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Introduction

The Canadian health system reflects the inherent complexity and diversity of a country covering the second largest landmass in the world (Figure 1). In addition to its original Aboriginal inhabitants and official language communities of French and English, the population is made up of immigrants, many recent, from virtually every part of the globe. Most live in large urban centers that hug the southern border with the United States but vibrant communities, some predating European colonization, are sprinkled throughout the ten provinces and three northern territories.

Not surprisingly, the Canadian health-care system reflects the country’s complexity and diversity. Indeed, it is misleading to use the term ‘system’ when in fact there are many health-care systems, sometimes operating simultaneously, within the same country. For this reason, intergovernmental cooperation among the federal, provincial, and territorial governments – along with significant

Figure 1  Source: Atlas of Canada, Natural Resources Canada.
nongovernmental health-care stakeholders – is so prominent in the financing, administration, and delivery of public health care in Canada. This article describes the political and administrative organization of health care in Canada, including its intergovernmental dimensions for conventional as well as alternative medicine and public health, and the relationship of each with conventional illness care. Since Canadians have played a major role in the development of the determinants of health approach to health policy internationally, this history is briefly recounted.

Political and Administrative Organization

The provinces and northern territories of Canada cover a land area of about 10 million km². Under the constitution of Canada, the provinces have the primary jurisdiction over health care. As a consequence, provincial governments are mainly responsible for the financing and administering of public health care in Canada. To enforce and uphold the Canada Health Act, the federal government makes cash transfers to the provinces, portions of which it can deduct from the transfers to provinces if they permit or encourage facilities or physicians to charge user fees for medically necessary and/or required services or breach the five broad principles of public administration, comprehensiveness, universality, portability, and accessibility as defined in the Canada Health Act (Figure 2).

While provincial governments play a dominant and direct role in the financing and administering of health care, they have a more arm’s-length role in the delivery of many public health-care services. Most physicians, for example, are responsible for their own private practices and clinics, and receive their remuneration through a fee schedule negotiated between these governments and the provincial medical associations. Most of the health professions are self-regulated under provincial government laws that set out a general framework under which the professions operate. Many health facilities, including nursing homes and other long-term care institutions, home care and community care organizations, medical laboratories, and diagnostic clinics are privately owned and administered. The majority are community-based not-for-profit organizations but some are private for-profit enterprises conducted on a commercial basis. Figure 3 illustrates the extent to which services are delivered privately in the Canadian system even when such services are publicly funded and administered.

Until recently, almost all hospitals in Canada were owned and administered at the local level by municipalities or private not-for-profit corporations, including religious-based organizations. However, some (but not all) of these hospitals have recently been subsumed by new public arm’s-length organizations known as regional health authorities (RHAs), which were established by the provinces beginning in the late 1980s. This change, commonly referred to as regionalization in Canada, involved the
| Funding | Administration | Delivery |
|---------|----------------|----------|
| **Public** Canada Health Act services (hospital and physician services plus) and public health services | Public taxation | Universal, single-payer provincial systems. Private self-regulating professions subject to provincial legislative framework | Private professional, private not-for-profit, private-for-profit, and public arm’s-length facilities and organizations |
| **Mixed** goods and service, including most prescription drugs, home care, and institutional care services | Public taxation, private insurance, and out-of-pocket payments | Public services that are generally welfare-based and targeted, private services regulated in the public interest by governments | Private professional, private not-for-profit and for-profit, and public arm’s-length facilities and organizations |
| **Private** goods and services including most dental and vision care as well as over-the-counter drugs and alternative medicines | Private insurance and out-of-pocket payments including full payments, co-payments, and deductibles | Private ownership and control; private professions, some self-regulating with public regulation of food, drugs, and natural health products | Private providers and private for-profit facilities and organizations |

*Figure 3* Matrix of funding, administration, and delivery. Reproduced from Marchildon GP (2005) Health systems in transition: Canada, p. 120. Brussels: World Health Organization on behalf of the European Observatory on Health Systems and Policies.
provincial governments carving up their respective territories into geographic regions and then creating RHAs to administer the delivery of a continuum of health services, from hospitals and nursing homes to home care and public health. As arm’s-length public organizations established under provincial law, RHAs have a mandate to meet the health needs of the populations within their boundaries as both purchasers and providers of services. The type and extent of services purchased from independent facilities or professionals vary considerably among RHAs and among provinces. As can be seen in Table 1, the population size of RHAs varies considerably from province to province.

Although the provincial governments are responsible for administering most public health care in Canada, the federal government nonetheless plays a critical role in health care beyond upholding the broad principles and conditions under the Canada Health Act. These other activities include: funding health research; collecting health data through Statistics Canada; financing and administering health services for First Nations people and Inuit, inmates of federal penitentiaries, war veterans, and active members of the Canadian armed forces and the Royal Canadian Mounted Police; as well as regulating the pharmaceutical and natural health products industries.

In 2000, the federal government replaced the Medical Research Council with the Canadian Institutes of Health Research (CIHR), which in turn, is made up of 13 funding bodies supporting research on Aboriginal peoples’ health, aging, cancer, circulatory and respiratory disease, gender, genetics, health services/policy, human development, children/youth, infection/immunity, metabolism and diabetes, neurosciences/mental health/addiction, and population and public health. Through CIHR funding of both investigator-driven as well as more government-driven strategic research, the federal government’s objective is to put Canada in the top five health research nations in the world.

### Table 1  Regionalization reforms in Canada, 1989–2005

| Province or territory | Total population (in thousands) | (Established) changed (year) | Current number of RHAs | Range in population size of RHAs (2005) |
|-----------------------|---------------------------------|-----------------------------|------------------------|----------------------------------------|
| British Columbia      | 4196                            | (1997) 2001                 | 5 (16)                 | 1 314 635 → 285 560                     |
| Alberta               | 3202                            | (1994) 2003                 | 9                      | 1 042 855 → 66 005                      |
| Saskatchewan          | 995                             | (1992) 2001–02              | 13                     | 272 195 → 2125                          |
| Manitoba              | 1170                            | (1997–98) 2002              | 11                     | 622 015 → 955                           |
| Ontario               | 12 393                          | 2005                        | 14                     | 1 356 500 → 234 000                     |
| Québec                | 7 543                           | (1989–92) 2003              | 18                     | 1 782 835 → 9600                        |
| Nova Scotia           | 937                             | (1996) 2001                 | 9                      | 398 038 → 33 165                        |
| New Brunswick         | 751                             | (1992) 2002                 | 8                      | 179 840 → 29 325                        |
| Prince Edward Island  | 137                             | (1993–94) 2005              | 0                      | –                                      |
| Newfoundland and Labrador | 517                            | (1994) 2003–04               | 6/4/2                   | 295 145 → 40 516                        |
| Northwest Territories | 43                              | (1997–98) 2002              | 8                      | 18 115 → 2441                          |

Reproduced from Marchildon GP (2005) Health systems in transition: Canada, p. 28. Copenhagen: World Health Organization on behalf of the European Observatory on Health Systems and Policies.

### Nonbiomedical Alternative Medicines and Approaches to Health

In Canada as in the United States, it has been customary to include alternative nonbiomedical medicines and approaches, including traditional Chinese medicines and acupuncture as well as native Canadian (Aboriginal) healing practices, with less mainstream biomedical therapies such as chiropractic and psychological therapies in a single category known as complementary and alternative medicine (CAM). The first category of therapies in particular share four common characteristics: (1) they are presumed to work in conjunction with the body’s own self-healing mechanisms; (2) they are holistic in the sense that they treat the whole person; (3) they try to involve the individual as an active participant in the healing process; and (4) they tend to focus on prevention and well-being as much as on treatment (Achilles et al., 1999).

Most nonbiomedical treatments and approaches, including nutritional and herbal medicinal products and therapies, are paid for and delivered privately, outside the public health-care system. The further west one travels in Canada, the more popular are nonbiomedical therapies. In addition, the intensity of their use is correlated with individuals with higher income and higher education, and with women more than men (McFarland et al., 2002). In 2004, the federal government, through the Natural Health Products Directorate in Health Canada, began regulating and approving traditional herb products, vitamins and mineral supplements, and homeopathic preparations.

### Intergovernmental Collaboration in Health Regulation, Planning, and Policy

Relative to Australia, Germany, and the United States, Canada is a relatively decentralized federation. As a
consequence, Canadian governments at the federal and provincial levels have been highly reliant on intergovernmental collaboration to administer, deliver, and reconfigure public health care. At the apex of this collaboration is the Conference of Federal-Provincial-Territorial Ministers of Health as well as a mirror committee of deputy ministers of health (O’Reilly, 2001). In addition to this committee structure, intergovernmental organizations with specific health-care mandates and varying degrees of independence from their sponsoring governments have been established in recent years.

The federal government regulates the safety of food and pharmaceutical products through Health Canada and the Food and Drugs Act, and the prices of patented pharmaceutical products through the Patented Medicine Prices Review Board. Since the provincial governments operate their own prescription drug programs, most of which are categorical programs targeting seniors and the poor, they in turn attempt to control cost by limiting the number and type of pharmaceuticals placed on provincial formularies. A minority of provinces have instituted reference-based pricing policies, in which only the lower-cost therapeutic alternative is subsidized in full by the provincial drug plan. To manage the jurisdictional and policy overlaps in pharmaceutical regulation, the federal and provincial governments work through an intergovernmental body known as the Canadian Agency for Drugs and Technologies in Health (CADTH). Conducting clinical- and cost-effectiveness studies under a Common Drug Review, CADTH makes formulary listing recommendations to all provincial governments with the exception of Quebec. Through the Canadian Optimal Medication Prescribing and Utilization Service, CADTH promotes evidence-based best practices in pharmaceutical prescribing and use. Finally, CADTH conducts a major health technology assessment program for a broad range of prescription drugs, medical devices, and other similar health technologies to assist all jurisdictions in decisions concerning the purchase of new health technologies on the basis of both clinical and cost-effectiveness.

The Canadian Institute for Health Information (CIHI) was established in 1994 to coordinate the gathering and dissemination of health data previously done by jurisdictions in isolation of each other. CIHI’s core functions include identifying national health indicators, coordinating the development and maintenance of national information standards, developing and managing health databases and registries, as well as conducting and disseminating basic research and analysis. In its work, CIHI cooperates closely with Statistics Canada, a federal government agency which enjoys an international reputation for the gathering and dissemination of population health data.

Since the late 1990s, Canadian governments have collaborated in the establishment of a number of new intergovernmental health organizations. These include Canadian Blood Services, which was set up by the provinces and territories in response to a major “tainted blood” controversy surrounding the safety of the country’s blood supply as then managed by the Canadian Red Cross. Established in 2001, Canada Health Infoway emerged out of the desire of federal, provincial, and territorial ministers of health to accelerate the development of electronic health records in all jurisdictions. In 2003, the Health Council of Canada was created to provide both an assessment of progress in priority areas of health reform, as identified by the prime minister and the premiers of the provinces and territories, as well as make recommendations for future health reform on a national basis. Beginning its work in 2005, the Canadian Patient Safety Institute was established to provide systematic evidence on medical errors and initiate change to improve patient safety throughout Canada.

Health Care Expenditures and Financing

As can be seen in Figure 4, approximately 70% of health expenditures are channeled through the public system while a further 30% are funneled through the private sector. Of the C$142 billion spent on health in 2005, approximately C$99 billion was public health care financed and administered by the provincial and federal governments. Of this sum, roughly C$56 million was spent on medically necessary or required hospital and physician services. As insured services under the Canada Health Act, they are made universally available to all Canadians without user fees on the same terms and conditions.

Total health-care expenditures have now reached 10% of Canada’s gross domestic product. As can be seen in Table 2, much of this growth can be attributed to mixed and private (i.e., non-Canada Health Act) goods and services including prescription drugs, home care services, long-term institutional services including nursing homes for seniors, dental services, vision care, as well as nonmedical goods and services. Whereas the first three categories of services may be subsidized by provincial governments for some of their residents, the other categories of health services and products are largely provided through the market and paid for through a combination of private insurance and out-of-pocket payments by consumers.

Almost all public health-care expenditures are financed through general government taxation at both the provincial and federal levels of government. Private health care is paid for out-of-pocket or through private insurance, the majority of which is employment-based. Unlike ‘voluntary’ health insurance in many other countries, private health insurance in Canada is generally part of a fixed (i.e., nonvoluntary) benefit package negotiated through a collective agreement between employers and employees. Private health insurance benefits generally
target dental care, vision care, and prescription drugs (Figure 5) (Marchildon, 2005).

**Public Health in Canada’s Public Health Care System**

Public health can be defined as the science and art of promoting health, preventing disease, and prolonging life through policies and programs that focus on the population as a whole. The implicit contrast is with health-care policies, the main focus of which is on treating already ill or injured individuals. Today, public health in Canada is generally identified with six discrete functions: (1) disease and injury control at the population level, (2) health protection at the population level, (3) emergency preparedness and response, (4) surveillance, (5) population health assessment, and (6) health promotion.
Before the introduction of universal hospital insurance in the 1950s, and universal physician care insurance in the 1960s – together referred to as Medicare – public health programs and services, at least those concerned with infectious disease control and public health and safety, constituted the main health-care responsibilities of all governments in Canada. This was reflected in the names of the departments that emerged in the early twentieth century – almost all were officially designated as departments of public health. At the same time, however, the work of such departments was largely limited to treating and preventing infectious diseases on a population basis as well as recording vital statistics such as births and deaths.

With the introduction of Medicare, the responsibilities of departments and ministers of public health were greatly expanded. At the same time, the provincial departments of health, as they were renamed, increasingly assumed the public health responsibilities of cash-strapped and tax-poor municipalities. Only larger urban centers in Canada were able to provide their inhabitants with public health services including infectious disease control and the administration and enforcement of health and safety standards.

The definition of public health, and along with it the role of government, did not change or expand fundamentally until the emergence of the determinants of health approach in the 1970s and 1980s, and the introduction of regionalization in most provinces in the 1990s. Although health scholars and program decision makers were aware of the impact of living standards, education, employment, and healthy lifestyles on health outcomes, as well as the elimination of financial barriers to Medicare for all necessary treatment and the marginal influence of illness care on the ultimate health of a population, it took considerable time for the full policy implications of this basic insight to be systematically examined.

The Lalonde Report and the Ottawa Charter: New Approaches to Health Determinants?

In 1974, Marc Lalonde, the federal minister of the Department of National Health and Welfare, released a working report entitled *A New Perspective on the Health of Canadians* (Lalonde, 1974). Although it attracted little media attention at the time, the four-quadrant health field concept at the center of the Lalonde report would prove to be exceptionally influential not only in Canada but throughout the world, in large part because of its emphasis on the impact of lifestyle and environmental factors as major determinants of health alongside the long-emphasized factors of human biology and health care. The Lalonde report was the product of a group of policy thinkers in the Long Range Health Planning Branch of the federal department of health. For its eight-year existence, the branch operated more like a think tank than a bureaucratic unit within government (McKay, 2000).

The reasoning behind the Lalonde Report was subsequently used to support the federal government’s decision to loosen the conditions on transfer funding in 1977 and to reduce the rate of growth of such transfers by the early 1980s. At the same time, a new Health Promotion Directorate within the federal Department funded and supervised cost-shared projects with citizen groups to pilot the new approach to health determinants. Although the projects at the local, regional, and national level initially focused on encouraging lifestyle changes, they eventually targeted larger societal and structural changes. This work had a profound impact on Health and Welfare Canada’s Framework for Health Promotion as well as the major contributions of Canada to the World Health Organization’s first international conference on health promotion and the release of the Ottawa Charter for Health
Promising, both of which appeared in 1986 (Epp, 1986; Boyce, 2002). Despite these advances, Canada’s more traditional system of public health remained highly fragmented, poorly coordinated, and poorly funded by federal, provincial, and local governments. As a consequence, it did not fare well when faced with its first major crisis of the twenty-first century.

The SARS Crisis and the Establishment of the Public Health Agency of Canada

In 2003, Canadians were caught by surprise with a major outbreak of severe acute respiratory syndrome, or SARS. By August of that year, there were 400 probable and suspect SARS cases in Canada, as well as 44 deaths in the greater Toronto area. Health-care workers were among the most vulnerable and three of the 100 SARS-infected health-care workers ultimately died. As the hardest-hit country outside of the Asian continent, Canada became the focus of international attention, with the World Health Organization recommending against nonessential travel to Toronto for almost a month during the worst part of the crisis.

As a consequence of the problems of coordination and communication associated with the public health response by the city of Toronto and the governments of Ontario and Canada, Health Canada established a National Advisory Committee on SARS and Public Health chaired by Dr. David Naylor of the University of Toronto. The mandate of the Naylor Committee went beyond recommendations on how to organize responses to infectious diseases crises in the future to providing directional recommendations on the future of public health in Canada. Influenced by the coordinating function of the Centers for Disease Control and Prevention (CDC) in the United States, the Naylor Committee recommended the establishment of a national public health agency in Canada (Health Canada, 2003). The federal government established the Public Health Agency of Canada (PHAC) in 2004. Although created as a government department separate from Health Canada, PHAC reports directly to the federal Minister of Health and is headed up by a Chief Public Health Officer. Although cities, provincial governments, and RHAs have long had chief public health officers, this was the first national officer for the country as a whole.

PHAC’s internal organization is illustrated in Figure 6. The Scientific Director General is responsible for strengthening the Agency’s scientific networks externally as well as coordinating scientific research and scientific policy throughout the Agency. The Infectious Disease and Emergency Preparedness Branch is responsible for enabling the prevention and control of infectious diseases on a national basis as well as improving the health of Canadian residents actually infected. This branch ensures that PHAC is ready to respond to public health emergencies including pandemic influenza, HIV/AIDS, West Nile virus infection, Creutzfeldt-Jakob disease, food- or waterborne disease, and other diseases and outbreaks at all times. To meet PHAC’s emergency preparedness mandate, the Branch administers five national laboratory and response centers: (1) Centre for Infectious Disease Prevention and Control; (2) Centre for Emergency Preparedness and Response; (3) National Microbiology Laboratory; (4) Laboratory for Foodborne Zoonoses; and (5) Pandemic Preparedness Secretariat (Figure 7).

The Health Promotion and Chronic Disease Prevention Branch works with numerous stakeholders to facilitate leadership in health promotion, surveillance, chronic disease control and prevention, and evaluation of existing programs. To help achieve this objective, this branch administers the Centre for Chronic Disease Prevention and Control and the Centre for Health Promotion. The Public Health Practice and Regional Operations Branch provides strategic direction in public health surveillance on a national basis while helping build public health capacity at the regional level.

Health Status and Health System Outcomes

Based upon a number of indicators, Table 3 illustrates the growing improvement in the health of the Canadian population. Since 1970, life expectancy has risen dramatically for both men and women and infant mortality has dropped significantly. In terms of two indicators – potential years of life lost and life expectancy at birth – Canada is ranked among the very top of the Organisation for Economic Co-operation and Development (OECD) nations. At the same time, Canada’s perinatal mortality rate is more in the middle of OECD countries: by way of illustration, it is

| Environment | Lifestyle |
|-------------|----------|
| Aspects of physical and social environment over which individual has little or no control | Personal decisions and risks over which individual has control |

| Human biology | Health organizations |
|---------------|----------------------|
| Aspects of physical and mental health that are a result of organic make-up | The institutional arrangements governing the provision of health services: access and quality |
better than the rates in France, the United Kingdom, and the United States but poorer than those in Sweden and Australia (OECD, 2005).

Outcomes in terms of disease indicators are more mixed. Whereas the rate for circulatory disease has seen a major decline, and respiratory disease rates have fallen appreciably, overall cancer rates have barely declined. Infectious diseases have actually increased and mental disorders have increased dramatically. In a comparison with other OECD countries, Canada ranks high in terms of cerebrovascular diseases but ranks closer to the mid-range of 30 OECD countries for respiratory disease, heart disease, and cancer (OECD, 2005).

As the Lalonde Report points out, many if not most of the factors influencing health are outside the health-care system. Lifestyle and environmental factors both play a significant role in shaping an individual's diet as well as risky behaviors in terms of alcohol, tobacco, and other drug consumption. As Table 4 shows, tobacco consumption has fallen by almost 50% since the early 1980s, a result in part of aggressive antitobacco initiatives by the federal and provincial governments and fundamental changes in attitudes and lifestyle behaviors by Canadians. Though not as dramatic, alcohol consumption has also fallen over the same period, again in part the result of attitudinal and behavioral changes. However, Canadians

### Table 3  Life expectancy and mortality indicators, Canada, 1970–2000

|                         | 1970 | 1980 | 1990 | 2000 |
|-------------------------|------|------|------|------|
| Life expectancy (Females at birth – years) | n/a  | 78.9 | 80.8 | 82   |
| Life expectancy (Males at birth – years) | n/a  | 71.7 | 74.4 | 76.7 |
| Life expectancy (Total population at birth – years) | n/a  | 75.3 | 77.6 | 79.4 |
| Infant mortality (Deaths/1000 live births) | 18.8 | 10.4 | 6.8  | 5.3  |
| Maternal mortality (Deaths/100 000 live births) | 20.0 | 8    | 2.5  | 3.4  |
| Potential years of Lost Life (Per 100 000, aged 0–74) | n/a  | 6250 | 4716 | 3571 |
| All malignant neoplasms (Deaths/100 000 pop.) | 183.4 | 185.8 | 191.7 | 175.7 |
| Lung cancer (Deaths/100 000 pop.) | 30.5 | 42.9 | 51.1 | 46.9 |
| Prostate cancer (Deaths/100 000 pop.) | 24.0 | 25.7 | 30.1 | 24.6 |
| Breast cancer (Deaths/100 000 pop.) | 30.2 | 29.7 | 31.3 | 24.5 |
| Colorectal cancer (Deaths/100 000 pop.) | 30.9 | 25.0 | 21.1 | 17.1 |
| Digestive diseases (Deaths/100 000 pop.) | 31.8 | 32.5 | 24.7 | 21.3 |
| All circulatory disease (Deaths/100 000 pop.) | 488.4 | 379.1 | 260.7 | 191.5 |
| Acute myocardial infarction (Deaths/100 000 pop.) | n/a  | 139.9 | 86.1 | 52.1 |
| Cerebrovascular disease (Deaths/100 000 pop.) | 100.8 | 70.2 | 47.6 | 37.8 |
| Ischemic heart diseases (Deaths/100 000 pop.) | 309.4 | 231.8 | 154.2 | 108.5 |
| Respiratory disease (Deaths/100 000 pop.) | 64.7 | 52.3 | 55.9 | 44.3 |
| Pneumonia and influenza (Deaths/100 000 pop.) | 36.1 | 22.3 | 22.0 | n/a  |
| Infectious and parasitic disease deaths (Deaths/100 000 pop.) | 7.0  | 3.6  | 7.8  | 8.3  |
| HIV (Deaths/100 000 pop.) | n/a  | n/a  | 3.2  | 1.4  |
| Mental and behavioral disorders (Deaths/100 000 pop.) | 2.7  | 6.1  | 9.6  | 13.6 |
| External causes (Deaths/100 000 pop.) | 70.9 | 65.5 | 46.9 | 38.2 |

Reproduced from Marchildon GP (2005) Health systems in transition: Canada, p. 13. Brussels: World Health Organization on behalf of the European Observatory on Health Systems and Policies.
have been increasing their intake of calories, apparently the result of greater reliance on prepared foods from both supermarkets and restaurants, which tend to have higher fat content. As a consequence, the rate of obesity has also gradually climbed, particularly among children and teenagers (CIHI, 2004).

**Conclusion and Assessment**

Canada's relatively high ranking in terms of health status is due to a number of factors including relatively low disparities in socioeconomic status and access to health care. When compared to the United States, in particular, both factors – socioeconomic status as measured by income, education, and occupation, and access based on medical rather than income – combine to produce better health outcomes (Lasser et al., 2006). However, the poor health status associated with the majority of Canada's Aboriginal peoples, many of whom are economically, geographically, and socially marginalized, has nonetheless resulted in an enormous health disparity within the Canadian population (Adelson, 2005).

In terms of health-care organization, Canada is in the mid-range of OECD countries in terms of the extent to which its system is publicly financed and administered. During the early to mid-1990s, access to, and the quality of, some health services were impaired as a result of government budget cutbacks. As a consequence, public confidence in the system was eroded although most Canadians remained committed to the solidarity principles underlying Medicare (Romanow, 2002). Since the late 1990s, both federal and provincial governments have been reinvesting in public health care in an effort to improve quality and reduce waiting time. As a consequence, as can be seen in Table 5, patient satisfaction has improved, albeit gradually.

This public reinvestment in health care has triggered concerns about the fiscal sustainability of Medicare. In reality, most of the cost drivers appear to be in the mixed and private categories of health services rather than Medicare services. In particular, the growth of private and public prescription drug plans has been in excess of double the rate in growth of hospital and physician expenditures. Despite this, most media and think tank commentators continue to focus on Medicare, occasionally suggesting alternatives to the current single-payer model of administration. These arguments were given considerable political support in a recent Supreme Court of Canada judgment. In the now famous Chaoulli case, the court concluded that the Quebec government's prohibition on private insurance for Medicare services violated the province's Charter of Rights in a situation in which a patient waits an unreasonable amount of time for elective surgery. While the decision is not likely to lead to private, multipayer insurance for Medicare services, it has fueled the ongoing debate concerning the appropriate divide between the public and the private sector in financing, administration, and delivery of health care in Canada.

**See also:** Health Systems of Mexico, Central America and the Caribbean; United Kingdom, Health System of; United States, Health System of.

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**Table 4** Factors influencing the Health Status of Canadians, 1981, 1991 and 2001

|                | 1981 | 1986 | 1991 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|----------------|------|------|------|------|------|------|------|------|------|------|
| Total calories intake (per capita) | 2337 | 2411 | 2356 | 2585 | n/a  | 2715 | 2725 | 2732 | 2757 | 2788 |
| Alcohol consumption (liters per capita, 15+) | 97.8 | 92.2 | 83.4 | 77.8 | 78.5 | 79.8 | 80.8 | 81.2 | 80.6 | 81.1 |
| Daily smokers (% of pop.) | 32.8 | 28.3 | 25.9 | 24.5 | 23.8 | 23.7 | 20.9 | 19.8 | 18.0 | 17.8 |
| Obese population (% of total pop. BMI > 0 kg/m²) | n/a  | n/a  | 12.2 | 12.2 | 14.6 | n/a  | 14.5 | n/a  | 14.9 | 14.9 |

Reproduced from Marchildon GP (2005) Health systems in transition: Canada, p. 17. Brussels: World Health Organization on behalf of the European Observatory on Health Systems and Policies.

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**Table 5** Satisfaction of Canadians with health care and/or health system

| Province or territory | 2001-% Excellent or good | 2003-% Excellent or good |
|-----------------------|---------------------------|--------------------------|
| British Columbia      | 84.0                      | 82.8                     |
| Alberta               | 83.6                      | 85.7                     |
| Saskatchewan          | 85.6                      | 88.4                     |
| Manitoba              | 80.3                      | 85.6                     |
| Ontario               | 84.5                      | 87.1                     |
| Quebec                | 85.0                      | 89.0                     |
| New Brunswick         | 82.8                      | 86.9                     |
| Nova Scotia           | 85.3                      | 87.3                     |
| Prince Edward Island  | 89.6                      | 88.6                     |
| Newfoundland and Labrador | 88.9                  | 86.1                     |
| Yukon                 | 81.7                      | 85.3                     |
| Northwest Territories | 80.5                      | 79.1                     |
| Nunavut               | 70.8                      | 77.1                     |
| Canadian average      | 84.4                      | 86.8                     |

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Cancer and Senescence

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Increased Risk of Cancer Development with Aging

The adult human body consists of approximately 60 trillion cells. The rate of proliferation and growth of this vast number of cells are under strict regulation and are highly coordinated. However, in rare cases, a few cells in a particular organ escape this tight regulation of growth, start uncoordinated proliferation, acquire invasive and metastatic properties, and become cancerous. The incidence of cancer rises exponentially with age in humans (Ries et al., 2006). As shown in Figure 1, until age 35, the incidence of cancer is 0.2% in the general population. This incidence rises to about 1.5% at ages 50–60. The maximum incidence of cancer, which is close to 5%, occurs between ages 70 and 80. Therefore, cancer tends to develop after 50 years of age, which is halfway from the 100th year, the maximum lifespan of humans. In addition, women tend to have twice the incidence of cancer at age 30–50 than men, although this trend reverses after age 50. After age 85, there tends to be a slight decline in the incidence of cancer.

The genetic basis of this increased incidence of cancer with age is unclear. Recent progress in aging and cancer research suggests that errors accumulated in DNA during each round of replication, together with several other genetic and epigenetic factors, are involved in the increased risk of cancer with advanced age. In addition to genetic factors such as the accumulation of mutations in DNA, epigenetic factors, such as methylation of DNA and acetylation or deacetylation of histones, which do not affect DNA sequence per se, but change the expression of genes, also contribute to various diseases, including cancer (reviewed in Jones and Laird, 1999). Other factors that may contribute to the age-dependent increase in cancer incidence are DNA

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July, until age 35, the incidence of cancer is 0.2% in the general population. This incidence rises to about 1.5% at ages 50–60. The maximum incidence of cancer, which is close to 5%, occurs between ages 70 and 80. Therefore, cancer tends to develop after 50 years of age, which is halfway from the 100th year, the maximum lifespan of humans. In addition, women tend to have twice the incidence of cancer at age 30–50 than men, although this trend reverses after age 50. After age 85, there tends to be a slight decline in the incidence of cancer.

The genetic basis of this increased incidence of cancer with age is unclear. Recent progress in aging and cancer research suggests that errors accumulated in DNA during each round of replication, together with several other genetic and epigenetic factors, are involved in the increased risk of cancer with advanced age. In addition to genetic factors such as the accumulation of mutations in DNA, epigenetic factors, such as methylation of DNA and acetylation or deacetylation of histones, which do not affect DNA sequence per se, but change the expression of genes, also contribute to various diseases, including cancer (reviewed in Jones and Laird, 1999). Other factors that may contribute to the age-dependent increase in cancer incidence are DNA