

## **SSHRC CLUSTER: POPULATION CHANGE AND PUBLIC POLICY**

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### **MORTALITY, MORBIDITY, AND THE CHANGING NATURE OF THE ELDERLY POPULATION**

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#### **Leading Trends and Issues of Mortality**

Throughout the 20<sup>th</sup> century, Canada as well as other developed countries experienced a tremendous transformation of their age structure, due to reduced fertility and mortality rates and changing causes of death. The first part of the century was characterized by the regression of mortality by infectious diseases, which helped nearly every child survive into adulthood, whereas the decades leading into the 21<sup>st</sup> century saw great improvements in mortality by cardiovascular diseases, which mainly profited older age groups.

This greater survival at all ages helped raise Canadians' life expectancy from 56 to 77 years for men and from 58 to 82 years for women, between 1921 and 2000 (CHMD, 2005). Although the rate at which mortality declines has slowed down compared with the earlier part of the 20<sup>th</sup> century, life expectancy has never stopped increasing. This decline of mortality has led to a significant increase of individuals surviving to age 65, as well as to age 80 and up. Along with the decrease in fertility, the decline in mortality contributes to the aging of the Canadian population: people aged 65 and over currently make up 13 percent of the country's population compared with 8 percent in 1971. In addition, an aging process is developing within older age groups: the importance of the 80+ age group among the 65+ has increased from 20 percent in 1971 to 24 percent in 2001. As a matter of fact, the fastest growing segment of the Canadian population is the oldest old, namely people aged 85 and over: their weight among Canada's total population more than doubled between 1971 and 2001. Furthermore, centenarians are becoming ever more common (figure 1), and research on supercentenarians (individuals surviving at least to the age of 110) has developed significantly in recent years.

The weight of these older age groups among the total population will keep growing in the near and far future. And as life expectancy keeps being pushed back to higher levels, reduction of mortality benefits mostly the elderly. Decrease in mortality among people aged 65 years and over is responsible for 35% and 45% of the life expectancy gain of men and women, respectively, recorded between 1990 and 1999 (Lussier, 2004).

Two phenomena illustrate eloquently the expansion of survival and the delay of age death: the compression of mortality and the rectangularization of the survival curves. The compression of mortality suggests that more and more deaths occur within a smaller age interval as time passes by (figure 2). And as mortality regresses, we notice that survival curves take up a rectangular shape, which implies that people survive into increasingly older ages, beyond which most deaths occur (figure 3) (Bourbeau et Smuga, 2003). Therefore, compression of mortality and rectangularization of survival curves are two phenomena that complement each other.

But despite the incredible progress achieved in mortality over the last century and the Canadian universal health care system, health inequalities subsist. It has been shown that mortality risks vary according to sex, age, religion, socioeconomic status, education, linguistic group, ethnic group and geographical region. As in other developed countries (except in Japan), the gap between male and female life expectancy at birth in Canada has been reducing since the end of the 1970s, when it had reached a peak of 7.5 years (Nault, 1997). So, while men are known to be at a disadvantage by comparison with women, the most alarming health inequalities occur between different socioeconomic statuses, the rich having a lower mortality than the poor (Wilkins *et al.*, 2002). Choinière *et al.* (2003) compared life expectancy of Montreal's health territories (CLSC). They also found great life expectancy differences between areas known as the poorest and the wealthiest, ranging from 70.4 to 81.5 years. Variations between socioeconomic statuses were also observed, the poor having a life expectancy five years shorter than the rich in 1994-98. In a study about urban mortality, it was found that mortality rates differ greatly between some of the country's metropolitan areas. Thus, mortality rates in cities such as St. John's (New Foundland), Chicoutimi-Jonquière (Québec) and Sudbury (Ontario) are at least 25 percent higher than in "healthier" cities such as Toronto, Victoria and Calgary (Gilmour and Gentleman, 1999).

Another concern regards the quality of life of the population, especially at older ages. Canadians are living longer indeed, but might be sacrificing their health in order to survive a few more years. In 1996, women could expect to live 70 years without disability even though their total life expectancy stood at over 81 years, and disability-free life expectancy of men was 67 years, which is 8.5 years less than their total life expectancy (75.5) (Statistique Canada, 2005). For that reason, the most alarming public health issue proves to be whether the population spends the additional years gained by advances in health and mortality in good or bad health. An individual "saved" from death will probably get out of it weakened, therefore prone to bad health. For example, morbidity resulting from cardiovascular diseases did not decline as fast as mortality did (Omran, 1998). As Canadians, we are proud of our universal health care system, but the financial burden associated with it proves to be heavy. Therefore, in a situation where the medical staff can prevent a death, but knows beforehand that the individual involved will come out of it with a serious disability, it is relevant to question the pertinence of saving people's lives at all costs (Légaré and Carrière, 1999).

The aging of the population is a trend that has been building up for many years, but its culminating point will be reached when baby-boomers attain official age of retirement, that is between 2011 and 2031. Current social policies and institutions will be faced in the near and far future with issues regarding health disparities, unbalanced age structure and increased morbidity. And while governmental institutions and researchers agree for the most part on how mortality will progress in the next decade, there are different standpoints about the evolution of mortality in the long term.

## **Perspectives**

According to Statistics Canada and Canada Pension Plan, mortality will continue to decrease during the first quarter of the 21<sup>st</sup> century. Their projections converge: Statistics Canada

estimates that life expectancy will increase to be 80.0 years for men and 84.0 years for women in 2026 (Statistics Canada, 2001), whereas Canada Pension Plan predicts 80.7 for men and 84.1 for women in 2025 (Office of the Superintendent of Financial Institutions, 2004).

Moreover, demographers and social biologists argue about the outcome of the evolution of mortality in the long run. Many demographers believe life expectancy will continue to rise steadily and reach 100 in 2060. Demographers also base their opinion on greater reductions of death rates among the older age groups than in the younger age groups. While death rates grow steadily from age 30 to age 85, there is a deceleration of death rates beyond this age. Besides, further advances in social medicine and in biomedicine are likely to occur in the future, which would help sustain the increase of life expectancy. Therefore, according to past and recent trends, demographers conclude that there are no signs undermining the continuation of the decline in mortality well into the 21<sup>st</sup> century (Oeppen and Vaupel, 2002). On the other hand, social biologists believe that the reduction of mortality will come to an end once life expectancy reaches about 85 years old. Social biologists state the slowing down of death rates' decline from endogenous diseases (ex. cardiovascular diseases and cancer) in the 1990s as a factor. Particularly, the protagonists point out the increase in death rates from cancer and chronic obstructive pulmonary diseases in the past decades. If Americans were to reach a life expectancy of 100 years old by 2060, age-specific mortality would have to decrease by 80 to 90 percent, which is considered practically impossible by Olshansky and other supporters of the social biologists' view. Matters such as the resurgence of some infectious diseases and emergence of new ones, and the prevalence of obesity among the population are disquieting and will most probably continue to alter survival rates in the next decades. Therefore, social biologists pretend that a life expectancy of more than 85 years old would be hardly impossible to attain unless the aging process would be modified (Olshansky, et al., 2001). Since there is no consensus on how high life expectancy will get, government measures must be prepared for a more or less important decrease of mortality.

Furthermore, public policies will need to take into consideration the impact of the imbalance between cohorts born during baby-boom and those born after 1965 on labour force. In 2001, cohorts born between 1966 and 1981, namely Canadians aged 20-34, accounted for only 85% of the preceding cohorts, those born between 1951 and 1966.

### **Challenges and Policy Implications**

The past and possible future decline of mortality and the evolution of morbidity present some serious challenges for public health and public policies. Perhaps the preoccupation brought up most often by officials and the media is the expenditures associated with aging. But the rising of healthcare costs actually depends more on the number of deaths than on the number of elderly, because a large proportion of healthcare costs are spent during the last months of life (Légaré *et al.*, forthcoming). The association between the increased number of elderly and the rise of healthcare costs comes from the fact that more elderly than young people are at the end of their life. However, healthcare costs associated with older age groups are comparable, not higher, than those associated with younger age groups (50-65 years old). For example, medical treatments and interventions are more expensive among those aged 50 to 65 than those aged 65 and beyond (Demers, 1998). Therefore, a mortality decline benefiting mostly individuals aged 50 and over would contribute to a lowering of healthcare costs. Nevertheless,

an increase in the total healthcare costs should be expected due to a rise in home care and long-term care services as the large post-war cohorts become older. The pressure on Canada's Pension Plan will be great: not only will large cohorts reach age of retirement soon, and will be followed by smaller cohorts unable to support their elders, but in addition, life expectancy should continue to rise, therefore prolonging the average period of pension benefits (Bourbeau et al., 2005).

Moreover, the social security system could face a crisis if mortality would decline faster than predicted. For example, if mortality would decrease twice as much as the medium mortality assumption proposed by Statistics Canada, life expectancy at age 65 would be 27 years for both sexes in 2050, which is 6.5 more years for men and 4 more years for women than Canada Pension Plan's projection.

On the other hand, public health might be faced with the opposite problem: what if some health issues already existing would expand much more than anticipated, or if some new diseases would unexpectedly emerge? In either case, the predicted decline of mortality would most probably be delayed. In particular, the prevalence of obesity must be considered a serious threat to health, and there are yet to be signs of a slowing down of its prevalence. Between 1985 and 1998-99, the proportion of overweight Canadians aged 15 and over rose from 32 to 47 percent, and the prevalence of obesity almost doubled (from 17 to 30 percent) (Statistique Canada, 1999). Additionally, consequences of environmental hazards such as radiation, pollution and the green house effect on health are not completely established, and could possibly get even more severe in the coming years or decades. Also, the potential onset of some new virulent infectious diseases can not be ruled out.

But no one can predict the future. What we do know, however, is that the aging of the population will boom in the next 10 to 20 years and, since funds are never endless, decisions will have to be taken regarding which avenues should have precedence. For instance, the health care system will be confronted with the care vs. cure dilemma: should investments make home care and palliative care their priority, or keep their focus on interventions and treatments? Moreover, the pay-as-you-go health system does not ensure a fair intergenerational distribution of health costs because of the disproportion between young and old cohorts. The pay-as-you-go funding of healthcare is inherited from a period of time where each cohort was larger than its predecessor; it is now outmoded in a world where demographic dynamics are quite different. Therefore, public administrations should seriously consider implementing an additional system of health funds, similar to that of pensions, so as to alleviate the pressure of health costs for younger generations (Légaré *et al.*, forthcoming).

In order to cope with population aging and with the growing importance of the oldest old, our universal health care system will need to be ready and flexible. Social policies must be prepared to face the possibility of any deviances from the current mortality projections, whether a slowing down or an accelerating of the decline. Also, policy-makers should contemplate the idea of setting up another health fund, in addition to the actual pay-as-you-go system. Finally, political officials responsible for implementing government measures and social policies should bear in mind that an important goal has yet to be reached, and that is the elimination of health inequalities. Canadians of any socio-economic class or gender should stand an equal chance of being healthy.

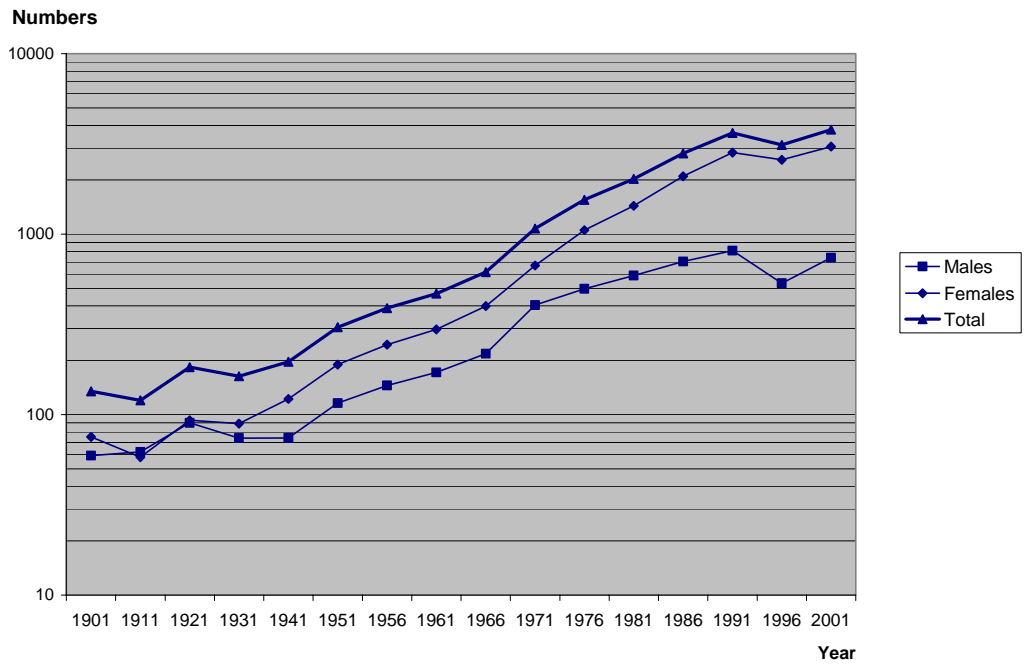
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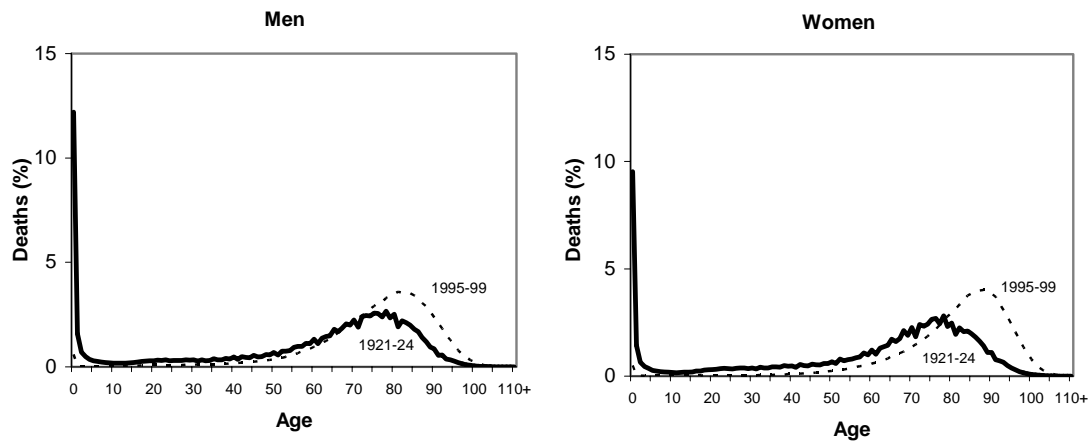
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Figure 1

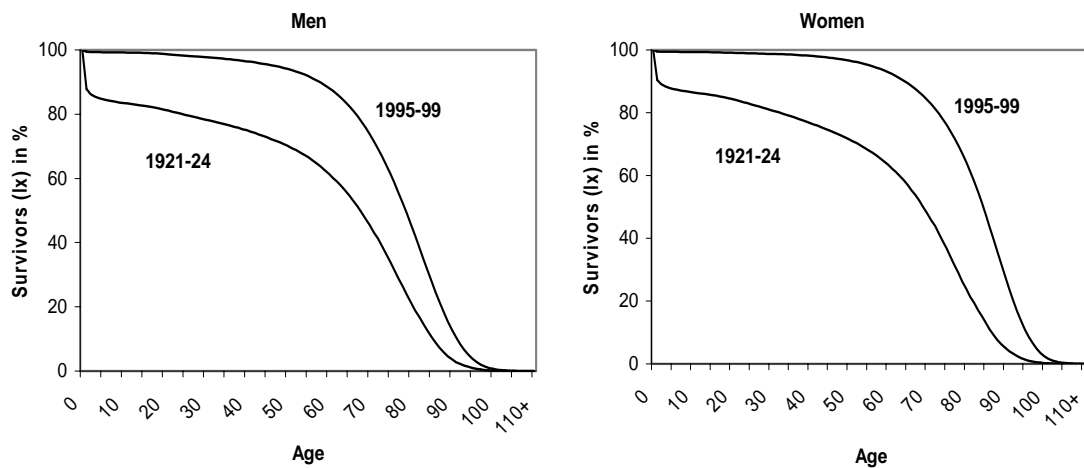
Population of age 100+, by sex, Canada, Census data from 1901 to 2001



**Figure 2.** Distribution of deaths by age (%), Canada, 1921-24 and 1995-99



**Figure 3.** Survival Curves, Canada, 1921-24 and 1995-99



Source: Canadian Human Mortality Database (CHMD), 2005.