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Improving Men's Health

Background Epidemiological Review of Selected Conditions

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Executive Summary

This report provides a description of some of the epidemiological findings related to men's health. It is meant to provide background to the "Improving Men's Health" main report. Findings related to the ten separate conditions described in the main report are reviewed here. The conditions are: prostate cancer, testicular cancer, lung cancer, sexual dysfunction, alcohol dependence, suicide, motor vehicle accidents, cardiovascular disease, osteoporosis, and HIV/AIDS. Where applicable, interest focuses on age and gender differences.

Each condition is reviewed in a similar manner. It starts with a brief review of points of interest or things that influence the estimates that follow. The literature is then summarized and our best estimates of the one year incidence (which provides an estimate of the number of new cases the health care system might have to respond to), prevalence (the number of cases the health care system is currently treating in some manner), and mortality (the number of individuals dying from the cause, which often results in higher demands on the health care system than simple prevalent cases in the period before death) are presented. We also look at potential years of life lost where possible. Based on the findings we calculate the number of male cases the condition would create in BC in 2009 and in 2019 as a method of comparing the relative impact of these conditions on the population in BC. Finally we present any relevant BC specific data we could find and use this as a check on the BC calculations.

After reviewing the separate conditions the results are combined to examine the relative contributions of these conditions. The final section of this report examines life expectancy in BC as an overall summary measure of health. Here Health Authority differences are examined as a method for looking at intra provincial differences that might exist in men's health issues.

Not too surprisingly (as the conditions were selected from a men's health perspective) gender differences were found to exist in most of the cases examined. A brief summary of the findings is presented here.

Prostate Cancer is primarily a disease of older men. Incidence rates are rising over time (doubling over the last 35 years) while mortality rates are much lower and much more stable. The introduction of the PSA test in an area seems to result in a large increase in calculated incidence, but then the pattern falls back to a more normal rate of increase. Based on the information available our calculations predict that in the year 2009 BC would expect to have 3,600 new prostate cancer cases diagnosed, 659 men die of prostate cancer, and about

14,200 individuals alive at the end of the year who have been diagnosed with prostate cancer in the preceding 5 years. Most of the new (incident) cases would be in the 60-69 age range, while over half the deaths would be in men 80 or older. The majority of prevalent cases would be in the ages 60-79. Based on BC specific mortality data these theoretical figures might be a bit high (perhaps by 14%) but the trends seem consistent.

Testicular Cancer is relatively rare but occurs most often in young or middle-aged men. Incidence is relatively low but rising. If diagnosed mortality is low, a 10 year survival rate of 95% has been observed. Given the low mortality the five year prevalence rates are higher in the younger age groups (a pattern that probably would not exist if life time prevalence was examined). In the year 2009 BC would expect to have slightly over 100 new testicular cancer cases diagnosed, 4 men die of testicular cancer, and about 500 individuals alive at the end of the year who have been diagnosed with prostate cancer in the preceding 5 years. Most of the new (incident) cases would be in the younger age range, as would the majority of the 5 year prevalent cases. Cross checking with BC specific data can be done through mortality rates, the predicted and observed rates are similar.

Lung cancer is the only condition that is showing a clear narrowing of the gender gap – male rates are decreasing and female rates increasing. The incidence of lung cancer in males has been decreasing over the last 30 years. Lung cancer is a cancer with one of the lowest 5 year survival ratios for both men and women, and hence the prevalence and mortality patterns tend to follow the incidence pattern. In the year 2009 BC would expect to have slightly under 1,900 new lung cancer cases diagnosed, 1,600 men die of lung cancer, and about 2,300 individuals alive at the end of the year who have been diagnosed with lung cancer in the preceding 5 years. Most of the new (incident) cases would be in the 70-79 age range, while over half the deaths would be in men 70 or older. The majority of prevalent cases would be in the ages 60-79. However, BC specific mortality is lower than that predicted (by about 25%), so these figures are likely overestimates.

Sexual dysfunction was examined in two areas: erectile dysfunction (ED) and premature ejaculation (PE). Neither present an immediate health risk (in the same sense as most cancers present a risk to health), although ED is associated with some serious medical conditions and the presence of ED can indicate examination for other medical conditions should be considered. Neither condition leads directly to death. Both conditions are somewhat “subjective” in

nature, and tend to be measured through self reports. Based on the limited epidemiological evidence available it was estimated that in 2009 BC would have about 38,000 incident ED cases and 280,000 prevalent ED cases. For PE incident data is not available, but given the limited prevalence estimates available it was estimated that in 2009 BC would have around 390,000 cases. Both the ED and PE estimates likely have large margins of error. No BC specific data is available for comparisons.

Alcohol Dependence is often described, at least from a clinical perspective, as arising out of alcohol abuse. However the epidemiological literature reports a peak incidence at age 18 and few new cases after the mid 20's. With a peak incidence around 18 there seems little time for alcohol abuse to be the precursor for alcohol dependence. Prevalence patterns follow the incidence: higher prevalence in younger age groups. Overall, there seems to be a pattern of "spontaneous recovery" from alcohol dependence for many individuals (in that at later ages they would no longer meet criteria). This makes the contribution of alcohol dependence to mortality unclear and we have not made any mortality estimates. Based on the information available we estimated that in the year 2009 BC would expect to have 16,000 new alcohol dependant men and about 40,000 males with some form of alcohol dependence. Most of the new (incident) cases would be in the 20-29 age range as would the majority of prevalent cases. No BC specific data is available for comparisons.

Suicide rates for Canadian males are almost 3 times higher than that of females, and higher in all age groups. Based on the age specific incident rates, in the year 2009 BC would expect to have 435 male suicides, with the age group with the highest count being 40-49. This number is higher than that observed in BC specific data by some 17%, but BC has been reported to have a lower than average suicide rate when compared to the Canadian average so this finding may not be surprising. It is hard to estimate suicide attempts (something the health system has to respond to) as the literature is inconsistent.

Motor Vehicle Accidents have a higher incidence with males than females whether measured in terms of absolute counts, population rates, or rates based on licensed drivers. Both genders are showing a decline in the number and rates of injury. Injury rates are highest in the 16-20 age groups. Prevalence estimates are hard to find, but after a year 30% of those injured in a MVA might still be experiencing some form of physical or emotional discomfort, although this might not be reflected in terms of return to work or ability to function on a day to day basis. Male mortality rates are higher than females and there is little evidence

that these rates are declining. Based on this in the year 2009 BC would expect to have slightly over 14,000 male MVA related injuries, with the age group with the highest count being below age 19. In terms of deaths, over 300 males would die in 2009due to MVAs, with the highest proportion of deaths being in the younger age groups. This is based on BC data so there are no BC specific comparisons to be made.

Cardiovascular Disease is a mixture of conditions and within the epidemiological literature it is sometimes the case that different studies combine different specific conditions under the general title cardiovascular disease. Cardiovascular disease is also progressive, and it can be hard to determine exactly when it first starts. This makes the determination of an incidence and prevalence difficult. Mortality rates are declining, perhaps faster in men than in women. In the year 2009 BC would expect to have slightly over 34,000 new male CVD, with the age group with the highest count being in the 70-79 age range. In terms of deaths, about 6,200 BC males would die in 2009. The prevalence data indicates that 126,000 BC males will have CVD related problems in 2009. Comparison with BC specific mortality figures shows that the observed mortality rate is slightly lower than the Canadian rate so these might be slight overestimates.

Osteoporosis is a disease that involves low bone mass and deterioration of the bone tissue leading to an increased risk of bone fractures. It is often seen as a major problem for older women, and female prevalence rates are clearly higher than male rates at all ages. However in older ages the prevalence rates are high and a significant number of men have this condition. Based on the prevalence data in the year 2009 BC would expect to have 53,000 male osteoporosis cases, with the age group with the highest count being in the 50-59 age range (low prevalence but high population) closely followed by the number of cases in the 80+ age range. The lifetime chances of getting a hip fracture for those with osteoporosis is estimated as 1 in 12, meaning those in the 50-59 age group have a significant chance of getting one before they die.

HIV/AIDS incidence rates (as measured by HIV positive tests) are higher in males than females and peaks in the 30-39 age group for males. The incidence rate has remained fairly consistent over the last 10 years for both males and females. With improved treatments the prevalence rates appear to be rising. Mortality peaked in the mid 1990's and has been constant over the last few years. Based on these patterns in the year 2009 BC would expect to see 250 new HIV cases and have a total of 3,200 male HIV/AIDS cases, with the age

group with the highest count being in the 30-39 age range. About 110 individuals would die of AIDS in the year. There is likely a wide range of error in the prevalence estimate.

Examining all of these conditions together (Chapter 12) shows that different conditions play larger or smaller roles at different ages and that the importance of a condition also depends on what one is focusing on (incidence, prevalence, or mortality). In terms of incidence (new events) younger males predominately show up in the MVA and alcohol dependence categories, with older ages having higher proportions of erectile dysfunction and CVD cases. In terms of prevalence the same general pattern holds for younger males, but in the 30's and 40's individuals with sexual dysfunction issues predominate before CVD and osteoporosis start to predominate in later ages. With mortality yet another pattern emerges: at younger ages it is MVA and suicide that account for most of the mortality, gradually switching to lung cancer and CVD, with prostate cancer gaining in importance at age 80.

Throughout the specific cause chapters we have included estimates of potential years of life lost. Comparing these provides another way of looking at the relative importance. A summary of the impact (for men) is tabulated below:

Source	PYLL/100,000	% of Total
All Cancers	1,605	23%
All Circulatory	1,195	17%
All Unintentional Injuries	943	14%
Suicide	684	10%
HIV/AIDS	169	2%
All Other (subtraction)	2,340	34%
All Causes of death	6,935	

The final chapter in this report examines life expectancy. In BC the trend is for increasing LE for both males and females over the period 1921 to 2008, with males always being lower than females. While it is sometimes reported that the difference in life expectancy is shrinking it might well be that the difference is simply returning to levels observed early in the 20th century. We also examined life expectancy by health authority. While different health authorities have slightly different life expectancies, the patterns across regions are similar, lending some support to the notion that the men's health issues outlined in this report at the provincial level would exist in each of the individual health authorities.

1 Introduction

This report provides a description of some of the epidemiological findings related to men's health. It is meant to provide further background to the "Improving Men's Health" main report. Ten separate conditions thought to be related to men's health issues were selected and reviewed here.

1.1 Approach

The epidemiological literature related to each of the ten conditions was reviewed with a particular emphasis on obtaining estimates of the prevalence, incidence, and mortality associated with the condition. Particular attention was focused on obtaining age specific estimates.

1.2 Structure of the Report

Each condition (presented in a separate section) is structured in a similar manner. It starts with a brief review of points of interest or things that influence the estimates that follow. The literature is then summarized and our best estimates of the incidence, prevalence, and mortality are presented (along with a description of how this was arrived at). We also look at potential years of life lost (PYLL) if possible. Finally, we present the number of cases the condition would create in BC (both in 2009 and in 2019) as a method of comparing the relative impact of these conditions on the population in BC. Our approach and reason for attention to these areas is described below.

1.2.1 INCIDENCE

Incidence is the number of new cases (over some time period, usually a year) of the condition being described. Incidence is usually presented in terms of a rate (new cases/population at risk). Incidence reflects the time of discovery of the condition. Incident (i.e. new) cases can be expected to require additional medical resources when compared to ongoing care (for things like diagnosis, initial treatment plan, etc) and also impact the individual to a large degree (as they have to come to terms with their condition, learn to navigate the medical system, etc). In terms of planning it represents a time of increased medical need for the individual. With good incidence estimates and a clear care pathway for the condition needed resources can be estimated with some degree of confidence.

Here we consider two measures of incidence.

1.2.1.1 Overall Incidence

For many conditions comparisons between areas (countries, provinces, etc.) are of interest. Age is a consideration, as the incidence of most conditions varies with age. If meaningful we have identified comparisons of incidence. In most cases these will be age standardized in some manner.

1.2.1.2 Age Specific Incidence

Age standardized rates allow for meaningful comparisons between areas. They are of limited use for planning or policy considerations because they cannot be used to describe the expected impact of a particular population of interest (here the province of British Columbia). Age specific rates are of interest in this case, and we have attempted to describe them when possible.

1.2.2 Prevalence

Prevalence is the number of individuals with the condition at a particular point in time. Prevalence is usually presented in terms of a rate (cases/population). It reflects the numbers who need some sort of treatment at a point in time. Many variations of prevalence exist; we have focused on one year prevalence where possible. In some conditions the idea of prevalence does not really apply (e.g. suicide). In others (e.g. cancer) it is not clear how exactly to calculate it, as after a few years it may not be clear if the individual still has the condition[1]. If it is possible we also present age specific rates.

1.2.3 Mortality

Mortality is the number of individuals who die from the condition. Mortality is usually presented in terms of a rate (deaths/population most often over a year). It provides a measure of the severity of the condition. Age specific rates are presented where possible.

1.2.4 Potential Years of Life Lost

Potential years of life lost is a measure of the number of years of life lost (compared to some standard expected years of life) by someone who dies of the condition under consideration. It is an alternative and sometimes more illuminating measure of the impact of a condition than simple mortality rates that has been touted as a more appropriate measure for public health strategies (e.g.,

[1] In conditions like cancer it is most common to consider prevalence as number of individuals still alive after x years from the diagnosis and not worry about if they still have cancer or not.

Doessel, Williams, & Whiteford, 2009). It is recognized that it is not an ideal measure, as it does not take into consideration the possibility of death from other causes (competing risk) and can be influenced by the age structure of the population upon which it is being calculated (Lai & Hardy, 1999). However it does present an alternative to simply looking at mortality and is often used and reported on in the literature.

1.2.5 Impact on BC

In the above sections we have our best estimate of an age specific incidence rate, prevalence rate, and mortality rate for each condition. We have applied these rates to BC population projections for the years 2009 and 2014 to provide some context to the numbers and allow for easier across condition comparisons.

1.2.6 BC Specific Data

The estimated numbers presented in the “Impact on BC” section are just that – estimates derived from rates (that are probably averaged in some manner). If it is possible BC specific data is presented to allow for a comparison of the estimates with what has actually been observed in BC. Note that it would be rare to find good age specific estimates of incidence, prevalence, and mortality based on BC data for any condition. However, where possible we present such information, allowing for some judgement as to the validity of the estimations presented in the previous section.

2 Prostate Cancer

The determination of the incidence rate of prostate cancer has been impacted by the differential use of the prostate-specific antigen (PSA) test in various parts of the world (and probably within countries). Countries that commonly use this test show a period of rapid increase in incidence, but this rate eventually falls back to a more normal increase. The PSA test has also appeared to impact the age specific incidence patterns of prostate cancer. In later years cases are being detected at an earlier age.

Despite this easily detected increase in incidence there is little evidence of large scale changes in mortality. Rates have remained fairly constant over an extended period of time, and there is little evidence of changes in the age specific rates.

Increased incidence (especially at an earlier age) combined with constant mortality implies increasing prevalence over time.

2.1 Incidence

2.1.1 Overall Incidence

In terms of incidence, prostate cancer has been showing increased incidence within Canada over the last 30 years. Figure 2 (see page 21)[2] plots data from the Canada Cancer Society's Canadian Cancer Statistics reports[3] and shows this rising, nearly linear, trend. Over the 37 years plotted the incidence rate has more than doubled (from 60.4/100,000 in 1973 to 127.9/100,000 in 2008[4]). This increasing rate is not a new finding; reports on the increase have existed for over 10 years (e.g., Levy, Iscoe, & Klotz 1998)

This rising trend is also observed in the United States (McDavid, Lee, Fulton, Tonita & Thompson, 2004). Both countries show a rising rate over time, with a large rise in the early 1990's. This large rise is associated with the introduction of the prostate-specific antigen (PSA) test, which is seen as influencing the large

[2] In some cases we have presented full page figures for clarity, and they are inserted in the document in groups (hence Figure 2 being referenced before Figure 1).
[3] Canadian Cancer Society's Steering Committee, 2009, with data added from previous reports to extend the years observed.
[4] The 2009 figure is clearly an estimate (and so indicated in the report), the 2008 figure is a combination of estimated and observed data.

peak in 1993 (and years around it) but not the overall rise in incidence. Increasing incidence has also been reported world wide (Gronberg, 2003; Quinn & Babb, 2002). In general the USA and Canada show the highest incidence in these reviews. However, this pattern might be influenced by the use of the PSA test in this time period, as shown by the Swedish experience where the incidence rate for prostate cancer showed a rapid rise after the onset of the common use of the PSA test as a screening tool in that country (Hemminki, Rawal, & Bermejo, 2005).

2.1.2 Age Specific Incidence Rates

Sufficient data has been reported that some idea of the age specific incidence pattern can be reliably described. Prostate cancer is quite rare in individuals under the age of 50. It has been described as a disease of the elderly, with 85% of the incident cases identified after the age of 65 (Grönberg, 2003). However, in Canada, the use of the PSA test has resulted in cases being detected at an earlier age, and the age specific incident rates have shifted accordingly. This pattern was demonstrated in 1998 by Levy (Levy et al, 1998), and still seems present in later estimates of age specific prevalence by Canadian Cancer Society (see Figure 3, page 22). The pattern of higher incidence rates at younger ages is not observed every year, as 2003 is an anomaly, but the trend seems clear. The difference in 2003 seems to be related to the drop in incidence related to the incidence peak around 2001 (see Figure 2). But the shape of the curves (as well as the change in incidence in younger age groups) is consistent with that reported by Levy for an earlier time period in Canada as well as age specific rates for other countries (e.g., Sweden as presented by Hemminki [2005]).

2.2 Prevalence

Prevalence data is harder to come by in terms of cancer statistics. Prevalence depends on incidence and survival rates, and thus can be different from what one might estimate just given the incidence or mortality rates. Prevalence can be seen as a measure that reflects the health care needs of a population. Table 1 uses data presented by Ellison and Wilkins (2009) and presents their 5 year[5]

[5] This is essentially an estimate of the count of the number of individuals who, at the time of counting, were alive and had been diagnosed with prostate cancer sometime in the last 5 years. Since they are doing their estimate for January 1, 2005, someone diagnosed with prostate cancer in 2000 would be counted here. But someone still alive but first diagnosed with prostate cancer in 1999 would not be included here (but they would be counted in the 10 year prevalence estimates).

prevalence estimates for the year 2005 by age group (the same data is plotted in Figure 1).

Table 1 Five Year Age Specific Prevalence Prostate Cancer Estimates

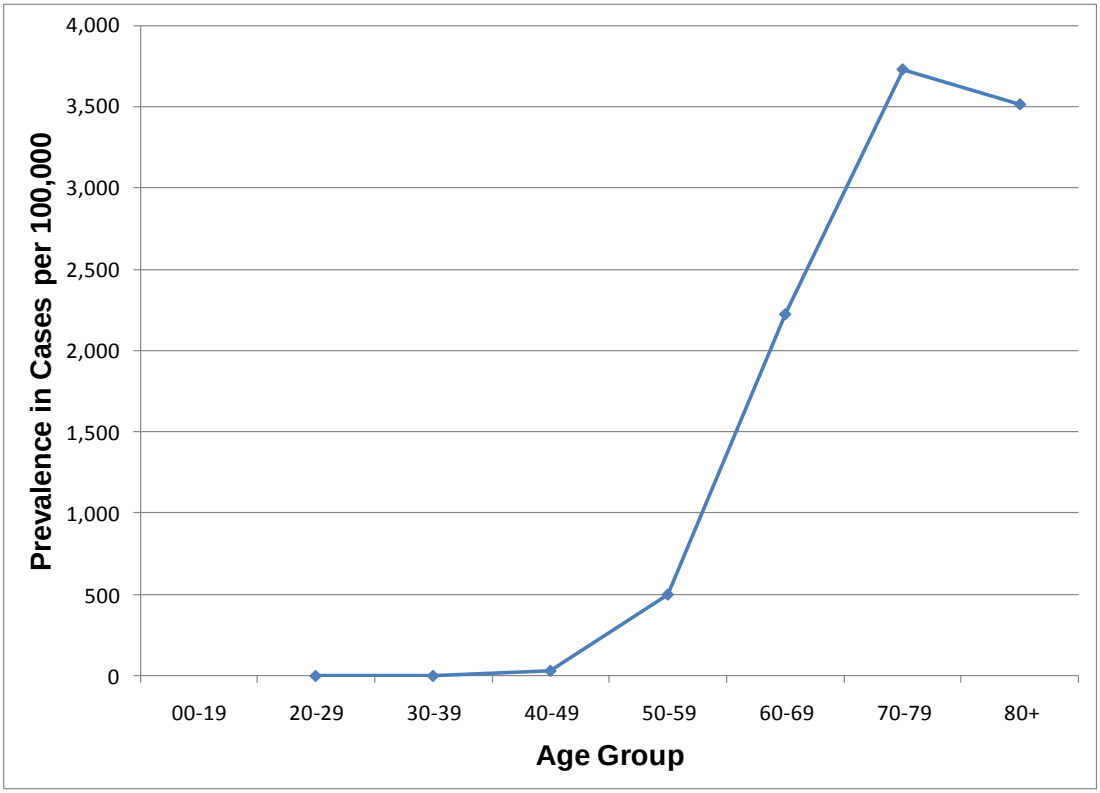
Age	*5 Year prevalence in cases per 100,000*
00-19	
20-29	0.3
30-39	0.3
40-49	31.6
50-59	500.1
60-69	2,222.2
70-79	3,727.0
80+	3,512.4
Total	539.7

Ellison and Wilkins (2009) also calculated the estimated number of cases in Canada at different prevalence-duration levels. Their data for prostate cancer is presented in Table 2.

Table 2 Number of Prevalent Cases in Canada at Different prevalence-duration Levels

Prevalence-Duration	*Estimated Cases*
Two-year	37,600
Five-year	86,000
Ten-year	135,100

Figure 1 Five Year Prevalence Estimates for Prostate Cancer in Canada as of January 1, 2005



2.3 Mortality

Unlike the incidence of prostate cancer there is little evidence of large changes in the mortality rates associated with the condition. Figure 4 presents the age standardized mortality using the same data sources as for Figure 2. Note the Y axis is at a much lower scale (1/4 that of the incidence figure) and hence the variability magnified. While the rates appear to be going down they are not that much lower than where they started off from in 1973, so it is hard to make a definitive statement about the long term trend. When death does occur it is concentrated in the older age groups (see Figure 5). The Canadian trends in mortality are similar to a number of other countries in the world (Quinn & Barr, 2002).

Figure 2 Age Standardized Prostate Incidence Rates for all of Canada

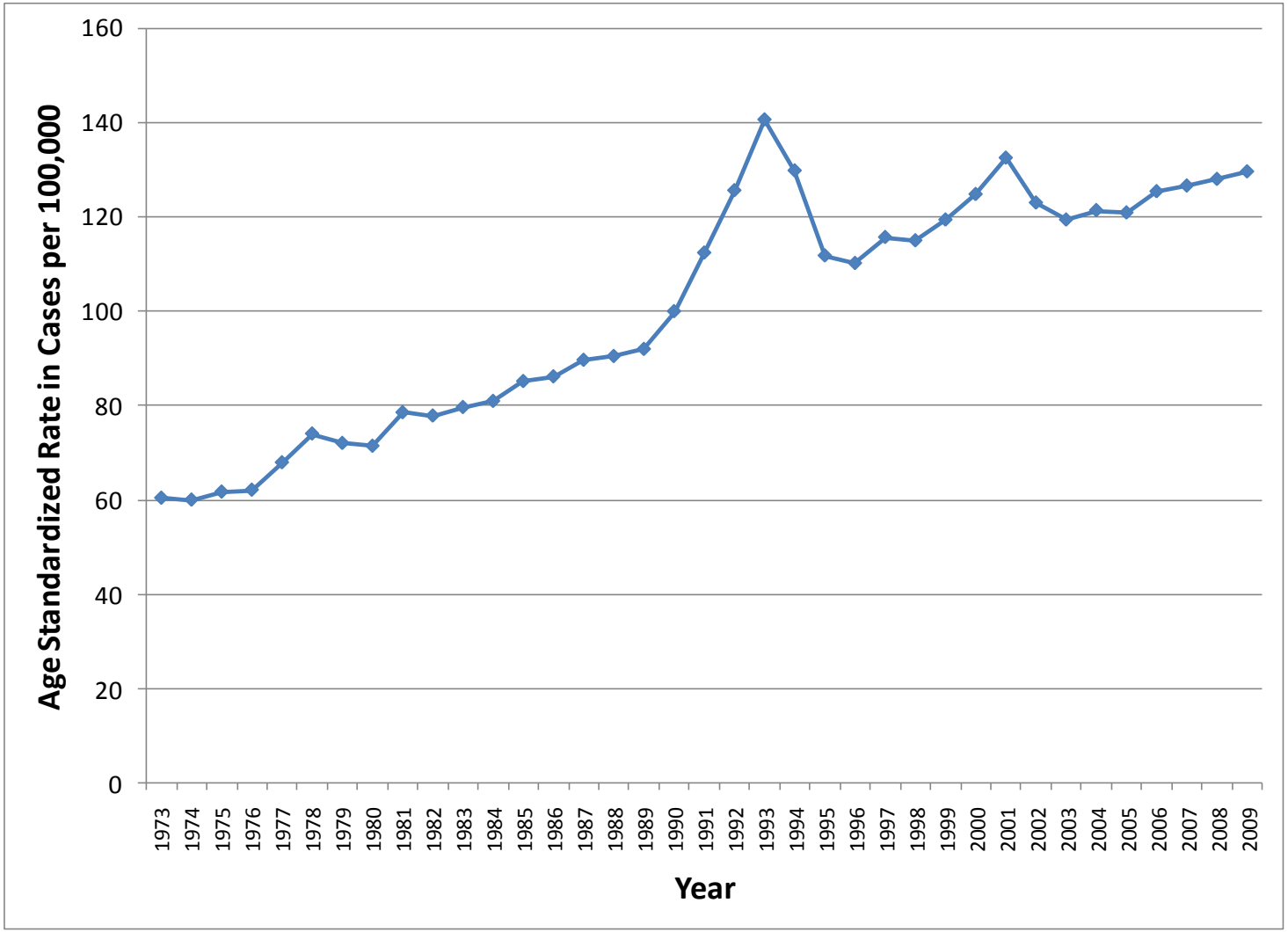


Figure 3 Age Specific Prostate Incidence Rates for all of Canada over 9 Years

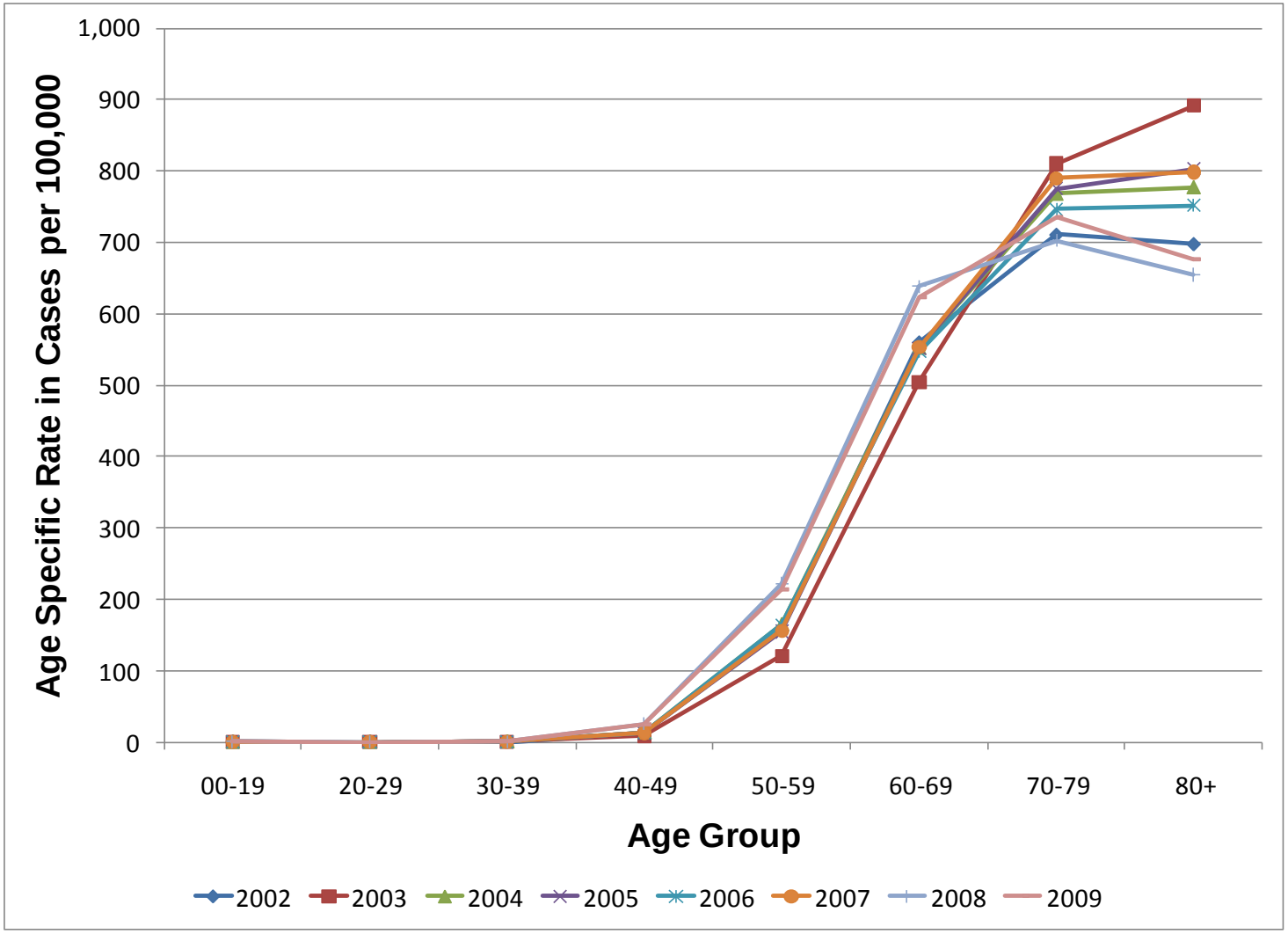


Figure 4 Age Standardized Prostate Mortality Rates for all of Canada

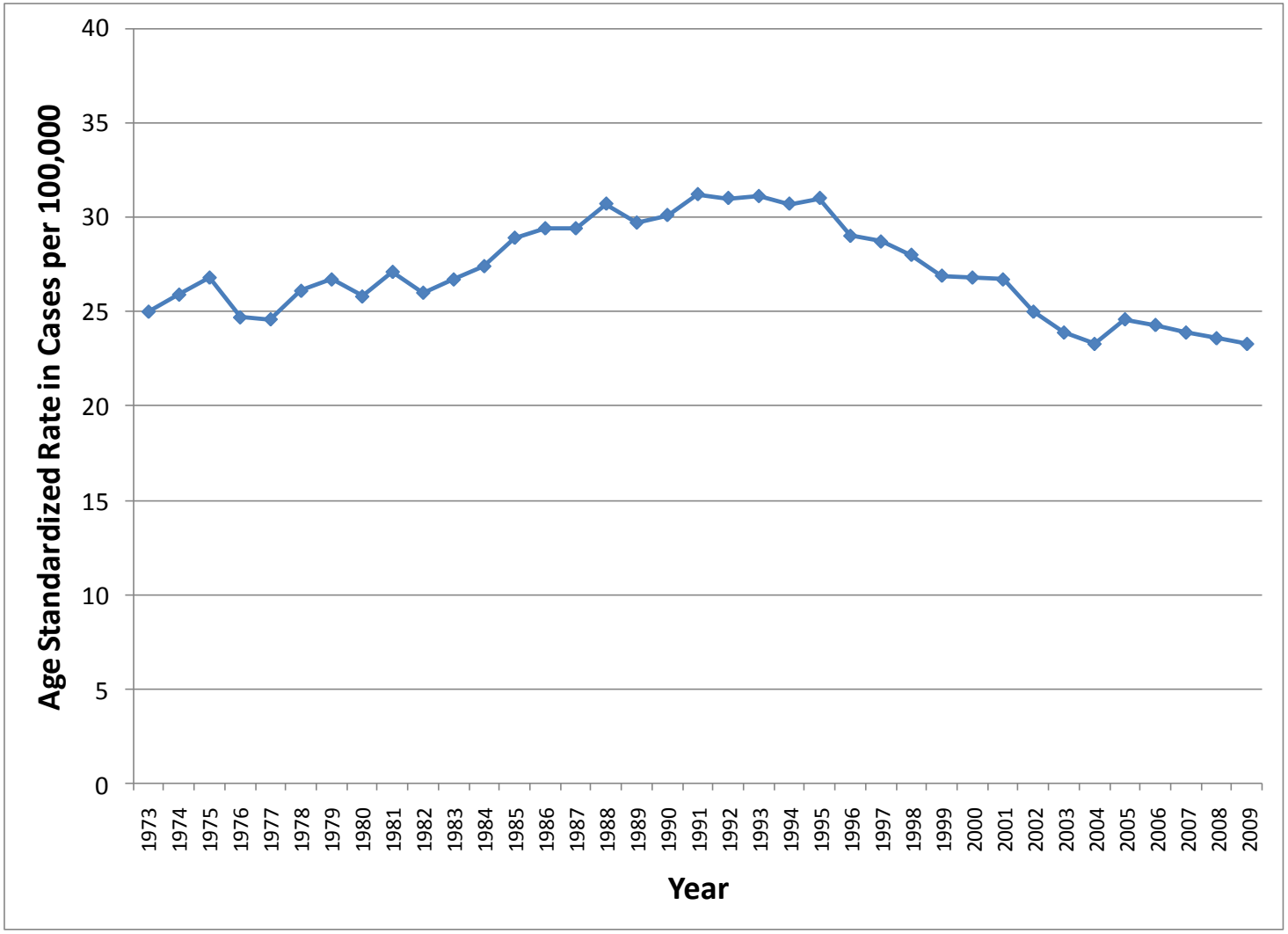
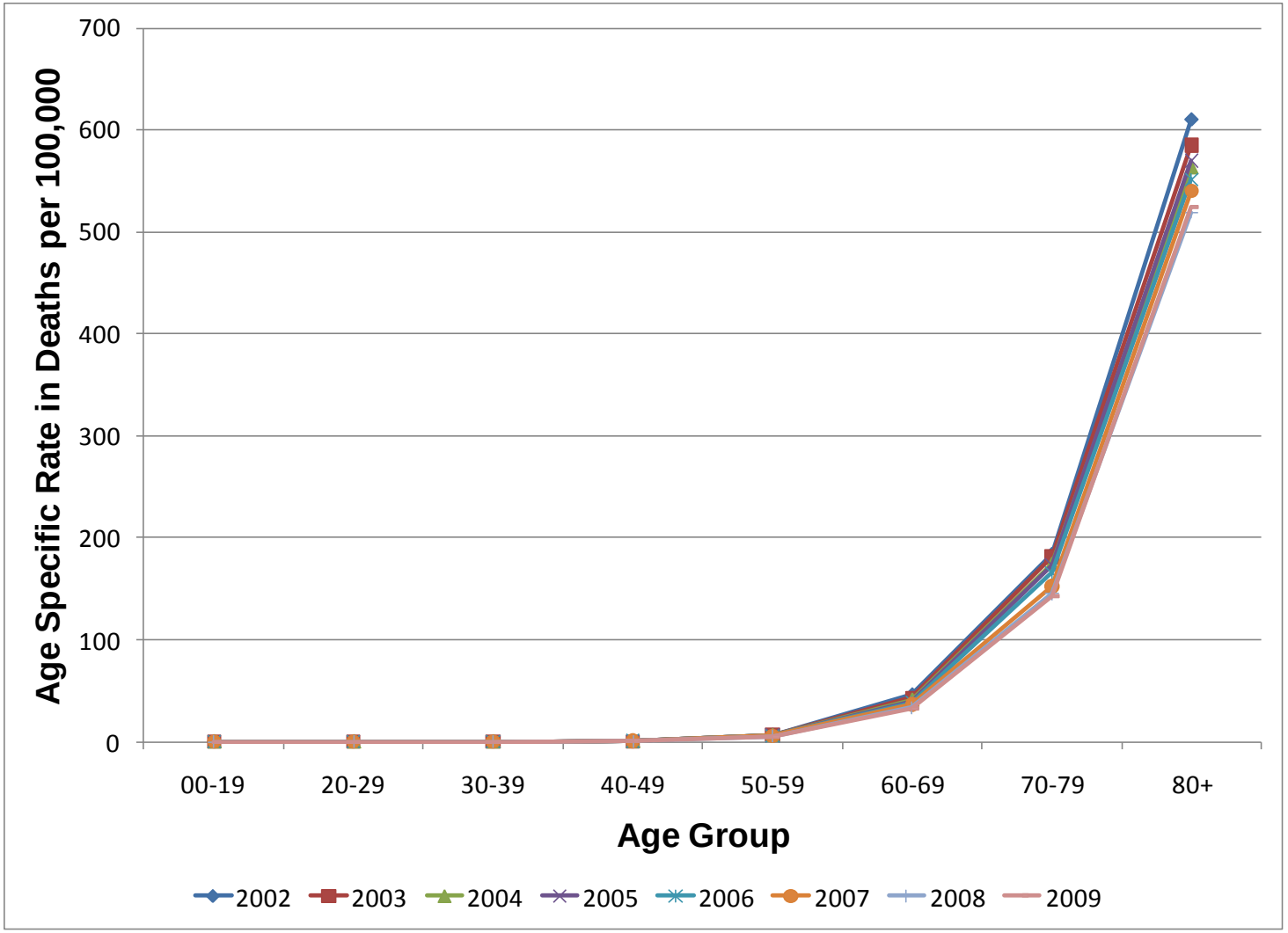


Figure 5 Age Specific Prostate Mortality Rates for all of Canada over 9 Years



2.4 Potential years of life lost

As death attributed top prostate cancer tend to occur at a late age (see Figure 5) the PYLL due to this condition could be anticipated as relatively low. Some indication of this can be obtained by comparing the PYLL for all cancer deaths in men with that of just prostate cancer (which, of course, makes up part of the PYLL for all cancer deaths). The January 2005 version of health reports presents tables that allow this comparison (based on 2001 data). For Canada as a whole the PYLL from prostate cancer was estimated as 56.6/100,000 (95% CI 55.9 to 57.3). All cancer PYLL was estimated as 1,604.7/100,000 (95% CI 1,601.0 to 1,608.4). Prostate cancer contributes about 3.5% to the total mens' PYLL due to cancer. Data is available for BC itself. The total cancer related PYLL for BC was reported as 1,469.8/100,000 (1,400.0 to 1,539.6) and the prostate specific figure as 52.8/100,000 (50.9 to 54.6). Thus the BC proportion is 3.6%, very similar to the Canadian value.

2.5 Impact on BC

Given the above, it is possible to use these estimates to examine the impact on the BC population. These are presented in Table 3.

Table 3 Estimated Prostate Cancer Values for BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	1	1	0	0	0	0
20-29	315,852	315,866	0	0	0	0	1	1
30-39	304,217	334,215	1	1	0	0	1	1
40-49	348,793	337,828	85	82	1	1	110	107
50-59	327,906	364,116	698	775	17	19	1,640	1,821
60-69	223,546	277,099	1,393	1,726	73	91	4,968	6,158
70-79	132,679	151,534	977	1,116	190	216	4,945	5,648
80+	72,247	85,554	489	579	379	448	2,538	3,005
Total	2,214,275	2,349,416	3,644	4,281	659	775	14,202	16,740

This calculation suggests that in the year 2009 BC would expect to have 3,600 new prostate cancer cases diagnosed, 659 men die of prostate cancer, and about 14,200 individuals alive at the end of the year who have been diagnosed with prostate cancer in the preceding 5 years. Most of the new (incident) cases would be in the 60-69 age range, while over half the deaths would be in men 80 or older. The majority of prevalent cases would be in the ages 60-79.

2.6 BC Specific Data

The numbers in Table 3 are theoretical estimates for BC. They are based on Canada wide estimates of incidence, mortality, and prevalence rates. Since detailed BC estimates do not exist in the literature[6] it is desirable to get at least some idea of how close these numbers fit to reported BC data. Incidence and prevalence data is not readily available but a BC government Vital Statistics agency annual publication (Selected vital statistics and health status indicators) has contained counts of the number of deaths by age group (and gender) for all ICD-10 causes listed on the death certificates. Table 4 presents a compilation of the data from the latest 11 reports currently available. The total number of deaths in the table ranges from 439 to 597 (median 487, mean 492) with no indication that the raw number is increasing or decreasing over this period. These figures are all lower than that predicted in Table 3 (691), the closest is the maximum which is lower by about 14%.

Table 4 Prostate Related Mortality (ICD10 C61 or ICD9 185) Compiled from BC Vital Statistics Publications

	Year										
Age	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Counts											
25-44		1					1				
45-64	38	42	32	30	32	26	43	29	42	40	31
65-79	226	224	199	220	212	240	206	179	185	202	188
80+	223	205	215	253	228	271	246	231	292	269	250
Total	487	472	446	503	472	597	496	439	519	511	469
Rate per 100,000											
25-44	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
45-64	9.0	9.6	7.1	6.4	6.6	5.2	8.3	5.4	7.6	7.0	5.3
65-79	131.7	126.7	109.7	118.6	112.7	125.4	106.2	90.8	92.1	98.8	89.8
80+	544.2	487.7	497.0	568.6	486.2	548.2	468.8	417.2	502.1	442.7	393.5
Total	25.2	24.0	22.5	25.2	23.5	29.5	24.3	21.3	24.9	24.2	21.9

Note: "Total" rate is based on total BC population (i.e., all ages)

Thus some caution is needed in the interpretation of Table 3. It may be that prostate cancer is less of a “problem” in BC than the rest of Canada and the incidence and prevalence is also lower than the rest of the country. Or, if the incidence is similar, then the lower mortality implies a higher prevalence (and thus more resources required for the ongoing treatment of these individuals).

[6] These could be developed, but they would require access to specific data sets and involve detailed calculations (essentially replicating the work done Canada wide). This is beyond the scope of this project.

3 Testicular Cancer

3.1 Incidence

3.1.1 Overall Incidence

Testicular cancer incidence has been rising over the years in Canada (Liu, Wen, Mao, Mery, & Rouleau, 1999) and various other countries in the world (Huyghe, Matsuda, & Thonneau, 2003). However, Richiardi et al (2004) also report that at least in some countries there are indications that the rise has stopped. It also has some other unique features. To quote the information provided by Cancer Research UK:

> *Testicular cancer has several distinct features when compared with other cancers. Firstly, it has an unusual age-distribution, occurring most commonly in young and middle-aged men. Secondly, its incidence is rising, particularly in white Caucasian populations throughout the world, for reasons as yet unknown. And thirdly, testicular cancer is curable in the majority of cases.*[7]

Rising incidence (if it is still continuing) means coming up with a single incidence rate is probably impossible. However, the incidence rate is relatively low (at least compared to other cancers). Reported rates are around 6-7/100,000[8] (in more recent years). The Canadian Cancer Society estimates around 850 (2005) to 900 (2009) new cases in Canada. With total male population estimates of 15,805,000 and 16,520,000 in these years this works out to a rate of 5.4/100,000 for 2005 and 2009.

3.1.2 Age Specific Incidence

Rising overall rates can be due to an increase across all ages or more localized within specific age groups. The increase seems more related to specificic age groups as can be seen in Figure 6 (US data) and Figure 7 (Canadian data). Note the age groups along the X axis differ making the shape of the curves appear different, but the peak incidence is about the same in each plot.

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[7] From http://info.cancerresearchuk.org/cancerstats/types/testis/incidence/ (June 2009)
[8] It is not always clear exactly what was used as the denominator.

Figure 6 Age Specific Testicular Cancer Rates from an American Population (adapted from Pharris-Ciurej et al, 1999)

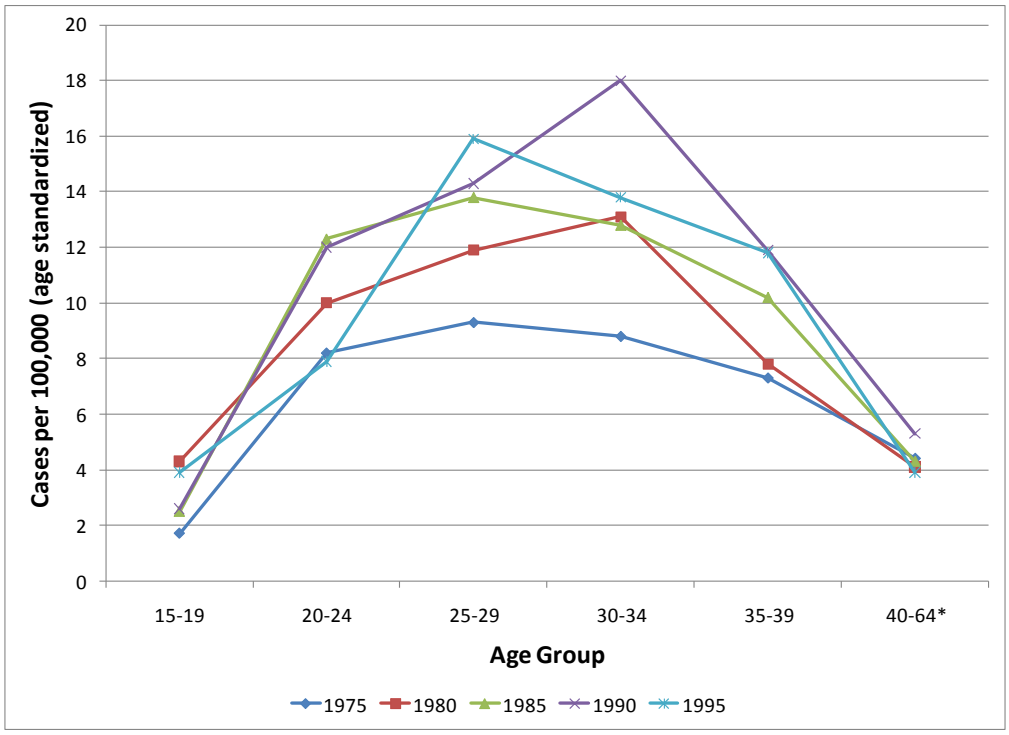


Figure 7 Age Specific testicular Cancer Rates for a Canadian Population (from Liu et al, 1999)

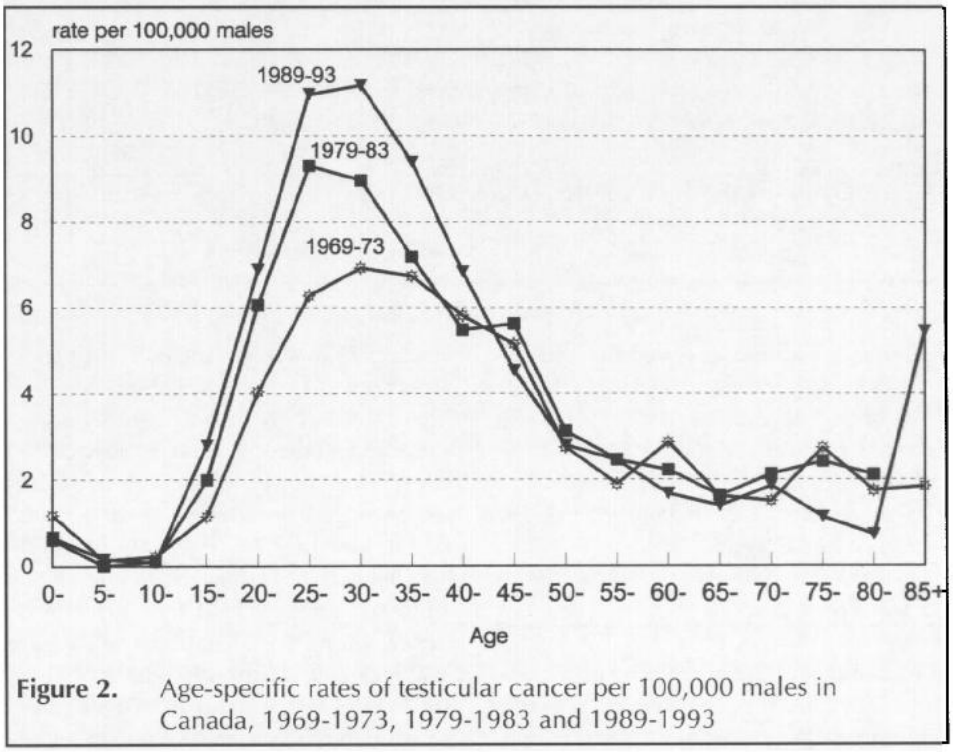
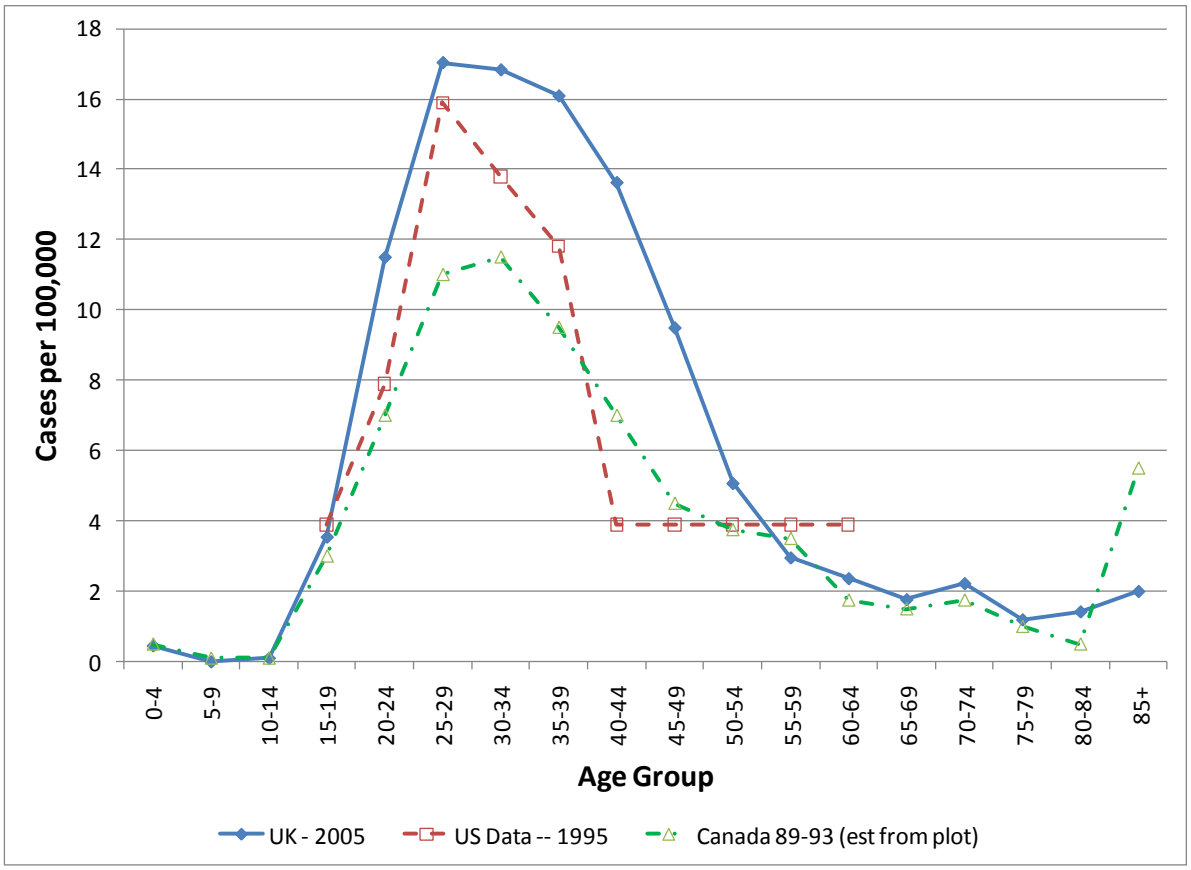


Figure 2. Age-specific rates of testicular cancer per 100,000 males in Canada, 1969-1973, 1979-1983 and 1989-1993

The above data is a bit old, but the pattern remains with more recent data. Figure 8 shows some more recent data from the UK (see footnote 7 for the source), with the 1995 data from Figure 6 and the 89-93[9] data from Figure 7 plotted for reference (as dotted lines). The shapes of the curves are about the same.

Figure 8 Testicular Cancer Incident Rates in 2005 from UK (with comparisons to older rates shown in Figure 6 and Figure 7)



3.2 Prevalence

With an incidence to mortality ratio of 30 to 1 prevalence would be expected to be relatively high. Figure 9 presents the 5 year prevalence estimates made by the Canadian Cancer Society (adapted from Ellison & Wilkins, 2009). Note that the figure plots 5 year prevalence (hence cases diagnosed 6 or more years prior are not counted as prevalent cases); the plot would look much different if life time prevalence was plotted.

[9] The values were read off the original graph so the underlying figures may not be entirely accurate.

3.3 Mortality

Testicular cancer has a very low mortality rate if adequate treatment is used and 10 year survival rates are around 95% (Schairer et al, 2007; Bertuccio et al, 2007). The Canadian Cancer Society estimated the expected 2009 mortality to be 30 cases (the lowest of the cancers they tabulate, see Table 1.1 in Canadian Cancer Society's Steering Committee, 2009) and they estimate the 5 year survival rate to be 96% (Table 7.1 from same source). Thirty deaths would work out to a crude rate of 0.18/100,000. Within Canada mortality has been low for an extended period of time, dropping from an age standardized rate[10] of 0.35/100,000 in the early 1980s to 0.15/100,000 in the early 2000's, a decrease of some 56% (Bertuccio et al, 2007). We could find no published Canadian age specific testicular cancer mortality rates.

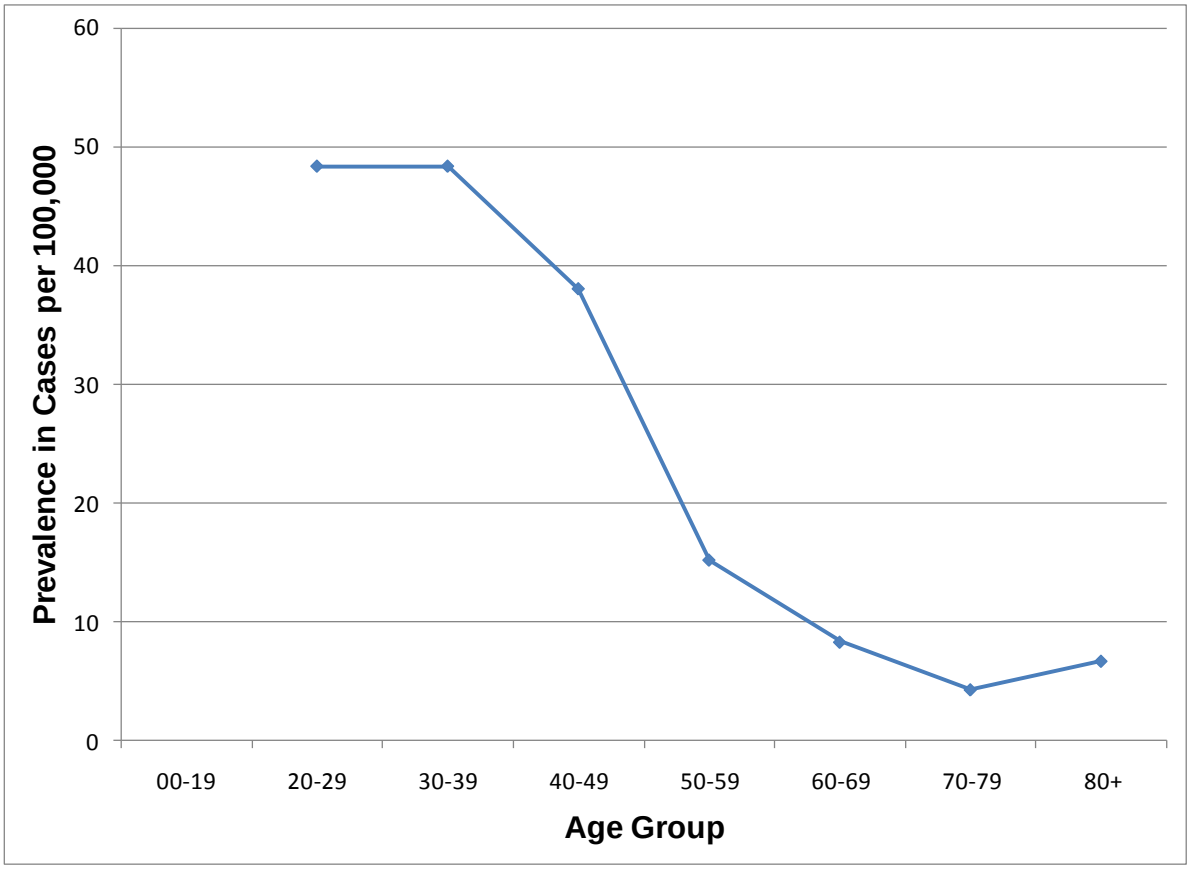
Within the current literature the mortality rate is so low that interest has shifted to the development of other cancers in those who developed testicular cancer. There does not appear to be increased risk of later cancer development in individuals who contract testicular cancer except in a relatively small cohort who were exposed to specific treatment regimes in the late 1970's (Schairer et al, 2007). .

3.4 Potential years of life lost

PYLL for testicular cancer might be considered to be low, given the high survival rate. Indeed, testicular cancer accounts for the fewest total PYLL of all cancer related deaths in Canadian males (0.3% of the total PYLL in 2003, see the 2007 Canadian Cancer Society report, Table 13). This is consistent with PYLL estimates in the United States (Yabroff et al, 2008), where testicular cancer was the cancer with the lowest PYLL of those examined. This is due to both the relatively low incidence rate and the high survival rate given good treatment. However, because of the young age of onset the average PYLL per death for testicular cancer has been shown to produce the highest average number of years of life lost per death (Friman, Finney, & Leibowitz, 1989). While these results are a bit dated (the time period examined was the late 1970's and early 1980's) it is likely this observation still holds today. Death from testicular cancer is relatively rate, but many years of life tend to be lost if it occurs.

[10] Note these are age standardized rates (to a world population) and thus cannot be directly compared to the Canadian Cancer Society estimates.

Figure 9 Five Year Prevalence Estimates for Testicular Cancer in Canada as of January 1, 2005



3.5 Impact on BC

From the above it can be seen that estimates for testicular cancer are not as readily available as for prostrate cancer. It is still possible to use these estimates to get a rough estimate on the expected impact on the BC population. These are presented in Table 5.

Table 5 Estimated Testicular Cancer Values for BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	5	4	--	--	0	0
20-29	315,852	315,866	28	28	--	--	153	153
30-39	304,217	334,215	32	35	--	--	147	161
40-49	348,793	337,828	20	19	--	--	133	128
50-59	327,906	364,116	12	13	--	--	50	55
60-69	223,546	277,099	4	5	--	--	19	23
70-79	132,679	151,534	2	2	--	--	6	7
80+	72,247	85,554	2	3	--	--	5	6
Total	2,214,275	2,349,416	104	110	4	4	511	533

In this table we have used the latest incidence estimates of Lui et al (1999). Mortality estimates can only be done on an overall basis. This calculation

suggests that in the year 2009 BC would expect to have slightly over 100 new testicular cancer cases diagnosed, 4 men die of testicular cancer, and about 500 individuals alive at the end of the year who have been diagnosed with prostate cancer in the preceding 5 years. Most of the new (incident) cases would be in the younger age range, as would the majority of the 5 year prevalent cases. Given the high survival one can anticipate that there are also a number of individuals with a history of testicular cancer in the older age groups.

3.6 BC Specific Data

As with prostate cancer, the BC government Vital Statistics agency annual publications (Selected vital statistics and health status indicators) were examined for ICD-10 cause of death C62 (or ICD9 cause 186 in earlier years). Table 6 presents a compilation of the data from the latest 11 reports currently available. The total number of deaths in the table ranges from 0 to 11 (median 0, mean 3.3) with no indication that the raw number is increasing or decreasing over this period. The number is highly variable, but the mean of 3.3 is fairly close to the expected number of deaths calculated in the section above.

Table 6 Testicular Cancer Related Mortality (ICD10 C62 or ICD9 186) Compiled from BC Vital Statistics Publications

	Year										
Age	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Counts											
15-19			1								
20-24								1			1
25-44			4					5	6		1
45-64			4				4	3	1		
65-79			2				1		1		
80+								1			
Total	0	0	11	0	0	0	5	10	8	0	2
Rate per 100,000											
15-19			0.7								
20-24								0.7			0.6
25-44			0.6					0.8	1.0		0.2
45-64			0.9				0.8	0.6	0.2		
65-79			1.1				0.5		0.5		
80+								1.8			
Total			0.6				0.2	0.5	0.4		0.1

Note: "Total" rate is based on total BC population (i.e., all ages)

4 Lung Cancer

Lung cancer is one of the more extensively studied cancers from an epidemiological perspective. Many studies have been (and continue to be) carried out. The Canadian Cancer Society reports are used as the primary data sources for this section.

Note that this is the one cancer in this report that impacts both men and women. In the past lung cancer was seen as primarily a male condition. However, as will be shown below, there are gender differences in the trends over time, and, if these trends were to continue, lung cancer may soon be a condition that impacts both genders to the same degree.

4.1 Incidence

4.1.1 Overall Incidence

The incidence of lung cancer in males has been decreasing over the last 30 years. Over this same period the incidence in women has been increasing. Figure 10 plots data from the Canada Cancer Society's Canadian Cancer Statistics reports (Canadian Cancer Society's Steering Committee, 2008). Over the period the male rate has fallen from a high in 1984 of 97/100,000 to the 2008 estimated rate of 67/100,000 (a 31% decrease from the 1984 maximum) while the female rate has risen from a low of 20/100,000 in 1979 to an estimated 51/100,000 in 2008 (an increase of around 150%). While the male incidence rate is still higher, if the near linear trends continue the lines would cross in about 10 years. Note that this trend is not unique to Canada; similar patterns are seen in Australia, South-East England, Ireland, and the United States (Youlden, Cramb, & Baade, 2008). However, it is not a world-wide phenomena, as other counties show different incidence patterns over time (Bray, Tyczynski, & Parkin, 2004; Devesa, Bray, Vizcaino & Parkin, 2005).

4.1.2 Age Specific Incidence

Age specific incidence rates for lung cancer exist from a variety of sources. Figure 11 presents the male age specific rates as calculated by the Canadian Cancer Society. Incidence rates rise with age, although the increase after age 79 is minimal. And while the overall incidence has been dropping over this time period the pattern has remained essentially the same. The female pattern is similar except that there is a definite decrease after age 79 (Figure 12 presents a

comparison of the male and female patterns for selected years based on the Canadian Cancer Society data). The Canadian pattern is not unique, almost exactly the same age specific patterns are observed in data on Michigan lung cancer incidence (Figure 13).

4.2 Prevalence

Ellison and Wilkins (2009) estimated 5 year prevalence rates for lung cancer[11] in the Canadian population. Table 7 presents a tabulation of their prevalence estimates.

Table 7 Lung Cancer Five Year Prevalence Estimates by Gender

Age	*Males*	*Females*
00-19		
20-29	2.0	2.6
30-39	2.0	2.6
40-49	19.3	35.3
50-59	97.4	116.6
60-69	324.9	282.9
70-79	596.1	398.9
80+	543.3	270.7
Total	88.7	83.3

Note: measure is cases per 100,000 population

The prevalence rates increase with age in a manner similar to the incidence rates.

4.3 Mortality

At a gross level lung cancer mortality patterns mirror the incidence patterns. Figure 14 presents the Canadian Cancer Society mortality patterns for males and females. The pattern is similar to that of incidence (Figure 10)[12]. Clearly in Canada the mortality rate for males is decreasing, that for females increasing. Other countries (but not all) also show a similar mortality pattern (see, for example, Bray, Tyczynski, & Parkin, 2004).

[11] They used the grouping “lung and bronchus” for their tabulation and that is tabulated here.
[12] Note that the Y axis differs between the two figures, so although they look more or less the same the slopes of the mortality plots are less than that of the incidence plots.

Figure 10 Age Standardized Lung Cancer Incidence Rates for all of Canada

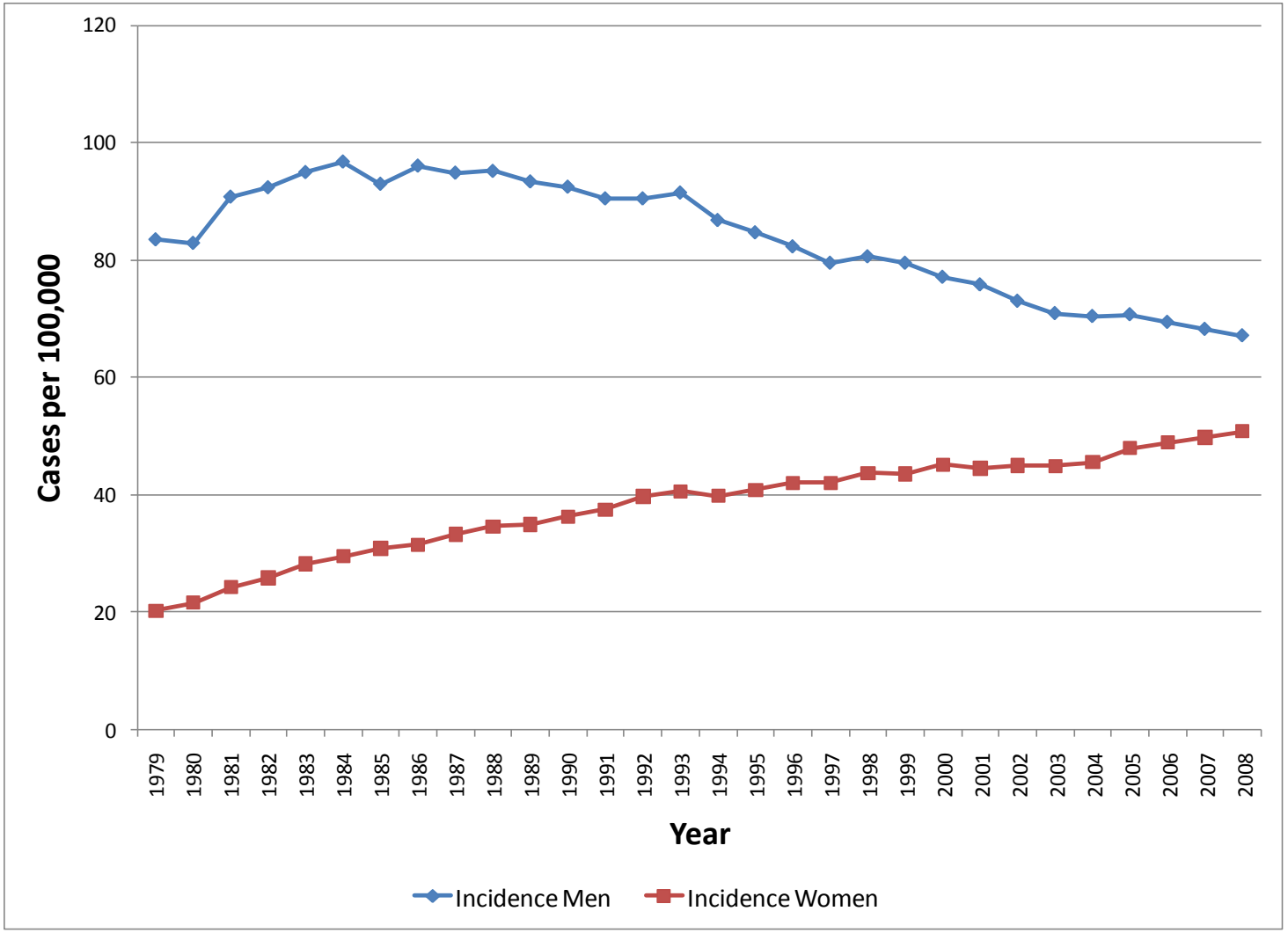


Figure 11 Age Specific Male Lung Cancer Incidence Rates for all of Canada over 9 Years

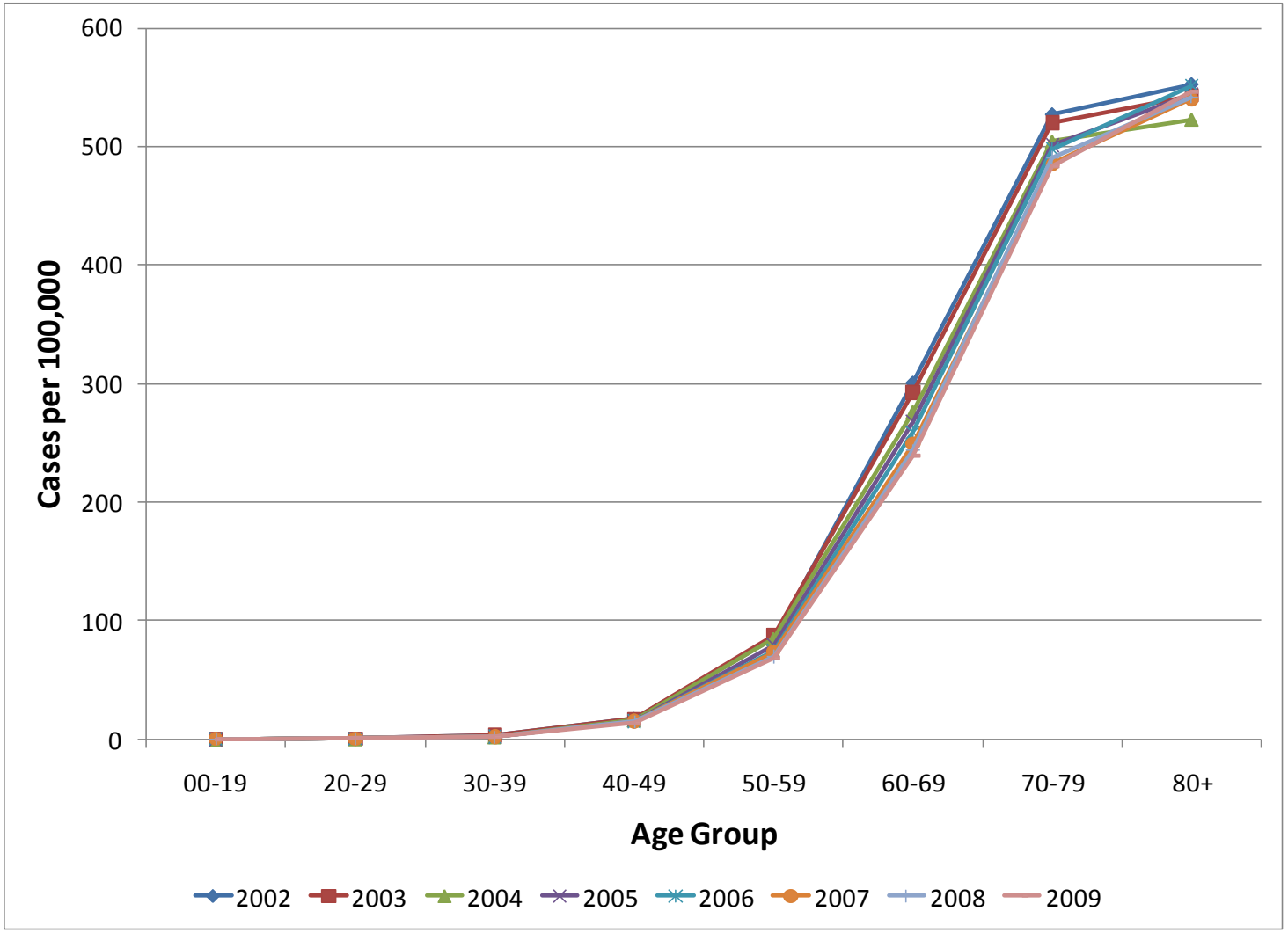


Figure 12 Male – Female Age Specific Lung Cancer Incidence Rates over Selected Years (Canada)

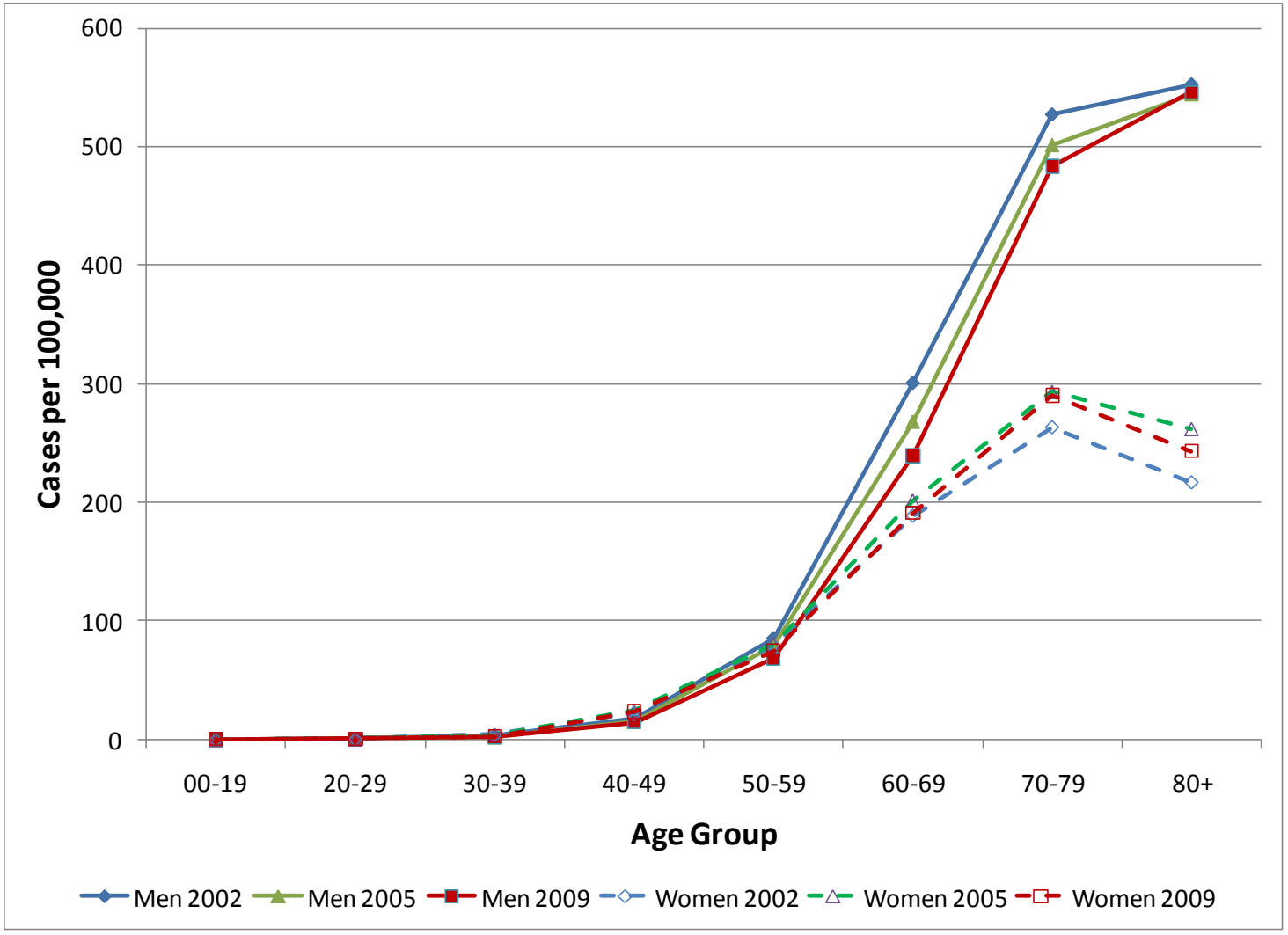
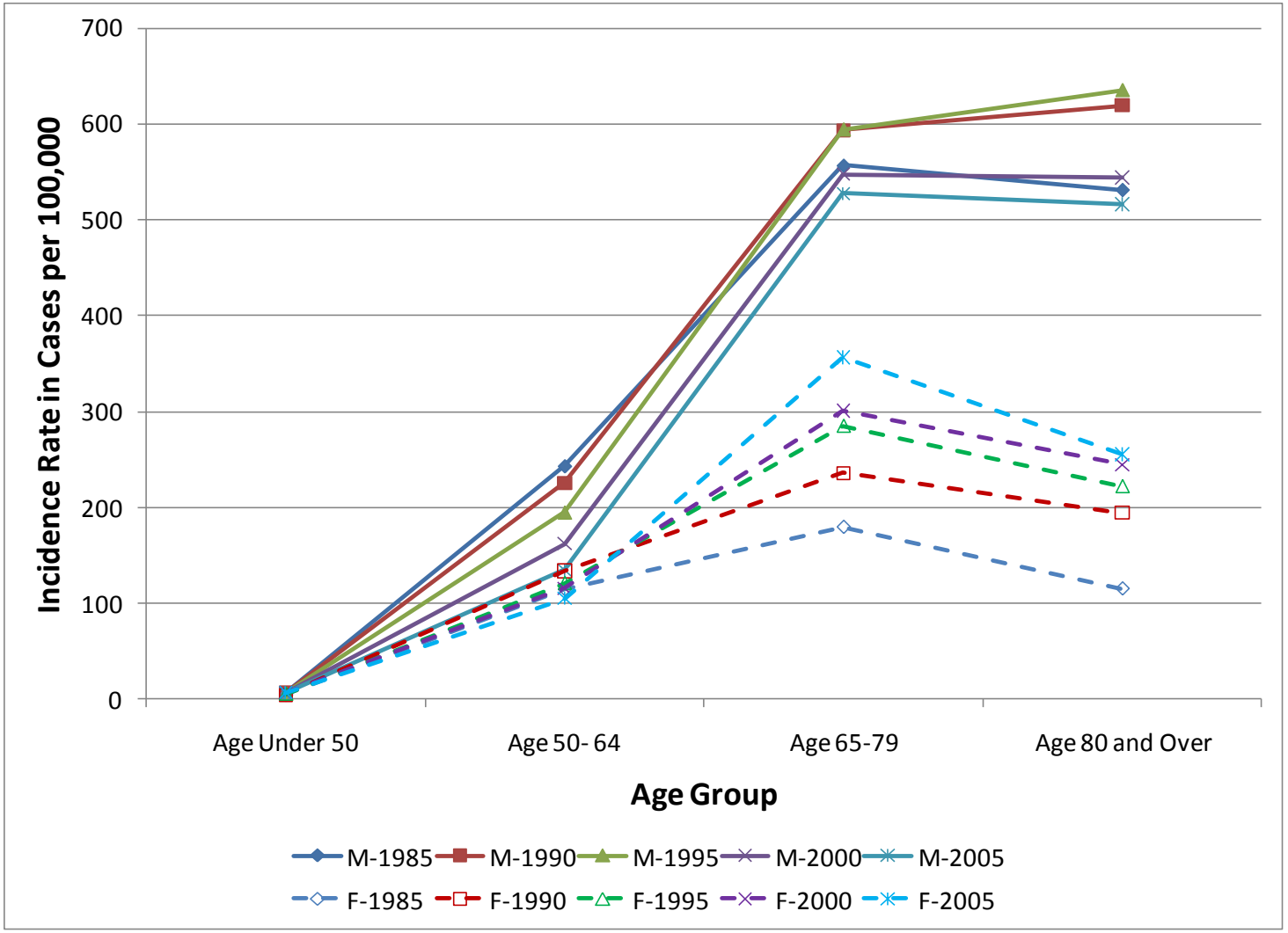
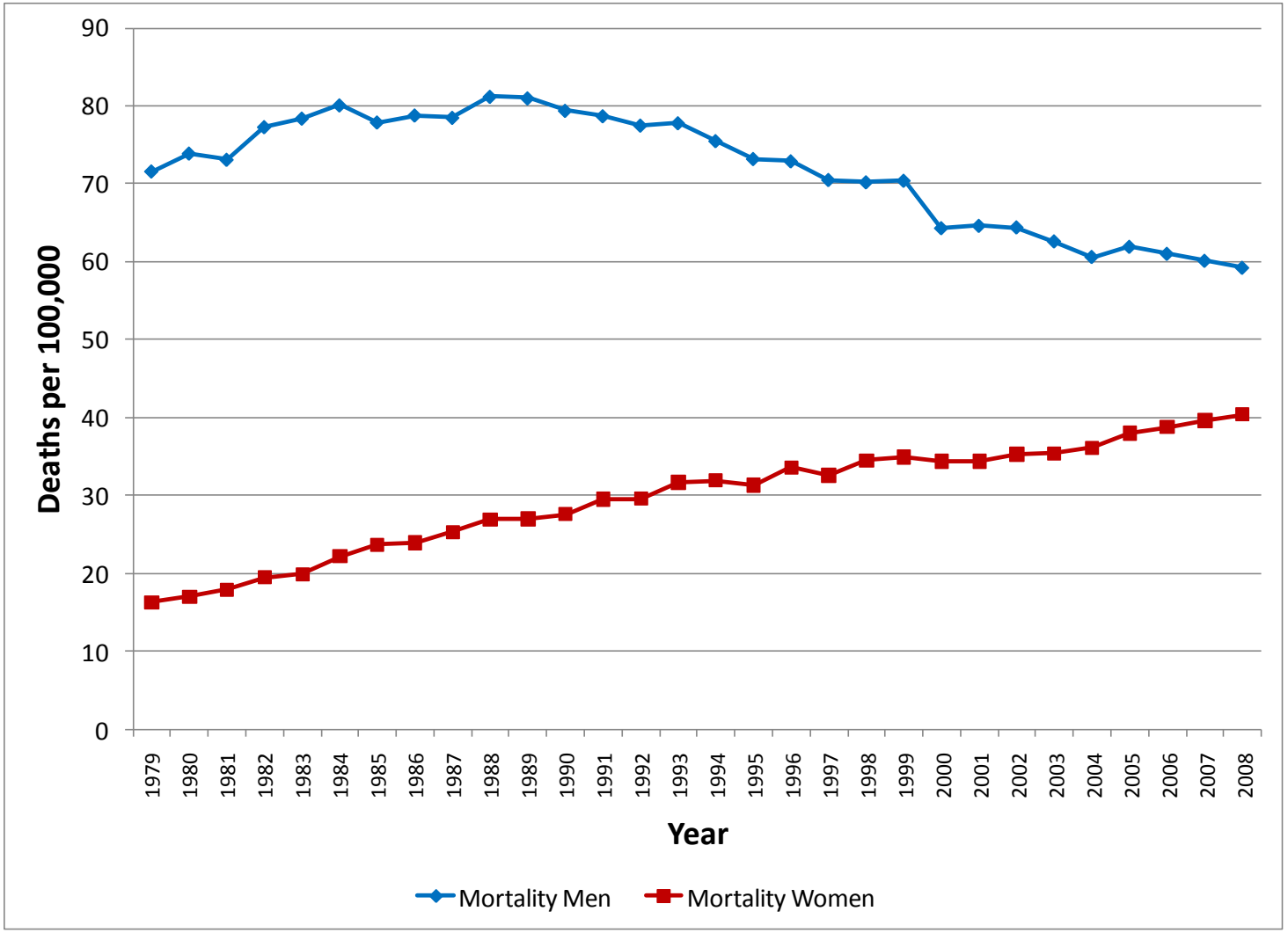


Figure 13 Male – Female Age Specific Lung Cancer Incidence Rates (State of Michigan)



Source: http://www.mdch.state.mi.us/pha/osr/Cancer/Race/Lung.asp?DxString=GenAgeLung (accessed July 2009)

Figure 14 Age Standardized Lung Cancer Mortality Rates for all of Canada



4.4 Potential years of life lost

Lung cancer is a cancer with one of the lowest 5 year survival ratios for both men and women. In Canada the rates have been estimated as 13% (male) and 18% (female) by the Canadian Cancer Society. Given a low 5 year survival rate and the relatively high incidence rates in ages below 70 one would expect PYLL would be high compared to other conditions. The Canadian Cancer Society (2007 report) estimated that lung cancer accounted for 29% of all the PYLL associated with cancer for males and 24% for females.

The January 2005 version of health reports presents tables that allow for a similar comparison (based on 2001 data). For Canada as a whole the PYLL for men from lung cancer was estimated as 453.0/100,000 (95% CI 451.0 to 455.0). All cancer PYLL was estimated as 1,604.7/100,000 (95% CI 1,601.0 to 1,608.4). Hence lung cancer contributes about 28% to the total men's PYLL due to cancer. Data is available for BC itself. The total cancer related PYLL for BC was reported as 1,469.8/100,000 (1,400.0 to 1,539.6) and the lung cancer specific figure as 360.5/100,000 (355.6 to 365.4). Thus the BC proportion is 25%, similar to the Canadian value.

4.5 Impact on BC

Given the rates presented above it is possible to use these estimates to examine the impact on the BC population. These are presented in Table 8.

Table 8 Estimated Lung Cancer Values for BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	1	1	0	0	0	0
20-29	315,852	315,866	1	1	1	1	6	6
30-39	304,217	334,215	5	6	3	4	6	7
40-49	348,793	337,828	50	49	37	36	67	65
50-59	327,906	364,116	223	248	168	186	319	355
60-69	223,546	277,099	535	663	422	523	726	900
70-79	132,679	151,534	642	733	583	666	791	903
80+	72,247	85,554	394	467	410	486	393	465
Total	2,214,275	2,349,416	1,851	2,167	1,624	1,901	2,309	2,701

This calculation suggests that in the year 2009 BC would expect to have 1,851 new lung cancer cases diagnosed, 1,624 men die of lung cancer, and about 2,309 individuals alive at the end of the year who have been diagnosed with lung cancer in the preceding 5 years. Most of the new (incident) cases would be in

the 70-79 age range, while over half the deaths would be in men 70 or older. The majority of prevalent cases would be in the ages 60-79.

4.6 BC Specific Data

The numbers in the above section are theoretical estimates for BC. They are based on Canada wide estimates of incidence, mortality, and prevalence rates. Table 9 presents a compilation of the observed BC mortality data from the latest 11 Vital Statistic reports currently available. The total number of deaths in the table ranges from 1,102 to 1,193 (median 1,141, mean 1,137) with no indication that the raw number is increasing or decreasing over this period. These figures are all lower than that predicted in Table 8 (1,624), the closest is the maximum which is lower by about 27%.

Table 9 Lung Cancer Related Mortality (ICD10 C34 or ICD9 162) Compiled from BC Vital Statistics Publications

	Year										
Age	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Counts											
25-44	19	21	16	17	11	14	7	15	14	6	7
45-64	300	268	270	291	296	264	282	261	272	277	314
65-79	600	616	595	604	586	588	580	582	595	629	546
80+	229	234	224	222	209	239	238	285	281	281	294
Total	1,148	1,141	1,105	1,134	1,102	1,105	1,107	1,144	1,162	1,193	1,161
Rate per 100,000											
25-44	2.9	3.2	2.5	2.7	1.7	2.2	1.1	2.4	2.3	1.0	1.1
45-64	71.4	61.3	59.6	62.2	61.2	52.8	54.6	48.8	49.3	48.6	53.3
65-79	349.6	348.5	327.9	325.6	311.5	307.1	298.9	295.1	296.3	307.6	260.9
80+	558.8	556.6	517.8	499.0	445.7	483.5	453.6	514.7	483.2	462.5	462.7
Total	59.5	58.1	55.8	56.9	54.9	54.6	54.2	55.5	55.8	56.5	54.3

Note: "Total" rate is based on total BC population (i.e., all ages)

In 2003 and 1997 there were deaths (1 and 2 respectively) under age 25 (included in total)

Thus the predicted values based on section 4.2 should be treated with caution.

5 Sexual Dysfunction

Two areas of sexual dysfunction are examined in this chapter: erectile dysfunction (ED) and premature ejaculation (PE). Both are believed to be widespread in men. Neither present an immediate health risk (in the same sense as most cancers present a risk to health), although ED is associated with some serious medical conditions and the presence of ED can indicate examination for other medical conditions should be considered. Neither condition leads directly to death. Thus mortality and PYLL are not issues. Both conditions are somewhat "subjective" in nature[13], and tend to be measured through self reports. This creates major problems for the epidemiological description of both conditions. Canadian specific epidemiological literature is hard to come by. Estimates of incidence are particularly difficult to find as the date of onset of most sexual dysfunctions can be difficult or impossible to determine (DeRogatis & Burnett, 2008). Most epidemiological work has thus focused on prevalence (DeRogatis & Burnett, 2008; Spector & Carey, 1990).

5.1 Erectile Dysfunction

5.1.1 INCIDENCE

Incidence studies of ED are relatively rare. Three are primarily cited in the literature (Johannes et al, 2000; Moreira et al, 2003; Schouten et al, 2005)[14]. All three studies examine a relatively small age range, and the reported rates varied considerably. Schouten et al (2005) further examined the impact of setting criteria for the definition of ED, and found rates varied based on the criteria used. The crude incidence rates reported are tabulated in Table 10, the age specific rates reported are presented in Figure 15.

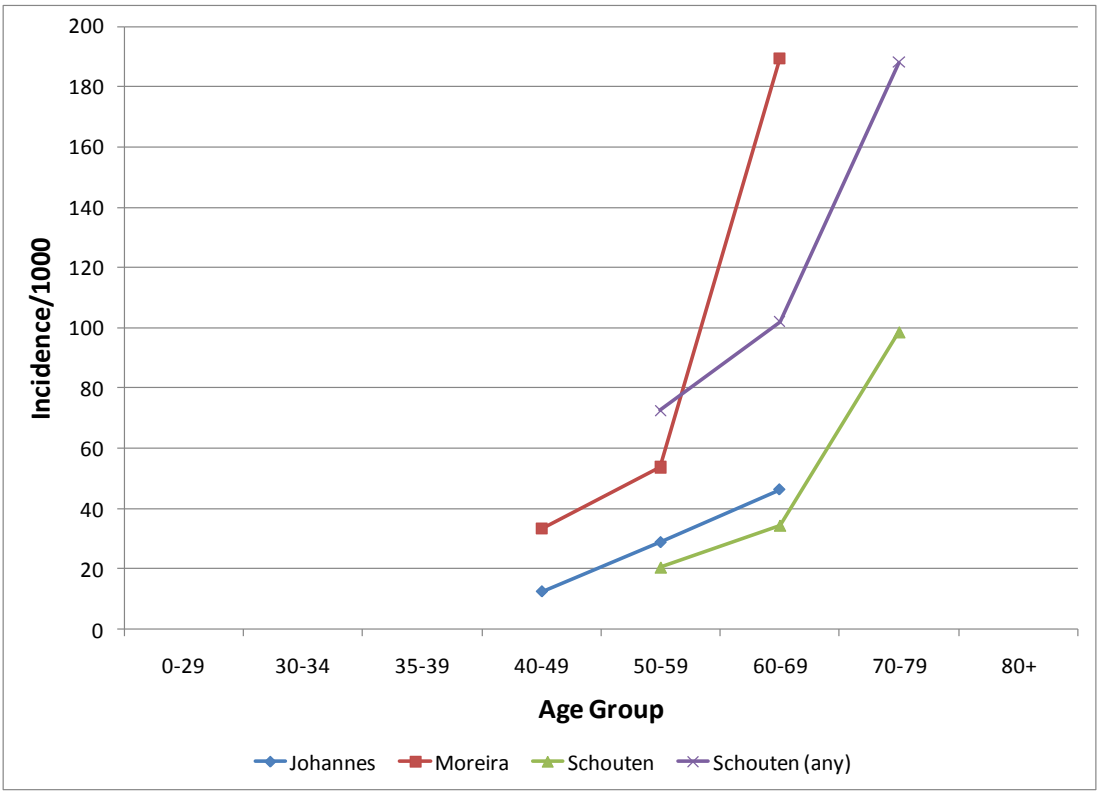
Table 10 Tabulation of ED Incidence Rates from Three Studies

Study	Reported Incidence in Cases/1000
Johannes	26
Moreira	66
Schouten (imputed rates)	
Any Ed	91
Significant ED	33
Clinically Relevant ED	29

[13] That is, it is not always clear where the condition ends and normal begins.
[14] One additional brief report (Kaye & Jick, 2003) provides some evidence that the incidence might be changing (increasing) over time.

In a review of the incidence of ED Lewis et al (2004) concluded that the overall incidence rate for Ed was 25-30 per thousand.

Figure 15 Age Specific Erectile Dysfunction Incidence Rates from Three Studies



Note: Schouten rates are for the "Significant ED" group or any group. Imputed rates shown.

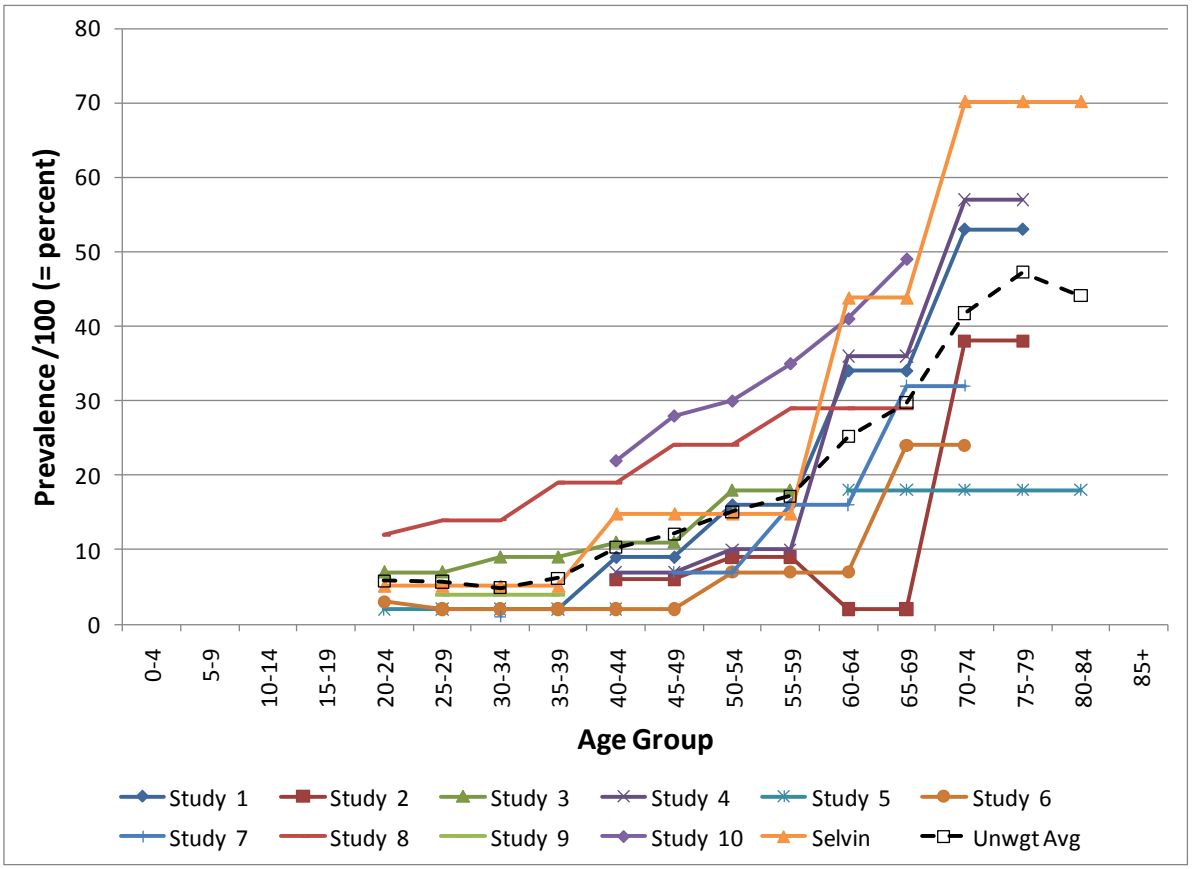
Clearly there are large differences in the rates, and the rate found can be influenced by the definition of ED used. But there is consistency in the finding that incidence increases with age. Part of the difference in rates appears related to the "type" of ED. The large difference between the Moreira rates and the other two studies disappears when those rates are compared to the Schouten "any ED" rates. It may be that cultural differences account for the higher rates in the Moreira study (which was done using a Brazilin population) and ED was assessed based on the results of 1 question.

5.1.2 PREVALENCE

Many prevalence estimates have been made for ED, and a wide variation exists. At least in part this variation exists because of differences in definitions used, ages examined, and degree of dysfunction (Lewis et al, 2004). A recent review

of the prevalence estimates has been presented by Kubin, Wagner, & Fugl-Meyer (2003). A plot of the results from 10 studies listed in their Table 2 is presented in Figure 16. Included in the figure is a later study by Selvin, Burnett, & Platz (2007).

Figure 16 Age Specific Erectile Dysfunction Prevalence Rates based on review by Kubin et al (2003).



While there is clearly a lot of variability in the individual results all tend to show the same general shape. Included in the figure (dotted line) is the un-weighted average of all studies with data at a particular age range[15]. This is probably a reasonable "first approximation" to the actual prevalence. Note that the scale in this figure is in cases/100 (where as the incidence is in cases per 1,000).

While we cannot be sure of the magnitude, the prevalence figures and incidence figures agree in what would be expected to be produced. A condition where incidence increases with age and is not associated with increased mortality should result in increasing prevalence with age.

[15] An average weighted by sample size would be more appropriate, but might give more implied legitimacy to the results than we think is warranted.

5.1.3 MORTALITY

Not applicable for this condition.

5.1.4 POTENTIAL YEARS OF LIFE LOST

Not applicable for this condition.

5.1.5 IMPACT ON BC

Close examination of the incidence and prevalence rates described above shows a problem – there is "no" incidence below the age of 40 but prevalent cases. The incidence studies have not looked at the younger age ranges hence there is no data upon which to base incidence estimates. In addition, from the incidence discussion it is clear that the definition of ED plays a role in the incidence rates. In order to get incidence estimates at these younger ages we have used a combination of Johannes and Schouten (significant ED) rates and linearly[16] interpolated the rates between age 19 (which was set to 0) and ages 40-49. Incidence and prevalence estimates using this approach are presented in Table 11.

Table 11 Estimated Erectile Dysfunction Values for BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	0	0	--	--	0	0
20-29	315,852	315,866	1,175	1,175	--	--	18,167	18,168
30-39	304,217	334,215	2,641	2,901	--	--	16,800	18,456
40-49	348,793	337,828	4,325	4,189	--	--	39,065	37,837
50-59	327,906	364,116	8,099	8,994	--	--	52,939	58,785
60-69	223,546	277,099	9,042	11,209	--	--	61,425	76,141
70-79	132,679	151,534	13,082	14,941	--	--	59,031	67,420
80+	72,247	85,554	0	0	--	--	31,861	37,729
Total	2,214,275	2,349,416	38,364	43,409	0	0	279,287	314,535

Note that the incidence and prevalence numbers are not internally consistent in the 20-29 age group. The incidence rate produces 1,100 cases per year, over 10 years this would imply about 11,000 cases maximum in the 20-29 age group. The calculated prevalence figure is much higher, so clearly one of the rates is incorrect (or they are possibly measuring different levels of ED). Clearly these results should be considered as having a wide margin of error. The dropping off of prevalence in the older age category is possibly an artefact of the small

[16] Other (more plausible) options than linear interpolation exist but most would produce even lower incidence in the younger age groups.

number of studies that actually look at this age group. Grover et al (2006) report that in a sample of patients seen in Canadian primary care settings over 80% of those age 70 or above had some form of ED (and one would expected most men over age 70 would have contact with a GP).

5.1.6 BC SPECIFIC DATA

Not applicable for this condition.

5.2 Premature Ejaculation

Several authors (Althof, 2006; Brock et al, 2009; Carson & Gunn, 2006; Jannini & Lenzi, 2005a) have indicated that the epidemiology of premature ejaculation (PE) is difficult to describe because there is a lack of a single definition of PE and there are no validated instruments to measure PE (which is not surprising given the lack of a clear definition). Montorsi (2005) points out that in order to define PE one needs a definition of normal ejaculation, and that worldwide there is a wide variation in the perception of what is normal.

5.2.1 INCIDENCE

No published age specific incidence data could be found. Jannini & Lenzi (2005b) reported that results from the Global Study of Sexual Attitudes and Behaviors[17] that suggested the incidence rate for men in their 40's was about 20% and that for men in their 60's was 30%. Jannini and Lenzi estimate that the incidence rate for younger men (18-25) that the incidence could be higher by 50-75%. Jannini and Lenzi seem to be implying that the incidence of PE is high in younger ages, drops off, and then climbs again. But they provide no rationale for this estimate and this might be best considered a plausible hypothesis at this time.

5.2.2 PREVALENCE

In contrast to incidence estimates there is some work in the area of the prevalence of PE. A variety of authors have settled on different estimates. Dunn et al (2002), in their systematic review, identified 5 studies that met their inclusion criteria, and concluded that there was no clear pattern across age groups and that the prevalence rate for 50 year old men is around 10-15%. Other authors

[17] They also state that one should not consider this study an epidemiological study but rather consider it as "a poll surveying people's attitudes towards sex and diseases" (Jannini & Lenzi, 2005b, p 70).

have settled on other numbers: 16-27% by Brock et al (2009)[18]; 21% by Jannini & Lenzi (2005a); 20-30% by Althof (2006); 30% by Montorsi (2005) and Carson & Gunn (2006); 36-38% by Spector & Carry (1990). Most conclude that there is not much in the way of variation across ages. The one study that reports age specific prevalence data seems to support this (Laumann, Paik, and Rosen (1999), see Table 12).

Table 12 Age Specific PE Prevalence Rates as Reported by Laumann, Paik, and Rosen (1999).

Age Group	% PE
18-29	30
30-39	32
40-49	28
50-59	31

5.2.3 MORTALITY

Not applicable for this condition.

5.2.4 POTENTIAL YEARS OF LIFE LOST

Not applicable for this condition.

5.2.5 IMPACT ON BC

Table 13 presents an estimate of the number of individuals in BC with some form of PE based on the prevalence estimates tabulated in Table 12. Mortality is not an issue here and we have chosen not to provide incidence estimates given the lack of any reliable incidence rates. Clearly even the prevalence column is incomplete – there should be at least some cases in the 60+ range. The overall prevalence where the data is available (i.e., ages 20-59) is 30% for both 2009 and 2014. If we were to apply this prevalence to the complete adult male population for these years (i.e., from 20+) the estimated number of PE cases would be 668,359 in 2009 and 711,026 in 2014.

[18] Percentage varies by the definition of PE used. Note that this is the only Canadian data available.

Table 13 Estimated Erectile Dysfunction Values for BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204			--	--	0	0
20-29	315,852	315,866			--	--	94,756	94,760
30-39	304,217	334,215			--	--	97,349	106,949
40-49	348,793	337,828			--	--	97,662	94,592
50-59	327,906	364,116			--	--	101,651	112,876
60-69	223,546	277,099			--	--	0	0
70-79	132,679	151,534			--	--	0	0
80+	72,247	85,554			--	--	0	0
Total	2,214,275	2,349,416			0	0	391,418	409,176

Note that the incidence and prevalence estimates described in the sections above, if close to correct, imply that PE is not a chronic condition. Otherwise, given the lack of mortality associated with the condition, the high incidence estimates would quickly produce close to 100% prevalence[19].

5.2.6 BC SPECIFIC DATA

Not applicable for this condition.

[19] Even at 20% incidence (the lowest estimate in the incidence section) after 10 years the expected prevalence in a stable population would be over 85% if the condition was chronic. By 20 years over 98% of the population would have the condition.

6 Alcohol Dependence

Within the alcohol related literature (as well as within the diagnostic criteria) there is a differentiation between alcohol abuse (AA) and alcohol dependence (AD). Generally, from a clinical perspective, AA is seen as a precursor to AD (Li, Hewitt, & Grant, 2007a). If so then the situation seems rather straightforward – one would expect increased incidence in AA (and prevalence), then increased incidence (and prevalence) of AD as some proportion of those with AA move on to AD. However, the epidemiological literature around alcohol dependence (AD) does not follow this expectation (Barbor, 2007). There is a rather consistent finding of higher lifetime prevalence in younger age groups than older age groups (Grucza, Bucholz, Rice, & Bierut 2008; Li, Hewitt, & Grant, 2007a). Incidence of AD peak sharply around age 18 and few new cases develop after age 25 (Li, Hewitt, & Grant, 2007b). The higher incidence in the young and decrease in prevalence with age could imply[20] that AD is not a chronic condition, and young individuals with AD simply grow out of the condition (Dawson, Grant, Stinson & Chou, 2006; Caetano & Babor, 2006). With a peak incidence around 18 there seems little time for AA to be the precursor for AD.

Thus the information that follows probably should be seen as preliminary. There are methodological (and possibly conceptual) issues that need to be resolved before one can have confidence in the epidemiological literature related to AD. Since AA is often used as a screening criteria for the assessment of AD (Hasin & Grant, 2004) it might be that some prevalence estimates of AD are too low because a significant proportion of AD cases are never assessed because they do not meet the criteria for AA. Alternatively, it may be that the identification of AD (at least in the young) is flawed, and population surveys count symptoms of a hangover as symptoms of withdrawal[21] (Caetano, 1999; Caetano & Babor, 2006).

6.1 Incidence

6.1.1 Overall Incidence

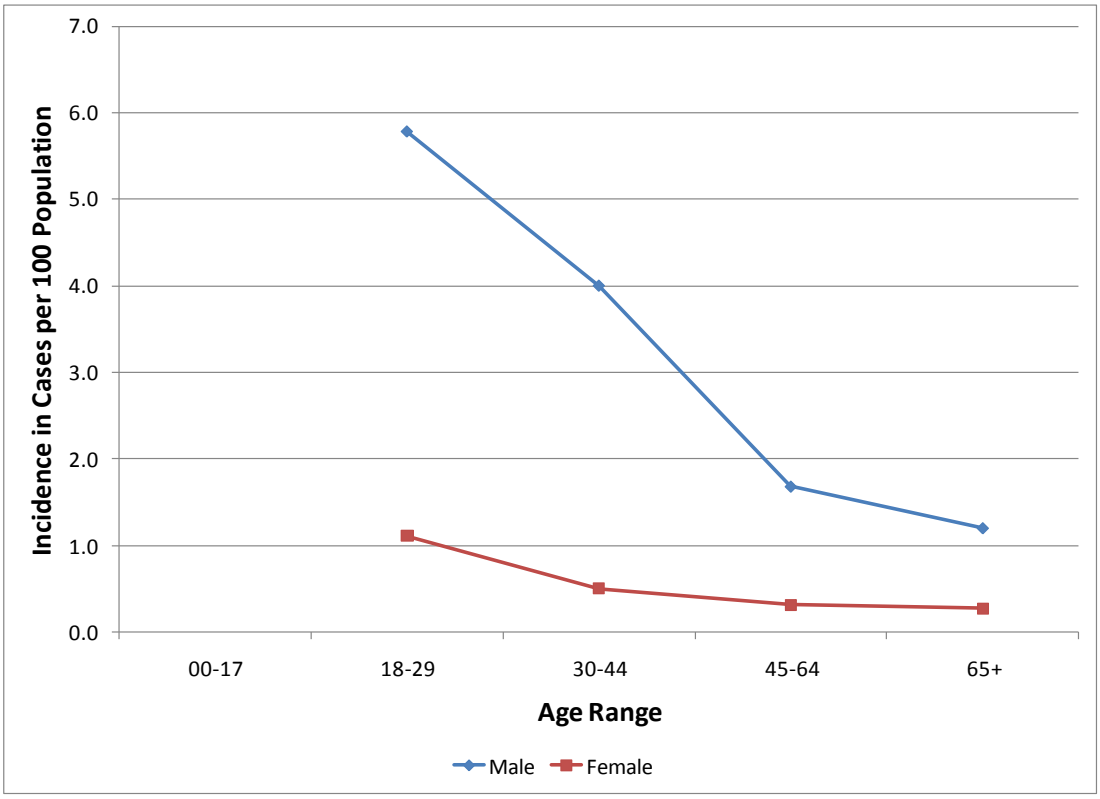
Incidence studies in the area of AD are few, and a recent review of substance related disorders reported having to drop the planned systematic review of incidence because of too few adequate studies (Somers, Goldner, Waraich & Hsu, 2004). Thus general incidence is not reported here.

[20] Such a pattern can imply other scenarios too.
[21] Withdrawal is one of the symptoms that define the presence of AD.

6.1.2 AGE SPECIFIC INCIDENCE

There is some information on the age specific incidence patterns, but it is brief. The report that the incidence of AD peaks sharply around age 18 and few new cases develop after age 25 (Li, Hewitt, & Grant, 2007b) was presented without supporting citations. Hasin et al (2007) report slightly similar findings: the peak age of the age of onset for AD (and AA) was 19 years of age[22] with a sharp decline in incidence after the early 20's. A report from the 1980's does describe the differences in age specific incidence patterns of males and females (Eaton et al, 1989), but for AA and AD combined. Figure 17 presents a plot of their incidence rates. Consistent with the prevalence rates (see below) male rates are higher than female rates.

Figure 17 Age Specific Incidence Rates for Alcohol Abuse/Dependence (from Eaton et al, 1989)



[22] Note that this might be based on the same data set.

6.2 Prevalence

A great deal of the epidemiological description of AD has focussed on prevalence. In general authors who have summarized these results conclude that the prevalence of AD is highest in the younger ages, and decreases with increasing age (e.g., Babor, 2007). Multiple surveys in the US indicate that this distribution is likely reasonably stable across time (Caetano & Cunardi, 2002), especially in the case of men (Grucza, Bucholz, Rice, & Bierut, 2008). Some later surveys seem to indicate that the prevalence in men might be decreasing in the younger ages (Grant et al, 2004). But later surveys have been criticized because of the tendency to not probe for AD unless criteria for AA had been achieved, and thus have potentially undercounted the AD cases[23] (Hasin & Grant, 2004). Gender differences exist, with all studies finding higher prevalence for AD in men than women.

Few Canadian studies seem to have been done that attempted to measure alcohol dependence directly. Some information has been derived from the CCHS surveys. Results from the Canadian Addiction Survey have been used to estimate heavy drinking profiles but this is not directly comparable to AD estimates (and may not be the same thing).

Plots of the prevalence figures are presented below. Figure 18 presents AD prevalence estimates for both sexes[24] while Figure 19 presents results reported by gender. The pattern is as described – higher prevalence in younger ages and for males. Figure 20 presents the average of the male prevalence estimates and female estimates (from Figure 19) along with the actual calculated values.

[23] In order to decrease the number of questions asked individuals some surveys took to assessing AA first, and if the individual did not meet the criteria for AA they did not receive questions related to AD. Hasin and Grant (2004) estimate that about a third of those who met criteria for AD did not meet the AA criteria. In some studies these would not have been counted as AD cases because of the selection criteria.

[24] Note Tjepkema (2004) uses data from Canada.

Figure 18 Alcohol Dependence Prevalence Estimates -- Male and Female Combined

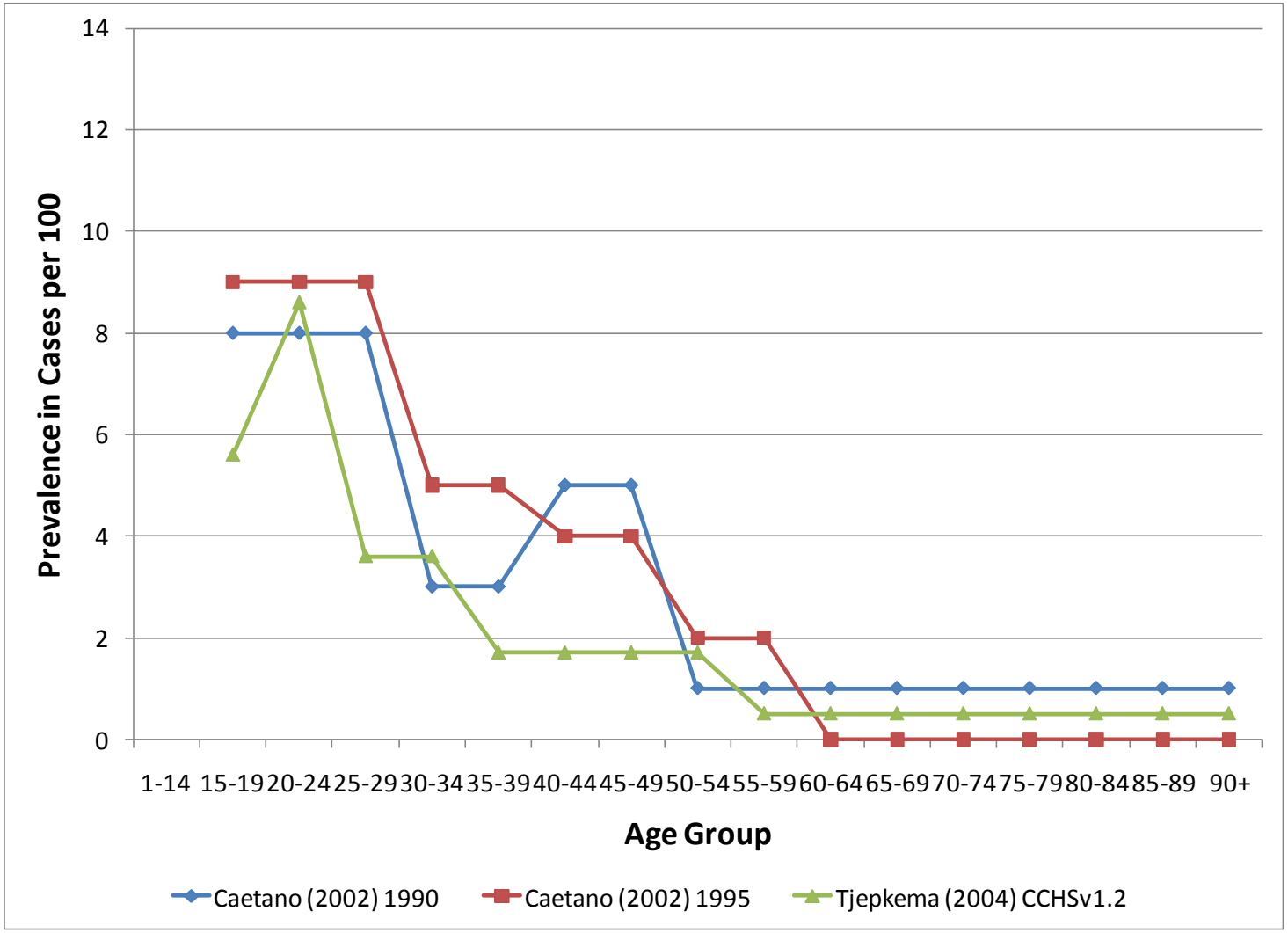


Figure 19 Alcohol Dependence Prevalence Estimates -- Male and Female Separately

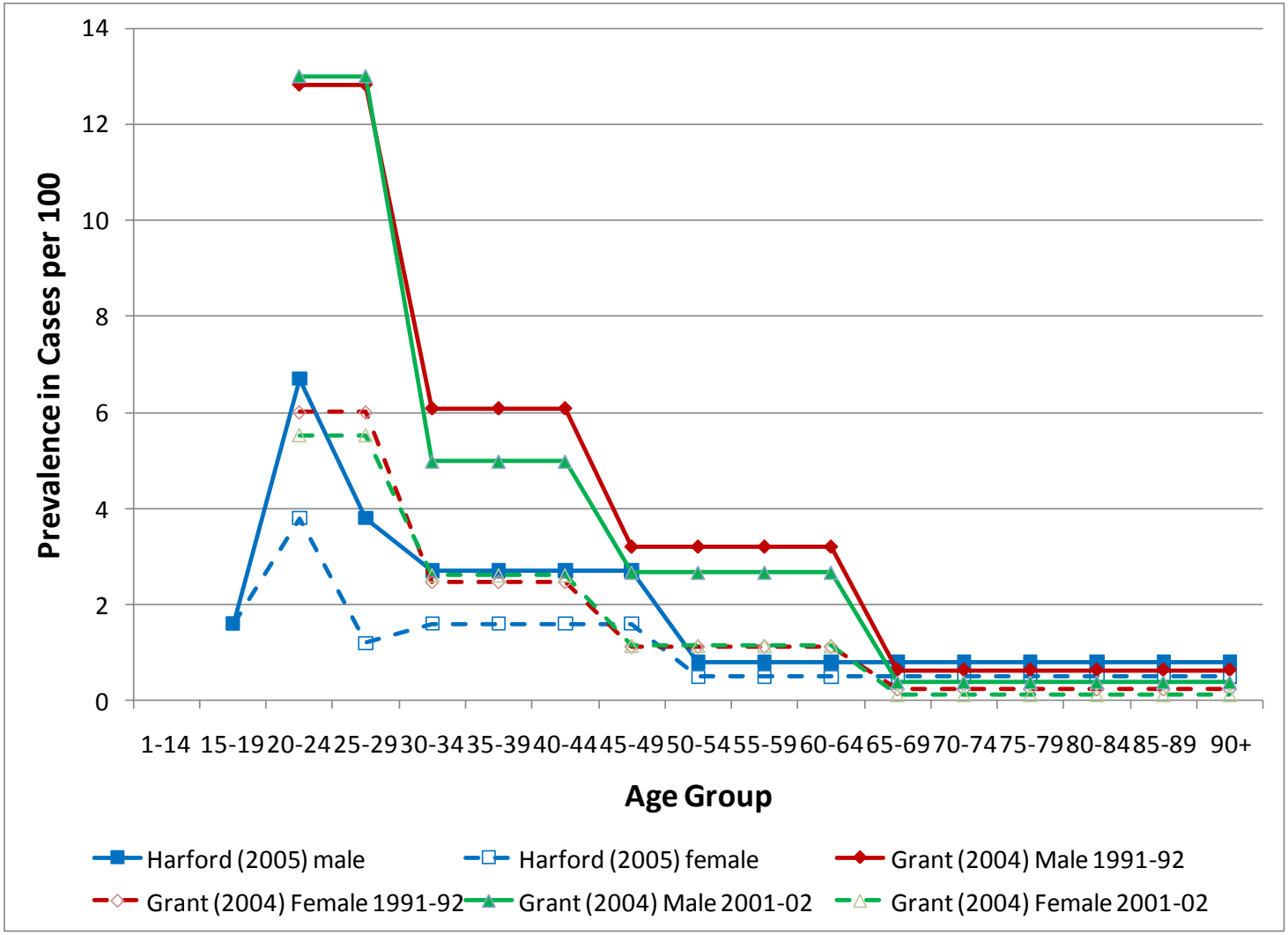
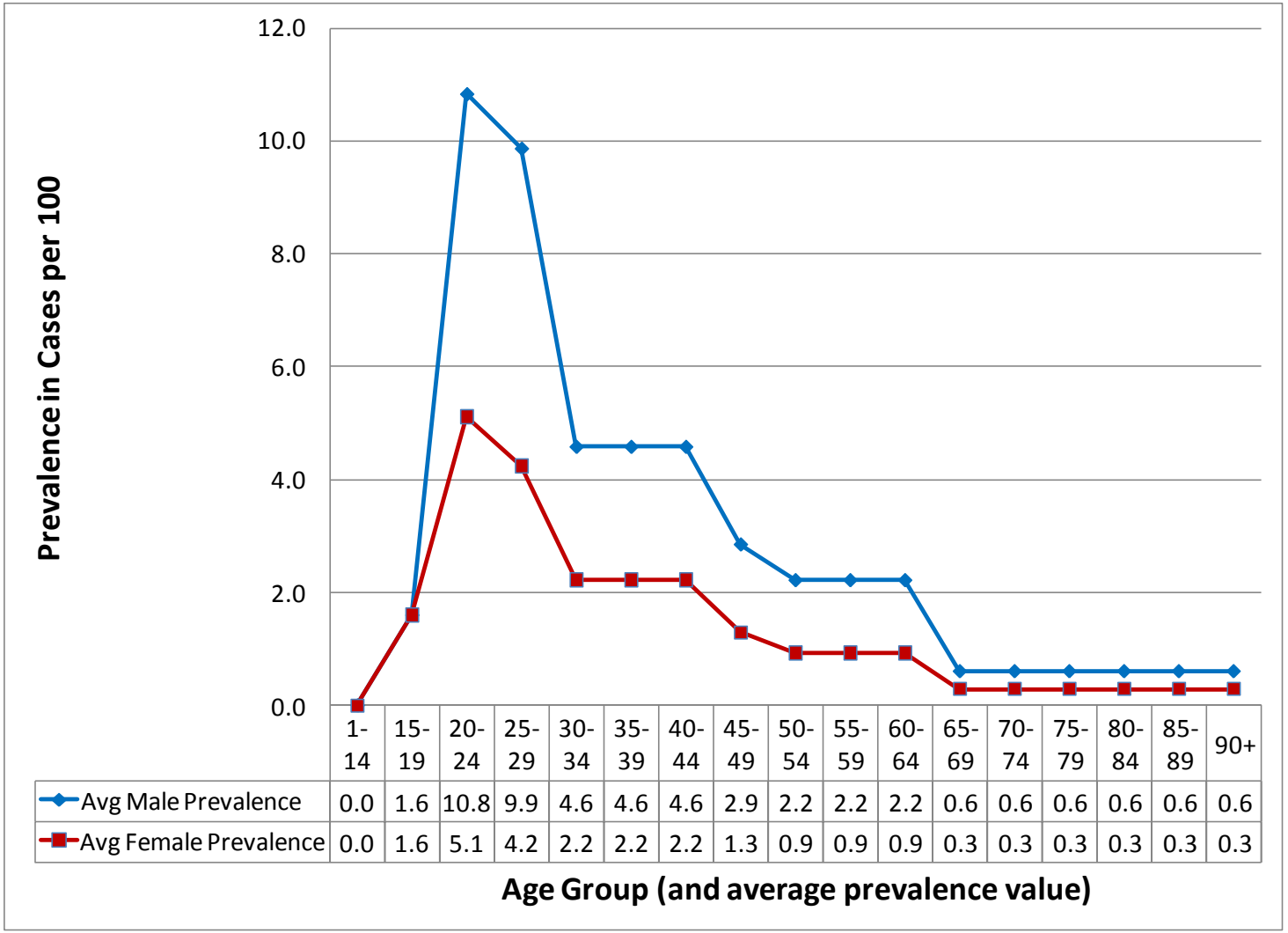


Figure 20 Alcohol Dependence Prevalence Estimates – Average Male and Female Rates



	1-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+
Avg Male Prevalence	0.0	1.6	10.8	9.9	4.6	4.6	4.6	2.9	2.2	2.2	2.2	0.6	0.6	0.6	0.6	0.6	0.6
Avg Female Prevalence	0.0	1.6	5.1	4.2	2.2	2.2	2.2	1.3	0.9	0.9	0.9	0.3	0.3	0.3	0.3	0.3	0.3

Note that the X axis has been broken out into 5 year age groups in order to facilitate the plotting of the various study results. No study used 5 year age groups to report the rates: where longer periods were used we have simply filled in the prevalence estimate across the age span (hence the “flat” sections in the plots).

6.3 Mortality

It has been clearly demonstrated that there is a relationship between higher levels of alcohol consumption and higher levels of mortality and morbidity (Rehm, Patra, & Popova, 2005; Dawson, 2000). The association is not necessary linear, a “J” shaped relationship has often (but not always) been found between alcohol consumption and all cause mortality, with moderate levels of alcohol consumption having at least some protective effect (for at least some conditions) over alcohol abstinence (Rehm, Patra, & Popova, 2005; Rehm, Giesbrecht, Patra, & Roerecke, 2006). However, this relationship is usually demonstrated by estimating alcohol consumption as a continuous variable (e.g., 5 drinks per week) not in terms of categorical variables like AD (Min, Noh, Shin, Ahn, & Kim, 2008; Dawson, 2000). While there clearly is some relationship between the amount of alcohol drunk and meeting the criteria for AD the relationship is not necessarily linear (for example, someone can meet the criteria for AA but not AD and consume, on average, more alcohol than someone who meets the criteria for AD).

So while there is little doubt that high levels of alcohol consumption leads to increased mortality and morbidity, the pattern between AD and mortality and morbidity is less clear. One study that looked at this relationship was carried out by Dawson (2000) on a US sample. She was able to estimate the consumption patterns of the US sample and classify them into four levels of alcohol consumption. As well, based on the information collected in the survey, respondents were able to be classified as AD or not AD (based on past years drinking and DSM-IV AD criteria). The relationship between AD and levels of alcohol consumption she obtained is presented in Table 14.

For the sample as a whole (i.e., including non and former drinkers) the prevalence of AD was 4.6% (data not shown), and 9% when only those who drank in the previous year were counted. Of interest is that even among the very heavy drinkers less than 50% were classified as AD.

Table 14 Relationship between AD and Alcohol Consumption (based on data from Dawson, 2000)

Past Year Drinking Pattern	AD Yes	AD No	TOTAL	%AD
light	229	9,328	9,557	2%
moderate	655	5,767	6,422	10%
heavy	342	1,060	1,402	24%
very heavy	460	626	1,086	42%
TOTAL	1,686	16,781	18,467	9%

Differences in the mortality patterns of these groups were found. The author summarized her findings in the following manner:

> *Together, these findings revealed that among nondependent drinkers, light and moderate drinking was protective and heavier drinking did not significantly affect the risk of dying; among dependent drinkers, the effect of alcohol consumption was never protective and often increased the risk of death. (Dawson, 2000, p 78)*

A similar pattern of results was found among a Korean sample (Min et al, 2008). Here too the researchers were able to classify subjects as AD or not AD and classify subjects as excessive or not excessive drinkers. They found AD individuals in both their excessive and non excessive drinking categories. In models that included both excessive drinking and AD they found a significant effect for AD (AD was associated with 3 times the mortality and morbidity compared to non drinkers) but not for excessive drinking. The authors noted that in their results excessive drinking by itself was not found to be related to health outcomes.

So there is some evidence that AD, by itself, may play a large role in the observed association between levels of alcohol consumption and mortality (or morbidity). But the apparent “spontaneous recovery” of many individuals meeting the AD criteria at a point in time makes a simple conclusion impossible. Many individuals who meet the criteria for AD today will not do so in the near future. Whether these individuals remain at risk for increased mortality is not clear.

6.4 Potential years of life lost

While PYLL calculations have been done for alcohol consumption they have not been done for AD directly. So there is no data to report in this section.

6.5 Impact on BC

Comparison of the prevalence estimates in the above figures with the one set of incidence estimates in Figure 17 shows an immediate problem: the incidence rate is higher than the prevalence rates in some age groups. The reason is that the incident estimate is for AA and AD. In order to tabulate BC estimates in the same manner as other sections of this report some adjustment had to be made to the incident rates. Harford et al's (2005) report includes a comparison of the ratio of AA to AD prevalence estimates. Over the ages studied AA prevalence exceeds AD prevalence by a factor of 1.9 to 2.8[25] and by 2.1 to 1 over the total sample. We thus adjusted the incidence estimates by this 2 to 1 factor (i.e., multiplied the reported values by .33). We have not provided any death data as the exact nature of the AD contribution is not clear.

Given the above it is possible to use these estimates to examine the impact on the BC population. These are presented in Table 15.

Table 15 Estimated Alcohol Dependence Values for BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	518	512			1,565	1,546
20-29	315,852	315,866	6,025	6,025			19,641	19,642
30-39	304,217	334,215	4,016	4,412			6,774	7,442
40-49	348,793	337,828	1,934	1,873			6,133	5,940
50-59	327,906	364,116	1,818	2,019			3,028	3,362
60-69	223,546	277,099	885	1,097			1,352	1,676
70-79	132,679	151,534	525	600			380	434
80+	72,247	85,554	286	339			207	245
Total	2,214,275	2,349,416	16,007	16,876	0	0	39,080	40,288

This calculation suggests that in the year 2009 BC would expect to have 16,000 new alcohol dependant men and about 40,000 individuals with some form of alcohol dependence. Most of the new (incident) cases would be in the 20-29 age range as would the majority of prevalent cases[26].

Clearly the relatively small difference between the incidence and prevalence data suggests a large proportion of AD cases are resolved (or individuals recover from AD) in a relatively short time (perhaps as many as 50%, see Dawson et al, 2006).

[25] There was no systematic trend with age.
[26] Note that even with the adjustment to the incident rate the older ages have a few more incident cases than prevalent cases.

6.6 BC Specific Data

In terms of alcohol dependence (as defined by the CCHS data) BC shows higher overall rates than the Canadian average (Veldhuizen, Urbanoski, & Cairney, 2007) and for both males and females (Cartar, Puyat, Jones, & Goldner, 2004). BC Vital Statistics has produced, each year, a count of the number of alcohol related deaths in BC. These are classified as directly or indirectly related to alcohol[27]. Table 16 presents a tabulation of these deaths (with a plot in Figure 21).

Table 16 BC Deaths Directly or Indirectly Related to Alcohol over 11 Years

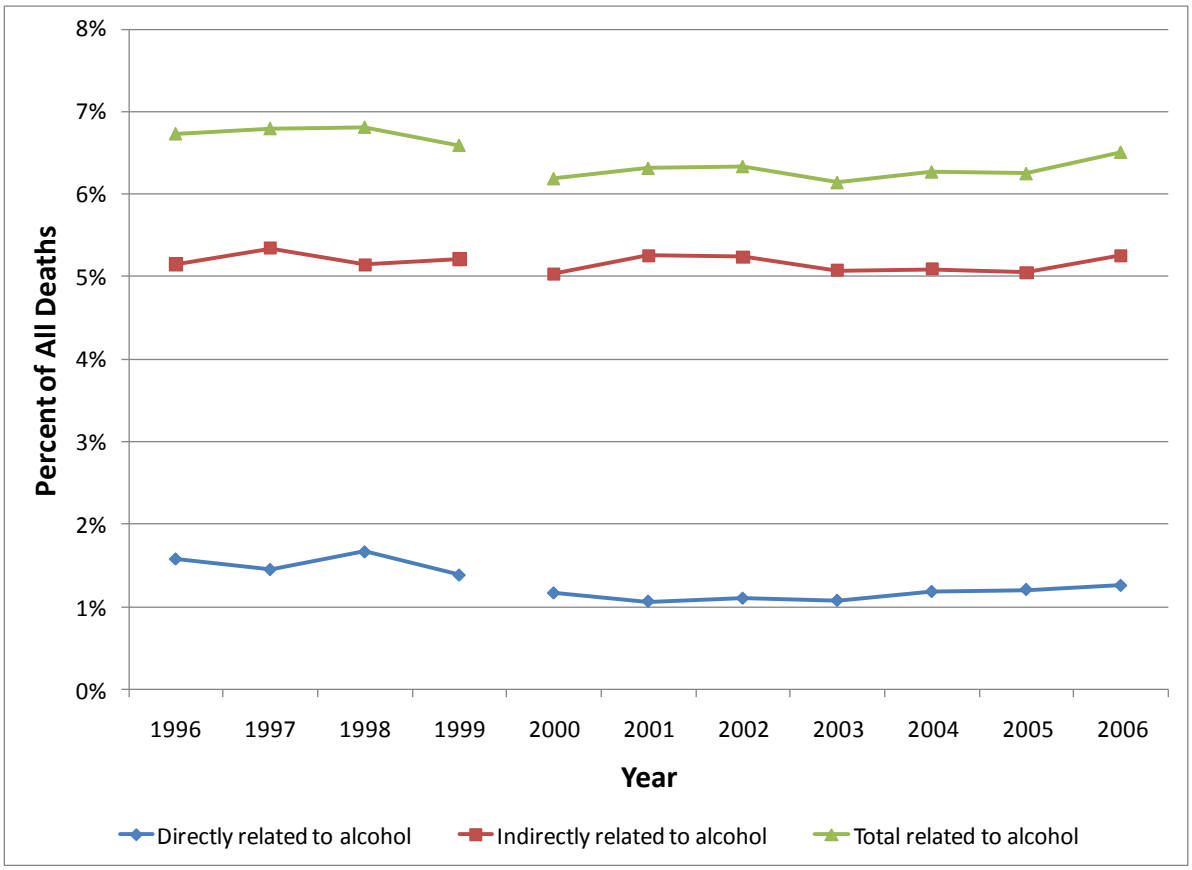
	Year										
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Counts											
Directly related to alcohol	432	395	463	384	317	299	315	312	350	362	383
Indirectly related to alcohol	1409	1455	1429	1448	1372	1480	1503	1477	1510	1516	1603
Total	1,841	1,850	1,892	1,832	1,689	1,779	1,818	1,789	1,860	1,878	1,986
All Deaths	27,361	27,241	27,790	27,794	27,273	28,164	28,686	29,108	29,652	30,033	30,513
Percent of All Deaths											
Directly related to alcohol	1.6%	1.5%	1.7%	1.4%	1.2%	1.1%	1.1%	1.1%	1.2%	1.2%	1.3%
Indirectly related to alcohol	5.1%	5.3%	5.1%	5.2%	5.0%	5.3%	5.2%	5.1%	5.1%	5.0%	5.3%
Total related to alcohol	6.7%	6.8%	6.8%	6.6%	6.2%	6.3%	6.3%	6.1%	6.3%	6.3%	6.5%

Note: Vital Statistics reports that changes in coding took place in 2000 so data prior to 2000 should not be directly compared with data on or after 2000.

While there is little evidence of major year to year changes, there is a slight trend over the last few years for the direct percentage to increase. Note however, that this should not be directly attributed to AD. That kind of breakdown does not exist in the BC data.

[27] Indirectly related is defined as a death where one of the directly alcohol related codes was listed as an antecedent cause or a contributing cause then the death is counted as indirectly related. Alcohol directly related causes of death are: Alcohol intoxication (F100), Alcoholic psychoses and dependence (F101-F109), Alcoholic neurological disorders (G312, G621, G721), Alcoholic cardiomyopathy (I426), Alcoholic gastritis (K292), Alcoholic liver disease (K70), Alcohol induced chronic pancreatitis (K860), Alcohol poisoning (X45, X65), and Other alcohol causes (E244, O354, O993, P043, Q860, R780, T510-T512, T519).

Figure 21 Plot of Alcohol Related Percentages from Table 16



7 Suicide

There is a large literature on suicide and a variety of reviews. While the outcome suicide is reasonably well defined[28] the terminology related to what was once known as para-suicide has changed over time (Nock et al, 2008) making over time comparisons of unsuccessful suicides difficult. Prevalence is not really meaningful in the case of completed suicide, and incidence and mortality are synonymous. There can, of course, be no mortality in the case of a failed suicide attempt.

7.1 Incidence

7.1.1 Overall Incidence

Averaged international suicide rates are about 17/100,000 (WHO, as reported in Nock et al, 2008). But large variations in the incidence of suicide exist, and these differences appear real and not due to cultural differences that might influence the description of the cause of death (Diekstra, 1996). Canadian rates are below the international average (11-12/100,000 between 2001 and 2005, see Statistics Canada, 2009; a value of 14/100,000 for Canada in 1998 was reported by Langlois & Morrison, 2002[29]).

Despite the variation in rates almost all countries show a much higher male suicide rate than female rate, with the male to female ratio falling within the range of 3/1 and 7.5/1 (Nock et al, 2008). Based on the Statistics Canada (2009) tabulations Canada's rate ratio is on the low end, but the male suicide rate is higher than the female rate by over a factor of 3 (varies between 3.2 and 3.7 over the years 2001 to 2005). Table 17 presents the Canadian rates over the years 2001 to 2005.

[28] This does not mean that the values are accurate. In most cases suicide is defined as what is listed as the cause of death. Issues as to the accuracy of the COD are not addressed.
[29] This value appears to be calculated on the population 10 and older, the lower values are for the population as a whole. The main point is that the estimates are in the lower end of the range.

Table 17 Canada Wide Suicide Rates (in cases per 100,000) as Reported by Statistics Canada (2009)

Year	Overall	Male	Female	Male/ Female Ratio
2001	11.9	18.6	5.2	3.6
2002	11.6	18.4	5.0	3.7
2003	11.9	18.5	5.4	3.4
2004	11.3	17.3	5.4	3.2
2005	11.6	17.9	5.4	3.3

7.1.2 Age Specific Incidence

The number of suicides in Canada in a year averaged around 3,700 between 2001 and 2002. The age specific pattern appears to differ between men and women, and varies with age. Thus some age specific rates can be based on relatively few deaths and present a larger degree of variability than the overall rates shown above. Figure 22 and Figure 23 present the age specific rates over the 5 years of data described by Statistics Canada (2009). Note that the Y axis differs between the two groups. While there are year to year variation in the individual age specific rates all years show the same general pattern, and there is a clear difference (not just a higher rate) in the shape of the male and females curves. Figure 24 plots the median age specific rate over the five years for males and females. The Canadian age pattern is similar to that observed in a variety of other countries (see Diekstra, 1996 and Nock et al, 2008 for summaries of age specific patterns observed in other countries).

Figure 22 Male Age Specific Suicide Rates Based on Statistics Canada Data

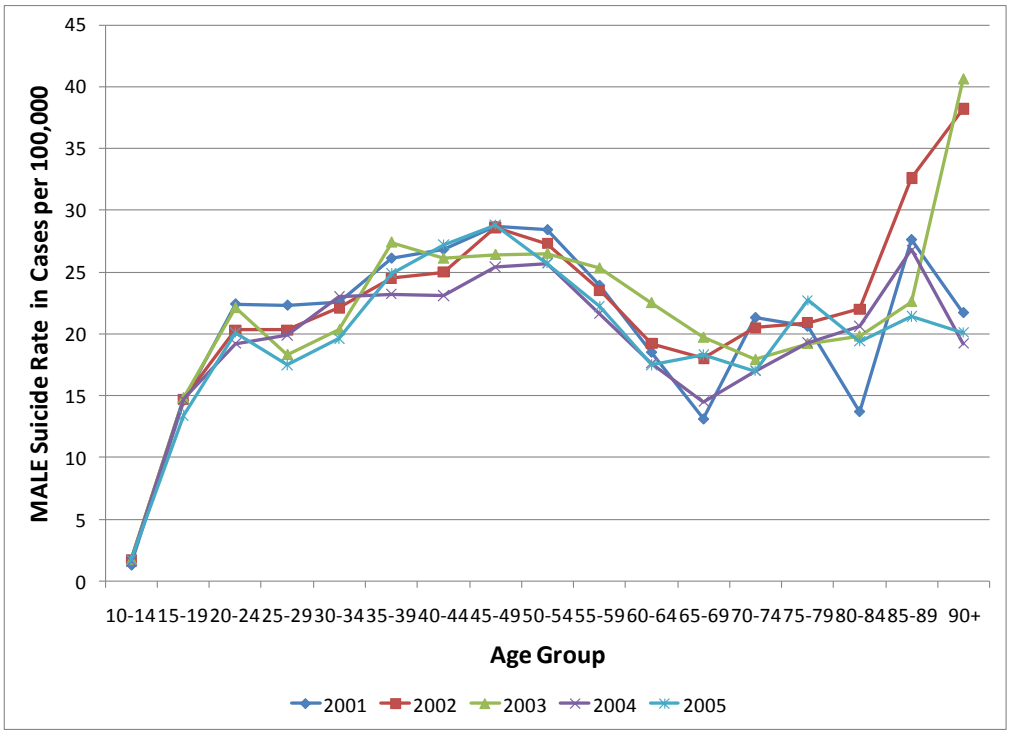


Figure 23 Female Age Specific Suicide Rates Based on Statistics Canada Data

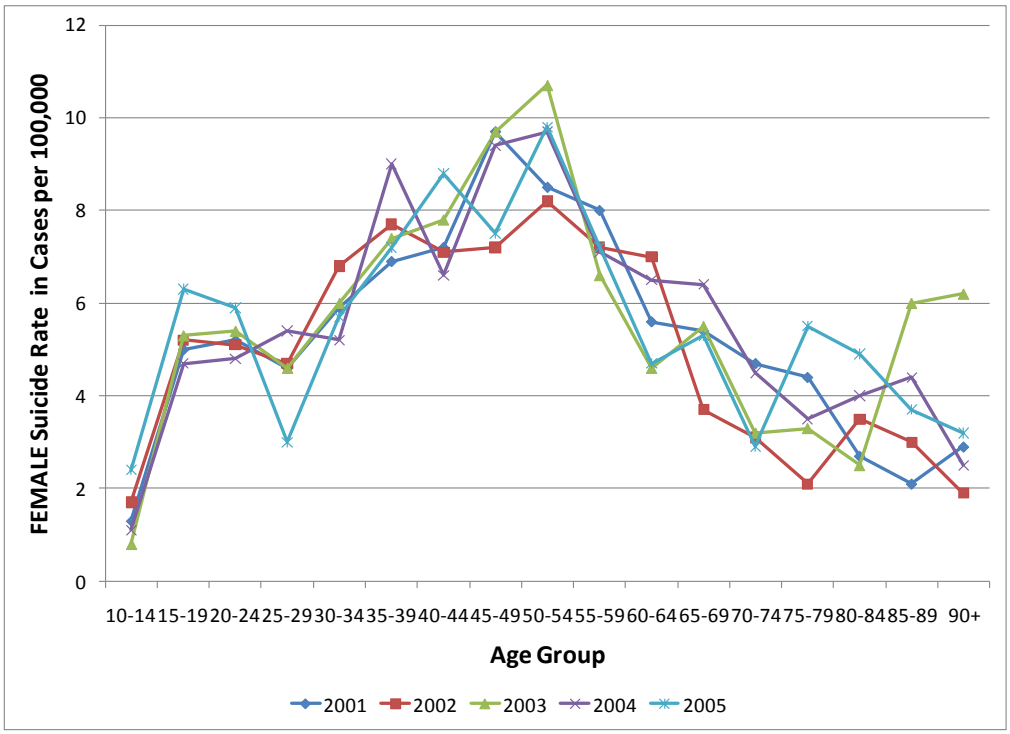
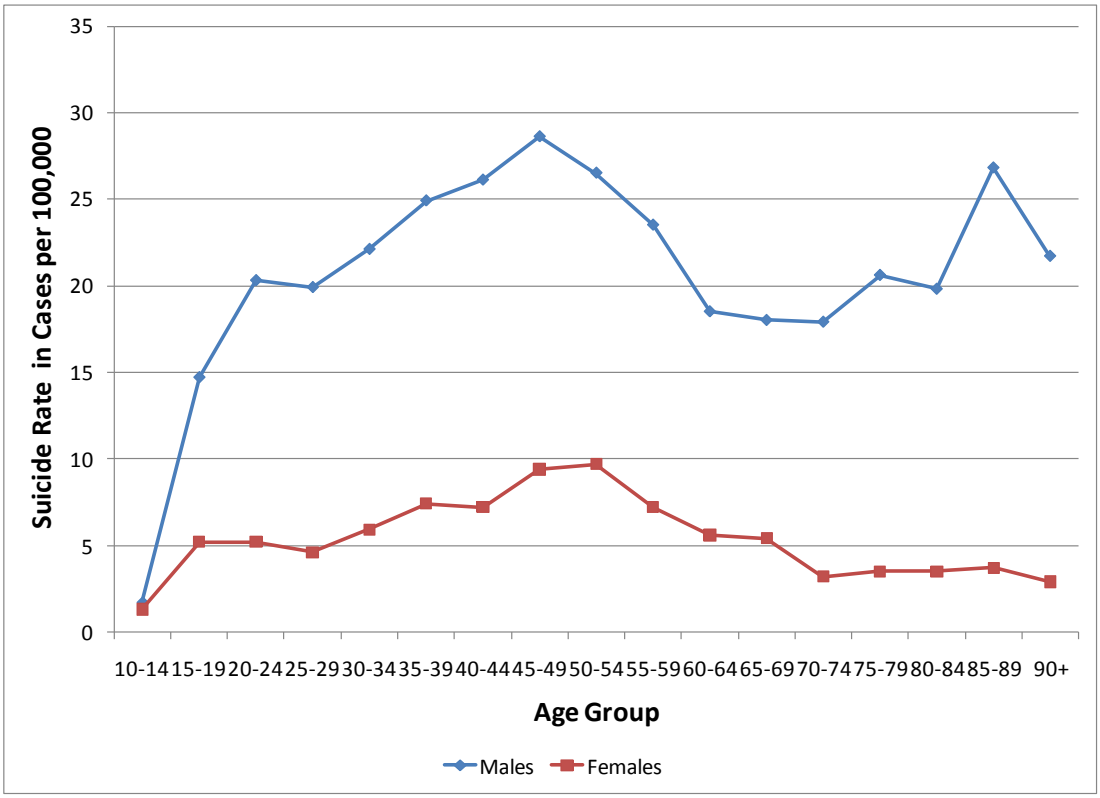


Figure 24 Median Male and Female Age Specific Suicide Rates Based on Statistics Canada Data



7.2 Prevalence

Prevalence is not relevant here.

7.3 Mortality

Mortality and incidence are equivalent here.

7.4 Potential years of life lost

Suicide has been identified as one of the conditions with a relatively low incidence rate but a higher public health impact when viewed in terms of PYLL. This is, in part, because deaths in the younger ages are relatively rare, but if an individual should die at a young age there is a significant probability that death will be due to suicide. This seems to have led at least some authors to see PYLL as the appropriate way to measure the impact of suicide (e.g. Doessel et al, 2009). The same point has been made in slightly different ways, as it has been pointed out that suicide is the leading cause of death (or close to the leading

cause of death) in certain specific (younger) age groups by a number of authors (Langlois and Morrison [2002] and Diekstra [1996] both make this point).

The January 2005 version of health reports presents tables that allow for a similar comparison (based on 2001 data). For Canada as a whole the PYLL for men from suicide was estimated as 684/100,000 (95% CI 681 to 686). All cause PYLL was estimated as 6,935/100,000 (95% CI 6928 to 6943). Hence suicide contributes about 10% to the total men's PYLL due to all causes of death. Data is available for BC itself. The all cause related PYLL for BC was reported as 7,134/100,000 (7113 to 7155) and the suicide specific figure as 525/100,000 (519 to 531). Thus the BC proportion is 7%, slightly lower than the Canadian value.

7.5 Impact on BC

It is possible to estimate the number of male suicides in BC using the median age specific rates described above. These are presented in Table 18. The only figures that can be estimated are deaths.

Table 18 Estimated Suicide Values for Males in BC in 2009 and 2014

	BC Population		#Deaths (Incident)		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	40	40				
20-29	315,852	315,866	63	63				
30-39	304,217	334,215	71	79				
40-49	348,793	337,828	95	92				
50-59	327,906	364,116	82	91				
60-69	223,546	277,099	41	51				
70-79	132,679	151,534	26	29				
80+	72,247	85,554	16	19				
Total	2,214,275	2,349,416	435	464				

This calculation suggests that in the year 2009 BC would expect to have 435 male suicides, with the age group with the highest count being 40-49. A similar pattern is expected in 2014.

7.6 BC Specific Data

Suicide statistics can be obtained from the BC Vital statistics reports, although they will be underestimates as it can take a long time for some undetermined causes of death to be finally classified. In 2006 a total of 297 male suicides are listed in the annual report. However, this number is a known undercount. In the 2005 report Vital Statistics presented a comparison of the number of suicides reported in their annual reports and the actual number as of March 2006. The

reported number of suicides was lower than the counts as of March 2006 by an average of 22% (yearly corrections ranging between 8% and 45%). Unfortunately these figures are for both males and females. But adjusting the 297 up by 22% brings the estimate up to 362, still lower than the estimated number in Table 18. BC has been reported to have a lower than average suicide rate when compared to the Canadian average (Langlois & Morrison, 2002) so this finding may not be surprising. It should be noted that given the data reported in the Vital Statistics reports it is possible to come up with BC age specific rates except that the values will be underestimates because of the data delay problem. The shape of the age specific curves look similar to those reported above[30].

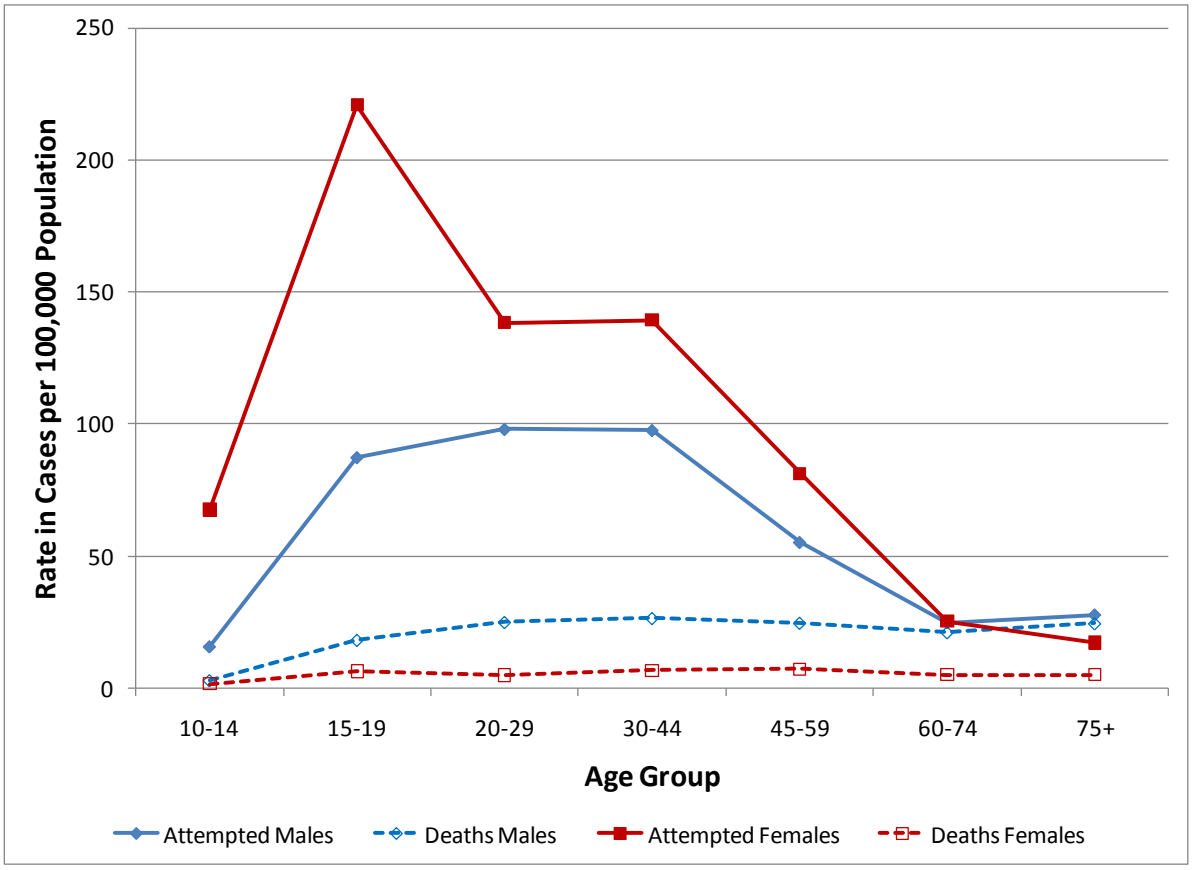
7.7 Suicide Attempts

Completed suicides leave no room for intervention on the individual level, and it can be difficult to identify interventions based on the incomplete histories of individuals who did commit suicide. Thus a lot of work has focused on those who attempted suicide. However, good information in this area is lacking (Diekstra, 1996) and subject to both changing terminology and non standard use of terminology (Silverman et al, 2007a). This can make comparisons of the results of different studies (or statistics from different countries) difficult and potentially misleading. Using hospital based statistics Langlois & Morrison (2002) determined the hospitalized for suicide attempts for Canada in 1998. A plot of their Table 2 data is presented in Figure 25. While male suicide rates are higher than female rates, females have the higher suicide attempt rate. This pattern is consistent with the pattern in the United States (Nock et al, 2008). Diekstra (1996) estimated that the attempted suicide rate was at least 10 times that of the actual rate, and this finding seems consistent with the figures for the US reported by Nock et al (2008)[31]. The overall Canadian hospitalization figures are about the same (a little under 10) and suggest that there is wide variation between gender and age.

[30] We decided not to present these BC specific results because we know they are underestimates. We just consider this a check – BC's age specific pattern does not look too different from what one gets from the Canada wide pattern. But an exact comparison is difficult because of the age ranges used by Vital Statistics in their annual reports.

[31] They report a US suicide rate of 11/100,000 and a nonfatal self injury rate of around 130/100,000.

Figure 25 Plot of Langlois & Morrison's (2002) Suicide Death and Suicide Attempt (Hospitalizations) Rates for Canada in 1998



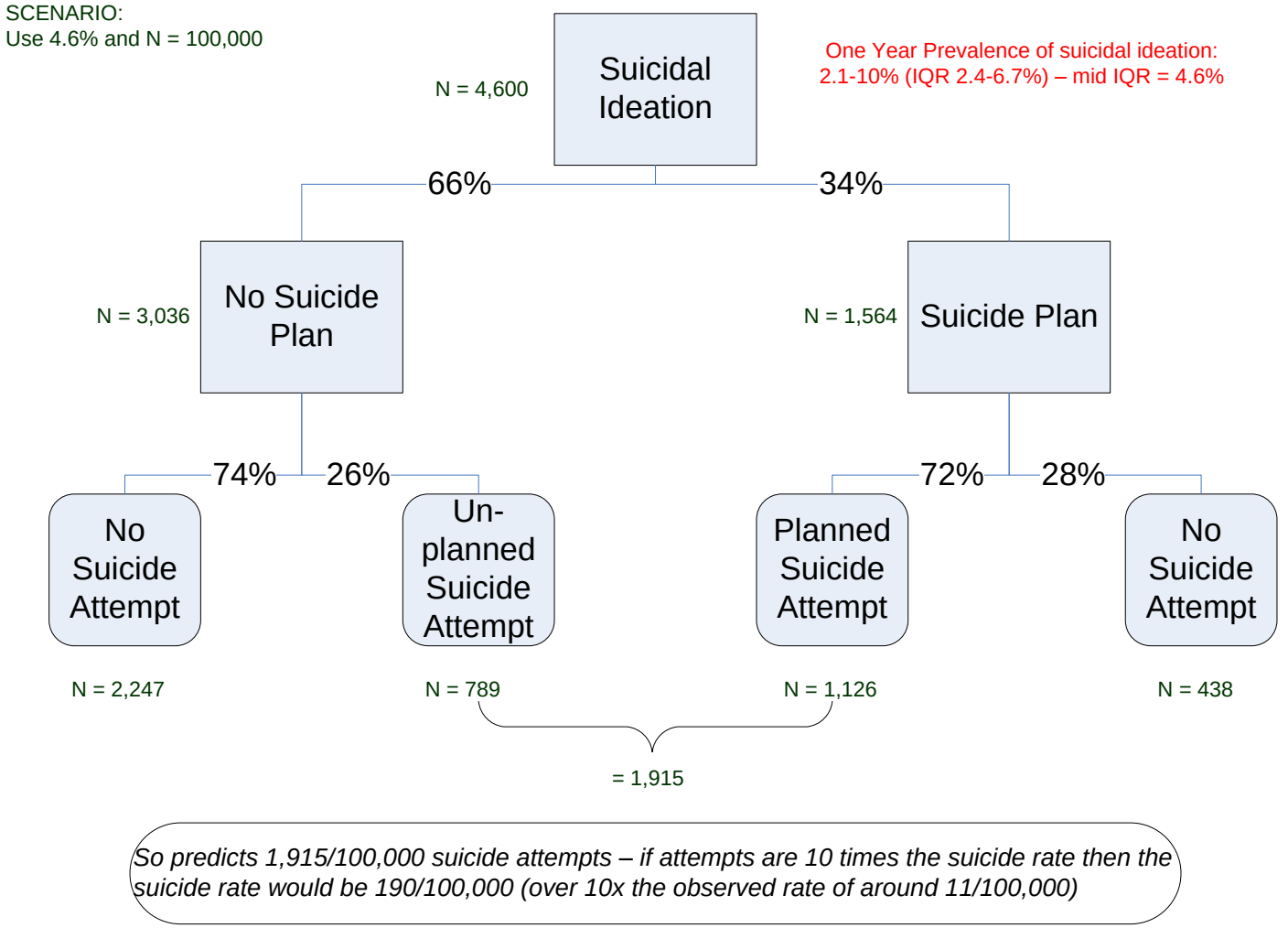
As part of their review Nock et al (2008) summarized the literature on the pattern of suicidal behaviours (stating that few people have examined this topic). They reported that:

- 34% of lifetime suicide ideators[32] go on to make a suicide plan,
- 72% of persons with a suicide plan go on to make a suicide attempt, and
- 26% of ideators without a plan make an unplanned attempt.

They also reported that majority of these events occurred during the first year of the suicide ideation (60% for planned and 90% for unplanned attempts). We can use these patterns to sketch out the expected events in the form of a flow chart (Figure 26).

[32] The terminology being used is as described by Silverman et al (2007b). Nock et al define the terms used as "…suicide ideation, which refers to thoughts of engaging in behavior intended to end one's life; suicide plan, which refers to the formulation of a specific method through which one intends to die; and suicide attempt, which refers to engagement in potentially self-injurious behavior in which there is at least some intent to die." (Nock et al, 2008, p134)

Figure 26 Suicide Behaviour Patterns as Described by Nock et al (2008)



The figure includes calculations based on a hypothetical population of 100,000 individuals. Following through the path from suicidal ideation to actual suicide one finds an expected total of about 1,900 attempts (or a rate of 1900/100,000). If attempts are 10 times the observed suicide rate (as described above) then this would imply a suicide rate of 190/100,000, an order of magnitude higher than the observed rate.

We do not present these calculations as a criticism of Nock et al (2008). Rather as an illustration of the need for more research in the area of attempted suicide. Greater consistency within the estimates is required before they can be used to plan interventions. In the above it is not clear where the problem lies, but the difference is substantial.

8 Motor Vehicle Accidents

The analysis of motor vehicle accidents (MVA) presents some unique challenges. MVAs are counted by a number of sources and detailed statistics can be obtained. But an accident can occur that results in no apparent injury, just damage to the vehicle(s) involved. While of concern to the insurance industry these are of little interest here. Unlike other the conditions above there is not a one-to-one relationship between the impact on the individual and an MVA. One MVA can injure or kill multiple individuals. Exposure is also an issue here, ones risk of being in an MVA is related to the amount of time one spends in a vehicle, but experience (obtained through longer exposure) is also probably a protective factor. In terms of mortality it is usually easy to determine the relationship between the MVA and the outcome. However, in the case of injury there is some concern, as how one counts these can influence the results (injuries resulting in a trip to a hospital, self reports, insurance claims, etc.). Different studies of injuries find different patterns of results, and this can be attributed, at least in part, to what is being counted as an injury (Roberts et al, 2008).

The literature in this area is vast, and focuses on a number of different areas. Statistics are maintained by a number of different agencies and a variety of reports are available. Within BC the Insurance Corporation of BC (ICBC) has produced a number of annual reports[33] spanning the years 1995-2007. These reports contain statistics on only police-attended personal injury and fatal collisions. Changes to accident reporting procedures have taken place over time and information in these reports seems to have stabilized after 1999 (ICBC, 2007).

8.1 Incidence

Here incidence is defined as the number of individuals injured in some manner due to a MVA. There are numerous ways to present this data (see Transport Canada 2007 for a variety of presentations), here the information from the ICBC reports are used for the BC data.

[33] Available online at http://www.icbc.com/road-safety/safety-research/collision-statistics (July, 2009).

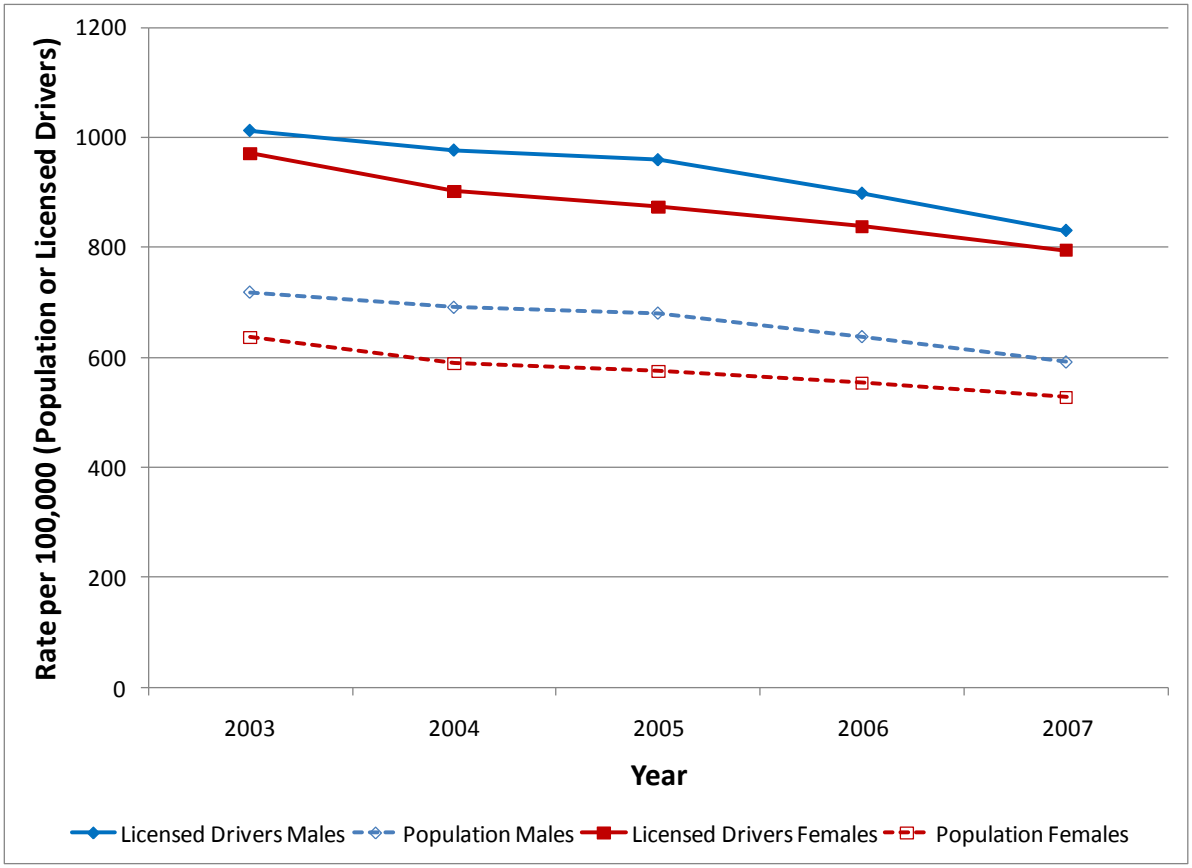
8.1.1 Overall Incidence

Table 19 presents the reported number of injuries over the years 2003-2007 from the ICBC tabulations. Two types of rates are reported: per total population (all ages) and per licensed drivers. Figure 27 plots the rates in the table.

Table 19 MVA Related Injuries in BC over 5 Years by Gender

	# Injuries		Population		Rates (per 100,000)	
YEAR	Males	Females	Males	Females	Males	Females
2003	14,801	13,326	2,060,656	2,094,714	718	636
2004	14,394	12,483	2,083,662	2,119,653	691	589
2005	14,363	12,339	2,111,174	2,146,659	680	575
2006	13,630	12,023	2,136,895	2,173,557	638	553
2007	12,803	11,620	2,162,876	2,201,689	592	528
			Licensed Drivers		Rates (per 100,000)	
YEAR			Males	Females	Males	Females
2003			1,462,778	1,372,550	1012	971
2004			1,474,654	1,384,110	976	902
2005			1,498,356	1,412,065	959	874
2006			1,518,191	1,435,279	898	838
2007			1,541,951	1,463,299	830	794

Figure 27 Plot of Injury Rates from Table 19



Males have more injuries whether measured in terms of absolute counts, population rates, or rates based on licensed drivers. Both genders are showing a decline in the number and rates of injury. Over the years males have about 12% more injuries than females, and there is no indication that the decline is different between the genders. Over the 5 years the overall injury rate declined (data not shown): from 677/100,000 in 2003 to 560/100,000 in 2007.

8.1.2 Age Specific Incidence

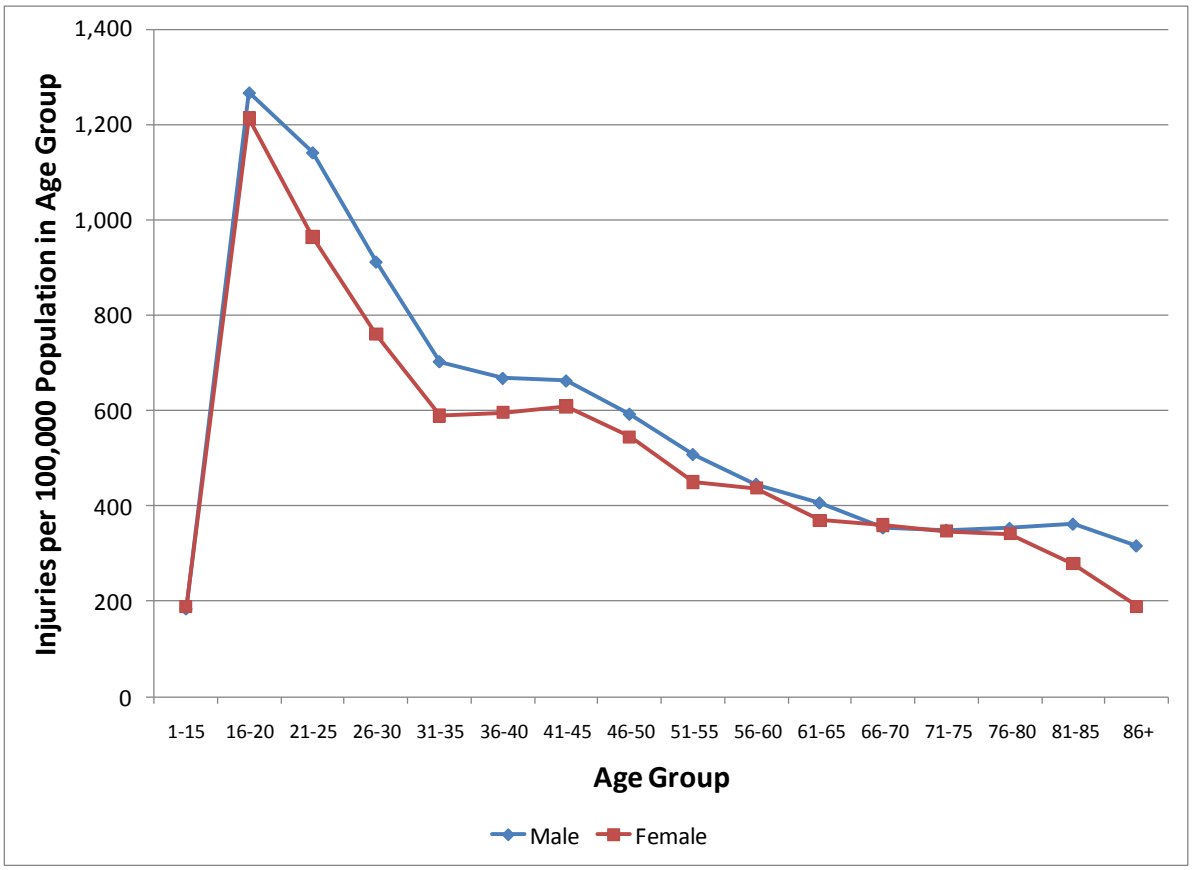
The age specific injury rates for the years 2003 to 2007 are presented in Table 20, with a plot of the 2007 rates in Figure 28. The higher male rate is spread across most of the age range. The equality of the rates in the 1-15 age group is not surprising, these individuals would primarily be passengers in vehicles driven by others. Reason for the higher male rates in the oldest age groups is not clear.

Table 20 Age Specific MVA Related Injuries Rates in BC over 5 Years by Gender

	2003			2004			2005			2006			2007		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1-15	262	261	262	231	234	232	221	224	223	198	208	203	184	188	187
16-20	1,703	1,650	1,677	1,601	1,443	1,524	1,470	1,307	1,391	1,332	1,253	1,293	1,267	1,213	1,240
21-25	1,471	1,189	1,333	1,389	1,052	1,224	1,313	1,084	1,202	1,221	1,029	1,127	1,141	964	1,054
26-30	1,080	791	936	995	810	903	1,042	799	921	936	747	842	912	760	836
31-35	835	732	783	819	695	757	820	694	757	790	666	728	703	589	646
36-40	784	693	738	769	644	706	817	641	728	737	621	679	668	596	632
41-45	725	613	669	681	612	646	715	611	663	707	592	649	662	608	635
46-50	663	602	633	643	571	607	624	539	581	645	531	588	593	545	569
51-55	569	533	551	574	551	563	559	534	547	537	524	531	508	450	478
56-60	506	514	510	525	467	496	549	450	499	505	468	486	446	437	441
61-65	426	512	469	472	412	442	432	413	423	449	429	439	406	370	388
66-70	383	405	394	450	385	417	423	362	393	384	376	380	354	360	357
71-75	425	434	429	389	353	370	377	344	360	370	359	365	349	347	349
76-80	425	426	426	463	386	420	500	434	464	347	362	355	353	342	347
81-85	442	374	400	425	335	370	380	333	352	478	278	358	362	279	312
86+	445	225	296	395	194	259	392	212	277	366	137	212	316	189	231
Total	718	636	677	691	589	640	680	575	627	638	553	595	592	528	560

Note: measure is rate per 100,000

Figure 28 Plot of Age Specific Injury Rates for 2007



8.2 Prevalence

Conceptually, the "prevalence" of motor vehicle accidents does not really exist. But the consequences of a MVA related injury can persist. However, it is difficult to find statistics that relate to the overall population prevalence of MVA related injuries. Most of the literature seems centred on specific causes (eg whiplash, spinal cord injuries, post-traumatic stress) or on the relationship between insurance issues and length of injury.

There is some limited information on the recovery of MVA related injuries (Mayou & Bryant, 2002; Ottosson et al, 2005). Mayou & Bryant (2002) followed approximately 500 individuals not severely injured in motor vehicle accidents. One year after the accident 31% of the individuals reported some degree of psychological distress, this decreased only slightly (to 26%) three years after the accident. Twenty-one percent of the subjects reported moderate or severe pain after three years. Ottosson et al (2005) found that 6 months after a minor traffic accident almost 44% did not consider themselves as recovered (70% did not feel recovered one month after the accident), slightly over 32% felt their work capacity was still impaired, and 40% had restrictions on their leisure activities.

Note that both studies had the majority of respondents working at the time of follow-up[34]. Sampalis et al (2006), using patients from a Quebec trauma centre, also found that patients injured in MVAs were more impaired psycho-socially than other types of trauma victims one year after the accident.

Coming up with some sort of overall prevalence number is difficult, but it would seem consistent with the above to conclude that after a year 30% of those injured in a MVA would still be experiencing some form of physical or emotional discomfort, although this might not be reflected in terms of return to work or ability to function on a day to day basis.

8.3 Mortality

Mortality rates (deaths due to MVAs) are much lower than the injury rates. Table 21 presents the rates over 5 years and Figure 29 plots the rates for 2007. Unlike the injury rates there is less evidence of a decline in the rates over time. Similar to the injury rates males show higher age specific rates: here across all ages except for 1-15. We are not sure of the reasons for the disparity at the oldest age ranges, a small number of deaths are involved (generally 10 or less per gender per year) but the high male rate is consistent over this period.

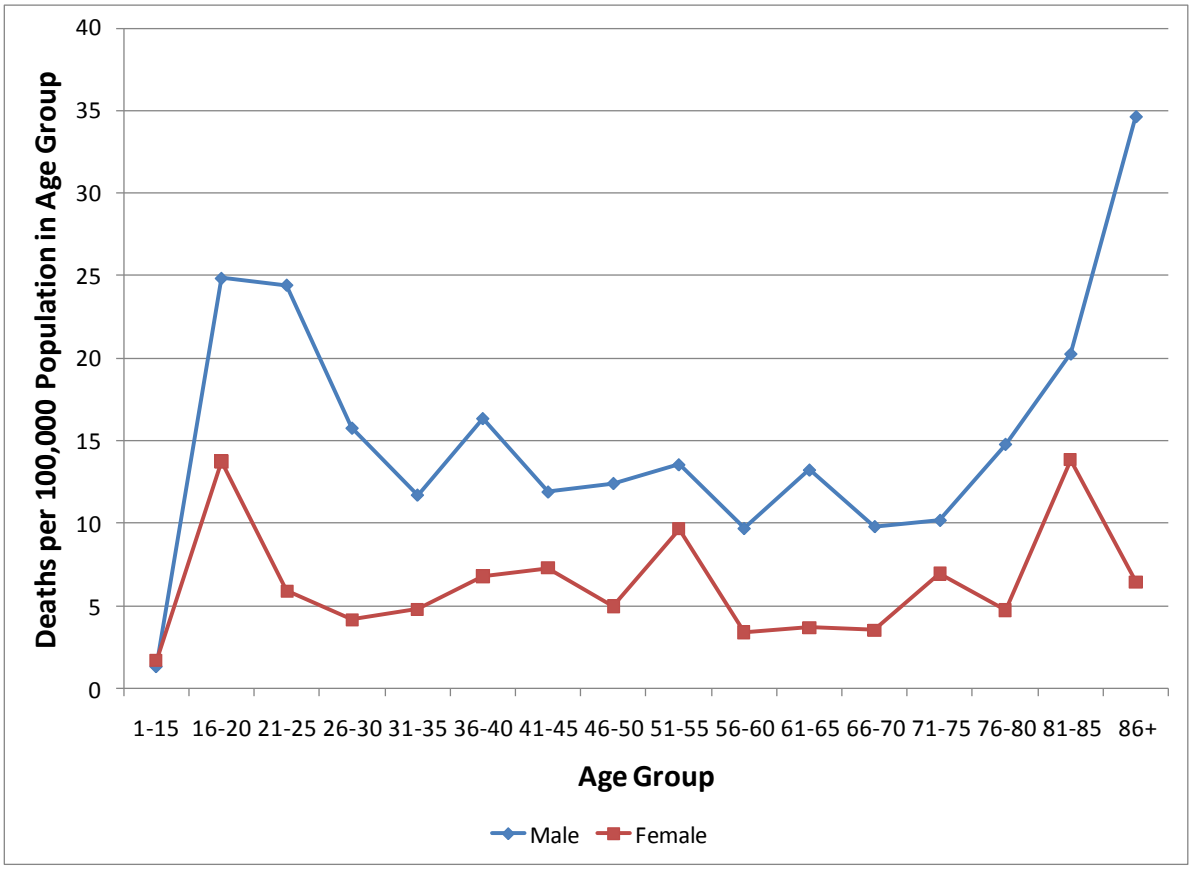
Table 21 Age Specific MVA Related Mortality Rates in BC over 5 Years by Gender

	2003			2004			2005			2006			2007		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1-15	4	3	4	2	1	2	2	1	1	3	1	2	1	2	1
16-20	30	6	18	24	7	16	20	14	17	26	12	19	25	14	19
21-25	31	12	22	26	7	17	42	10	27	22	7	15	24	6	15
26-30	25	1	13	21	10	16	18	9	13	18	1	10	16	4	10
31-35	10	3	7	15	4	9	17	7	12	16	6	11	12	5	8
36-40	18	8	13	16	2	9	10	3	6	15	5	10	16	7	12
41-45	12	4	8	14	6	10	12	7	9	14	4	9	12	7	10
46-50	11	5	8	12	3	8	18	7	12	12	6	9	12	5	9
51-55	10	4	7	16	6	11	11	4	7	13	4	8	14	10	12
56-60	5	9	7	17	5	11	15	5	10	12	6	9	10	3	7
61-65	16	4	10	17	10	13	10	12	11	17	3	10	13	4	8
66-70	17	9	13	8	18	13	10	5	8	6	6	6	10	4	7
71-75	18	7	12	15	7	11	18	6	11	9	6	7	10	7	9
76-80	27	11	18	14	15	14	18	11	14	13	13	13	15	5	9
81-85	27	26	27	26	15	19	36	10	21	39	16	25	20	14	16
86+	34	11	18	43	5	17	26	25	25	33	2	12	35	6	16
Total	15	6	10	14	6	10	15	7	11	14	5	9	13	6	9

Note: measure is rate per 100,000

[34] So an “objective” measure of recovery might indicate that these individuals were not hampered by the MVA.

Figure 29 Plot of Age Specific Mortality Rates for 2007



8.4 Potential years of life lost

The annual BC Vital Statistics has calculated PYLL for a number of conditions over the last 12 years. One of these conditions is MVAs, and thus we can get BC specific data for this cause of death. Table 22 presents the total PYLL and average PYLL for deaths due to MVAs in BC between 1995 and 2006[35]. There is a general trend in decreasing impact of MVAs over this period. This can be observed in (1) MVA deaths as a percent of all deaths has decreased (from 1.5% in 1995 to 1.1% in 2006), (2) the total PYLL has decreased over this period; (3) the average PYLL is going down slightly; and, (4) the percent of MVA related PYLL is decreasing over this period.

[35] Note that the number of deaths in this table do not match those reported by ICBC and used to calculate the rates in Table 21. The ICBC counts are higher by about 15-20% over the 4 years where the data overlaps. Vital Statistics cautions that their numbers might get increased over time as uncertain causes of death get resolved. It is also possible that some MVA related deaths do not get coded as such on death certificates (although ICBC would see these as a MVA related death). In any case the emphasis here is on the trends within the data, and reporting differences should be consistent within the data sources.

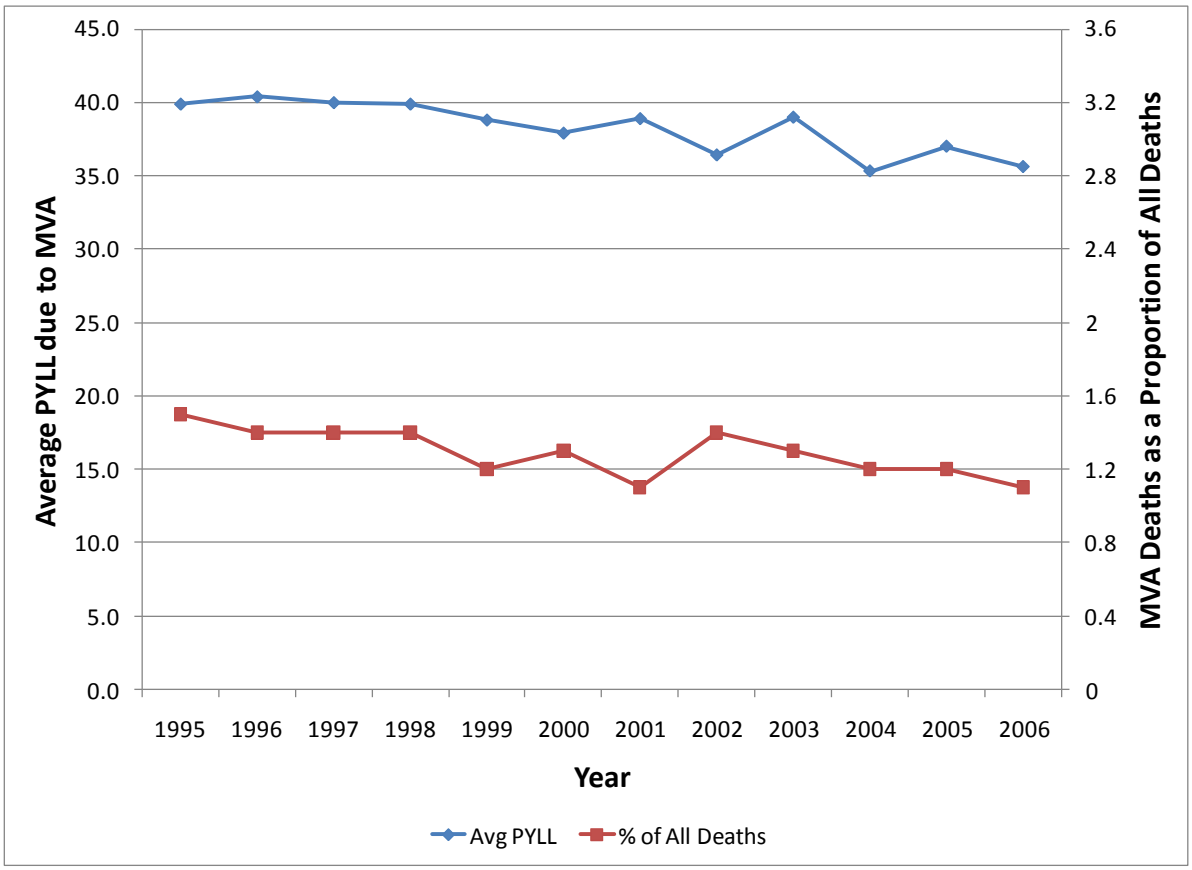
Table 22 MVA Related PYLL Statistics for BC Over 12 Years

	All Ages		Age < 75			
Year	Total Deaths	% of All Deaths	#Deaths	Total PYLL	Avg PYLL	% of all PYLL
1995	397	1.5	369	14,736	39.9	7.1
1996	386	1.4	351	14,171	40.4	6.8
1997	374	1.4	350	14,014	40.0	6.9
1998	380	1.4	331	13,216	39.9	6.7
1999	346	1.2	306	11,871	38.8	6.4
2000	342	1.3	302	11,444	37.9	6.4
2001	307	1.1	277	10,787	38.9	5.8
2002	399	1.4	352	12,815	36.4	6.9
2003	376	1.3	327	12,763	39.0	6.9
2004	370	1.2	328	11,567	35.3	6.2
2005	369	1.2	326	12,075	37.0	6.2
2006	334	1.1	291	10,357	35.6	5.4

Figure 30 plots the average PYLL and MVA deaths as a percent of all deaths to illustrate these trends (note there is a primary and secondary Y axis in this plot).

While the trend may be going down one should not minimize the contribution to PYLL. In the 15-24 year age group MVA's account for 25% of all male PYLL and 19% of all female PYLL. While this percentage is down from the 28% (male and female rates were the same in that year) in 2000 it still represents a substantial proportion in this age group.

Figure 30 MVA PYLL Related Trends for BC



8.5 Impact on BC

Using the age specific rates described above it is possible to estimate the number of male MVA cases in BC. These are presented in Table 23. Note that the prevalence estimate is simply 30% more than the incident rate[36].

Table 23 Estimated MVA Values for Males in BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	3,547	3,505	64	63	4,611	4,556
20-29	315,852	315,866	3,242	3,242	63	63	4,214	4,215
30-39	304,217	334,215	2,085	2,290	43	47	2,710	2,977
40-49	348,793	337,828	2,188	2,120	42	41	2,845	2,756
50-59	327,906	364,116	1,563	1,736	38	42	2,032	2,257
60-69	223,546	277,099	850	1,053	26	32	1,105	1,370
70-79	132,679	151,534	466	532	17	19	605	691
80+	72,247	85,554	245	290	20	23	318	377
Total	2,214,275	2,349,416	14,186	14,768	313	331	18,442	19,198

[36] This really should be the incident rate plus 30% of the previous years incident cases, but the complexity of the calculations does not seem justified by the crudeness of the estimate.

This calculation suggests that in the year 2009 BC would expect to have slightly over 14,000 male MVA related injuries, with the age group with the highest count being below age 19. This would rise in 2014, because we carry the latest incidence rates forward. This is not in keeping with the trend in decreasing incidence shown above, and one might want to decrease this value accordingly. In terms of deaths, over 300 males would die in 2009 and 2014 due to MVAs, with the highest proportion of deaths being in the younger age groups. The prevalence data mirrors the incidence data.

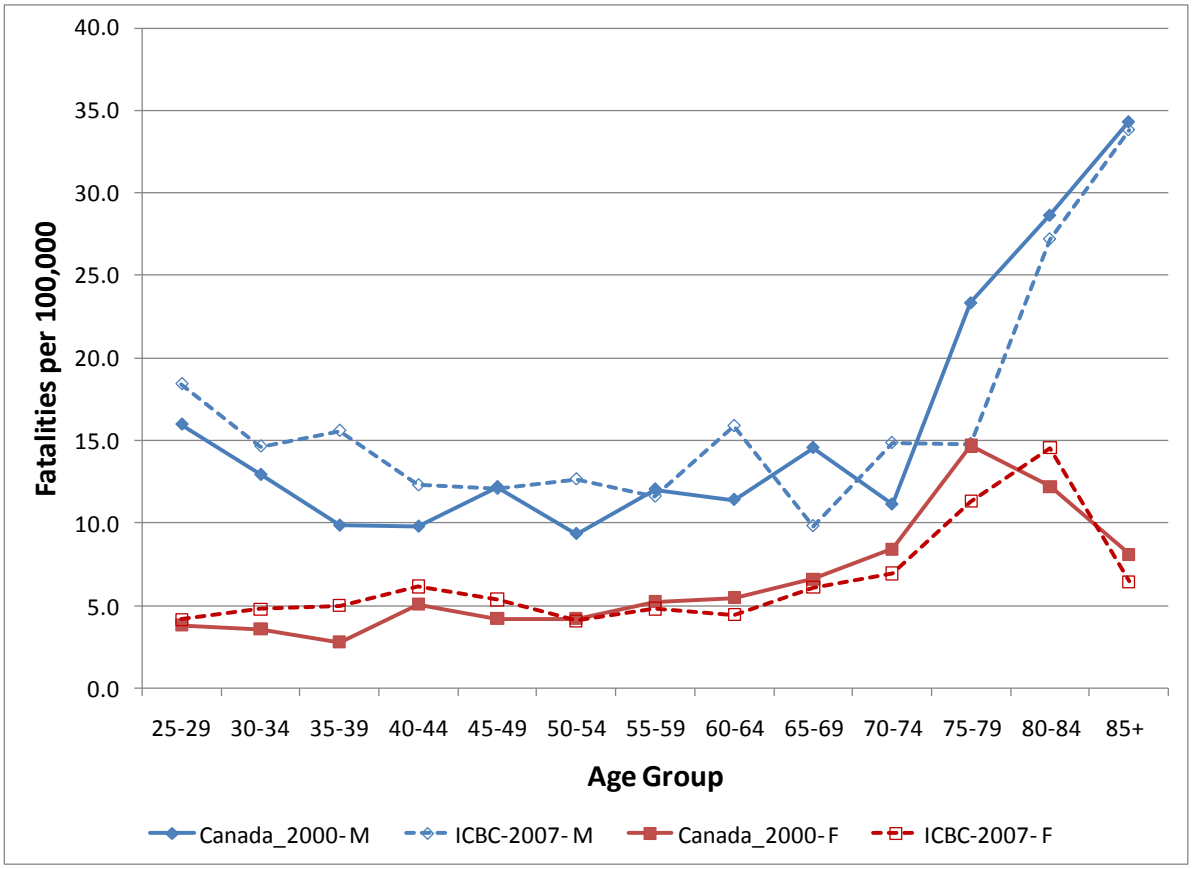
8.6 BC Specific Data

Data used in this chapter is from BC, so there is no comparison to be made with BC specific data. But the BC pattern is not different from patterns reported elsewhere. For example, Beck, Dellinger, & O'Neil (2007) reported on US injury and death rates based on exposure (estimates of the number of trips). They report the highest fatality rates for passenger vehicles to be in the 15-24 age group[37] and the highest non fatal injury rates in the same age group. Using Canadian data a similar pattern for deaths was found by Ramage-Morin (2008), with the highest death rates being in the 15-24 age group. Finally, the Public Health Agency of Canada [PHAC] (Public Health Agency of Canada, 2009) maintains a database on chronic disease outcomes, and one of the outcomes is the MVA age standardized mortality rates. The PHAC rates for 2000 are compared to the 2007 ICBC rates in Figure 31. While the curves do not align perfectly there is little indication of a systematic difference in the plots.

Overall, there seems little reason to believe the BC data differs dramatically from other similar areas in North America.

[37] The second highest was in the >= 65 age group.

Figure 31 Comparison of Canada Wide Age Standardized Mortality Rates with Rates Derived from ICBC Data



9 Cardiovascular Disease

Cardiovascular disease is defined by MedicineNet.com as:

> *Disease affecting the heart or blood vessels. Cardiovascular diseases include arteriosclerosis, coronary artery disease, heart valve disease, arrhythmia, heart failure, hypertension, orthostatic hypotension, shock, endocarditis, diseases of the aorta and its branches, disorders of the peripheral vascular system, and congenital heart disease.*[38]

Thus it is a mixture of conditions. Within the literature it appears to be a term used fairly loosely, closer examination of the results shows that often some, but not all, conditions are being examined or reported upon. Fortunately general trends related to age and gender seem consistent across a variety of conditions, but there are some conditions that show different gender patterns than the norm.

9.1 Incidence

Incidence of a progressive condition like cardiovascular disease (CVD) is difficult to determine, because it is rarely clear when the condition started or reaches a state where the individual can be counted as a case. Once treated one is clearly a case, and most studies thus count incident cases as individuals who first start treatment for a CVD condition. This can be most easily done through combining hospitalization and mortality figures. It is hard to find an incident rate for CVD, as most tend to be disease specific. Interest has also focused on the potential decrease in CVD rates over time (Tunstall-Pedoe, 1999), and many reports focus on the change in rates of specific conditions (or combinations of conditions) over time. This makes the determination of the incidence of CVD challenging, as a decrease (or increase) in one condition may not reflect patterns in other conditions (Arcerio et al, 2009).

9.1.1 Overall Incidence

PHAC (Public Health Agency of Canada, 2009) reports a 2005 Canadian CVD hospital discharge rate (for circulatory diseases) as 979/100,000; with the female rate being 722/100,000 and the male rate 1274/100,000. The rate for just “Ischaemic heart disease” and “Cerebrovascular disease” is 522/100,000; with the female rate being 342/100,000 and the male rate 725/100,000.

[38] As described by http://www.medterms.com.

The Canadian rates cited above are close to other rates. A US study of male physicians found a major cardiovascular disease incidence rate of 696/100,000 person years (Driver et al, 2009). This rate is higher than that reported by Arciero et al (2004), who reported an age adjusted coronary disease incident rate of 571/100,000 in 1988 and 503/100,000 in 1998.

9.1.2 Age Specific Incidence

Age specific incidence estimates also tend to be for selected combinations of conditions. One examination of Canadian age specific incidence was done by Tu et al (2009). They looked at incidence of AMI, heart failure, and stroke in terms of deaths and hospital admissions, with the latest data for 2004. They presented the age specific rates in Table 24.

Table 24 Canadian CVD Incidence Rates for 2004 as Presented by Tu et al (2009)

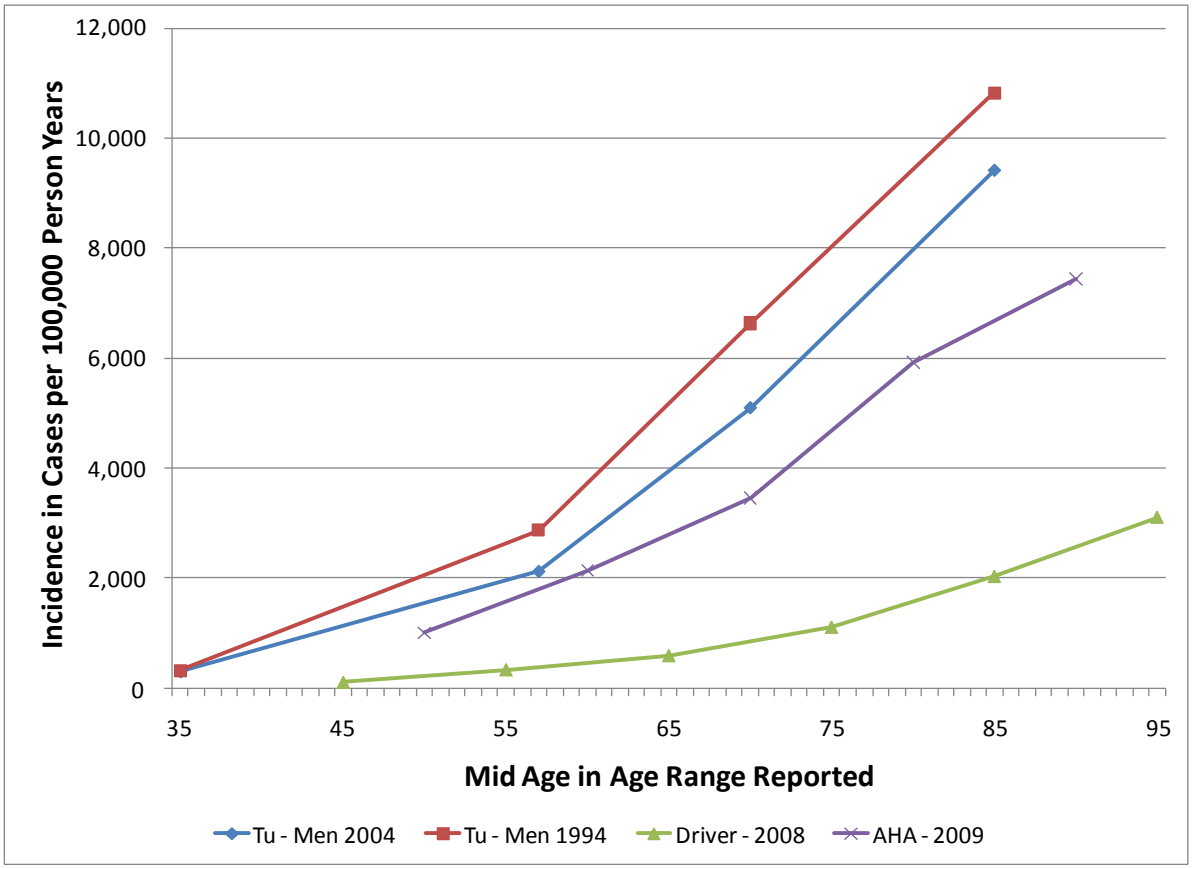
Age Range	Men	Women
20-49	299	168
50-64	2,119	923
65-74	5,093	2,862
75+	9,403	7,038

Note: Values are cases per 100,000 population.

In addition to 2004 Tu et al (2009) calculated values for 1994. We could find two other reports that presented age specific incidence figures, one by Driver et al (2008) that looked at the male incidence among a population of US male physicians and figures supplied by the American Heart Association (2009). We have plotted all these rates in Figure 32.

The Driver et al (2008) figures are based on a select (and well off) population and clearly are lower than the others. But the trend is clear – incidence increases with age.

Figure 32 Age Specific CVD Rates from Different Sources



9.2 Prevalence

As with incidence, prevalence of CVD is difficult to determine because most often individuals present with an acute event. Counting just these cases misses the (potentially large) number of asymptomatic cases that might exist in the population. In Canada the most often cited prevalence estimates come from the CCHS v1.1 survey. This survey found 5.4% of men and 4.6% of women self reported that they had some form of hearth disease (Chow et al 2005; Manuel et al, 2003; Rabi & Cox, 2007).

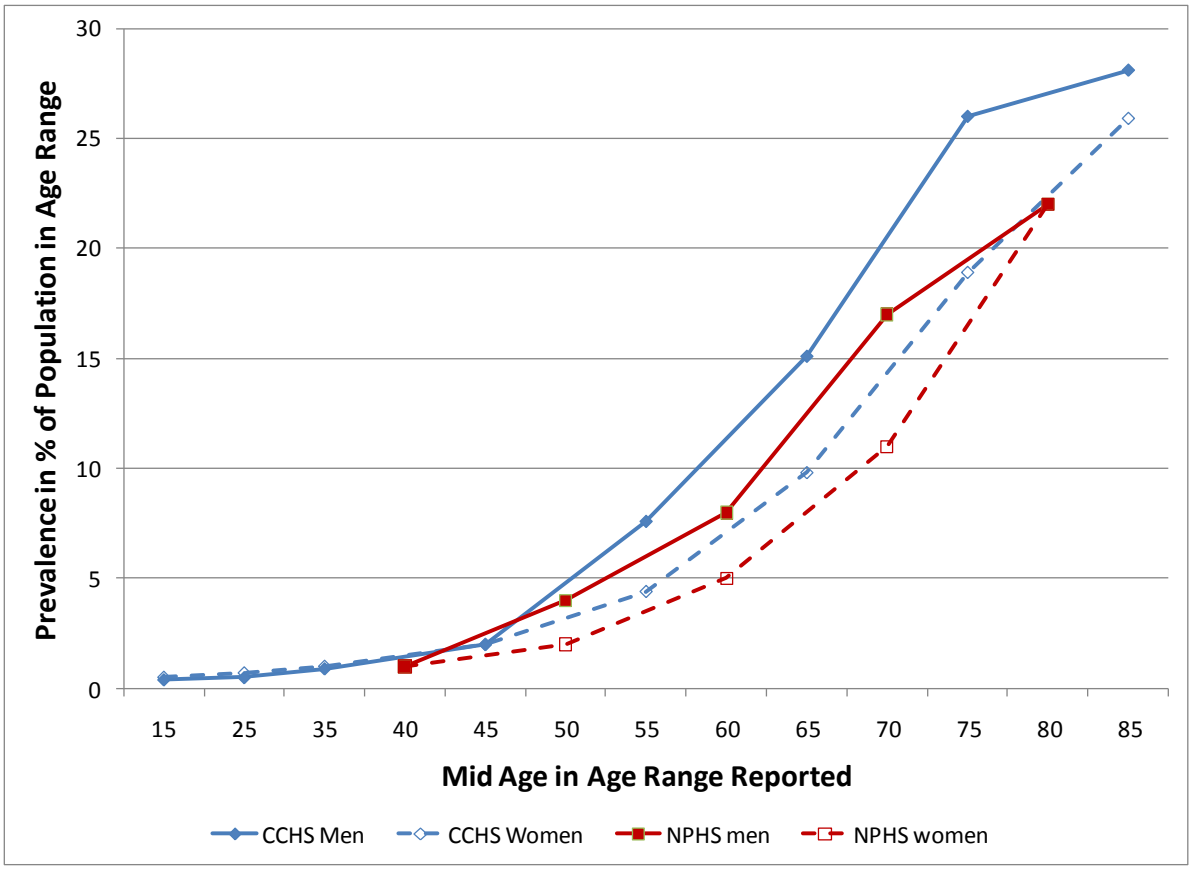
Rabi & Cox (2007), in their summary of the literature, conclude that prevalence is higher in men than women. They cite survey results that indicate 5.4% of Canadian men compared to 4.6% of Canadian women, and 8.4% of US men (compared to 5.6% of US women) were diagnosed with CVD as supporting this conclusion. Higher prevalence in men compared to women has also been reported in European studies (Bleumink et al, 2004).

Chow et al (2005) present Canadian prevalence estimates based on the CCHS 1.1 data. An earlier estimate based on NPHS data was presented in a report by

the Heart and Stroke Foundation of Canada (Heart and Stroke Foundation of Canada, 1999). Figure 33 presents a plot of the estimates from these two sources. Both sets of data show the same general shape; in both cases the male prevalence is higher than the female, and the differences in the oldest age range start to converge again.

Much different prevalence rates are presented in US data compiled by the American Heart Association (2009). Prevalence rates in the older age groups are in the high 70% range (the reason likely is the inclusion of hypertension as a condition in their estimates). There is less of a difference between males and females in their rates, males are higher in the younger age groups, and females higher in the oldest (80+) group, with an 86% prevalence reported. The shape of the curves is generally the same as that in Figure 33.

Figure 33 Prevalence Estimates of Heart Disease in Canada



9.3 Mortality

Overall, in Canada male mortality rates from CVD exceed those of female rates. In 1999 the ratio of male (288/100,000) to female (175/100,000) CVD death rates

was 1.6 (Manuel et al, 2003). PHAC (2009) reports that the 2005 age standardized mortality rate for "Major cardiovascular diseases" was 212/100,000 for males and 132.4/100,000 for females (still a ratio of 1.6). Total deaths from any form of heart disease was 741/100,000 for men and 452/100,000 for women (as reported by American Heart Association, 2009) in 2002, and this is also a ratio of 1.6.

The PHAC (2009) information source provides age specific mortality rates for a variety of the conditions that make up CVD for the year 2000. The age specific mortality rates are tabulated in Table 25 and plotted in Figure 34.

Table 25 Age Specific Mortality Rates for CVD in 2000 (PHAC, 2009)

	2000	
Age	Male	Female
25-29	2	2
30-34	4	2
35-39	11	4
40-44	27	9
45-49	54	15
50-54	99	30
55-59	187	55
60-64	314	111
65-69	543	220
70-74	899	431
75-79	1,599	869
80-84	2,751	1,777
85+	5,440	4,611

Note: 1. Combination of the ischaemic heart disease and cerebrovascular disease rates
2. Measure is rate per 100,000

There is a clear increase in rates with age, with males being higher than females at all but the younger ages. This pattern has also been noted by in the report by the Heart and Stroke Foundation of Canada (Heart and Stroke Foundation of Canada, 1999).

A similar picture of Canadian mortality is presented through data by Tu et al (2009). They looked at the mortality rates for 1994 and 2004. The data from their tables is plotted in Figure 35. While the age scale is a little coarser (making visual comparisons difficult) the shape seems generally the same.

Figure 34 Plot of Rates in Table 25

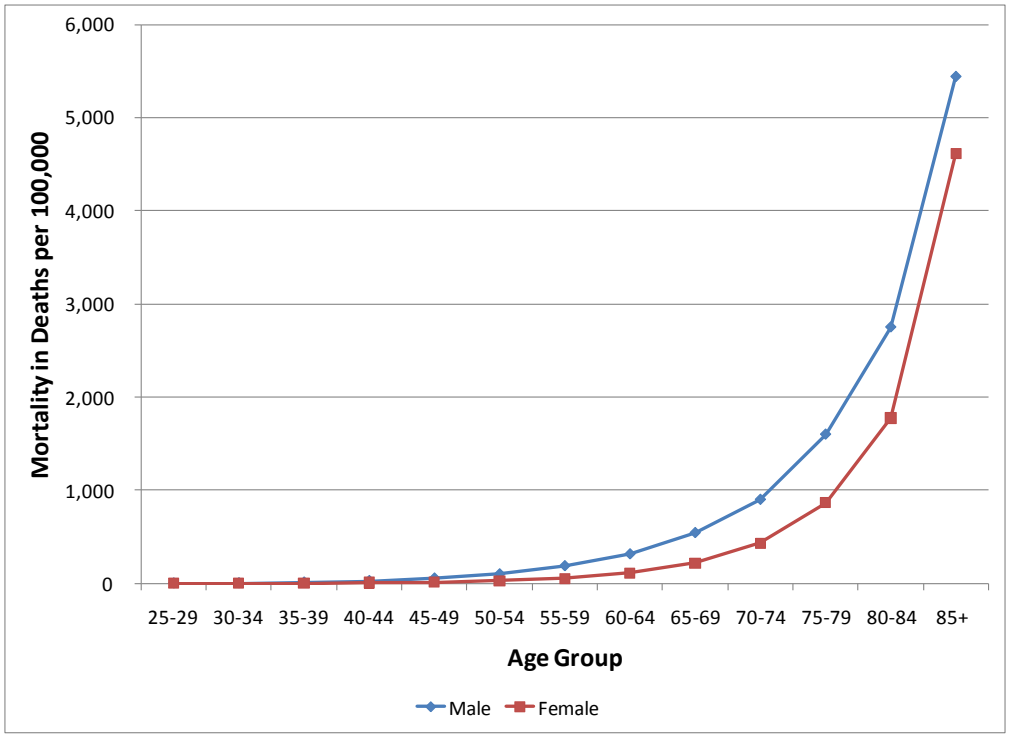
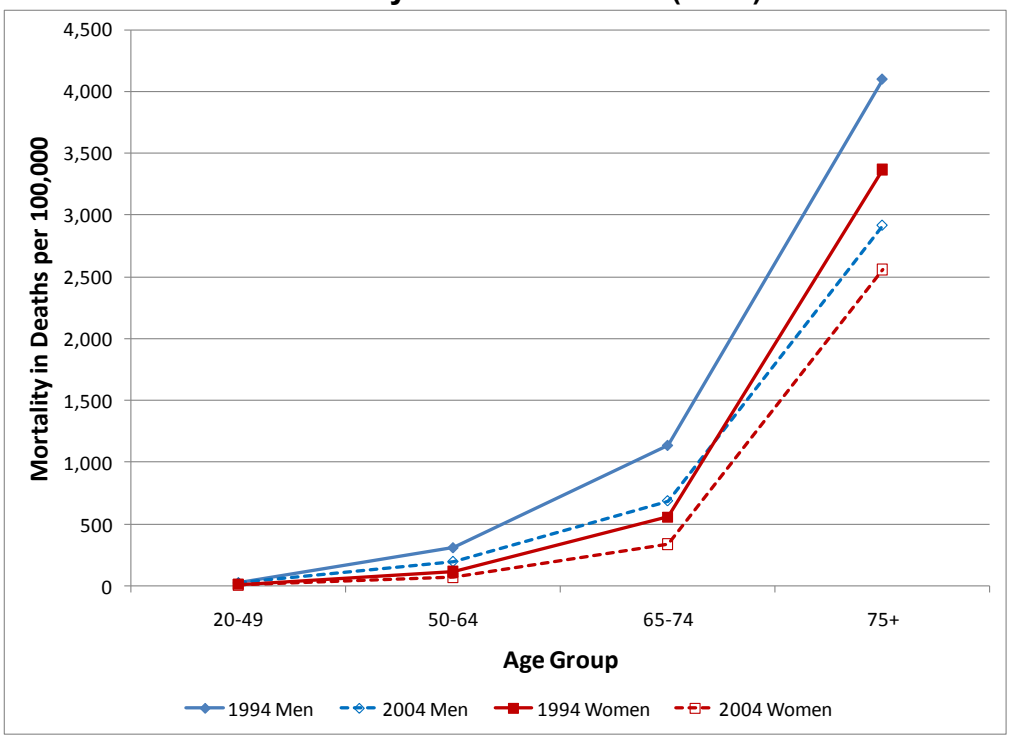


Figure 35 Plot of CVD Mortality Rates in Tu et al (2009)



Numerous studies have reported on the decline in CVD related mortality over the years. This finding appears robust and worldwide. A WHO project monitored changes in the CVD morbidity and mortality over a 10 year period in the 1990's (Tunstall-Pedoe et al, 1999) concluded that fatality rates for coronary heart disease did fall for both men and women (by 0.6% per year for men and 0.8% per year for women). The Canadian site that contributed to this data showed a larger decline (6.3% for men and 4.1% for women in mortality). In Canada male age standardized rates have dropped from 702/100,000 in 1950 to 288/100,000 in 1999, a change of 59%, and female rates have dropped from a 562/100,000 to 175/100,000 (a change of 69%, see Manuel et al, 2003).

9.4 Potential years of life lost

CVD strikes at a relatively late age, and thus its PYLL figures can look low when based on small samples, as most who die from these causes will do so at a relatively late age. But it is also one of the most frequent causes of death, so it can amass a relatively large PYLL over the population as a whole[39].

The January 2005 version of health reports presents tables that allow for a comparison (based on 2001 data). For Canada as a whole the PYLL for men from all types of circulatory disease deaths was estimated as 1195/100,000 (95% CI 681 to 686). All cause PYLL was estimated as 6,935/100,000. Hence all circulatory deaths contribute about 17% to the total men's PYLL due to all causes of death. Data is available for BC itself. The all cause related PYLL for BC was reported as 7,134/100,000 and the all types of circulatory disease specific figure as 1,042/100,000. Thus the BC proportion is 15%, similar to the Canadian value.

Now the all types of circulatory disease reported is made up of three subcategories, and it is possible to break these down into more detail. This is presented in Table 26. As can be seen the BC breakdown differs from the national, with a higher proportion of PYLL coming from cerebrovascular causes of death and a lower proportion from ischaemic heart disease deaths.

[39] 1000 people dying from CVD at age 73 makes a PYLL of 2000, compared to 10 dying at 25 from an MVA (which makes a PYLL of 500).

Table 26 PYLL Broken Down by Types of Circulatory Disease

	PYLL rate per 100,000 population age 0-74			
Source	Canada	% of all	BC	% of all
ischaemic heart disease deaths (ICD-10 I20-I25)	783	66%	638	61%
cerebrovascular disease deaths (ICD-10 I60-I69)	270	23%	268	26%
all other circulatory disease deaths (ICD-10 I00-I02, I05-I09, I10-I15, I26-I28, I30-I52, I70-I79, I80-I89, I95-I99)	142	12%	136	13%
all circulatory disease deaths (ICD-10 I00-I99)	1195		1042	

9.5 Impact on BC

Based on the information above it is possible to estimate the number of male CVD cases in BC. These are presented in Table 27.

Table 27 Estimated CVD Values for Males in BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	0	0	0	0	978	966
20-29	315,852	315,866	472	472	6	6	1,579	1,579
30-39	304,217	334,215	909	999	22	25	2,738	3,008
40-49	348,793	337,828	1,563	1,514	142	137	6,976	6,757
50-59	327,906	364,116	6,950	7,717	469	521	24,921	27,673
60-69	223,546	277,099	8,061	9,992	957	1,187	33,755	41,842
70-79	132,679	151,534	9,616	10,983	1,658	1,893	34,497	39,399
80+	72,247	85,554	6,793	8,044	2,959	3,504	20,301	24,041
Total	2,214,275	2,349,416	34,364	39,721	6,213	7,272	125,745	145,265

This calculation suggests that in the year 2009 BC would expect to have slightly over 34,000 new male CVD, with the age group with the highest count being in the 70-79 age range. This would rise to almost 40,000 in 2014. In terms of deaths, about 6,200 males would die in 2009 and 7,200 in 2014. The increase is based on the same age specific mortality pattern in both years, a situation that is not in keeping with the observed decrease in mortality over the years[40]. The prevalence data indicates that 126,000 males will have CVD related problems in 2009 (rising, as would be expected, in 2014). Note that in the prevalence data the age group 60-69 has a higher proportion of prevalent cases than incident cases.

[40] Note that there is no consistent evidence that the incidence is decreasing (people are surviving better) and hence one might suspect the prevalence will increase, although given the age of the majority of cases they may die of other conditions.

9.6 BC Specific Data

In comparing the results in Table 27 with BC vital stats data one finds that the estimations in the above section for mortality exceed the observed mortality by a lot. Table 28 presents the number of reported male deaths from diseases of the circulatory system[41] in the BC Vital Statistics reports over the last 11 years. As can be seen, the number never approaches the 6,000 estimated in the above section.

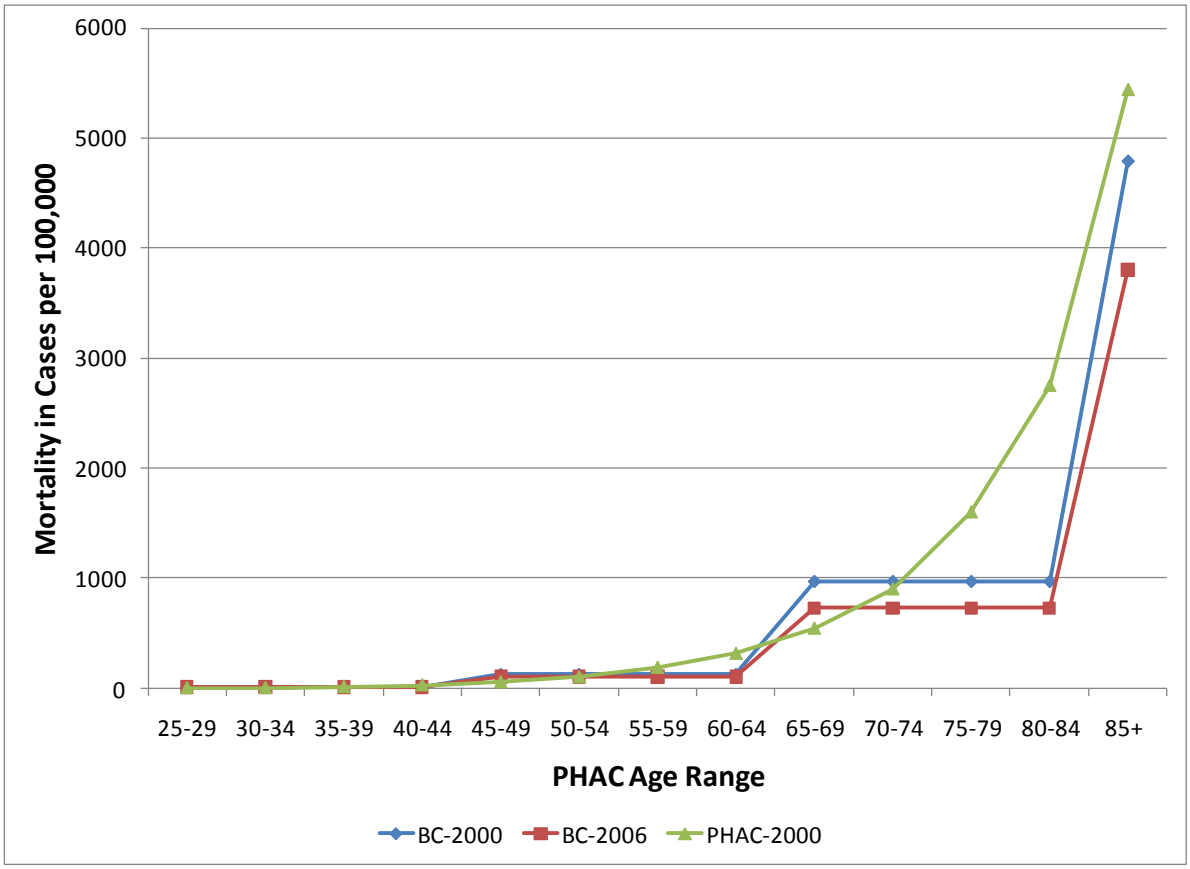
Table 28 BC Male Deaths from All Diseases of the Circulatory System as Recorded in Vital Statistics Reports

Year	Number of Male Deaths	Rate in Cases / 100,000
1995	4,969	264
1996	5,232	271
1997	5,053	257
1998	5,000	252
1999	5,157	259
2000	4,776	238
2001	4,917	243
2002	4,807	236
2003	4,852	235
2004	4,804	231
2005	4,688	222
2006	4,635	217

In BC it appears that the CVD mortality rate is probably a bit lower than might be expected given the epidemiological data. We have compared the calculated BC mortality rate (based on the Vital Statistics reports) with the mortality rates used in the above section (which were based on the PHAC data). Figure 36 plots this comparison. Because the BC data uses such large age ranges in older groups the BC plot is not very smooth (we have used the PHAC age ranges in the plot, so the BC bigger ranges are simply copied over the PHAC ages – we have made no effort to smooth the BC data). The shape seems similar, but the BC rates are lower.

[41] The BC figure would be expected to be higher using this grouping because it includes conditions not seen as belonging to CVD.

Figure 36 BC Mortality Rates Compared to Epidemiological Rates



Given the mortality is lower one might have concerns about the incidence and prevalence estimates. While there is no way to check these figures with published data there is the possibility that they may be more accurate than mortality. Mortality rates have been dropping and it might be that BC simply is one of the leaders in this area.

10 Osteoporosis

Osteoporosis is seen as a disease that involves low bone mass and deterioration of the bone tissue, leading to bone fragility and an increased risk of bone fractures (Tenehouse et al, 2000). One factor of this definition is that the deterioration is long term and starts from a theoretical point of full bone density. This has implications for the descriptive epidemiology of this condition, as the concept of incidence has little meaning in this kind of situation. Decrease in bone density is gradual, and while it is possible to define a number at which the density crosses over the line to make the individual an incident case of osteoporosis this has little impact on the individual. They experience little difference the minute before or after this threshold is crossed. Thus the main focus is on prevalence.

10.1 Incidence

Not relevant in this condition.

10.2 Prevalence

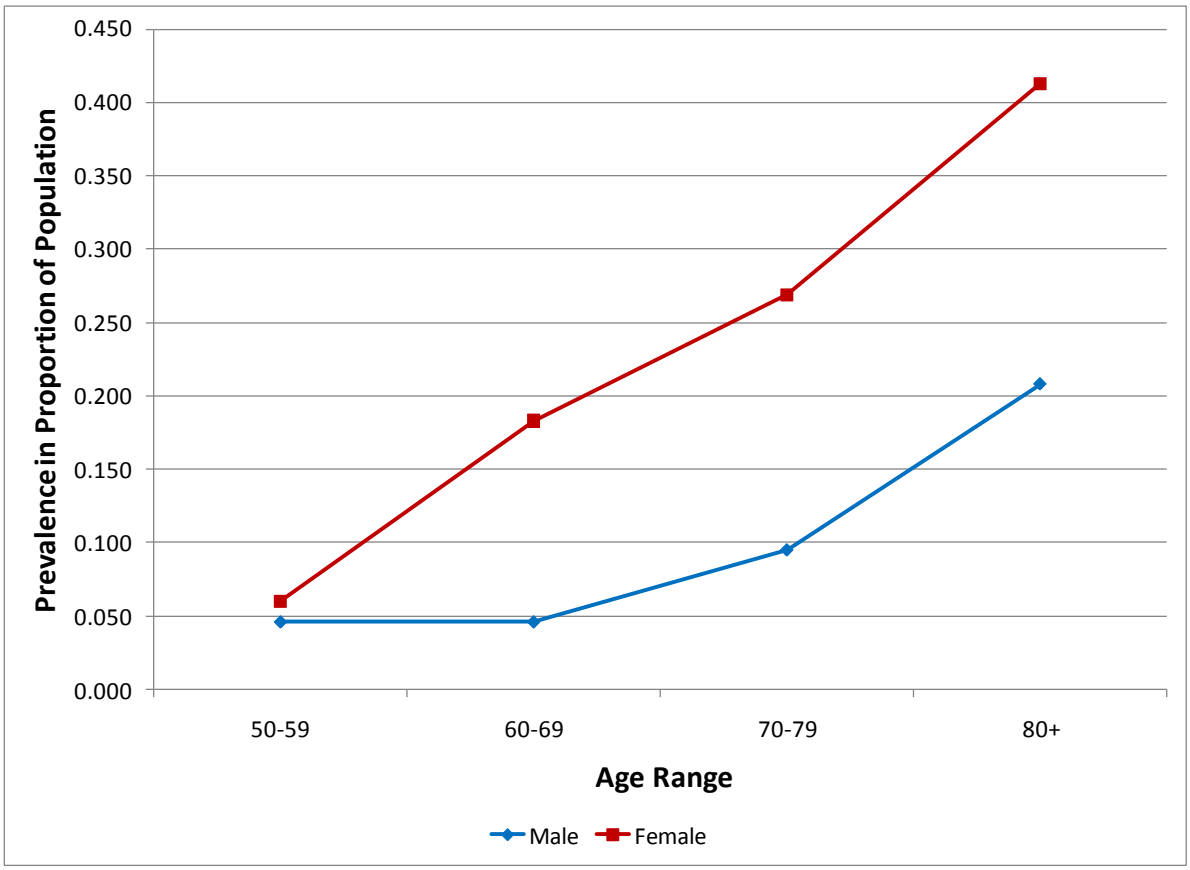
Kmetic et al (2002) present prevalence estimates (in terms of the proportion of the population with the condition) for Canadian men and women. A summary of their results is presented in Table 29. The age specific rates are plotted in Figure 37.

Table 29 Osteoporosis Prevalence Estimates for Canadian Population (Kmetic et al, 2002)

Age	Female	Male
50-59	0.060	0.046
60-69	0.183	0.046
70-79	0.269	0.095
80+	0.413	0.208
Overall		
50+	0.188	0.068
25+	0.082	0.035

Note: Measured as proportion of the age specific population.

Figure 37 Plot of Age Specific Rates in Table 29



Female rates are clearly higher than male rates at all ages.

Papadimitropoulos et al (1997) reported on hip fracture rates (most of which would be assumed related to osteoporosis) in Canadian females and males based on hospital records. They found a rate of 479/100,000 for females and 187/100,000 for males based on hospital data from 1993/94. Thus the osteoporosis rates reported by Kmetic et al (2002) are approximately 12 times as large as the hip fracture rates for both males and females[42].

10.3 Mortality

Osteoporosis itself is not a cause of death, although increased mortality rates for Canadian individuals suffering from a fracture related to osteoporosis has been reported (Papadimitropoulos et al, 1997).

[42] Note the summary figures in Table 29 are for specific age ranges, we base this calculation on a conversion of the 25+ proportion to a rate for the Canadian population as a whole.

10.4 Potential years of life lost

Not relevant for this condition.

10.5 Impact on BC

Based on the information above it is possible to estimate the number of male osteoporosis cases in BC. Data can only be calculated for prevalence, and the estimates are presented in Table 30.

Table 30 Estimated Osteoporosis Values for Males in BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204					0	0
20-29	315,852	315,866					0	0
30-39	304,217	334,215					0	0
40-49	348,793	337,828					0	0
50-59	327,906	364,116					15,084	16,749
60-69	223,546	277,099					10,283	12,747
70-79	132,679	151,534					12,605	14,396
80+	72,247	85,554					15,027	17,795
Total	2,214,275	2,349,416					52,999	61,687

This calculation suggests that in the year 2009 BC would expect to have 53,000 male osteoporosis cases, with the age group with the highest count being in the 50-59 age range (low prevalence but high population, note the close correspondence with the 80+ estimates). This would rise to almost 62,000 in 2014, with the highest number of cases now in the 80+ range (50-59 is second highest). We note that if the 1/12 relationship between osteoporosis and hip fractures holds in this time period the chances of those in the 50-59 age group developing a hip fracture before they die are quite large.

10.6 BC Specific Data

No BC specific data was available.

11 Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS)

While the mechanism of transmission of HIV seems to be well understood (HIV is a blood borne pathogen, and can only be passed from individual to individual through the exchange of contaminated blood or blood by-products) information on the descriptive epidemiology is sketchy. In part this is because of the high concentration of HIV cases among specific subpopulations (MSM or IDU[43]) of the general population. Reporting has tended to focus on these subgroups, making it difficult to determine overall population rates. In addition, the incidence (and prevalence) of HIV has been influenced by increases in specific subgroups at different times (Boulos et al, 2005; McInnes et al, 2009; Public Health Agency of Canada, 2008). The PHAC report (Public Health Agency of Canada, 2008) provides the most extensive data on HIV in Canada and provides the main source of data for this section.

Individuals do not die of HIV, rather the presence of HIV can lead to the development of AIDS and subsequent death. The mortality section of this report will focus on AIDS related deaths. However, individuals with HIV die of other causes too (e.g., they are not immune from motor vehicle accidents), and there is some evidence that their other causes mortality rate might be higher, especially for those receiving antiretroviral therapy (Martınez, 2007).

11.1 Incidence

Incidence (and prevalence) is measured in terms of positive HIV tests. Since the presence of HIV does not necessarily lead to symptoms requiring medical attention the measured incidence rates are likely underestimates of the actual rate of infection and are subject to influences that impact the rate of willingness to undergo testing. A count of the positive HIV tests (in a year say) measures both the new cases developed in the year and older infections that have not been tested to that point in time. In order to get a true estimate of incidence a large cohort would need to be followed (and continually tested) over time. Since these studies have not been done incidence rates are generally estimated from the number of positive tests using epidemiological modelling techniques. Or reports focus on the incidence of positive HIV tests.

[43] MSM = men who have sex with men; IDU = injection drug users.

11.1.1 Overall Incidence

Table 31 presents an estimated incidence rate for positive HIV tests in Canada over the years 1995-2007, with the same data plotted in Figure 38.

Table 31 Incident of HIV Positive Tests in Canada

Year of test	Number reported to PHAC	Canada Pop	rate /100,000
1985-1994	*32,841*	*274,266,561*	*12.0*
1995	2,948	29,302,091	10.1
1996	2,738	29,610,757	9.2
1997	2,473	29,907,172	8.3
1998	2,298	30,157,082	7.6
1999	2,197	30,403,878	7.2
2000	2,106	30,689,035	6.8
2001	2,221	31,021,251	7.2
2002	2,471	31,361,611	7.9
2003	2,483	31,629,677	7.8
2004	2,532	31,974,363	7.8
2005	2,501	32,270,507	7.7
2006	2,559	32,576,100	7.8
2007	2,432	32,927,400	7.3

Notes

Adapted from data presented in PHAC (2008) Table 1, page 15
1985-1994 was presented as a total, the Canadian population for this row is the sum of the population over these years.

PHAC also presents a breakdown by gender for those over the age of 14 (PHAC, 2008, Table 3). This data is presented in Table 32 and plotted in Figure 39. The male rate is over 3 times higher over this period. There also appears to be a difference in the pattern over time. Working with what seems to be the same data[44] (just slightly different years) Hall et al (2009) found that there was a statistically significant decrease in HIV diagnosis among males in the period 1996-2001 but not among females. Over the period 2001-2005 they found no statistically significant trends in either gender. Over the time period plotted here there does not seem to be any significant trend.

[44] The authors cite a Public Health Agency 2006 surveillance report earlier in their article, some of the authors are from PHAC, but the article does not seem to actually state where their Canadian data came from.

Figure 38 Plot of Incident of HIV Positive Tests in Canada

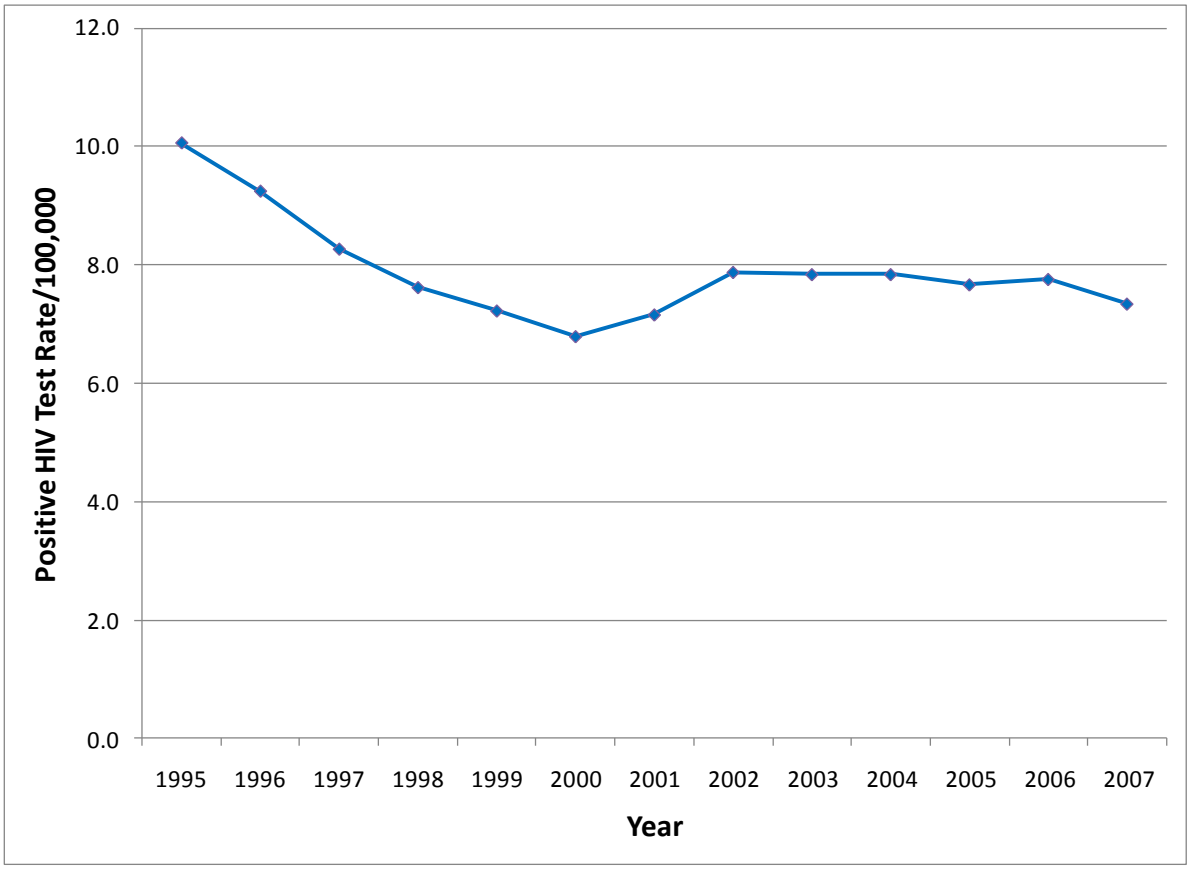


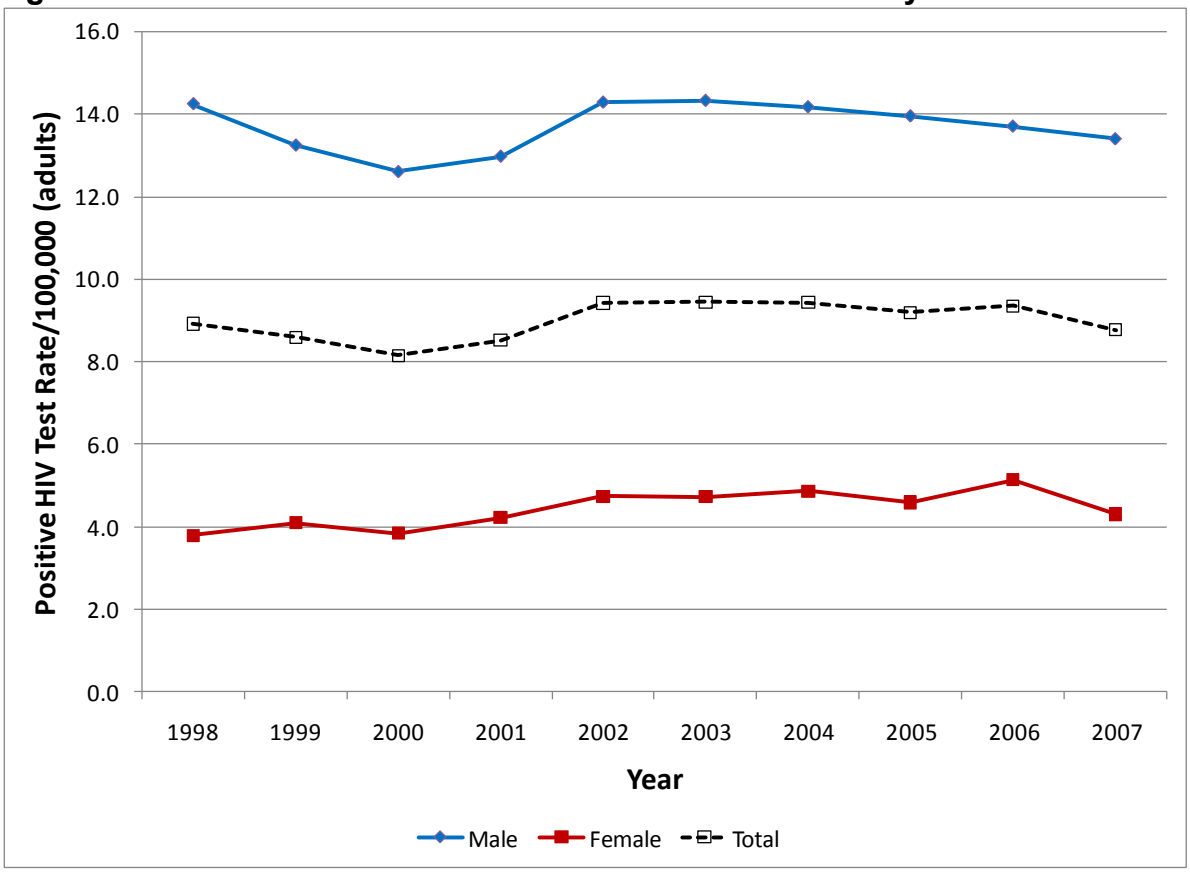
Table 32 Incident of HIV Positive Tests in Canada by Gender (age > 14)

	Male		Female		Total	
Year of test	No. of tests	rate /100000	No. of tests	rate /100000	No. of tests	rate /100000
1998	1,691	14.2	467	3.8	2,158	8.9
1999	1,592	13.2	511	4.1	2,103	8.6
2000	1,536	12.6	485	3.8	2,021	8.1
2001	1,605	13.0	540	4.2	2,145	8.5
2002	1,792	14.3	615	4.7	2,407	9.4
2003	1,819	14.3	622	4.7	2,441	9.4
2004	1,827	14.2	649	4.9	2,476	9.4
2005	1,823	13.9	621	4.6	2,444	9.2
2006	1,803	13.7	699	5.1	2,502	9.3
2007	1,782	13.4	592	4.3	2,374	8.8

Notes

Adapted from data presented in PHAC (2008) Table 3, page 17
Notes to the PHAC table indicate that for 1,323 cases gender was missing or reported as transgender and these values are not included in their (or this) table.

Figure 39 Plot of Incident of HIV Positive Tests in Canada by Gender



Now the data presented above represents HIV positive tests, and is not necessarily equivalent to the incidence of new HIV infections (because some may have been infected years earlier and just got tested, and others will have become infected in the year but not be tested). The only way to estimate the underlying newly HIV infected incidence rate is through epidemiological modelling. This has been done for the Canadian population, first in a 2003 Canadian Communicable Disease Report (CCDR, 2003) and later by Boulous et al (2006). These estimates, along with the positive test figures, are presented in Table 33.

Table 33 Yearly Estimates of New HIV Cases for Canada.

	Year		
Source	1999	2002	2005
CCDR 2003	3,310-5,150	2,800-5,200	
mid point	*4,230*	*4,000*	
Boulous et al (2006)		2,100-4,000	2,300-4,500
mid point		*3,050*	*3,400*
Positive HIV tests	2,197	2,471	2,501

Both reports present an upper and lower range but no single point estimate[45] (the mid point is our calculation). As would be anticipated the estimated yearly incidence rates are higher than the observed positive test rates. However, there is a large discrepancy in 2002, the year the estimates overlap (by about 25% or 33% depending on which report one wants to use as the denominator). The method of estimation differs between the two reports, and data would be refined over time, so some differences would be expected, but the size of the difference does seem to be rather large.

11.1.2 Age Specific Incidence

The age specific incidence of positive HIV tests (based on data from PHAC, 2008, tables 4a through 4c) is presented in Table 34. Differences between males and females start to appear in the 20-29 age group (see Figure 40). Over the six years presented there has been a reduction in the male 30-39 rate (Figure 41) over the last three years. And while it is difficult to make out in the figure, there has been a small but consistent increase in the male 50+ rates. No consistent pattern seems to exist with the female rates.

Table 34 Age Specific Incidence of HIV Positive Tests in Canada by Gender

		Number of Positive Tests Reported						Rate in Positive Tests per 100,000					
Gender		2002	2003	2004	2005	2006	2007	2002	2003	2004	2005	2006	2007
M & F	15-19	34	26	43	35	47	39	1.6	1.2	2.0	1.6	2.1	1.8
	20-29	479	482	485	495	530	483	11.3	11.2	11.1	11.2	11.9	10.7
	30-39	964	945	916	866	865	800	20.0	20.1	19.7	18.9	18.3	16.7
	40-49	661	705	717	726	725	693	12.9	13.5	13.5	13.5	13.5	12.8
	50+	282	287	325	334	352	379	3.1	3.0	3.3	3.3	3.5	3.7
	Age unk	*37*	*28*	*23*	*18*	*19*	*20*						
	Total	2,457	2,473	2,509	2,474	2,538	2,414	9.6	9.6	9.6	9.3	9.5	8.9
Male	15-19	9	13	16	18	17	17	0.8	1.2	1.5	1.6	1.5	1.5
	20-29	302	284	284	322	320	314	14.0	13.0	12.7	14.3	14.1	13.7
	30-39	713	692	690	644	597	571	29.4	29.2	29.5	27.9	25.1	23.7
	40-49	536	581	574	566	580	564	20.9	22.2	21.6	21.1	21.6	20.8
	50+	232	249	263	273	289	316	5.4	5.6	5.8	5.8	6.1	6.6
	Age unk	*18*	*7*	*11*	*6*	*13*	*9*						
	Total	1,810	1,826	1,838	1,829	1,816	1,791	14.4	14.4	14.3	14.0	13.8	13.5
Female	15-19	25	13	27	17	29	22	2.4	1.3	2.6	1.6	2.7	2.0
	20-29	175	198	198	168	208	166	8.4	9.4	9.2	7.7	9.5	7.5
	30-39	243	251	223	218	262	223	10.2	10.7	9.7	9.6	11.2	9.4
	40-49	122	123	140	157	139	121	4.7	4.7	5.3	5.9	5.2	4.5
	50+	50	37	61	61	61	60	1.0	0.7	1.2	1.1	1.1	1.1
	Age unk	*2*	*4*	*2*	*2*	*0*	*2*						
	Total	617	626	651	623	699	594	4.8	4.8	4.9	4.6	5.1	4.3

Note: Unknown Age totals differ because some genders are unknown too

[45] Probably to discourage people from doing what we are doing here – presenting a single number as the estimate of the incident cases.

Figure 40 Age Specific HIV Incidence by Gender (2007)

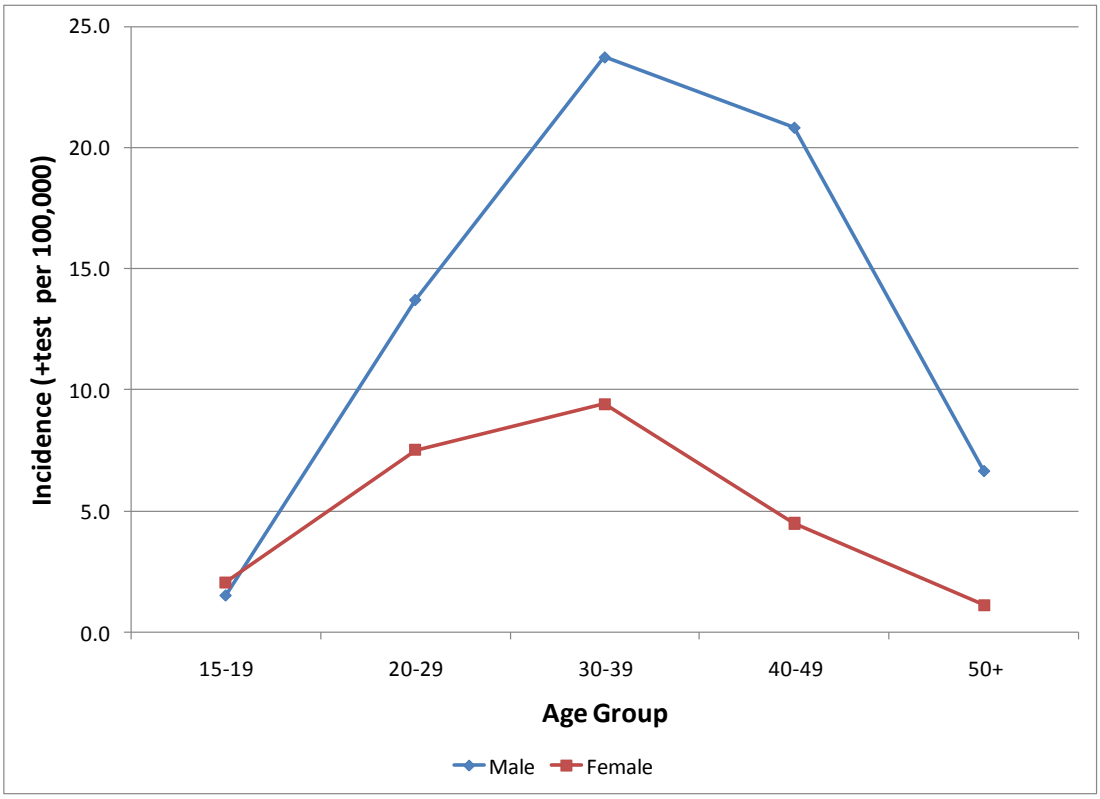
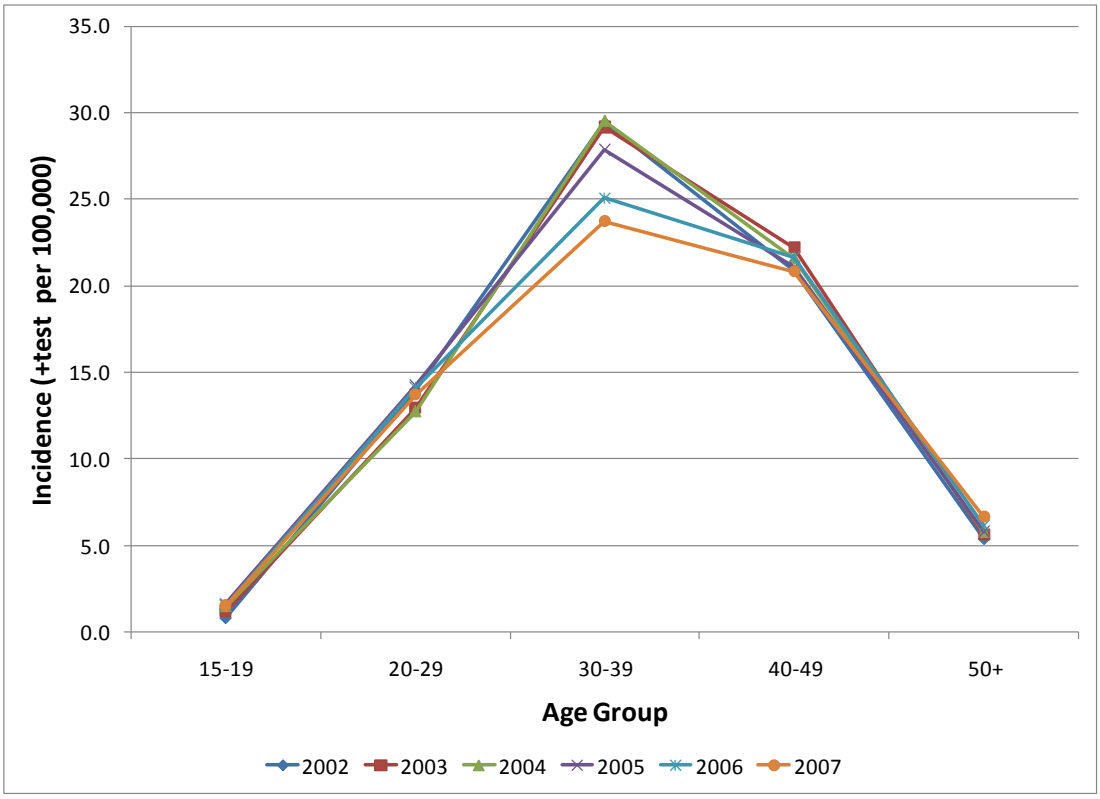


Figure 41 Age Specific HIV Incidence Over Time for Males



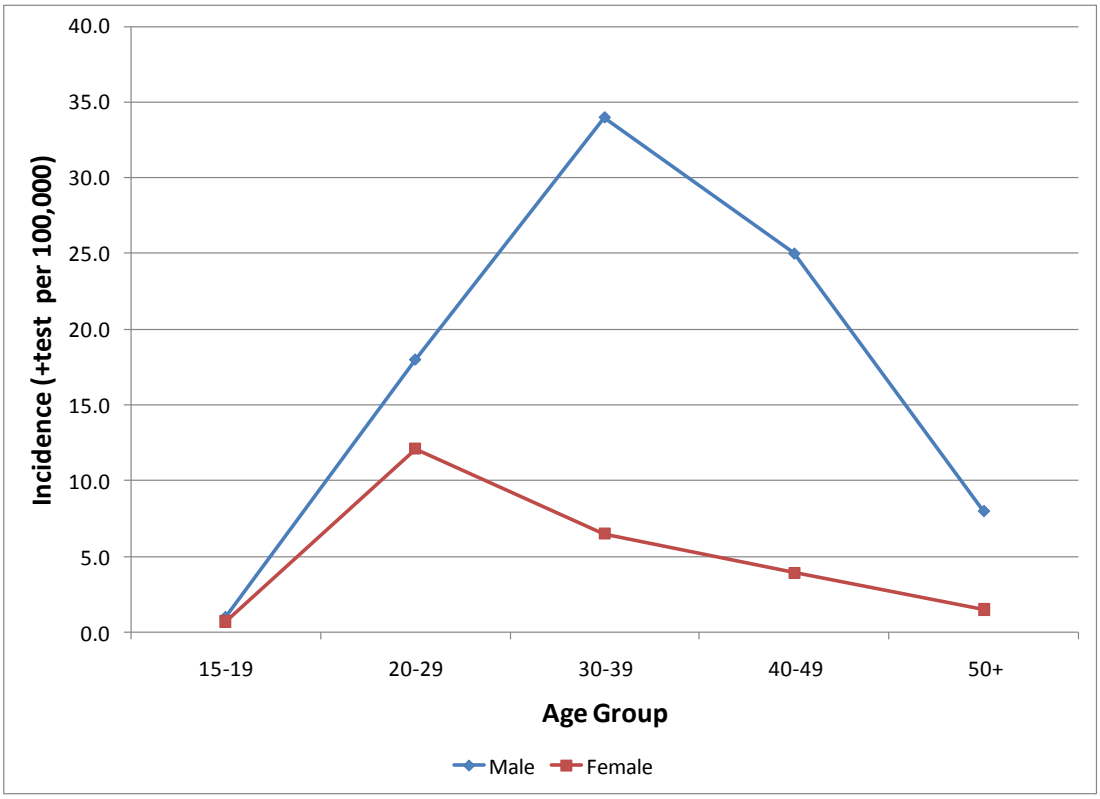
The BC Centre for Disease Control also reports on HIV and AIDS for the province of BC[46]. HIV positive test rates from the 2008 report are presented in Table 35. The BC distributions are similar in shape to the overall Canadian distributions (see Figure 42, which can be compared to Figure 40) but the overall and male rates tend to be higher, while the female rates slightly lower. But this trend is not consistent over the period (e.g., in 2006 all the BC rates are lower).

Table 35 Age Specific Incidence of HIV Positive Tests in BC by Gender

		Rate in Positive Tests per 100,000						
Gender		2002	2003	2004	2005	2006	2007	2008
M & F	15-19	2.0	1.0	2.0	2.0	2.0	1.0	0.0
	20-29	12.0	13.0	14.0	10.0	13.0	15.0	12.0
	30-39	25.0	22.0	22.0	21.0	18.0	20.0	16.0
	40-49	18.0	17.0	21.0	19.0	13.0	15.0	15.0
	50+	5.0	6.0	5.0	5.0	5.0	4.0	4.0
	Total	10.2	9.9	10.6	9.5	8.5	9.0	8.0
Male	15-19	1.0	1.0	1.0	1.0	2.0	1.0	1.0
	20-29	17.0	16.0	17.0	14.0	18.0	18.0	19.0
	30-39	39.0	34.0	33.0	37.0	29.0	34.0	27.0
	40-49	31.0	29.0	35.0	31.0	23.0	25.0	25.0
	50+	10.0	11.0	10.0	9.0	9.0	8.0	8.0
	Total	16.7	15.7	16.3	15.4	13.7	14.1	13.3
Female	15-19	2.9	1.5	2.2	2.2	1.5	0.7	
	20-29	8.2	9.5	10.4	6.3	8.5	12.1	4.9
	30-39	11.0	10.6	12.4	6.2	7.5	6.5	4.2
	40-49	4.4	5.4	7.3	7.0	3.1	3.9	5.6
	50+	0.5	1.2	0.7	1.5	1.3	1.5	1.1
	Total	3.9	4.3	5.0	3.6	3.4	3.8	2.7

[46] The data reported here are used in the PHAC report (which should be a rollup of similar provincial reports), and both reports have the same limitations in terms of what they report.

Figure 42 Age Specific HIV Incidence by Gender for BC (2007)



11.2 Prevalence

The total number of individuals living with HIV at a point in time includes those who have developed AIDS. With treatments now available (since around the mid 1990's) for AIDS one would expect the prevalence to increase over time, not because the incidence is increasing but because survival time with AIDS is increasing. We start with the same two reports described above (CCDR, 2003; Boulous et al 2006) that estimated the incidence of HIV, as both provide estimates of prevalent HIV/AIDS cases, along with an earlier report (Albert and Williams, 1998) that provided estimates for 1996 (Table 36). Note that here all reports provided the estimates of the number of cases.

Table 36 Prevalence Estimates of HIV/AIDS Cases for Canada.

	Year			
Source	1996	1999	2002	2005
Albert et al (1998)	35,700-41,900			
est #	38,900			
CCDR 2003		45,000-54,600	46,000-66,000	
est #		49,800	56,000	
Boulous et al (2006)			41,000-59,000	48,000-68,000
est #			50,000	58,000
Rate per 100,000				
Albert	131			
CCDR 2003		164	179	
Boulous			159	180

As with the incidence, the two models that overlap produce different estimates although the percentage difference is much smaller (11-12%). The rates reported in the table are our calculations. The prevalence does appear to be increasing.

HIV/AIDS is much more prevalent in certain subgroups, and attention tends to focus on these groups, meaning overall prevalence is of limited interest to most authors. The 2005 rate in the above table (180/100,000) works out to 0.18%, and is a rate for the population of Canada as a whole. This is much lower than the overall prevalence rate of 1.21% estimated by McInnes et al (2009) for the city of Vancouver in the year 2006. While Vancouver may be atypical in terms of its overall population makeup (especially in terms of high risk groups) compared to the rest of Canada they also present an estimated prevalence rate of 0.09% for the Vancouver population with high risk populations removed[47]. Based on the tabulated information in Boulous et al (2006) it is possible to remove their high risk groups, resulting in a non high risk population prevalence estimate of 0.05% for the Canadian population. These estimates differ by almost a factor of 2. Another estimate of the overall HIV/AIDS prevalence in Canada is available from the CIA fact book[48], which provides an estimate of 73,000 people living with HIV/AIDS in 2007 (a rate of 0.3%), which is in the same general region as the other estimates.

[47] They separated out men who have sex with men, injection drug users, and females sex workers.

[48] See (October, 2009) https://www.cia.gov/library/publications/the-world-factbook/fields/2156.html?countryName=&countryCode=&regionCode=T.

It should be noted however, that the McInnes et al (2009) estimates showed males to be at about 3 times the prevalence of females, similar to the incidence ratios described above.

In the United States, the Center for Disease Control estimates that the prevalence for HIV/AIDS in the US is 447.8 per 100,000 population (0.45%)[49], again a figure close to the Canadian ones cited above.

11.3 Mortality

Canada wide mortality attributed to HIV infections is reported by PHAC (2007) and is presented in Table 37. Figure 43 presents a plot of the number of deaths along with the percent that were male, and Figure 44 presents our calculations of the crude death rates based on the adult population of Canada (since 1991).

Table 37 Deaths Attributable to HIV Infections in Canada (PHAC, 2007)

	Number of Deaths		
Year	Male	Female	Total
1987	486	32	518
1988	611	44	655
1989	793	52	845
1990	934	44	978
1991	1,102	61	1,163
1992	1,284	66	1,350
1993	1,465	88	1,553
1994	1,485	125	1,610
1995	1,628	122	1,750
1996	1,192	106	1,298
1997	550	71	621
1998	414	70	484
1999	364	66	430
2000	428	81	509
2001	369	66	435
2002	343	61	404
2003	373	67	440
2004	344	75	419
Total	14,165	1,297	15,462

[49] See (October 2009) http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5739a2.htm.

Figure 43 Plot of Data from Table 37

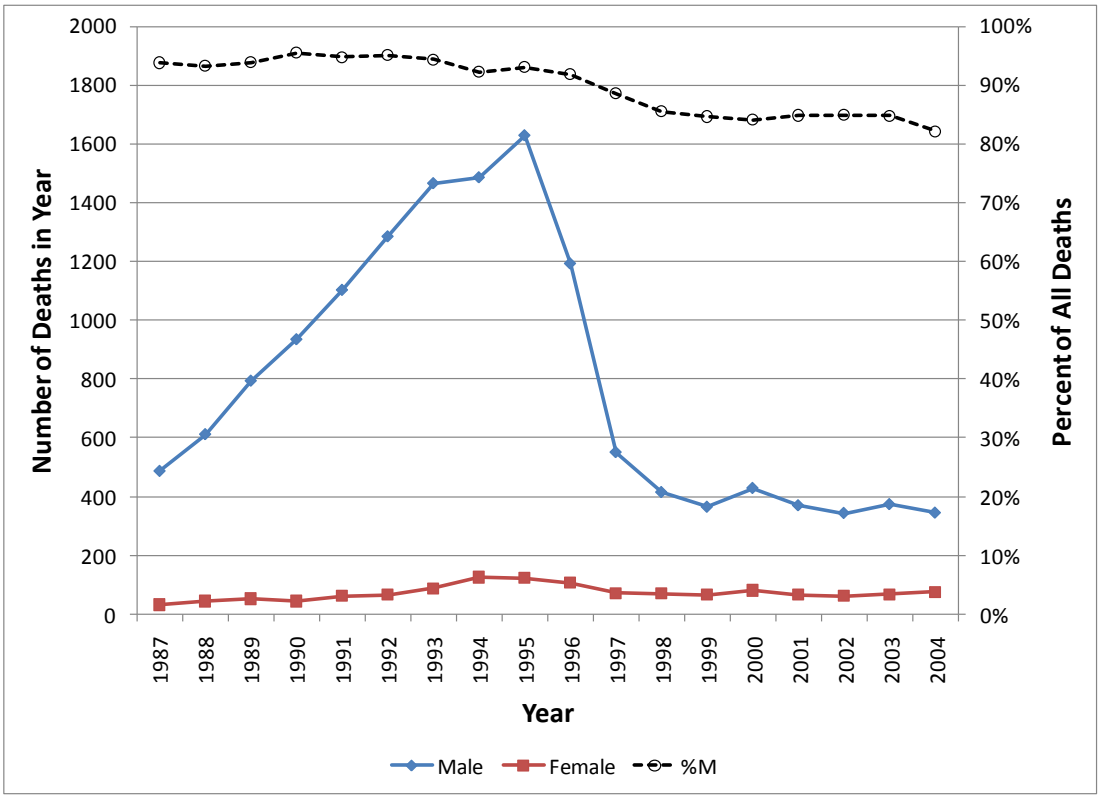
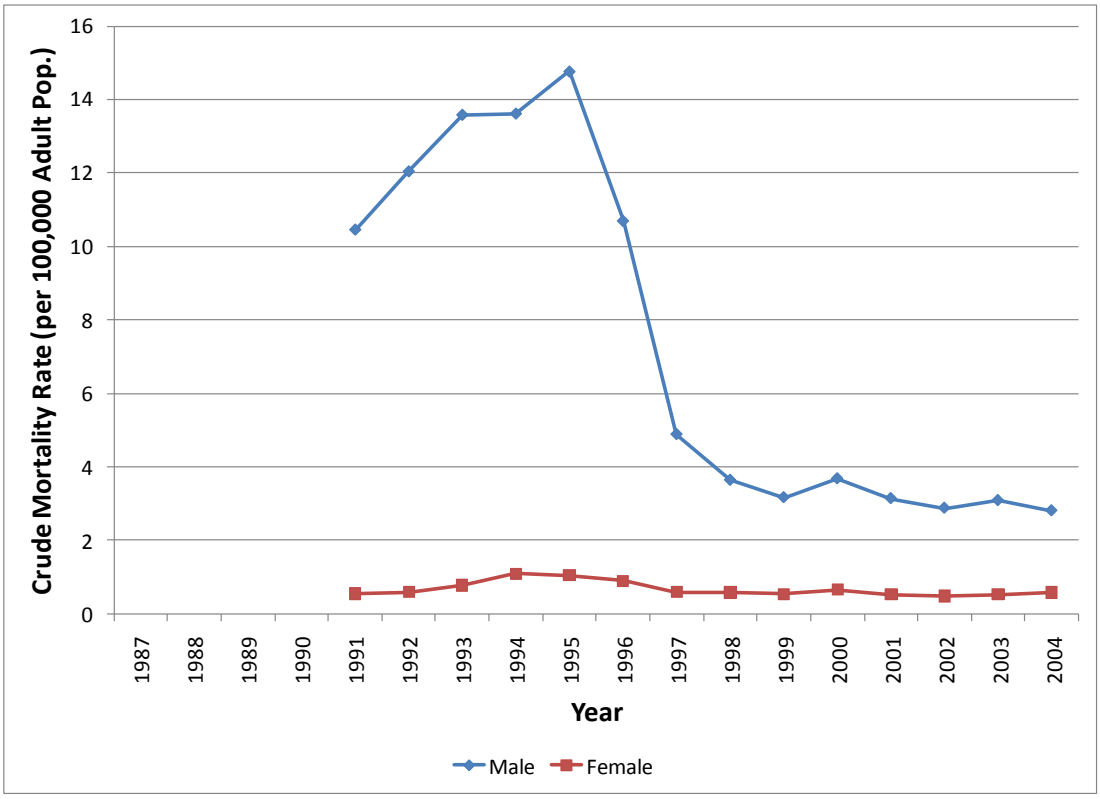


Figure 44 Crude HIV Associated Death Rates



Total deaths peaked in 1995 (although the peak for women was in 1994). Since that time deaths have dropped by over 50% (see Schanzer, 2003). Note the female rate has dropped by over 40%, although it might be hard to determine from the figure.

HIV related mortality data is available from BC Vital Statistics reports. Figure 45 (females) and Figure 46 (males) plots the mortality rates for selected years (note the male Y axis is scaled 10x the female Y axis). The female numbers are small, and it is hard to discern a definite pattern from the plot. For males the plot clearly reflects the changing death rates over time described above and seems to indicate a shift in the peak age of mortality to an older age group over the years.

Figure 45 Age Specific HIV BC Mortality for Females for Selected Years

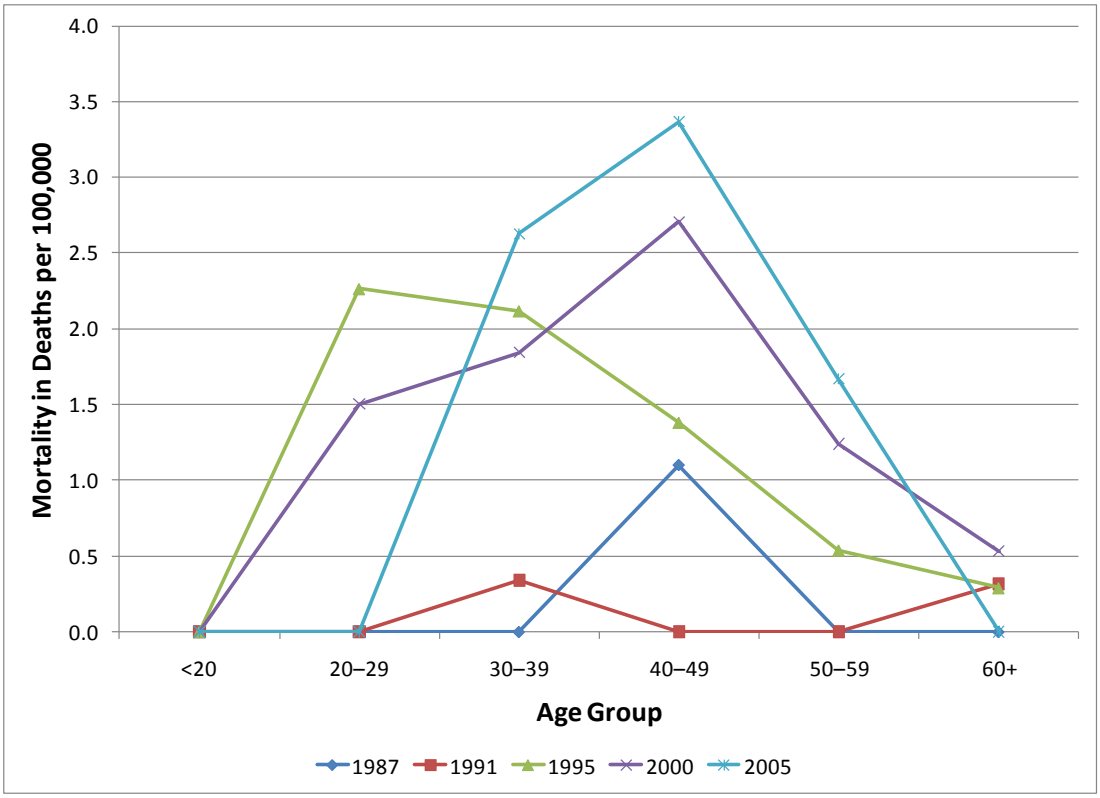
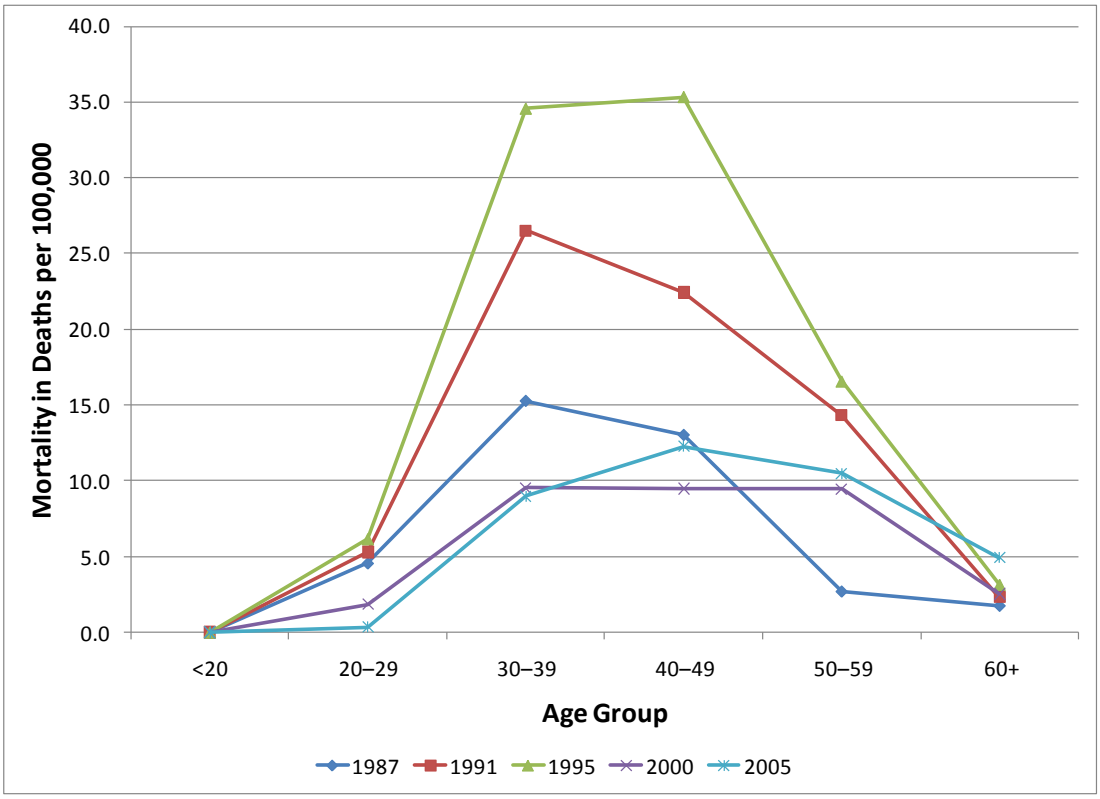


Figure 46 Age Specific HIV BC Mortality for Males for Selected Years



11.4 Potential years of life lost

As might be expected from the mortality data, the potential years of life lost due to HIV infection will vary depending on what years one was looking at.

The January 2005 version of health reports presents tables that allow for a comparison (based on 2001 data). For Canada as a whole the PYLL for men from AIDS was estimated as 169/100,000 (95% CI 168 to 170). All cause PYLL was estimated as 6,935/100,000 (95% CI 6928 to 6943). Hence AIDS contributes about 2.4% to the total men's PYLL due to all causes of death. Data is available for BC itself. The all cause related PYLL for BC was reported as 7,134/100,000 (7113 to 7155) and the AIDS specific figure as 246/100,000 (242 to 250). Thus the BC proportion is 3.4%, higher than the Canadian value.

11.5 Impact on BC

Based on the information above it is possible to estimate the number of male HIV/AIDS cases in BC. Note that the prevalence information is based on

proportioning out the cases based on percentages in age groups not actual prevalence data. The estimates are presented in Table 38.

Table 38 Estimated HIV/AIDS Values for Males in BC in 2009 and 2014

	BC Population		# new (Incident) Cases		# Deaths		Prevalent Cases	
Age	2009	2014	2009	2014	2009	2014	2009	2014
00-19	489,035	483,204	1	1	0	0	3	3
20-29	315,852	315,866	43	43	2	2	474	474
30-39	304,217	334,215	84	92	25	28	1,376	1,512
40-49	348,793	337,828	75	72	35	34	892	864
50-59	327,906	364,116	19	21	30	33	309	343
60-69	223,546	277,099	13	16	8	9	93	115
70-79	132,679	151,534	8	9	4	5	11	13
80+	72,247	85,554	4	5	2	3	3	4
Total	2,214,275	2,349,416	246	259	107	115	3,162	3,328

This calculation suggests that in the year 2009 BC would expect to see 250 new HIV cases and have 3,200 male HIV/AIDS cases, with the age group with the highest count being in the 30-39 age range. This would rise slightly to 3,300 in 2014, with the highest number of cases still in the 30-39 range. About 110 individuals would die of AIDS in the year. It should be noted that the prevalence calculations rest heavily on the overall prevalence estimates described above, and modern treatment regimes seem to be increasing the survival period (which could increase prevalence). Indeed, the estimated number of prevalent cases here is less than that estimated by McInnes et al (2009) for the city of Vancouver.

11.6 BC Specific Data

BC mortality data is presented above and thus there are no further comparisons to be made here.

12 Summary of BC Results

12.1 Incidence, Prevalence, Mortality

In each of the above Chapters we have tried to prepare BC specific estimates based on the data reviewed (see subsections titled “Impact on BC”). This section attempts to combine these results in a variety of manners. The impact of condition depends on what is being examined, and it can be difficult to see the relative impact from separate analyses. For example, if the focus is on mortality then erectile dysfunction has zero impact – no one dies with this as a cause of death. Yet if you were interested in the number of men who might be suffering from one of the conditions examined here (without weighting the degree of suffering[50]) then the prevalence figures suggest erectile dysfunction is the biggest single problem. More men have this condition than any of the conditions examined here.

Putting the data from the different conditions together in some useful but not misleading way presents a variety of problems. We start with just a summary of the results from each section. Table 39 through Table 41 (and Figure 47 through Figure 49) present the summary tables and row percentages. The row percentages tell something about the relative importance of the condition for men in that age group. As can be seen most clearly from the plots, the impact of the conditions changes with ages, and clearly what one thinks is important will depend on the ages of interest and the measure being examined. The three plots look (and are) quite different from each other.

[50] One could imagine that having lung cancer is worse than erectile dysfunction if one had to compare the two, but here we are just treating them as counts. Weighting brings in a whole host of other issues.

Table 39 Summary of "Impact on BC" Calculations for Incidence Measure

Age	Prostate Cancer	Testicular Cancer	Lung Cancer	Erectile Dysfunction	Premature Ejaculation (XXX)	Alcohol Dependence	Suicide	MVA	CVD	Osteoporosis (XXX)	HIV/AIDS	TOTAL
00-19	1	5	1	0	0	518	40	3,547	0	0	1	4,111
20-29	0	28	1	1,175	0	6,025	63	3,242	472	0	43	11,007
30-39	1	32	5	2,641	0	4,016	71	2,085	909	0	84	9,760
40-49	85	20	50	4,325	0	1,934	95	2,188	1,563	0	75	10,261
50-59	698	12	223	8,099	0	1,818	82	1,563	6,950	0	19	19,445
60-69	1,393	4	535	9,042	0	885	41	850	8,061	0	13	20,811
70-79	977	2	642	13,082	0	525	26	466	9,616	0	8	25,335
80+	489	2	394	0	0	286	16	245	6,793	0	4	8,226
Total	3,644	104	1,851	38,364	0	16,007	435	14,186	34,364	0	246	108,956
Row Percent												
00-19	0%	0%	0%	0%	0%	13%	1%	86%	0%	0%	0%	100%
20-29	0%	0%	0%	11%	0%	55%	1%	29%	4%	0%	0%	100%
30-39	0%	0%	0%	27%	0%	41%	1%	21%	9%	0%	1%	100%
40-49	1%	0%	0%	42%	0%	19%	1%	21%	15%	0%	1%	100%
50-59	4%	0%	1%	42%	0%	9%	0%	8%	36%	0%	0%	100%
60-69	7%	0%	3%	43%	0%	4%	0%	4%	39%	0%	0%	100%
70-79	4%	0%	3%	52%	0%	2%	0%	2%	38%	0%	0%	100%
80+	6%	0%	5%	0%	0%	3%	0%	3%	83%	0%	0%	100%
Total	3%	0%	2%	35%	0%	15%	0%	13%	32%	0%	0%	100%

Note: Top part of the table contains the calculated cases (copied from previous sections), the bottom half contains row percentages (i.e., percent the condition contributes to the total number of cases for that age group). Conditions with "(XXX)" as part of the title have all 0 values.

Table 40 Summary of "Impact on BC" Calculations for Prevalence Measure

Age	Prostate Cancer	Testicular Cancer	Lung Cancer	Erectile Dysfunction	Premature Ejaculation	Alcohol Dependence	Suicide	MVA	CVD	Osteoporosis	HIV/AIDS	TOTAL
00-19	0	0	0	0	0	1,565	0	4,611	978	0	3	7,154
20-29	1	153	6	18,167	94,756	19,641	0	4,214	1,579	0	474	138,517
30-39	1	147	6	16,800	97,349	6,774	0	2,710	2,738	0	1,376	126,525
40-49	110	133	67	39,065	97,662	6,133	0	2,845	6,976	0	892	152,991
50-59	1,640	50	319	52,939	101,651	3,028	0	2,032	24,921	15,084	309	201,663
60-69	4,968	19	726	61,425	0	1,352	0	1,105	33,755	10,283	93	113,634
70-79	4,945	6	791	59,031	0	380	0	605	34,497	12,605	11	112,859
80+	2,538	5	393	31,861	0	207	0	318	20,301	15,027	3	70,650
Total	14,202	511	2,309	279,287	391,418	39,080	0	18,442	125,745	52,999	3,162	923,993
Row Percent												
00-19	0%	0%	0%	0%	0%	22%	0%	64%	14%	0%	0%	100%
20-29	0%	0%	0%	13%	68%	14%	0%	3%	1%	0%	0%	100%
30-39	0%	0%	0%	13%	77%	5%	0%	2%	2%	0%	1%	100%
40-49	0%	0%	0%	26%	64%	4%	0%	2%	5%	0%	1%	100%
50-59	1%	0%	0%	26%	50%	2%	0%	1%	12%	7%	0%	100%
60-69	4%	0%	1%	54%	0%	1%	0%	1%	30%	9%	0%	100%
70-79	4%	0%	1%	52%	0%	0%	0%	1%	31%	11%	0%	100%
80+	4%	0%	1%	45%	0%	0%	0%	0%	29%	21%	0%	100%
Total	2%	0%	0%	30%	42%	4%	0%	2%	14%	6%	0%	100%

Note: Top part of the table contains the calculated cases (copied from previous sections), the bottom half contains row percentages (i.e., percent the condition contributes to the total number of cases for that age group). Conditions with "(XXX)" as part of the title have all 0 values.

Table 41 Summary of "Impact on BC" Calculations for Mortality Measure

Age	Prostate Cancer	Testicular Cancer (XXX)	Lung Cancer	Erectile Dysfunction (XXX)	Premature Ejaculation (XXX)	Alcohol Dependence (XXX)	Suicide	MVA	CVD	Osteoporosis (XXX)	HIV/AIDS	TOTAL
00-19	0		0				40	64	0		0	104
20-29	0		1				63	63	6		2	133
30-39	0		3				71	43	22		25	140
40-49	1		37				95	42	142		35	318
50-59	17		168				82	38	469		30	773
60-69	73		422				41	26	957		8	1,519
70-79	190		583				26	17	1,658		4	2,472
80+	379		410				16	20	2,959		2	3,784
Total	659	4	1,624	0	0	0	435	313	6,213		107	9,248
Row Percent												
00-19	0%	0%	0%	0%	0%	0%	39%	61%	0%	0%	0%	100%
20-29	0%	0%	1%	0%	0%	0%	48%	48%	4%	0%	2%	100%
30-39	0%	0%	2%	0%	0%	0%	51%	31%	16%	0%	18%	100%
40-49	0%	0%	12%	0%	0%	0%	30%	13%	45%	0%	11%	100%
50-59	2%	0%	22%	0%	0%	0%	11%	5%	61%	0%	4%	100%
60-69	5%	0%	28%	0%	0%	0%	3%	2%	63%	0%	0%	100%
70-79	8%	0%	24%	0%	0%	0%	1%	1%	67%	0%	0%	100%
80+	10%	0%	11%	0%	0%	0%	0%	1%	78%	0%	0%	100%
Total	7%	0%	18%	0%	0%	0%	5%	3%	67%	0%	1%	100%

Note: Top part of the table contains the calculated cases (copied from previous sections), the bottom half contains row percentages (i.e., percent the condition contributes to the total number of cases for that age group). Conditions with “(XXX)” as part of the title have all 0 values.

Figure 47 Plot of the Percentages in the Incidence Summary Table

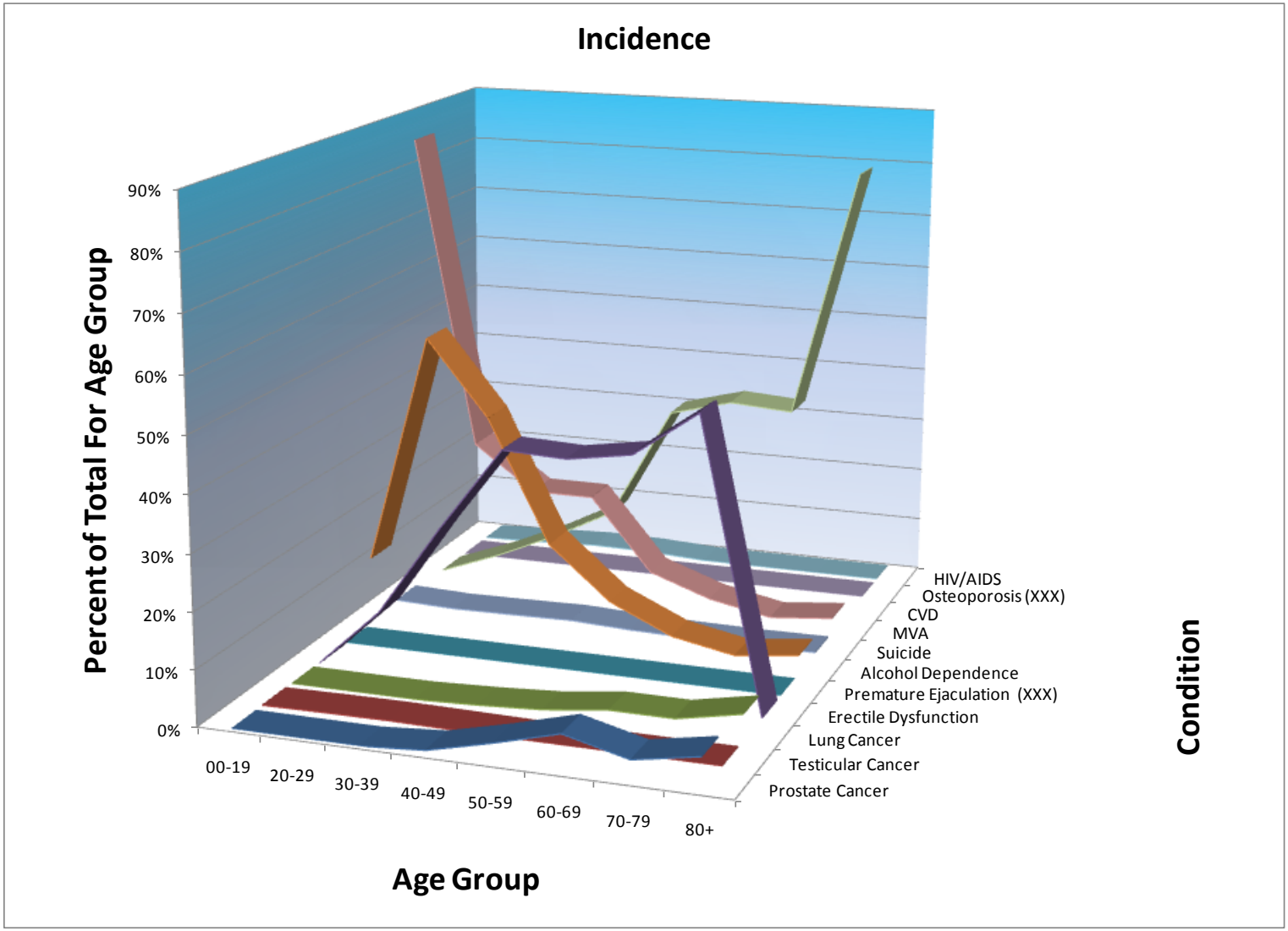


Figure 48 Plot of the Percentages in the Prevalence Summary Table

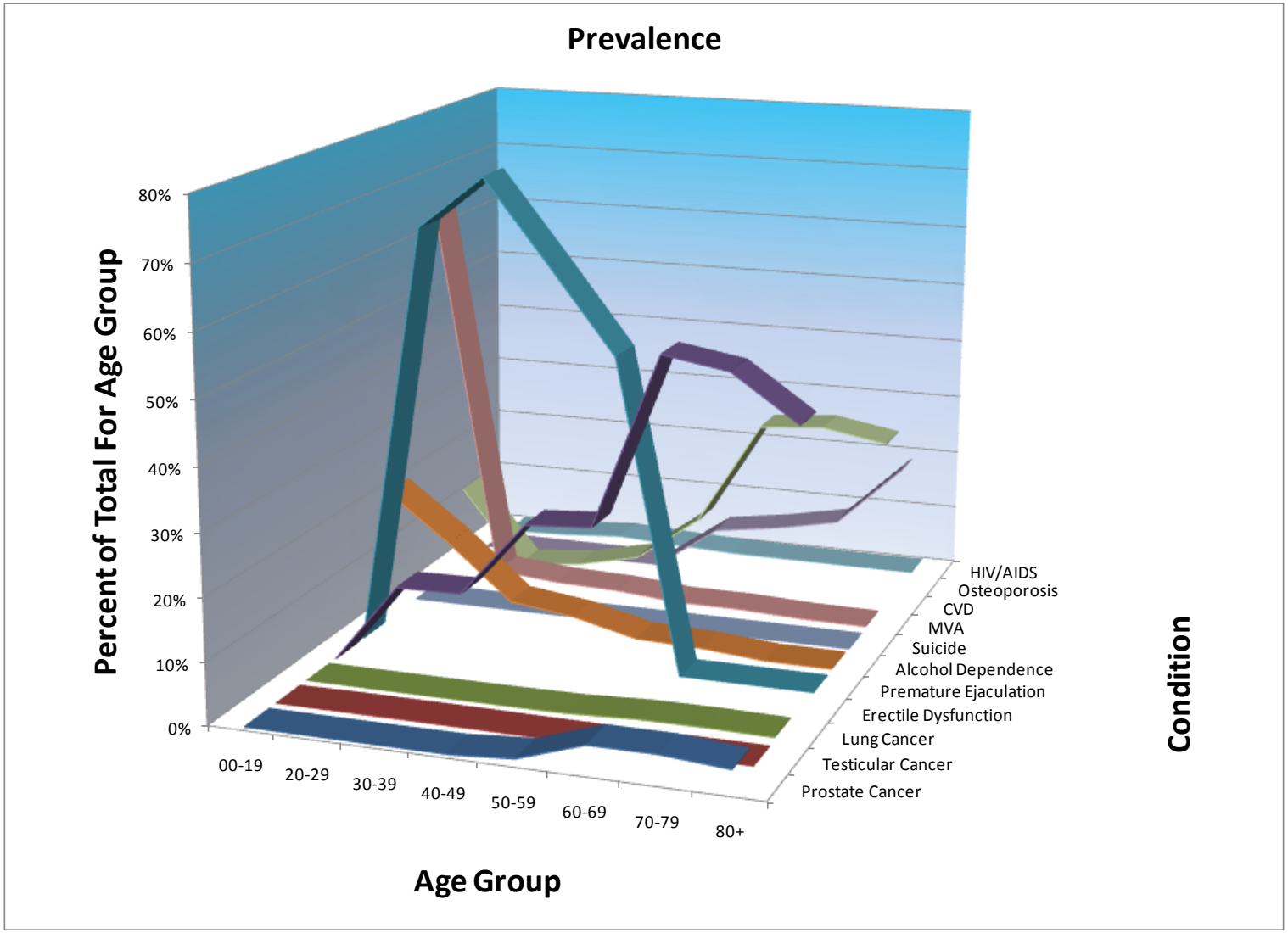
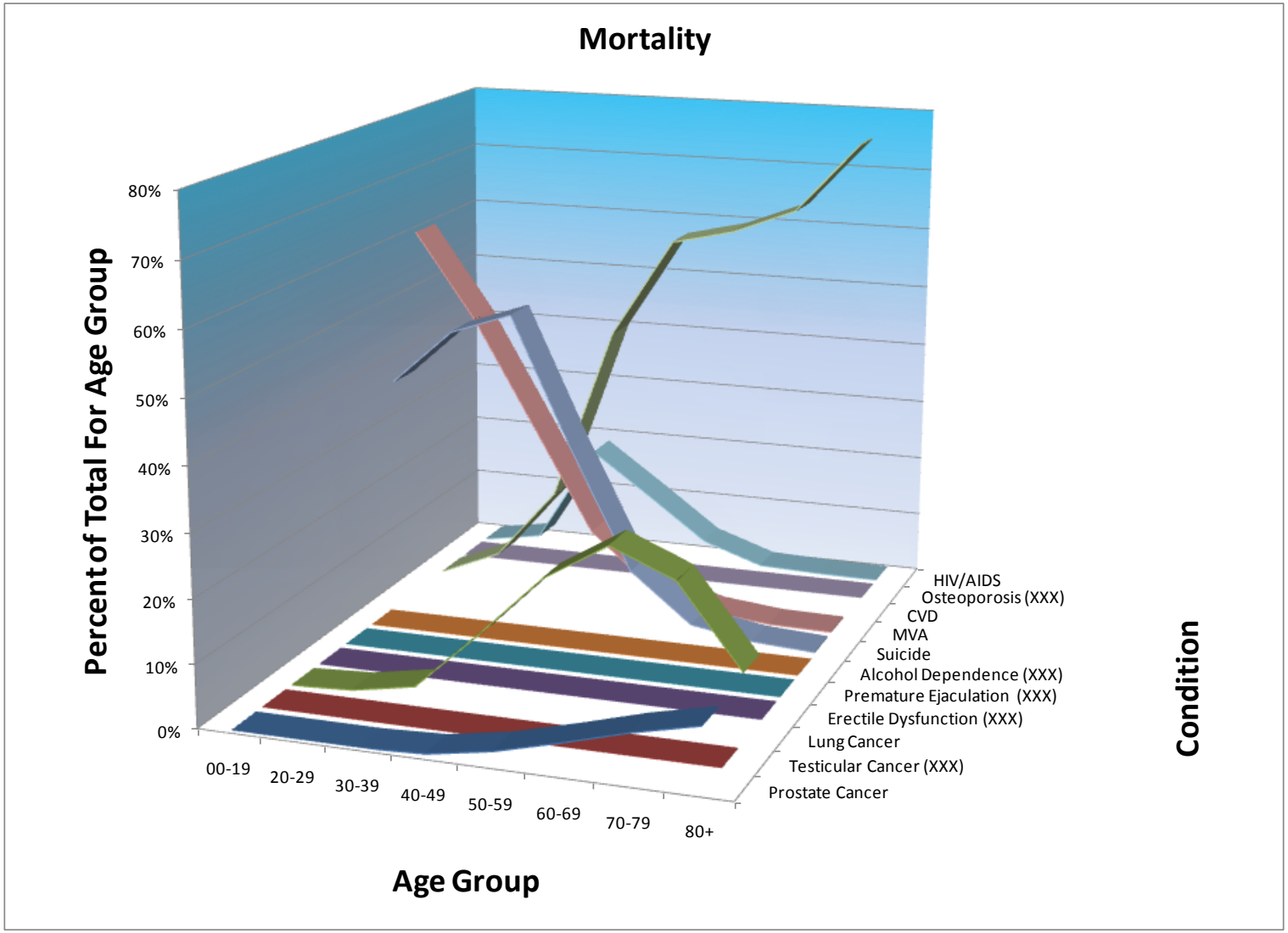


Figure 49 Plot of the Percentages in the Mortality Summary Table



While the above might help focus what should be concentrated upon from a public health perspective the reality is that different disciplines treat different conditions. So another question (or way of looking at the results) might be from the perspective of a condition, what seems to have the biggest impact, incidence, prevalence, or mortality? The following figures (Figure 50 through Figure 60) plot, for each condition, the incidence, prevalence, and mortality row percentages as calculated in Table 39, Table 40, and Table 41. Note that the scale of the Y axis changes from figure to figure.

Interpretation of the figures can be a bit tricky. For example the prostate figure is not saying more people die of prostate cancer at 80+ than have it (the prevalence measure). Rather it is saying that in the 80+ group mortality due to prostate cancer accounts for 10% of the mortality due to the conditions examined here (i.e., not 10% of all causes of death) and 6% of all the incident cases of the conditions examined here (which would likely involve more resources than prevalent cases).

Figure 50 Relative Contribution for Prostate Cancer

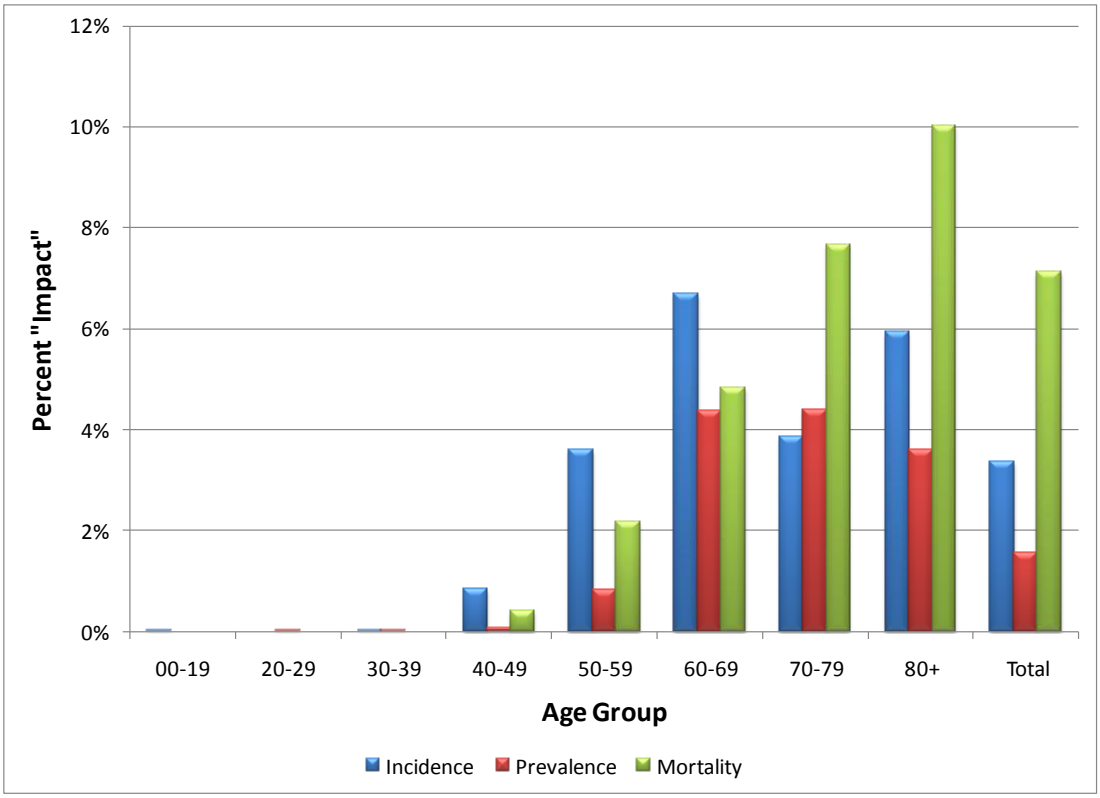


Figure 51 Relative Contribution for Testicular Cancer

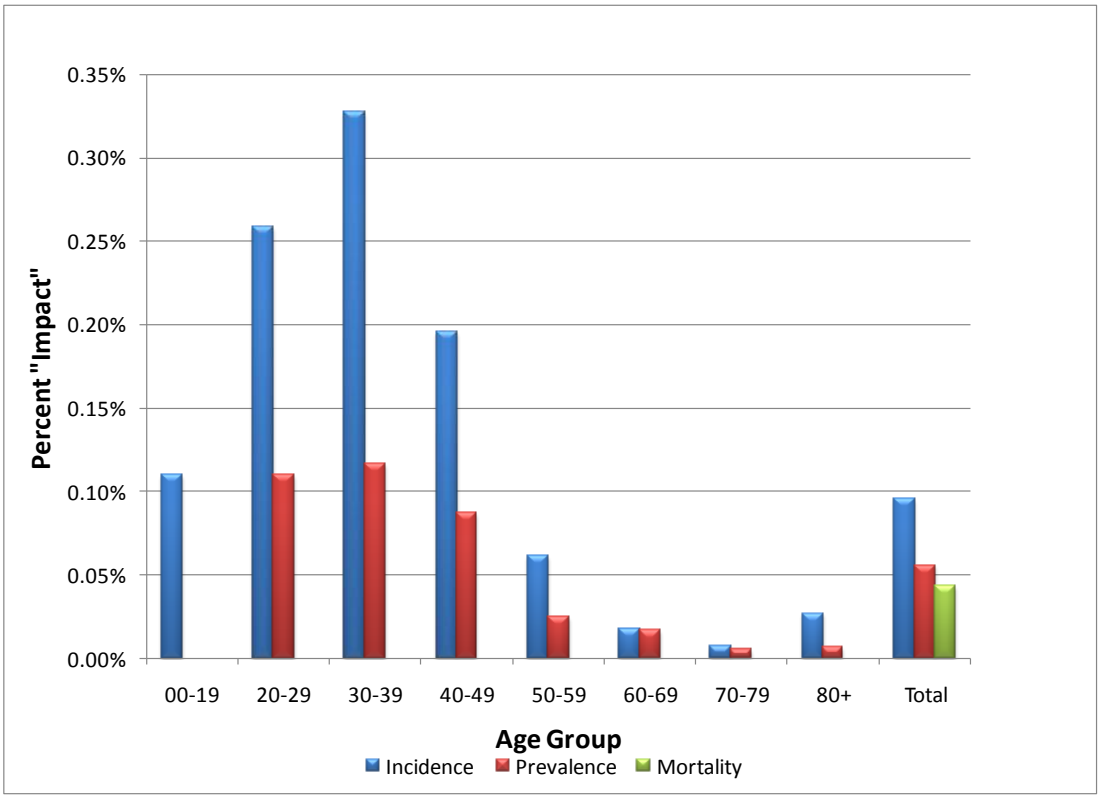


Figure 52 Relative Contribution for Lung Cancer

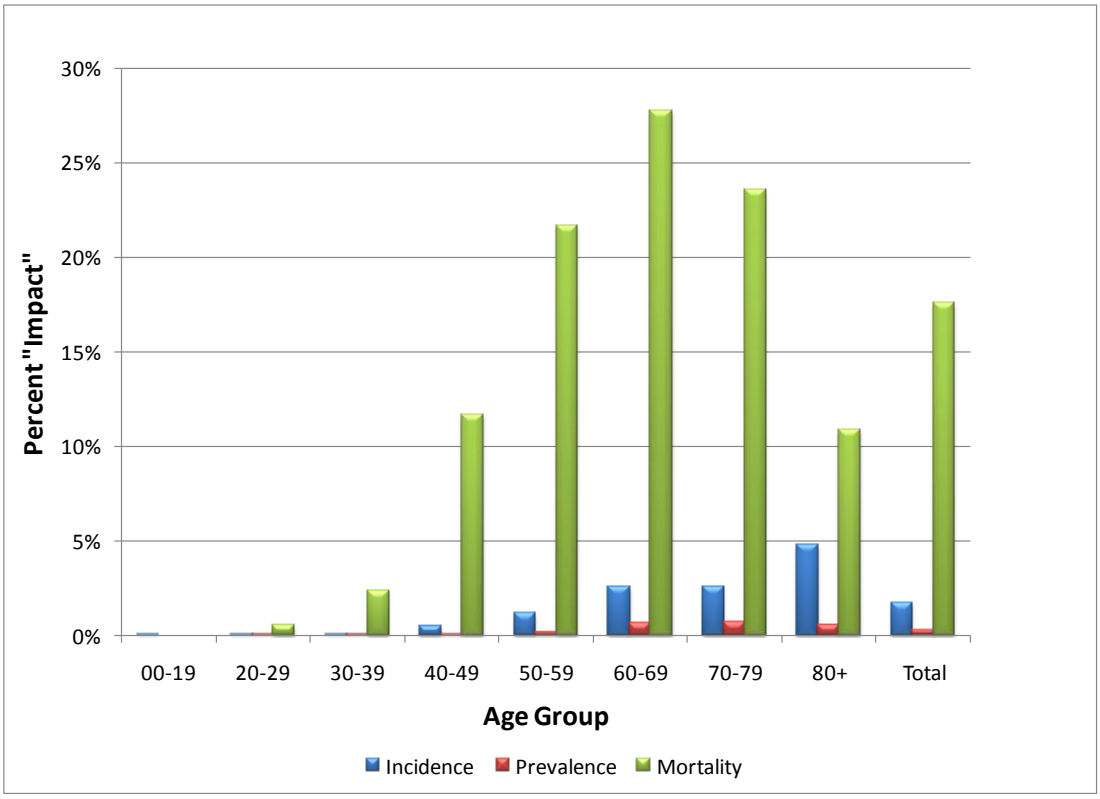


Figure 53 Relative Contribution for Erectile Dysfunction

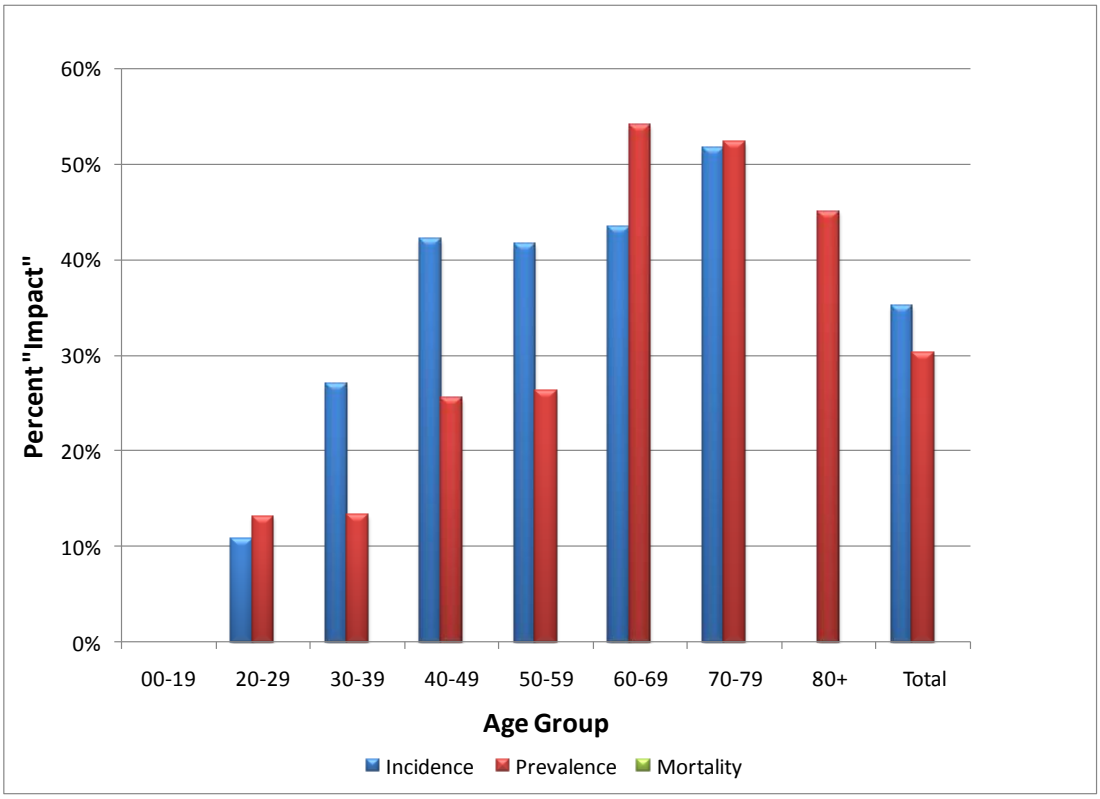


Figure 54 Relative Contribution for Premature Ejaculation

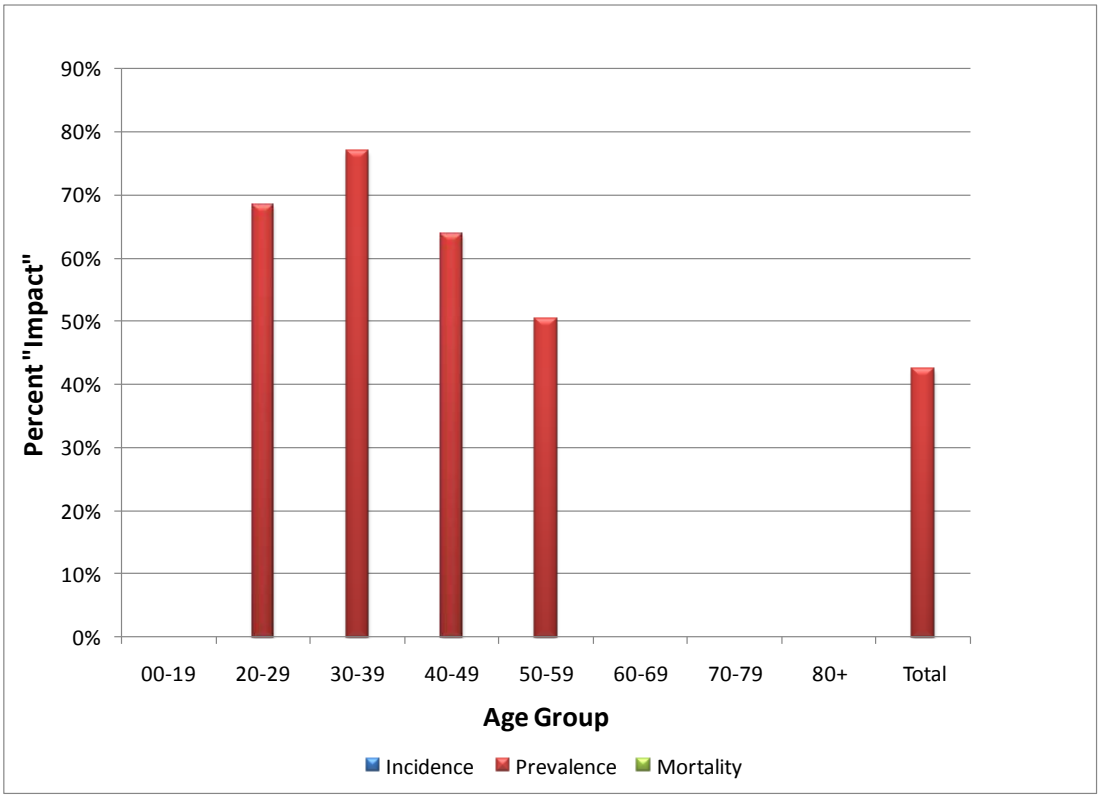


Figure 55 Relative Contribution for Alcohol Dependence

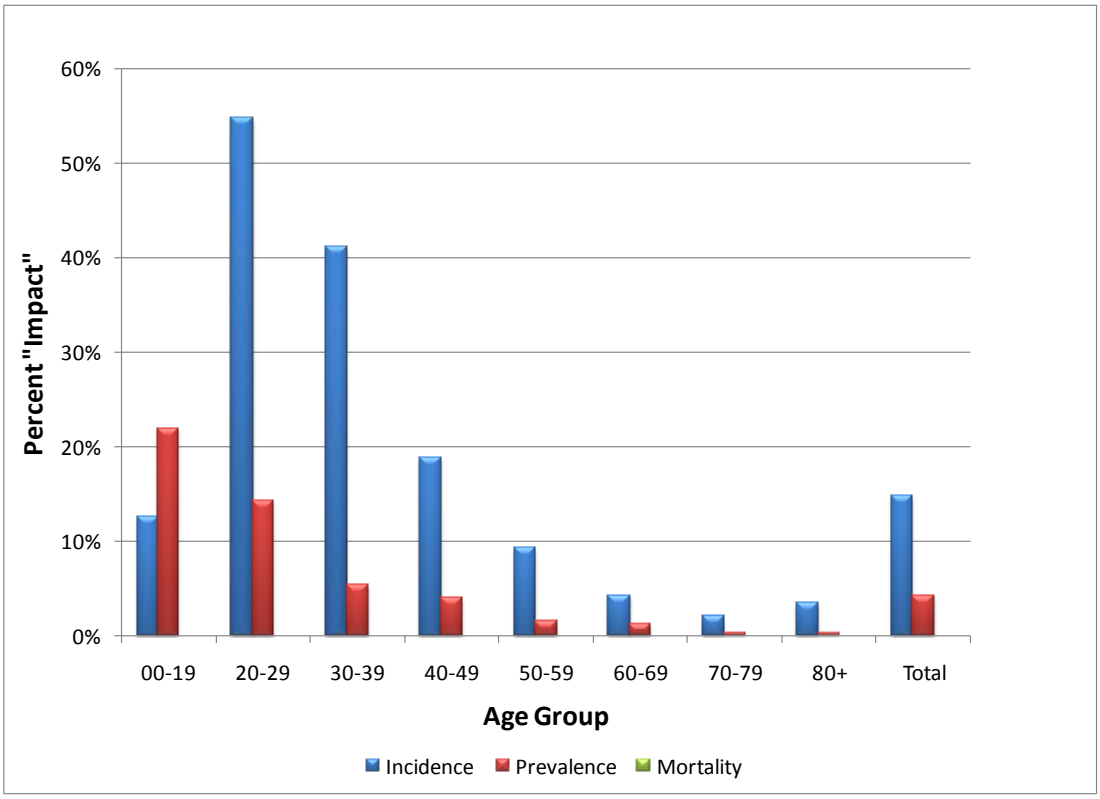


Figure 56 Relative Contribution for Suicide

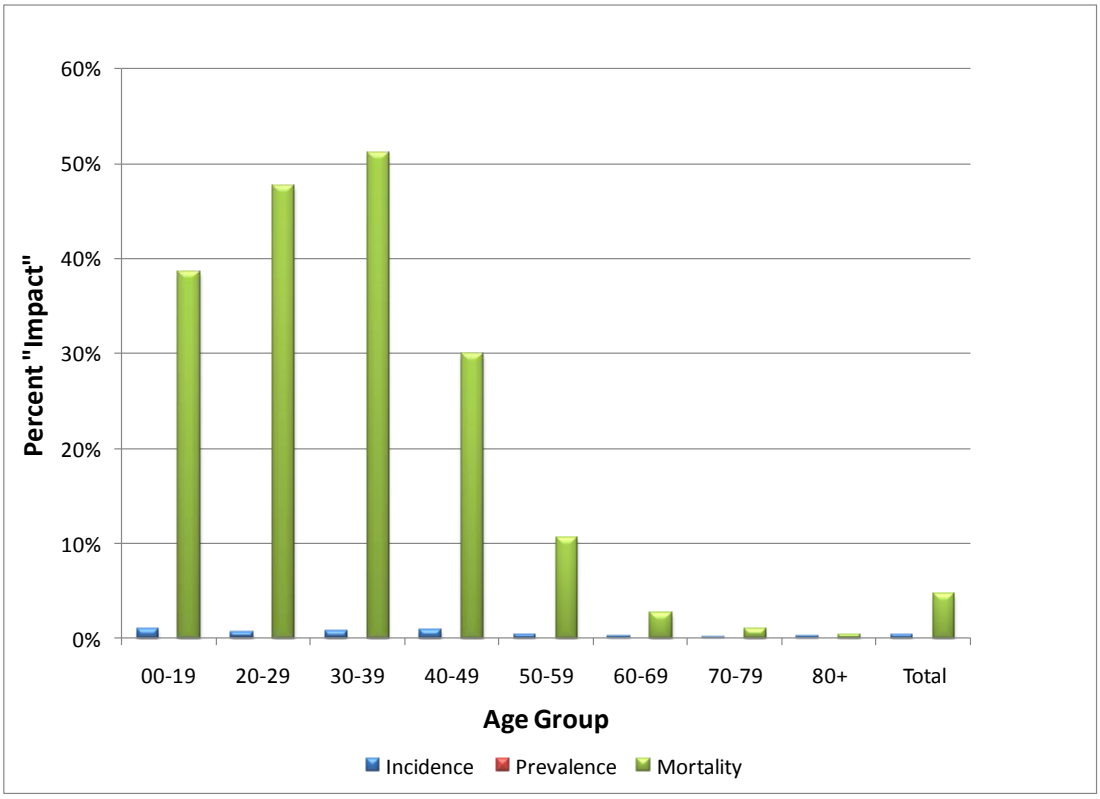


Figure 57 Relative Contribution for MVA

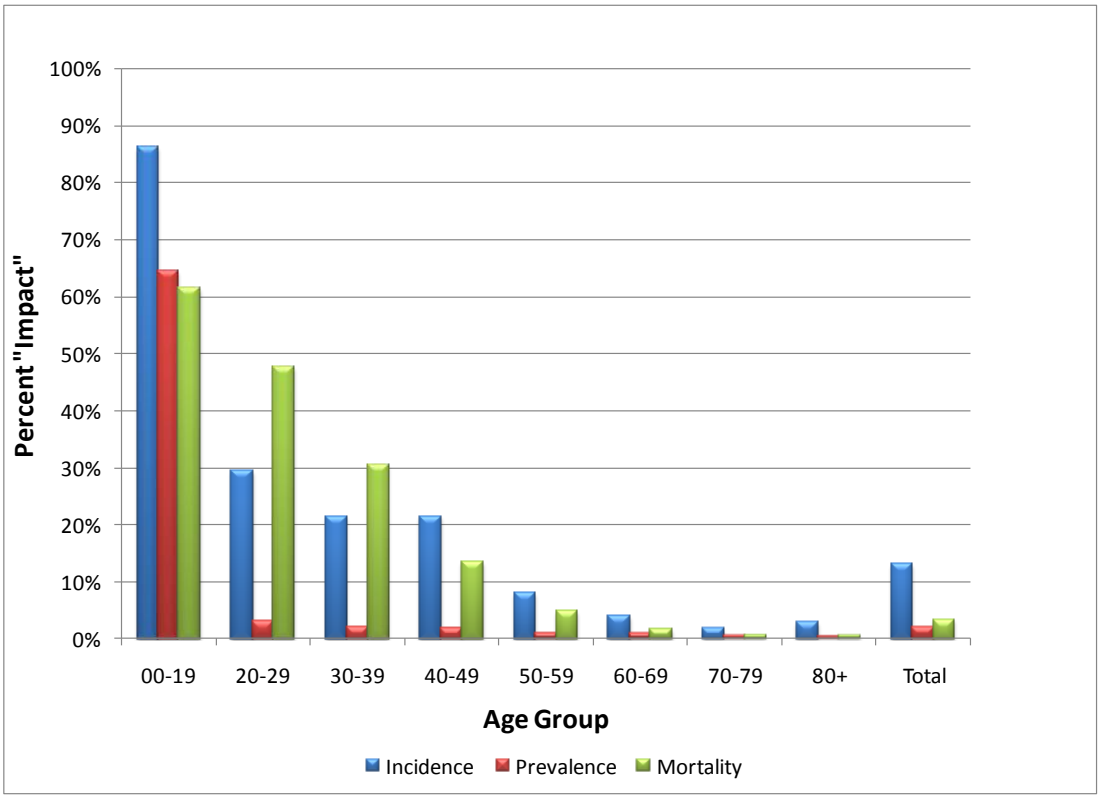


Figure 58 Relative Contribution for CVD

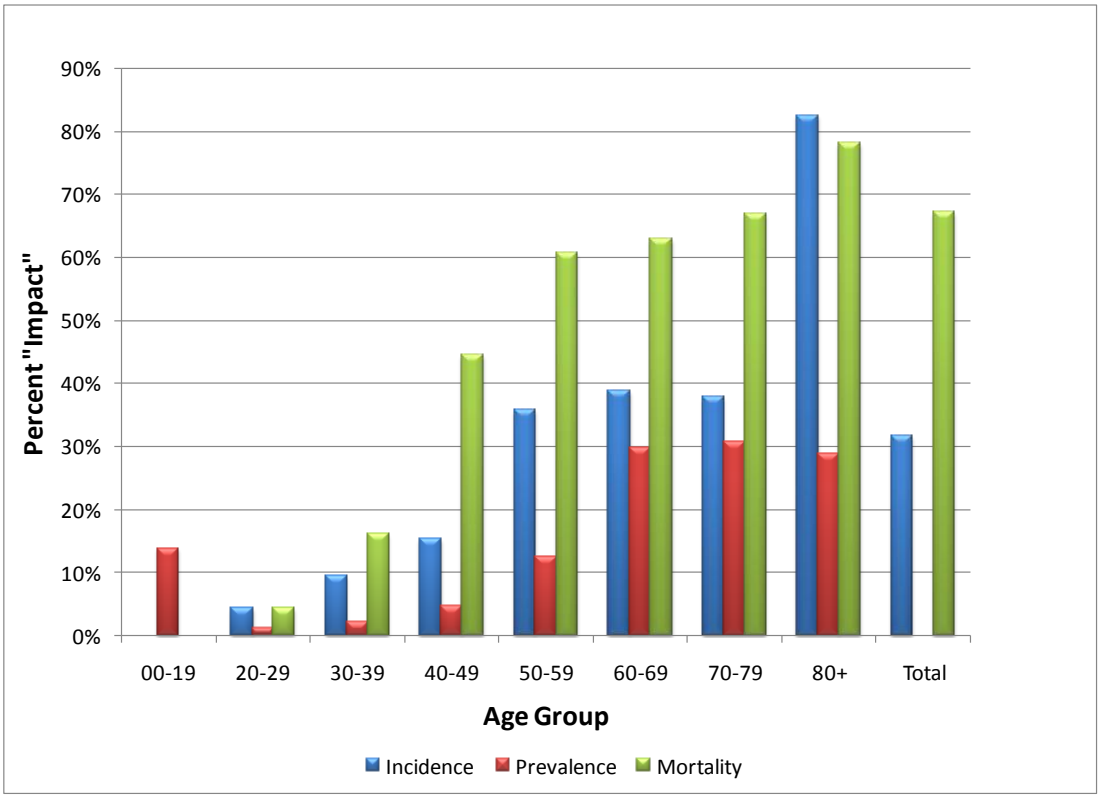


Figure 59 Relative Contribution for Osteoporosis

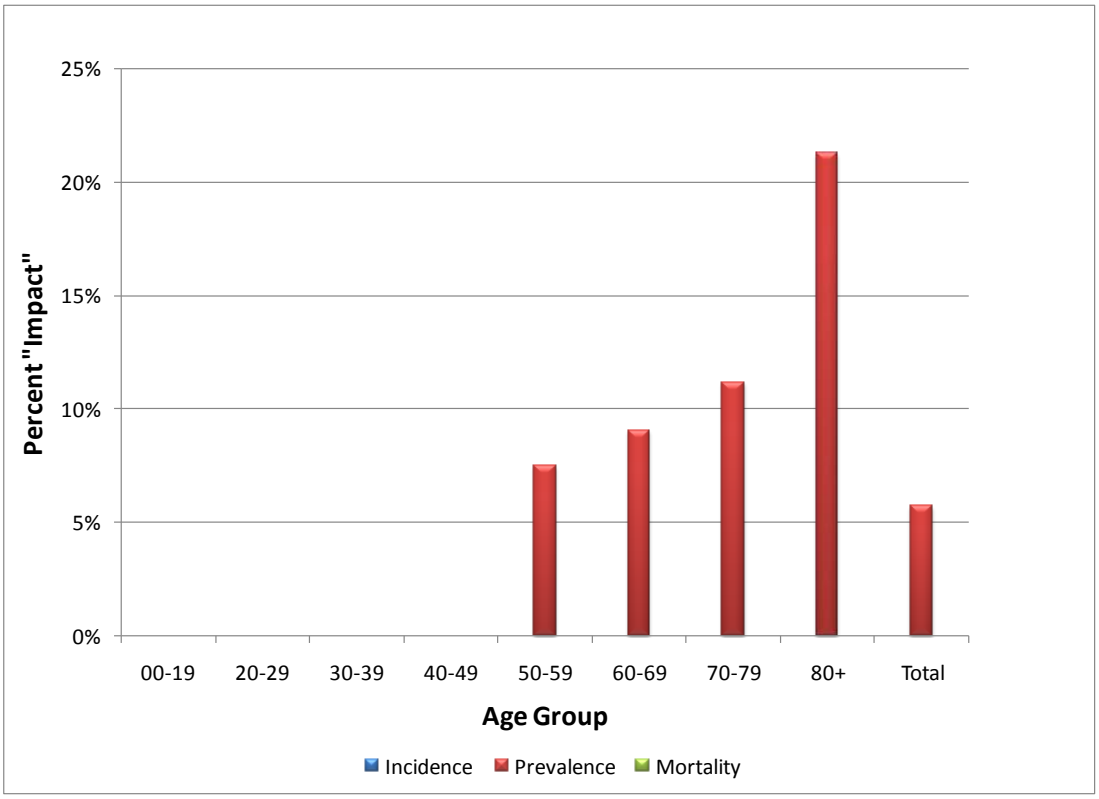
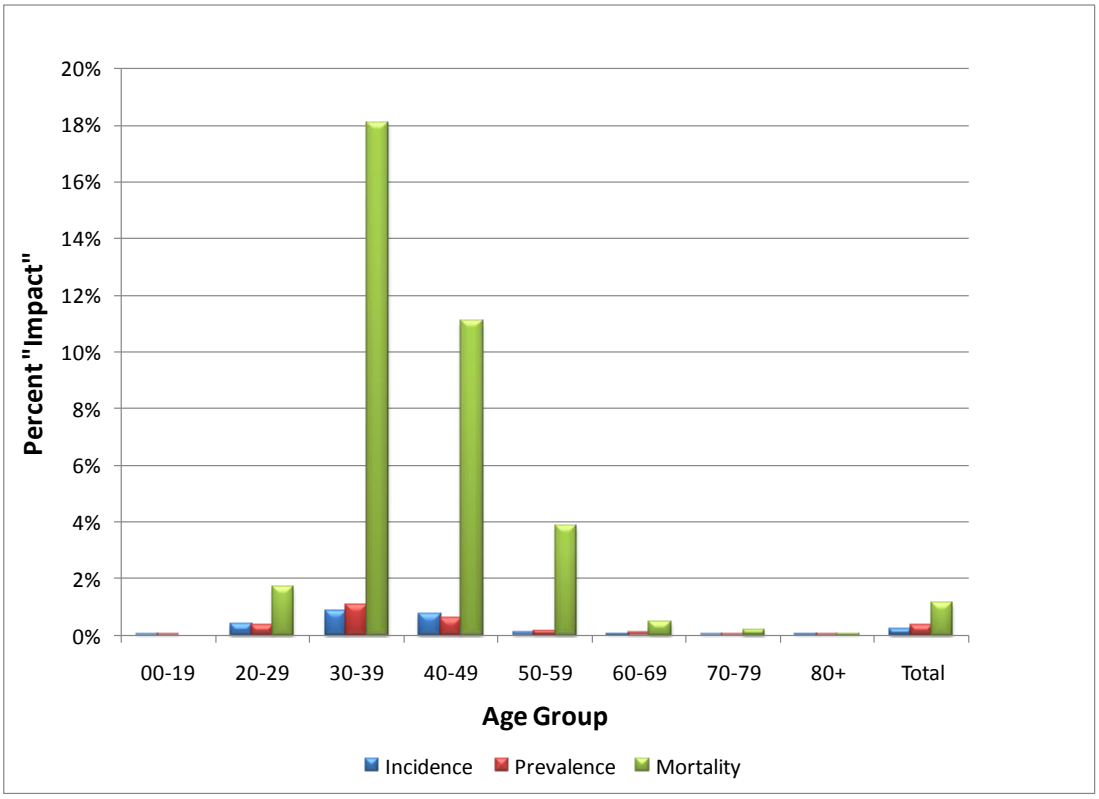


Figure 60 Relative Contribution for HIV/AIDS



12.2 Potential Years Life Lost

In each of the above sections (where relevant) we have included a description of the potential years of life lost (as calculated by Statistics Canada) for Canada as a whole and BC in particular. As the data can be grouped (for example all cancers or broken down to the specific cancers used here) we present an overall breakdown and then a more specific one.

Figure 61 Potential Years Life Lost Overall Distribution for BC Males

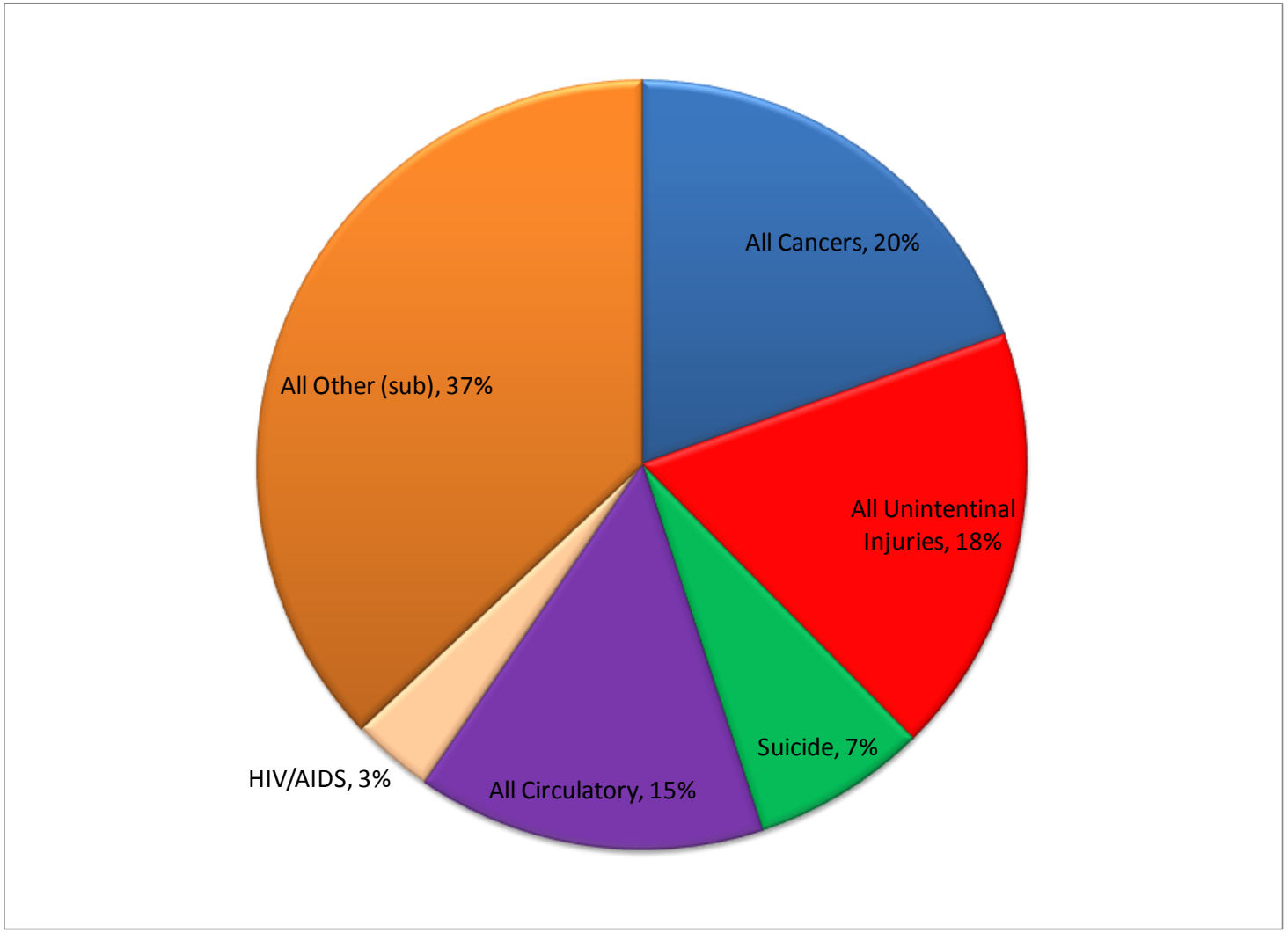
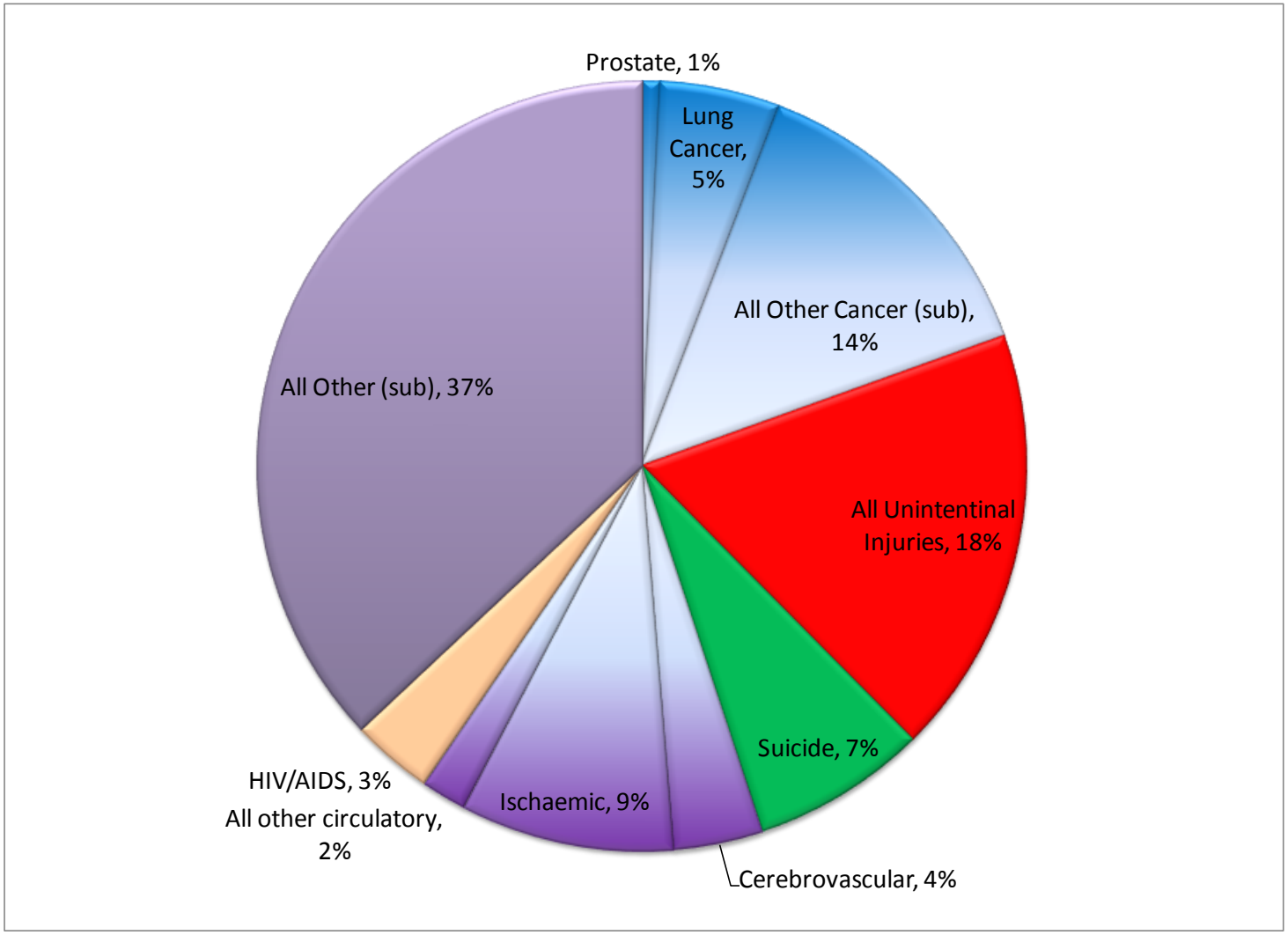


Figure 62 Potential Years Life Lost Detailed Distribution for BC Males



13 Life Expectancy

This chapter provides a summary of life expectancy (LE) calculations for British Columbia. As with previous chapters it is focused on male female differences. Overall LE can be seen as a summing up of all the separate factors (negative and positive) that influence the age of death for individuals in a population. Some of these have been described above. But other factors also contribute to overall LE.

LE is one of the original summary population health measures and is perhaps most valuable when comparing different country (or large area) populations. Generally speaking, one would consider the area with the larger LE a more healthy area. But one should be aware that LE alone does not explain why the situation exists. And LE can be calculated or presented in different ways, meaning that one area could have a larger LE as calculated by one method and a smaller one calculated by another method[51].

Unlike the previous sections, here we just focus on BC. As a summary measure incidence and prevalence have no meaning here, and thus the section headings differ from above.

13.1 Data Source

BC Stats has calculated a variety of life expectancy measures for BC[52], and we have used this as the primary source of data for this section.

13.2 Results

13.2.1 Male – Female Differences in Life Expectancy

LE at birth is perhaps the measure of most interest. BC Stats provides two sets of information on their web site. One is some historical data on LE starting from 1921. LE from birth is presented starting from 1921; LE at age 65 is presented from 1950. Figure 63 presents a plot of the LE at birth over the available time period (note that the Y axis is truncated). Figure 64 presents plots of the data available for LE at birth (as plotted in previous figure) and at age 65.

[51] For example, LE at birth and LE at age 65 are two common measures.
[52] See http://www.bcstats.gov.bc.ca/data/pop/vital.asp (accessed September 2009) for links to the reports or downloads of the data used in this Chapter.

Figure 63 Life Expectancy at Birth for British Columbia

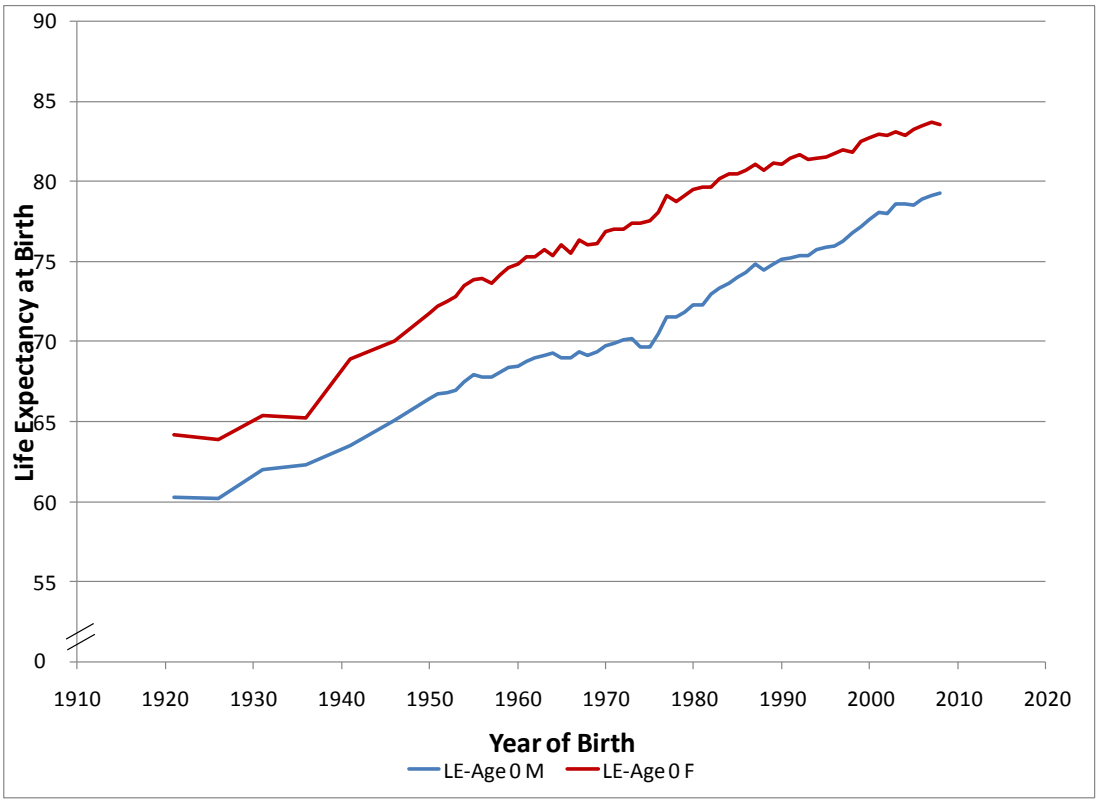
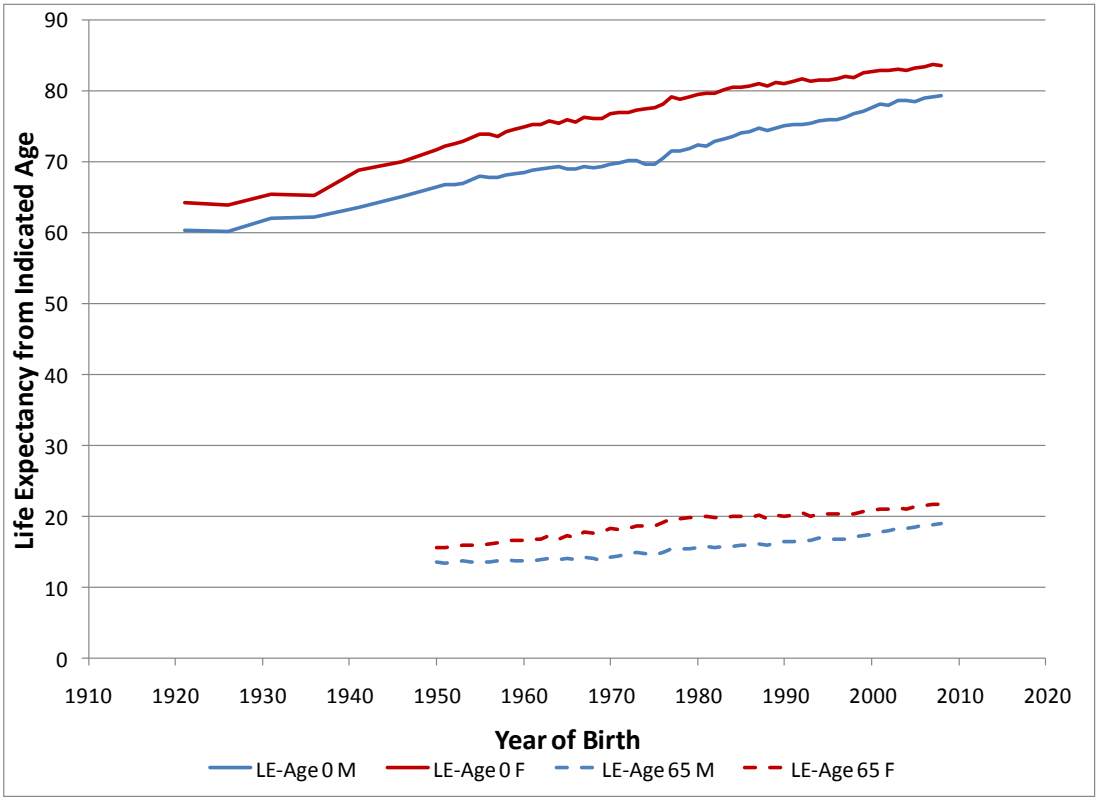


Figure 64 Life Expectancy from Birth and Age 65 for British Columbia



The trend is for increasing LE for both males and females over this period, with males always being lower than females. The trends over time are almost linear, fitting a linear trend line to the data results in r^2 of 0.95 and higher, with a slightly better fit being observed with the LE from birth data. The linear fit equations are presented in Table 42.

Table 42 Linear Trend Line Equations for the Data in Figure 64

Line		Equation	R^2
LE-Age 0	Female	y = 0.2292x - 375.09	0.9674
	Male	y = 0.2249x - 372.65	0.9855
LE-Age 65	Female	y = 0.1059x - 190.7	0.9514
	Male	y = 0.0941x - 170.58	0.9508

The slopes of the male and female LE Age 0 lines are almost the same (implying a gain of 0.2 years LE every year since 1921) and thus the female advantage in LE has stayed more or less constant over this period. There is not too much difference in the age 65 LE (females a bit higher than males) either. Note that this conclusion is based on long term trends. Others (e.g., Fang, 2007) have focused on a much shorter time frame (there the last 15 years) and concluded that the gap between BC men and women is shrinking. However it is possible that what is being seen is just a return to previous differences. The gap between men and women can be examined in a variety of ways. Figure 65 plots the difference between the female and male LEs, while Figure 66 presents the ratio (male LE/ Female LE).

In Figure 65 no difference in LE would result in a 0 value for the difference, while in Figure 66 no difference would result in a ratio of 1.0. As can be seen the lines in both figures are approaching these values in later years. However, they have yet to reach (or barely reached) historical levels. One might also conclude that the difference is finally getting back to the levels it once was. Whether it will continue to shrink is not clear.

In any case it is clear that in BC a woman's LE is higher than that of a man's, and this difference has been present for nearly 100 years. This trend is not unique to BC, similar trends have been observed in Canada as a whole (St-Arnaud, Beaudet & Tully, 2005) as well as in many other countries (Oeppen &.Vaupel, 2002).

Figure 65 LE Gap in terms of the Difference between Female and Male

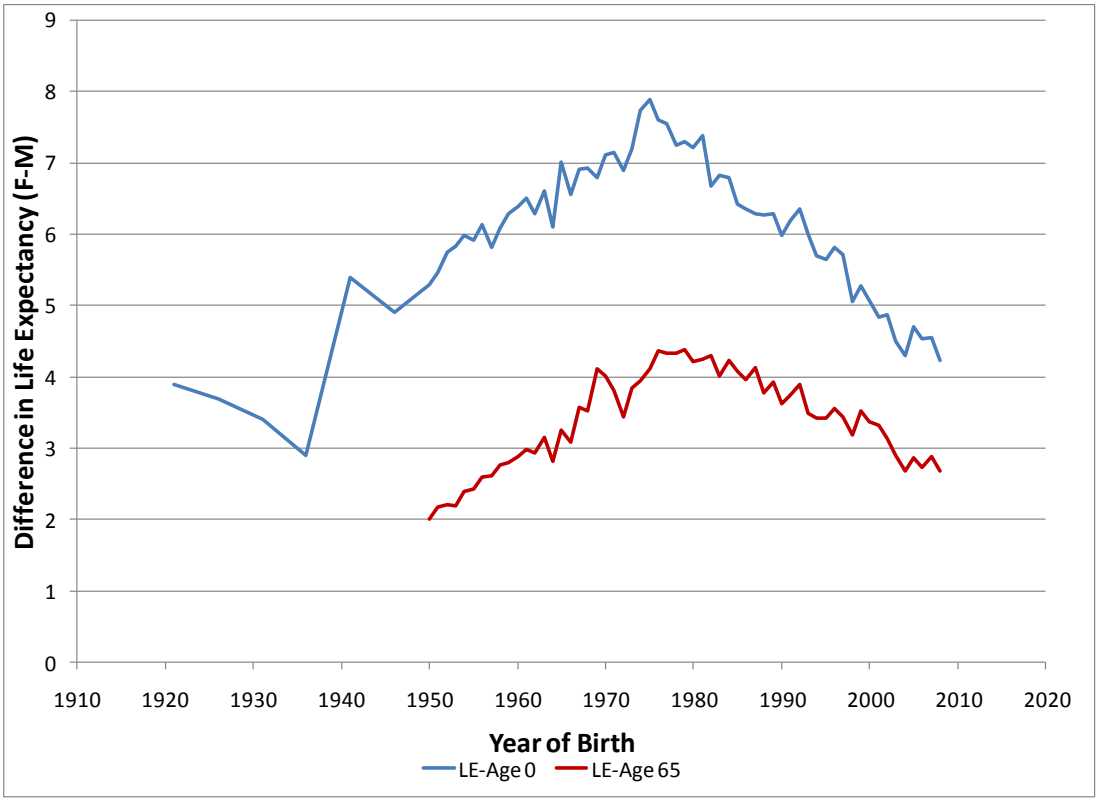
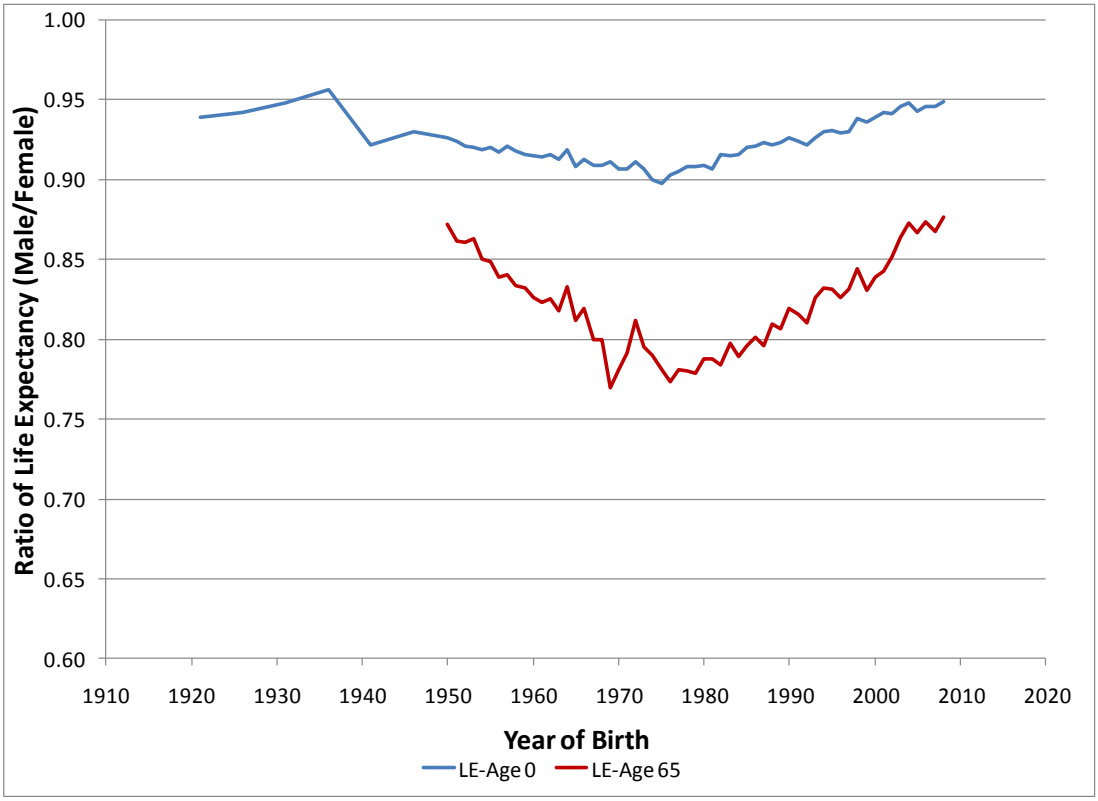


Figure 66 LE Gap in terms of the Ratio of Male to Female



13.2.2 LIFE EXPECTANCY BY HA

The second measure is LE at birth broken down by health authority (HA). The provincial differences described above could reflect province wide concerns or be due to differences confined to specific regions within the province. Table 43 presents a summary of the results. Note the data is collapsed into 5 year periods and the final period (2004-2008) overlaps with the previous period (2002-2006).

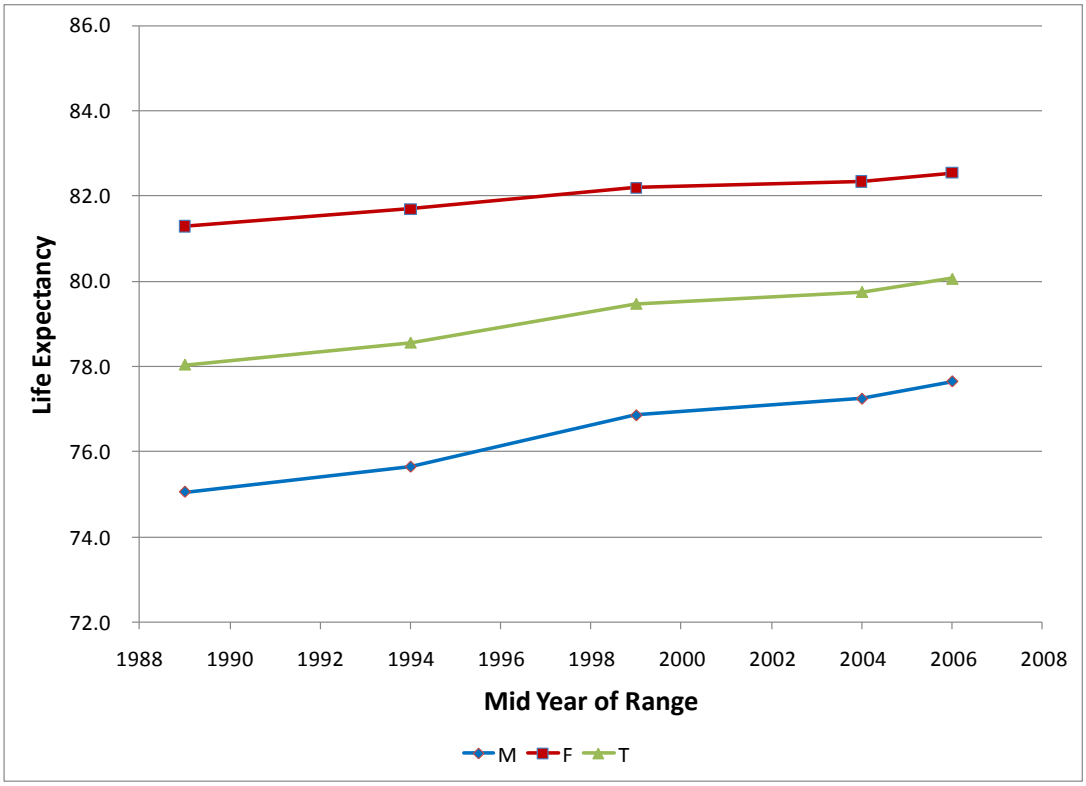
Table 43 Life Expectancy at Birth by Health Authority and Gender

		Period				
Health Authority	Gender	1987-1991	1992-1996	1997-2001	2002-2006	2004-2008
Provincial	F	81.1	81.6	82.4	83.1	83.3
	M	74.9	75.7	77.2	78.5	78.9
	T	78.0	78.6	79.8	80.8	81.1
Interior	F	81.3	81.7	82.2	82.3	82.5
	M	75.1	75.6	76.9	77.2	77.7
	T	78.0	78.6	79.5	79.8	80.1
Fraser	F	81.3	81.5	82.5	83.1	83.3
	M	75.6	76.3	77.5	78.7	79.1
	T	78.4	78.9	80.1	81.0	81.2
Vancouver Coastal	F	81.2	82.1	83.0	84.3	84.8
	M	74.6	75.2	77.5	79.7	80.2
	T	77.9	78.6	80.3	82.0	82.6
Vancouver Island	F	81.0	81.3	82.0	82.7	83.0
	M	75.2	75.9	77.2	78.4	78.7
	T	78.1	78.6	79.6	80.6	80.9
Northern	F	79.1	79.9	80.5	80.9	81.0
	M	72.4	74.2	75.3	76.3	76.4
	T	75.4	76.8	77.7	78.5	78.6

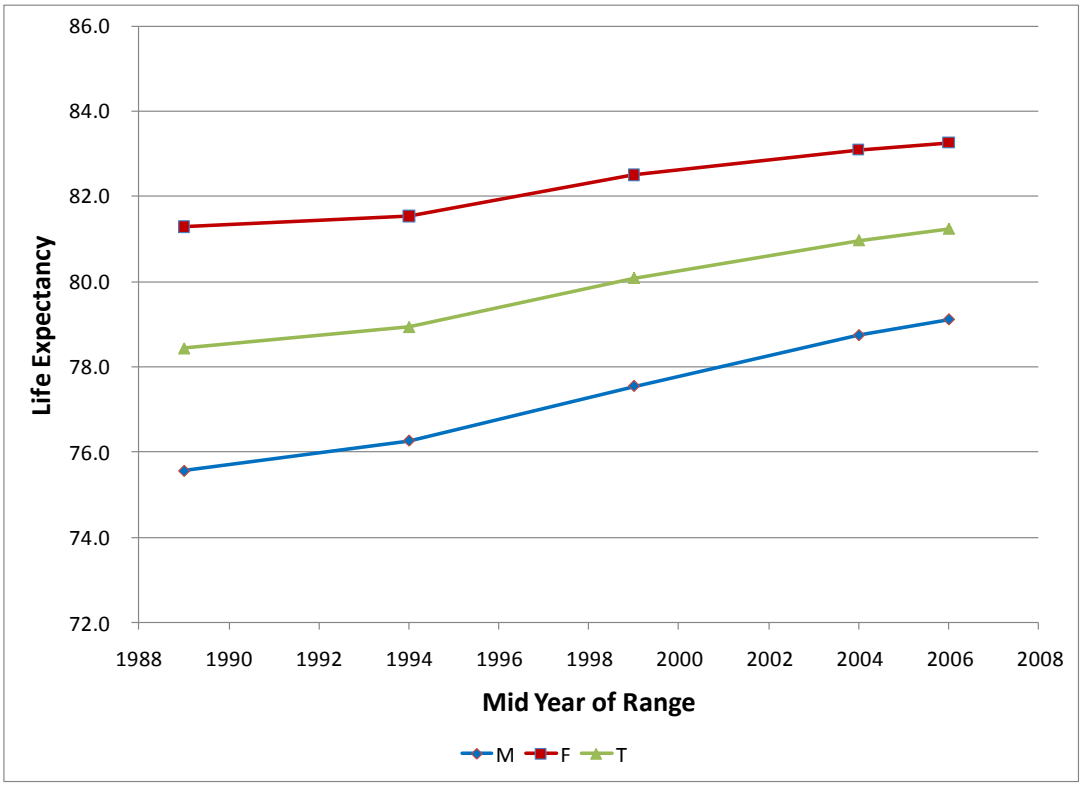
As determining trends from a table can be difficult we have plotted these in Figure 67. Note that the Y axis has been fixed to be the same for all five plots and starts at age 72 and goes to age 86 (thus magnifying the changes over time).

Figure 67 HA Specific Life Expectancy Patterns

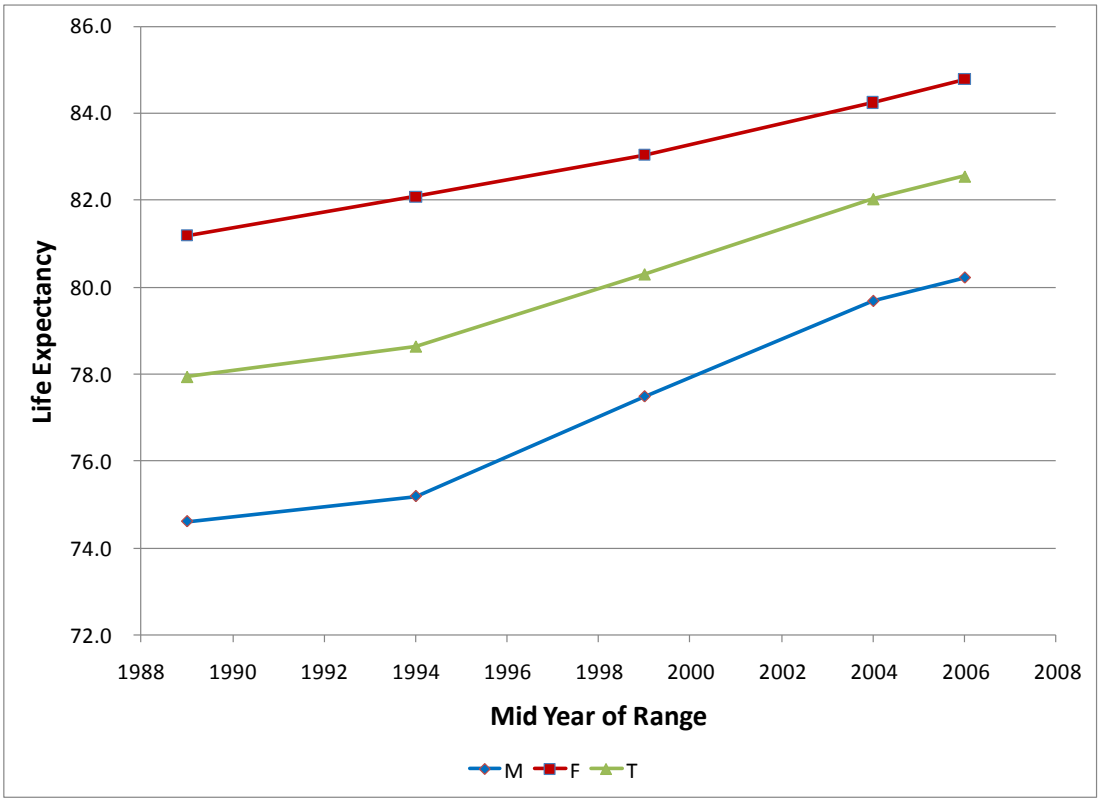
(a) IHA



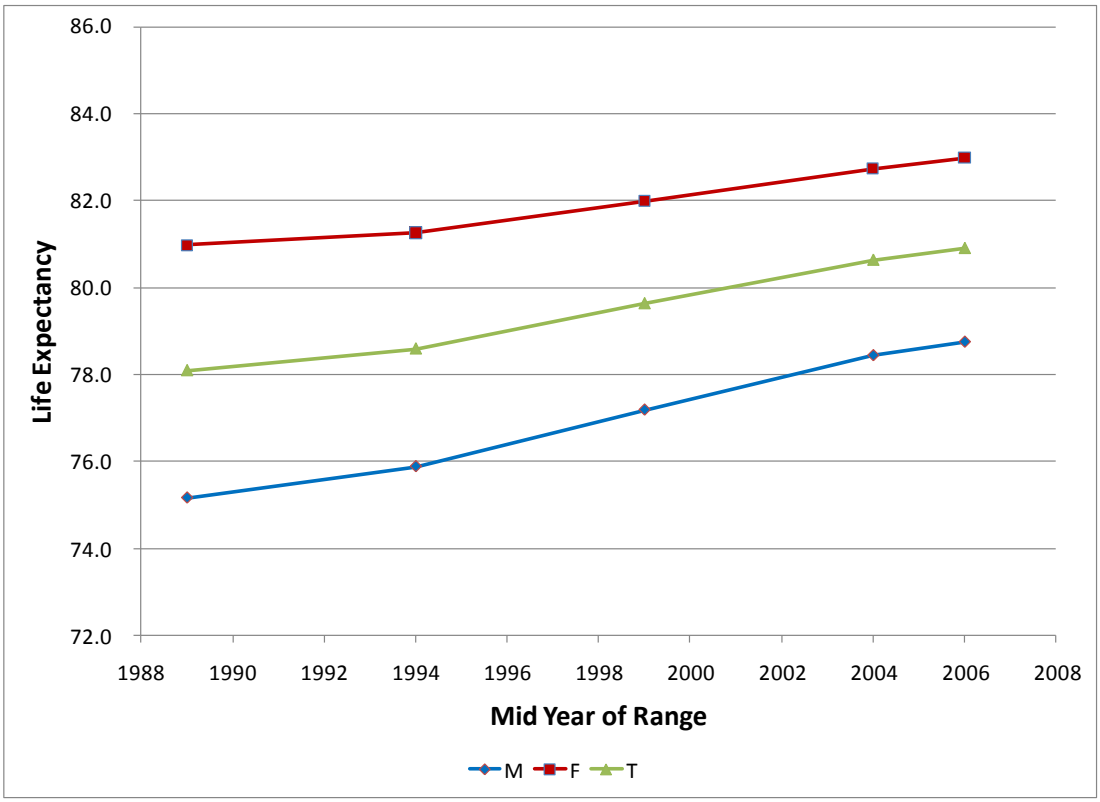
(b) FHA



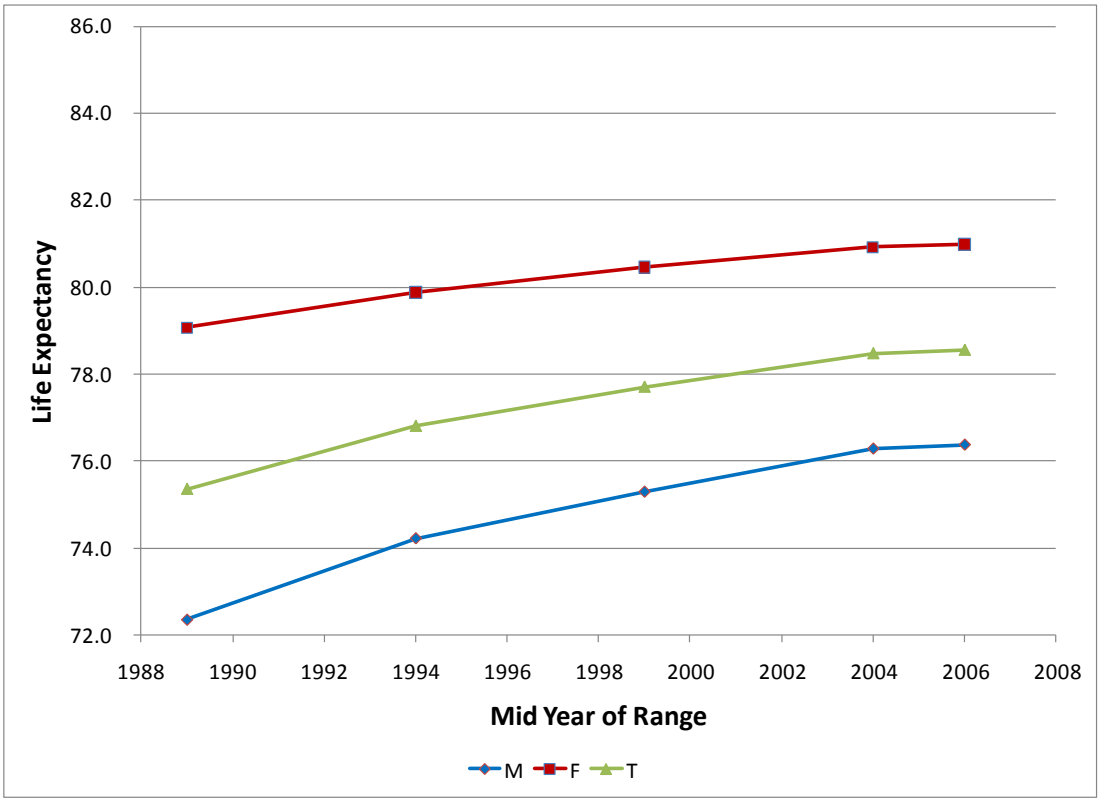
(c) VCHA


86.0
84.0
82.0
80.0
78.0
76.0
74.0
72.0
Life Expectancy
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Mid Year of Range
M
F
T

(d) VIHA


86.0
84.0
82.0
80.0
78.0
76.0
74.0
72.0
Life Expectancy
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Mid Year of Range
M
F
T

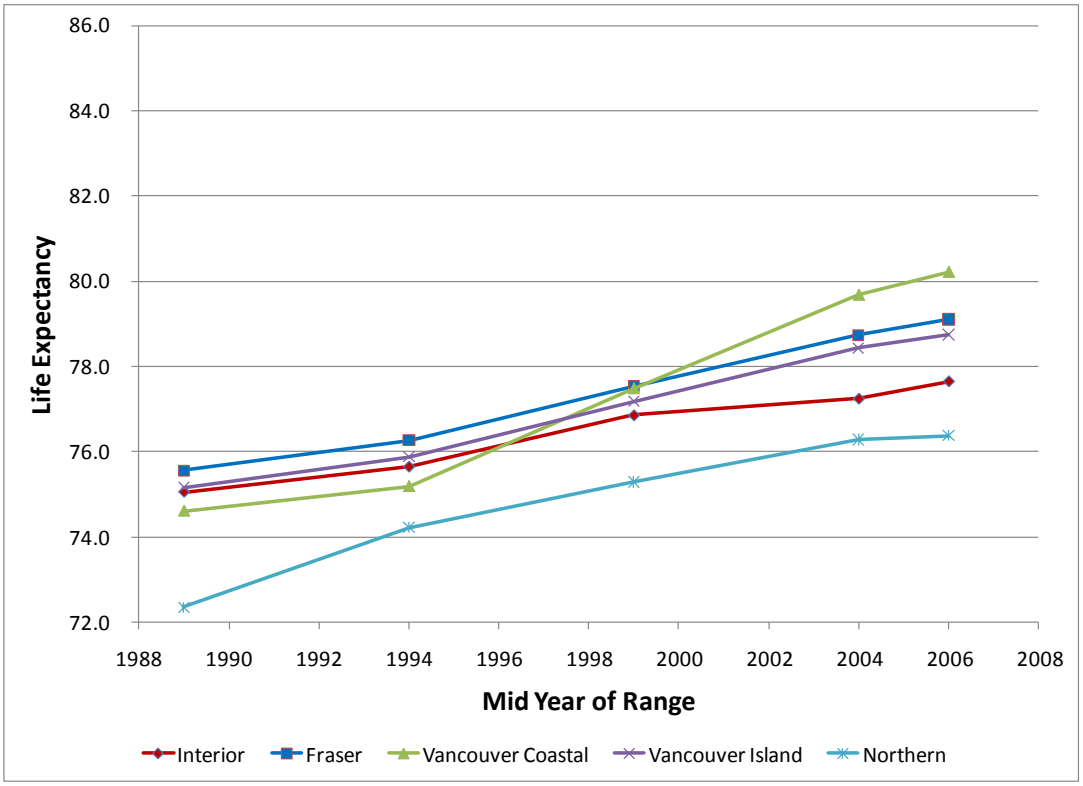
(e) NHA



There are differences in the HA life expectancy, but all show the same pattern. The NHA is lowest for both males and females (see Figure 68). In later years VCHA seems to be rising faster than the others. The HA differences in the "gap" are decreasing, at least slightly, as shown in Figure 69.

Figure 68 Life Expectancy by Gender for all HAs

(a) Males



(b) Females

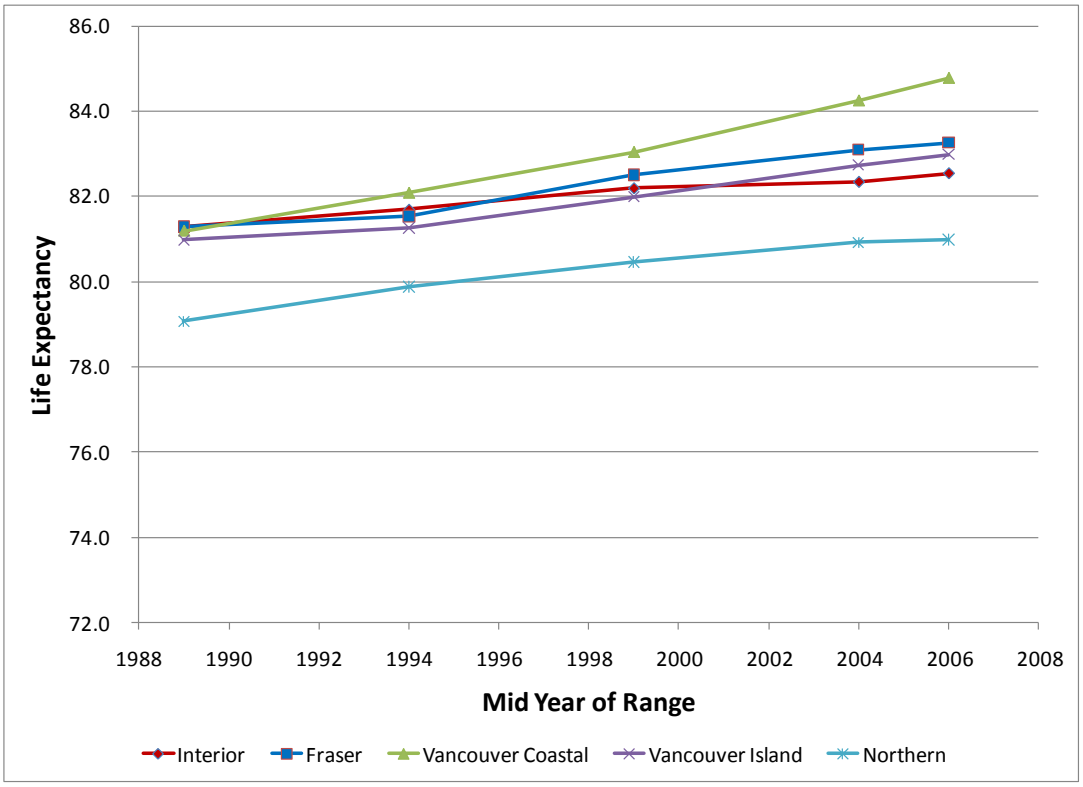
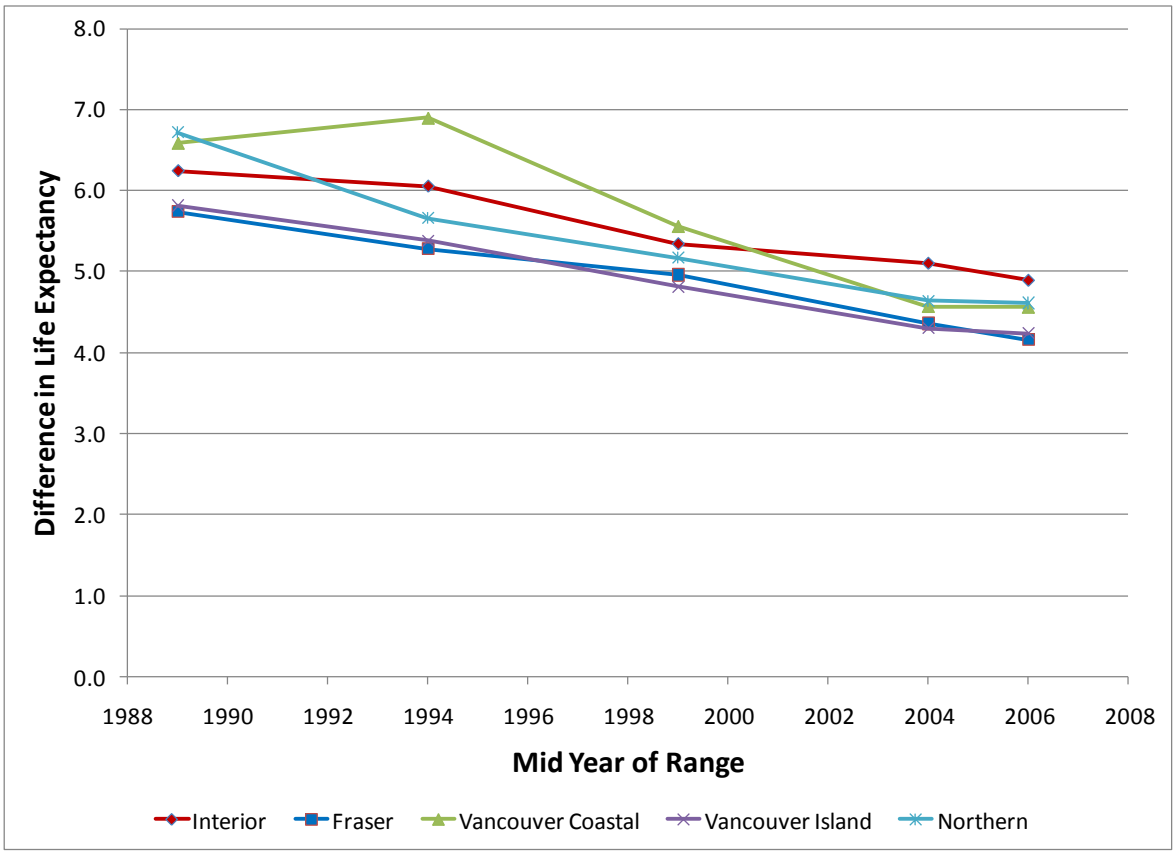


Figure 69 Life Expectancy Difference (Female - Male) by HA over Time



13.3 Discussion

From the above it is clear that LE in BC is rising for both men and women. Men have had, and continue to have, lower LE than women, although the difference in later years is getting smaller. Whether or not men are "catching up" to women (as seems to be the implication of Fang, 2007) is less clear, as one might also conclude that the shrinking difference just reflects a return to historical levels.

Life expectancy at birth can be influenced by a number of factors (such as infant mortality rates, high rates of young adult deaths due to wars or accidents, high maternal death rates, etc.). Most of these are not likely to be explanations for BC differences, either at birth or at age 65.

The consistent pattern across HAs in terms of LE also implies that the condition specific differences described in previous sections also exist, and hence should be of concern to, all HAs. It would require a rather strange set of circumstances to be present for an overall LE gap to exist yet the male – female differences found above not to exist within a particular HA.

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