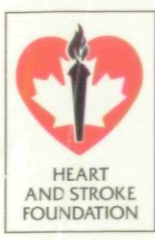




# ARDIOVASCULAR DISEASE IN CANADA

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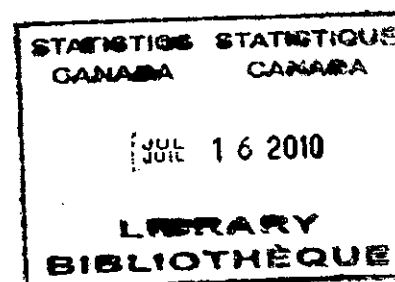
1991





# **CARDIOVASCULAR DISEASE IN CANADA**

**1991**



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## **1. INTRODUCTION**

Cardiovascular disease (CVD) is a major cause of death, disability and illness in Canada. Although mortality rates have declined in recent decades, cardiovascular disease still remains a great burden on the health of Canadians.

Cardiovascular disease is a broad group of conditions, the major components of which are ischemic heart disease and stroke (Figure 1). In **ischemic heart disease (IHD)**, the heart muscle has been damaged by reduced blood supply (ischemia) most often due to arteriosclerosis or "hardening" of the arteries that supply the heart muscle. Ischemic heart disease is most often manifested as angina (temporary chest pain precipitated by effort or excitement) or **acute myocardial infarction (AMI - "heart attack")**. **Other ischemic heart disease** includes chronic ischemic heart disease and sudden death. In **stroke**, an area of the brain has been damaged by a sudden decrease in the blood supply or by hemorrhage. **Other cardiovascular diseases** include arrhythmias (disturbance of heart rhythm), hypertension (high blood pressure), valvular heart disease (conditions of the heart valves), and peripheral vascular disease (that affecting the arteries and veins).

In recent years, considerable progress has been made in identifying the multiple factors that place individuals at risk of developing cardiovascular disease. Successful programs of prevention have demonstrated that through the modification of these risk factors, death and illness from cardiovascular disease can be reduced.

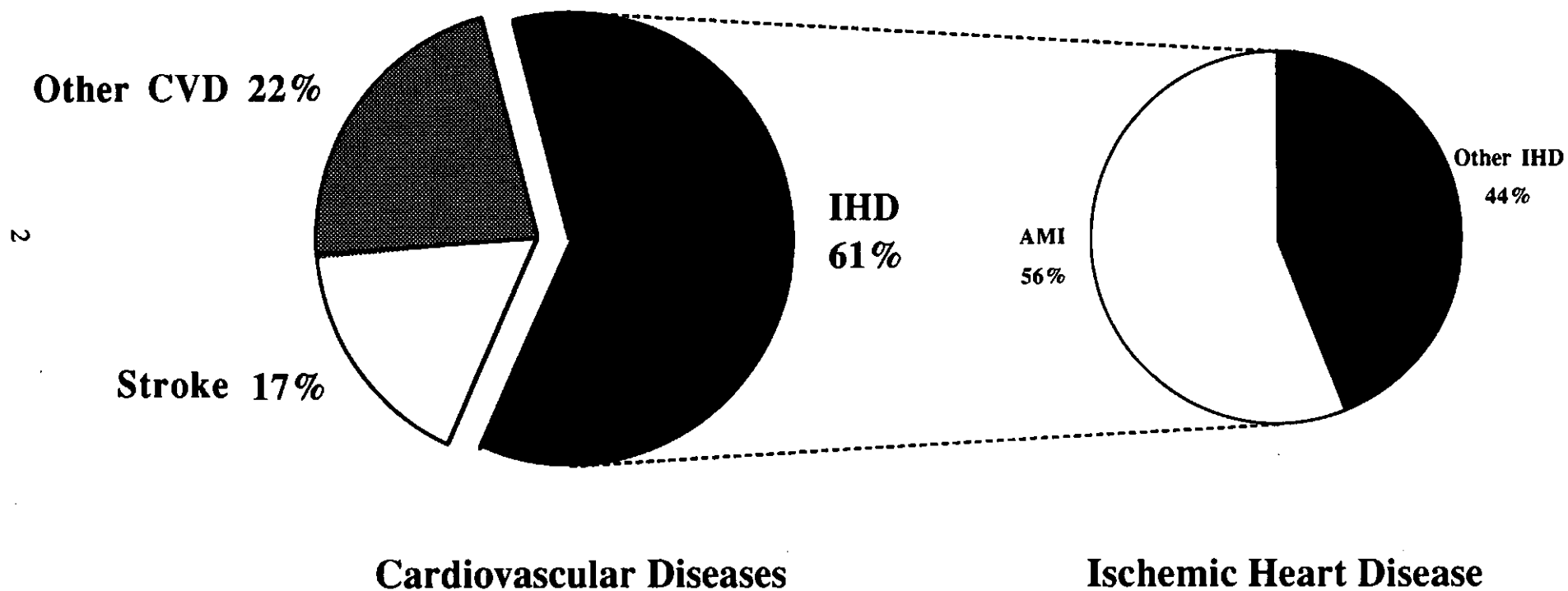
The purpose of this booklet is to provide both the public and health professionals with an overview of the patterns of cardiovascular disease in Canada. It will outline the pattern of mortality, disability, and the use of the health care system due to this disease, and will examine its economic impact. A discussion of the risk factor distribution in Canada will illustrate the scope for cardiovascular disease prevention.

This publication has been sponsored by the Heart and Stroke Foundation of Canada and developed collaboratively by Health and Welfare Canada, Statistics Canada, and the Saskatchewan Heart and Stroke Foundation Epidemiology Unit at the University of Saskatchewan. It is the first issue of what is planned as an annual publication on cardiovascular disease in Canada.

The data are the most recent available, but are not necessarily those of the same year. The source and date of the data in each section are therefore clearly indicated. Age-standardization for international comparisons has been to the 1976 world population, whereas for all Canadian comparisons age-standardization has been to the 1981 population of Canada.

A glossary of technical terms is included (p. 30 - 31) to facilitate use of this publication. Please refer to it as required as you read through this document.

**FIGURE 1**  
**Categories of Cardiovascular Disease**  
**Percent Mortality, Canada, 1988**



SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>1</sup>

## **2. DEATHS FROM CARDIOVASCULAR DISEASE**

### **2.1 The Leading Causes of Death**

Forty-one percent (41%) of all deaths in Canada in 1988 were due to cardiovascular disease (Figure 2)<sup>1</sup>. Ischemic heart disease accounts for twenty-five percent (25%) of all deaths, of which over half are attributable to acute myocardial infarction. Stroke and other cardiovascular disease are responsible for seven (7%) and nine (9%) percent of deaths respectively in Canada.

One quarter of individuals suffering an acute myocardial infarction die suddenly before admission to hospital<sup>5</sup>. Seventeen percent (17%) of those admitted die before discharge and up to twenty-seven percent (27%) die within the first year<sup>3</sup>. Thus, although improved treatment services can be expected to produce reductions in the number of deaths from cardiovascular disease, a great impact could be expected from reducing the incidence of the disease in the first instance<sup>7</sup>.

### **2.2 International Comparisons**

Cardiovascular disease is the leading cause of death world-wide, but rates vary considerably between countries. In the mid-1980's, age standardized mortality (death) rates for males ranged from 496 deaths per 100,000 population in Romania to a low of 174 deaths per 100,000 in Japan<sup>1</sup> (Figure 3). Canada's rate (1986) was 264 per 100,000. If Canada were to attain the cardiovascular disease death rate of France (210 per 100,000), an estimated 8,800 deaths among males and 6,600 deaths among females might be avoided annually<sup>11</sup>. Among the 15 selected countries, Canada's mortality rates from ischemic heart disease are relatively high, whereas those from stroke are among the lowest (Figure 4).

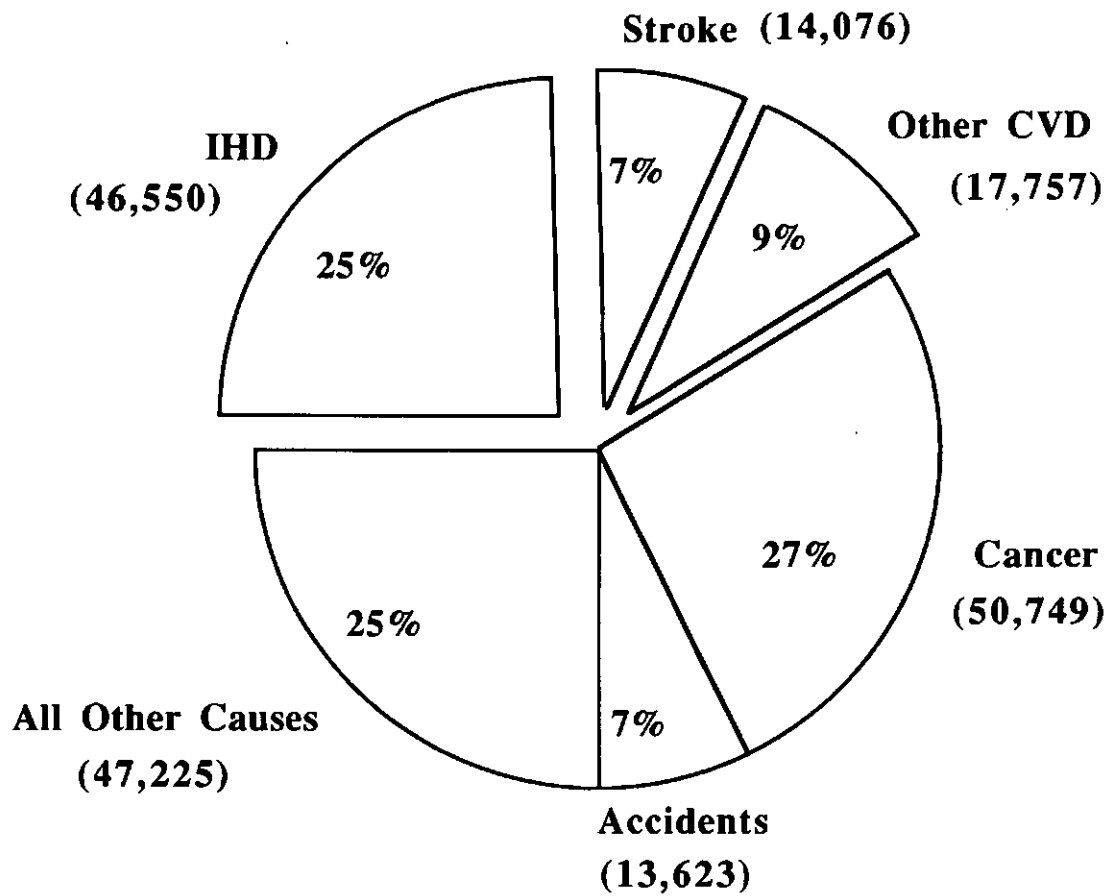
A number of factors may account for international differences in death rates: genetic predisposition, the amount and type of fat in the diet, the amount of fish and fibre in the diet, smoking habits, and the prevalence of high blood pressure in the population. Much of the difference, however, remains unexplained.

### **2.3 Age and Sex Specific Death Rates**

Gender differences in cardiovascular disease are well documented. Males experience almost twice the death rates of females in all categories of cardiovascular disease except stroke, for which the rates are approximately equal (Table 1). Research suggests that normal estrogen levels in premenopausal women confer protective benefit against the development of ischemic heart disease. In the decades following the menopause, ischemic heart disease death rates of women approach those of men.

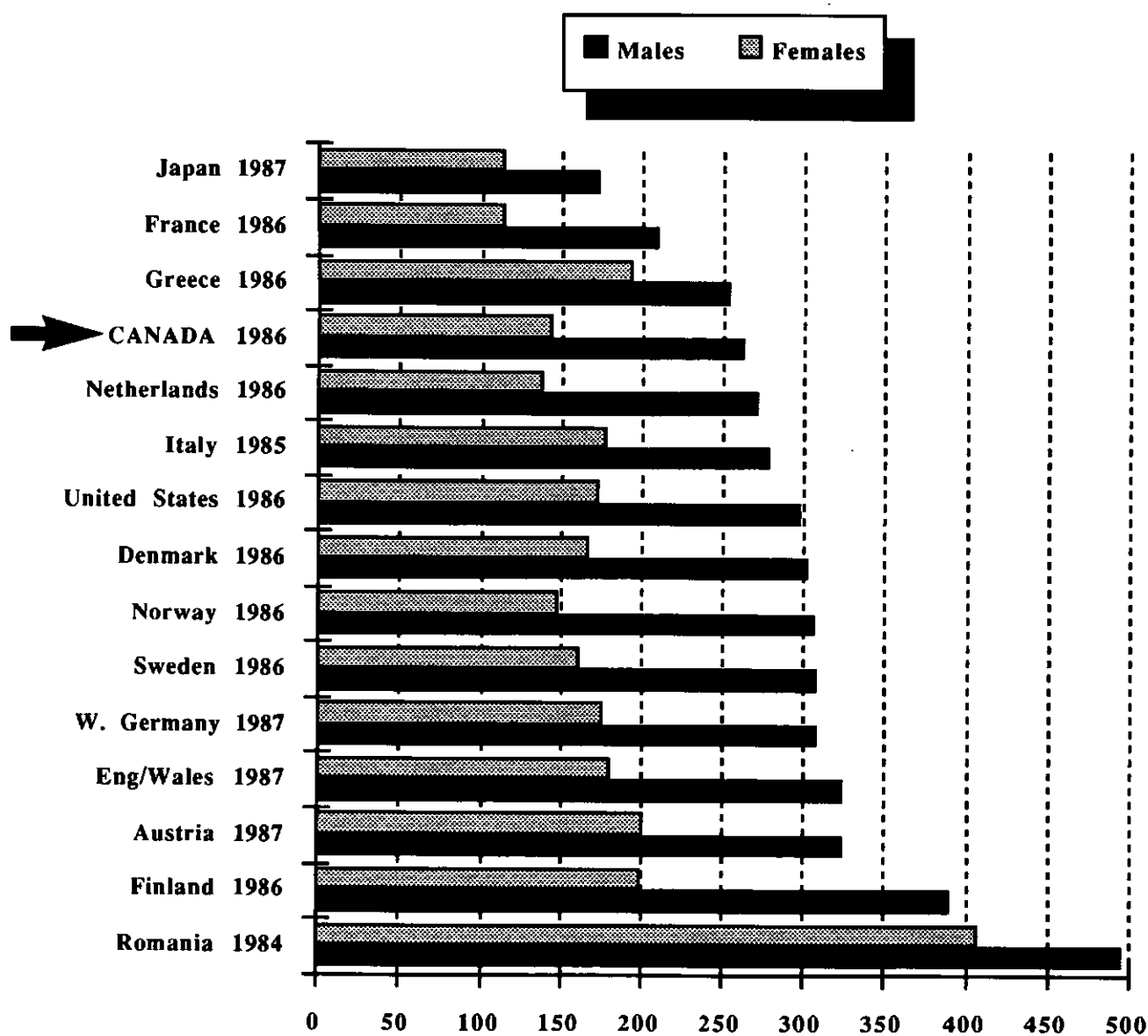
For both sexes, rates increase dramatically in the older age groups (Table 1). During the coming decades as the proportion of elderly (over 65 years) within the population increases, the absolute number of deaths due to cardiovascular disease may increase. The lower death rate for the 35-64 age group does not diminish the importance of cardiovascular disease on health status; it is still the leading cause of death for this age group.

**FIGURE 2**  
**Leading Causes of Death, Canada, 1988**  
**Percentage and Number of Deaths**



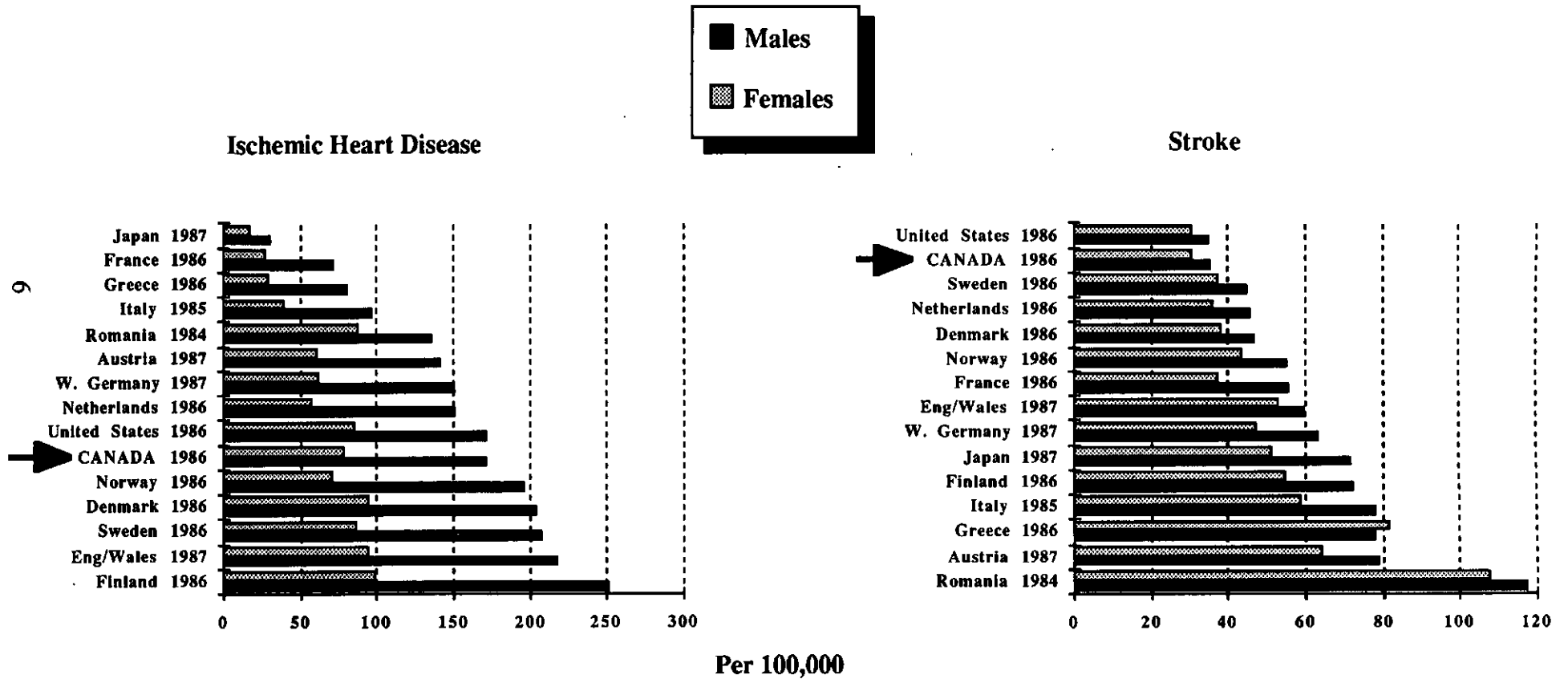
SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>1</sup>

**FIGURE 3**  
**Age-Standardized Mortality Rates**  
**Cardiovascular Disease, Mid-1980's**



SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>1</sup>

**FIGURE 4**  
**Age-Standardized Mortality Rates**  
**Mid-1980's**



SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>1</sup>

**TABLE 1**

**Age-Standardized Mortality Rates, Canada, 1988**  
**All Cardiovascular Diseases**  
**Males and Females**  
**(Rates Per 100,000)**

	35-54		55-64		65-74		75+	
	M	F	M	F	M	F	M	F
<b>IHD</b>	67.3	13.3	402.3	113.1	1034.1	423.3	2833.1	2032.0
<b>AMI*</b>	43.7	8.7	261.7	74.5	621.6	265.8	1466.7	934.6
<b>Stroke</b>	8.5	9.2	49.4	36.0	175.5	118.7	843.9	885.9
<b>Other CVD</b>	12.1	7.0	77.3	36.4	250.9	123.0	1001.0	873.4
<b>Total CVD</b>	87.9	29.5	529.0	185.5	1460.5	665.0	4678.0	3791.3

\* AMI is a sub-category of IHD

IHD = Ischemic Heart Disease  
AMI = Acute Myocardial Infarction (Heart Attack)  
CVD = Cardiovascular Disease

SOURCE: Laboratory Centre for Disease Control, Health and Welfare Canada<sup>11</sup>;  
Canadian Centre for Health Information, Statistics Canada<sup>16</sup>

## **2.4 Regional Comparisons**

An East-West gradient in cardiovascular disease death rates within Canada can be observed (Figures 5, 6, 7, Table 2). The provinces of Atlantic Canada have consistently higher rates than those of Western Canada. Overall, cardiovascular disease death rates in 1988 were highest for men in Nova Scotia (375 per 100,000 population) and for women in Newfoundland (246 per 100,000 population)<sup>16</sup>. The rates were lowest for both sexes in British Columbia (297 and 178 per 100,000 population, respectively)<sup>16</sup>. Regional differences are more notable with respect to death rates from acute myocardial infarction than those due to stroke. Mortality atlases such as Figures 6 and 7 are able to show overall disease patterns in Canada, however the death rates given for specific census divisions should be interpreted cautiously due to the relatively small number of deaths from which they are derived.

Some of the regional variation in cardiovascular disease in Canada may be attributable to the difference in the prevalence of the known risk factors (Section 6), such as smoking, high blood pressure, or elevated serum cholesterol in the population, although much is still unexplained.

Native populations (both Inuit and Indian) in Canada, historically experienced much lower cardiovascular disease death rates than the non-native population. In recent years however, death rates among native people for ischemic heart disease and stroke have approached the national rates<sup>12, 35</sup>. The increasing prevalence of such risk factors for cardiovascular disease as high blood pressure, diabetes, obesity and smoking may account, in part, for this trend.

## **2.5 Socioeconomic Status and Cardiovascular Disease Death Rates**

Canadian communities with lower average income and educational levels experience higher rates of death from cardiovascular disease than communities with higher levels of income and education (Figure 8). This may be due in part to a greater prevalence of risk factors such as smoking and obesity in the lower socioeconomic groups of Canadian society (Section 6). Comparisons on these data are made between average income levels and average cardiovascular disease death rates in given geographical areas, and not between individual income level and risk of death from cardiovascular disease<sup>33</sup>.

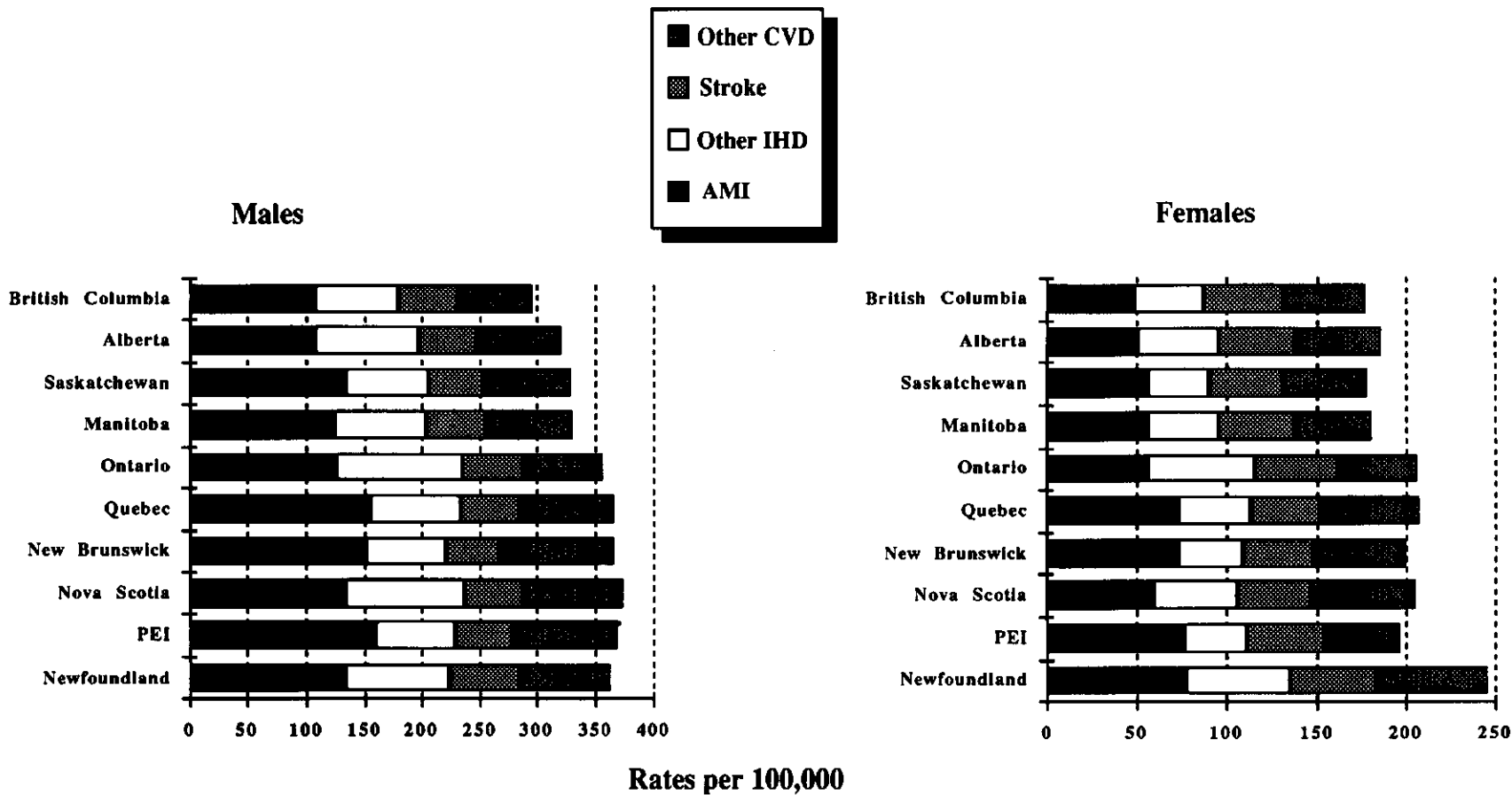
## **2.6 Time Trends**

Cardiovascular disease death rates have been declining steadily in Canada since the mid-1960's. The 1988 death rates are almost half those of 1969; this applies to all major categories of cardiovascular disease, and to rates among both males and females<sup>16</sup>.

Ischemic heart disease rates peaked in Canada in the mid-1960's (Figure 9). Ontario's rates were the highest, reaching 414 deaths per 100,000 population (males) in 1970, whereas those in Saskatchewan were the lowest, reaching 294 deaths per 100,000 population (males) in 1969<sup>16</sup>. Since then, the decline has been steady at approximately two percent (2%) per year. The rate of decline has been greatest in Atlantic Canada and less in the Prairies, so that by the end of the 1980's, considerably less regional variation is seen than two decades earlier. The decline may be

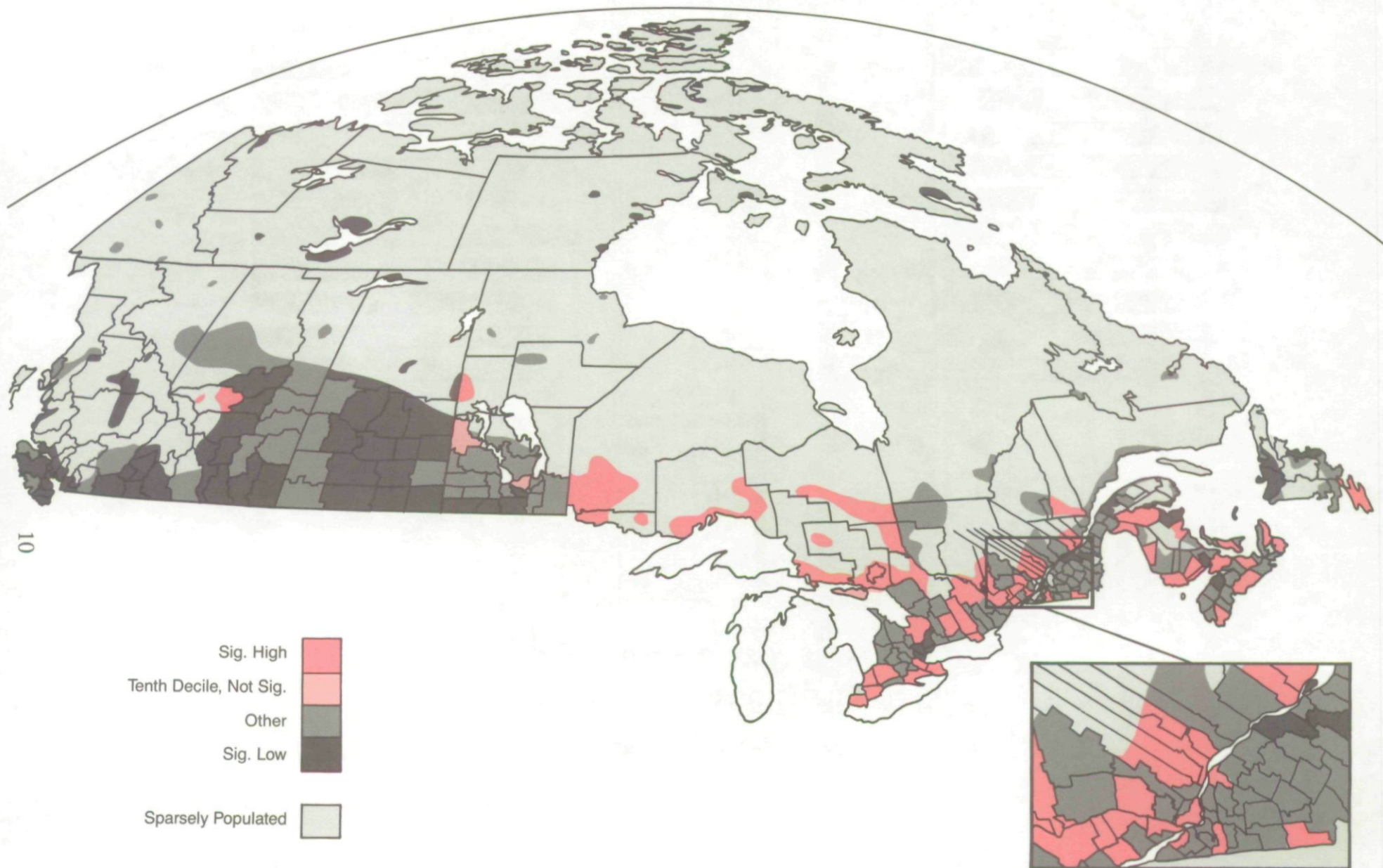


**FIGURE 5**  
**Age-Standardized Mortality Rates, 1988**  
**All Cardiovascular Diseases**

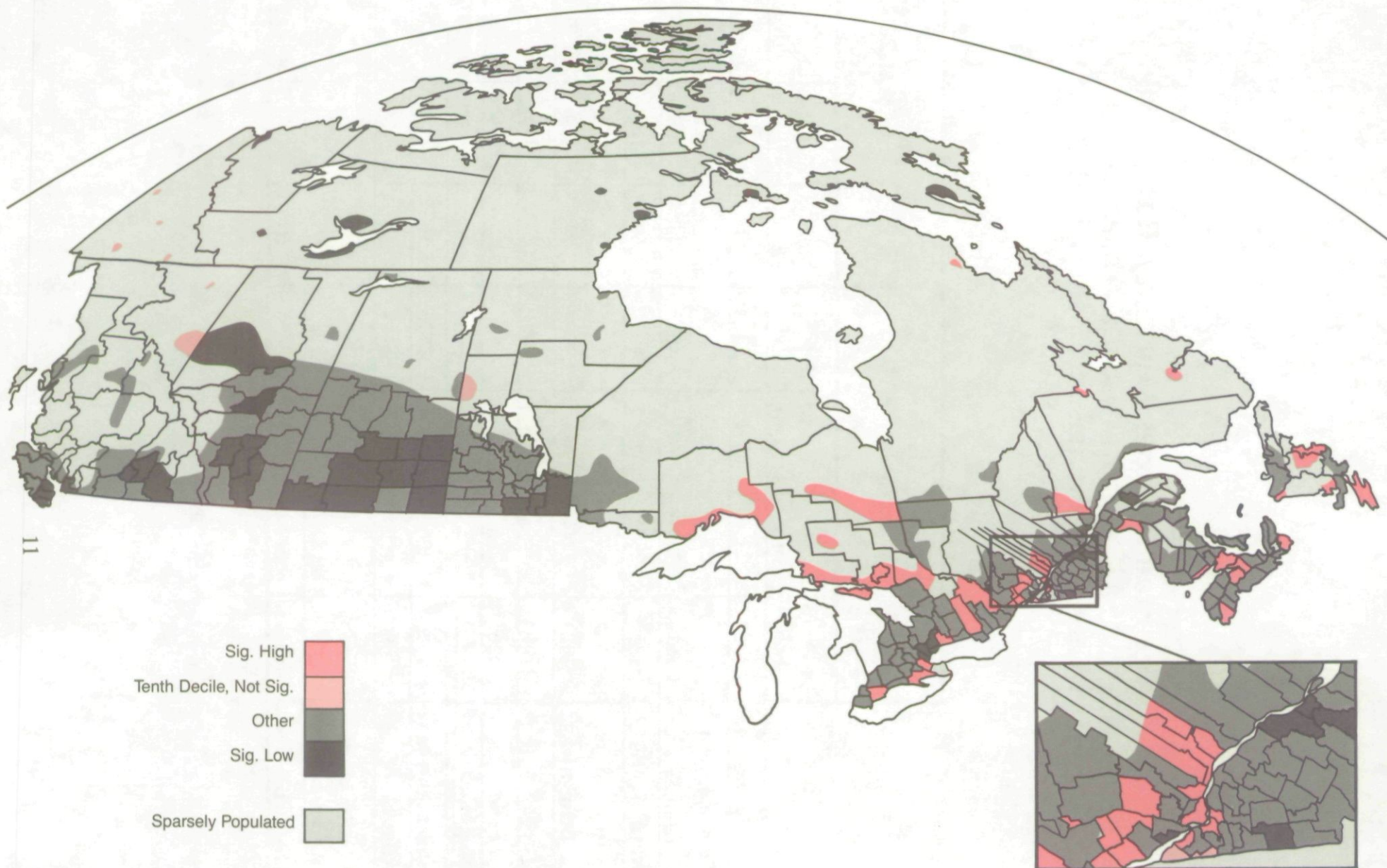


SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>1</sup>

**FIGURE 6**  
**Coronary Heart Disease, Males**  
**Ages 35 to 69, 1980-1986**



**FIGURE 7**  
**Coronary Heart Disease, Females**  
**Ages 35 to 69, 1980-1986**

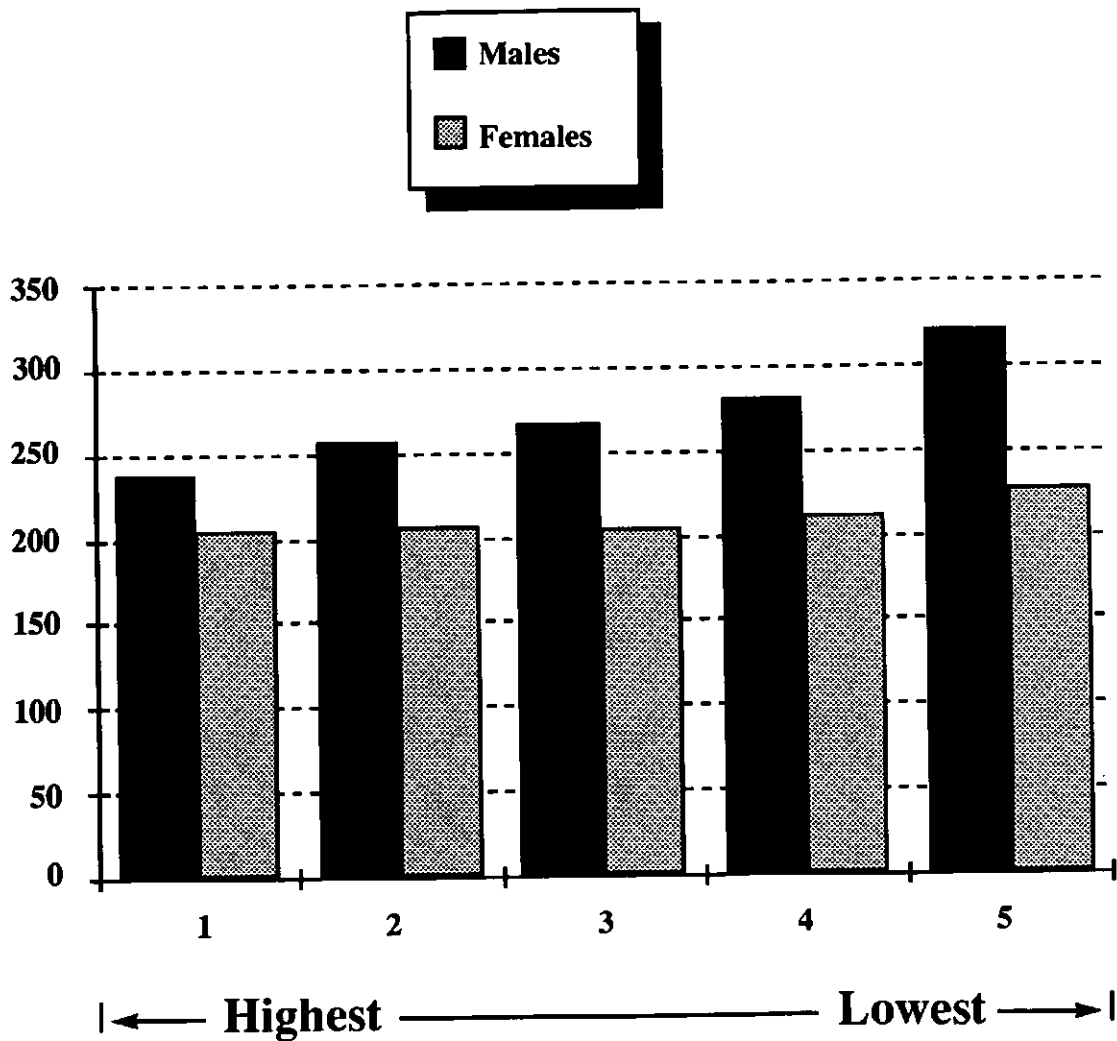


**TABLE 2**  
**Age-Standardized Mortality Rates, 1988**  
**All Cardiovascular Diseases**  
**Provincial Comparisons, Males and Females**  
**(Rates Per 100,000)**

	MALES				FEMALES			
	AMI	IHD	STROKE	TOTAL CVD	AMI	IHD	STROKE	TOTAL CVD
Newfoundland	135	225	59	395	78	136	48	270
Prince Edward Island	161	230	49	400	74	109	44	213
Nova Scotia	135	238	50	406	60	106	41	225
New Brunswick	152	221	46	398	73	109	39	219
Quebec	156	234	50	399	73	113	40	227
Ontario	126	236	52	387	56	116	46	227
Manitoba	125	204	51	360	56	95	43	199
Saskatchewan	135	206	48	357	56	90	41	196
Alberta	109	199	48	348	51	95	44	205
British Columbia	109	181	50	323	49	87	45	195
CANADA	131	222	51	347	60	108	44	200

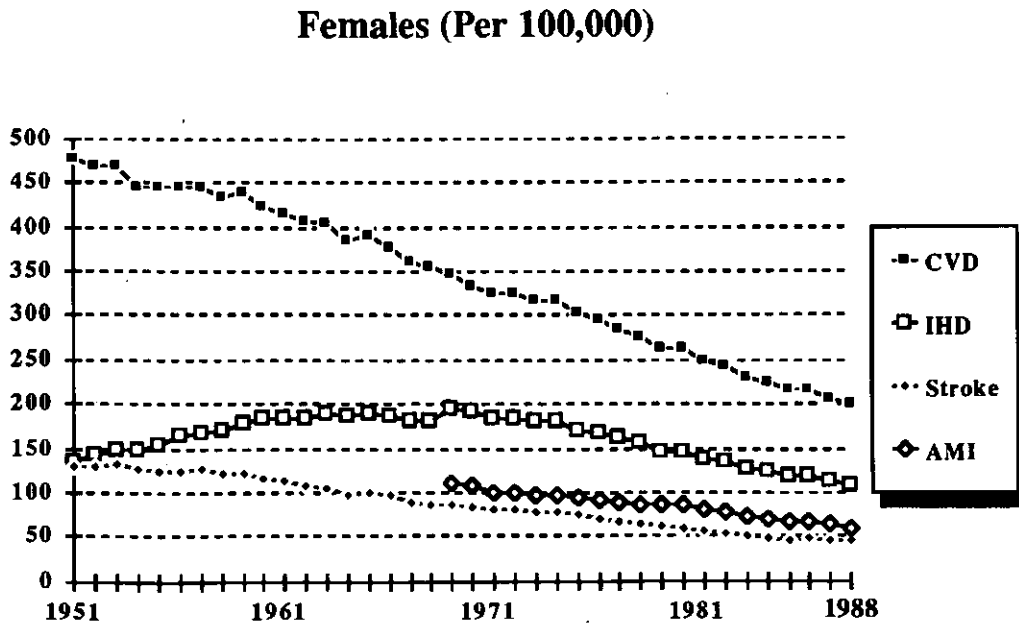
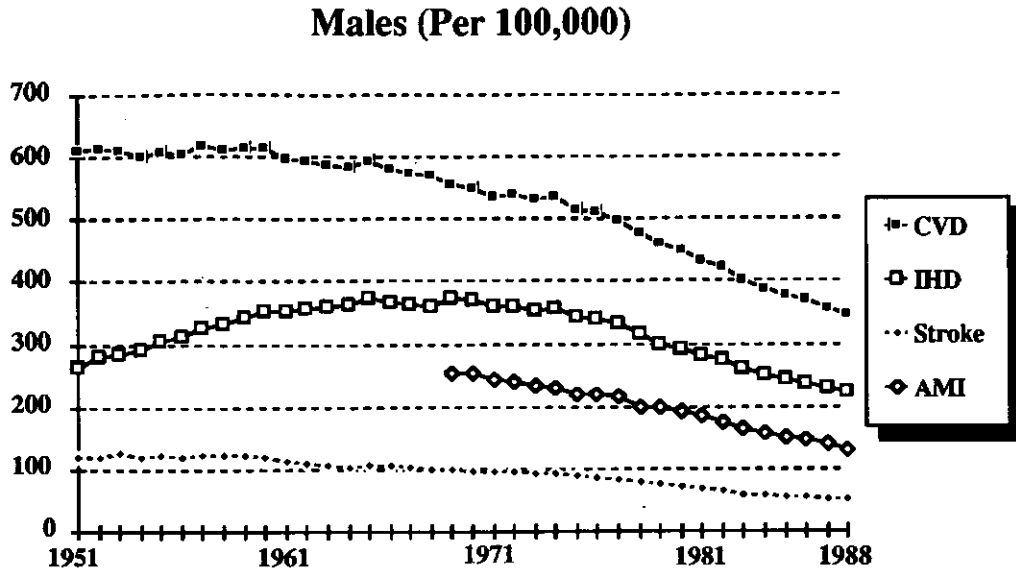
SOURCE: Laboratory Centre for Disease Control, Health and Welfare Canada<sup>11</sup>

**FIGURE 8**  
**Age-Standardized Mortality Rates, 1986**  
**Cardiovascular Disease, Income Quintile**



SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>1,33</sup>

**FIGURE 9**  
**Age-Standardized Mortality Rates, 1951-88**



SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>1</sup>

explained in part by a reduction in the prevalence of smoking, a reduction in the consumption of dietary fat, improved identification and control of hypertension, and improved medical and surgical care of individuals who have developed cardiovascular disease.

The decline in the death rate from acute myocardial infarction is similar to that seen for ischemic heart disease (Figure 9). Statistics specific to acute myocardial infarction were not collected until 1969 and therefore death rates prior to this are not available.

Death rates from stroke have declined at approximately 2% per year since the 1950's. Earlier regional differences are now less apparent so that rates in 1988 ranged from a high of 59 per 100,000 population (males) in Newfoundland to a low of 46 per 100,000 population (males) in New Brunswick<sup>16</sup>. The death rate from stroke is closely related to the prevalence of high blood pressure and smoking in the population. The decline in death rate from stroke may be related to an improved public awareness of high blood pressure and its earlier detection and treatment, a reduced prevalence of smoking, as well as improved therapy for individuals who develop stroke.

## **2.7 Potential Years of Life Lost**

The impact of premature death can be measured by calculating the potential years of life lost (PYLL). This has been calculated as the sum of the number of years of life that individual Canadians "lost", that is, did not live, due to premature death (prior to age 70). Premature death from cardiovascular disease is responsible for an estimated 200,000 years of life lost, and is third after that from injuries and cancer<sup>11</sup> (Figure 10). This represents a significant social and economic loss to the nation and stresses the importance of preventive health programs to decrease the number of premature deaths from cardiovascular disease.

## **2.8 Probability of Death from Cardiovascular Disease**

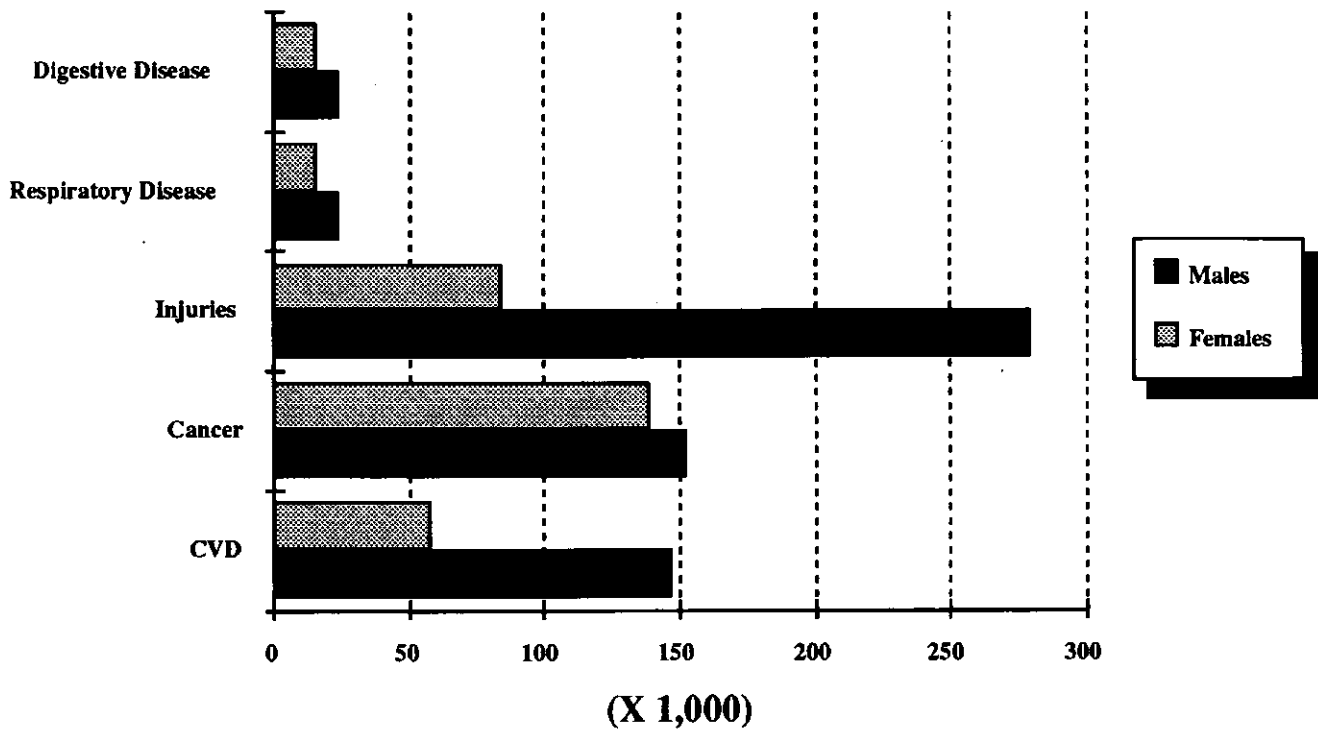
At birth, a male has a 42.3% probability of dying from a cardiovascular disease in the coming 85 years, whereas a female has a 48.1% probability (Table 3). In that time period, males are more likely than females to die of ischemic heart disease and acute myocardial infarction, whereas females are more likely to die of stroke<sup>11</sup>.

A comparison of the probability of death between ages 0-75 with that between ages 0-85 demonstrates the dramatic increase in the risk of cardiovascular disease death that occurs between the ages 75-85, especially among females.

## **3. DISABILITY FROM CARDIOVASCULAR DISEASE**

About one in four (26%) disability pensions paid through the Canada Pension Plan in 1986 were for cardiovascular disease, second only to payments for musculoskeletal disability<sup>25</sup>. This proportion has been decreasing by approximately one percent (1%) per year in recent years. Sixty percent (60%) of the cardiovascular disease pensions are related to ischemic heart disease, of which heart attack is only a small proportion (2.4%) since death is a more likely outcome of heart attack than long term disability. Twenty percent (20%) of cardiovascular disease pensions are related to stroke.

**FIGURE 10**  
**Potential Years of Life Lost**  
**Prior to Age 70, Canada, 1988**



SOURCE: Laboratory Centre for Disease Control, Health and Welfare Canada<sup>11</sup>



**TABLE 3****Probability of Death From Cardiovascular Disease  
Males and Females  
Canada, 1988****MALES**

<b>AGES</b>	<b>All CVD</b>	<b>IHD</b>	<b>AMI</b>	<b>STROKE</b>
<b>0-75</b>	24.0%	16.7%	10.2%	3.0%
<b>0-85</b>	42.3%	27.1%	15.0%	6.4%

**FEMALES**

<b>AGES</b>	<b>All CVD</b>	<b>IHD</b>	<b>AMI</b>	<b>STROKE</b>
<b>0-75</b>	14.2%	8.4%	5.3%	2.8%
<b>0-85</b>	48.1%	25.6%	12.2%	10.8%

**SOURCE: Laboratory Centre for Disease Control, Health and Welfare Canada<sup>11</sup>**

## **4. UTILIZATION OF HEALTH SERVICES**

### **4.1 Hospitalization**

Cardiovascular disease has a significant impact on Canada's health care system. In 1987, it accounted for 426,000 (11.5%) of all hospital admissions up from 414,000 admissions in 1983/84. Of the admissions, thirty-seven percent (37%) were for ischemic heart disease (of which 13% were acute myocardial infarction), fifteen percent (15%) for stroke and forty-eight percent (48%) for other cardiovascular diseases<sup>1</sup>.

Over twenty percent (>20%) of all patient days in hospital, a total of 8.5 million in 1987, were for the treatment of cardiovascular disease<sup>11</sup> (Figure 11). Patients with cardiovascular disease have a longer length of stay (20.0 days) than average (11.7 days, all causes) with striking differences between the younger (35-64) and older (65+) age groups (11.5 days versus 26.5 days, respectively)<sup>1</sup>.

### **4.2 Physician Consultation**

Of the total of 212,916,000 visits Canadians make to physicians each year (Health and Welfare Canada, 1988-89 fiscal year), Almost ten percent (9.6% - 20.4 million visits) are estimated to be due to cardiovascular disease (Table 4). Nearly half (47%) of these are for the management of high blood pressure, eleven percent (11%) for ischemic heart disease, eight percent (8%) for angina pectoris, and thirty-four percent (34%) for other cardiovascular disease<sup>10</sup>.

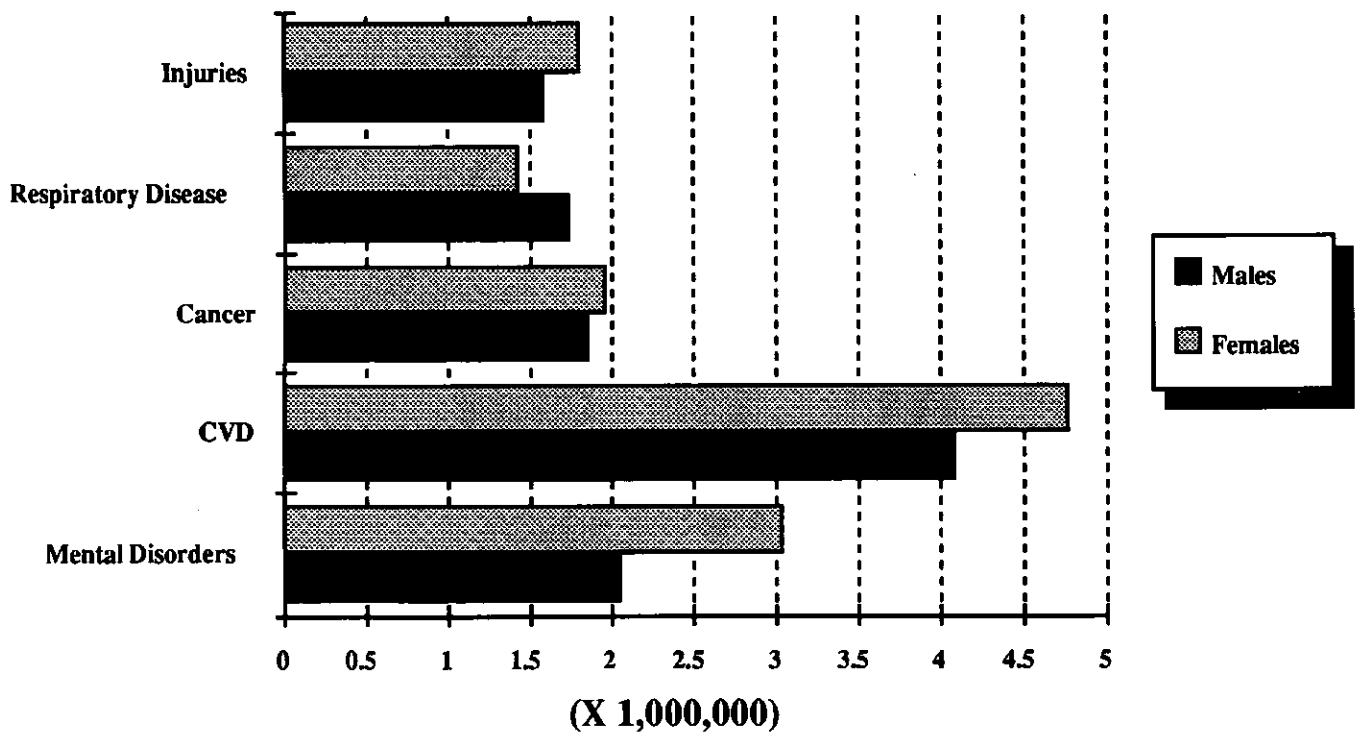
### **4.3 Cardiovascular Disease-Related Procedures**

In the past decade, the performance of both coronary artery bypass (CAB) surgery and angioplasty has increased (Figure 12). A total of 10,865 CAB surgical procedures (43.2 per 100,000 population) and 3,353 angioplasties (13.3 per 100,000 population) were performed in Canada in the 1986-87 fiscal year. CAB surgical rates are highest in the age groups 55-64 and 65-74 and are considerably higher in males than females<sup>21</sup> (Table 5). As greater numbers of Canadians enter the 55-74 year age group during the coming decades, a further increase in the number of these surgical procedures performed annually may be expected.

### **4.4 Utilization of Pharmaceuticals**

Prescription drugs for the treatment of cardiovascular disease are estimated to account for more than twelve percent (12.1%) of the total 193,000,000 prescriptions dispensed in Canada in 1989<sup>10</sup> (Table 6). Beta-blocking agents are the most frequently prescribed, comprising nearly thirty percent (28.8%) of the total used in the treatment of cardiovascular disease. This is followed by calcium channel blocking agents (18.3%); vasodilators (16.4%); digitalis preparations (11.9%); angiotensin-converting enzyme inhibitors (11.8%); and other agents (12.8%). Diuretics account for a further small percentage (5.4%) of prescription drugs sold in Canada; most diuretics are utilized in the treatment of cardiovascular disease.

**FIGURE 11**  
**Hospital Days for Major Causes**  
**By Sex, Canada, 1987**



SOURCE: Laboratory Centre for Disease Control, Health and Welfare Canada<sup>11</sup>

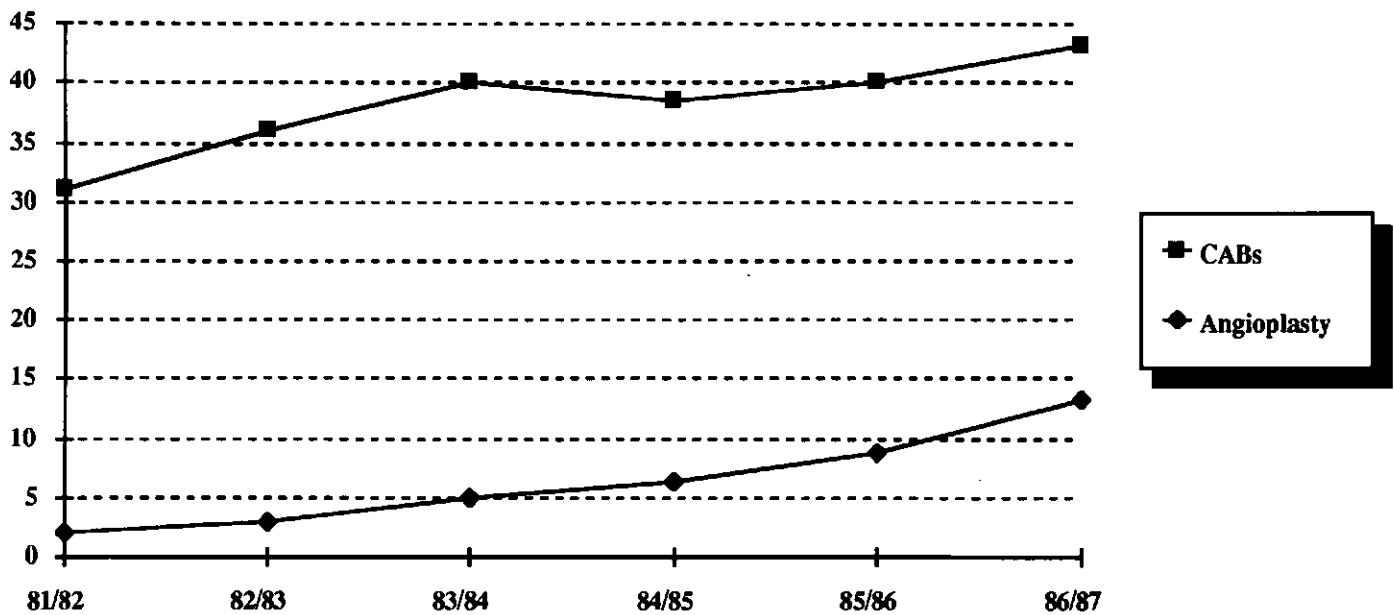
**TABLE 4****Percentage Physicians Visits per Diagnostic Category\*  
Canada, 1989**

<b>Diagnostic Category (ICD-9)</b>	<b>Percentage</b>
Respiratory Disease (460-519)	13.8
Cardiovascular Disease (390-459)	9.6
Central Nervous System Disorders (320-389)	8.7
Mental Disorders (290-319)	7.8
Musculoskeletal Disorders (710-39)	7.7
Injury & Poisoning (800-999)	6.4
Genito-Urinary Disease (580-629)	6.1
Skin Diseases (680-709)	5.2
Digestive Diseases (520-79)	4.9
Endocrine/Immune Disorders (240-79)	4.6
Infective/Parasitic Diseases (001-139)	3.9
Neoplasms (140-239)	2.8
Other Categories	18.5
<b>TOTAL</b>	<b>100.0</b>

\* Data drawn from the Canadian Disease and Therapeutic Index of IMS, Montreal, Quebec. The database is comprised of self-reported practice patterns of a representative sample of 652 office-based family physicians and specialists throughout Canada surveyed four times per year.

SOURCE: Intercontinental Medical Statistics (IMS)

**FIGURE 12**  
**CAB Surgery and Angioplasty, 1981-87**  
**Rates per 100,000 Population, Canada**



SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>21</sup>

**TABLE 5**

**Age-Specific Coronary Artery Bypass Surgery  
Six Year Average Annual Rate per 100,000 Population  
Canada, 1981-1987**

		<b>AGE GROUP</b>			
		<b>35-54</b>	<b>55-64</b>	<b>65-74</b>	<b>75+</b>
<b>MALES</b>		86	289	238	51
<b>FEMALES</b>		11	64	78	15

**SOURCE: Canadian Centre for Health Information, Statistics Canada<sup>21</sup>**

**TABLE 6****Pharmaceutical Prescriptions per Diagnostic Category\*  
Number and Percentage, Canada, 1989**

<b>Diagnostic Category</b>	<b>Estimated Number (Millions)</b>	<b>Percentage</b>
Cardiovascular	23.4	12.1
Anti-infectives	21.8	11.3
Psychotherapeutics	18.4	9.5
Analgesics	15.9	8.3
Hormones	12.8	6.6
Contraceptives	10.6	5.5
Diuretics	10.5	5.4
Antiarthritics	9.9	5.2
Others	69.6	36.1
<b>TOTAL</b>	<b>193.0</b>	<b>100.0</b>

\* Data drawn from the Canadian Compuscript Audit of IMS, Montreal. The database is comprised of the prescription-filling patterns of a representative sample of 1500 retail pharmacies throughout Canada collected on a continual basis.

SOURCE: Intercontinental Medical Statistics (IMS)

## **5. ECONOMIC IMPACT OF CARDIOVASCULAR DISEASE**

### **5.1 Direct and Indirect Costs**

Cardiovascular disease has significant economic impact in Canada in terms of both direct and indirect costs. Direct costs refer to the value of resources actually expended that could have been allocated elsewhere. Indirect costs are those equalling the value of lost productivity due to illness or disability, and/or the loss of future earnings by people who die prematurely.

Cardiovascular disease is responsible for twenty-one (21%) of total disease-classifiable costs of illness in Canada (1986). Of the \$16.8 billion attributable to cardiovascular disease, direct costs comprise \$5.2 billion, whereas indirect costs comprise \$11.6 billion<sup>32</sup> (Figure 13).

The sources of the direct and indirect costs of cardiovascular disease are illustrated in Figure 14. Direct costs comprise those for hospital expenditures, medical care, pensions and benefits, research, and drugs. Indirect costs comprise those due to premature mortality and chronic and short-term disability. One of the greatest indirect costs of illness is the loss of future earnings from people who die prematurely. Cardiovascular disease is responsible for the greatest proportion (32%) of total future earnings lost due to premature death, followed by cancer (27%). Cardiovascular disease accounts for seventeen percent (17%) of lost productivity due to disability, while musculoskeletal injuries account for thirty-two percent (32%).

### **5.2 Other financial considerations**

Twenty-one percent (21%) of hospital operating expenditures and nine percent (9%) of medical care expenditures is spent on the care of cardiovascular disease patients. Twenty-six percent (26%) of disability pensions are paid out for cardiovascular disease.

Although cardiovascular disease constitutes one of the major health problems in Canada, funding allocation for research (\$53 million, 1986-87 fiscal year) does not reflect this, and lags behind that for endocrine disorders (\$72 million) and cancer (\$54 million)<sup>32</sup>.

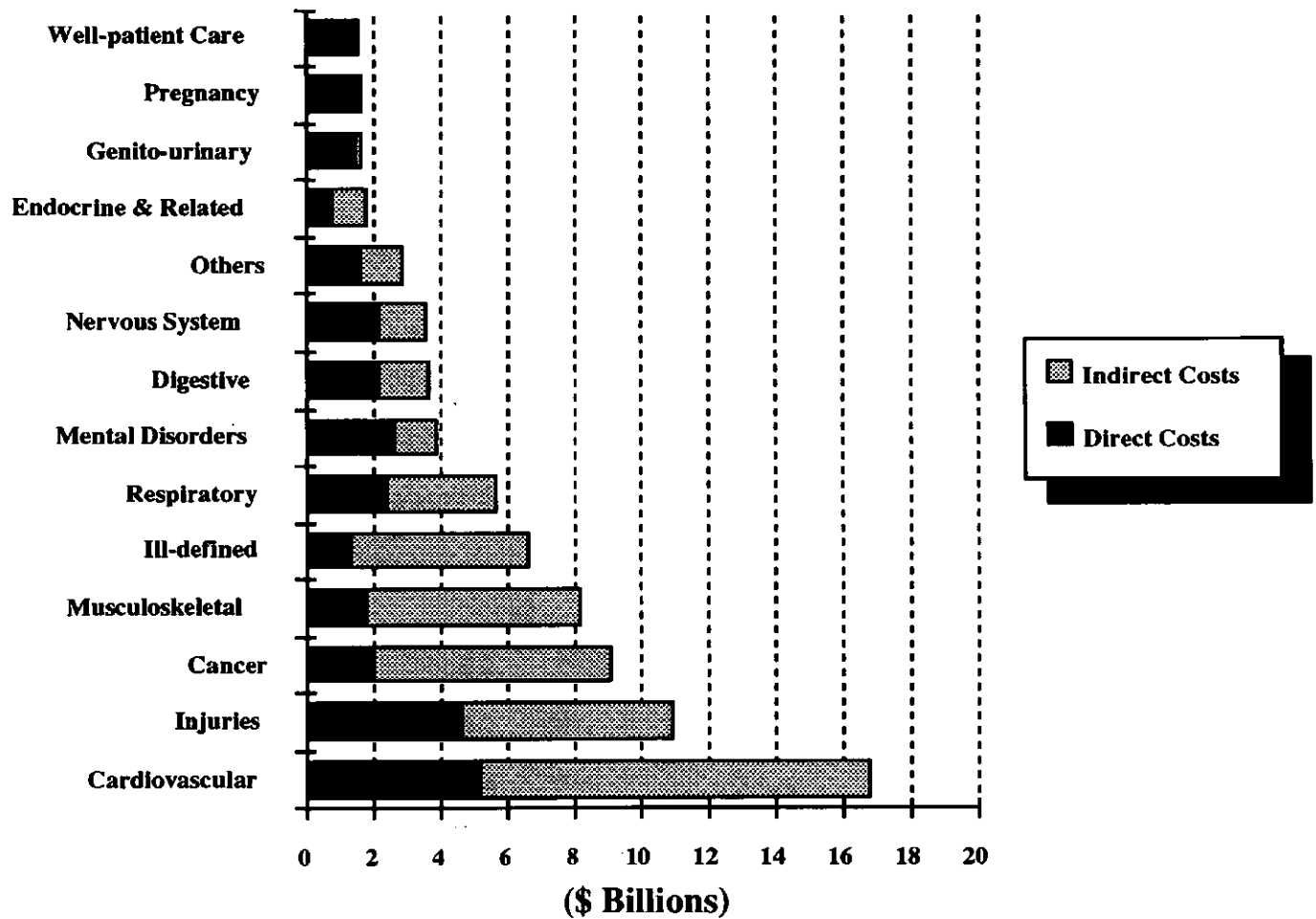
Death rates for cardiovascular disease are declining, while the economic costs of cardiovascular disease are increasing. Considerable effort must be made to not only support the decline in cardiovascular disease mortality but also to reduce the incidence of the disease so as to minimize its social and economic costs.

## **6. RISK FACTORS FOR CARDIOVASCULAR DISEASE**

Extensive research has identified the major risk factors for cardiovascular disease. Some factors are considered "modifiable" through individual behaviour change or medical management; these include smoking, high blood pressure, elevated blood cholesterol, diabetes, physical inactivity, and obesity. Others such as family history of cardiovascular disease, age, and male sex are "non-modifiable".



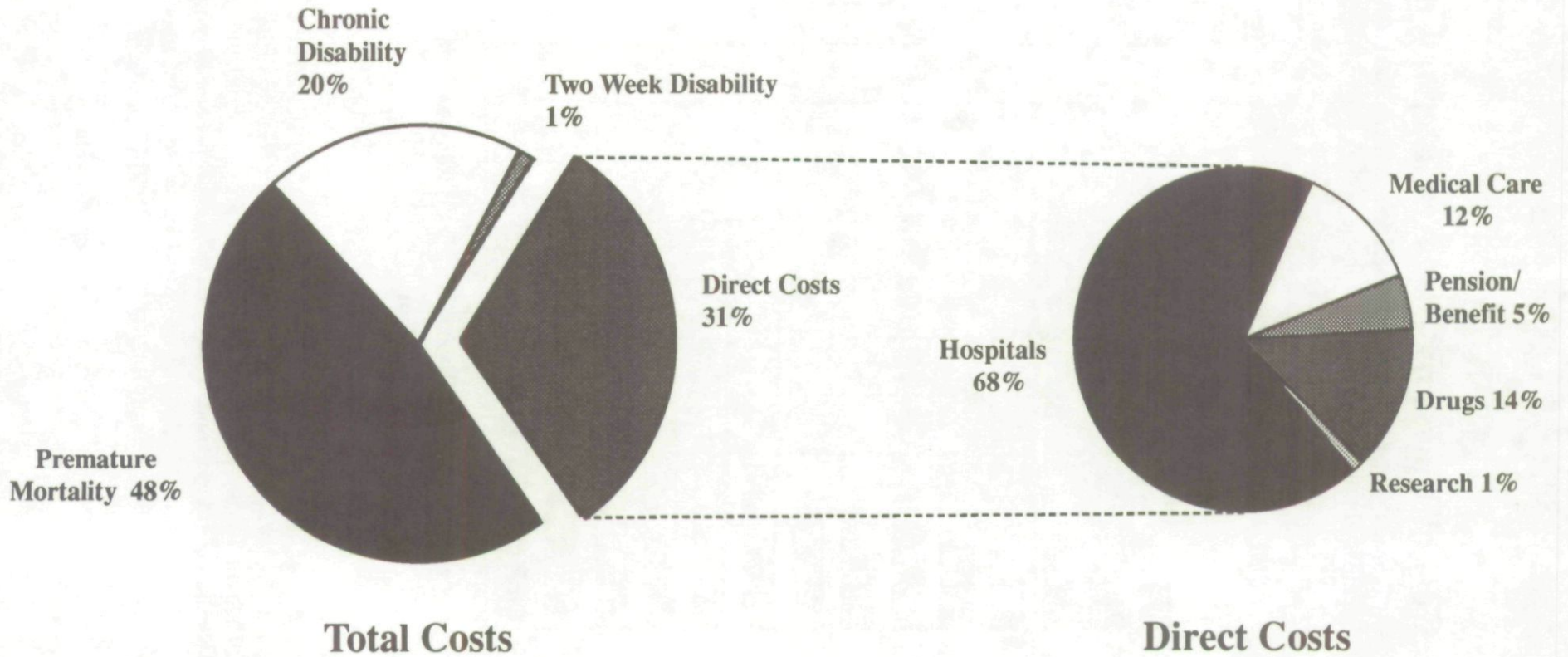
**FIGURE 13**  
**Cost of Illness by Disease Category**  
**Canada, 1986**



SOURCE: Laboratory Centre for Disease Control, Health and Welfare Canada<sup>32</sup>

**FIGURE 14**  
**Economic Impact of Cardiovascular**  
**Disease in Canada, 1986**

26



SOURCE: Laboratory Centre for Disease Control, Health and Welfare Canada<sup>32</sup>

Several studies have examined the prevalence of these risk factors in Canadian society<sup>4,23,27,28</sup>. Furthermore, since 1986, as a result of the Canadian Heart Health Initiative, a number of provincial cardiovascular disease risk factor surveys have been conducted and others planned<sup>8,14,17,20,22,26</sup>. These surveys, which use standardized measurement and analytical techniques, will provide consistent nation-wide results on the prevalence of cardiovascular disease risk factors and public knowledge and attitudes toward them. Table 7 summarizes these findings.

As illustrated in Table 8, the prevalence of these risk factors is higher in certain age, sex, and educational groups. Although the presence of any single risk factor approximately doubles the risk for development of cardiovascular disease, when multiple risk factors are present, they act in a synergistic manner.

## **7. PREVENTION OF CARDIOVASCULAR DISEASE**

Some of the burden of cardiovascular disease can be prevented. "Primary" prevention by risk factor modification can reduce disease incidence, "secondary" prevention through early identification and management of disease states can increase survival, whereas "tertiary" prevention through the rehabilitation from established disease can further reduce disability and suffering, and so enhance individual quality of life.

Optimal prevention requires the use of all three strategies incorporating a combination of individual lifestyle changes, modification of social and physical environments and the medical management of disease<sup>34</sup>. It has been estimated, for example, that fifty-four percent (54%) of the decline in ischemic heart disease mortality observed in North America in recent decades may be due to changes in lifestyle, almost forty percent (39.5%) may be the result of medical intervention, and more than six percent (6.5%) unexplained<sup>7,31</sup>. Studies in Canada and the United States estimate that as much as thirty percent (30%) of cardiovascular disease mortality is attributable to elevated blood pressure, nineteen percent (19%) to diabetes, seventeen percent (17%) to smoking, and fifteen percent (15%) to elevated serum cholesterol<sup>31</sup>. This indicates a considerable opportunity for prevention through change in these modifiable risk factors.

The Stanford Five City<sup>6</sup>, the North Karelia<sup>24</sup> (Finland), Heartbeat Wales and other projects have convincingly demonstrated that enhanced prevention can result from programs that are community-based and are targeted at both the general population and to individuals at "high risk" of cardiovascular disease. Established "Heart Health" programs are functioning in a number of communities in Canada and are being developed in others as a result of provincial heart health promotion programs. The Canadian Heart Health Initiative is co-sponsored by Health and Welfare Canada and the provincial ministries of health, in collaboration with the Heart and Stroke Foundation of Canada. Since its successful launch in Nova Scotia in 1987, this initiative is effectively fostering heart health promotion activities across the nation. Furthermore, through its continued support of such public and professional education programs as "Jump Rope for Heart", "Know Your Blood Pressure by Heart" and "Heart Smart" (cooking courses, shopping guide and restaurant selection considerations), the Heart and Stroke Foundation of Canada and provincial foundations are playing a major role in the prevention of cardiovascular disease in Canada.

**TABLE 7**  
**Overall Prevalence of  
 Cardiovascular Disease Risk Factors<sup>a</sup>, Canada**

<b>RISK FACTORS</b>	<b>PERCENTAGE</b>
Smoking <sup>33</sup>	28.0
High Blood Pressure <sup>7</sup>	18.0
Elevated Blood Cholesterol <sup>b</sup>	45.0
Overweight <sup>28</sup>	34.0
Physically Inactive <sup>32</sup>	58.0
Diabetes Mellitus <sup>b</sup>	5.0
One or More Major Risk Factors <sup>b,c</sup>	65.0

<sup>a</sup> See Glossary for risk factor definitions.

<sup>b</sup> Mean calculated from Heart Health Surveys of Nova Scotia<sup>20</sup>, New Brunswick<sup>8</sup>, Prince Edward Island<sup>22</sup>, Newfoundland<sup>17</sup>, Saskatchewan<sup>26</sup> and British Columbia<sup>14</sup>. Age-Sex Standardized to 1986 population of Canada.

<sup>c</sup> Major Risk Factors = smoking, high blood pressure, elevated blood cholesterol.

**TABLE 8****Prevalence of Selected Cardiovascular Disease Risk Factors  
(percentage of individuals)**

	MALES (age groups)			FEMALES (age groups)			EDUCATION Age Standardized (Years)		
	18-34	45-64	>65	18-44	45-64	>64	<9	9-12	>12
<b>High Blood Pressure<sup>a</sup></b>	11	31	28	6	25	43	20	16	15
<b>Over-weight<sup>b</sup></b>	23	34	29	11	26	29	33	23	17
<b>Smoking<sup>c</sup></b>	40	31	22	33	29	13	35	37	27

<sup>a</sup> High blood pressure is defined as diastolic blood pressure equal to or greater than 90 mm HG and/or on treatment either pharmacologic or non-pharmacologic (weight control and/or salt restriction) for the purpose of lowering blood pressure.

<sup>b</sup> Self-reported weight. Over-weight considered Body Mass Index  $[(\text{weight in kg})/(\text{height in metres})^2] \geq 27$ .

<sup>c</sup> Individuals are considered to be smokers if they regularly smoke at least one cigarette per day.

SOURCE: Canadian Blood Pressure Survey, Health and Welfare Canada<sup>4</sup>

## **GLOSSARY**

**ACUTE MYOCARDIAL INFARCTION:** (ICD-9 410) A manifestation of ischemic heart disease, describing a severe sudden onset of myocardial necrosis due to the formation of a thrombus in the coronary arterial system obstructing arterial blood flow to that section of cardiac muscle.

**AGE-STANDARDIZED RATES:** The standardized rate represents what the crude rate would be if the population under study had the age distribution of the standard population. It is the weighted average of age-specific rates applied to a standard distribution of age.

**ANGINA PECTORIS:** (ICD-9 413) A symptomatic manifestation of ischemic heart disease, describing a severe squeezing or pressure-like thoracic pain, brought on by exertion or stress.

**CARDIOVASCULAR DISEASE:** All diseases of the circulatory system classified according to ICD-9 390-459. It includes acute myocardial infarction, ischemic heart disease, valvular heart disease, peripheral vascular disease, arrhythmias, high blood pressure, and stroke.

**DIABETES:** Diabetes mellitus is an illness associated with a disturbance of blood glucose control. In the provincial heart health surveys, individuals were considered to have diabetes if they reported ever having been so diagnosed by a physician.

**ELEVATED SERUM CHOLESTEROL:** Elevated blood cholesterol is here defined as a total plasma cholesterol level greater than or equal to 5.2 mmol/litre.

**HIGH BLOOD PRESSURE:** High blood pressure is defined as diastolic blood pressure equal to or greater than 90 mm HG and/or on treatment either pharmacologic or non pharmacologic (weight control and/or salt restriction) for the purpose of lowering blood pressure.

**ICD:** International Classification of Diseases - 9th Revision 1977

**INCIDENCE:** The number of instances of illness commencing, or of persons falling ill, during a given period in a specified population.

**INCOME QUINTILES:** Five approximately equal sized groups of census tracts ranked according to the percentage of population below Statistics Canada's low-income cut-off (See Wilkins, Adams, & Brancker, Health Reports, 1(2):137-174, 1989.)

**INJURIES:** The category "injuries" includes intentional (homicides, suicides, etc.) and unintentional (falls, motor vehicle accidents, poisonings, etc.) injuries. It is based upon ICD-9 (external causes of injury) E800-E999 and ICD-9 (nature of injury) 800-999.

**ISCHEMIC HEART DISEASE:** (ICD-9 410-414) Any condition in which heart muscle is damaged or works inefficiently because of an absence or relative deficiency of its blood supply; most often caused by atherosclerosis, it includes angina pectoris, acute myocardial infarction, chronic ischemic heart disease, and sudden death.

**OVERWEIGHT:** Individuals are considered overweight if they have a Body Mass Index [weight in kilograms/(height in metres)<sup>2</sup>] greater than or equal to 27.

**PHYSICAL INACTIVITY:** In the Canada Fitness Survey, 1981, individuals were considered physically inactive or 'sedentary' if they reported a usual daily leisure-time energy expenditure of less than 1.5 kcal/kg/day.

**POTENTIAL YEARS OF LIFE LOST:** The sum of the number of years of life that individual Canadians 'lost' due to premature death. It is calculated with death prior to age 70 being considered premature. Since the average life expectancy for males is 71 years, and 79 years for females, death prior to age 70 can be considered premature for both males and females.

**PREVALENCE:** The number of instances of a given disease or other condition in a given population at a designated time; the term usually refers to the situation at a specified point in time.

**SMOKING:** Individuals are considered to be smokers if they regularly smoke at least one cigarette per day.

**STROKE: (ICD-9 430-438)** Sudden development of a focal neurologic deficit due to disease of one or more blood vessels of the brain.

## REFERENCES

1. Canadian Centre for Health Information. Causes of Death, Health Reports. Statistics Canada, Catalogue 82-003, 1990, 2(1), 3.
2. Castelli, W. W. Epidemiology of coronary heart disease, Framingham study. American Journal of Medicine, 1984, 76(2A), 4-12.
3. Cairns, J. A., et al. One year mortality outcomes of all coronary and intensive care unit patients with acute myocardial infarction, unstable angina or other chest pain in Hamilton, Ontario, a city of 375,000 people. Canadian Journal of Cardiology, 1989, 5(5), 239-246.
4. Department of National Health and Welfare. Main findings report of the Canadian blood pressure survey. Ottawa, ON: National Health and Welfare, 1989.
5. Eisenberg, M. S., Bergner, L., Hallstrom, A. P., & Cummins, R. O. Sudden cardiac death. Scientific American, 1986, 254(5), 37-43.
6. Farquhar, J. W., et al. Effects of community wide education on cardiovascular disease risk factors: the Stanford Five-City project. Journal of the American Medical Association, 1990, 264(3), 359-365.
7. Goldman, L., & Cook, E. F. The decline in ischemic heart disease mortality rates. Annals of Internal Medicine, 1984, 101, 825-836.
8. Health and Community Services New Brunswick & Health and Welfare Canada. New Brunswick Heart Health Survey Report, 1989.
9. Higgins, M. W. ed. Trends in Coronary Heart Disease Mortality: the Influence of Medical Care. New York: Oxford University Press, 1988.
10. Intercontinental Medical Statistics. Montreal, QC: Unpublished data.
11. Laboratory Centre for Disease Control, Health and Welfare Canada. Unpublished data.
12. Mao, Y., Morrison, H., Semen, C. W. R., & Wigle, D. Mortality on Canadian Indian reserves - 1977-1982. Canadian Journal of Public Health, 1986, 77, 263-68.
13. Millar, W. J., & Wigle, D. T. Socioeconomic disparities in risk factors for cardiovascular disease. Canadian Medical Association Journal, 1986, 134, 127-132.
14. Ministry of Health Province of British Columbia & Health and Welfare Canada. British Columbia Heart Health Survey Report. 1990.
15. Nair, C., Colburn, H., McLean, D., & Petrasovits, A. Cardiovascular Disease in Canada. Health Reports, Statistics Canada, Catalogue 82- 003, 1989, 1(1), 1-22.



16. Nair, C., & Nicholls, E. Cardiovascular Disease in Canada. Ottawa, ON: Canadian Centre for Health Information, Statistics Canada, 1990.
17. Newfoundland Department of Health & Health and Welfare Canada. Report of the Newfoundland Heart Health Survey. 1990.
18. Nicholls, E., Nair, C., MacWilliam, L., Moen, J., & Mao, Y. Cardiovascular Disease in Canada. Ottawa, ON: Statistics Canada & Health and Welfare Canada, 1986.
19. Nicholls, E. S. Cardiovascular disease mortality in Canada. Canadian Medical Association Journal, 1981, 125, 981-992.
20. Nova Scotia Department of Health & Department of National Health and Welfare. Report of the Nova Scotia Heart Health Survey. 1987.
21. Peters, S., Chagani, K., Paddon, P., & Nair, C. Coronary artery bypass surgery in Canada. Health Reports, 1990, 2(1), 9-26.
22. Prince Edward Island Department of Health and Social Services & Department of National Health and Welfare. Prince Edward Island Heart Health Survey. 1989.
23. Promoting Healthy Weights: A Discussion Paper. Ottawa, ON: Health & Welfare Canada, 1988.
24. Puska, P., Tuomilehto, J., Salonen, J., et al. The North Karelia Project: Evaluation of a comprehensive community programme for control of cardiovascular diseases in 1972-77 in North Karelia, Finland. Copenhagen, Denmark: World Health Organization/EURO Monograph Series, 1981.
25. Report of the Canadian Health & Disability Survey 1983-84. Ottawa, ON: Health and Welfare Canada, 1988.
26. Saskatchewan Health, Department of National Health and Welfare, City of Regina Health Department, Saskatoon Community Health Unit, Heart and Stroke Foundation of Saskatchewan, & University of Saskatchewan. Report of the Saskatchewan Heart Health Survey. 1990.
27. Smoking Behaviour of Canadians 1986. Ottawa, ON: Health Promotion Directorate, 1988.
28. Stephens, T., Craig, C. L., & Ferris, B. F. Adult physical activity in Canada: findings from the Canada fitness survey I. Canadian Journal of Public Health, 1986, 77(July-Aug.), 285-290.
29. Thom, T. J. Trends in total mortality and mortality in heart disease in 26 countries from 1950-78. International Journal of Epidemiology, 1985, 14(4), 510-520.

30. Trends and Determinants of Coronary Heart Disease Mortality: International Comparisons. International Journal of Epidemiology, 1989, v.18, Suppl. 1.
31. White, C. C., Tolsma, D. D., Haynes, S. G., & McGee, D. Cardiovascular Disease. In Amler, R. (Ed), Closing the Gap: The Burden of Unnecessary Illness. New York: Oxford University Press, 1986, 43-53.
32. Wigle, D. T., Mao, Y., Wong, T., & Lane, R. Economic Burden of Illness in Canada, 1986. Ottawa, ON: Health and Welfare Canada, 1990.
33. Wilkins, R., Adam, O., & Brancker, A. Changes in mortality by income in urban Canada from 1971-86. Health Reports, Statistics Canada, Catalogue 82- 003, 1989, 1(2), 137-74.
34. Federal - Provincial Working Group on the Prevention and Control of Cardiovascular Disease. Promoting Heart Health in Canada. Ottawa, ON: 1987.
35. Young, T. K. Cardiovascular Disease and Risk Factors Among North American Indians. Winnipeg, MB: Northern Health Research Unit, 1990.

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