly assumes that the additional years of life resulting from increased life expectancy are expensive ones. If, however, the advances in medical technology and population health that have produced the ongoing increases in life expectancy in Canada have also led to an improvement in the health of Canadians, then the effect of increased longevity may be to *delay* the onset of expensive years rather than add to their number.

The evidence on whether Canadians have been getting healthier as they live longer is mixed (see "Trends in Chronic Conditions" on p. 18), but there is some evidence that increased life expectancy is associated with a flattening of the relationship between age and health care spending. This phenomenon, which is termed "compression of expenditures," is discussed in the article on p. 13.

Policy Implications

Concerns that the increasingly elderly Canadian population will place substantial financial pressures on the public health care system are justified on several fronts. The aging of the Canadian population will almost certainly lead to a substantial increase in the cost of providing the current level of health care in Canada and this cost pressure will not lead to an offsetting increase in incomes or tax revenues. This financial burden will be more acute in some provinces than others because of provincial differences in age structure and population health.

That being said, these financial pressures will likely be temporary, as the post-World War II Baby Boom generation moves into its senior years. More importantly, there is considerable evidence that these pressures will not threaten the long-term sustainability of Canada's health care system, but will simply be a reflection of temporary cycles in fertility which, in turn, lead to cycles in health expenditure.

The appropriate approach to dealing with this bunching of expenditures is not to change the health care system or reduce services during times of expenditure growth, but to allow health expenditure to cycle. Governments can save during the low expenditure periods by paying down public debt in order to finance higher expenditure when the need arises. An alternative approach would be to finance the increases in health expenditure out of tax revenue at the time it occurs. Either way, the financial pressures arising from the aging of the post-war Baby Boom generation are a public finance rather than a health system problem, which suggests a public finance rather than a health system solution.

Of course, if improvements can be made to improve the system's efficiency and help offset expenditure increases arising from aging, then these reforms should be made, but that would be the case even if aging were not a financial pressure. In any event, such reforms should be made on the basis of a reasoned examination of the evidence and not be driven by the specter of aging.

This does *not* mean that aging has no implications for health system reform. Rather, the conclusion here is that the focus should move from the first of the two questions presented at the beginning of this article to the second — that is, from a concern with financial pressures to a focus on system organization within a given budget and ensuring that the appropriate medical structures are in place to deal with the health needs of an increasingly elderly population.

Finally, it is important to note that the financial pressures arising from aging will vary widely across different groups of Canadians because of differences in age structure and population health. For instance, although the First Nations and Inuit communities tend to have younger populations in general than the rest of Canada, the financial pressures of aging in these communities may be more acute because the age at which expenditures start to rise is lower than for the rest of Canada. Also, the more rapid aging in some provinces than others will lead to the financial burden being much more pressing in those provinces. This may well have implications for the capacity of the public health system to deliver a comparable level of service to all Canadians.

Source: *Population figures were drawn from Statistics Canada population estimates. Population projections were based on Statistics Canada population estimates and "medium" fertility and mortality assumptions. Expenditure data were provided by Health Canada's Health Policy and Communications Branch.*

A Framework for Thinking about Health Care Expenditure Drivers

Aging is just one of many forces that have been putting pressure on health care expenditures in Canada. Some of these forces, however, are considerably more benign than others. To properly assess the implications of an expenditure driver for the health care system, we need to ask four questions:

1. *Does the pressure on health care expenditures constitute a true* **cost** *driver, in the sense of its representing an increase in the cost of providing a given level of health care, or does it involve an increase in the level of health care?*

Increases in expenditure to finance improved health care represent a policy decision to purchase better outcomes by spending more money. They don't constitute a serious pressure on the health care system, or at least not to the extent that a true cost driver does, which implies a need to devote more and more expenditure to simply maintain an existing level of service.

2. *Is the pressure on health care expenditure one that brings with it an increase in incomes to pay for it, or is it a pressure that, if not checked, will lead to an increase in the fraction of income devoted to health expenditures?*

Some pressures that lead to an increase in health care expenditures are also forces that lead to an increase in income (and hence to government tax revenue). For instance, population growth will lead to a need for greater total health expenditure, but it will also tend to lead to a larger work force and hence more economic output. Such expenditure drivers do not place pressures on the health care system. General inflation also drives up both expenditures and ability to pay.

3. *Is the expenditure pressure one that is caused by the incentives in the health care system in some way, or is it completely independent of it?*

There is concern that some of the forces pushing up health care expenditures are not external forces that put pressure on the system, but are caused in part by the structure of the system. Obviously, such system-derived pressures suggest a greater need for system reform than pressures that originate from outside the system.

4. *Is the pressure one that will lead to ongoing growth in expenditure, or does it simply represent a one-time shift in the level of expenditures?*

This is perhaps the most important question. Even if an expenditure pressure is a genuine cost driver that does not provide an offsetting increase in income and that originates within the system, if it represents a one-time increase, it is possible to absorb the expenditure increase by diverting resources from other uses. An ongoing pressure, on the other hand, creates a much larger imperative for system reform.

Aging as a Health Care Cost Driver

Allan Pollock

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Applied Research and Analysis Directorate, Health Canada

Although Canada's aging population will place considerable pressure on future health care expenditures, these pressures are more likely to come from the temporary influence of an aging post-war Baby Boom generation than from changes in overall mortality rates.

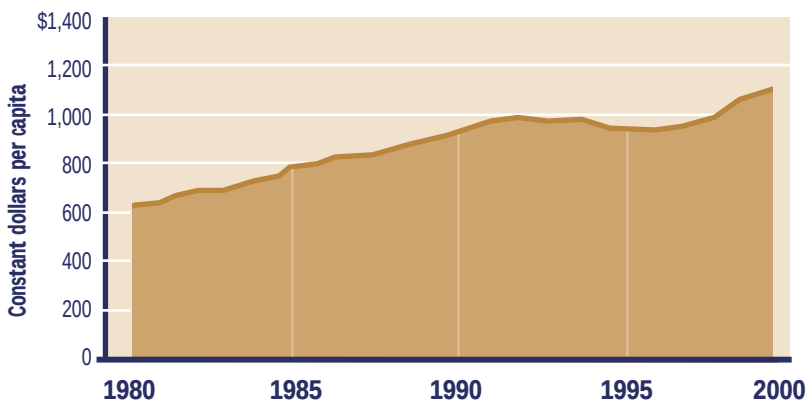
Between 1980 and 1999, total real per capita health care costs grew at an average rate of about 2.8 percent per year. As illustrated in Figure 1, this growth was not evenly distributed — real per capita health care costs grew most rapidly during the 1980s, then fell with the recession and fiscal restraint of the early 1990s.

The overall trend in health care expenditure is also the result of pressures specific to health, including the rapid development of expensive new medical technologies and wage pressures in a highly labour intensive sector. It is likely that population aging has also played a role in rising health expenditures over the past 20 years, as health expenditure tends to increase with age. The effects of an aging population will become even more significant in the future as the Baby Boom generation reaches the high health care cost years.

This article attempts to quantify the role of an aging population on health expenditure by decomposing historical data on health expenditure growth in Canada into aging and other factors, and to estimate the impact of future health care cost drivers. Specifically, the following three questions are addressed:

- How important has aging been relative to other factors as a driver of health expenditure?
- How important is aging likely to be as a driver of health expenditure in the future?
- How much of the effect of aging is the result of changes in mortality and how much is the result of past fertility cycles?

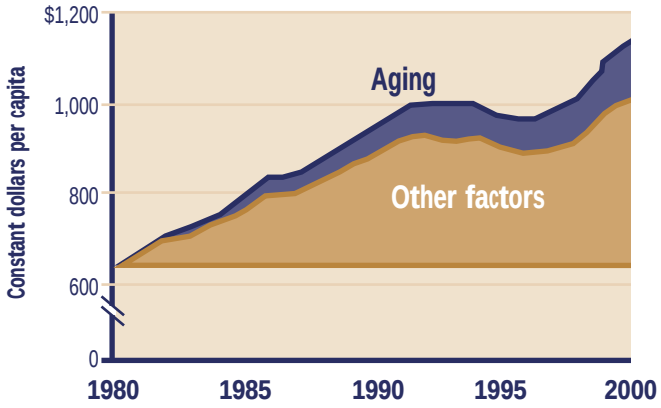
Figure 1: **Real Per Capita Health Expenditures (public and private combined)**



An Historical Perspective

To estimate the historical role of aging on real per capita health care expenditure, the following question was asked: what would have happened to expenditure over time if there had been no change to the age and sex composition of the population? The remainder of expenditure growth can then be attributed to aging.

Figure 2: **Decomposition of Past Expenditure Growth**



This decomposition is illustrated in Figure 2, which shows that the estimated contribution of aging to expenditure growth has so far been small relative to other factors. From 1980 to 2000, aging accounted for only 0.6 percent average annual real per capita growth. In fact, this probably overstates the impact of aging on expenditures over the past 20 years. The decomposition attributes any change in per capita expenditures for a given age and sex to factors other than aging. However, as discussed in the article "Compression of Health Expenditures" on p. 13, one of the causes of population aging — increases in life expectancy — has probably also been a factor in *reducing* per capita expenditures in older age groups, as reductions in mortality delay the onset of the high expenditure last years of life.

When this "compression of expenditures" effect is considered, aging accounts for average annual growth of only 0.25 percent in real per capita health expenditure over the past 20 years. The influence of aging is very small compared with other factors, which account for about 2.6 percent average annual growth over the same period. The relative importance of aging, however, will increase considerably in the future.

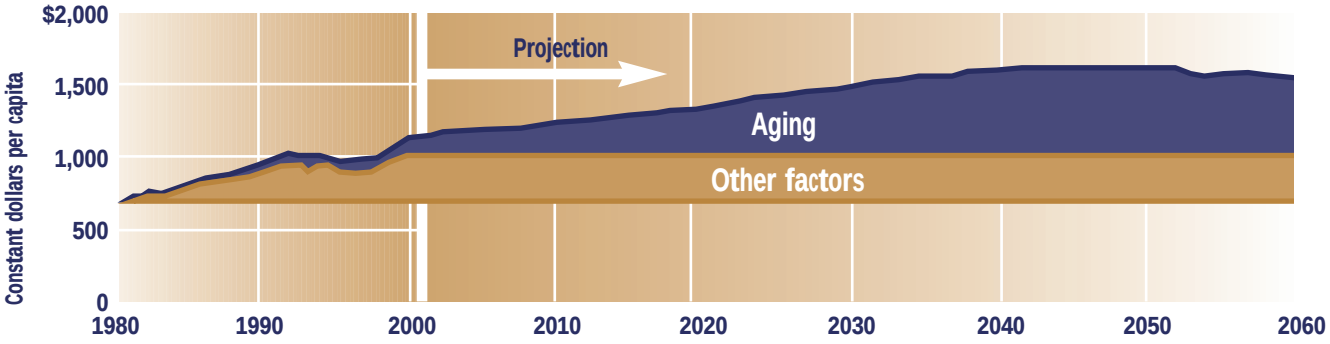
Looking Ahead

The growing importance of aging is illustrated in Figure 3, which adjusts the data in Figure 2 to account for the effect of compression of expenditure and projects the data into the future. Projections beyond 2000 show the impact on total expenditure if the population were to age according to a standard projection *but if there were no other factors driving health expenditure growth*. That is, the projection is not a forecast of what is likely to happen to total expenditure, but simply an illustration of the specific impact of aging. As can be seen, the impact of aging increases substantially, generating average annual growth in health expenditure of about 0.8 percent per year over the next 30 years. The cumulative effect of aging is estimated to be a more than 30 percent increase in expenditure.

Mortality vs. Fertility

As noted in the article "Aging and Financial Pressures on the Health Care System" on p. 5, population aging is affected by two distinct factors: changes in mortality and past cycles in fertility. Both factors can put pressure on health expenditures by increasing the fraction of

Figure 3: **Projected Effect of Aging**



the population in the older, more expensive age groups. However, the policy implications of expenditure growth may differ, depending on which factor is in play. For this reason, it is important to separate their effects.

The decomposition of fertility and mortality effects is shown in Figure 4. The solid line reproduces from Figure 3 the estimate of what expenditures would be if the only source of future expenditure growth were aging. The dotted line shows the effect on expenditure if, in addition, there had been a constant number of births each year in Canada in the 20th century (i.e., no post-World War II Baby Boom). The difference between the two lines illustrates the effect of past fertility cycles. Because the population projections assume no future fertility cycles, the two expenditure paths eventually converge.

Figure 4: **Fertility and Mortality Effects**

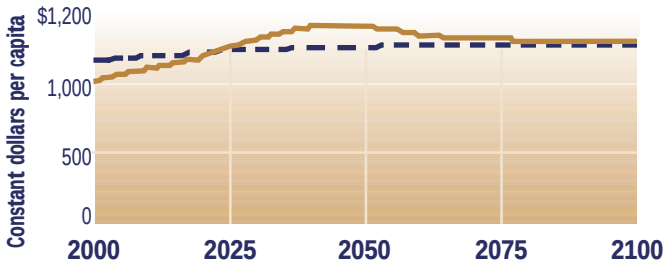


Figure 4 illustrates three important points. First, the projected increases in expenditure from population aging over the next 50 years are primarily the result of the aging of the post-World War II Baby Boom generation, not from decreases in mortality rates. Second, although the fertility effect is substantial and long lasting, it will in large part be reversed after the middle of this century. Finally, because the post-war Baby Boom generation is still younger than 65, per capita health care costs are currently much lower than they would have been in the absence of the Baby Boom.

Policy Implications

The findings presented in this article show that aging has not been an important driver of health expenditure growth in the past, but is likely to become more important in the future. Furthermore, future pressures from aging will result almost entirely from the long-lasting but temporary pressure of the aging post-war Baby Boom generation.

Of course, the projected contribution of aging to average annual expenditure growth of 0.8 percent over the next 30 years is still small relative to the historical growth of 2.6 percent that has been due to non-aging factors. It might seem, therefore, that aging is not a major financial concern.

This simple comparison, however, can be misleading. Much of the growth in health expenditure in the past 20 years has probably been driven by increases in Gross Domestic Product (GDP), partly because higher incomes lead to a higher demand for health services and partly because economic growth leads to higher wages and salaries, which tends to put pressure on costs in a service sector such as health. As noted in the box on p. 9, expenditure drivers associated with equivalent increases in ability to pay do not create a financial pressure.

Between 1980 and 2000, real GDP per capita grew by an average of 1.5 percent per year. Therefore, the contribution of non-aging factors to health expenditure growth in excess of GDP was only 1.1 percent. Furthermore, much of this growth likely reflects improvements in the quantity and quality of health care over that period, rather than increasing costs of providing the same level of service.

In contrast, the aging of the population over the next 30 years represents a genuine cost driver that is not likely to be associated with offsetting increases in GDP. The pressures from past fertility cycles are currently minimal, but they have the potential to increase substantially by 2030. In fact, by 2028, the contribution of aging to health expenditure growth is projected to reach almost 1.0 percent per year. Since about 70 percent of health expenditure in Canada is publicly funded, this aging-derived expenditure growth will likely have a significant impact on public finances.

Source: *Population figures were drawn from Statistics Canada population estimates. Population projections were based on Statistics Canada population estimates and "medium" fertility and mortality assumptions.* *Health Canada gratefully acknowledges the cooperation of provincial/territorial registrars of vital statistics, who make mortality data available to Statistics Canada under federal-provincial agreements.*

COMPRESSION of Health Expenditures

Allan Pollock

Allan Pollock, Policy Analyst, Health Demand and Supply Analysis, Applied Research and Analysis Directorate, Health Canada

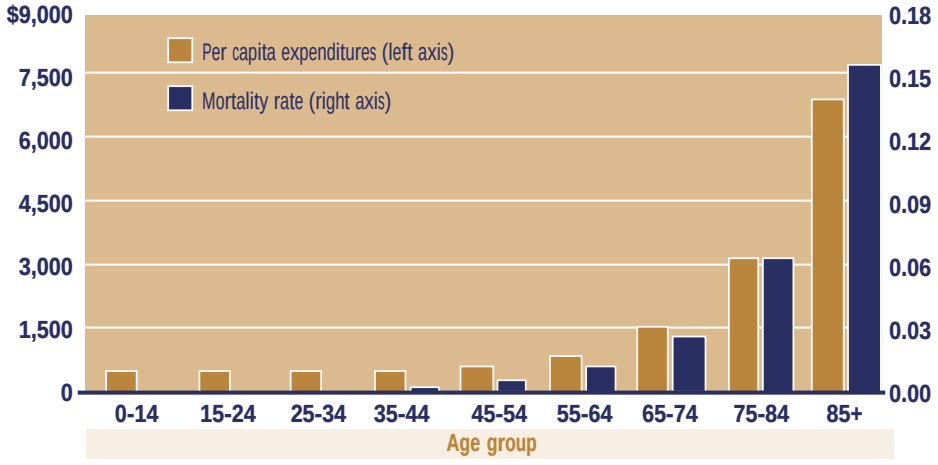
Increases in health care expenditures associated with an aging population have largely been due to high health care costs in the last years of life. However, population aging from increased life expectancy does not necessarily mean increases in per capita health expenditures. In fact, it may contribute to keeping expenditures down.

A major concern about population aging is that health expenditures increase with age. More specifically, as shown in Figure 1, per capita health expenditures increase substantially after age 65. One might conclude, therefore, that total health expenditures will necessarily rise as an increasing proportion of the population reaches age 65 or older. However, the appropriateness of this conclusion depends on what *causes* expenditures to rise with age.

Explaining the Age-Expenditure Profile

There are two possible explanations for this profile of increasing age-expenditure. The most obvious is that health tends to deteriorate as an individual ages, with a consequent increase in health care spending on that individual. Another explanation is that health expenditures tend to be fairly low and evenly distributed until the last year or two of people's lives, when the highest expenditures occur regardless of the age at which they die. This pattern would still be consistent with the age-expenditure profile since the fraction of people in their last year of life increases with age. It is possible, then, that the profile of increasing average expenditures per person is due to a greater proportion of older individuals being in their high cost last years of life, not because expenditures increase with age for each individual.

Figure 1: **Health Expenditures and Mortality Rates, 1981**



Another way of expressing these two possibilities is that, under the first explanation, expected health expenditure on a person is largely a function of the number of years since his or her birth and, under the second, that it is linked to the number of years remaining until death. Although both explanations would yield an age-expenditure profile that is qualitatively similar to that in Figure 1, the implications of each for future health care costs may be very different.

If health expenditure is largely a function of the number of years since birth, one would expect increased life expectancy to lead to increases in per capita health expenditure as the added years of life would be ones with high health expenditure. If, however, the profile of increasing age-expenditure is largely the result of a growing proportion of people being in their last years of life, then over time one would expect to see a flattening of the age-expenditure profile as increases in life expectancy delay the high cost last years of life to later ages. This flattening of the relationship between age and heath expenditures is known as *compression of expenditures*.

What Evidence is There for Compression?

A number of studies in other industrialized countries have found evidence that expenditure is linked to the number of years remaining till death. Typically, these studies find that about one third of all health expenditure is incurred by people in their last year of life.

Ideally, estimates of these figures for Canada would rely on data relating health expenditures to the age and years remaining to death for a large number of individuals. In the absence of such data, however, the relationship between expenditure and proximity to death must be estimated indirectly. One way of doing this is to consider the relationship between per capita expenditure on health care and the mortality rate at each age, since the mortality rate of the population at any age is equivalent to the fraction of people at that age who are in their last year of life.

Figure 1 shows the (combined sexes) mortality rates for different age groups in 1980, together with the per capita health expenditures for the same year. The close relationship between the two suggests that being in the last year of life does have an impact on health expenditures.

An econometric model was used to quantify the extent of this impact. In effect, the model asked how much of the variation in costs across age groups for each sex in a given year could be explained by variation in the proportion of that age and sex group who died in that year. This allowed the costs attributable to people who were in their last year of life to be separated from those attributable to people who were not. Health Canada expenditure data for 1980 to 1997 were used, broken down by age group and sex.

The initial results suggested that health care costs for people not in their last year of life increase at age 65, but do not vary much within the age groups 0-64 and 65+. For this reason, the final model specified that these age-specific costs would change only at age 65.

Table 1 shows the breakdown of per capita expenditures as a function of age and whether a person is in his or her last year of life. According to the results, average health expenditures on people who are in their last year of life is between 50 and 100 times more than expenditures on those who are not.

Some caution is needed in interpreting these results. As stated earlier, due to data limitations, it was not possible to show a *direct* relationship between years remaining to death and health care expenditures. It is interesting to note, however, that the results indicate that about one third of health expenditures in Canada are incurred by people in their last year of life, as has been found in other industrialized countries. This adds to the credibility of these results.

Table 1: **Results**

	Age-specific costs (if not in last year of life)		Costs of death
	0-64	65+	All ages
Males	$362.01	$666.36	$29,180.80
Females	$428.92	$544.66	$50,956.34

Conclusions

Based on the estimates presented in this study, the sharp increase in health care expenditures with age is largely the result of high health expenditures in the last years of life. If this phenomenon continues, any future decreases in mortality will be met with reductions in

per capita expenditures, as people will live longer before reaching high health cost years. This implies that, despite the steep age-expenditure profile, population aging as a result of increased life expectancy need not require increases in per capita health expenditures, and may, in contrast, be a force compressing these expenditures.

Source: *Health expenditure data were provided by Health Canada's Health Policy and Communications Branch. Mortality data were made available by Statistics Canada. Health Canada gratefully acknowledges the cooperation of provincial/territorial registrars of vital statistics, who make mortality data available to Statistics Canada under federal-provincial agreements.*

Who's doing what?

Considerable research relevant to aging policy is under way at Canadian universities. Profiled below are some of the centres that are making a significant contribution to the national knowledge base on aging, health status, determinants of health and health service utilization.

Centre on Aging, University of Victoria — http://www.coag.uvic.ca/

The Centre is working on a number of aging issues, including: physical activity; preventing falls; health care and social policy; informal and formal support; aging and ethnicity; utilization of services; long-term care; neuropsychology of normal and pathological aging; intergenerational relations and caregiving; chronic illness; aging women; pensions; aging and mental health; and legal issues and the cognitively impaired.

Gerontology Research Centre, Simon Fraser University — http://www.harbour.sfu.ca/gero/

Some of the Centre's focus areas are: aging and the built environment; preventing the victimization and exploitation of older persons; health promotion/population health and aging; changing demography and lifestyles; and older adult education.

The Health Policy Research Unit, University of British Columbia — http://www.chspr.ubc.ca/

Well-known for its studies on age and health service utilization, the Unit is also exploring such issues as patient waiting lists, patient-focussed care, income inequalities and health, and cross border medicine.

The Aging in Manitoba Longitudinal Study, University of Manitoba — http://www.umanitoba.ca/academic/faculties/medicine/community_health_sciences/AIM/

For 25 years, the population-based Aging in Manitoba (AIM) Longitudinal Study has provided policy makers and others with a wealth of information on the physical, social and psychological dimensions of healthy aging, the determinants of healthy aging, and aging and health service utilization.

Social and Economic Dimensions of an Aging Population, McMaster University — http://socserv.socsci.mcmaster.ca/sedap/index.html

This multidisciplinary and multicentre research program is exploring such issues as: population aging and the economy; aging and health; aging and family life; and retirement and financial security.

Canadian Study of Health and Aging, Faculty of Medicine, University of Ottawa — http://www.uottawa.ca/academic/med/epid/csha.html

Coordinated through the University of Ottawa, this multidisciplinary, multicentre research program is examining the epidemiology and clinical aspects of dementia and cognitive impairment, healthy aging, frailty and informal caregiving.

The Groupe de recherche interdisciplinaire en santé (GRIS), Université de Montréal — http://www.gris.umontreal.ca/

Aging is one focus within the Groupe's major research areas of: health system financing; the organization, delivery and quality of care; professional practice; and primary care.

Submitted by: *Louise A. Plouffe and Simone Powell, Division of Aging and Seniors, Population and Public Health Branch, Health Canada*

NHRDP Funded Projects on Seniors and Aging

Following is a sampling of recently completed projects on seniors and aging that received funding from the National Health Research and Development Program (NHRDP). More information on these and other projects is available at http://www.hc-sc.gc.ca/iacb-dgiac/nhrdp/

Project	Agency
Prescription and Non-prescription Drug Use Among Six Nations Community Elderly SIRP*/CDS** Community Researcher Award Project Number: 6606-5566-603	Professor Bryan Embree Grand River Polytechnic Hagersville, Ontario
Vieillir dans la communauté : santé et autonomie Project Number: 6605-4570-602	Dr. François Béland Université de Montréal
Does Health Care Support Independence or Threaten It: A Population Based, Person Specific Analysis of Patterns of Use by Seniors Project Number: 6610-2117-602	Dr. Robert G. Evans University of British Columbia
Determinants of Seniors' Independence: Availability, Accessibility, Barriers and Utilization Project Number: 6606-5491-602	Dr. Mark W. Rosenberg Queen's University
Evaluating Programs of Innovative Continuing Care Project Number: 6609-1915-602	Dr. Norah Keating University of Alberta
Seniors' Independence Through Self-care, Self-help and Mutual Aid: A Collaborative Multi-method Research Program on Community Approaches Project Number: 6610-2122-602	Dr. Lawrence W. Green University of British Columbia
Self-Help/Mutual Aid for Seniors and their Family Caregivers Project Number: 6603-1464-602	Dr. Miriam Stewart Dalhousie University
A Comparison of Western and Traditional Chinese Medicines Use Among the Elderly by Culture SIRP*/CDS** Community Researcher Award Project Number: 6606-5560-603	Ms. Erin Yuet Tjam University of Waterloo
Une meilleure organisation de services pour une plus grande autonomie des aîné(e)s SIRP*/CDS** Community Researcher Award Project Number: 6605-4636-603	Madame Michèle M.L. Paradis Centre de santé publique de Québec Beauport, Québec
Culturally Sensitive Seniors' High Risk Screening Program SIRP*/CDS** Community Health Researcher Award Project Number: 6606-5567-603	Dr. Cornelia van Ineveld St. Boniface Hospital Winnipeg, Manitoba

** The Seniors Independence Research Program (SIRP) was coordinated by the Division of Aging and Seniors and the contributions were administered by NHRDP.*

*** Canada's Drug Strategy*

Did You Know?

***Did You Know?** is a regular column examining aspects of health data and research that may be subject to misconceptions.*

. . . There's More to Life Expectancy

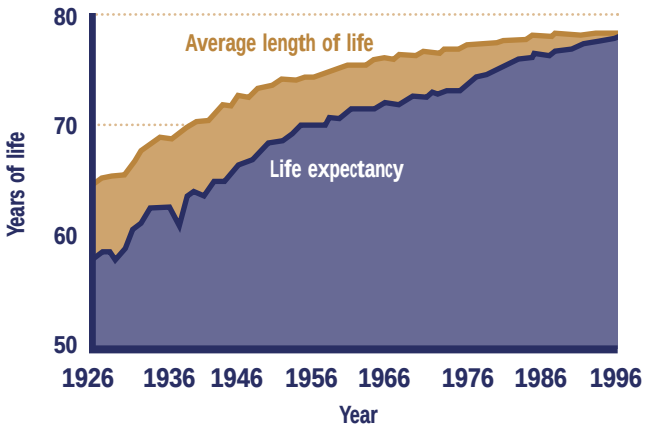
One of the most cited indicators of a population's health, life expectancy is used to compare the overall health of different countries and to track a specific country's progress over time. However, it is not widely understood just what life expectancy measures.

A common misunderstanding about life expectancy is that it represents the average number of years that people born in a particular year can expect to live. However, life expectancy actually measures a slightly different concept. Specifically, it is the average number of years that a hypothetical group of individuals born in that year would live *if the observed mortality rates at each age for that year were to remain constant in all succeeding years.*

For example, the calculation of life expectancy for people born in 1926 assumes that their mortality rate at the age of 50 is the same as for 50-year-olds who died in 1926. In reality, however, people born in 1926 were subject to the 1976 mortality rate when they reached 50 years of age.

Because mortality rates have been falling over time, the calculation of life expectancy in any given year underestimates the actual number of years people born in that year can expect to live. For example, although Canadians born in 1940 could expect to live about 70 years on average, the formal measure of life expectancy for Canada did not reach that level for another 20 years. This is illustrated in Figure 1, which shows life expectancy in Canada from 1926 to 1996, compared to an estimate of the actual average length of life.

Figure 1: **Life Expectancy and Length of Life**



Although average length of life is the more intuitive measure, life expectancy is a better measure to use as an indicator of a population's health in any given year, since it summarizes mortality rates from only that year. It is also a more objective measure, as it does not rely on predictions of future mortality rates.

Life expectancy can also be calculated at ages other than birth. For instance, life expectancy at age 65 describes the average number of additional years that people aged 65 in a particular year would live if the observed mortality rates for that year were to remain constant into the future.

This example helps to illustrate another common misunderstanding about life expectancy — the belief that increases in life expectancy imply an equivalent increase in the number of years that people can expect to spend in old age. For instance, life expectancy (at birth) increased by 20 years between 1926 and 1996. Over the same period, however, life expectancy at age 65 increased by only four years. That is, most of the gains in life expectancy over the past century are due to an increase in the number of people surviving to age 65, and very little to an increase in the number of years lived after age 65.

This article was submitted by Jeremy Lise, formerly with Health Canada's Applied Research and Analysis Directorate, now an economist with the Economic Studies and Policy Analysis Division at Finance Canada. Population figures were drawn from Statistics Canada population estimates. Population projections were based on Statistics Canada population estimates and "medium" fertility and mortality assumptions. Mortality data were provided by Statistics Canada. Health Canada gratefully acknowledges the cooperation of provincial/territorial registrars of vital statistics, who make mortality data available to Statistics Canada under federal-provincial agreements.

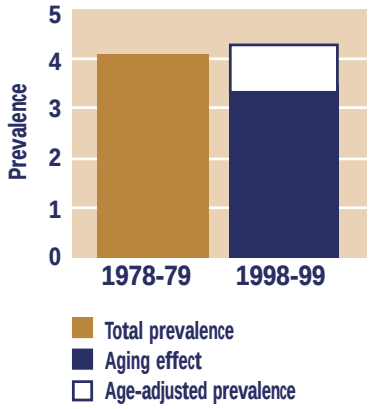
Using Canada's Health Data ***is a regular column of the*** Health Policy Research Bulletin ***highlighting some of the methodologies commonly used in analyzing health data.***

Trends in Chronic Conditions

Over the past 20 years in Canada, the prevalence of certain chronic conditions has increased. Some of these increases have been substantial. For example, the proportion of Canadians with hypertension rose by 36 percent, those with diabetes by 75 percent, and those with cancer by 200 percent. Even heart disease, an area in which medicine is reputed to have made significant progress, increased slightly during the last two decades.

How can these data be explained? At first glance, it is tempting to conclude that Canadians are becoming less healthy. However, it is important to consider a number of other factors that may be at play before drawing any such conclusion. This article discusses three of these "mitigating" factors.

Figure 1: **Adjusted and Unadjusted Prevalence of Heart Disease in Canada**



An aging population

Most chronic conditions are much more prevalent among the elderly than they are among young people. And because the Canadian population is aging (see the article "Aging and Financial Pressures on the Health Care System" on p. 5), the proportion of the population in these high-risk age groups is increasing. Therefore, one would expect to see an overall increase in the proportion of Canadians with age-related chronic conditions simply as a result of the population's changing age composition.

Researchers often address this problem by "age adjusting" the data. For example, they would ask the question: "If the age distribution of the population had not changed from 1978 to 1998, what would have been the change in the prevalence of the chronic condition over that period?"Age adjustment can explain much of the increase in chronic conditions among Canadians. For instance, as illustrated by Figure 1, age-adjusted data for heart disease show a reduction over the past 20 years, in contrast to unadjusted figures showing a small increase.

Living with illness

George Burns is famous for the observation that old age is a far cry better than the alternative. His comment neatly summarizes another reason why data showing an increase in chronic conditions might be misleading: if medical progress allows people to live with a chronic condition rather than die from it, the improvement in their health will be reflected in the data as increased prevalence. This "survival effect" almost certainly explains why, for instance, the proportion of Canadians with cancer has increased so dramatically, despite the substantial progress that has been made in treating a wide range of cancers.

How do you control for the survival effect? One way is to examine any changes in the number of years a person can expect to live *without* a given chronic condition (what is sometimes referred to as "Health-Adjusted Life Expectancy"). When this calculation is made, it is evident that progress has been made between 1978 and 1998 in almost all chronic conditions, including diabetes and cancer.

Better diagnosis

Another reason for caution in interpreting increases in the prevalence of chronic conditions is that the data may simply reflect increased rates of diagnosis. That is, any reported increase in prevalence does not necessarily mean more people have the condition, but simply that more people *are told* they have the condition. Diabetes is one condition where increases in prevalence are, at least in part, the result of improved diagnosis.

This article was prepared by Sarah Hogan, an economist with Health Canada's Applied Research and Analysis Directorate. Population figures were drawn from Statistics Canada population estimates. Morbidity data were drawn from the National Population Health Survey, 1998-99, and the Canada Health Survey, 1978-79.

New and Noteworthy

Find out more about any of the following initiatives, events and publications at the websites provided.

New Policy Research Program at Health Canada

Health Canada is enhancing its capacity to fund extramural policy research through its newly-established Health Policy Research Program which is housed in the Research Management and Dissemination Division (RMDD), Applied Research and Analysis Directorate. Once funding priorities for the program have been established, the first request for applications will be issued and posted on the RMDD website at http://www.hc.gc.ca/iacb-dgiac/nhrdp/

As of April 1, 2001 programs administered under Health Canada's National Health Research and Development Program (NHRDP) will be transferred to the Canadian Institutes of Health Research (CIHR). CIHR will integrate programs of both the Medical Research Council of Canada and NHRDP to become the leading agency for health research in Canada. Over the years, NHRDP has made a significant contribution to the field of applied research in Canada.

International Publication on Health Promotion

The results of an innovative health promotion study are now available in a two-part report entitled *The Evidence of Health Promotion Effectiveness: Shaping Public Health in a New Europe*. The study, undertaken by the International Union for Health Promotion and Education (IUHPE), documents evidence about health promotion programs over the past 20 years.

Part One is a summary document that presents the evidence and makes recommendations for action. Part Two presents the findings in more detail and includes a Canadian case history.

For more information visit the IUHPE website at http://www.iuhpe.org

SEDAP Paper on Aging and Health Care

The Program for Research on Social and Economic Dimensions of an Aging Population (SEDAP) recently released a report entitled the Effects of Population *Aging on the Canadian Health Care System*. Authored by Dr. Mark W. Rosenberg of Queen's University, and based on evidence from Canadian and international literature, the report assesses the relationship between population aging and future health care costs.

The paper, commissioned by Health Canada, is available at http://www.socserv2.mcmaster.ca/sedap/ under SEDAP Research Paper No. 14.

European Aging Report

The status of research on aging is the subject of a recent study by the European Commission's Ad Hoc Advisory Committee on Coordination of Research and Technology Development Policies. The study was designed to promote awareness of major European initiatives in aging research, as well as to strengthen collaboration between scientists, researchers and policy makers.

A summary report examines the aging process, the health and quality of life of older people, and issues relevant to individual aging and population aging within a broad range of research disciplines.

More information is available at http://www.europa.eu.int/comm/research/biomed/ageing-book.pdf

Seniors Policies and Programs Database (SPPD)

Researchers and policy makers now have access to a comprehensive database of government programs and policies on seniors. A collaborative effort of the federal, provincial and territorial governments, the SPPD allows users to search for policy and program information by jurisdiction, by keyword or by sector. For example, a search of the keyword "housing" yields a list of related national/provincial programs and policies, a brief description of each program/policy, and links to the responsible agencies. Visit the database at http://www.sppd.gc.ca

Up and Coming ...

WHO Report on Aging

Many people don't realize that most of the world's aging population live in developing countries. Moreover, these numbers are expected to rise at a much more rapid rate than in developed countries. As the Second World Assembly on Aging draws near in 2002, decision makers everywhere are wrestling with how best to support healthy, active aging on global and national scales. With the support of Health Canada, the World Health Organization (WHO) is developing a monograph and booklet for policy makers on active aging. Visit **http://www.who.int/ageing** for information on the availability of these documents.

Mark Your Calendar

What	When	Theme
Reasons for Hope 2001: New Research Developments in Breast Cancer — Second Scientific Conference	May 3-5, 2001 Quebec City, Quebec http://www.breast.cancer.ca	New developments in breast cancer research
Health, Economics and the Future: The 9th Canadian Conference on Health Economics	May 23-26, 2001 Toronto, Ontario http://www.healtheconomics.org/cher/conference.html	Highlighting research done in Canada and abroad in the area of health economics and health services research
XVIIth World Conference on Gerontology	July 1-6, 2001 Vancouver, British Columbia http://www.harbour.sfu.ca/iag	Working together in a changing world — meeting the challenges of individual and population aging in the 21st century
XVIIth World Conference on Health Promotion and Health Education	July 15-20, 2001 Paris, France iuhpemcl@worldnet.fr	Evidence, investment, advocacy and ethics
IIIrd International Conference of the Health Economics Association	July 22-25, 2001 York, United Kingdom http://www.ihea2001york.org.uk	The economics of health — within and beyond health care
First International Conference on the Impact of Environmental Factors on Health	September 10-12, 2001 Cardiff, Wales, UK http://www.wessex.ac.uk/conferences/	The complex interrelationship between environmental risk and health, and social, occupational and lifestyle factors
IVth International Conference on Priorities in Health Care	September 19-22, 2002 Oslo, Norway http://www.healthpriorities.net/4thedition.htm	Priority setting — successes and failures; national approaches; role of the media in priority setting