

Culminating Project Cancer Trends in Canada

Data Management

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Course: MDM 4U1

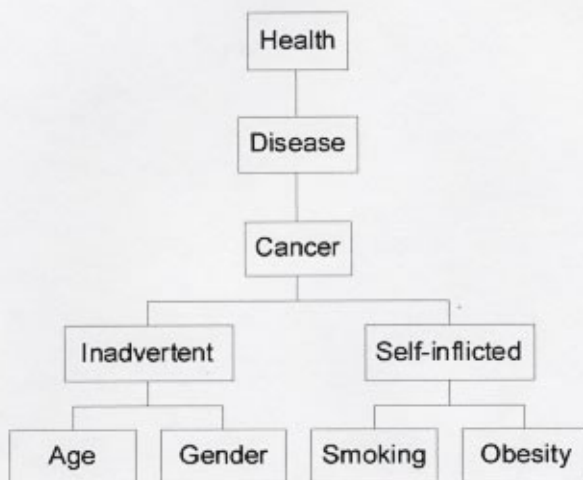


Area of Interest

I began this project by investigating health related topics. After producing a very broad mind map, I began searching for information to support my ideas. This led me to research cancer to explore its causes, which allowed me to concentrate on a particular area.

What factors affect getting cancer?

Refined Mind Map



Once I had gathered some reference material I came up with the following thesis statements:

Smoking causes a definite increase in the chances of getting lung cancer.

The amount of people being diagnosed with cancer is on the rise.

Most people become diagnosed and die from cancer between ages 60 – 80.

My first question addressed the topic of whether smoking affected the chances of getting lung cancer. www.forces.org/evidence/carol/carol8.htm provided excellent information comparing male and female smokers to male and female non-smokers by age group. It clearly demonstrated how smoking on average takes many years off a person's life.

www.canoe.ca/HealthReference/statscan_14.html provides data concerning numbers of smokers and percent of smokers by age group in Canada. The chart shows that 25% of all people in Canada smoked in 1995. A chart found on <http://www.kidon.com/smoke/percentages.htm> compared smoking statistics from every country around the world.

<http://www.benbest.com/health/cancer.html> - This web site offers information on causes and preventions of cancer, which is shown on the following chart:

RELATIVE INCIDENCE OF CANCER, BY CAUSATIVE AGENT

TOBACCO	33 %
DIET AND ADULT OBESITY	32 %
PERINATAL EFFECTS	6 %
BIOLOGIC AGENTS (EG VIRUSES)	5 %

OCCUPATIONAL FACTORS	5 %
ALCOHOL	3 %
SEDENTARY LIVING	3 %
REPRODUCTIVE FACTORS	3 %

INHERITED GENES	3 %
IONIZING AND UV RADIATION	3 %
ENVIRONMENTAL POLLUTION	2 %
FOOD ADDITIVES (INCL. SALT)	2 %
MEDICAL PRODUCTS/PROCEDURES	1 %

After realising diet and obesity had such a large role in causing cancer I decided to research it further. However, many of the informative sites on this topic happened to be US based so I decided to focus less on this area. These sites included,

<http://seer.cancer.gov/publications/raterisk/risks73.html>,

<http://www.hps-online.com/newsweek.htm>,

<http://medicolegal.tripod.com/pearl1938.htm>, etc.

One thing they mention was how our high fat, fast food diet has caused an increase in obesity and also increases the risk of getting particular types of cancer.

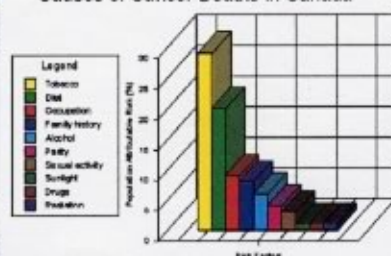
Some additional sites on how self-inflicted actions such as smoking and alcohol effect getting and dieing from cancer...

http://www.geocities.com/ssukhmeet/drugs_deaddiction.html - This address informs us that alcohol and smoking, etc. do affect our chances of getting cancer and other diseases. Alcohol is the 4TH MOST COMMON CAUSE OF DEATH after heart disease, stroke and cancer. These deaths were caused by LIVER FAILURE OR CANCER. In addition everyone knows that smoking is the main cause of lung cancer, yet it also can cause Cancer of the mouth, lung, food pipe, bladder Kidney, stage: cervix, pancreas. 'Medical risks', 'Did you know?' and 'Screening Tests' are also available.

<http://www.jr2.ox.ac.uk/bandolier/booth/booths/cancer.html#diet> - How cancer is affected my alcohol, diet, etc. There are also cancer stories and diagnosis available.



Causes of Cancer Deaths in Canada



Rank	Cancer	Incidence	Prevalence	Deaths
1	Lung	10,000	10,000	10,000
2	Prostate	8,000	8,000	8,000
3	Breast	7,000	7,000	7,000
4	Colon	6,000	6,000	6,000
5	Pancreas	5,000	5,000	5,000
6	Stomach	4,000	4,000	4,000
7	Esophagus	3,000	3,000	3,000
8	Bladder	2,000	2,000	2,000
9	Uterus	1,000	1,000	1,000
10	Ovary	1,000	1,000	1,000

<http://www.hc-sc.gc.ca/hpb/lcdc/bc/index.html>-(index or table of contents on cancer)

Health Canada provided excellent information, from statistics, to graphs, to articles. Each section compares types of cancers to age, gender and region. The address

<http://www.hc-sc.gc.ca/hpb/lcdc/bc/stats.html> provided the link to the stats and

helpful data when trying to make a comparison. From this informative data I decided to mainly focus on these areas.



<http://www.cancer.ca> - The Canadian Cancer Society (CCS) was another source for cancer information. It provided sections on risk reduction, prevention, statistics, research, articles, etc. Along with...

- National Cancer Institute of Canada (NCIC)

<http://www.ncic.cancer.ca>

- Canada Strategy for Cancer Control

<http://www.cancercontrol.org>

After investigating and narrowing down my topic, I decided returning to Statistics Canada (ESTAT) would aid in my search. (The data that was collected came from a variety of web sites and from the ESTAT database.) - <http://www.statcan.ca>

To acquire the findings from ESTAT proceed with the following directions:

- Go to <http://estat.statcan.ca/> and choose *English*.
- Click on *Learning Resources* on the left hand side of the screen.
- Choose *Student* and on the left side *E-STAT*.
- Accept the terms of the preceding Licence Agreement and enter in your password.
- From this menu choose *Health, Data, and Diseases*.
- The following numbers are examples of tables that provide some information regarding my topic: 102-0003, 102-0050, 103-0003, 103-0004...

Print screens from E-STAT



Sources of National Cancer Institute Information

Cancer Information Service

Toll-free: 1-800-4-CANCER (1-800-422-6237)

TTY (for deaf and hard of hearing callers): 1-800-332-8615

NCI Online - Internet - Use <http://cancer.gov> to reach NCI's Web site.

- For general information regarding cancer statistics or any other aspect of cancer (such as cancer prevention, screening, diagnosis, treatment and care, etc.), contact the **Canadian Cancer Society's Cancer Information Service** at 1-888-939-3333.
- **For Information from Health Canada:**
Information on risk assessment and surveillance of cancer is available from the **Cancer Bureau, Health Canada**, Tunney's Pasture, Ottawa, Ontario, K1A 0L2. Tel. (613) 957-0327, Fax. (613) 941-2057.

CANADIAN COUNCIL OF CANCER REGISTRIES

Ontario Director
Ontario Cancer Registry
Division of Preventive Oncology
Cancer Care Ontario
620 University Avenue
Toronto, Ontario
M5G 2L7
Tel: 416-971-9800
Fax: 416-971-6888
<http://www.cancercare.on.ca>

NATIONAL CANCER INSTITUTE OF CANADA & CANADIAN CANCER SOCIETY

Ontario Division

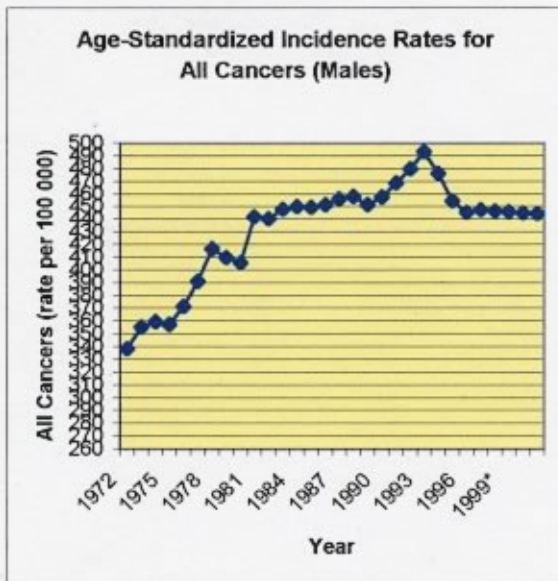
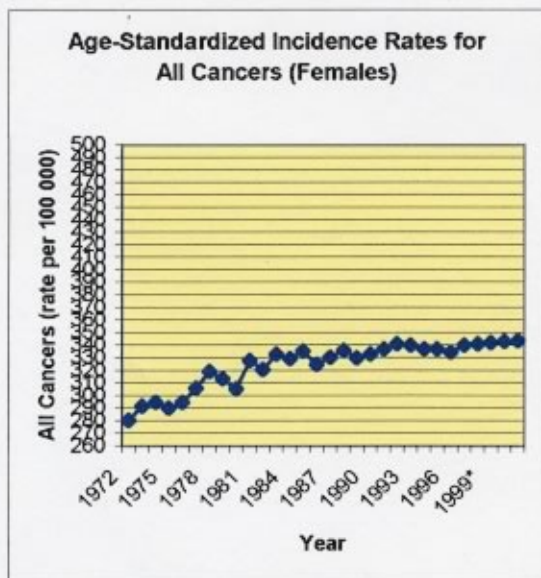
Canadian Cancer Society
1639 Yonge Street
Toronto, Ontario, M4T 2W6
Tel. (416) 488-5400
Fax. (416) 488-2872

Now that I have found many sites regarding my topic, I am able to start analysing my data.

Analyzing Data Involving One Variable

I started by using my data collected from Health Canada.

Answer Question: Is the amount of people being diagnosed with cancer on the rise for males and females?



We can conclude from these graphs that in general, people being diagnosed with cancer is on the rise. Females show a starting rate of 280.2 in 1972 and reach its peak in 2001 at 343.9. The males illustrate this same pattern very adequately, however there is a large

bulge between 1991 and 1996 where the graph jets up for a few years then back down to a relatively steady slope. The starting point is 338.3 occurring in 1972, maxing at 493.5 in 1993, and finishing with a more level slope in 2001 with a rate of 444.5. In addition, by using the same scale I was clearly able to demonstrate that males are more frequently getting cancer. In 2001 females reached a rate of 343.9, where males were at 444.5. Nevertheless, female smokers have continued to increase over the years, while males are levelling off.

Measures of Central Tendency

This data was calculated on Excel by using the previous data on incidence for all cancers.

<u>Females</u> (sample)	
mean	324.5133
median	331.75
mode	294.9
standard deviation	18.55091
variance	344.1364

<u>Males</u> (sample)	
mean	432.1533
median	446.5
mode	#N/A
standard deviation	40.21653
variance	1617.369

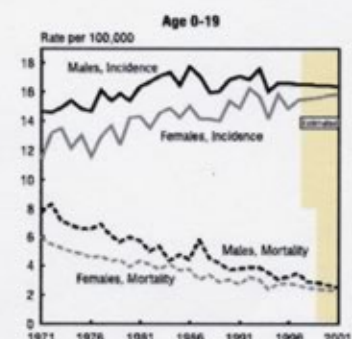
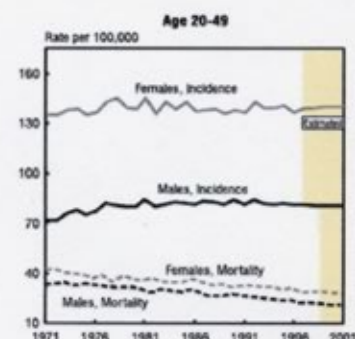
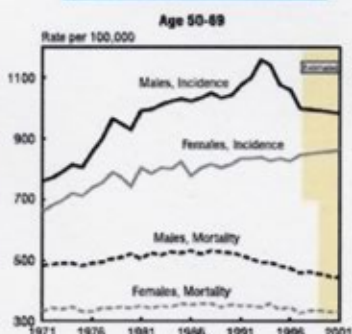
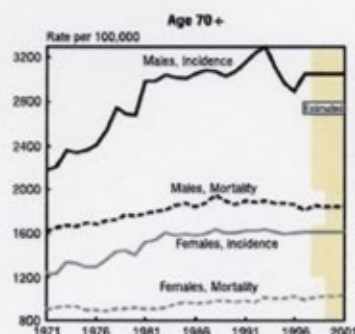
Females: 21 appear in 1 standard deviation of the mean ($\times/30$)

Males: 21 appear in 1 standard deviation of the mean ($\times/30$)

The data found for females had a much smaller standard deviation, or smaller spread. Therefore, the data must be closely cluster around the mean, where as the males have a larger spread.

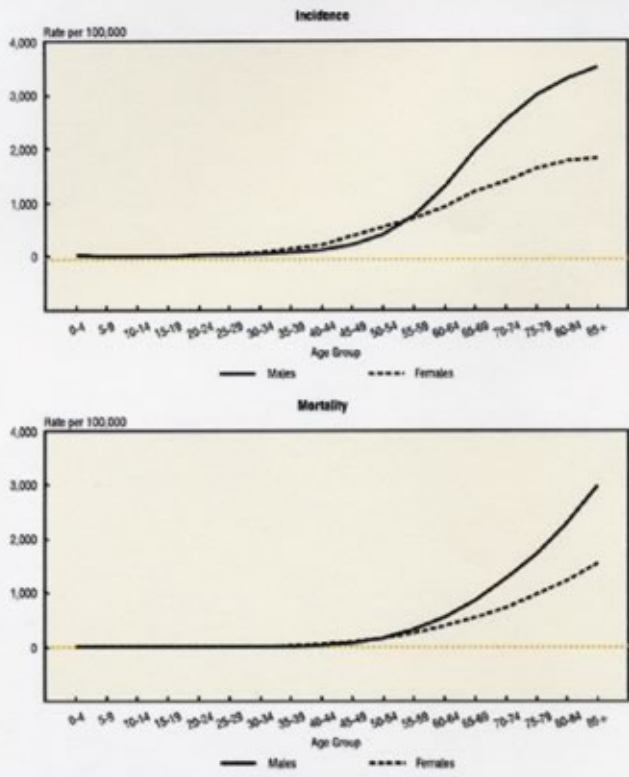
Answer Question: Are Males more prone to getting cancer than females?

Age-Standardized Incidence and Mortality Rates by Broad Age Group, All Cancers, Canada, 1971-2001



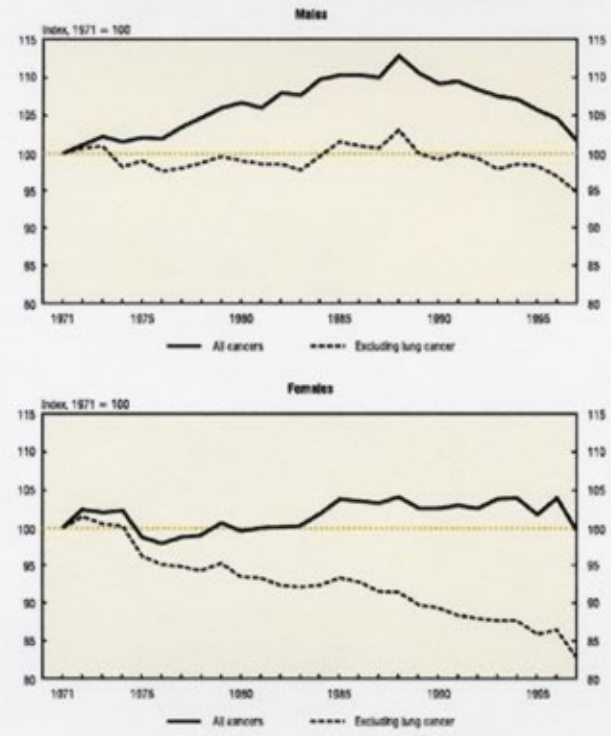
These graphs clearly show a comparison between males, females, incidents, mortality, and age. The differences by age group were somewhat expected, with over 70 having a substantial increase in the chances of being diagnosed and dying from cancer. The only negative aspect to these graphs is their scales are very different on the y-axis so you have to be careful when comparing trends and numbers. Here again males demonstrate their dramatic difference in the number being diagnosed and dying from cancer.

Age-Specific Incidence (1996) and Mortality (1997) Rates for All Cancers by Gender, Canada



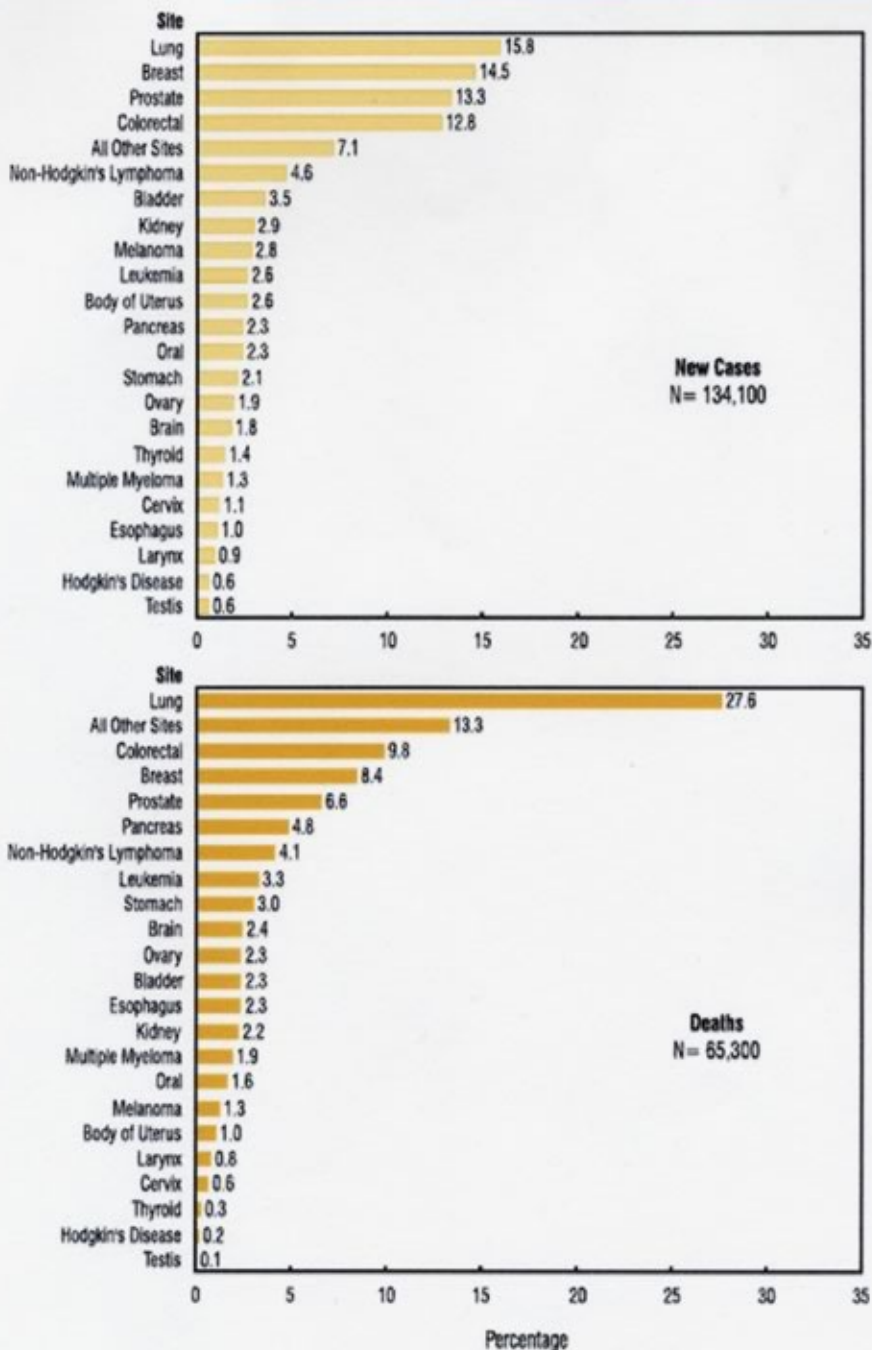
The figure demonstrates that women are far less likely to suffer from or die from cancer. Between ages 50-70 males show a large increase in diagnosis. However, when reach 70 years plus most people have already been diagnosed. Women have a more gradual curve starting at about 30 years of age and levelling off for the same reason. Deaths show a gradual positive curve, as people get old they are more likely to die from cancer. Again the male curve is greater then the female.

Index of Age-Standardized Mortality Rates Including & Excluding Lung Cancer, Canada, 1971-1997



When analyzing all cancers, males have had a greater risk of dying from cancer over the years. Also, the index value in 1997 for both sexes was very similar to the base year of 1971. Females have had a steadier number of individuals dying, staying closer to the base year. In addition, we can conclude that more females have taken up smoking and other causes of lung cancer since this cancer has such a great effect on the index. By excluding lung cancer for males, their results become steadier around the base year. These indexes give us a clear inclination when trying to analyse cancer deaths over the years.

Percentage Distribution of Estimated New Cases and Deaths for Selected Cancer Sites, Canada, 2001

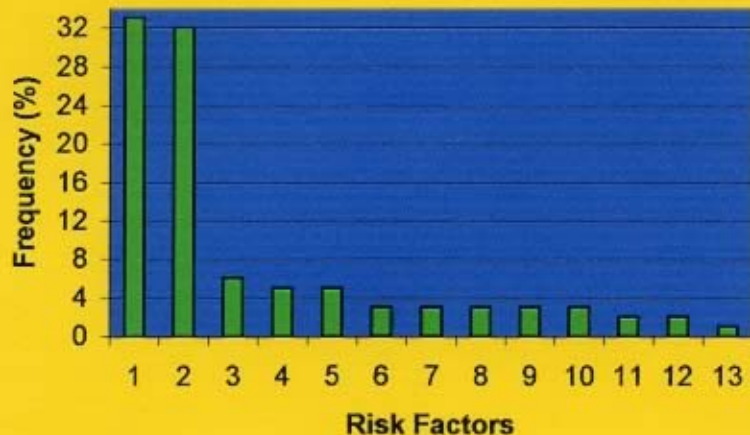


When the general term cancer is broken up into its smaller groups, we can see how they compare to one another. Lung cancer has the greatest amount of new cases, as well as the most dying from the disease. There are about 4 leading causes for new cancer cases by this graph. However, these sites do not appear in the same order when analyzing the deaths figure. Lung Cancer is substantially in the lead, which continues my interest in this area.

After observing and analyzing most of my graphs and information I noticed how prominent lung cancer is in our society. Therefore, I decided to research farther into risks of cancer to better understand my previous data. At first I began finding all the causes, knowing that I would after look into the top risk more in-depth.

Answer Question: What are the main causes of Cancer in Canada?

Causes of Cancer Incidents in Canada



Legend

1. Tobacco
2. Diet & Adult Obesity
3. Prenatal Effects
4. Biologic Agents (viruses)
5. Occupational Factors
6. Alcohol
7. Sedentary Living
8. Reproductive Factors
9. Inherited Genes
10. Ionizing & UV Radiation
11. Environmental Pollution
12. Food Additives (salt)
13. Medical Products/Procedures

This bar graph clearly illustrates what agents cause cancer and by how much in comparison to each other (totalling 100%). Tobacco or smoking comes out in the lead at 33% which is somewhat expected from all the publicity the issue gets. However, I found it quite interesting that diet and adult obesity follows in a close second (32%), which we do not hear so much about. Both these main risk factors can be prevented with living a healthy lifestyle. I find it unnecessary that self-inflicted risks are the main causes of cancer.

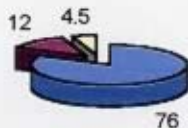
Answer Question: How much does smoking effect the risk of getting cancer and life expectancy?

Lifetime Risk of Lung Cancer, Females (risk factor 1 in x)



■ Non-smokers ■ Ever smokers □ Smokers > 1pkt/day

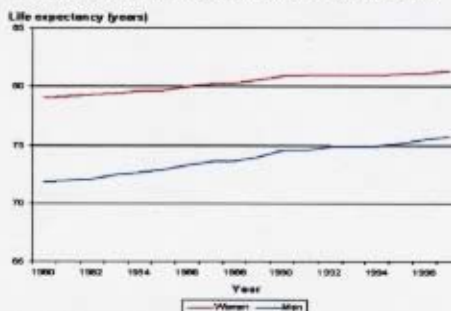
Lifetime Risk of Lung Cancer, Males (risk factor 1 in x)



■ Non-smokers ■ Ever smokers □ Smokers > 1pkt/day

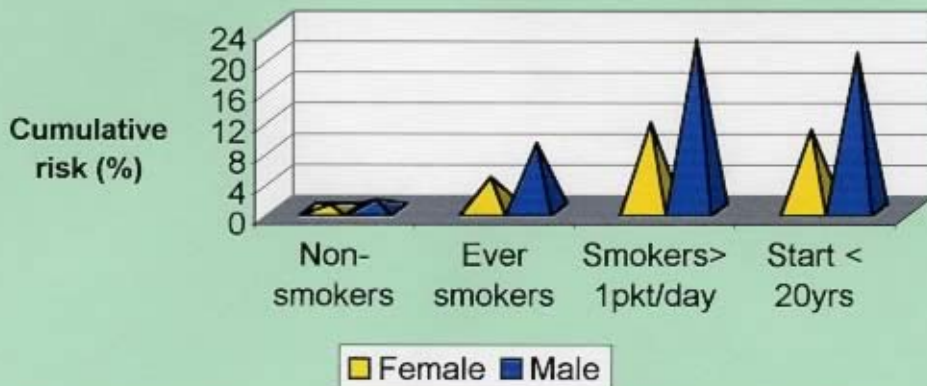
These two pie graphs illustrate that 1 out of x number of people will be a risk of cancer. The key areas to notice are that non-smokers have the least chance (1/157 or 1/76) of being diagnosed, and females are in a better position than males.

Life expectancy at birth by sex, Canada, 1980-1997

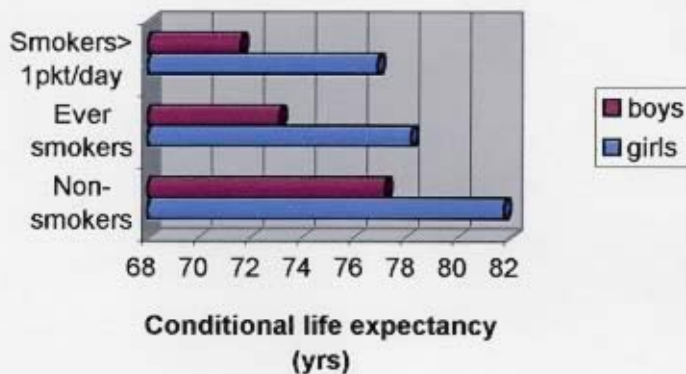


Source: Statistics Canada, Report on the Demographic Situation in Canada, Catalogue 21-285-XPF, 1998.

Cumulative Risk of Lung Cancer



Life Expectancy at age 15 in NSW girls/boys - 1992



I find this graph very informative, by demonstrating how smoking affects life expectancy. Female non-smokers are expected to live to 81.8, where ever smokers only 78.2, and smokers > 1pkt/day only 76.9. So by smoking women on average are losing 4.9 years of their life. Males life expectancy is lower in general, as non-smokers on average will live to 77.2, ever smokers only 73.1, and Smokers > 1pkt/day only 71.6. Therefore, by smoking males are losing potentially 5.6 years of their life by something they could avoid.

Conclusion

To this point I can conclude that cancer is on the rise and males are more prone to being diagnosed than females. It is interesting how much lung cancer affects the trends present on the graphs. Smoking and other causes of lung cancer in women are on the rise and it appears that it has severely increased the incidents of lung cancer. Without lung cancer, female's cancer mortality would be on a decrease. Again, when broken into sites lung cancer is at the top of the list for both New Cases, and Deaths. Tobacco, diet and adult obesity are the main factors in causing cancer. Together they account for 65% of all risk factors. On average smoking takes 5 years off a female's life expectancy and 6 years for males. This is quite a substantial amount, especially considering it's the average, meaning many lose more, and others are lucky. One pack a day smokers are the most at risk with 1/8.8 females, and 1/4.5 males being effected by lung cancer.

Analysing Data Involving Two Variables

I began by using my data previously collected from Health Canada.

Refined Question: What types of cancers are most prominent in our society for males and females?
The following charts and graphs on Cancer distribution can aid in answering this question.



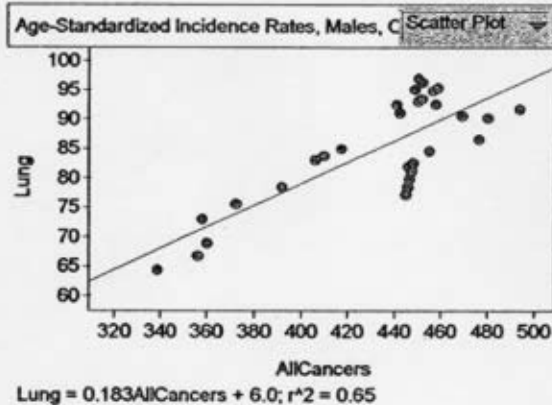
Age-Standardized Incidence Rates, Males, Canada, 1972-2001

	Year	AllCancers	Prostate	Lung	Colorectal
1	1972	338.3	56.7	64.5	47.8
2	1973	355.8	60.4	66.9	52.6
3	1974	359.8	60	69	50.8
4	1975	357.7	61.7	73.1	51.2
5	1976	371.9	62.1	75.7	55.3
6	1977	391.4	67.9	78.6	56.4
7	1978	417.2	74	85.1	59.4

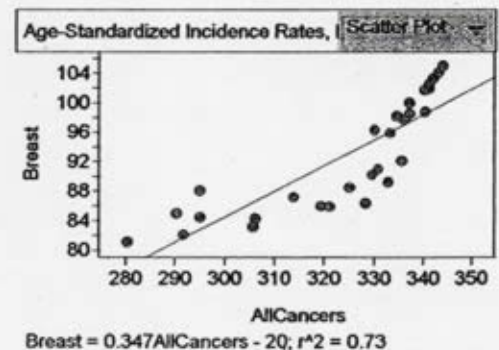
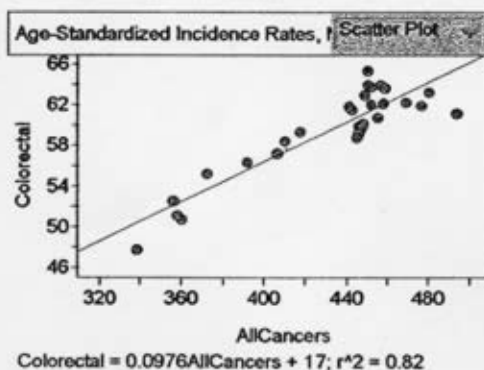
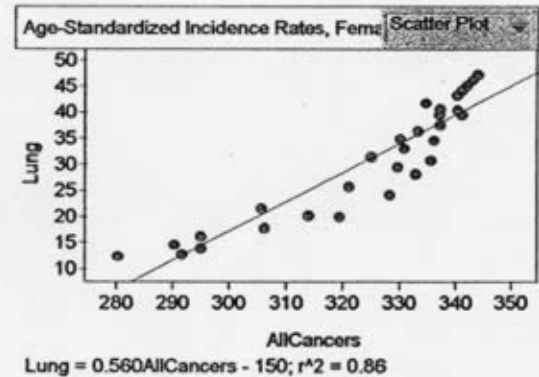


Age-Standardized Incidence Rates, Females, Canada, 1972-2001

	Year	AllCancers	Breast	Lung	Colorectal
1	1972	280.2	81.2	12.5	42
2	1973	291.6	82.2	12.9	46.2
3	1974	294.9	88.2	14	44.4
4	1975	290.2	85.1	14.7	43.7
5	1976	294.9	84.6	16.3	44.6
6	1977	306	84.4	17.9	47.2
7	1978	319.3	86.1	20.1	49.5



By comparing Lung Cancer to AllCancers I can conclude that Males incidence have been rather steady with some ups and downs but only a slope of 0.183. There is a strong linear correlation of $r=0.81$ between the two axes. Females chance of getting Lung cancer has however increased much more rapidly. The linear correlation is $r=0.93$ and has a slope of 0.560. There also appears to be an exponential correlation present. Colorectal Cancer is the third leading cancer for males. From 1972 to 2001 there has been a steady slow incline of 0.0976 and a correlation of $r=0.91$. Breast Cancer affects the most females of all cancers. The slope is 0.347 and its linear correlation is $r=0.85$, although an exponential regression could give a more accurate analysis of this data. Although women being diagnosed with cancer has increased more rapidly over the years than men, men still get cancer more frequently.

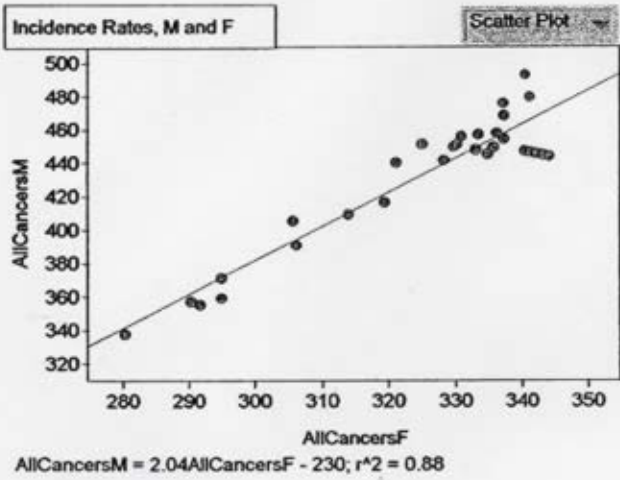


After analysing these graphs, I decided to compare men and women more directly to find any pattern that might be present.

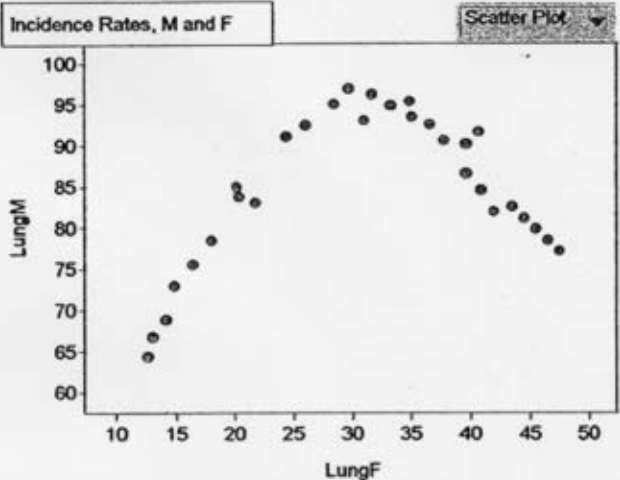


Incidence Rates, M and F

Incidence Rates, M and F					
	Year	AllCancer...	LungM	AllCancer...	LungF
1	1972	338.3	64.5	280.2	12.5
2	1973	355.8	66.9	291.6	12.9
3	1974	359.8	69	294.9	14
4	1975	357.7	73.1	290.2	14.7
5	1976	371.9	75.7	294.9	16.3



This graph is showing how people being diagnosed with cancer is on the rise. However, women are increasing at a faster rate than men. This could be due to women smoking more and not being as health conscious as in 1972. In addition, the rate at which cancer has increased over the years, seems to have slowed down, shown by the cluster on the right side of the graph.



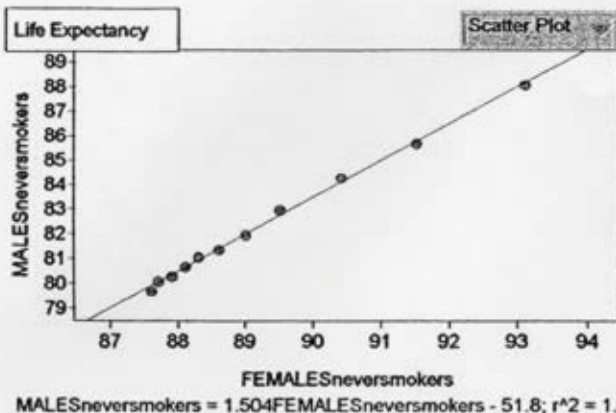
I found this graph very interesting as it appears to be an almost perfect quadratic. The negative parabola shape indicates that males increased rapidly until about 1985 and then incidents of lung cancer decreased rapidly in the amount being diagnosed with cancer. Females appear to have increased steadily, with a jump in 1978 and 1981

Refined Questions: Do females have a greater life expectancy than males? How much does smoking effect life expectancy?

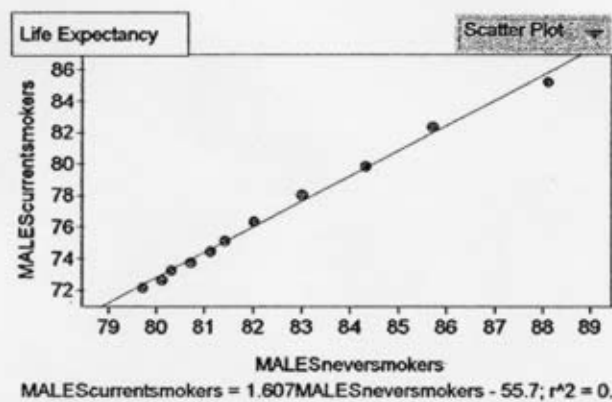
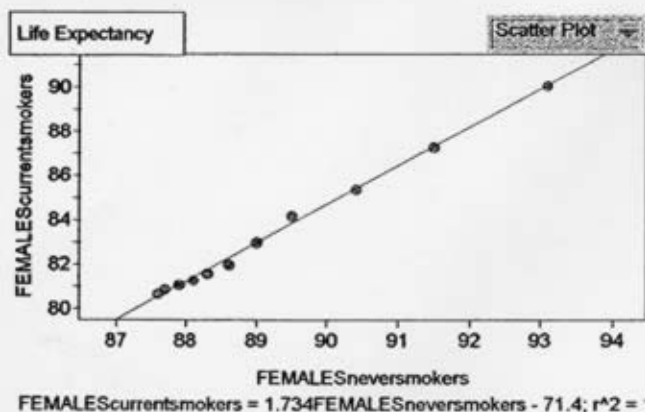


Life Expectancy

Life Expectancy					
	LIFEEXPECT...	FEMALESnevers...	FEMALEScurrents...	MALESneversm...	MALEScurrent...
1	25 - 29	87.6	80.7	79.7	72.2
2	30 - 34	87.7	80.9	80.1	72.7
3	35 - 39	87.9	81.1	80.3	73.3
4	40 - 44	88.1	81.3	80.7	73.8
5	45 - 49	88.3	81.6	81.1	74.5
6	50 - 54	88.6	82	81.4	75.2
7	55 - 59	89	83	82	76.4
8	60 - 64	89.5	84.2	83	78.1
9	65 - 69	90.4	85.4	84.3	79.9
10	70 - 74	91.5	87.3	85.7	82.4
11	25 +	93.1	90.1	88.1	85.3



This graph shows that females have a greater life expectancy than males with a perfect, positive linear correlation.



These two graphs illustrate how smoking takes about 5 years off a persons life on average. The correlation between the two variables for females is $r=1.0$ and males $r=0.99$. The perfect and strong linear correlation both show that as a person ages their life expectancy increases as well as the amount smoking affects them. Females have a greater slope then males, 1.734 to 1.607. This means that females, although they live longer, they smoke more frequently in comparison to their own data.

Refined Question: What patterns appear between exercise and life expectancy of smokers and non-smokers?



Exercise, 1994-95, in %, both sexes

Exercise, 1994-95, in %, both sexes

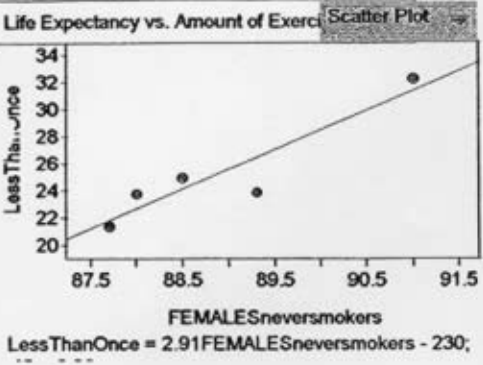
	AgeGroups	Total	ThreeOrMore	OnceOrTwice	LessThanOnce	<
1	25-34 years	100	51.9	22.4	21.4	
2	35-44 years	100	48.6	23.1	23.8	
3	45-54 years	100	47.6	22.6	25	
4	55-64 years	100	53.7	17.4	23.9	
5	65 years and over	100	46.8	13.7	32.3	



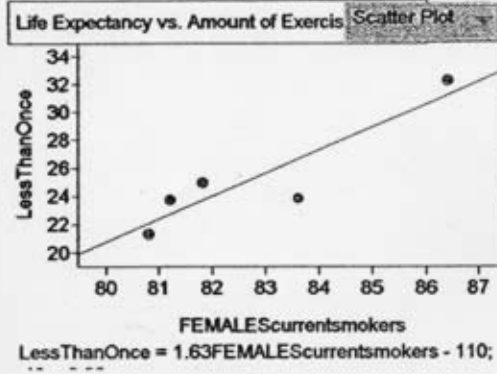
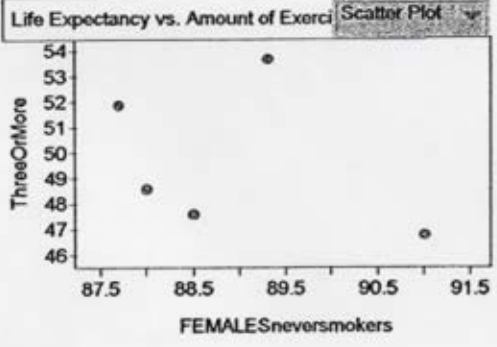
Life Expectancy, by certain age groups

Life Expectancy, by certain age groups

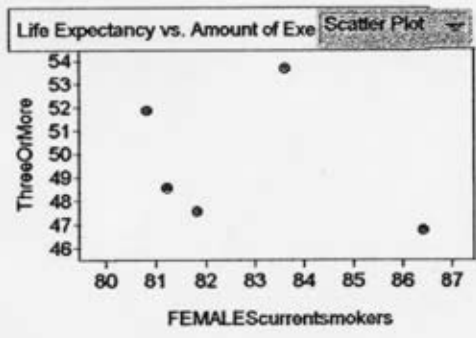
	AgeGroups	FEMALESnever sm...	FEMALEScurrent...	MALESnever...	MALEScurrent...	
1	25-34 years	87.7	80.8	79.9	72.5	
2	35-44 years	88	81.2	80.5	73.6	
3	45-54 years	88.5	81.8	81.3	74.9	
4	55-64 years	89.3	83.6	82.5	77.3	
5	65 years and over	91	86.4	85	81.2	



When comparing life expectancy to amount of exercise I found that exercising Less Than Once a week had a linear correlation of $r=0.93$ and slope 2.9 for non-smokers compared to $r=0.91$ and slope 1.6 for smokers. However, there appears to be a cubic regression present, which could be verified with more data. By these graphs smoking appears to take off about 7 years of a females life, if both groups exercise the same amount.



The graphs on the right show that the age groups 25-34 and 55-64 exercise the most. People between ages 35 and 54 could be so overwhelmed with getting their career going they don't have time to exercise. Once people are settled in their job or retire there is more time for activities, until they become over 65 and old age begins to set in.



Refined Question: Is there a correlation between the number of lung cancer deaths to the number of deaths by province and by smoking?



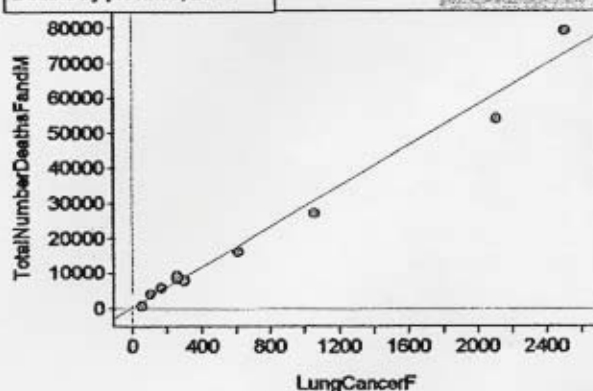
Deaths by province, 2001

Deaths by province, 2001

	Province	LungCancerM	SmokingM	LungCancerF	SmokingF	TotalNumberDeathsFandM	
1	Nfld.	240	682	100	307	4318	
2	P.E.I.	55	193	50	61	1030	
3	N.S.	430	1133	290	495	8044	
4	N.B.	350	866	160	375	5944	
5	Que.	3500	8622	2100	4216	54399	
6	Ont.	3500	10605	2500	6688	79541	
7	Man.	350	1174	250	635	9511	
8	Sask.	320	1093	250	418	8637	
9	Alta.	740	2242	600	1139	16452	
10	B.C.	1200	3443	1050	2190	27412	
11							

Deaths by province, 2001

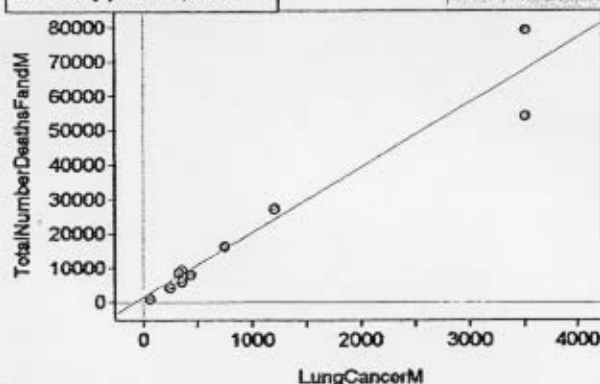
Scatter Plot



$$\text{TotalNumberDeathsFandM} = 29.0\text{LungCancerF} + 240; r^2 = 0.98$$

Deaths by province, 2001

Scatter Plot

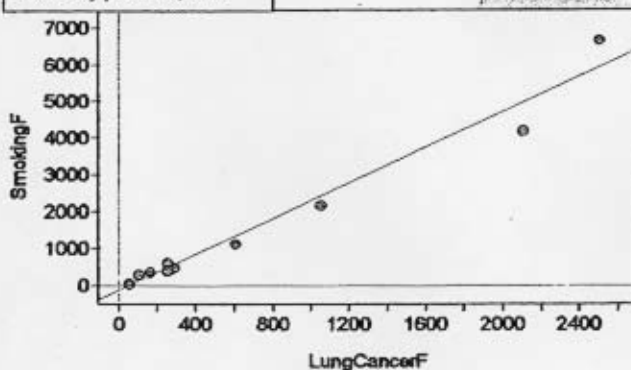


$$\text{TotalNumberDeathsFandM} = 18.9\text{LungCancerM} + 1300; r^2 = 0.97$$

These two graphs show that provinces with more lung cancer deaths have substantially more deaths in total. Females have a strong, positive, linear, correlation of $r=0.99$ and males $r=0.97$. This data demonstrates that lung cancer is very prominent in our society and causes a large number of deaths. From here I decided to look more closely into causes of lung cancer. I then compared Lung Cancer deaths to Smoking Attributed deaths by province and sex.

Deaths by province, 2001

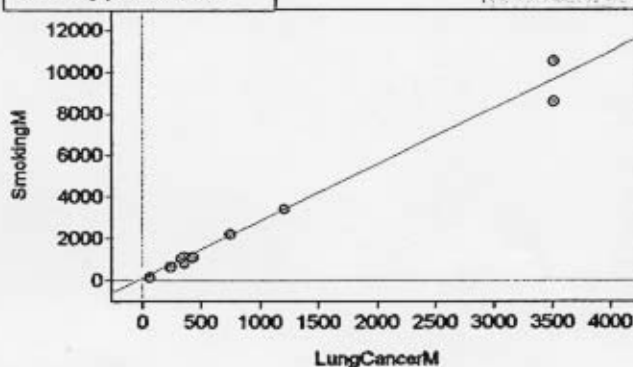
Scatter Plot



$$\text{SmokingF} = 2.43\text{LungCancerF} - 130; r^2 = 0.97$$

Deaths by province, 2001

Scatter Plot



$$\text{SmokingM} = 2.73\text{LungCancerM} + 93; r^2 = 0.98$$

These two graphs support my thesis that smoking greatly affects a person's chance of dying from Lung Cancer. The provinces with more smoking-related deaths therefore have more Lung Cancer deaths. There is a strong positive linear correlation of $r=0.98$ for females and $r=0.99$ for males. The slope of the female line is 2.43 and the male is 2.73, indicating a substantial difference between provinces. Ontario has the greatest number of deaths and P.E.I. has the least, but to truly compare the two you would need to look at both provinces' populations.

Conclusion:

Using Fathom I was able create graphs with lines of best fit, equations and correlation coefficients. I will explain my results to this point, but further research would verify my outcome. I can now answer my question, "What types of cancers are most prominent in our society for males and females?" Lung Cancer was the greatest for men until 1990 when Prostate Cancer took over. However, Breast Cancer is number one for females; Lung Cancer only becoming second in 1996 when it passed Colorectal Cancer. I compared the sexes individually and together to find patterns. I found that male incidence of Lung Cancer increased rapidly until about 1985 when it decreased rapidly. Generally, females have increased steady and quickly.

My next questions then became, "Do females have a greater life expectancy than males? How much does smoking affect life expectancy?" Females do have a greater life expectancy than males by about seven years. Smoking reduces life expectancy at least six years for females and at least five years for males.

My third asks, "What patterns appear between exercise and life expectancy of smokers and non-smokers?" My data concludes that people exercise more when they are young, then get so involved with their career they reduce their physical activity, until mid life crisis when they realize they need to be more health conscience and have more time. However, once they are over 65 years old people seem to become tired and feeble to exercise more than once a week.

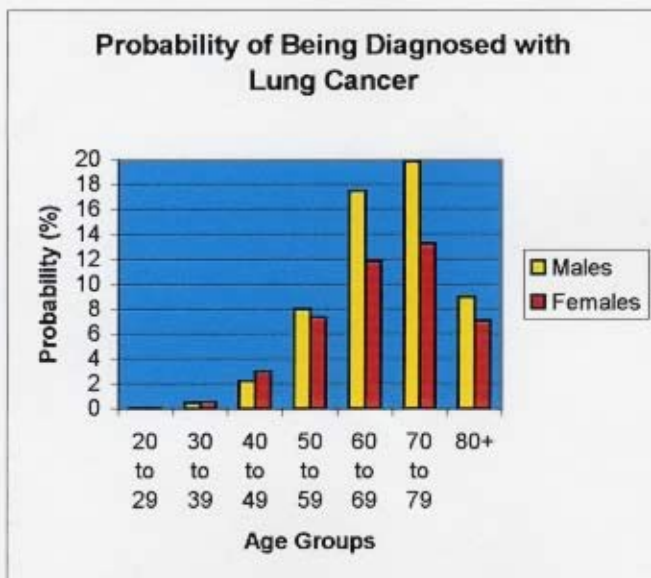
Lastly, "Is there a correlation between the number of lung cancer deaths to the number of deaths by province and by smoking?" The answer is yes. When the number of death in a province is greater, there are more deaths by Lung Cancer and more deaths caused by smoking. This reinforces my point that smoking is a main cause of Lung Cancer.

Once I got started I found many strong correlations between my data. Researching more about numbers of smokers by province, compared to deaths and amount of Lung Cancer in the area could add to my findings. However, there is no doubt that smoking has a great affect on lung cancer. By smoking people are actually paying to prematurely kill themselves. As a society we need to solve this problem and find a cure before we lose more loved ones.

Probabilities and Probability Distributions

I decided to further explore the probability of being diagnosed and dying from Lung Cancer, since the disease effects so many people. I used Cancer statistics found on Health Canada's web site. Here I divided each age group by the total to find the probability. I entered my data into Excel and produced graphs that clearly illustrate my findings.

Example Calculation (for 40-49 year old, males): $P = 470/21200 * 100$
 $= 2.22\%$



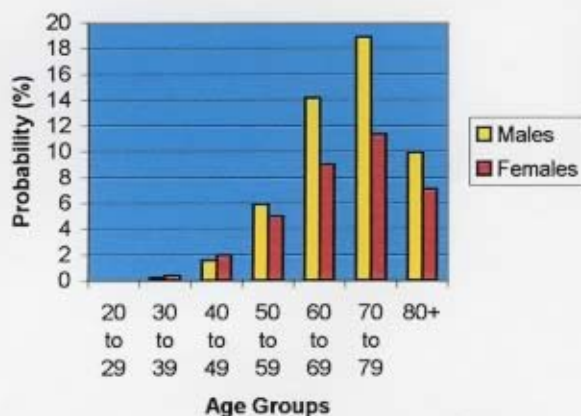
	Males	Females
20 to 29	0.07	0.05
30 to 39	0.45	0.52
40 to 49	2.22	2.97
50 to 59	8.02	7.31
60 to 69	17.45	11.79
70 to 79	19.81	13.21
80+	8.96	7.08

Males have a greater probability of being diagnosed with Lung Cancer, except between 30 and 49 years of age, when females have a slightly greater chance. Men have a 56.98% chance when totalling all age groups and women have a 42.93% chance. This shows that men still have a greater likelihood of developing lung cancer, even though women are on the rise due to such factors as increased smoking and a high fat diet.

There is a 40% probability that men will develop cancer sometime in their life and a 26.7% chance that they will die from it. Women have a 35.5% chance of developing cancer and a 22.2% probability of dying from the disease. (Found on Canadian Cancer Statistics 2001)

Now we can look at the Probability of death once diagnosed with lung cancer...

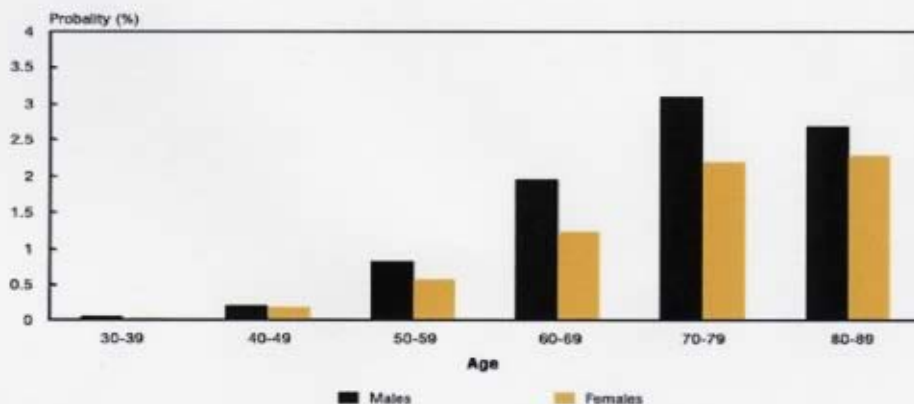
Probability of Death Once Diagnosed with Lung Cancer



	Males	Females
20 to 29	0.02	0.02
30 to 39	0.19	0.33
40 to 49	1.56	1.93
50 to 59	5.9	4.95
60 to 69	14.15	8.96
70 to 79	18.87	11.32
80+	9.91	7.08

This graph shows that the majority of people diagnosed with lung cancer die. 50.6% of the men fall under this category and 34.59% of the women. You could conclude that women are more likely to survive than men, since their probability of death is less. The data appears to leave 15.81% that were cured of the disease.

Probability (%) of Developing Colorectal Cancer in the Next 10 Years by Age, Canada



This graph found on Health Canada shows the probability of developing Colorectal Cancer. It illustrates how the chances are relatively small but still substantial and that men have a greater probability of developing the disease. If you look at the probability of getting Colorectal Cancer compared to Lung Cancer you would see that Lung Cancer dominates in affecting people's lives.

To investigate probability distribution further I would require more data broken into age groups and much time. I would then look into hidden variables and find more reasons for the trends in probability. Lung cancer has an immense effect on our society so I would continue to focus my attention in this direction.

Conclusion

Restated Thesis Statements:

Smoking causes a definite increase in the chances of getting lung cancer.

The amount of people being diagnosed with cancer is on the rise.

Most people become diagnosed and die from cancer between ages 60 – 80.

Once I got further into this project I began to focus on how smoking effects the chances of getting Lung Cancer. The provinces with more smoking related deaths therefore have more Lung Cancer deaths. I found a strong positive linear correlation of $r=0.98$ for females and $r=0.99$ for males. Ontario has the greatest number of deaths and PEI the least, but to truly compare you need to look at province's population. Therefore, I can conclude that my first thesis is true and people are paying to get a deadly disease.

The amount of people being diagnosed with cancer is on the rise. Males are more prone to getting the disease, yet have stabled off. Women have a substantially lower chance, but are on the rise, especially when studying Lung Cancer. Overall, men have a 56.89% probability of getting Lung Cancer, where women have a 42.93% chance. When looking at deaths and survivals from the disease, 50.6% of men diagnosed with Lung Cancer will perish. However, women only have a 34.59% chance, which suggests that females can fight the disease longer. A mere 15.81% appear to be cured of Lung Cancer.

Most people are diagnosed and die from cancer between 60-80. However, there appears to be a dramatic increase in your chances of being diagnosed at 50 years of age. This increase begins to level off over 75 when most have already been diagnosed and will perish. The male and female mortality has an exponential curve, as people get older they are more likely to die from cancer. Still, males have a greater slope then females. Between ages 60 to 80 males use 36.9% of their 56.98% chance of being diagnosed with Lung Cancer and 33.02% of 50.6% probability of dieing from cancer. Women use 24.42% of there 42.93% in the same age span and 20.28% of 34.59% probability of perishing from the disease.

After researching and analysing all my data I can confirm the validity of my thesis statements. Smoking does cause an increase in the chances of getting Lung Cancer and therefore people are prematurely killing themselves. We need to stop people from picking up this deadly habit before they start. With more time and resources I would further look into how smoking effects life expectancy and why men are more prone to cancer then females. Most of my data was taken from the Canadian Census, but a larger sample size on smoking related deaths and amount of exercise could further verify my outcomes. This project was very thought provoking and informative.

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