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Issue 10, May 2005

Health Policy Research Bulletin

Changing Fertility Patterns: Trends and Implications

Fertility trends in Canada and other industrialized countries reflect profound changes in society over the past 40 years. This issue of the *Health Policy Research Bulletin* examines the complex dynamics behind recent fertility trends, including transformations in family structure, gender roles and life transitions. It also explores the implications of these trends for women, men, children, the health care system and society as a whole.

Canadians today are having fewer children and having them later in life than ever before. Research on reproductive delay, commissioned by Health Canada, shows that the gap between the socioeconomic status of older first-time parents and their younger counterparts has grown. While later childbearing presents certain health risks for mothers and infants, socioeconomic status is a key determinant of health and must also be considered in the study of fertility trends.

This issue of the Bulletin also examines:

- how delays in life transitions, such as pursuing higher education, leaving home and forming relationships, are associated with later childbearing
- the relationship between reproductive delay and the overall trend towards declining fertility rates
- the socioeconomic benefits and health risks of reproductive delay for women, men and their families
- the health and social implications of the timing of childbirth for individual families and at the societal level

Finally, the need for discussion and debate on the implications of these findings is highlighted, as well as the need for further research on factors that influence the childbearing decisions of both women and men. From a policy perspective, efforts might well focus on modifying the factors that contribute to these trends, and mitigating or eliminating the disadvantages arising from them. In pursuing debate on the potential for a population policy in Canada, the Bulletin puts forward several options to be explored.

In this Issue

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Glossary of Some Commonly Used Terms

Delayed reproduction: The difference between a woman's actual age at the birth of her first child and the average maternal age for all first-time births. It is calculated by taking into account factors such as education level, major field of study, urban size and birth year of the mother.

Dependency ratio: A measure equal to the number of individuals aged 0–14 and 65+ (people who are not of working age) divided by the number of individuals aged 15–64 (people of working age).

Fertility: The physiological ability to conceive (female) or to father (male) a child.

Fertility rates:

- **Total fertility rate (TFR) —** The average number of children that would be born to each woman if all women lived to the end of their childbearing years and bore children according to the fertility patterns of the current year. A TFR of 2.1 is considered to be the replacement rate for the population — i.e., the rate necessary to maintain the current population size.
- **Age-specific fertility rate** — The number of live births per 1,000 women in each age group.

Infertility: The failure to conceive (female) or to father (male) a child for a period of 12 months or longer due to a deviation from, or interruption of, the normal structure or function of any reproductive part, organ or system for reasons other than surgical sterility or use of contraceptives.

Parity: The sequential placement of a birth to a particular mother. Three categories are used: first, second, and third or later.

Post-reproductive productivity: The period in life after one's own children have completed their education and left home, but before retirement.

Prenatal testing: Screening and diagnostic procedures that can be performed on a pregnant woman to determine the probability (screening) or presence/absence (diagnosis) of structural defects or chromosomal anomalies in the fetus. Procedures include prenatal ultrasound, maternal blood screening for alpha-fetoprotein levels, amniocentesis and chorionic villus sampling (CVS).

Preterm birth: A live birth in which the infant's gestational age is less than 37 completed weeks.

About the Health Policy Research Bulletin

Health Canada's *Health Policy Research Bulletin* is published three times a year. The Bulletin is part of a larger policy research dissemination program designed to enhance Health Canada's policy-relevant evidence base.

A departmental steering committee guides the development of the Bulletin. The Research Management and Dissemination Division (RMDD) within the Applied Research and Analysis Directorate, Information, Analysis and Connectivity Branch coordinates the Bulletin's development and production. RMDD would like to thank the steering committee members for their contributions, as well as Nancy Hamilton, Managing Editor, Jaylyn Wong, Managing Editor for Issue 10, Tiffany Thornton, Coordination, Raymonde Sharpe, Quality Control, Marie-Josée Therrien and Jeff Thibert for editorial work, and Kathryn Joly, Abacus Services. Special thanks go to Linda Senzilet, Sari Tudiver and the Guest Editors for this issue, Phyllis Colvin, Director of the Policy Division, Policy, Planning and Priorities Directorate, Health Policy Branch (HPB), and Deanna St.Prix-Alexander, Executive Director of the Bureau of Women's Health and Gender Analysis, HPB.

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Electronic HTML and PDF versions of the Bulletin are available at: <http://www.hc-sc.gc.ca/arad-draa>.

Health Policy Research Bulletin

ISSN 1496-466 X

Editing, design and layout by Allium Consulting Group Inc.

Publications Mail Agreement Number 4006 9608

Return if undeliverable to:

Health Canada
IACB/DGIAC
RMDD/DGDR
P/L: 1904A
Ottawa, Ontario
K1A 0K9

The Dynamics of Fertility
from a Policy Perspective

An interview with **Phyllis Colvin**, *Director of the Policy Division, Policy, Planning and Priorities Directorate, Health Policy Branch, Health Canada, and* **Deanna St.Prix-Alexander**, *Executive Director of the Bureau of Women's Health and Gender Analysis, Health Policy Branch, Health Canada, conducted by Nancy Hamilton, Managing Editor of the* Health Policy Research Bulletin.

Q *Recent evidence points to some interesting trends in patterns of fertility and reproduction in Western industrialized countries, including Canada. What are some of these trends?*

Phyllis: There are a variety of significant trends in the area of fertility and reproduction, reflecting some fairly profound changes taking place in the Western industrialized world. This issue of the *Health Policy Research Bulletin* focuses on one of the most important demographic shifts of the last several decades in Canada — the increasing age of mothers at first childbirth. It also explores some of the health, social and economic changes this demographic phenomenon has brought in its wake.

Most Canadians are aware that Canada is an aging society. However, many may not be aware that the aging of the population is largely the result of a lower overall fertility rate. Like women in other Western industrialized countries, Canadian women are having fewer children. While the decline in fertility rates is a product of several long-term secular trends, it is also associated with delays in certain key life transitions. As discussed in the article by Roderic Beaujot (page 21), men and women are forming unions later in life and are delaying having children. As a result, the reproductive period is compressed, contributing to lower overall fertility rates.

Q *What do we know about the factors and conditions that have been shaping and driving these trends?*

Deanna: The life transition issues related to demographic and fertility trends are quite complex. This issue of the Bulletin looks at the broader context of these trends, or what I call their "social meaning." We explore the economic realities and disparities in society and what they mean for fertility, and consider the changing roles and expectations of men and women in light of the struggle for gender equality (see article on page 7).

For a more complete understanding of these trends, we need to look at them from a historical perspective, in terms of the "burden of childbirth" and the cost of that burden for women. With improved public health and maternity care, fertility rates have declined and women's

overall health has improved. The importance that governments in countries such as Canada have placed on reproductive rights is also a key contextual factor. International conventions, to which Canada is a signatory, acknowledge the right of women and men to decide together on the number and spacing of their children. For women, the ability to control their reproductive life has been hard won.

A diversity lens is also important when looking at fertility trends. The article by Sari Tudiver and Linda Senzilet (see page 24) examines some of the geographical and ethnocultural diversity factors underlying these overall trends. For example, we need to develop a more textured understanding of the challenges facing female and male immigrants and how, over time, their experiences in Canada influence their childbearing decisions.

***Q** Fertility patterns and trends are certainly interesting, but why should they be a priority for the health sector?*

Phyllis: While the increasing age of mothers at first childbirth means there are fewer teenage mothers, there are reasons for concern about childbearing for mothers at the other end of the age spectrum. For example, increasing age has an impact on the incidence of certain reproductive problems. In addition, many physical indicators that are positively associated with the long-term health of children (e.g., birth weight) tend to decrease as the mother's age increases (see article on page 15).

In addition, delaying reproduction often makes it more difficult to reproduce. As an example, it increases the time window for sexually transmitted infections (STIs) to compromise or end reproductive ability. Although the implications are primarily private, increased female and male infertility has led to a growing interest in technologies designed to "assist" reproduction. As society faces increasing pressures for assisted human reproduction (AHR), governments have been confronting important social, ethical, health and safety issues related to their use.

Although increased age at childbirth can be associated with negative impacts on the physical health of mothers and infants, it can also bring benefits in the form of higher education, greater labour force participation, more income and greater family stability, all of which contribute to households that are better able to support children.

Deanna: The definition of women's health, as outlined in Health Canada's Women's Health Strategy and acknowledged by the United Nations and the World Health Organization, recognizes that "all aspects of women's lives — their health, social conditions, economic and legal status — interact and influence their well-being." The issue of fertility provides a good example of how these elements are linked and why they're important for developing supportive and empowering social policies.

Although I agree that AHR is one reason the issue of fertility warrants interest by the health sector, there are other reasons as well. Society has experienced profound changes in the way people define relationships and families, and in what this means for "women's equality" and, more recently, "gender equality." We need to understand these issues in terms of health. For instance, employment issues have important health implications for women in light of their continuing caregiving roles. We must also look at men's health in relation to changing caregiving roles and the balance between paid work and family life. As we address issues of economic and social equality, including employment equity, we need to explore how they can contribute to better health status and improved health outcomes. Clearly, we must consider the broader basket of social policies that enable health.

***Q** I understand that Health Canada has commissioned research on the implications of the trend towards delayed reproduction. What does the research tell us about the pathways by which this trend influences health?*

Phyllis: Not all of the Policy Division's research in this area is complete; however, this issue of the Bulletin highlights some of the preliminary findings. A central focus of this research is the "health gradient" — a phenomenon in which measures of health status often have a positive association with measures of socioeconomic status (see text box, next page). Our research explores the degree to which these gradients exist in Canada, what accounts for their presence or absence, and what they mean for health policy. Although Canada does not experience the same patterns of health inequality as the United States, our research shows that health-related gradients are present, especially between neighbourhoods within Canada's cities and between various sub-groups of the population.

Moreover, we are finding that recent trends in reproduction have implications that may be related to the gradient. For example, the article by Clarence Lochhead (see page 11) shows that those who delay reproduction benefit from increased education and income. Since income and social status are determinants of health, children born into families with higher socioeconomic status may experience healthier development. Those who do not delay reproduction to the same extent, even though they also benefit from a certain amount of delay, tend to be less educated, poorer, and more subject to unemployment and isolation. As a result, their children may experience fewer health benefits derived from socioeconomic status.

Of course, these are not simple phenomena. There are policy implications related to younger parents and older parents, as well as to those in between who represent the majority of the population. I believe there is a continuum of effects through which reproductive experience may contribute to inequality. These effects could both *arise from and be the product of* increasing levels of socioeconomic inequality emerging in Canada. Over time, it may be difficult for those who cannot benefit extensively from delay to rectify the economic consequences of their experience.

The "Health Gradient"

As socioeconomic status increases, generally so does health status. Conversely, lower socioeconomic status is associated with poorer health. This "gradient" relationship is incremental — an increase in socioeconomic status is associated with better health at all levels of society, not just for those who have low incomes. The steeper the slope of a society's health gradient, the greater the difference in health status between various levels of socioeconomic status.

Deanna: The Policy Division has commissioned some fascinating research and I look forward to reading more. I see a trend towards polarization that is of particular concern. Having a child in one's early twenties should not be a risk factor for poverty for women or couples. Moreover, while much of the work has focused on women's age at first childbirth, the Bulletin also raises the issue of increasing age among first-time fathers. This is important because we've tended to see this as a women's issue — subtly "blaming" women for falling fertility rates — rather than what it means for both men and women in terms of fertility patterns and changing roles related to paid and unpaid work.

Q *Can policy action modify fertility trends? If so, should we be concerned and is there an appropriate role for government?*

Phyllis: I think we should all be concerned about disadvantage in the population — for social reasons, for reasons of justice and fairness, and for economic reasons. Moreover, as Richard Wilkinson has observed, it is "the most egalitarian rather than the richest developed countries which have the best health."[1]

Since reproductive decisions are private and personal, one might think that fertility patterns would be difficult to change. Traditionally, patterns of reproduction have been resistant to policy intervention, largely because the intervention repertoire has been so narrow (e.g., allowances for lost time or income). However, as discussed in Mark Wheeler's article (see page 28), both Sweden and France demonstrated that a comprehensive reproductive policy can result in increased fertility and enhanced equality. Canada does not have an explicit reproductive policy, so the obvious question is whether Canadians could benefit from one. To the degree they have been asked about this issue, Canadians generally indicate that they would like to have more children than they subsequently do. We now have international policy benchmarks that identify some policy options to help them achieve this goal.

Even if Canada does not follow in the wake of France or Sweden, it is possible to help Canadians become more aware of the consequences of their decisions and to mitigate or correct disadvantages so that inequality is not entrenched and passed on to future generations. For instance, the Canadian transfer system helps to reduce poverty among the elderly and might also be used to balance the economic equation for young people planning to have children and those currently raising children. Reduced inequality, however, can also be achieved through policies that focus on other variables such as trust and inclusion, which are "free" goods and products of early life experiences.

Deanna: Many people, including policy makers, worry about declining fertility for a wide variety of reasons, including a declining tax base, future challenges to economic growth and innovation, and implications for immigration and adoption policy.

The Bureau of Women's Health and Gender Analysis is less concerned about declining fertility rates per se, and more concerned about the factors behind the economic disparity and work/professional life balance that are affecting the decisions of men and women to have the number of children they want. It is important to think about social and economic policies that might facilitate this.

As Phyllis mentioned, government policies can support people in having children, while supporting gender equality at the same time. I believe governments should play a role in encouraging individual and community dialogue that can contribute to better policies and programs.

Q Given the complexity of fertility and reproductive issues, there must be many unanswered questions. Where do we go from here to build on the research presented in this issue of the Bulletin?

Deanna: As mentioned earlier, there are pitfalls in looking at fertility trends in isolation. Unfortunately, much of the literature on demographics does not take into account the factors that influence people's decisions about whether they have children, when and how many. It is critical that social and economic policies be based on a thorough understanding of the challenges and circumstances confronting men and women in Canada.

To do so, we need to know more about the nature of child- and family-friendly policies in various occupational settings and how they relate to shift and part-time workers, as well as to professional workers. We also need to be concerned about the double burden that many women continue to carry in their caregiving roles. More qualitative research is needed in a Canadian context to understand how people address the interrelationships between work and family life. We also need to take advantage of the work that has already been done in Canada (e.g., Linda Duxbury's work on work/family life imbalance[2]), so we can understand what role governments can best play.

Canada's reproductive and fertility trends are creating new and unprecedented circumstances that make collaboration in policy development and analysis all the more important — whether it's between the Bureau of Women's Health and Gender Analysis and the Policy Division at Health Canada or, more broadly, between different social and economic policy sectors.

In many rural and remote communities across Canada, including many Aboriginal communities, maternity care is only available outside the community. Although this is generally seen as disruptive for women and their families, it is unclear whether it has a direct impact on fertility rates. Nonetheless, policies supportive of reproductive health services closer to local communities can create a more positive, empowering environment for families. As noted in *Who's Doing What?* (see page 32), policy research in this area is currently under way through the Centres of Excellence in Women's Health.

I agree that it is important to look at positive initiatives in other countries like Sweden — not just so fertility rates will rise, but so that women, men and families can have more satisfying, healthier, less stressful lives. If total fertility rates rise as a result, so much the better. If not, they are still worth initiating!

Phyllis: Canada's reproductive and fertility trends are creating new and unprecedented circumstances that make collaboration in policy development and analysis all the more important — whether it's between the Bureau of Women's Health and Gender Analysis and the Policy Division at Health Canada or, more broadly, between different social and economic policy sectors. Breaking down the silos, both intellectual and cultural, is a precondition for understanding and addressing the important issues raised by our changing patterns of reproduction and fertility.

@ Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.

Exploring Fertility Trends in Canada through a Gender Lens

Sari Tudiver, *Bureau of Women's Health and Gender Analysis (BWHGA), Health Policy Branch (HPB), Health Canada*

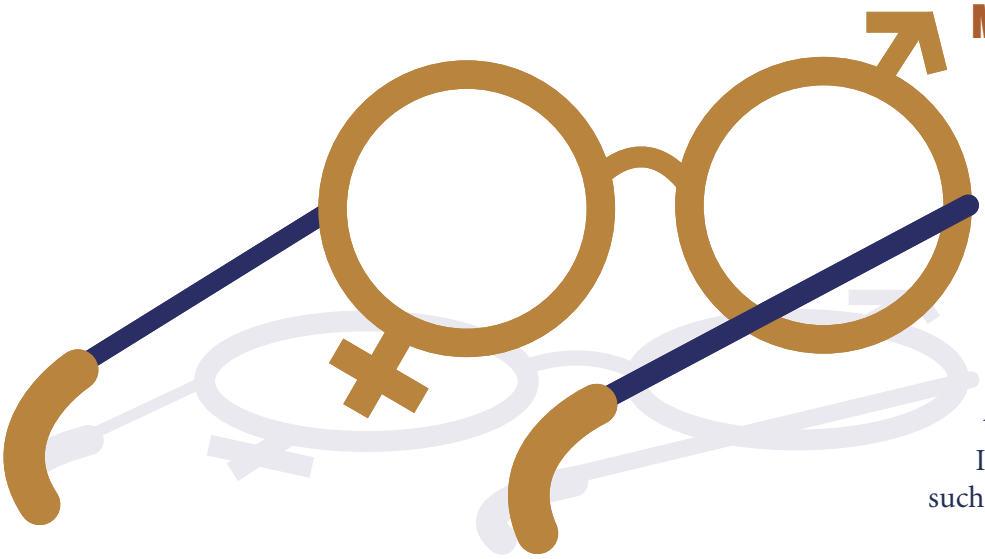
Special thanks to: Deanna St.Prix-Alexander and Nathalie Valdés, BWHGA, HPB; Roderic Beaujot, University of Western Ontario; Mark Wheeler, HPB; Madeline Boscoe, Canadian Women's Health Network; Ann Pederson, B.C. Centre of Excellence for Women's Health; and Donna Johnson, Consultant.

This article is an introduction to current fertility trends in Canada and to some of the conditions shaping these trends. Understanding total fertility rates and other indices requires an examination of women's and men's behaviours and attitudes about reproduction, within the context of major economic, social and cultural transformations over the past century.

The Context of Reproduction

In Canada and in other Western societies, conception and reproduction are generally viewed as deeply personal experiences. However, the context and consequences of such experiences are gendered and profoundly social. Whether to have a child, how many and when, involve desires and decisions influenced by cultural and religious values and beliefs that women and men have about children, family and community. Reproductive outcomes may also be unplanned, with very different life consequences for women than men.

Reproductive decisions and behaviours are subject to powerful institutional and social forces. Historically, religions and the state have taken a strong interest in reproduction — particularly the behaviour of women — through moral prescriptions, proscriptions and pro- or anti-natalist policies.[1] Upheavals of war, economic depression and migration can also influence reproductive outcomes.[2] As this issue of the Bulletin illustrates, gender roles and relative power, socioeconomic status and being fertile or infertile are among the factors that can enable or constrain the realization of women's and men's desires and expectations about having a child.



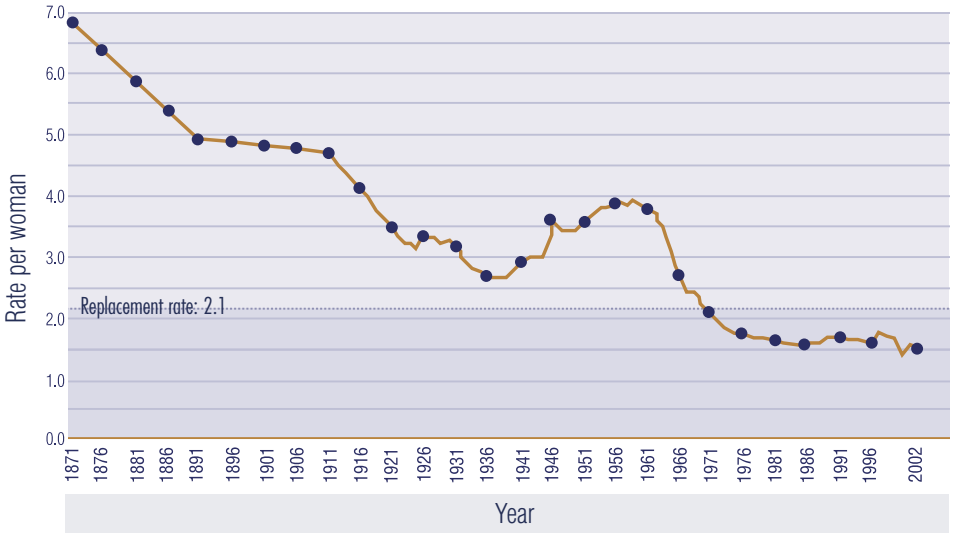
Major Trends: In Brief

Declining Fertility Rates

As Figure 1 shows, total fertility rates (TFRs) in Canada have been declining for over a century. Over the past four decades, Canada's TFR declined from 3.94 in 1959 to 1.50 in 2002, below the population replacement rate of 2.1.[3]

Declining fertility rates are a global trend. Canada's fertility rates fall between those of "low fertility" countries, such as Ireland, and "very low fertility" countries, such as Italy, Greece and Japan.[4]

Figure 1: **Total Fertility Rate, Canada, 1871–1996**



Sources: Beaujot, 2000;[5] Statistics Canada, The Daily;[3] Statistics Canada, 2001 Canada Year Book.[6]

Why Canada and many highly industrialized countries are "below replacement" is widely debated and of interest to policy makers, in part because of the economic and social implications of an aging society (see pages 3 and 28).[7] Low TFRs contrast with the expressed desires and expectations of many women and men in Canada to have two or more children.[8,9]

Delayed First Birth for Women and Men

On average, women and men in Canada are having children later in life (see page 11). Between 1976 and 2002, the average age of first-time mothers increased from 23.4 years to 27.7 years,[10] and the proportion of first-time mothers 30 years and older increased from 9 percent to 34 percent.[11] As Figure 2 illustrates, the age-specific fertility rates of women aged 30 to 44 have risen since the late 1970s, while those for women under the age of 30, including teens, have declined.

The trend towards later parenting also applies to men, although to a lesser degree. For example, the median age of first-time fathers rose from 28.1 years for those born between 1922 and 1940, to 29.6 years for men born between 1941 and 1960, to 31.7 years for those born between 1961 and 1980.[12] Since women have traditionally been the primary subjects of reproductive research, clinical interventions and policies, the health and social implications of later fatherhood have received only limited attention.[13]

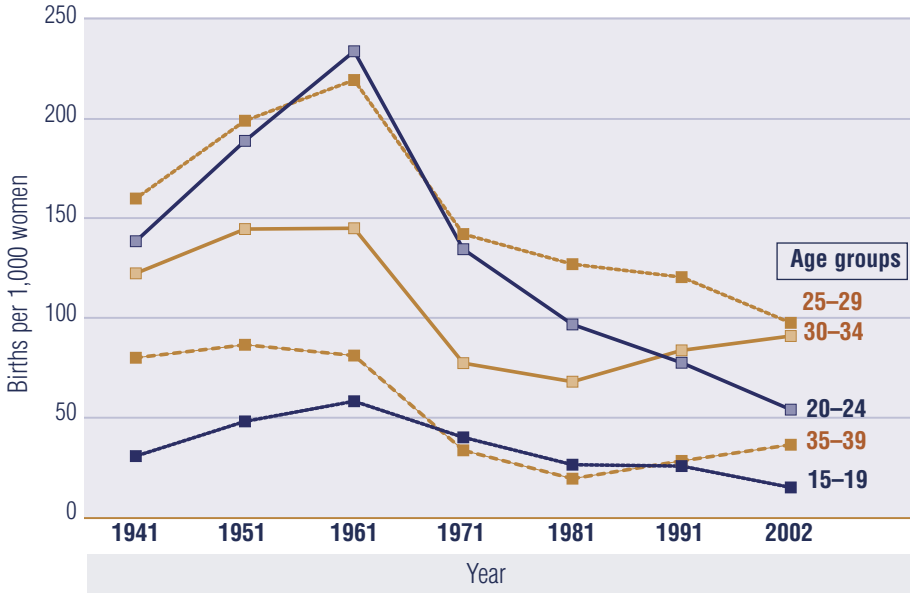
Other Delayed Transitions

Delayed reproduction is associated with other late transitions for women and men, including late median age leaving the parental home, entering the work force, cohabiting or marrying for the first time.[10] In addition to being gendered, the "pathways to adulthood" vary between socioeconomic groups, depending on experiences and opportunities for schooling, paid employment and family circumstances.[14]

Growing Disparities

Research shows that the economic and social disparities between younger and older parents with young children appear to be widening (see page 11). This polarization needs to be explored in the context of increasing economic inequalities in Canada and in other countries experiencing these trends, and in relation to the risks that inequalities pose to the health of women, men and children across their lifespan.[15,16]

Figure 2: **Age-Specific Fertility Rates, Selected Age Groups, Canada, 1941–2002**



Sources: The Vanier Institute of the Family, Profiling Canada's Families III, 2004; Statistics Canada, Births, Catalogue No. 84F0210XPB, 91-205, and CANSIM Table 102-4505.

Behind the Trends

The First Demographic Transition (1870 to 1945)[17]

The initial wave of declining fertility rates is commonly referred to as "the first demographic transition." Among the transformations that shaped this transition are:

Industrialization and Urbanization — During the latter part of the 19th century, industrialization and urbanization created demands for a labour supply that was responsive to fluctuating markets and shifts in production. In farm families, children were a crucial economic resource and insurance against risks, while children in industrial families represented additional costs. The industrial family unit was expected to care for and support its members through unpaid household labour, mostly by women, and the "family wage," commonly provided by men but often supplemented by women's part-time earnings. Child labour laws and mandatory schooling further extended children's dependency on parents. Reproductive behaviours began to reflect the reduced economic need for, and added costs of, children.

Improved Public Health and Early Birth Control — Declining fertility rates are associated with improved public health measures and better obstetrical care, as evidenced in the plummeting rates of maternal and infant mortality in Canada since the 1920s.[5] Despite legal prohibitions,[18] some forms of birth control — including abortion — were used widely and promoted by social reformers, especially among the poor.[19]

Wars, the Depression and Other Upheavals — Declining fertility rates during and after World War I were partly the result of wartime losses among men. Economic uncertainties, separation and other dislocations led many couples to delay having children during the Depression and World War II. These upheavals contributed to the rapid spread of new ideas and practices, including birth control.[5]

The "Baby Boom" (1947 to 1966)

The baby boom was an outcome of optimism and greater economic security in the post-war period. With the expansion of consumer-oriented industries, almost full employment, near zero inflation and veterans' benefits, many families relied on the single income of the male "breadwinner." Pro-natalist ideologies, labour policies and social marketing campaigns promoting domesticity discouraged women, many of whom had worked for the war effort, from "taking the jobs" of male veterans.[20] Married women in the labour force commonly interrupted paid work to raise a family.[21] In 1959, Canada's TFR rose to 3.94, reflecting a trend towards earlier first births and births to older parents who had postponed having children until after the war. While baby boomers would have a profound impact on Canadian society, this "demographic aberration" would not be sustained.

The Second Demographic Transition (1967 to Present)

Other transformations set the stage for "the second demographic transition," characterized by diverse family forms and further declines in fertility rates. These transformations include:

Social Movements and Gender Equality — In the 1960s, many people around the world joined social movements pressing for democratic rights, including gender equality.[22] The women's movement called for changes to patriarchal family structures, greater employment options and redress of legal and other inequities affecting women. In Canada, the Royal Commission on the Status of Women (1970) laid the basis for many initiatives aimed at achieving greater gender equality.[23]

New Contraceptive Technologies — Birth control and access to abortion were legalized in Canada in 1969, spurred in part by demands of the women's movement for greater reproductive rights, developments in hormonal research and more secular public attitudes.[24] New contraceptive methods had a profound social impact on attitudes and norms towards sex, marriage and reproduction. The "pill" became symbolic of sexual freedom, enabling women to more predictably control their fertility and, ideally, the course of their reproductive years.

Women's Labour Force Participation and Higher Education — Since the 1960s, increasing numbers of married women and mothers have joined the paid labour force, motivated by many factors including a desire for paid work.[25] By 2003, more than 70 percent of women with children under the age of 16 were in the Canadian work force, one of the highest rates in the industrialized world.[26] As barriers to women entering previously male-dominated professions were reduced or removed, women

increasingly sought higher education.[27] However, many women continue to work in traditionally female occupations, such as nursing and teaching, and the majority hold lower paid, part-time clerical and sales jobs.[26,28]

Women's entry into the labour force has also been influenced by a growing need for dual incomes to cope with economic conditions, such as rising unemployment and high inflation during the mid-1970s, high interest rates in the 1980s, economic recessions in the early 1980s and 1990s, and current student and other debt loads.[29]

One outcome of this trend has been increasing economic and social polarization — with a gendered face. Between 1980 and 2000, the average earnings of couples with low education levels generally stagnated or decreased, while the incomes of couples with university degrees increased.[30] Women have seen their incomes rise, while the earnings of less educated men have declined. In cases such as these, women's increased earnings have helped to keep families from falling further behind. However, at all education levels, women's average annual earnings are still considerably less than those of men. While surveys show that family finances are a factor in many people's decision to have a child,[31] not enough is known about the different ways economic pressures influence fertility decisions and behaviours of women and men across the socioeconomic spectrum.

Changing Families and Households — In Canada and other highly industrialized countries, significant transformations have occurred in the nature and variety of family and household relationships over the past four decades.[32] These include: rising divorce rates; trends toward cohabitation and common-law unions both before and after marital relationships, and a higher proportion of children born to such unions; an increase in the number of blended families and other family forms, including same-sex relationships; and a rise in the proportion of people living in single-parent families. These transformations reflect a broad-based secular movement towards greater tolerance of a variety of relationships.[33] They also indicate how women and men respond to, and help shape, the economic, political and social environments that characterize the Canadian welfare state today.[34]

Exploring Fertility through a Gender Lens

How women's and men's experiences as younger or older parents differ, and interrelate, needs to be more deeply understood. In its diverse forms, the family/household unit remains the dominant social structure for raising children in Canada. Household/family members are dependent on income and unpaid caregiving and must negotiate a division of labour. The pressures are especially significant for women, who continue to assume primary responsibility for household tasks and caregiving.[35] Many people indicate they have fewer children than they would like, in part because they are unable to establish a satisfactory division of labour in the home.[36]

An emerging policy research literature suggests that fertility is particularly low in countries, such as Italy and Japan, where women have greater equality in education and in the market economy, but where societal arrangements make it hard to combine waged work and family life. As summarized by Beaujot, fertility appears somewhat higher where there are stronger policies in support of families and gender equality, and where there is greater acceptance of alternate family forms.[37]

Evidence suggests that women who have children in their early to mid-20s — the optimal biological period for childbearing — tend not to pursue higher education and may be at greater risk of poverty over the long term (see text box on page 14). Women who pursue higher education and establish careers often delay or forego having children due to career pressures and a lack of family-friendly policies in educational and workplace settings.[38] The timing of childbirth can also have particular health consequences for women and children (see page 15).[39,40]

A Final Note

Given Canada's commitments to improved population health and gender equality,[41] these findings have important implications for the development of Canadian social, economic and health policies. For this reason, they merit careful consideration and debate.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.

Growing Disparities among First-Time Parents: 1971 to 1996

Clarence Lochhead, *Senior Researcher, Canadian Labour and Business Centre, and former consultant to Health Canada*

The author acknowledges the assistance of Derek McCall and Talia De Laurentis of the Policy Division, Health Policy Branch, Health Canada.

To date, little attention has been given to the impact of fertility patterns — in particular, the timing of first childbirth — on the characteristics and circumstances of parents. This article reports on research commissioned by Health Canada indicating that today's first-time parents are generally better educated and many have higher incomes than first-time parents of the 1970s. However, it also presents evidence of growing socioeconomic disparities between today's younger and older first-time parents, and considers the implications of these disparities.

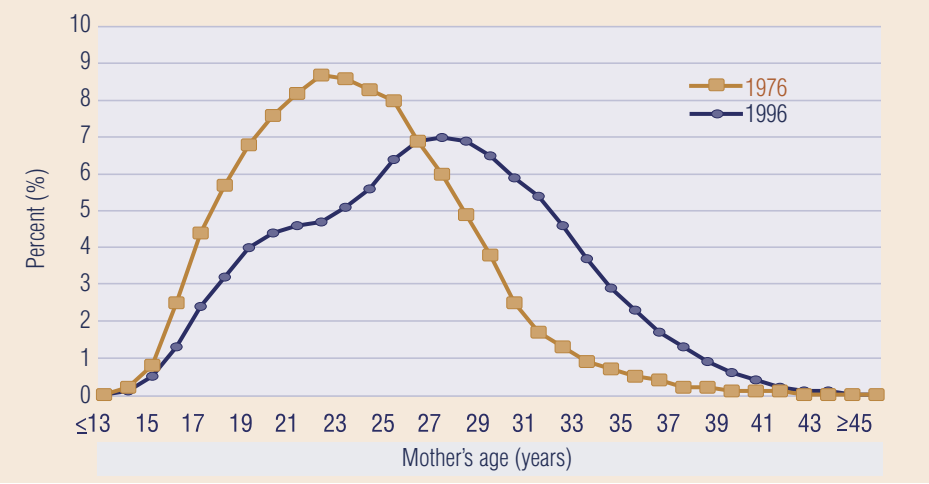
The Trend of Delayed First Birth

In comparison to earlier generations of post-World War II parents, people in Canada today are having fewer children, and often delaying childbirth until their late twenties and early thirties. The trend towards older mothers at first childbirth is demonstrated by the rightward shift of the 1996 distribution in Figure 1. Moreover, the shape of the 1996 distribution is irregular, indicating that the percentage of first births to women between the ages of 19 and 22 did not increase but flattened. The uniquely shaped distribution for 1996 is likely due to a decreased fertility rate, resulting partly from the increased enrolment of 19- to 22-year-old women in post-secondary education. This hypothesis is supported by an analysis of the age of first-time mothers with and without a university education, as displayed in Figure 2.[1]

First-Time Parents: A Changing Picture

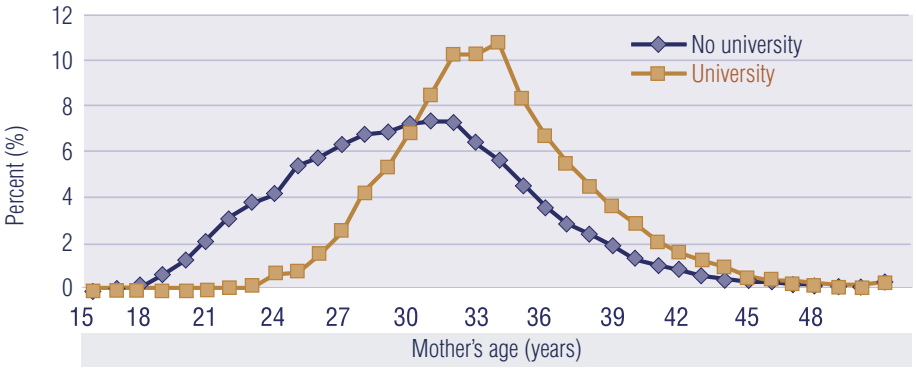
There are powerful economic incentives for many young women and men to delay childbirth and family formation. Having children later in life allows young people to pursue post-secondary education and gain employment experience in a highly competitive labour market. In addition, many women

Figure 1: **Distribution of First Births, by Age of Mother, Canada, 1976 and 1996**



Source: Statistics Canada Census data.

Figure 2: **Distribution of First-Time Mothers, by Age and Education, Canada, 1996**



Source: Statistics Canada Census data.

are able to pursue the goal of financial independence prior to starting a family. Today's first-time mothers and fathers are not only older, they generally have higher levels of formal education and are more likely to be part of a dual-earner family, resulting in considerably higher family incomes.[2] (See text box.)

Growing Income Disparity among First-Time Parents

While fewer in number, today's younger parents have much lower levels of education, employment activity and income than parents who have delayed childbirth. The divergence in the incomes of younger and older parents over time is shown in Figure 3, which compares the average total family income (after transfers) of different parental age groups to the overall median income.[3] These data include only two-parent families. While further research is needed on the experiences of lone-parent families, the article by Roderic Beaujot (page 21) offers some insight.

In 1971, the median income of two-parent families whose oldest child was under 6 years of age was $35,905 (in constant 1998 dollars), and the average income of two-parent families in which the mother was under 25 was about $3,800 lower. On the other hand, the average income of families in which the mother was age 35 or older was $43,230, surpassing the overall median income level by just over $7,000. In short, compared to the median level, younger first-time parents in 1971 were not as well off financially as older first-time parents.

It is hardly surprising that younger first-time parents have lower incomes than older first-time parents. More important is the extent to which the income gap has widened over time. In 1996, the median income of two-parent families whose oldest child was age 5 or under had increased to $50,976 in constant 1998 dollars. In the same year, the average inflation-adjusted family income of young parents fell to slightly less than $30,000. Therefore, the average income of younger parents was $21,000 *below* the median, compared to the average income of older parents, which was $19,000 *above* the median. As the 1996 data show, the income gap between younger parents and those who delayed first childbirth was considerably greater than in previous years. The question remains: is this growing income disparity an important factor in determining health and social outcomes?

First-Time Parents: A Comparison

Educational Attainment – In 1971, 61 percent of first-time mothers and fathers had less than a Grade 12 education. In 1996, only 21 percent of mothers and 23 percent of fathers had less than a Grade 12 education. Gains are also apparent at the post-secondary level. Between 1971 and 1976, the percentage of first-time mothers with a university degree increased from 4 percent to 18 percent, and rose from 11 percent to 20 percent among first-time fathers.

Employment Activity – As a result of increased employment rates among mothers, the majority of couples today having their first child are dual earners (72 percent in 1996, compared with 44 percent in 1971). Many are employed on a full-time, full-year basis.

Family Income – Measured in constant 1998 dollars, the average total family income (after transfers) of first-time parents increased by $14,400 between 1970 and 1995 (from $36,600 to $51,000).

Healthy Child Development: Socioeconomic Determinants

As discussed in the following article on page 15, the trend toward delayed childbirth is associated with increased maternal health risks.

However, findings on the growing socioeconomic disparity among first-time parents must also be considered in the context of research about the links between socioeconomic factors and health.

One of the best-known concepts in health analysis is the "gradient," the widely known positive association between the socioeconomic status (SES) and health status of a population. There is a substantial body of literature illustrating that health differences exist throughout society, with every level in the social hierarchy experiencing better health outcomes than the level preceding it.[4] For this reason, the trend to reproduction at older ages — to the degree that it is accompanied by higher levels of income, education and labour force participation — could be regarded as advantageous to both parents and children. Thus, a trend that can carry physical health disadvantages may also carry social and economic advantages that, in turn, translate into benefits for healthy child development.

That being said, it would be incorrect to assume a mechanistic relationship between the economic status of families and child development outcomes. Numerous research studies using the *National Longitudinal Survey on Children and Youth* (NLSCY) have demonstrated that income is only one of several factors affecting child development and health. Other factors, such as parenting skills, do not necessarily vary with age, education or income.[5]

Results from the 1998 *General Social Survey on Time Use* indicate that nearly 50 percent of married mothers who are employed full-time and have children under 5 years of age experience severe time stress. The extent of time stress and its impact on the health of parents and children is not well understood, and it may be that time stress disproportionately affects older or younger parents. Additional research is needed on this issue in relation to the timing of childbirth, its impact on the health of parents and children, and its possible role as a factor contributing to families and children at risk.

Some Policy Observations

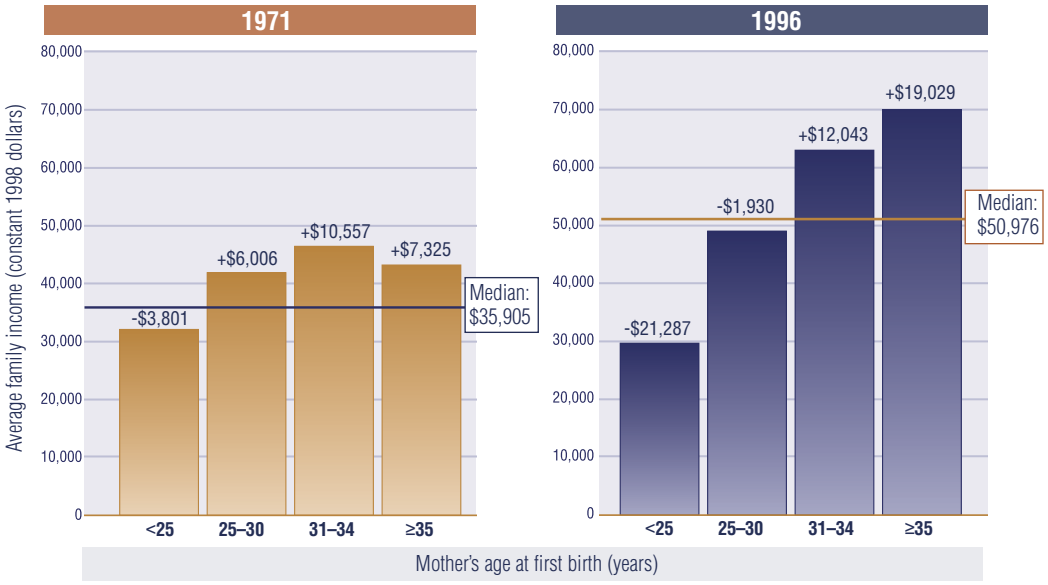
The previous discussion on the association between family income and the timing of first births raises several questions and policy-related observations that merit further attention.

Economic Security

Family income is only one measure of financial status. Additional research is needed to determine whether assets (e.g., housing) and debt (e.g., student loans) contribute to or diminish the apparent economic advantage associated with delayed first childbirth. For example, it remains to be seen whether the apparent economic advantage accruing from delayed childbirth diminishes under increasing post-secondary debt loads.

It is not known if the lower income and education of younger parents is "carried forward" through time. Research suggests that "it is likely that an early birth and the attendant child-rearing process curtails education, and additional births continue to keep the women out of a formal education system."[6] In this sense, the lower levels of education among younger mothers may tend to be a permanent characteristic, not one that is merely postponed.

Figure 3: **Difference between Average and Median Two-Parent Family Incomes, by Mother's Age at First Birth, Canada, 1971 and 1996***



*Data are based on two-parent families with the oldest child being 0–5 years of age. Average and median two-family incomes are measured in constant 1998 dollars.

Source: Statistics Canada, Vital Statistics, Statistics Canada Census data.

Related Research: The Health and Educational Outcomes of Children in Manitoba

Current research at the Manitoba Centre for Health Policy (MCHP) is using Manitoba longitudinal data to explore how children's health outcomes and educational performance vary depending on the age of the mother when she had her first child and whether the family was receiving income assistance in 2001.

Preliminary results show that the vast majority of infants in Winnipeg families whose mother was a teen when she had her first child had normal birth weights. However, during the first year after birth, children whose mother was a teen when she had her first child had poorer health status (based on hospitalization rates) than children whose mother was aged 20 to 24 when she had her first child. Similarly, children in the latter group had higher hospitalization rates than children whose mother was 25 or older. Looking at educational outcomes, children whose mothers were teens when they had their first child were also less likely to pass Grade 3 and Grade 12 standardized tests on schedule than other children, and more likely to drop out or be behind in school by at least one year.

Children in families receiving income assistance in 2001 typically had normal birth weights, and yet a lower health status emerged for these children during the first year after birth. The relationship between socio-economic status and educational performance was also strong, with children in families receiving income assistance performing worse than other children, and performance increasing with each increase in socioeconomic status.

Families in which the mother was a teen when she had her first child were most likely to be receiving income assistance in 2001, even if that was up to 20 years after the birth of her first child. Furthermore, the research suggests that delaying childbearing until after the teenage years may not be enough to protect families from having low incomes – women who had delayed childbearing until they were aged 20 to 24 were also more likely to receive income assistance in 2001 than women who delayed childbearing until 25 or older. It is not yet known whether young motherhood is a risk factor for, or a symptom of, low income and researchers at MCHP are continuing research in this area.

Note: *This information is based on an unpublished manuscript and discussions with Marni Brownell about unpublished MCHP research.*

It is noteworthy as well that parenthood for Canadian men tends to start later the higher the education level achieved.[7]

Reproductive Decisions

To what extent are reproductive decisions driven by the perceived benefits of obtaining post-secondary education? Will "lifelong learning" further affect reproductive decisions? Should policy options support education and family equally, rather than as chronological priorities? In an economy that demands and rewards post-secondary training, the incomes of younger and less educated parents have fallen far behind their older counterparts. Older first-time parents often possess post-secondary credentials, have high levels of employment and, as shown in Figure 3, family incomes that are well above the median.[2] Meanwhile young parents are competing for jobs in a labour market that has seen declining inflation-adjusted earnings for young adults, particularly young men.[8]

In Conclusion

In addition to offering a new window into the linkages between demographic trends and the tradeoffs involved in obtaining an education and starting a family, this analysis also serves as a preliminary basis from which to consider hypotheses about work/family tradeoffs and their associated health implications. For example, the trend in delayed childbirth may lead to greater demand for assisted reproductive technologies. This, in turn, implies a trend toward more multiple births and an increasing number of low birth weight babies (see article on page 15). Given the trends noted above and the preliminary results of ongoing research at the Manitoba Centre for Health Policy (see text box), increased policy consideration should be given to the longer term implications of the timing of childbirth.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.

Reproduction at Older Ages: The Health Implications

Linda Senzilet, **Derek McCall** *and* **Joanna Theriault**, *Policy Division, Health Policy Branch, Health Canada*

The authors acknowledge the contributions of Bernard Starkman and Taban Nabi, Policy Division, and Rodney Ghali, Assisted Human Reproduction Implementation Office, Health Policy Branch, Health Canada; Rhonda Kropp, Janice Mann and the late Sharon McMahon, Centre for Infectious Disease Prevention and Control, and Dr. Hajnal Molnar-Szakács, Centre for Healthy Human Development, Public Health Agency of Canada; and Roderic Beaujot, University of Western Ontario.

Fertility patterns and trends have a number of important health implications, ranging from immediate health impacts affecting mothers and infants to broader issues affecting the health care system. This article examines the influence of older maternal and paternal age on the health-related consequences of reproduction.

Introduction

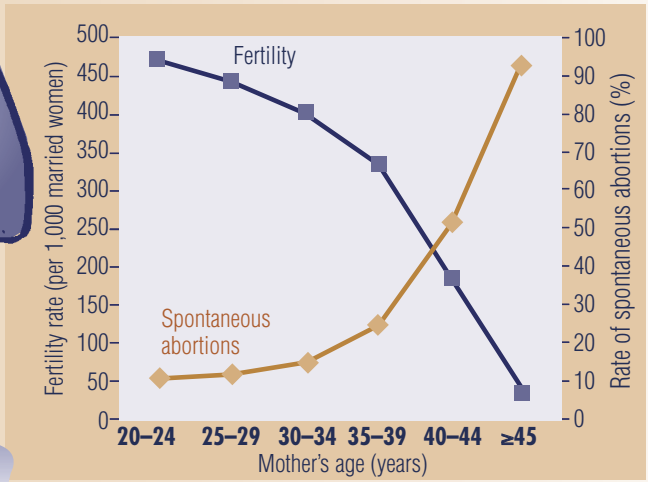
An unprecedented number of women are extending their reproductive years into their mid-30s and beyond, a trend that has implications for the health outcomes of older mothers and their infants. Not surprisingly, this trend also has implications for the health care system, including an increasing demand for services that assist human reproduction.

Ability to Have a Child

Infertility Associated with Aging

Because aging affects both the number and quality of a woman's eggs, her physiological ability to conceive a child and carry it to term declines with age.[1] While 91 percent of women are able to become pregnant at age 30, the proportion drops to 77 percent by age 35 and to 53 percent by age 40.[2] Embryos formed from the eggs of older women are also less likely to fully develop — one of the main reasons for spontaneous abortion (miscarriage). Miscarriage rates increase from about 10 percent in women 20 years of age, to more than 90 percent among women 45 years and older (see Figure 1).[3] Unlike women, some men remain fertile into their 60s and 70s; however, as men age, they may have problems with the shape and movement of their sperm, resulting in a slightly higher risk of sperm gene defects. They may also produce no sperm or too few sperm.[1]

Figure 1: **Fertility and Miscarriage Rates as a Function of Mother's Age**



Source: L.J. Heffner, 2004.[3]

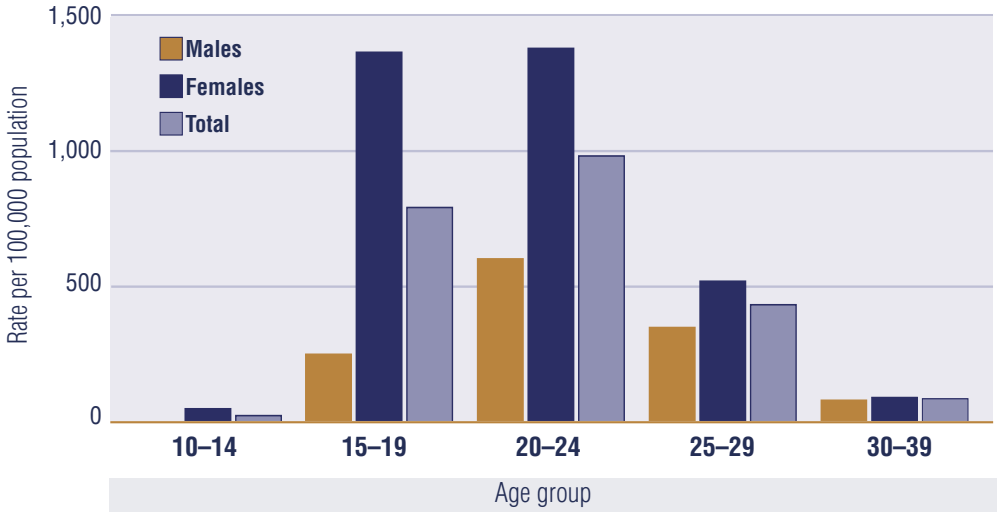
Acquired Infertility

Endometriosis, a condition in which tissue resembling the lining of the uterus is found elsewhere in the pelvis, can

cause infertility. The incidence of endometriosis increases with age, peaking at age 40.[4]

Research shows that relatively large numbers of young Canadians engage in risky sexual practices, such as having multiple partners and rarely or never using condoms.[5,6] These risky behaviours often occur under the influence of alcohol[7] and can result in the transmission of sexually transmitted infections (STIs). While the incidence rates of STIs in Canada were on the decline until 1997, that trend has reversed and rates of reportable STIs have continued to rise since then. For example, incidence rates of chlamydia and gonorrhea, which are responsible for a large proportion of *acquired* infertility, have increased by 65 percent and 60 percent, respectively, between 1997 and 2002. The rates are highest among young people, who have their reproductive lives ahead of them (see Figure 2).[8]

Figure 2: **Reported Rate of Genital Chlamydia, by Age and Sex, Canada, 2002**



Preliminary data.

Source: Sexual Health and STI Section, Community Acquired Infections Division, Public Health Agency of Canada.

In Canada, an estimated 50 to 70 percent of people infected with chlamydia are asymptomatic.[9] Therefore, it is likely that the reported number of STI cases represents only a fraction of the actual number of infections.[7] (For information on how the Public Health Agency of Canada is addressing STIs, please see *Who's Doing What?* on page 32.) Since persons with asymptomatic infections often go undiagnosed and untreated, they can infect their sexual partners. Women with untreated infections can develop pelvic inflammatory disease (PID), which may result in scarring and blockage of the fallopian tubes. The movement of eggs and sperm is then obstructed, and fertilization and/or proper implantation cannot take place.[10] Women who have had PID are at higher risk for ectopic pregnancy (occurring when the embryo implants itself outside of the uterus), which is a significant cause of maternal morbidity and mortality.[11] For example, it is estimated that 64 percent of tubal infertility and 42 percent of ectopic pregnancies are attributable to chlamydia.[12] A considerable proportion of female infertility is preventable, since both chlamydial and gonococcal infections can usually be diagnosed and treated.

In men, gonorrhea and chlamydia — especially repeated infections — can cause epididymitis, a condition of the testicles that can result in scarring and blocking of the sperm passage, and lead to impaired fertility if left untreated.[13-16] Environmental exposure to toxins or chemicals may reduce a man's sperm count either by directly affecting testicular function or by altering hormonal systems, although the specific environmental exposures involved and the extent of their impacts remain controversial.[16] Results from animal studies suggest that exposure to various organic and inorganic pollutants, commonly referred to as endocrine-disrupting substances (EDS), may potentially reduce sperm production in males.[17,18]

Physical and Mental Health Impacts

Most women who have children at age 35 or older have healthy pregnancies and healthy babies.[19] In fact, most older pregnant women who develop age-related complications still have successful pregnancies and births when they have careful prenatal and intrapartum care. However, older pregnant women and their offspring may face certain physical health risks, as described below. These risks may be even greater if pregnancy is achieved through the use of assisted reproductive technologies (ART).

Between 10 and 15 percent of all postpartum women[20-22] are affected by postpartum depression (PPD). While the literature suggests that PPD occurs

less frequently in older first-time mothers than in their adolescent counterparts, older first-time mothers may nevertheless experience difficulty in making the transition to parenthood, as described later on in this article.

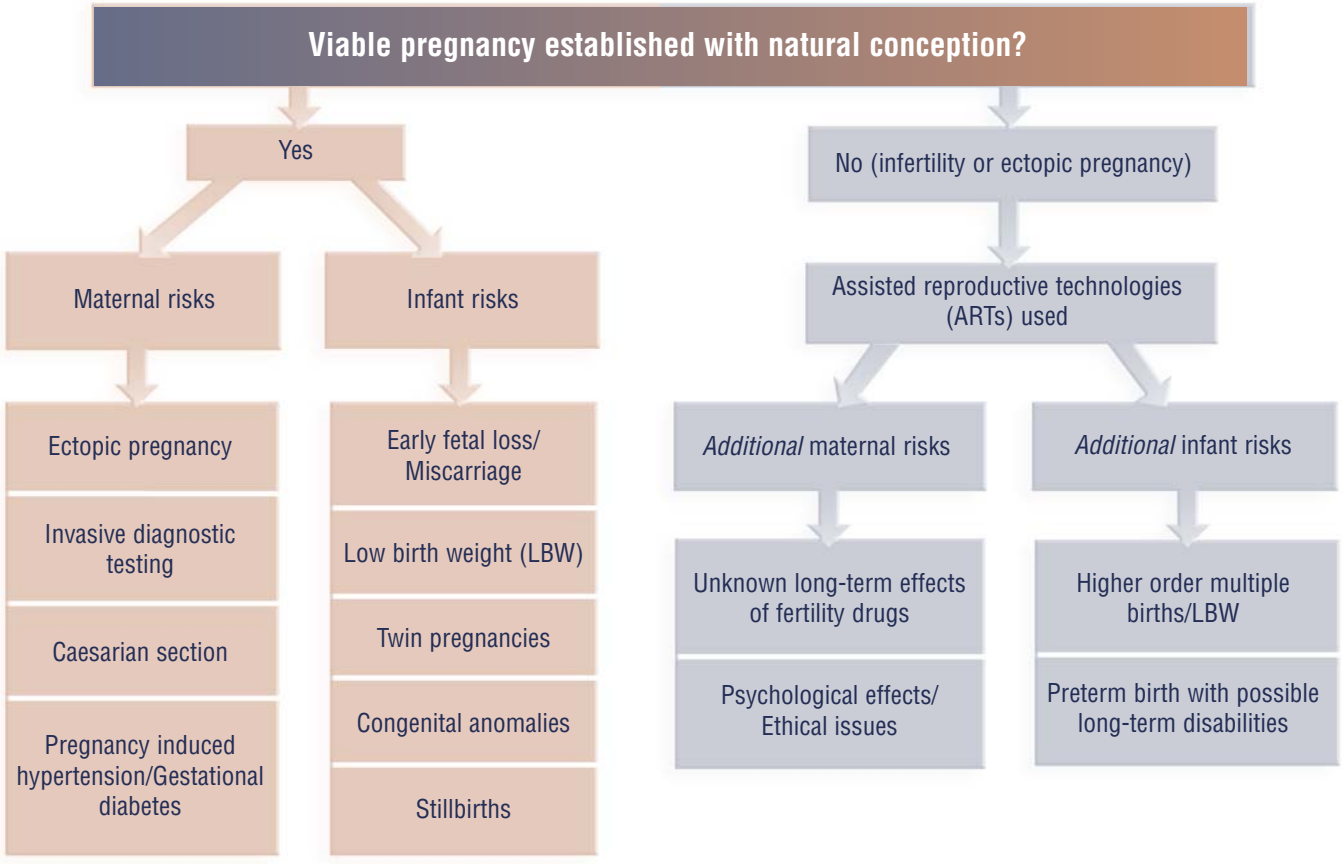
Physical Health

Figure 3 illustrates some of the physical health risks associated with pregnancy at older ages. Most of these risks do not appear abruptly at a specific maternal age, but rather increase with age.

The occurrence of pregnancy-induced hypertension after the 20th week of gestation (a condition known as pre-eclampsia) is strongly associated with fetal growth restriction, low birth weight, preterm delivery, respiratory distress syndrome, admission to neonatal intensive care and stillbirth.[23] A combination of careful risk assessment, screening at different stages of pregnancy and making pregnant women aware of the symptoms are necessary for the successful management of this condition. A pregnant woman with pre-existing diabetes, or one who develops diabetes during her pregnancy (gestational diabetes), must be carefully monitored throughout her pregnancy to prevent her fetus from receiving too much blood sugar, causing it to grow very large *in utero*. Oversized babies are at risk of birth injuries during vaginal delivery, so they must often be delivered by Caesarean section (C-section). Controlling maternal blood sugar levels reduces the risk of the newborn having breathing difficulties, low blood sugar and jaundice.[24-28] It is important that pre-existing chronic health problems such as hypertension and diabetes be well controlled *prior* to pregnancy, to the extent possible.

Recent research has raised questions about whether women who take certain fertility drugs for extended periods, as well as infertile women who take fertility drugs and do not become pregnant, may be at increased risk of developing ovarian cancer. These associations have not been proven, however, and more research is needed.[29] Powerful fertility drugs given in conjunction with some assisted reproductive technologies may result in ovarian hyperstimulation syndrome and/or high-order multiple pregnancies. Women who are carrying more than two fetuses may face the extremely

Figure 3: **Maternal and Fetal Risks Associated with Reproduction at Older Ages**

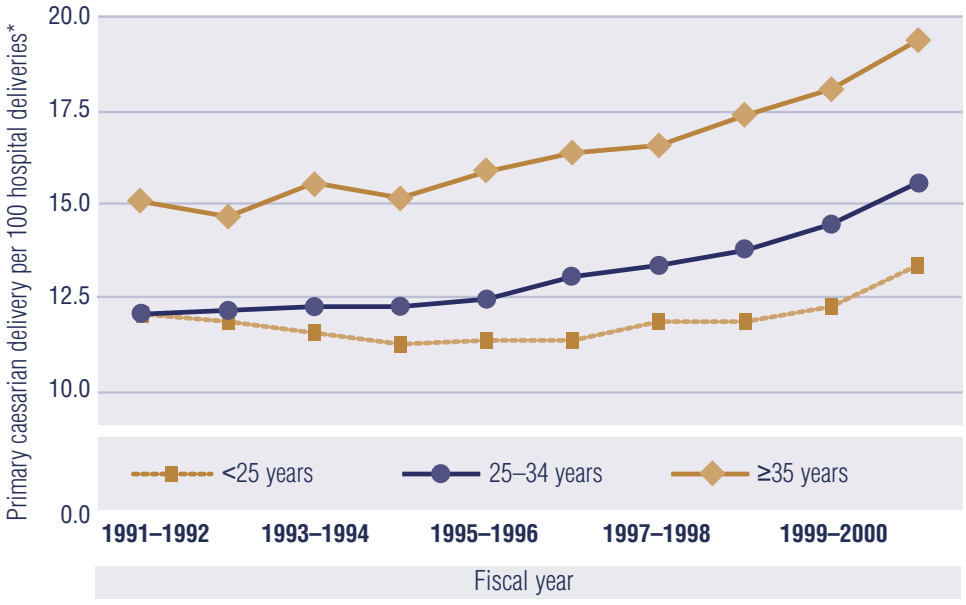


difficult decision of whether to undergo multifetal pregnancy reduction, in which the number of fetuses is reduced in order to protect the viability and health of the remaining fetus(es).

One Canadian study showed that first-time mothers aged 35 years and older were 83 percent more likely to have a C-section than their 20- to 29-year-old counterparts.[28] The relationship between maternal age and primary C-section delivery is clearly illustrated in Figure 4.[11] Some of the reasons for high C-section rates in older mothers are maternal diabetes, prolonged labour and multiple births. (Twin births increase with maternal age and older mothers who conceive with the assistance of fertility drugs and/or ARTs often have multiple births.) Post-caesarean mothers are at higher risk of developing an infection than women who deliver vaginally, and are at increased risk for subsequent ectopic pregnancy or stillbirth, serious problems pertaining to the placenta, or uterine rupture.[30,31]

One Canadian study showed that first-time mothers aged 35 years and older were 83 percent more likely to have a C-section than their 20- to 29-year-old counterparts.

Figure 4: **Rate of Primary Caesarian Delivery, by Maternal Age, Canada, 1991–1992 to 2000–2001**



*Excludes hospital deliveries with unknown maternal age.

Source: Health Canada, Canadian Perinatal Health Report, 2003.[11]

Mental Health

Postpartum mood disorders, such as "baby blues," PPD and postpartum psychosis, have been described as the "most frequent form of maternal morbidity following delivery."[32] While increased attention has been paid to these disorders in recent years, much of the literature remains inconclusive about their causes. PPD deserves particular attention because it is more common than generally recognized and can have serious consequences for the mother, her child, partner and family.[33] PPD causes significant distress for the mother, including irritability, sadness, insomnia, lack of appetite, disturbance of concentration and loss of libido.[34] Furthermore, disturbed mother-infant attachment may adversely affect the cognitive, social and emotional development of the child.[35,36]

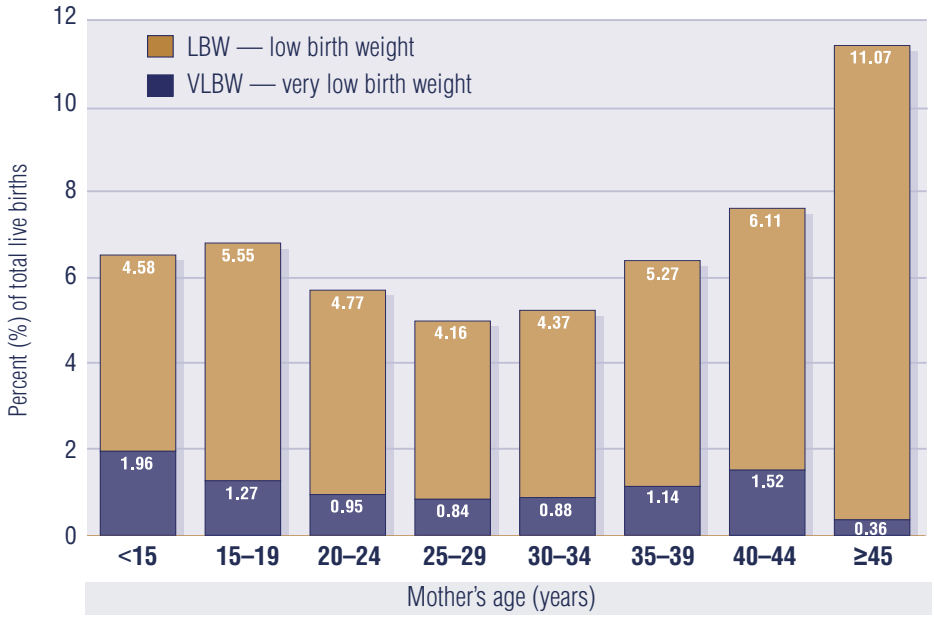
There are many psychosocial stressors that contribute to PPD, such as stressful life events, unemployment, marital conflict and lack of personal support from one's spouse, family and friends.[35] These stressors can affect women at any age, but the literature suggests that certain factors inherent to the very young (<20 years), such as less schooling, lower self-esteem, lower occupational levels, lower socioeconomic status and less social support, may make adolescent mothers more vulnerable to PPD.[37] In fact, a 2002 U.S. study found that the occurrence of PPD among teenage mothers was 2½ times that of older mothers (30+ years).[20] Older first-time mothers generally have higher educational attainment, higher occupational levels and higher socioeconomic status than their younger counterparts.

A study of birthing experiences of women found that women aged 35 and older were more likely than their younger counterparts (aged 20 to 29) to believe their baby's life could potentially be at risk during

labour and delivery.[38] However, these concerns did not necessarily lead to negative consequences for the childbirth experience, nor was their emotional well-being in the postnatal period adversely affected.

Some studies have found that older mothers may have unique stressors arising from their perception of age-related biophysical risk and their expectations of motherhood, which may affect how easily they make the transition to parenthood,[38,39] and suggest that this age group may experience the transition to parenthood differently than younger first time mothers. Early detection of older first time mothers with high expectations of themselves as mothers, lower satisfaction in parenting and inadequate social support systems would allow for appropriate interventions.[39]

Figure 5: **Percentage of Birth Weights below 1,500 g (VLBW) and 1,500–2,499 g (LBW), by Mother's Age Group, Canada, 2000**



Source: Statistics Canada, Canadian Vital Statistics System, 2000.

Infant and Child Health Impacts

Birth Weight

Birth weight is one of the most important indicators of infant health. The distribution rates of both low birth weight (LBW — under 2,500 g) and very low birth weight (VLBW — under 1,500 g) are U-shaped, with the lowest rates occurring between the ages of 25 and 34, and higher rates at under 20 years of age and especially for those over 40[40] (see Figure 5). Low birth weight results from preterm births or intrauterine growth restriction, or both. Preterm births are on the rise in Canada — an estimated 7.6 percent of babies were born prematurely in 2000, compared to 6.6 percent in 1991.[11] In part, this is due to an increasing number of multiple births, which can be a consequence of both maternal aging and ART. LBW and VLBW can cause immediate problems such as respiratory distress syndrome and lifelong health, respiratory and neurological complications, including cerebral palsy.[11,41,42]

Caesarean Section

Babies born by C-section have a higher risk of respiratory distress[31,32] following birth and difficulties initiating breastfeeding.[31]

Congenital Anomalies

The older a pregnant woman is, the higher is her risk of carrying a child with a chromosomal anomaly. For example, the risk of carrying a child with Down syndrome increases from 1 in 1,667 live births when the mother is 20 years old, to 1 in 30 live births when the mother is aged 45.[3] For this reason, older mothers are more likely to undergo prenatal screening to determine if the fetus is at increased risk for a congenital anomaly. If the screen is positive, subsequent diagnostic testing will determine whether the fetus is actually affected by the anomaly.[43] The invasive nature of some types of diagnostic testing may result in miscarriage. Parents whose child is confirmed to have a congenital anomaly face extremely difficult options.

A recent large Swedish study found that children born to fathers who are older than 30 years have a greater risk of developing schizophrenia later in life. This association was true for offspring without a family history of schizophrenia, leading the authors to attribute the increased risk to a new genetic mutation in the paternal sperm prior to conception.[44] Advanced paternal age also increases the risk of autosomal dominant diseases, such as achondroplasia and Marfan syndrome, which also appear to result from new genetic mutations in the sperm.[3] In addition, some studies suggest

that children born to women over 40 years and/or fathers over 35 years may be at higher risk of certain congenital heart defects.[43]

Implications for the Health Care System

The trend toward reproductive delay has a number of implications for the health care system, many of which relate to the increased demand/requirement for special services that assist pregnancy and birth.

Assisted Reproductive Technologies

The three major categories of ART are: in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI); donor insemination; and artificial insemination with the partner's sperm. There has been a steady increase in the demand for ART over the past 25 years.[45] Many ART procedures are not publicly insured, so their high costs are borne privately. However, the publicly funded health care system bears the costs of multiple births resulting from the use of these technologies, in the form of prenatal hospital care for mothers who carry multiple fetuses as well as neonatal care for multiple birth neonates who are born prematurely. Babies with low birth weight have longer lengths of stay in neonatal wards than do normal birth weight babies. Furthermore, the higher prevalence of chronic health problems in LBW and VLBW children creates long-term demands on the health care system.

Despite the challenges associated with pregnancy at older ages, the availability of publicly funded prenatal and intrapartum care in Canada results in healthy mothers and babies in the vast majority of pregnancies. However, there is a need for the health care system to improve surveillance, education and treatment on a number of fronts.

Prenatal Testing

The trend toward advanced maternal age has increased the demand for prenatal testing procedures. Because these services are publicly insured, they place additional demands on health care system resources across the country.

Caesarean Deliveries

As described earlier, women aged 35 and over have a higher likelihood of undergoing a caesarean delivery. Due to the increased health risks to mother and baby, and to longer hospital stays, these deliveries can translate into higher than average maternity costs to the health care system.

Conclusion

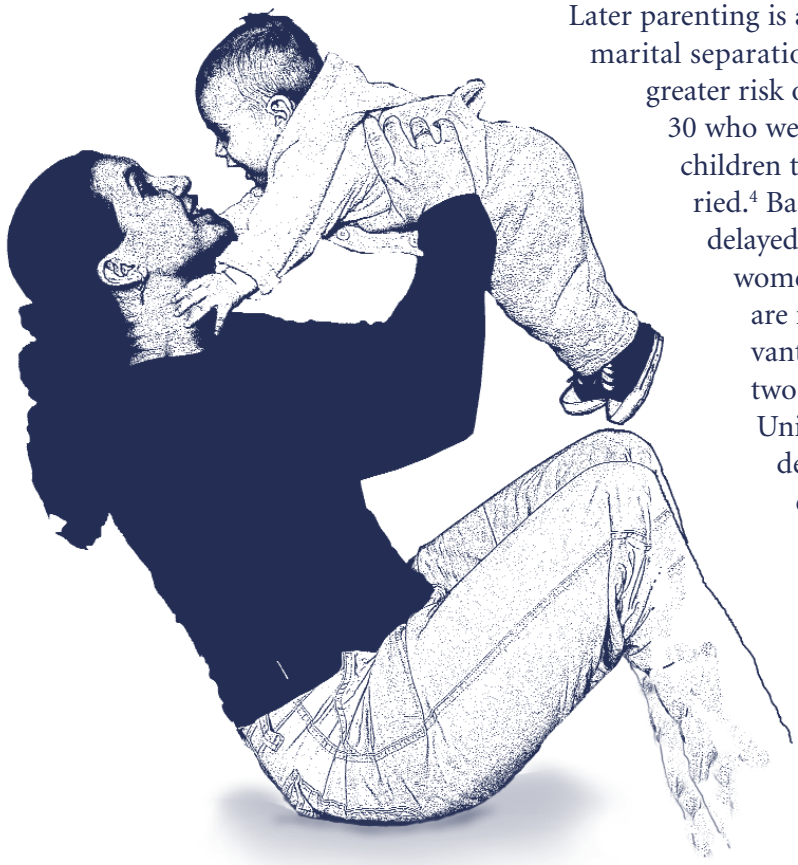
Despite the challenges associated with pregnancy at older ages, the availability of publicly funded prenatal and intrapartum care in Canada results in healthy mothers and babies in the vast majority of pregnancies. However, there is a need for the health care system to improve surveillance, education and treatment on a number of fronts. For example, health promotion and protection resources should focus on the prevention, detection and treatment of STIs in young people in order to prevent acquired infertility. In addition, there is a need for surveillance of use patterns for assisted reproductive techniques, and maternal and infant health outcomes of ARTs. Moreover, medical professionals should watch for early signs of PPD in women of all ages and ensure that affected women are referred for assessment and appropriate treatment.

@ *Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.*

The Net Effects of Delayed Reproduction

Roderic Beaujot, *University of Western Ontario*

Fertility trends have health implications at both the individual and population levels. This article points out some of the advantages and disadvantages associated with delayed reproduction and fewer births at the individual level. For instance, while delayed reproduction brings an increased risk of low birth weight and infertility, it often means that parents have more resources available. At the societal level, the family trends and population aging associated with later childbearing, low fertility and increased lone parenthood can contribute to growing disparities.



At the Individual Level

As the article on page 15 shows, the trend toward later childbearing is associated with maternal and child health risks, such as low birth weight. On the other hand, women who have children later in life typically pursue more economic opportunities and, as a result, their children have the advantage of more parental resources (see article on page 11).

The delay in family life transitions — that is, leaving home, forming relationships and childbearing — allows young people to establish themselves in the labour force and to attain more financial stability before starting a family.[1] Based on data from the 1998 *Survey of Labour and Income Dynamics*, Drolet[2] found that the wage advantages associated with delayed parenthood have increased for younger generations of mothers. Controlling for other factors, the wages of women who have their children later in life do not differ from those who have no children. However, women who have their children earlier than the norm for their level of education, field of study, urban community size and birth year, have lower average wages. In particular, women who delay childbirth accumulate more years of full-time work experience.[3]

Later parenting is also associated with a lower likelihood of marital separation, whereas early parenthood presents a greater risk of lone parenthood. Women under the age of 30 who were formerly married are more likely to have children than those who are single, cohabiting or married.[4] Based on census data, Lochhead concluded that delayed childbearing is more pronounced among women who have a university education and there are increasing income differentials to the disadvantage of younger first-time mothers, even in two-parent families.[5] Using data from the United States, Martin found that people who delay having children and who have higher education levels are more likely to raise their children in intact marriages, while those having children early are more likely to raise them outside of marriage.[6] Bianchi[7] characterizes one group as able to take advantage of parental investment from both mothers and fathers,

and the other as more likely to have fathers who are absent and mothers with less time and resources to invest in their children. Children born from mature parents are more likely to have the advantages of a mother with greater human capital, along with the presence of a father in a dual-income family.

This contrasts with the greater likelihood of lone parenthood for those who have children early. From these findings, it appears that delayed childbearing results in advantages for individual adults and their children. While there is a higher incidence of low birth weight as mothers age, this is likely countered by greater availability of resources among older parents.

In the Long Term

However, delays in childbearing result in a higher proportion of individuals with no children or fewer children than they expected. While only 6.5 percent of people aged 20 to 29 indicated they did not expect to have children, in reality, approximately 15 percent of Canadians do not have any children, perhaps as a result of difficulty in establishing a secure relationship and economic stability. Similarly, although most people in the 20 to 29 age group expect to have more than two children,[8] it estimated that women born in 1970 will have an average of only 1.69 children by the time they complete their childbearing years.[9] This compares to an average of 1.95 children to women born in 1950.

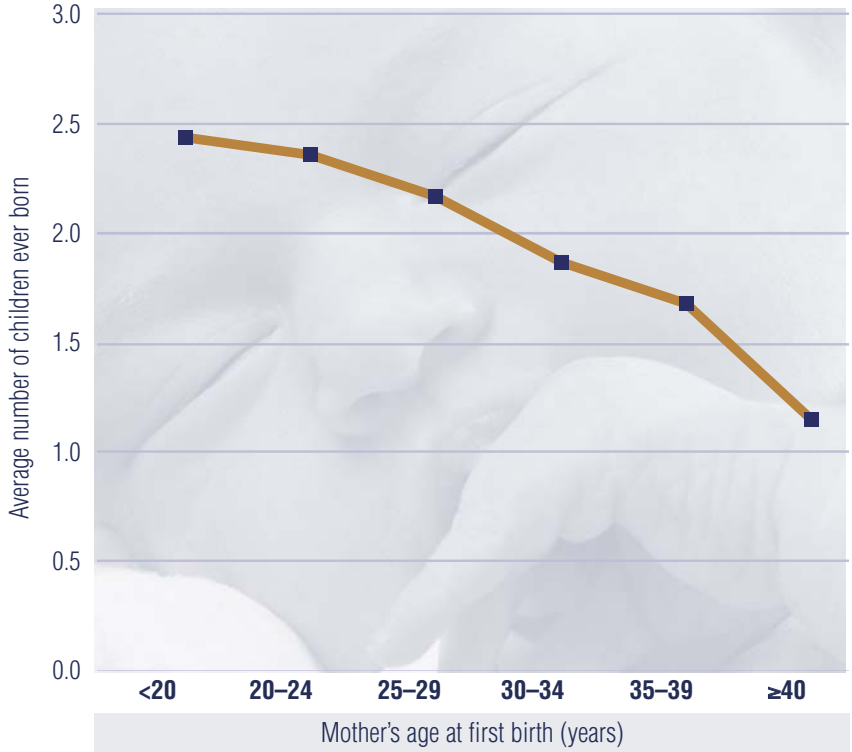
The experience of having no children, or fewer than intended, may lead to psychological frustrations as women and men are prevented from achieving their life goals. Caldwell and Schindlmayr[10] concluded that children provide a unique fulfilment, build up a network of relationships for parents and provide a source of support in later age. People without children may lack these supports and associated health benefits. While most elderly people today are not economically dependent on their children, the frail elderly may rely on children for social support. More research is needed in this area — despite a universal health care system, private care is important in the lives of many elderly persons.

At the Population Level

As noted in the article on page 7, the fertility and family trends since the mid-1960s have been interpreted as a "second demographic transition." This transition has been marked by various family changes, especially a greater flexibility in the entry and exit from unions. Another characteristic of the second demographic transition is the shift to more individualistic values. For instance, Nevitte[11] documents greater permissiveness, tolerance and a more egalitarian orientation. Changes such as these, which make families more varied and flexible, have prompted further declines in fertility, delays in childbearing and a higher proportion of children living in lone-parent or blended families. These phenomena are linked, since later childbearing is associated with fewer births. As Figure 1 demonstrates, the later the first childbirth, the smaller the average number of children.

Lesthaeghe and Neels[12] argue that the second transition has undermined social cohesion. Given the greater importance accorded to individual autonomy, the

Figure 1: **Average* Number of Children Ever Born, by Mother's Age at First Birth, Canada, 2001**



*Weighted averages
Note: N=1,861 women aged 45–54 in 2001 who had had at least one child.
Source: Statistics Canada, 2001 General Social Survey.

second demographic transition is characterized by a weaker role for families in establishing social ties, a diversity of family types instead of the one-family model based on intact marriages, and childbearing largely seen as a means of individual gratification.[13,14]

Children can be a source of cohesion as they provide an enduring interpersonal link, particularly when other relationships are less stable.[15,16] At the same time, there are competing sources of cohesion, both at work and in the community. For some people, finding self-fulfilment does not include having children.[17]

Increase in Lone-Parent and Reconstituted Families

Basing their findings on the 1995 *General Social Survey*, Heuveline et al.[18] calculate that 8.3 percent of children are born to mothers who are neither married nor cohabiting. By age 15, 34.5 percent of children have experienced living in a household without both biological parents. Given the greater likelihood of disadvantages for children in lone-parent and step-parent environments,[19] these trends in family patterns can have a negative impact on children's health and well-being.

Children in lone-parent and blended or reconstituted families experience a range of circumstances. For example, one of the biological parents in the previously intact family may have been a net negative in terms of transfers to the child, and the child's well-being may be improved in a one-parent environment. Also, some step-parents may provide more resources than the average biological parent. However, at the population level, the average transfers to children are reduced when they live with one parent, and informal or step-parents may bring fewer transfers to the children of their spouse.[20]

Population Aging

The most significant social trend linked with the lower fertility and delayed reproduction of the second demographic transition is population aging. When the trend towards low fertility began, issues of aging and eventual population decline were not seen as particularly significant, partly because of the long timeframe involved. Canada's below-replacement fertility levels were first evident in the early 1970s; however, with relatively few elderly and a large number of people in their reproductive years, the population was still growing. Nonetheless, a population with a fertility rate of below two births per woman will eventually have more deaths than births. In Canada's case, this is likely to occur sometime shortly after 2025.[21] While immigration helps to postpone population decline, it has little effect on age structure and cannot prevent population aging.

The most significant social trend linked with the lower fertility and delayed reproduction of the second demographic transition is population aging.

In her 1986 assessment, McDaniel[22] painted a favourable picture of population aging. She observed that many of the causes of population aging are "good," such as control over childbearing, more diversified opportunities for women, and increasing lifespans. At first, population aging occurred "at the bottom," with a reduction in the number of young people. This was liberating for adults as it gave many the advantage of fewer young dependents. Since then, the baby boom generation has aged, but this has been experienced as a "demographic bonus" as it meant that a larger proportion of the population was in the labour force and able to pay the taxes required for health benefits. After 2011, however, Canada will experience significant "aging at the top," meaning fewer people in the labour force and a growing number of frail elderly and people requiring costly medical and other care as they near the end of their lives.[23]

The implications of population aging are complex and multifaceted. Lutz and his colleagues,[24] have identified a number of concerns related to aging and population decline, including: challenges to social security and health systems; more difficult productivity gains; strained relations among generations who are contributors or receivers of public pension programs; and diminished social cohesion if societies have difficulty incorporating larger numbers of immigrants. There are also issues associated with caregiving to a large proportion of the population, including the gendered nature of caring activities, where women typically carry a greater share of the burden.

The Net Effects of Delayed Reproduction, *continued on page 39*

Understanding VARIATION:

Fertility Trends in Some Canadian Sub-Populations

Sari Tudiver, *Bureau of Women's Health and Gender Analysis, and* **Linda Senzilet**, *Policy Division, both of the Health Policy Branch, Health Canada*

The authors would like to acknowledge the input of Susan Taylor-Clapp, Health Information and Analysis Division, First Nations and Inuit Health Branch, Health Canada, and Mark Wheeler and Derek McCall, both of the Policy Division, Health Policy Branch, Health Canada.

Underlying Canada's overall fertility patterns are variations across sub-populations. This article explores some of these variations in different regions of the country, as well as among immigrants and First Nations peoples.

Introduction

Aggregated data tend to mask the particularities of local economies and cultures, and the impacts that social policies have within geographic regions. To better understand the determinants of broad trends in decreased fertility and delayed first childbirth, we need to know how factors such as geographic location, ethnocultural background and socioeconomic conditions affect reproductive decisions and behaviours. The following examples are drawn from geographic, immigrant and First Nations sub-populations to illustrate a few of the complexities in fertility rates.

Geographic Variation

Although there is some interprovincial variation in total fertility rates (TFRs), rates across the country have been falling for decades and have generally been below the replacement level of 2.1 for the last quarter century. Although Québec is commonly thought to have the lowest fertility rates in Canada, since 1991[1] its rates have been comparable to the other two largest provinces, Ontario and British Columbia, while Newfoundland and Labrador has had the lowest TFR. As Figure 1 shows, the lowest TFRs in 2002 were in Newfoundland and Labrador, Nova Scotia, British Columbia, New Brunswick, Québec and Ontario, with the highest rates in the Prairie provinces and the three territories.[2]

Why the Variation?

Figure 2 illustrates the strong relationship between 2002 provincial TFRs and 2001 provincial employment rates, suggesting that being employed may be an important consideration in having a child.

Periods of "boom and bust" can affect decisions to bring a child into the world. For example, the fact that Newfoundland and Labrador had the lowest total fertility and employment rates of all provinces in 2002 may reflect, among other factors, the closure of most of Atlantic Canada's cod fisheries in the 1990s, causing 30,000 men and women in that province to either lose their jobs or to have substantially reduced incomes.[3]

Cultural diversity may also contribute to differences in TFRs. For example, the high fertility rates in the Prairie provinces are believed to be due, in part, to the greater number of young Aboriginal women, who tend to have higher fertility rates than women in Canada overall.[4] As Figure 2 shows, the TFRs for Saskatchewan and Manitoba are higher than what might be expected, given their respective employment rates.

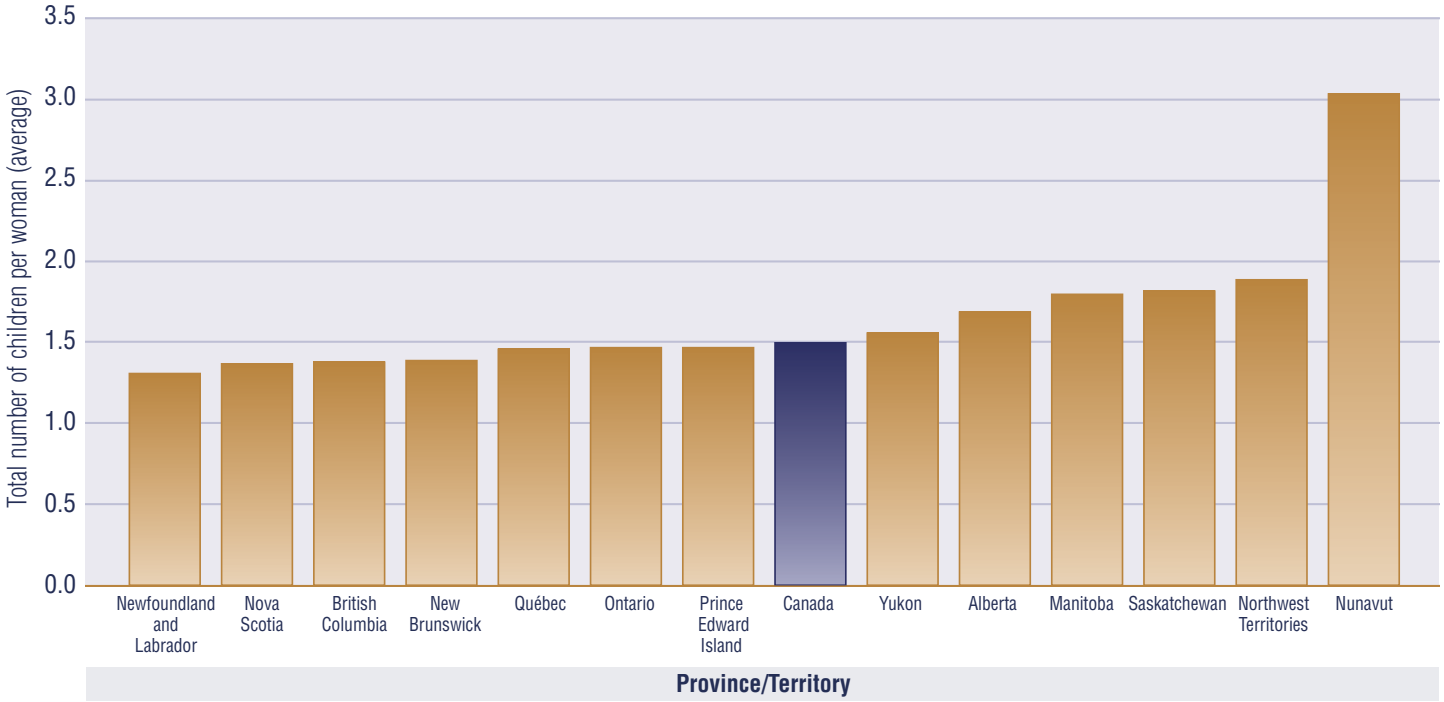
Understanding other reasons behind provincial variations requires an appreciation of the histories of demographic transitions within specific geographical regions. Québec offers a striking example of the complex dynamics of demographic transitions.[5]

While the size of rural families declined throughout the 20th century as a result of increasing industrialization and urbanization, Québec's TFR remained the highest of any Canadian province as late as the 1950s. The transformations of the Quiet Revolution in the 1960s modernized the economy, expanded and secularized the education system, provided greater employment opportunities — especially for women — and saw a decline in Church authority, notably in the areas of marriage, divorce and contraception. As well, the province established an infrastructure of health and community social services.

From the mid-1960s to the mid-1970s, Québec's TFR was the lowest in the country, and by the mid-1980s it was one of the lowest in the world at 1.4 children per woman.[6] By this time, the Québec government had recognized the rights of children born outside marriage and had provided access to contraception, among other legislative reforms. Changes in Québec's TFR can be explained in the context of these transformations, including a shift in dominant beliefs and attitudes about gender roles, marriage and reproduction, which was due in part to the province's women's movement.

In 1988, the Québec government introduced the "Allowance for Newborn Children," a non-taxable child benefit designed to reverse the decline in provincial birth rates. These birth allowances increased in value with each successive child born to a family. Although the fertility rate increased over the next few years (to 1.65 children per woman in 1992), the rate had fallen

Figure 1: **Total Fertility Rates (TFRs), by Province and Territory, Canada, 2002**



Source: Statistics Canada, Vital Statistics.

to just over 1.5 by the time the program was terminated in 1997.[6,7] This policy intervention appears to have had only a small and temporary impact, which was more than offset by other factors.

Trends among Immigrants

A variety of cultural, socioeconomic and sociopolitical forces shape the lives of Canada's immigrants. Women and men come with beliefs and desires about fertility and reproduction that may or may not be realized in Canada. Age at immigration, access to reproductive health services, employment and financial circumstances,[8] and the extent of familial social supports in Canada may all influence decisions about the number of children immigrants will have.

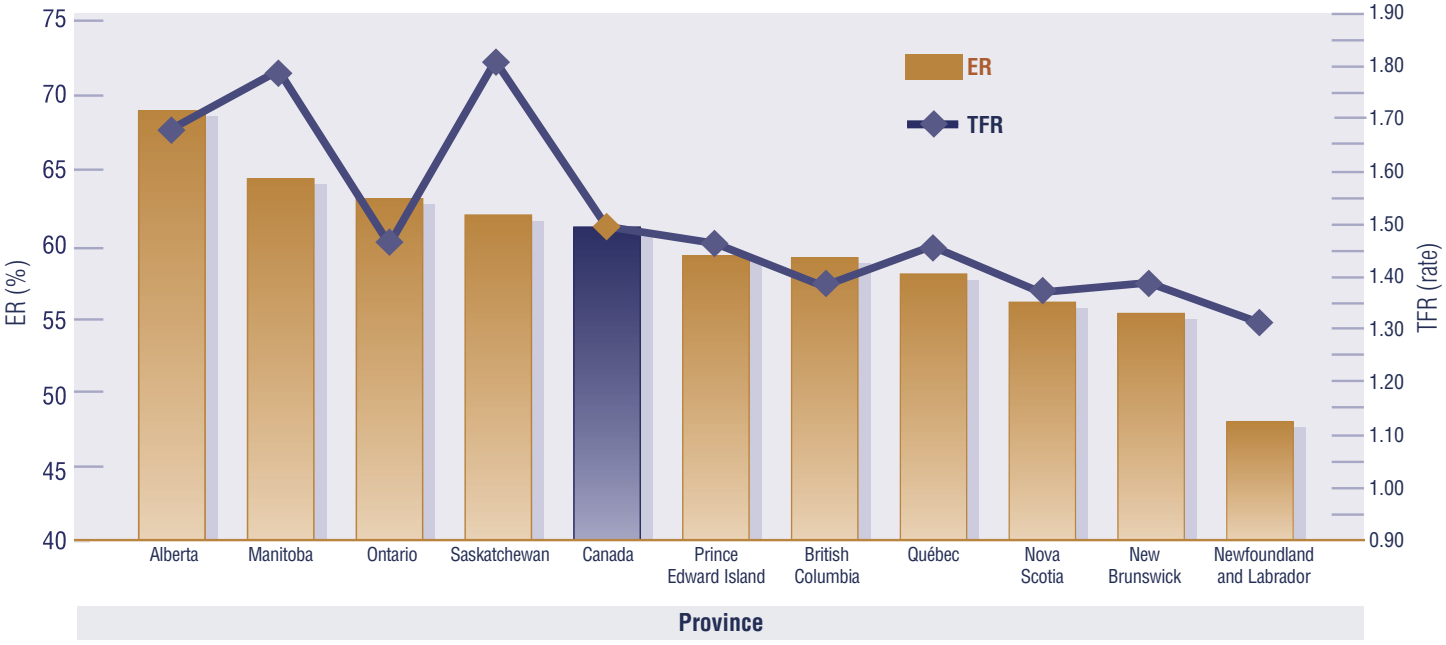
Since the late 1980s, Canada has increased the number of immigrants, in part to help offset the effect of low fertility rates. For example, immigrants accounted for nearly 70 percent of Canada's population growth in 2001. The contribution of immigrants to population growth in Canada is cumulative, since many immigrants are young and start families once they have settled in this country.[9]

A variety of cultural, socioeconomic and sociopolitical forces shape the lives of Canada's immigrants. Women and men come with beliefs and desires about fertility and reproduction that may or may not be realized in Canada. Age at immigration, access to reproductive health services, employment and financial circumstances, and the extent of familial social supports in Canada may all influence decisions about the number of children immigrants will have.

However, the longer an immigrant female lives in Canada, the more likely her fertility pattern will come to resemble that of a woman who has been born and raised in Canada. This convergence of fertility rates is more marked among women who immigrated to Canada before the age of 15.[9]

One study that followed fertility rates over 25 years found that TFRs dropped by 10 percent for both immigrant and Canadian-born women (from 2.03 to 1.82 for immigrant women, and from 1.64 to 1.47 for Canadian-born women).[9] Since immigrants are not a homogeneous group, it is not surprising that significant differences were found in TFRs, depending on country of origin.

Figure 2: **Relationship between Provincial Employment Rates (ERs)* (2001) and Provincial Total Fertility Rates (TFRs) (2002)**



*The ER is the number of persons employed expressed as a percentage of the population aged 15 and over.

Source: Statistics Canada, Labour Force Survey (ER), and Vital Statistics (TFR).

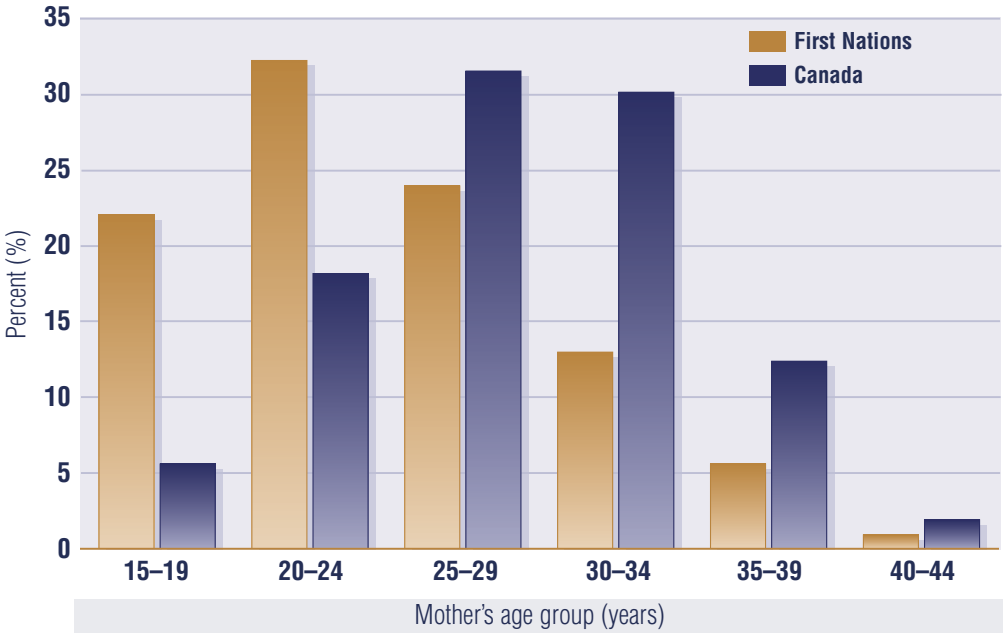
First Nations Trends

Registered Indians living on and off reserve are also experiencing a decline in TFRs.[10] Over the last several decades, the TFR for First Nations dropped from 4.4 children per woman in 1974 to 3.2 children in 1990 and 2.9 children in 2000. It is projected that the TFR for this group will remain above the replacement level of 2.1 until at least 2021.[11]

Many First Nations women begin having children at a younger age than do women in Canada overall. In 2000, 22.1 percent of First Nations babies were born to women aged 15 to 19, compared with 5.6 percent of all babies born in Canada in 1997 to mothers in this age group. Similarly, in the 20- to 24-year-old age group, the proportions were 32.3 percent and 18.2 percent, respectively.[12,13] In contrast, a higher percentage of babies was born to all women in Canada aged 25 to 29 and 30 to 34 than to First Nations women (see Figure 3). Although reproductive delay is not currently a First Nations phenomenon, it is unclear whether the trend toward delayed first birth, which exists in the general population, will be prevalent in the future. As First Nations women and men achieve higher educational and income status, they may choose to delay childbearing.

Because First Nations people are very diverse in their culture, geographical location, status of self-government and economic development, fertility trends must be interpreted in the context of specific circumstances. As well, the high value placed on children as the future of First Nations communities and current initiatives to ensure better access to birthing and health services may influence future reproductive trends.[14-16]

Figure 3: **Percentage of Live Births, by Age Group of Mother, First Nations (1999) and Canada (1997)**



Note: First Nations data exclude Québec; Canadian data exclude Newfoundland and Labrador.

Sources: Health Canada, First Nations and Inuit Health Branch in-house statistics; and Canadian Perinatal Health Report, 2000.[13]

Although reproductive delay is not currently a First Nations phenomenon, it is unclear whether the trend toward delayed first birth, which exists in the general population, will be prevalent in the future. As First Nations women and men achieve higher educational and income status, they may choose to delay childbearing.

A Final Note

Although fertility patterns with respect to other types of diversity, such as religious and urban/rural diversity, have not been addressed in this article, they warrant study. In addition, there needs to be greater understanding of the different factors influencing reproductive decisions among women and men from Canada's different sub-populations. As this article suggests, overall trends in fertility rates tend to hide variations. Sub-analyses are necessary to determine effective policy responses to the specific needs of sub-populations and, where appropriate, to plan targeted health and social services for meeting those needs.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.

Policy Implications of Delayed Reproduction and Low Fertility Rates

Mark Wheeler, *Policy Division, Health Policy Branch, Health Canada*

Do delayed reproduction and low fertility rates present a problem for Canada? If so, what can be done about them? The author reviews the evidence, makes a case for why we should be concerned and suggests possible policy directions to meet the challenges posed by these phenomena.

Why Should We Be Concerned?

In an earlier article (page 21), Roderic Beaujot describes the link between an aging population, delayed reproduction and low fertility. These phenomena could well cause Canada to face serious labour market challenges in about 10 years, which, if not offset through increased labour productivity, could lead to a decline in the rate of growth of real Gross Domestic Product (GDP),[1] a lower standard of living, and an insufficient tax base needed to sustain social programs such as universal health care.[2]

In the article on page 11, Clarence Lochhead documents one of the key population level impacts of delayed reproduction, namely, the increasing disparities in the educational and economic circumstances of "younger" and "older" first-time parents. Such economic disparities *may* portend a more stratified Canadian society, which could impact upon the health status gradient, described earlier by Phyllis Colvin (see interview on page 3).

What Underlies the Problem?

The First and Second Demographic Transitions

Economic change was at the heart of the first demographic transition. The average fertility rate fell from 6.6 children per woman in 1851, when farm life was the norm in Canada, to 4.6 in 1901, after people began moving to cities in search of economic opportunity. In 1921, after school attendance until the age of 16 had been made mandatory and child labour laws had been enacted, the fertility rate fell to 3.5 children per woman.[3] Clearly, children were losing their economic value to the family unit.[4]

6.6 children per woman in 1851, when farm life was the norm in Canada

4.6 children per woman in 1901, after people began moving to cities in search of economic opportunity

The second transition began as women claimed a greater role in society and became less inclined to raise large families. Two of the factors that contributed to this trend were the increasing opportunities for women to obtain higher education and then pursue careers, and the ever-increasing cost of raising and educating children.[5]

Many of our social institutions and social policies have yet to catch up with the demographic transitions, since we have not had the "institutional transition" that is analogous to the introduction of a public education system. Such a transition could ensure that the apportionment of the costs of human capital formation between families and society at large aligns with our societal needs and aspirations, and is commensurate with the costs, and opportunity costs, of having children.

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Stalled Life Course Transitions

Parental age at first childbirth is explained by the number and timing of a variety of life course transitions.[4] Between the two World Wars, transitions to adulthood and parenthood — completing education, entering the work force, leaving home, establishing a union and starting a family — were compressed into a relatively short period of time. Today, life course transitions may be more numerous, and trajectories — which life course transition precedes what — may be more varied, given increased educational requirements and the trend toward entering and leaving multiple relationships prior to establishing long-term unions. Transitions may take longer, especially as regards the (normatively preferred) imperative to secure a good job prior to contemplating a union. As Sari Tudiver notes earlier (page 7), for women, higher education, career aspirations and the all too frequent inability to achieve work-life balance further inhibit family formation.

Women with a university degree have better labour market prospects and are not as likely as their less educated counterparts to have a child.[5,6] The opportunity cost of having children is higher among university-educated Canadian women in couples, in that they work longer hours, work more weeks of the year and earn more than their less educated counterparts. For Canadian men, higher education delays fatherhood; however, after controlling for other factors, higher income enables fatherhood because union formation occurs sooner.[7]

Figure 2 in the article by Sari Tudiver and Linda Senzilet (page 24) demonstrates an association between employment and fertility: by and large, babies are born where the jobs are. It does not, however, explain why British Columbia's fertility rate is almost as low as that of Newfoundland and Labrador, and it does not provide insight into which life course transitions are delayed, and why. Considering, though, that student debt levels are highest in Newfoundland and Labrador, and that mortgage debt is highest in British Columbia,[8] it could be that debt and the unavailability of good jobs are delaying home leaving in the former, while housing costs might help explain why fatherhood is delayed most in the latter.[7] While more research is needed to understand stalled transitions, it seems clear that the story will differ between regions.

Housing costs, the pursuit of higher education, the servicing of student debt, experimenting with relationships prior to forming a union and the unavailability of good jobs all help explain, to varying degrees, the delay in home leaving, arguably one of the most important transitions to adulthood and independence. In 2001, 41.1 percent of Canadians aged 20 to 29 were still living with their parents, compared to 27.5 percent two decades earlier.[4] In Europe, the average age at home leaving ranges from the mid-20s in Italy and Spain to 20 years in Sweden. It would appear that home leaving is facilitated in countries such as Sweden where there are greater social transfers to young people.[4]

The Economy and Earnings

In 1971, only 44 percent of families had two incomes, but by 2000, 62 percent of families had two incomes.[9] A study of Canadian couples between 1980 and 2000 (where the man was between age 25 and 54) found that the *average* annual earnings of the men rose by 2 percent in constant dollars, while *median* annual earnings dropped by 6 percent,[10] suggesting that the majority of those men had declining annual earnings.

Men aged 35 to 44 with a university degree who were married to women who also were university graduates benefited the most, while men in all age categories with no more than high school education lost significant financial ground.

Increased labour force participation by female lone parents led to some of the largest percentage gains in family earnings between 1989 and 2001,[11] although some of these gains appear to have been lost in the following year.[12]

What, if Anything, Can We Do?

What can be done about the higher dependency ratios that the baby boom, increased life expectancy and sub-replacement total fertility rates (TFRs) have generated? Three possibilities include: accepting the very real possibility of a lower standard of living (if higher productivity per worker does not compensate for a proportionately smaller work force); promoting higher immigration levels in order to replace workers who will retire during the coming decade; and implementing policies that seek to reverse the decline in TFR.[13] Pursuit of any or all of these scenarios would require debate on the merits of a "Population Policy for Canada," to arrive at some consensus on desired population size and on strategies for achieving it.

Québec's Allowance for Newborn Children (1988 to 1997) appears to have had greater influence on the occurrence of third births than on first births.[6,14] It is not clear, however, how much of Canada's fertility decline can be attributed to "missing" first births (i.e., women not having any children) versus "missing" third and higher order children. Sweden (see text box) and France also found that incentives contributed to higher fertility, and it appears that the impact on parity was the same as in Québec.

In Canada overall, while the rate of second and third and higher births have remained largely unchanged over time, the rate of first births has been more volatile.[6] By and large, the literature is silent on the characteristics of childless families. More research is needed to study the extent to which infertility, as well as the various socioeconomic characteristics of childless couples (including the extent to which people of reproductive age are either between relationships or in unstable ones), are factors that contribute to the "missing" first child.

Case Study: Sweden[15]

In recent decades, Swedish fertility rates have fluctuated so much that demographers have compared its fertility trends to a roller coaster. The total fertility rate (TFR) was at its lowest (1.6) in the late 1970s. By 1985, the country was experiencing a baby boom, and by 1990 the TFR had exceeded replacement level (2.14 children per woman). By 1999, however, the TFR had fallen to 1.52, but by 2002[16] it had risen again to 1.65.

Policies that embraced working mothers, secure incomes and improved employment conditions (including universal publicly subsidized, high quality child care), in combination with favourable economic conditions and low unemployment, succeeded in raising Sweden's TFR in the 1980s. The reduction of some of these policies in the 1990s contributed to a sharp decline in TFR, and their subsequent partial restoration contributed to an increase.

The key lesson from Sweden is that TFR is sensitive to the presence or absence of policies supportive of family formation, as well as to prevailing economic conditions.

How Can We Do It?

The evidence shows that no single measure can influence fertility, but that a suite of them used in combination can.[15,17] Policies and political cultures that favour social capital also appear to be favourable to the development of human capital. In pursuing debate on the merits of a population policy, the following options could be explored:

Rethink Targeting — It is perfectly reasonable to target income supports on the basis of economic need; however, not all needs are economic in nature. For example, early childhood development programs should be more widely available because not all children who would stand to benefit from an enriched early childhood experience are found in low-income families.[18]

Similarly, before Canada's Baby Bonus Program evolved into the income-dependent Child Tax Benefit, it had a symbolic value which likely transcended its economic value, in the sense that it acknowledged that Canadian society as a whole valued children and had a stake in them.

Consider Intergenerational Equity Issues — Helping young people through their important early life transitions and enabling them to become parents, if that is their wish, will require Canadian society to work out better ways of transferring resources to them. This, in turn, will require a longer period of post-reproductive productivity,[4] which means that we should be thinking of later, rather than earlier, retirement from the labour force. In the 1980s, Canada showed that it was possible to deal with the high prevalence of poverty among seniors through greater intergenerational transfers; it ought to be equally possible to address the needs of younger Canadians.

Promote Work-Life Balance — The recent Canada-Québec agreement to de-link parental leave benefits from Employment Insurance, in order for such leave to be accessible to those who are self-employed, is illustrative of the kind of program innovation that is needed. But change here is not entirely up to the public sector. As employers increasingly feel the labour market pressures brought on by the retirement of baby boomers, and as the recruitment and retention of younger workers becomes increasingly critical, there likely will be avid interest in the best practices of achieving work-life harmony. But, it will be important for the public and private sectors alike to be cognizant of Ranson's "deeper dilemma that anything done, in a structural or policy sense, to 'help' women combine paid work and family responsibilities only entrenches the belief that children are women's work."[19]

Enable Life Course Transitions — To the extent that home leaving in Newfoundland and Labrador is due at least in part to student debt, and that later fatherhood in British Columbia is due at least in part to housing costs, the goal of facilitating life course transitions may require a different strategic mix in different regions. Income contingent repayment of student loans may be more critical in some regions than in others, although economic development and the creation of real, sustainable employment opportunities may be the *sine qua non* for any increase in TFR in Canada's less affluent regions. Affordable housing opportunities may be of greater importance in Vancouver or Toronto, say, than elsewhere in Canada, although the means to achieve this will need careful consideration, so as not to inadvertently increase housing prices.

The foregoing options are among those available, should Canadians favour having a population policy, and should that policy favour measures to increase our fertility rates. These options also ought to favour a more inclusive Canadian society, by investing in all children, by accommodating the needs of young families in the workplace and by valuing young people and helping them through life transitions.

Conclusion

The trend that Lochhead documents may lead to a more stratified Canadian society, but increased stratification need not necessarily imply a steeper health status gradient. Inclusion and a commitment to relative fairness are hallmarks of countries where life expectancy and quality of life are higher.[20]

The foregoing options are among those available, should Canadians favour having a population policy, and should that policy favour measures to increase our fertility rates. These options also ought to favour a more inclusive Canadian society, by investing in all children, by accommodating the needs of young families in the workplace and by valuing young people and helping them through life transitions. This means that Canada will have an opportunity to build human and social capital simultaneously; this is a good thing, given the feelings of aimlessness and alienation among many of Canada's youth today.[21] They are, after all, our next generation of parents.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.

Who's Doing What?

Who's Doing What? is a regular column of the Health Policy Research Bulletin that looks at key players involved in policy research in the current theme area. This article profiles some national-level initiatives by researchers working in the area of human reproduction and fertility.

Taban Nabi, *Policy Division, and* **Nathalie Valdés**, *Bureau of Women's Health and Gender Analysis, both with the Health Policy Branch, Health Canada*

On the National Front

Health Canada

First Nations and Inuit Health Branch (FNIHB)

FNIHB recently released *A Statistical Profile on the Health of First Nations in Canada*. According to the report, 61.1 percent of the First Nations population was under 30 years of age in 2000, compared to 38.8 percent of the general Canadian population in 2001. The report concludes that a high birth rate and a lower life expectancy are the primary reasons for the youthfulness of First Nations peoples. In 2000, the crude birth rate among First Nations was 23.4 per 1,000 — more than twice the Canadian rate. One in five First Nations births was to a teenage mother, a considerably higher proportion than in the Canadian population (5.6 percent). For more information, visit: <http://www.hc-sc.gc.ca/fnihb/>.

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Health Policy Branch

Policy Division, Policy, Planning and Priorities Directorate

The Policy Division identifies and examines "frontier files" on new or complex issues to give Health Canada's policy community a context for considering and developing policy and program options. One such frontier file concerns the relationship between health and the economy, and was motivated by an interest in the observed gradient between health status and a range of socioeconomic factors. The Health Policy Research Program of the Applied Research and Analysis Directorate (IACB) provides funding assistance for research on the health impact of economic change. Details of this program can be found at: <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/rfp/rfp012.html>.

Bureau of Women's Health and Gender Analysis (BWHGA)

The Bureau, through its Women's Health Contribution Program, supports research designed to inform the policy process and narrow the knowledge gap on gender/diversity and health determinants. Reports and policy recommendations on contraception and reproductive health, fertility, midwifery, high-risk pregnancies, prenatal diagnosis, pregnancy and addiction, and maternity among Aboriginal women and immigrants are available at: <http://www.cewh-cesf.ca>.

Recent highlights from the Bureau's Contribution Program include:

- **National Forum on Reflecting on the State of Midwifery in Canada** — A report on the forum, which explored lessons learned in jurisdictions with legislated midwifery, is available at: <http://www.acewh.dal.ca/Midwifery_Files/MidwiferyWay.pdf>.
- **Midwifery Care: What Women Want** — The purpose of this project was to assess whether midwifery care is responsive to women's needs. A report is available at: <http://www.pwhce.ca/midwiferyCare.htm>.
- **Choosing a Cesarean Birth — A Forum to Discuss the Issues** — The event supported an informed and evidence-based discussion of a complex issue. For a report on the forum, go to: <http://www.acewh.dal.ca/Midwifery_Files/MidwiferyChoosingCesareanBirth.pdf>.

Public Health Agency of Canada

Division of Childhood and Adolescence

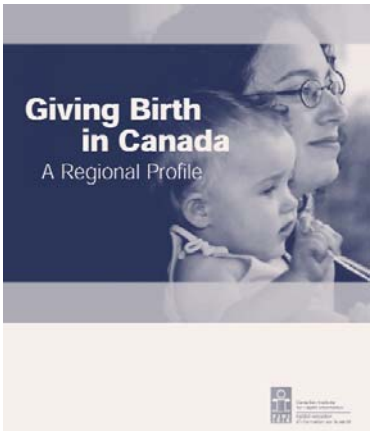
According to a recent publication entitled *Young people in Canada: Their health and well-being*, a high proportion of sexually active adolescents are at risk of teenage pregnancy and sexually transmitted infections due to excessive alcohol use. Research also shows that young people who have babies face a higher risk of poor birth outcomes, including low birth weight and Fetal Alcohol Spectrum Disorder (FASD). Supporting the health of young people is important in preventing future health concerns such as infertility, as young people move into adulthood and parenthood. Community-based prevention programs, such as the Canada Prenatal Nutrition Program (CPNP), the Community Action Program for Children (CAPC) and Aboriginal Head Start (AHS), provide health information and support for those who live in conditions of risk, including pregnant teens. In 2000, it was estimated that CPNP served 40 percent of the 17,000 Canadian teens who had live births and 60 percent of those who were living in poverty. For more information, visit: <http://www.phac-aspc.gc.ca/dca-dea/main_e.html>.

The Sexual Health and STI Section of the Community Acquired Infections Division

Working with provincial/territorial governments, non-governmental organizations and health care providers, this section aims to improve the sexual health and well-being of Canadians by preventing and controlling sexually transmitted infections and their complications, including infertility and cancer. The Section provides national leadership and coordination through programs that develop and support surveillance and targeted research studies, develop evidence-based national standards and policy, and provide for the timely dissemination and exchange of information. To find out more, visit: <http://www.phac-aspc.gc.ca/std-mts/index.html>.

Assisted Human Reproduction Implementation Office (AHRIO)

As the organization responsible for implementing the *Assisted Human Reproduction Act*, AHRIO is developing a regulatory framework and will establish the Assisted Human Reproduction Agency of Canada to license, inspect and enforce activities controlled under the Act. Given the complexity of the regulatory program, it is expected that the development process, including public consultation activities, will take approximately three years. For more information, visit: <http://www.hc-sc.gc.ca/english/lifestyles/reproduction/index.htm>.



Canadian Institute for Health Information (CIHI)

CIHI recently released *Giving Birth in Canada: A Regional Profile*, the second in a series of reports on birthing care in Canada. It describes maternal and infant care at the regional, provincial/territorial and national levels, and includes regional information on five key birthing indicators: epidurals, assisted deliveries, caesarean sections, vaginal birth after a caesarean section and visits to the neonatal intensive care unit (NICU). The first report, *Giving Birth in Canada: Providers of Maternity and Infant Care*, looks at trends in birthing and maternity care across the country and the changing scope of practice for maternal and infant care providers. Both reports are available at: <http://www.cihi.ca>.

Infertility Awareness Association of Canada Inc. (IAAC)

Founded in 1990, IAAC works with its nationwide network of support groups to provide educational material and assistance to individuals and couples experiencing infertility, a condition which affects more than half a million Canadian women and men. To find out more, visit: <http://www.iaac.ca/index.asp>.

Other Web Sites of Interest

Canadian Institute of Child Health <http://www.cich.ca>
Canadian Childcare Federation <http://www.cccf-fcsge.ca/home_en.html>

Did You Know? is a regular column of the Health Policy Research Bulletin *examining aspects of health information, data and research that may be subject to misconception. In this issue, however, we deviate from our usual format and present the results of the Bulletin's Readership Survey.*

About the Readership Survey

Tiffany Thornton, *Applied Research and Analysis Directorate, Information, Analysis and Connectivity Branch, Health Canada*

Did you know that in June 2003, the Research Management and Dissemination Division (RMDD) of Health Canada's Applied Research and Analysis Directorate (ARAD) surveyed readers of the *Health Policy Research Bulletin*? The survey gathered information on reader demographics, reading patterns and use of the publication, as well as views and opinions on the publication's content and presentation. In particular, we wanted to know whether the Bulletin was achieving its primary objectives, which are to: strengthen Health Canada's evidence base for decision making; disseminate health research results; identify areas where further research is needed; stimulate discussion on emerging health policy issues; and encourage networking within Canada's health policy research community.

Survey Methodology

The survey was delivered as part of the release of Issue 6 of the Bulletin (*Antimicrobial Resistance: Keeping It in the Box!*). It included a mix of 16 open- and closed-ended questions focusing on three areas: general questions about the Bulletin (e.g., sections read, likes and dislikes, reading patterns); specific questions about the content and appearance of Issue 6 (e.g., usefulness and relevance of the information); and questions designed to tell us about the demography of our readership.

Key Findings — What You Told Us

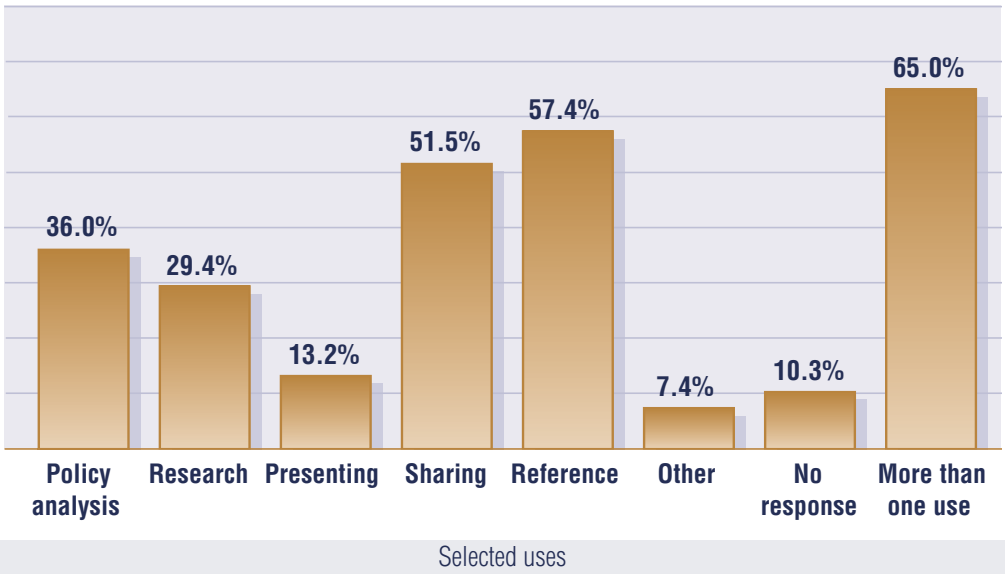
Despite a low response rate, the survey results indicate that readers find the Bulletin relevant and useful, and the content and presentation easy to read, and would like to see it published more often. Following are some of the highlights of the survey findings:

- ***The Bulletin contributes to the evidence base for decision making.***
  The majority of respondents indicated that the Bulletin examines important and emerging health issues (84 percent) that are a current priority for Health Canada (67 percent). Three quarters (73 percent) said the Bulletin presents high quality research that makes a useful contribution to the evidence base for decision making. As one reader commented:

  "The way the evidence is presented through the different columns is very useful. It provides a kind of structure and order to the issue where all the articles build from one another! The format also lends itself well to highlighting the evidence being discussed!"

- ***The Bulletin is used for many purposes — most often as a reference to be shared with others.***
  Two thirds (65 percent) of respondents indicated they use the Bulletin for more than one purpose. As Figure 1

Figure 1: **Reported Uses of *Health Policy Research Bulletin*, by Selected Uses**



shows, 57 percent use the publication as a reference; some respondents commented that the Bulletin is a useful and current information source for the issue's featured theme area. Others suggested that it serves as a valuable background document for both those with and without expertise in a particular theme.

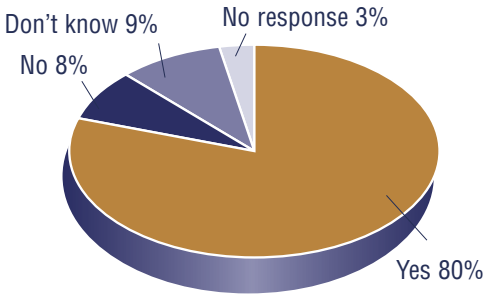
More than one third (36 percent) of respondents said they use the Bulletin to assist in policy analysis/development activities. This finding suggests that the Bulletin is achieving one of its main goals by providing an evidence base for policy choices. Moreover, it serves as an internal communication tool for decision making.

Almost one third (29 percent) of respondents indicated they find the publication useful in their research activities. For example, some noted that the Bulletin provides useful background for future research, or affects their research agenda by casting research questions in new ways.

- ***The Bulletin focuses on important and timely research issues.***
  When asked specifically about Issue 6, most respondents (84 percent) said they consider the topic of antimicrobial resistance to be an important and emerging health issue. Three quarters (73 percent) agreed that the issue presented high quality, relevant research in the area, while a slightly higher proportion (76 percent) said it made a useful contribution to the research evidence currently available. This finding suggests that the Bulletin is filling a gap in the evidence required for policy analysis and development.

Figure 2: **Contribution of *Health Policy Research Bulletin* (Issue 6) to Reader's Knowledge**

Did the Bulletin (Issue 6) increase your knowledge or understanding of antimicrobial resistance?



- ***The Bulletin helps to increase readers' knowledge.***
  As Figure 2 shows, 80 percent of respondents indicated that the Bulletin increased their knowledge and understanding about the theme of antimicrobial resistance.

- ***The Bulletin is a high quality publication that is readable and well presented.***
  The vast majority (91 percent) of respondents indicated that the content of Issue 6 was easy to read and almost no one (1 percent) found it too technical. Many respondents remarked on the visual appeal of the graphics, noting how useful the charts and diagrams were in helping them understand the content.

  Some respondents said they keep the graphs as a reference for later use, but a few commented that they were difficult to photocopy. It was suggested that the graphs should be made available on the ARAD website. These comments reinforce the finding that the publication is often used as a reference document and should be made as accessible as possible.

- ***The Bulletin is a well-read publication; a printed copy is the preferred format.***
  The survey results also help to show readership patterns — for example, the theme-related articles are the most widely read (84 percent) and many respondents read the entire issue, either skimming it (28 percent) or reading the full publication (25 percent). More than two thirds (68 percent) of respondents prefer a printed version of the Bulletin; less than one third (29 percent) would rather receive an electronic version.

Putting the Findings to Work

While most readers agree that the Bulletin is a high quality publication, they offered some comments and suggestions for maintaining and improving it. These include: eliminating technical jargon; enhancing the publication's usefulness as a reference; animating the research and presenting it in a way that encourages policy decision makers to see policy options; and ensuring that the Bulletin is relevant and useful for both experts and non-experts in selected theme areas.

Thank you to all those who responded to the survey and be assured that we will do our best to address your concerns. In fact, a number of new features designed to enhance the Bulletin's overall appeal and usefulness are already in the planning stages. We welcome your feedback on these changes, as well as any other comments you may have on the Bulletin. Please contact us at: <bulletininfo@hc-sc.gc.ca>.

Using Canada's Health Data is a regular column of the Health Policy Research Bulletin highlighting some of the methodologies commonly used in analyzing and interpreting health data. This issue focuses on statistical distributions.

The "Ins and Outs" of Statistical Distributions

Linda Senzilet, *Policy Division, Health Policy Branch, Health Canada*

What Is a Statistical Distribution?

In their research, social scientists often describe and analyze how certain characteristics, or *variables*, are distributed among populations of interest. *Discrete variables* are arranged into groups of values (e.g., gender, age group), while *continuous variables* have a range of values along a continuum (e.g., weight, income).[1]

Frequency distributions show the number of observations at different values or within certain ranges[2] of a particular variable and help the reader determine which values or ranges are most common[3] (see Figure 1).

Probability distributions show the probabilities for all possible values of a variable (see Figure 2). For instance, a *discrete probability distribution* might show the respective probabilities of a Canadian woman giving birth to zero, one, two or three children. *Continuous probability distributions* list an "unbroken" continuum of possible values of a variable, for example, the probability of a Canadian baby being born at a particular birth weight.

Many frequency or probability distributions are bell-shaped, with the most frequent values clustered at the centre of the curve and the least frequent values falling into the left and right "tails." If this type of distribution is symmetrical, it is known as a normal distribution. If it is asymmetrical, it is said to be skewed.

Displaying Distributions

Distributions can be displayed in many ways. For example, they may be shown as mathematical formula, in tabular form as frequency tables, or graphically as histograms, bar charts, pie charts or a series of points on the axes of a Cartesian coordinate plane (e.g., lines, scatterplots, polygons and curves).

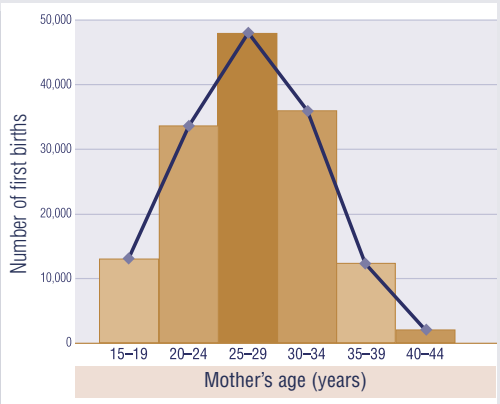
The Normal Distribution

The normal distribution is the most important type of statistical distribution. It describes many naturally occurring phenomena and occupies a central role in statistical analysis as it is used to calculate confidence intervals and significance testing.[4] Two properties common to all normal distributions are the mean and standard deviation.

The *mean* is the arithmetic average of all values of the variable and is represented by the highest point in the curve. However, the mean alone does not give any indication of the variability, or spread, of the values.

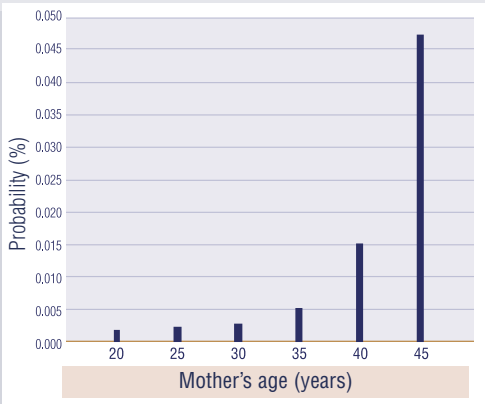
The *standard deviation* is a measure of spread that shows the deviation from the mean of all values of a

Figure 1: **Frequency Distribution of First Births, by Mother's Age, Canada, 2002**



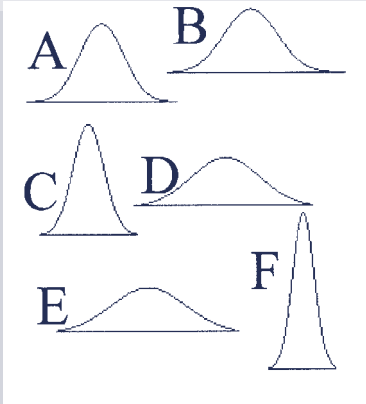
Source: Statistics Canada, Cansim Table 102-4508.

Figure 2: **Distribution of the Probabilities of a Live Birth Having a Chromosomal Anomaly, by Maternal Age**



Source: L.J. Heffner, 2004.[5]

Figure 3: **Normal Distributions with Different Means and Standard Deviations**



particular variable and is represented by the overall width of the curve. This variability can be due to biological factors, temporal factors or measurement error.[6]

Figure 3 demonstrates how the mean and standard deviation influence the shape of a normal distribution. Distribution "F" has the largest mean, while distributions "B," "D" and "E" have the largest standard deviations.

How Are Statistical Distributions Used?

Distribution of a Single Variable at a Point in Time

Public policy may be directed at, for example, lowering the standard deviation of a variable (by targeting persons with extreme values that fall into either "tail" of the distribution), or at shifting the mean to either the right or the left. However, policy makers must not lose sight of all members of a population that make up a distribution.

Distribution of the Same Variable over Time

Comparing the distribution of a variable over time helps to identify trends. For example, the finding that mean maternal age at first birth in Canada rose between 1976 and 1996[7] and has become skewed toward older first-time mothers (see Figure 1 on page 11) has implications for programs and policies related to assisted human reproduction, since female fertility declines with increasing age.

Using Multiple Distributions

Displayed in a graphic format, multiple distributions can yield evidence about risk factors for various diseases or health states by showing how one variable changes in relation to another. For example, in Issue 5 of the *Health Policy Research Bulletin*, the association between housing density and the risk of contracting tuberculosis is demonstrated by superimposing a line graph of Aboriginal tuberculosis incidence rates onto a bar chart showing the number of persons housed per room.[8] This use of distributions can yield evidence about risk factors for various diseases or health states.

Comparing the Same Variable across Population Groups

Distributions also allow researchers to compare values of the same variable across two or more population groups, for example, rural and urban residents. Programs and policies can then be targeted to populations with the greatest need.

Calculating the Proportion of Individuals within Each Category of a Variable

Statistical distributions can be used to indicate the proportion of individuals falling into each category of a variable. For example, a pie chart showing that nearly 13 percent of all new mothers in Canada in 1996 were lone parents[9] would help decision makers identify the new mothers (and their babies) most in need of support and therefore requiring a proportionately larger share of postpartum social services resources.

Using Distributions in the Evaluation Process

Analyzing distributions prior to and following a targeted intervention or policy implementation can help in evaluating the impacts and informing appropriate corrective action.

Displayed in a graphic format, multiple distributions can yield evidence about risk factors for various diseases or health states by showing how one variable changes in relation to another.

Monitoring Epidemics

Epidemiologists investigating infectious disease outbreaks use epidemic curves that plot the distribution of cases by time/date of onset. This information, in conjunction with other disease-specific knowledge (e.g., incubation period), helps officials monitor the epidemic and implement control measures.

Disease Surveillance

Disease surveillance yields statistical distributions that can be put to many uses, including determining disease trends, identifying outbreaks at the earliest possible stages, evaluating the impact of vaccine strategies and comparing disease rates across Canada.[10]

Good News for Non-Statisticians!

While a great deal of skill is involved in collecting and presenting data as statistical distributions, policy analysts, program managers and senior decision makers who are not formally trained in either statistics or epidemiology are able to analyze and interpret these distributions, and can use the valuable information they provide to benefit their work.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.

New and Noteworthy

New and Noteworthy is a regular column of the Health Policy Research Bulletin highlighting "up and coming" policy research in the health field.

Child Maltreatment and Policy

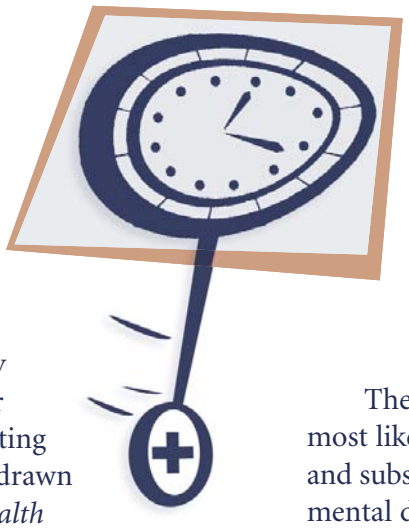
The Canadian Incidence Study of Reported Child Abuse and Neglect (CIS) is the first attempt to collect and analyze national data on the incidence of child maltreatment in Canada. At a recent Health Canada sponsored forum, senior public servants were asked how the CIS could be made more useful for evidence-based policy development and program implementation. The resulting discussion is captured in the article: "Policy Makers Perspectives on the Utility of a National Study of Child Maltreatment." For copies of the article or for further information, contact: <Lil_Tonmyr@hc-sc.gc.ca>.

Health Care in Canada 2004

The Canadian Institute of Health Information (CIHI) recently released its fifth annual report on issues affecting the Canadian health care system. *Health Care in Canada 2004* focuses on topics such as the continuum of care, health expenditures, health care professionals and the outcomes of care. The report also provides national patient safety indicators and highlights various adverse events that can affect Canadians, including prescription errors, contracting a hospital-acquired infection and experiencing birth trauma. As well, an insert provides new data on a range of health and health system indicators at both the regional and provincial/territorial levels. To obtain a copy of the report, go to: <http://www.cihi.ca>.

Waiting Times for Treatment

Health Canada's Canada Health Act Division has produced an empirical study on the determinants of waiting for non-emergency surgery in Canada. The model links the major factors contributing to prolonged waiting times and tests the model using data drawn primarily from Statistics Canada's *Health Services Access Survey*. For more information, contact: <Piyanjali_Tissaaratchy@hc-sc.gc.ca>.



Social Determinants of Health

A new book, entitled *Social Determinants of Health: A Canadian Perspective*, explores how socioeconomic factors affect the health of Canadians, surveys the current state of 11 social determinants of health and analyzes how these determinants affect Canadians' health. The book also explores policy options that would contribute to better health outcomes and ways to ensure that these options are pursued. For more information, or to order a copy of the book, go to: <http://www.cspi.org/books/s/socialdeter.htm>.

Injury Data Sources and Surveillance

The Centre for Surveillance Coordination has released print and electronic versions of the third edition of the *Inventory of Injury Data Sources and Surveillance Activities*. The goal of the Inventory, which includes 35 new sources for a total of 93, is to provide public health professionals with an extensive list of major sources of injury data and surveillance activities described within a common framework. This work will enable more timely and accurate public health action in areas such as monitoring trends in injury occurrences and developing preventive responses to decrease the incidence of injury in Canada. The Inventory is available at: <http://www.phac-aspc.gc.ca/csc-ccs/injury_e.html>; for more information, please contact: <caroline_dasilva@hc-sc.gc.ca>.

Community Health Survey

Statistics Canada's 2002 *Canadian Community Health Survey* (CCHS) on "Mental Health and Well-being" focuses on mental disorders, well-being and risk factors, utilization of mental health service and the social impacts of mental health problems. Developed in conjunction with Health Canada, the survey sampled 30,000 people, aged 15 and older, living in all 10 provinces. The results show that youth aged 15 to 24 were most likely to suffer from certain mental disorders and substance abuse problems, and the majority with mental disorders and substance abuse did not seek help. For more information, contact: <mario.bedard@statcan.ca>.

Support for Health Policy Research

Health Canada's Health Policy Research Program (HPRP) funds extramural, peer-reviewed research that contributes to the evidence base for the department's policy decisions. HPRP supports a range of initiatives including primary, secondary and synthesis research, and policy research workshops to fund research of national significance. Twenty-two initiatives have been funded since the program's inception in 2001; three recently completed projects are summarized below. For more information about HPRP, or to obtain summaries of these reports, contact: <RMDDinfo@hc-sc.gc.ca>.

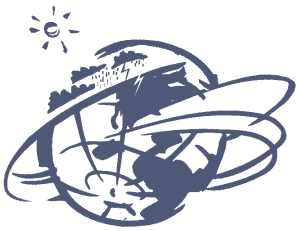
Effectiveness of Physical Activity Enhancement and Obesity Prevention Programs in Children and Youth **(Helen Thomas, RN, MSc McMaster University)**

Over the past 15 years, obesity rates in children have doubled, resulting in substantial costs to the health care and other systems, and to a decreased quality of life for those affected. To provide national policy direction, a systematic literature review was undertaken on the effectiveness of interventions aimed at promoting healthy weights, preventing overweight/obesity and increasing physical activity among school-aged children and youth. The review organizes the literature according to a variety of topics and puts forward a number of recommendations for policy, program delivery and research.

Are Integrated Approaches Working to Promote Healthy Weights and Prevent Obesity and Chronic Disease? **(Alan Shiell, Ph.D., University of Calgary)**

Chronic non-infectious illnesses, such as cardiovascular disease, type 2 diabetes and cancer, are the leading cause of death and disability in Canada. Excess body weight — one common risk factor for these health problems — is often a result of physical inactivity and diet practices that are affected by a range of social, economic, cultural and physical factors. Dr. Shiell has undertaken an extensive literature review to assess whether existing integrated approaches are effective in preventing excess weight and chronic disease.

Climate Change, Extreme Weather Events, and Health-Effects in Alberta **(Dr. Colin L. Soskolne, University of Alberta)**



Current climate conditions suggest a trend toward extreme weather activity. This study investigates the impact that natural weather disasters (e.g., drought, extended periods of extreme heat and cold, snow storms, forest fires and floods) and climate shifts have had on Albertans over the last 40 to 100 years. It also assesses various plans of action and policies for dealing with the increase in extreme weather conditions.

The Net Effects of Delayed Reproduction, *continued from page 23*

Conclusion

At the individual level, there are both advantages and disadvantages related to delayed reproduction and fewer births. Delayed reproduction is associated with a higher risk of low birth weight and a greater likelihood of not having children, but it also means that parents are likely to have more resources available. At the societal level, there is the potential for greater disparity due to changing family patterns and population aging trends associated with later childbearing and low fertility.

Ultimately, investments in children and parenting provide the best basis for society's long-term health and security. Investments in young families can take a variety of forms, from family-friendly work environments and better funding of parental leave, to opportunities for part-time work with good benefits, publicly funded child care, higher child tax benefits and more provisions for lone-parent families. Policy discussions about aging should address structural adjustments to pension systems, as well as to labour markets and health and fiscal systems. These adjustments will require concerted efforts, especially as aging societies tend to pay particular attention to the aged. Without sustained attention to the issues faced by young families, society's potential for reproduction may be undermined. As the current demographic bonus disappears, it is vital to recognize that investments in the early stages of life provide the best basis for the long-term health and security of society as a whole.

Please note: Full references are available in the electronic version of this issue of the Bulletin: <http://www.hc-sc.gc.ca/arad-draa>.

Mark Your Calendar

What	When	Theme
International Health Economics Association 5th World Congress: Investing in Health	July 9–13, 2005 Barcelona, Spain <http://healtheconomics.org/barcelona/presentations/themes.html>	A variety of themes, including health disparities, addiction, obesity and cost, econometrics
6th Global Conference on Health Promotion	August 7–11, 2005 Bangkok, Thailand <http://www.who.int/noncommunicable_diseases/6gchp/en/>	Policy and partnership for action: addressing the determinants of health
6th World Conference on Melanoma	September 6–10, 2005 Vancouver, BC <http://www.worldmelanoma.com/>	Prevention, management, research and treatment of melanoma, one of the most prevalent cancers
3rd International Conference on the Impact of Environmental Factors on Health	September 14–16, 2005 Bologna, Italy <http://www.wessex.ac.uk/conferences/2005/ehr05/>	The impacts of environmental factors on health
6th International Conference on the Scientific Basis of Health Services	September 18–20, 2005 Montréal, QC <http://www.icsbhs.org/index_eng.html>	Focus on improving health by advancing health care and linking research, policy and action
Canadian Public Health Association 96th Annual Conference	September 18–22, 2005 Ottawa, ON <http://www.cpha.ca/english/conf/conf.htm>	Mapping the future of public health — people, places and policies
Canadian Mental Health Association Conference	September 20–25, 2005 Edmonton, AB <http://www.cmha-edmonton.ab.ca/conference/>	Discussion of strategies to make mental health matter
World Conference on Family Violence	October 23–27, 2005 Banff, AB <http://www.who.int/violenceprevention/events/23_10_2005/en/>	Exploration of knowledge, practice and impact
2005 Canadian Injury Prevention and Safety Promotion Conference	November 6–8, 2005 Halifax, NS <http://www.injuryprevention conference.ca/>	Focus on unintentional injury, violence and suicide prevention
12th Canadian Conference on International Health	November 6–9, 2005 Ottawa, ON <http://www.csih.org/what/conferences2005.html>	Exploration of health in the global economy

References

References for *The Dynamics of Fertility from a Policy Perspective* (p. 3)

1. Wilkinson, R.G. (1996). *Unhealthy Societies: The Affliction of Inequality* (p. 75). London: Routledge.

2. Duxbury, L., & Higgins, C. (2001, October). Work-life balance in the new millennium: *Where are we? Where do we need to go?* CPRN Discussion Paper No. W12. Ottawa, ON: Canadian Policy Research Networks, Work Network.

References for *Exploring Fertility Trends in Canada through a Gender Lens* (p. 7)

1. See, for example: Goody, J. (1976). *Production and Reproduction: A Comparative Study of the Domestic Domain*. Cambridge, MA: Cambridge University Press. McLaren, A., & McLaren, A.T. (1998). *The Bedroom and the State: The Changing Practices and Politics of Contraception and Abortion in Canada, 1880–1997* (3rd ed.). Toronto, ON: Oxford University Press.

2. Caldwell, J.C. (2004, June). Demographic theory: A long view? *Population and Development Review, 30(2)*, 297–316.

3. Statistics Canada. (2004). Births, 2002. *The Daily*, Monday, April 19, 2004. Ottawa, ON: Author. Retrieved from <http://www.statcan.ca/Daily/English/040419/d040419b.htm>.

4. For example, in 2003, the TFR in Canada was 1.61; Ireland, 1.89; Japan, 1.38; Greece, 1.35; and Italy, 1.26. *CIA World Factbook*. Total fertility rate (children born/woman), 2003. Retrieved from <http://www.geographic.org>.

5. Beaujot, R. (2000). *Earning and Caring in Canadian Families*. Peterborough, ON: Broadview Press.

6. Statistics Canada. (2001). *2001 Canada Year Book*. Catalogue No. 11-402-XPE. Ottawa, ON: Author. Available online as *The Canada e-Book*, Catalogue No. 11-404-XIE: <http://142.206.72.67/02/02a/02a_002_e.htm>.

7. Caldwell provides an overview of various demographic theories and their implications. See: Caldwell, J.C. (2004, June). Demographic theory: A long view? *Population and Development Review, 30(2)*, 297–316. See also: Bongaarts, J. (2002). The end of the fertility transition in the developed worlds. *Population and Development Review, 28(3)*, 419–443.

8. Dupuis, D. (1998). What influences people's plans to have children? *Canadian Social Trends, 48*, 2–5; and Beaujot, R. (2000). *Earning and Caring in Canadian Families* (p. 236). Peterborough, ON: Broadview Press.

9. Beaujot effectively summarizes the many reasons people give for having children. See: Beaujot, R. (2000). *Earning and Caring in Canadian Families*. Peterborough, ON: Broadview Press; and Beaujot, R., & Muhammad, A. (2004, June). *Transformed Families and the Basis for Childbearing*. London, ON: Population Studies Centre, University of Western Ontario.

10. Beaujot, R. (2004, May). Delayed life transitions: Trends and implications. *Contemporary Family Trends*. Ottawa, ON: The Vanier Institute of the Family.

11. Lochhead notes that women aged 30 years or older accounted for 9 percent of all first-order births in 1976; by 1996, the share of first-order births to women aged 30 years and older more than tripled, accounting for three out of every ten first births. This proportion has continued to rise. See: Lochhead, C. (2000, Autumn). The trend toward delayed first child-birth: Health and social implications. *ISUMA: Canadian Journal of Policy Research, 1(2)*, 41–44. See also: Payne, J. (2004). The impact of a reduced fertility rate on women's health. *BMC Women's Health*. Retrieved from <http://www.biomedcentral.com/1472-6874/4/S1/S11>.

12. Ravanera, Z.R., & Rajulton, F. (2004, April). *Bifurcation by Social Status in the Onset of Fatherhood*. Discussion Paper No. 04-04. London, ON: Population Studies Centre, University of Western Ontario. Retrieved from <http://www.ssc.uwo.ca/sociology/popstudies/dp/dp04-04.pdf>.

13. See, for example: Sipos, A., et al. (2004, November). Paternal age and schizophrenia: A population based cohort study. *British Medical Journal, 329*, 1070, doi:10.1136/bmj.38243.672396.55.

14. See: Ravanera, Z.R. & Rajulton, F. (2004, April). *Bifurcation by Social Status in the Onset of Fatherhood*. Discussion Paper No. 04-04. London, ON: Population Studies Centre, University of Western Ontario. Retrieved from <http://www.ssc.uwo.ca/sociology/popstudies/dp/dp04-04.pdf>; and Ravanera, Z.R., & Rajulton, F. (2004, June). *Social Status Polarization in the Timing and Trajectories to Motherhood*. Discussion Paper No. 04-06. London, ON: Population Studies Centre, University of Western Ontario.

15. As Sauvé notes, in 1989, the average after government transfer and income tax incomes of the richest 20 percent of families was 4.8 times the average income of the poorest 20 percent of families. This rose to a high of 5.5 times by 2001. See: Sauvé, R. (2004, February). The current state of Canadian family finances — 2003 report. *Contemporary Family Trends*. Ottawa, ON: The Vanier Institute of the Family.

16. See, for example: Canadian Population Health Initiative. (2004). *Improving the Health of Canadians*. Ottawa, ON: Canadian Institute for Health Information; and Caledon Institute of Social Policy. (2004). *The Links between Low Income and Health*. Ottawa, ON: Canadian Institute for Health Information.

17. This brief discussion of some of the key features of the "demographic transitions" draws largely from: Beaujot, R. (2000). *Earning and Caring in Canadian Families*.

Peterborough, ON: Broadview Press; Beaujot, R. (2004, May). Delayed life transitions: Trends and implications. *Contemporary Family Trends*. Ottawa, ON: The Vanier Institute of the Family; and Caldwell, J.C. (2004, June). Demographic theory: A long view? *Population and Development Review, 30(2)*, 297–316.

18. In Canada, abortion was made illegal in 1869 and the sale or advertisement of a medicine, drug or article to prevent conception or cause an abortion became part of the *Criminal Code* in 1892 (section 179c).

19. See: McLaren, A., & McLaren, A.T. (1998). *The Bedroom and the State: The Changing Practices and Politics of Contraception and Abortion in Canada, 1880–1997* (3rd ed.). Toronto, ON: Oxford University Press; and Liu, K.E., & Fisher, W.A. (2002). Canadian physicians' role in contraception from the 19th century to now. *Journal of Obstetrics and Gynaecology Canada, 24(3)*, 239–244.

20. Friedan, B. (1963). *The Feminine Mystique*. New York: Dell Publishing Co., Inc.

21. Armstrong, P., & Kitts, O. (2004). One hundred years of caregiving. In K. Grant, C. Amaratunga, P. Armstrong, et al. (Eds.), *Caring For/Caring About: Women, Home Care and Unpaid Caregiving* (pp. 45–73). Aurora, ON: Garamond Press.

22. Backhouse, C., & Flaherty, D. (Eds.). (1992). *Challenging Times: The Women's Movement in Canada and the United States*. Montréal, QC, and Kingston, ON: McGill-Queen's University Press. There were, of course, strong social movements, including feminism, prior to the 1960s.

23. Bégin, M. (1992). The Royal Commission on the Status of Women in Canada: Twenty years later. In C. Backhouse & D. Flaherty (Eds.), *Challenging Times: The Women's Movement in Canada and the United States* (pp. 21–38). Montréal, QC, and Kingston, ON: McGill-Queen's University Press.

24. McLaren, A., & McLaren, A.T. (1998). *The Bedroom and the State: The Changing Practices and Politics of Contraception and Abortion in Canada, 1880–1997* (3rd ed.). Toronto, ON: Oxford University Press.

25. Zukewich, N. (2000, September). Paid and unpaid work. In Statistics Canada, *Women in Canada 2000: A gender-based statistical report*. Catalogue No. 89-503-XPE. Ottawa, ON: Minister of Industry.

26. Statistics Canada. (2003). *Women in Canada: Work chapter updates*. Catalogue No. 89F0133XIE. Ottawa, ON: Author.

27. Normand, J. (2000). Education. In Statistics Canada, *Women in Canada 2000: A gender-based statistical report*. Catalogue No. 89-503-XPE. Ottawa, ON: Minister of Industry.

28. See also: Fast, J., & Da Pont, M. (1997). Changes in women's work continuity. *Canadian Social Trends*. Catalogue No. 11-008-XPE. Ottawa, ON: Statistics Canada.

29. See, for example: Baker, M., & Phipps, S. (1997). Family change and family policies: Canada. In A. Kahn & S. Kamerman (Eds.), *Family Change and Family Policies in Great Britain, Canada, New Zealand, and the United States* (pp. 105–202). Oxford, England: Clarendon Press; and Sauvé, R. (2004, February). The current state of Canadian family finances — 2003 report. *Contemporary Family Trends*. Ottawa, ON: The Vanier Institute of the Family.

30. Data in this section are drawn from: Morissette, R., & Johnson, A. (2004). *Earnings of Highly and of Less Educated Couples in the Canadian Labour Market, 1980–2000*. Catalogue No. 11-621-MIE2004017. Ottawa, ON: Business and Labour Analysis Division, Statistics Canada.

31. Bibby, R. (2004). *A Survey of Canadian Hopes and Dreams*. Ottawa, ON: The Vanier Institute of the Family.

32. Eichler, M. (1997). *Family Shifts: Families, Policies, and Gender Equity*. Don Mills, ON: Oxford University Press.

33. The Vanier Institute of the Family. (2004). *Profiling Canada's Families III*. Ottawa, ON: Author. This recent comprehensive report documents the wide diversity in household and family forms in Canada as well as increased secularism. Among its findings: the "traditional" family no longer comprises the majority in family types in Canada.

34. Baker, M., & Phipps, S. (1997). Family change and family policies: Canada. In A. Kahn & S. Kamerman (Eds.), *Family Change and Family Policies in Great Britain, Canada, New Zealand, and the United States* (pp. 105–202). Oxford, England: Clarendon Press. The authors provide a useful summary of the historical underpinnings to social welfare and family policies and legislation in Canada, including the role of social movements in pressing for particular policy initiatives.

35. Armstrong, P., & Kitts, O. (2004). One hundred years of caregiving. In K. Grant, C. Amaratunga, P. Armstrong, et al. (Eds.), *Caring For/Caring About: Women, Home Care and Unpaid Caregiving* (pp. 45–73). Aurora, ON: Garamond Press.

36. Matthews, B.J. (1999). The gender system and fertility: An exploration of the hidden links. *Canadian Studies in Population, 26(1)*, 21–38.

37. McDonald, P. (2000). Gender equity, social institutions and the future of fertility. *Journal of Population Research, 17(1)*, 1–16; Beaujot, R. (2004, May). Delayed life transitions: Trends and implications. *Contemporary Family Trends*. Ottawa, ON: The Vanier Institute of the Family; and personal communication. See also: Raphael, D., & Bryant, T. (2004). The welfare state as a determinant of women's health: support for women's quality of life in Canada and four comparison nations. *Health Policy, 68*, 63–79.

38. Duxbury, L., & Higgins, C. (2001, October). *Work-life balance in the new millennium: Where are we? Where do we need to go?* CPRN Discussion Paper No. W12. Ottawa, ON:

Canadian Policy Research Networks, Work Network; and Duxbury, L. (2003). *Work-Life Conflict in Canada in the New Millennium: A Status Report*. Ottawa, ON: Health Canada.

39. Women in professions with family-friendly policies are more likely to have their preferred family size. See: Ranson, G. (1998). Education, work and family decision making: Finding the "right time" to have a baby. *Canadian Review of Sociology and Anthropology, 35(4)*, 517–533. Retrieved from <http://crsa.icaap.org/content/archives/35-4/35-4Ranson.pdf>.

40. Payne, J. (2004). The impact of a reduced fertility rate on women's health. *BMC Women's Health*. Retrieved from <http://www.biomedcentral.com/1472-6874/4/S1/S11>.

41. Status of Women Canada. (1995). *The federal plan for gender equality*. Ottawa, ON: Author.

References for *Growing Disparities among First-Time Parents: 1971 to 1996* (p. 11)

1. The statistical profile of first-time mothers and fathers is drawn from the Census public-use micro data files (PUMFS). Because the Census provides no direct identifier of first-time mothers, it is necessary to derive it on the basis of the age of the oldest child in the family. Accordingly, first-time parents are defined here as those whose oldest child living at home was aged 0–5.

2. Lochhead, C., & Schellenberg, G. (1999, November). *A Profile of Mothers and Fathers in Canada, 1971–1996*. Research report prepared for Health Policy Division, Health Canada, Ottawa, ON.

3. Lone-parent mothers and fathers are excluded from the analysis of incomes.

4. For one example describing how the gradient functions, please refer to: Wilkinson, R.G. (1996). *Unhealthy Societies: The Affliction of Inequality*. London: Routledge.

5. McCain, M.N., & Mustard, J.F. (1999). *Reversing the Real Brain Drain: Early Years Study Final Report*. Toronto, ON: Publications Ontario.

6. Grindstaff, C.F., Balakrishnan, T.R., & Dewit, D.J. (1991, August). Educational attainment, age at first birth and lifetime fertility: An analysis of Canadian fertility survey data. *The Canadian Review of Sociology and Anthropology, 28(3)*, 335.

7. Ravanera, Z.R. & Rajulton, F. (2004, April). *Bifurcation by Social Status in the Onset of Fatherhood*. Discussion Paper No. 04-04. London, ON: Population Studies Centre. University of Western Ontario. Retrieved from <http://www.ssc.uwo.ca/sociology/popstudies/dp/dp04-04.pdf>.

8. Policy Research Initiative. (1999, February). *Sustaining Growth, Human Development and Social Cohesion in a Global World*. Ottawa, ON: Author.

References for *Reproduction at Older Ages: The Health Implications* (p. 15)

1. National Women's Health Information Center, Office on Women's Health, U.S. Department of Health and Human Services. *Fertility Awareness and Infertility*. Retrieved from <http://www.4woman.gov/Pregnancy/infertility.htm#4>.

2. Beaujot, R. (2000). *Earning and Caring in Canadian Families*. Peterborough, ON: Broadview Press.

3. Heffner, L.J. (2004). Advanced maternal age: How old is too old? *New England Journal of Medicine, 351(19)*, 1927–1929.

4. Farquhar, C.M. (2000). Endometriosis. *British Medical Journal*, 320, 1449–1452.

5. Statistics Canada. 1994 National Population Health Survey data. Referenced in: Health Canada. (2003). *HIV/AIDS Epi Update*. Ottawa, ON: Author.

6. Statistics Canada. 1996 National Population Health Survey data. Referenced in: Health Canada. (2003). *HIV/AIDS Epi Update*. Ottawa, ON: Author.

7. Boyce, W. (2004). *Young People in Canada: Their Health and Well-being — Report Overview*. Retrieved from <http://www.phac-aspc.gc.ca/media/nr-rp/2004/2004_53bk1_e.html>.

8. Centre for Infectious Disease Prevention and Control, Sexual Health and STI Section, Community Acquired Infections Division, Public Health Agency of Canada.

9. Health Canada. (1998). *Canadian STD Guidelines*. Ottawa, ON: Author. Retrieved from <http://www.phac-aspc.gc.ca/publicat/std-mts98/>.

10. National Institute of Allergy and Infectious Diseases, National Institutes of Health, U.S. Department of Health and Human Services. (2004, July). *Health Matters — Chlamydia*. Author. Retrieved from <http://www.niaid.nih.gov/factsheets/stdclam.htm>.

11. Health Canada. (2003). *Canadian Perinatal Health Report, 2003*. Ottawa, ON: Author. Retrieved from <http://www.phac-aspc.gc.ca/publicat/cphr-rspc03/index.html>.

12. Maticka-Tyndale, E. (2001, Spring/Summer). Sexual health and Canadian youth: How do we measure up? *The Canadian Journal of Human Sexuality, 10(1–2)*, 1–17.

13. National Institute of Allergy and Infectious Diseases, National Institutes of Health. (2004, October). *Health Matters — Gonorrhea*. Author. Retrieved from <http://www.niaid.nih.gov/factsheets/stdgon.htm>.

14. Mayo Clinic. (2005, May). *Gonorrhea*. Retrieved from <http://www.mayoclinic.com/invoke.cfm?objectid=FC64ED83-AF70-46DB-94F95A992AAB7664&dsection=5>.

15. Mayo Clinic. (2005, May). *Chlamydia*. Retrieved from <http://www.mayoclinic.com/invoke.cfm?objectid=76877F15-F95F-44BB-85C8B47F756CBA49&dsection=6>.

16. University of Maryland Medical Center. *What are the causes of male infertility?* Retrieved from <http://www.umm.edu/patiented/articles/what_causes_of_male_infertility_000067_4.htm>.

17. Foster, W., & Beecroft, M.L. *Chemical exposures and human fertility*. Article on the Infertility Awareness Association of Canada website. Retrieved from <http://www.iaac.ca/english/articles/chemexp.asp>.

18. Myres, A. (2002). Vulnerable populations, critical pathways. *Health Policy Research Bulletin, 4*, 13–14. Retrieved from <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/bulletin/issue4.html#page13>.

19. International Birth Defects Information Systems. (2005). *Prevention of birth defects is before pregnancy*. Retrieved from <http://ibis-birthdefects.org/start/bdpregnancy.htm>.

20. Herrick, H. (2002). *Postpartum depression: Who gets help?* State Center for Health Statistics. Statistical Brief No. 24. Department of Health and Human Services, North Carolina Division of Public Health.

21. Astedt-Kurki, P., et al. (2002). Sociodemographic factors of families related to postnatal depressive symptoms of mothers. *International Journal of Nursing Practice, 8(5)*, 240–246.

22. Seyfried, L.S., & Marcus, S.M. (2003). Postpartum mood disorders. *International Review of Psychiatry, 15*, 231–242.

23. Milne, F., et al. (2005). Pre-eclampsia community guideline (PRECOG): How to screen for and detect onset of pre-eclampsia in the community. *British Medical Journal, 330*, 576–580.

24. Medline Plus. (2005). *Gestational diabetes*. Retrieved from <http://www.nlm.nih.gov/medlineplus/ency/article/000896.htm#Causes,%20incidence,%20and%20risk%20factors>.

25. Mayo Clinic. (2005, May). *Gestational diabetes*. Retrieved from <http://www.mayoclinic.com/invoke.cfm?id=DS00316>.

26. Beaulieu, M-D. (1994). Screening for gestational diabetes mellitus. In *The Canadian guide to clinical preventive health care*. Ottawa: Health Canada. Retrieved from <http://www.hc-sc.gc.ca/hppb/healthcare/pdf/clinical_preventive/s1c2e.pdf>.

27. Health Canada. (2004). *Special Report on Maternal Mortality and Severe Morbidity in Canada — Enhanced Surveillance: The Path to Prevention*. Ottawa: Author. Retrieved from <http://www.phacaspc.gc.ca/rhs-ssg/srmm-rsmm/pdf/mat_mortality_e.pdf>.

28. MacNab, Y.C., Macdonald, J., & Tuk, T.A. (1997, Autumn). The risks of childbearing at older ages. *Health Reports, 9(2)*, 41–50. Ottawa, ON: Statistics Canada.

29. National Cancer Institute. (2000). *Fertility drugs as a risk factor for ovarian cancer*. Retrieved from <http://cis.nci.nih.gov/fact/3_6.htm>.

30. Hannah, M.E. (2004). Planned elective cesarean section: A reasonable choice for some women? *Canadian Medical Association Journal, 170(5)*, 813–814.

31. Lippman, A. (2004, Summer/Fall). C-section on demand: Not just a matter of choice. Canadian Women's Health Network, *Network, 7(2/3)*, 4. Retrieved from <http://www.cwhn.ca/network-reseau/7-23/7-23pg4.html>.

32. Dennis, C.E. (2004). Preventing postpartum depression part I: A review of biological interventions. *Canadian Journal of Psychiatry, 49(7)*, 467–475.

33. Oates, M.R., et al. (2004). Postnatal depression across countries and cultures: A qualitative study. *The British Journal of Psychiatry, 184*, S10–S16.

34. World Health Organization. (1998). *Postpartum care of the mother and newborn*. Retrieved from <http://www.who.int/reproductive-health/publications/msm_98_3/postpartum_care_mother_newborn.pdf>.

35. Cooper, P.J., & Murray, L. (1998). Fortnightly review: Postnatal depression. *British Medical Journal, 316(20)*, 1884–1886.

36. Cooper, P.J., & Murray, L. (1997). Prediction, detection, and treatment of postnatal depression. *Archives of Disease in Childhood, 77*, 97–101.

37. Chen, C. (1996). Postpartum depression among adolescent mothers and adult mothers. *Kaohsiung Journal of Medical Science, 12(2)*, 104–113.

38. Windridge, K.C., & Berryman, J. (1999). Women's experiences of giving birth after 35. *Birth, 26(1)*, 16–23.

39. Reece, S.M. (1993). Social support and the early maternal experience of primiparas over 35. *Maternal-Child Nursing Journal, 21(3)*, 91–98.

40. Statistics Canada, Vital Statistics database.

41. Canadian Institute of Child Health. (2000). *The Health of Canada's Children, 3rd Edition*. Ottawa, ON: Author.

42. Canadian Institute for Health Information. (2004). *Giving Birth in Canada — A Regional Profile*. Ottawa, ON: Author. Retrieved from <http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=PG_306_E&cw_topic=306&cw_rel=AR_1106_E#full>.

43. Health Canada. (2002). *Congenital Anomalies in Canada — A Perinatal Health Report, 2002*. Ottawa, ON: Author. Retrieved from <http://www.phac-aspc.gc.ca/publicat/cac-acc02/>.

44. Sipos, A., et al. (2004, November). Paternal age and schizophrenia: A population based cohort study. *British Medical Journal, 329*, 1070, doi:10.1136/bmj.38243.672396.55.

45. In 2002, the federal government introduced the *Assisted Human Reproduction Act*. The Act, which became law on March 29, 2004, has three primary objectives: to prohibit unacceptable practices such as human cloning; to protect the health and safety persons making use of AHR procedures to build their family; and to provide a controlled environment in which research involving the *in vitro* embryo can take place. The Act will also establish the Assisted Human Reproduction Agency of Canada (AHRAC) to licence, inspect, and enforce activities controlled under the Act. With the *AHR Act* in place, there is now a mechanism by which the health and safety concerns associated with AHR, first raised by the Royal Commission, can be addressed. Regulatory development under the Act is under way and, once completed, the AHRAC will play an important role in ensuring that the health and safety objectives are met.

References for *The Net Effects of Delayed Reproduction* (p. 21)

1. Beaujot, R. (2004). Delayed life transitions: Trends and implications. *Contemporary Family Trends*. Ottawa, ON: The Vanier Institute of the Family.

2. Drolet, M. (2002). *Wives, Mothers and Wages: Does Timing Matter?* Catalogue No. 11F0019 No. 186. Ottawa, ON: Statistics Canada.

3. Drolet, M. (2003). Motherhood and paycheques. *Canadian Social Trends, 68*, 19–21.

4. Ravanera, Z. (1995). A portrait of the family life of young adults. In R. Beaujot, E.M. Gee, F. Rajulton & Z. Ravanera (Eds.), *Family over the Life Course*. Catalogue No. 91-543. Ottawa, ON: Statistics Canada.

5. Lochhead, C. (2000, Autumn). The trend toward delayed first childbirth: Health and social implications. *ISUMA: Canadian Journal of Policy Research, 1(2)*, 41–44.

6. Martin, S.P. (2000). Diverging fertility among U.S. women who delay childbearing past age 30. *Demography, 37*, 523–533.

7. Bianchi, S. (2000). Maternal employment and time with children: Dramatic change or surprising continuity? *Demography, 37(4)*, 401–414.

8. Beaujot, R., & Muhammad, A. (in press). Transformed families and the basis for childbearing. In K. McQuillan & Z. Ravanera (Eds.), *Family Transformation and Social Cohesion*. Toronto, ON: University of Toronto Press.

9. Bélanger, A. (2003). *Report on the Demographic Situation in Canada 2002*. Catalogue No. 91-209. Ottawa, ON: Statistics Canada.

10. Caldwell, J., & Schindlmayr, T. (2003). Explanations of the fertility crisis in modern societies: A search for commonalities. *Population Studies, 57(3)*, 241–264.

11. Nevitte, N. (1996). *The Decline of Deference*. Peterborough, ON: Broadview Press.

12. Lesthaeghe, R., & Neels, K. (2002). From the first to the second demographic transition: An interpretation of the spatial continuity of demographic innovation in France, Belgium and Switzerland. *European Journal of Population, 18(4)*, 325–360.

13. Ariès, P. (1980). Two successive motivations for the declining birth rate in the West. *Population and Development Review, 6(4)*, 645–650.

14. Giddens, A. (1991). *Modernity and Self-Identity: Self and Society in the Late Modern Age*. Cambridge, England: Policy Press.

15. Friedman, D., Hechter, M., & Kanazawa, S. (1994). A theory of the value of children. *Demography, 31(3)*, 375–401.

16. Schoen, R., Kim, Y.J., Nathanson, C.A., Fields, J., & Astone, N.M. (1997). Why do Americans want children? *Population and Development Review, 23(2)*, 333–358.

17. Van de Kaa, D. (2001). Postmodern fertility preferences: From changing value orientation to new behavior. *Population and Development Review, 27(Suppl.)*, 290–331.

18. Heuveline, P., Timberlake, J., & Furstenberg, F. (2003). Shifting childrearing to single mothers: Results from 17 Western countries. *Population and Development Review, 29(1)*, 47–71.

19. Kerr, D., & Beaujot, R. (2003). Child poverty and family structure in Canada, 1981–1997. *Journal of Comparative Family Studies, 34(3)*, 321–335.

20. Beaujot, R. (2000). *Earning and Caring in Canadian Families* (pp. 296–297). Peterborough, ON: Broadview Press.

21. Statistics Canada. (2001). *Population Projections for Canada and the Provinces and Territories, 2000–2026*. Catalogue No. 91-520. Ottawa, ON: Author.

22. McDaniel, S. (1986). *Canada's Aging Population*. Toronto, ON: Butterworths.

23. Beaujot, R., & Kerr, D. (2004). *Population Change in Canada* (pp. 179–205). Toronto, ON: Oxford.

24. Lutz, W., O'Neill, B., & Scherbov, S. (2003). Europe's population at a turning point. *Science, 299*, 1991–1992.

References for *Understanding Variation: Fertility Trends in Some Canadian Sub-Populations* (p. 24)

1. Statistics Canada, Health Statistics Division data.
2. Statistics Canada. (2004). Births, 2002. *The Daily*, Monday, April 19, 2004. Ottawa, ON: Author. Retrieved from <http://www.statcan.ca/Daily/English/040419/d040419.pdf>.
3. Canadian Broadcasting Corporation. (2003). *To the last fish: the codless sea.* Retrieved from <http://stjohns.cbc.ca/features/CodFisheries/>.
4. Payne, J. (2004). The impact of a reduced fertility rate on women's health. *BMC Women's Health, 4 (Suppl 1)*, S11. Retrieved from <http://www.biomedcentral.com/1472-6874/4/S1/S11>.
5. Piché, V., & Le Bourdais, C. (2003). *La démographie Québecoise : enjeux du XXI^e siècle.* Montréal, QC: Les Presses de l'université de Montréal.
6. Grindstaff, C. (1995, Winter). Canadian fertility 1951–1993: From boom to bust to stability? *Canadian Social Trends*, 12–16.
7. Milligan, K. (2002). *Quebec's Baby Bonus: Can Public Policy Raise Fertility?* C.D. Howe Institute Backgrounder.
8. Vissandjee, B., Desmeules, M., Cao, Z., Abdool, S., & Kazanjian, A. (2004). Integrating ethnicity and migration as determinants of Canadian women's health. *BMC Women's Health, 4(Suppl 1)*, S32. Retrieved from <http://www.biomedcentral.com/1472-6874/4/S1/S32>.
9. Bélanger, A., & Gilbert, S. (2003). The fertility of immigrant women and their Canadian-born daughters. In Statistics Canada, *Report on the demographic situation in Canada.* Catalogue No. 91-209-XPE. Ottawa, ON: Author.
10. Note on limitations on data: The information presented does not include First Nations data from Yukon or Northwest Territories, or Inuit data from Inuvialuit in the Northwest Territories or Nunavut. Currently, there is little Inuit specific health information and, with the exception of non-insured health benefits data, no Inuit health data are routinely collected and forwarded to Health Canada.
11. Statistics Canada, Demography Division. (2002). Total Fertility Rates of Registered Indians, Canada and Regions, 1974–2000 (observed), 2001–2021 (projected). Ottawa, ON: Author.
12. Health Canada, First Nations and Inuit Health Branch. (2003). *A Statistical Profile on the Health of First Nations in Canada.* Ottawa, ON: Author.
13. Health Canada. (2000). *Canadian Perinatal Health Report, 2000.* Ottawa, ON: Author.
14. Women's Health Bureau. (2003). Aboriginal women and healthy communities. *Health Policy Research Bulletin, 5*, 23–26. Retrieved from <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/bulletin/bulletin5.pdf>.
15. Carroll, D., & Benoit, C. (2001, Summer). Aboriginal midwifery in Canada: Blending traditional and modern forms. Canadian Women's Health Network, *Network, 4(3)*, 2. Retrieved from <http://www.cwhn.ca/network-reseau/4-3/4-3pg2.html>.
16. Smith, D. (2002). *Comprehensive Maternal Child Health Care in First Nations and Inuit Communities: A Discussion Paper.* Ottawa, ON: Office of Nursing Services, First Nations and Inuit Health Branch, Health Canada.

References for *Policy Implications of Delayed Reproduction and Low Fertility Rates* (p. 28)

1. Fougère, M. Personal communication. February 8, 2005.
2. Hogan, S. (2001). Aging and financial pressures on the health care system. *Health Policy Research Bulletin, 1(1)*, 5–8. Retrieved from <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/bulletin/bulletin.pdf>.
3. Milan, N. (2000). One hundred years of families. *Canadian Social Trends.* Catalogue No. 11-008, 2-12. Ottawa, ON: Statistics Canada.
4. Beaujot, R. (2004). Delayed life transitions: Trends and implications. *Contemporary Family Trends.* Ottawa, ON: The Vanier Institute of the Family. Retrieved from <http://www.vifamily.ca/library/cft/delayed_life.html>.
5. Ravanera, Z., & Rajulton, F. (2004). *Social Status Polarization in the Timing and Trajectories to Motherhood.* Discussion Paper 04-06. London, ON: Population Studies Centre, University of Western Ontario. Retrieved from <http://www.ssc.uwo.ca/sociology/popstudies/dp/dp04-06.pdf>.
6. Milligan, K. (2004). *Subsidizing the Stork: New Evidence on Tax Incentives and Fertility.* Monograph. Retrieved from <http://www.econ.ubc.ca/kevinmil/research/babies2004.pdf>.
7. Ravanera, Z., & Rajulton, F. (2004). *Bifurcation by Social Status in the Onset of Fatherhood.* Discussion Paper 04-04. London, ON: Population Studies Centre, University of Western Ontario. Retrieved from <http://www.ssc.uwo.ca/sociology/popstudies/dp/dp04-04.pdf>.
8. Statistics Canada. (1999). *Assets and debts held by family units.* From Survey on Financial Security. Retrieved from <http://www40.statcan.ca/l01/cst01/famil99a.htm>.
9. The Vanier Institute of the Family. (2004). *Profiling Canada's Families III.* Ottawa, ON: Author.
10. Morissette, R., & Johnson, A. (2004). *Earnings of couples with high and low levels of education, 1980–2000.* Analytical Studies Branch Research Paper Series, Statistics Canada. Retrieved from <http://www.statcan.ca:8096/bsolc/english/bsolc?catno=11F0019MIE2004230>.

11. Sauvé, R. (2004). The current state of Canadian family finances — 2003 report. *Contemporary Family Trends.* Ottawa, ON: The Vanier Institute of the Family. Retrieved from <http://www.vifamily.ca/library/cft/state03.html>.

12. Sauvé, R. (2005). The current state of Canadian family finances — 2004 report. *Contemporary Family Trends.* Ottawa, ON: The Vanier Institute of the Family. Retrieved from <http://www.vifamily.ca/library/cft/state04.html>.

13. Bongaarts, J. (2004). *Population Aging and the Rising Cost of Public Pensions.* Working Paper No. 185, Policy Research Division, Population Council. Retrieved from <http://www.popcouncil.org/pdfs/wp/185.pdf>.

14. Duclos, E., Lefebvre, P., & Merrigan, P. (2001, May). *A 'Natural Experiment' on the Economics of Storks: Evidence on the Impact of Differential Family Policy on Fertility Rates in Canada.* Working Paper No. 136. Montréal, QC: Centre for Research on Economic Fluctuations and Employment, Université du Québec à Montréal. Retrieved from <http://www.unites.uqam.ca/eco/CREFE/cahiers/cah136.pdf>.

15. Grant, J., et al. (2004). *Low Fertility and Population Ageing: Causes, Consequences, and Policy Options.* Report prepared for the European Commission. RAND Corporation. Retrieved from <http://www.rand.org/pubs/monographs/2004/RAND_MG206.pdf>.

16. Council of Europe. (2003). *Recent demographic developments in Europe, 2003.* Supplement on Country Data: Sweden. Belgium: Council of Europe Publishing. Retrieved from <http://www.coe.int/T/E/Social_Cohesion/Population/Demographic_Year_Book/2003_Edition/04%20Country%20Data/Member%20States/Sweden/Sweden%20General%20Page.asp>.

17. Caldwell, J., Caldwell, P., & McDonald, P. (2002). Policy responses to low fertility and its consequences: A global survey. *Journal of Population Research, 19(1)*, 1–24. Retrieved from <http://demography.anu.edu.au/Publications/popfutures/policy_responses_to_low_fertility.pdf>.

18. McCain, M.N., & Mustard, J.F. (1999). *Reversing the Real Brain Drain: Early Years Study Final Report.* Report of a study undertaken by the Canadian Institute for Advanced Research for the Premier of Ontario. Retrieved from <http://www.founders.net/ey/home.nsf/a811f0e8afbb2a7985256786003a3dd9/1e4ad2a677be034685256a4700737a3b/$FILE/early_years_study.pdf>.

19. Ranson, G. (1998). Education, work and family decision making: Finding the "right time" to have a baby. *Canadian Review of Sociology and Anthropology, 35(4)*, 517–533. Retrieved from <http://crsa.icaap.org/content/archives/35-4/35-4Ranson.pdf>.

20. Marmot, M. (2004). *The Status Syndrome: How Social Standing Affects Our Health and Longevity.* New York: Times Books.

21. Adams, M. (2003). *Fire and Ice: The United States, Canada and the Myth of Converging Values.* Toronto, ON: Penguin Canada.

References for *Using Canada's Health Data* (p. 36)

1. Last, J.M. (Ed.). (2001). *A Dictionary of Epidemiology, Fourth Edition.* New York: Oxford University Press.

2. Kirkwood, B.R. (1988). *Essentials of Medical Statistics.* Oxford, England: Blackwell Scientific Publications.

3. Morton, R.F., Hebel, J.R., & McCarter, R.J. (1990). *A Study Guide to Epidemiology and Biostatistics, 3rd Edition.* Rockville, MD: Aspen Publications.

4. Ducharme, M. (2002, October). A journey into statistical significance. *Health Policy Research Bulletin, 4*, 27–28. Retrieved from <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/bulletin/BULLETIN4.PDF>.

5. Heffner, L.J. (2004). Advanced maternal age: How old is too old? *New England Journal of Medicine, 351(19)*, 1927–1929.

6. Colton, T. (1974). *Statistics in Medicine.* Boston: Little, Brown and Company.

7. Lochhead, C. (2005, May). Growing disparities among first-time parents: 1971 to 1996. *Health Policy Research Bulletin, 10*, 11–14.

8. Probert, A., & Poirier, R. (2003, March). The health status of First Nations people in Canada. *Health Policy Research Bulletin, 5*, 6–10. (At p. 7.) Retrieved from <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/bulletin/bulletin5.pdf>.

9. Lochhead, C., & Schellenberg, G. (1999, November). *A Profile of Mothers and Fathers in Canada, 1971–1996.* Research report prepared for Health Policy Division, Health Canada, Ottawa, ON.

10. Stratton, E., & Gosselin, P. (2002, October). Surveillance: What is it? *Health Policy Research Bulletin, 4*, 25–26. Retrieved from <http://www.hc-sc.gc.ca/iacb-dgiac/arad-draa/english/rmdd/bulletin/BULLETIN4.PDF>.