

Factors affecting Thyroid Condition in human beings

Locating the areas of interest(topic selection):

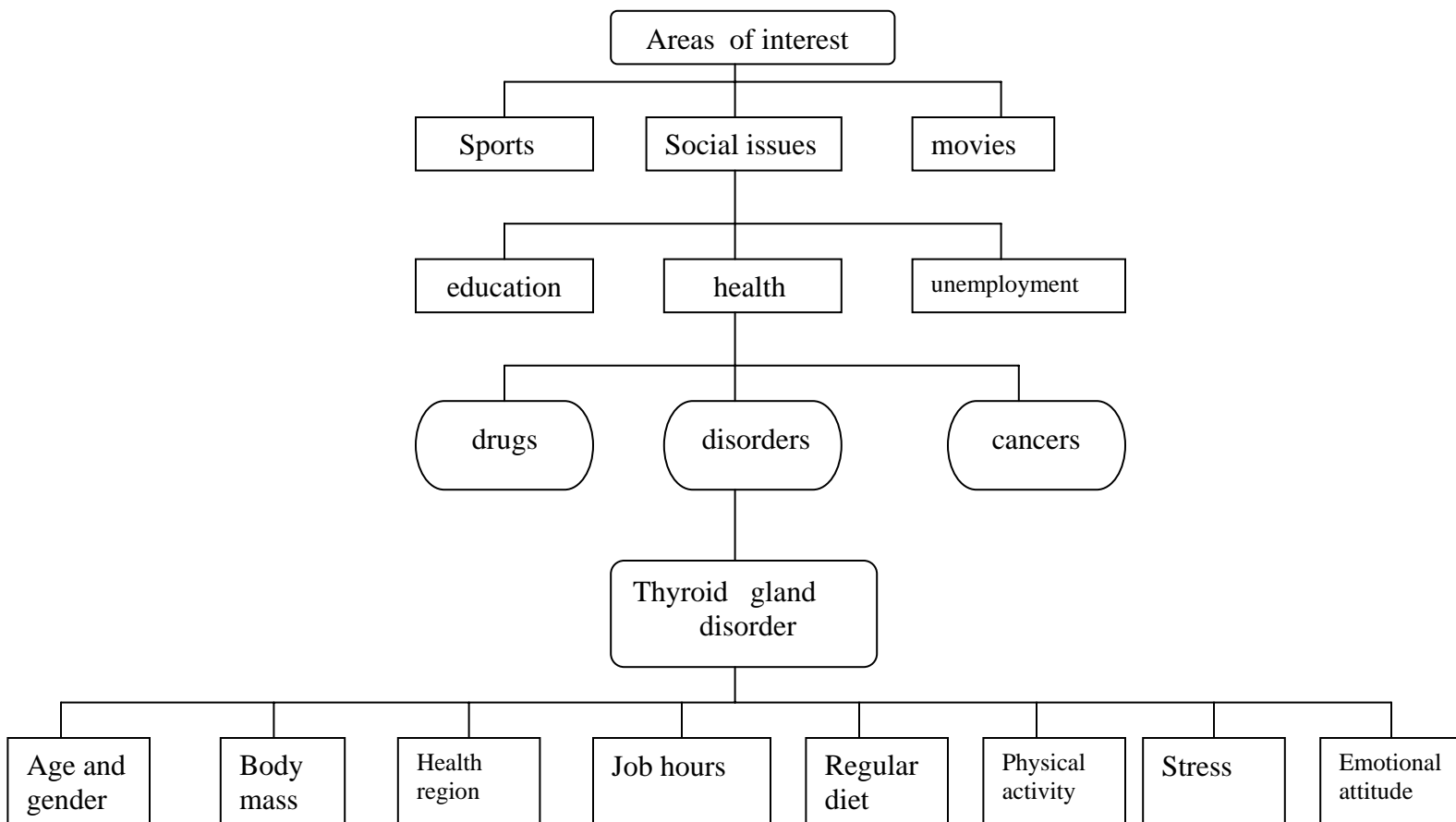
When attempting to select my project topic. I came across many areas of interest that my project could be based on such as health, Sports Movies and music etc. But when creating mind map I narrowed it down to researching something related to health.

After doing some search work I came with an idea to do my project on drug abuse, as it is a serious problem that our society is facing. I came up with several questions that can be considered such as Is there a connection between drug abuse and various family units(single parent family, family with many siblings etc. When I began to look for the data I realized that there was not enough data available regarding this topic.

I decided to look for a new topic, the search work this time for a new topic was not that time consuming as I already decided to search in the field of health and I finally came up with a topic: Thyroid condition in human beings. The topic not only interested me but it is also linked to my family through my mother who suffers from thyroid deficiency.

Question: What are the factors that affect thyroid condition in human beings ?

Mind map:



Thyroid condition(basic information):

Thyroid disorder is one such disease that is becoming common among teens as well as adults. It is marked either by underactive thyroid gland which leads to Hypothyroidism, or an overactive thyroid gland which leads to hyperthyroidism. Both of these conditions are a result of improper functioning of thyroid glands that fails to produce adequate insulin for the body. It is characterized by low, metabolism, weight gain or weight loss, fatigue, stress, muscular and joint pains etc. I used this information to predict what factors might have an impact on the functioning of thyroid gland.

In Canada thyroid disorders are estimated to affect one in twenty. Thyroid disorders are mostly 5-7 times more common in women than in men.

Hypothesis:

Based on the information that I collected about thyroid condition. I hypothesized that following factors have an impact on thyroid condition in human beings:

Age and gender

Body mass.

Health regions

Emotional attitude

Physical activity level

Regular diet

Job hours

stress level

Locating Data (procedure): I began looking for the Canadian data using health survey sites and programs. It was necessary to use internet engine, and open all search results until appropriate data was found from seemingly reliable source. The first site that I looked at was:

<http://www.statcan.ca/start.html>.

This site helped me to locate various health regions in Canada but this site did not cover all the aspects of health so I decided to use a program that particularly focus on health issues. The program was called *Canadian community health survey (CCHS)*. The software(CCHS) allowed me to organize data into spreadsheets comparing two or more variables. I decided to have a separate spreadsheet for each Factor that I hypothesized. The next

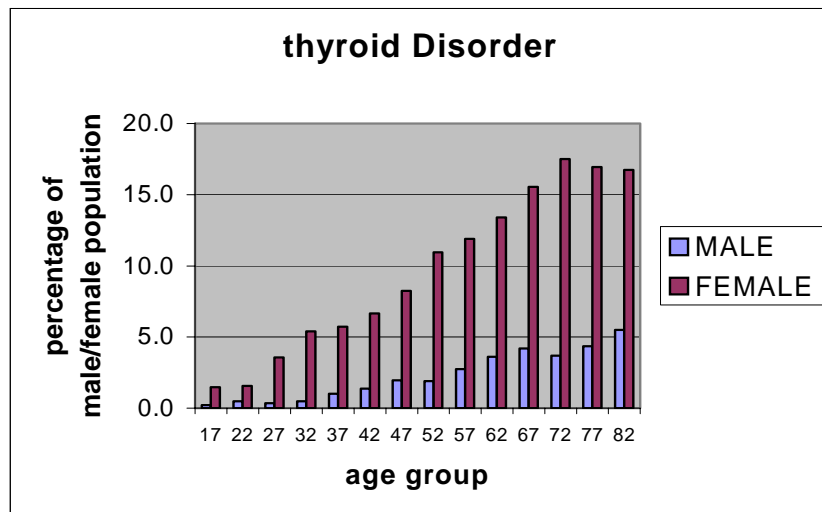
important step was to use technology to convert data into usable form and to make graphs from it. I used excel to convert it into percentages(close one decimal place). I used the same excel program to do my graph as it was more convenient to have graphs and the data together in a spread sheet. Once the data was found from the software I entered it into the specific excel spreadsheet from which graphs were constructed. I used excel to create bar graphs as well as scatter graphs and also conducted linear and non-linear regression for each scatter graph to get the correlation Coefficient. The important operation before doing the graphs was to take out all the outliers so that the result given by the data are not biased. Furthermore I used fathom and excel to calculate the mean values and other measures of central tendency and measures of spread as these measures are one important technique to be used to analyze the data. Data collection was simple and easy using CCHS but converting data into percentages and doing graphs in excel was trickier and the most important step as well because all the analysis depend on the results that these graphs produce.

Data analysis:

The analysis of my report will be based on the individual analysis of each factor that I considered have an impact on thyroid condition:

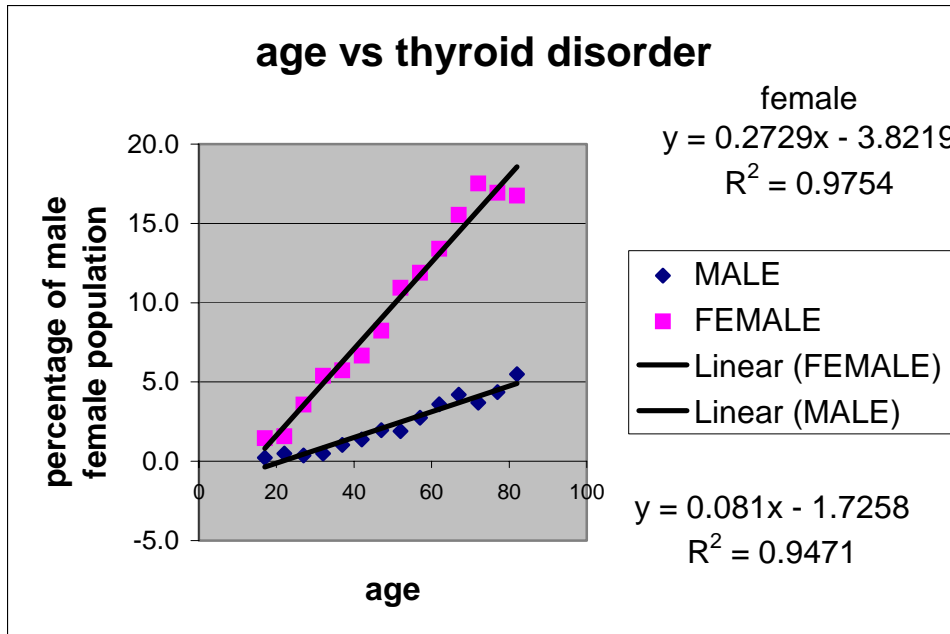
1. Do females tend to have more cases of thyroid disorder than males? What role does age play in the development of thyroid disorder in human beings?

My prediction that age and gender has an impact on thyroid condition is proved by the following graph :



The graph shows a distinction between the thyroid condition in males and females. One important point of my background search was that thyroid disorder is 5-7 times common

in female population than in males. The graph proves my hypothesis and the figures further illustrate this as the female population suffering from thyroid disorder has the range of 17.3 from 0.2% to 17.5% with the mean value of 9.8 and the median of 9.6 .The standard deviation (5.77) shows that the population does not clusters around the mean population (9.8). Male population has the range of 5.3 from 0.2 to 5.5% and a mean value of 2.3 which is a lot lower than females and the median shows that half of the population is above 1.95 and half is below . The standard deviation of 1.74 shows that the data clusters around the mean. Age also seems to play an equally important role in both males and females.



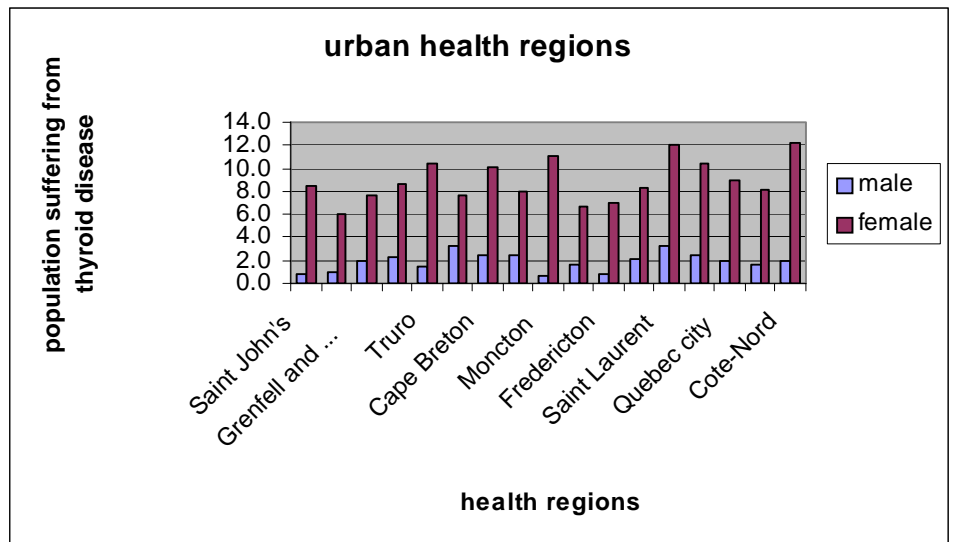
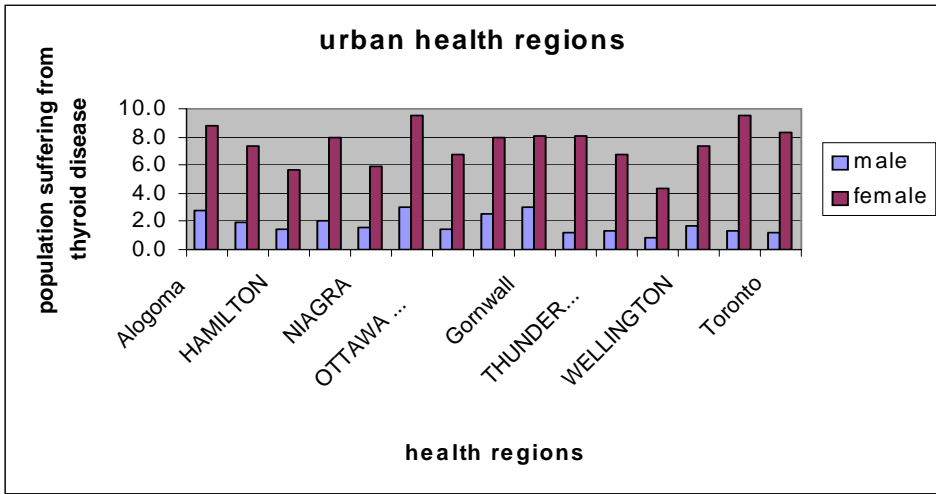
One important step for convenience in doing graph is to calculate the mid-point of each age group when converting data into percentages and then use it to graph relationships. The average age of male and female population having thyroid disorder is 49.5. The graph shows strong positive linear correlation between age and male/female population having thyroid disorder and thus it shows that the cases of thyroid disorder increases with age. The fact that females in Canada have more thyroid disorder cases than males encourages the idea that males and females might have different factors that affect their thyroid condition but age is one such factor that is strongly correlated with both the male and female population suffering from thyroid disorder

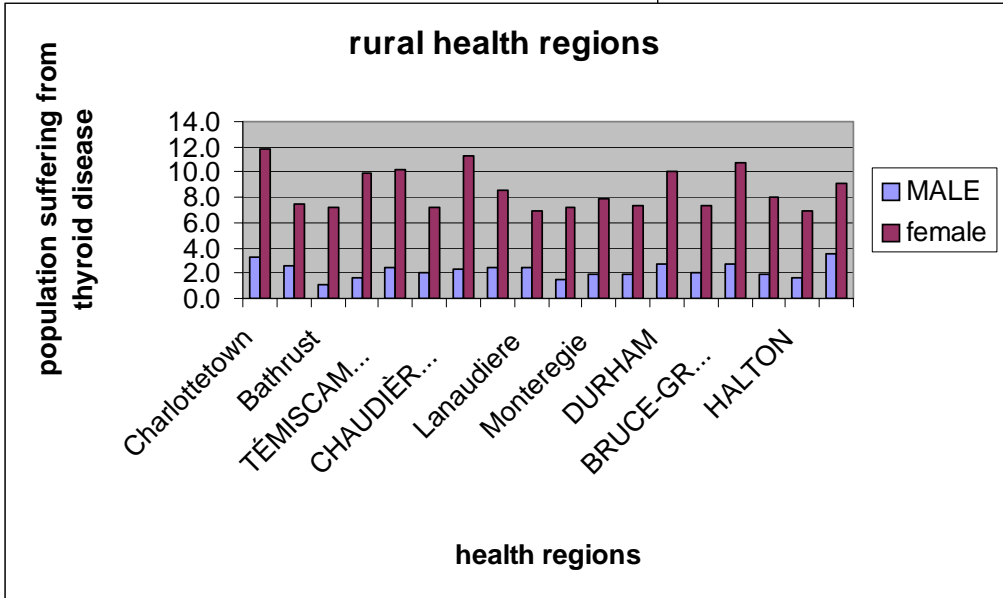
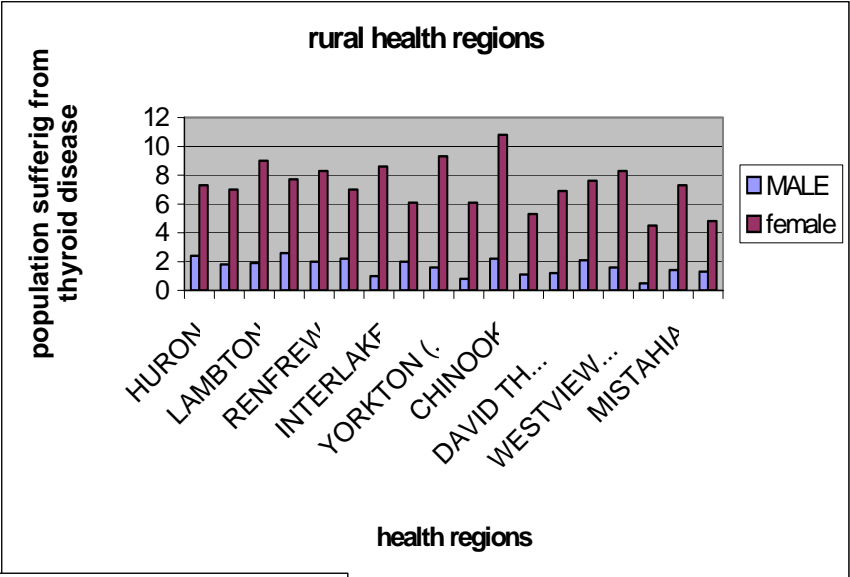
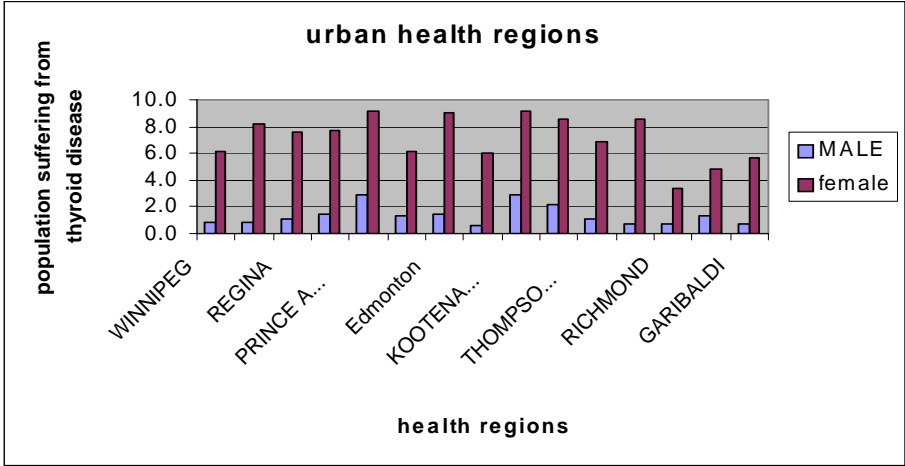
Other statistical information

IQR (female): 10.1	IQR(male):3.2
Q1 (female):5.4	Q1(male):0.5
Q3 (female):15.5	Q2(male):3.7

2. **In which part of the country there are more cases of thyroid disorder rural or urban?**

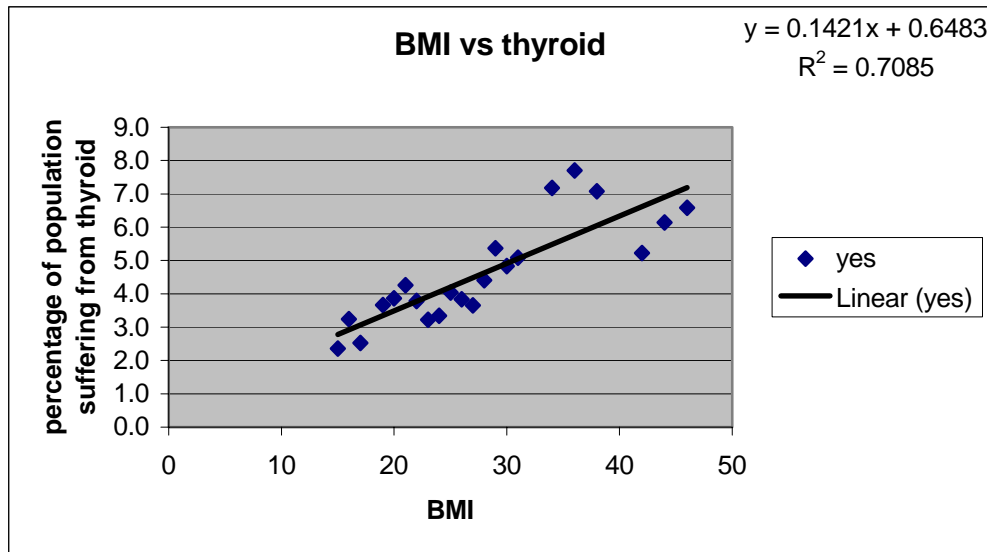
I divided various rural and urban health regions into small groups so that they are easier to graph and analyze. The graph shows that area of living is not an appropriate factor that might produce a change in thyroid condition as the percentage of male population suffering from thyroid disorder in rural areas is in the range of (2.8) with the mean value of 1.9 and standard deviation of 0.65 whereas the range of males in urban areas is (2.6) with the mean value of 1.7 and standard deviation of 0.77. Female population in urban areas has the range of 8.8, mean value of 7.9 and standard deviation of 1.77 and the female population in rural areas has the range of 7.9 mean of 7.9 and standard deviation of 1.73. There is a very little gap between the range of the male and the female population having thyroid disorder in both rural and urban areas and there is no real significant difference between the mean value of population suffering from thyroid disorder in rural and urban areas, therefore thyroid disorder is not influenced by health regions. The graphs for both rural and urban areas show that in every city females have a higher ratio of thyroid disorder than males. I compared rural and urban health regions thinking of the external factors such as the damage to the environment by pollution and busy life style and higher stress level, all these contribute to make life in urban areas harder than in rural areas I predicted that people in urban areas are at a high risk of thyroid disorder. From the graph and mean measure it is evident that the area of living has a very little impact on thyroid disease.





3. Is there a strong correlation between higher body mass and thyroid condition?

My indication that Body mass index is another tool to predict whether the person can be at a risk of thyroid disorder is illustrated by the following graphs.



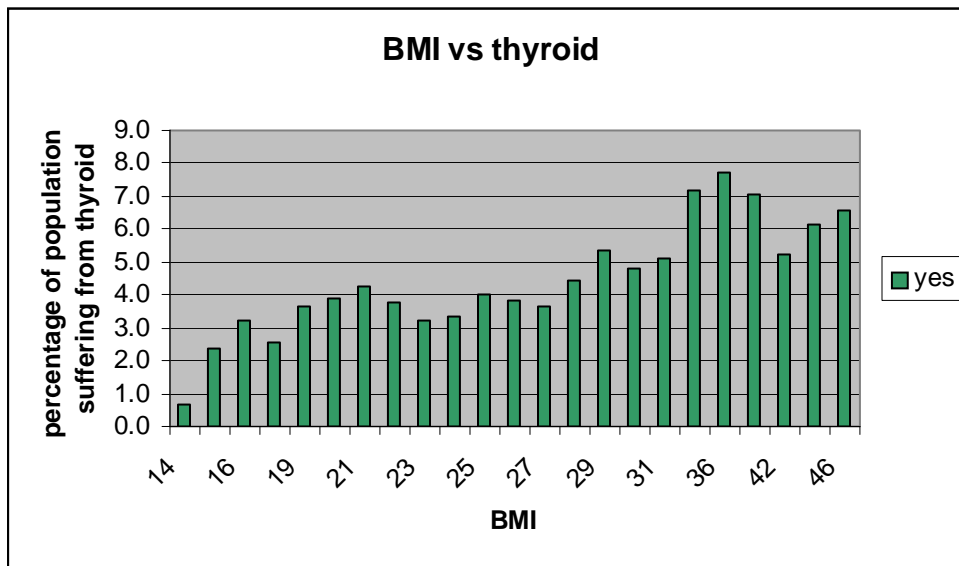
The graph shows a linear positive correlation between body mass index and thyroid disease. The relationship is understandable as high BMI results in obesity and can cause the improper functioning of the body. According to the graph if the body mass is higher the percentage of population having thyroid disease will be higher. I included measures of central tendency and measure of spread of thyroid population to analyze the data more efficiently.

BMI	Percentage of population suffering from thyroid disorder
15	2.4
16	3.2
17	2.5
19	3.7
20	3.9
21	4.3
22	3.8
23	3.2
24	3.3
25	4.0
26	3.8
27	3.7
28	4.4
29	5.4
30	4.8
31	5.1
34	7.2
36	7.7
38	7.1

42	5.2
44	6.1
46	6.6

Mean population	4.4
Median	4.0
St deviation	1.698678
range	7
IQR(population)	2.1
Q1(population)	3.3
Q3(population)	5.4

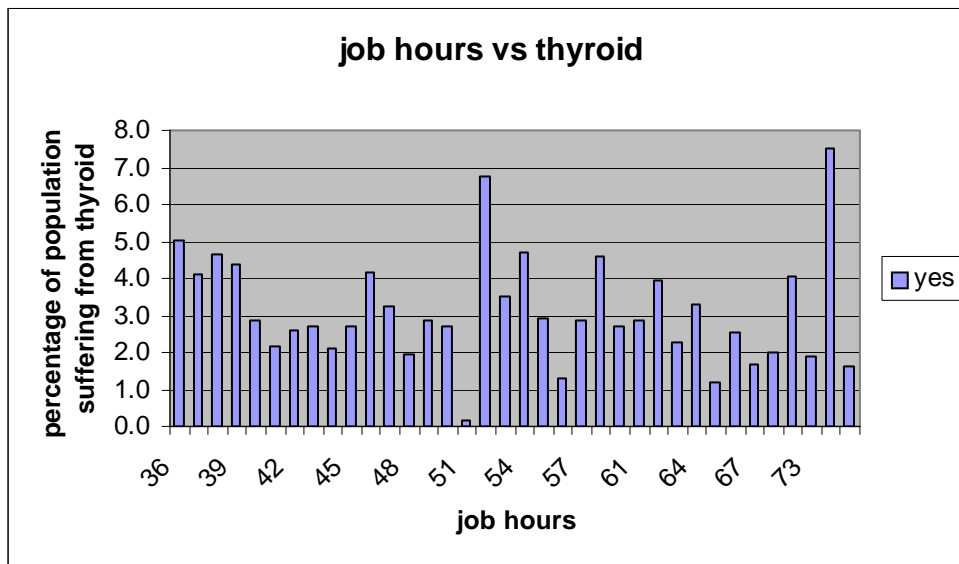
The standard deviation measures how closely the population is clustered around the mean value of 4.4 in the range of 7. The median value of the body mass index is 26 BMI whereas the median value of the population is 4.0 and the graph also shows that half of the population is above 4.0 and half is below. The data table also illustrates that the population above the median tend to have higher body mass and this is what makes the relationship between BMI as perfectly linear.



Earlier in my project when I started analyzing the relationship between thyroid condition and various other factors. I used actual body weight in Kg but when I referred back to my research on thyroid disorder I thought BMI would be a better measure as thyroid patients are expected to gain weight if they suffer from hypothyroidism. Therefore it is important to have some background information of the topic. Also I used very convenient way of data collection, using the program CCHS it was always possible to add up any new factors in my project for comparison and analysis.

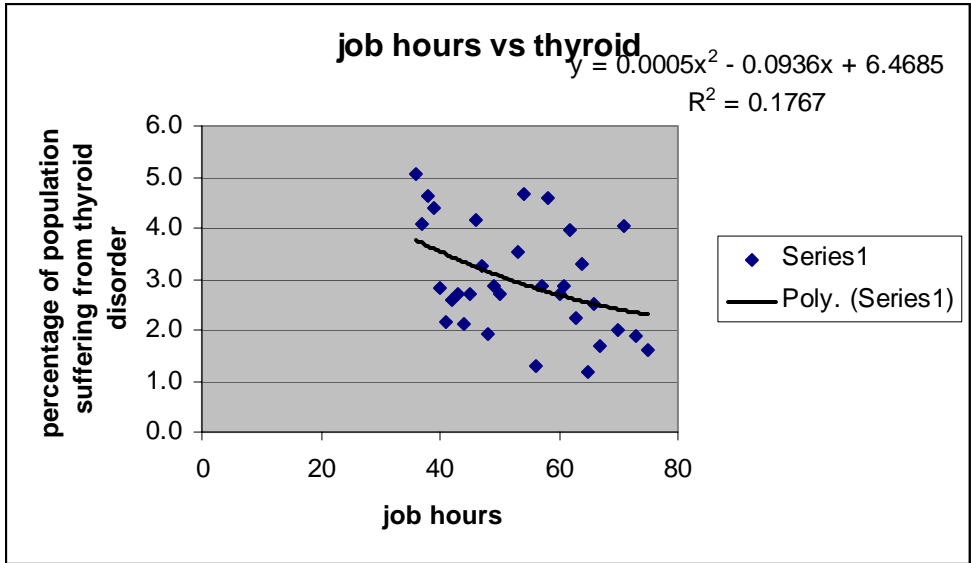
4. Is there a linkage between job hours or stress level and thyroid condition ?

I predicted that job hours are related to thyroid disorder. The hypothesis was not strong. The analysis of this relationship are based on the following graphs. Normally if a person works from 8 hours daily than total working hours per week will be up to 56. Thinking that increase the working hours can increase fatigue or work stress which can have a worse impact on thyroid disorder I considered job hours an important estimate of thyroid disorder.

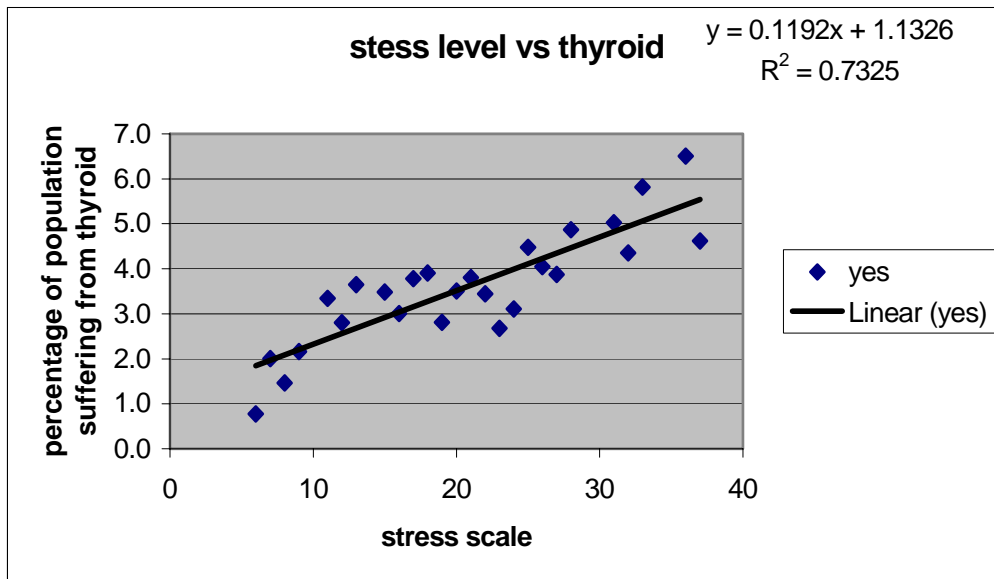


mean	3.1
Standard deviation	1.488227
range	7.3
IQR	1.9
Q1	2.1
Q3	4
Median	2.8

The standard deviation is 1.5 which shows percentage of population suffering from thyroid clusters around the mean in the range of 7.3. The range of job hours is 3.9 with the mean value of 54.2. The graph shows that job hours do not have a strong impact on thyroid condition. For example out of the population that works for 54 hours only 7% has thyroid disorder whereas from the population that works for 67 hours only 1% has thyroid disorder. The increase in the job hours does not reflect an increase in the percentage of population suffering from thyroid disorder. The correlation between job hours and thyroid condition does not appear to be strong and the regression is non-linear.



Thus it is not worthwhile to say that if people work longer they are expected to have thyroid disorder. However analyzing the impact of stress on thyroid condition can lead to a new hypothesis. The relationship between thyroid condition and stress level shows a strong positive correlation.



stress scale	Percentage of population suffering from thyroid disorder
6	0.8
7	2.0
8	1.5
9	2.2
11	3.3
12	2.8
13	3.7
15	3.5
16	3.0
17	3.8
18	3.9
19	2.8
20	3.5
21	3.8
22	3.4
23	2.7
24	3.1
25	4.5
26	4.0
27	3.9
28	4.9
31	5.0
32	4.4
33	5.8
36	6.5
37	4.6

mean	3.6
standard deviation	1.261695
range	5.7
IQR(population)	1.6
Q1(population)	2.8
Q3(population)	4.4
Median	3.6

The graph shows that higher the stress level the greater the percentage of population suffering from thyroid will be greater. Thus stress have an impact in worsening thyroid condition. The relationship is understandable as higher stress level can cause trouble in the secretion of hormones and in the functioning of the body glands. The average stress level is 20.6 with the median value of 20.5 in the range of 31. The reason why job hours have no impact on thyroid condition is because some people choose to work longer if their job is less stressful. Thus stress level is better measure as higher stress levels are expected to have a negative impact on health. It also have a negative impact on thyroid condition. According to the graphs the median value for thyroid population is 3.6 and the population above the median has higher stress level, this is what makes this relationship

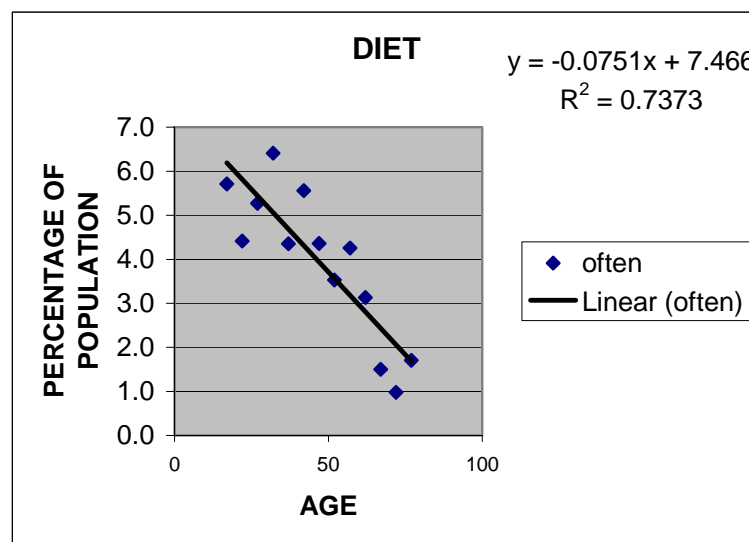
linear, increase in the stress level will result in an increase in the percentage of population suffering from thyroid.

5. Do people with poor diet have a thyroid disorder?

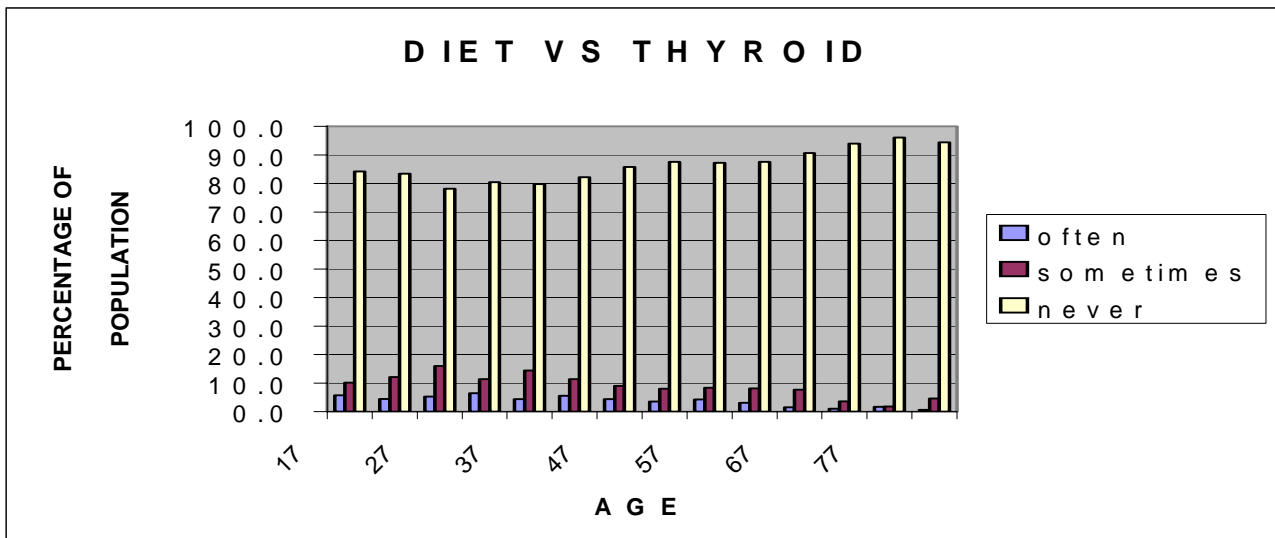
Diet plays a very important role in the development of a disease in the body. It is believed that people who have inadequate diet will make up the percentage of those who suffer from thyroid disorder. My analysis of the relationship between diet and thyroid disease are based on the following graphs.



The graph shows a big difference between people who have thyroid condition and their regular diet. People who often did not eat the desired quality of food have the highest percentage of thyroid disorder. This is understandable as these people are most likely to lack sufficient nutrition needed for the proper functioning of the body. But one important fact that arises from the graph is that people who always eat proper food have more cases of thyroid disorder than those who sometimes take risk and do not eat the desired quality or quantity of food. If diet has an impact on the thyroid condition than people who never did not eat the desired quality of food or always eat perfectly should have the lowest percentage of population suffering from thyroid. To get more clear view I analyzed how strong the relationship between diet and thyroid disease is. I carried out linear regression for people who often did not eat the desired quality of food and the graph produce following outcomes.



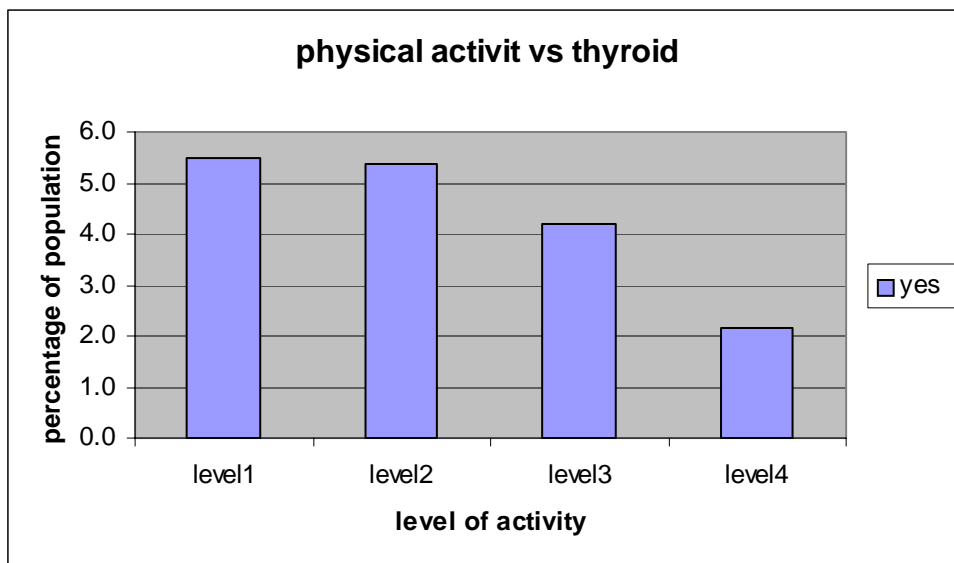
The relationship between people who often did not eat the desired quantity of food and have thyroid condition shows a negative linear correlation. Thus from the graph I analyzed that people in their young age tend to be more careless about their diet and the result of their poor diet contributes in worsening thyroid condition. Thus for this group of young people diet plays important role but for those who are in mature age there are other factors that add up in worsening thyroid condition. Another way of analyzing this is by comparing the diet and level of thyroid of people of different age groups.



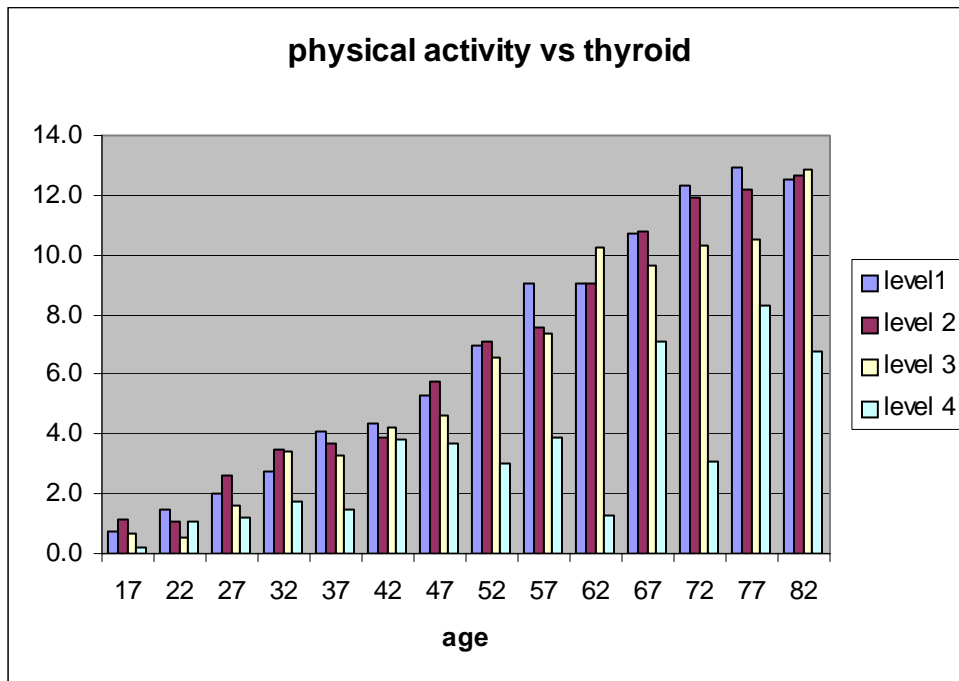
The graph illustrates that people in late 50's and above tend to be more careful about their diet than those who are young. People in mature ages have less population who have thyroid due to the fact that they often did not eat the desired quality of food. Thus diet seem to have an impact on thyroid condition for those who are in young age. For the people who are older there might be other factors that play the dominant role in worsening thyroid condition. Thus poor diet can be considered as one factor why young people have thyroid.

6. What role does physical activity plays for those who have thyroid disorder?

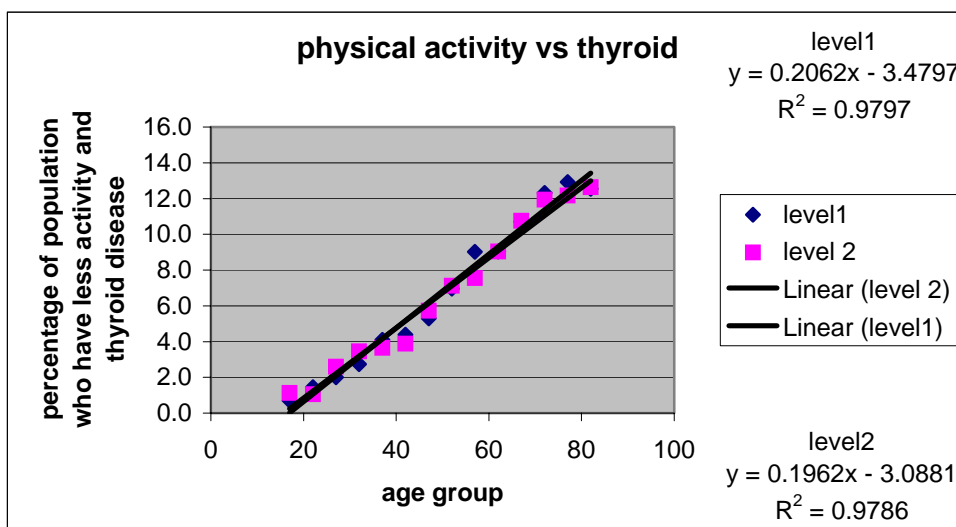
To analyze the impact of physical activity on thyroid condition I compared the percentage of population suffering from thyroid with the level of physical activity. My analysis are based on the following graph.



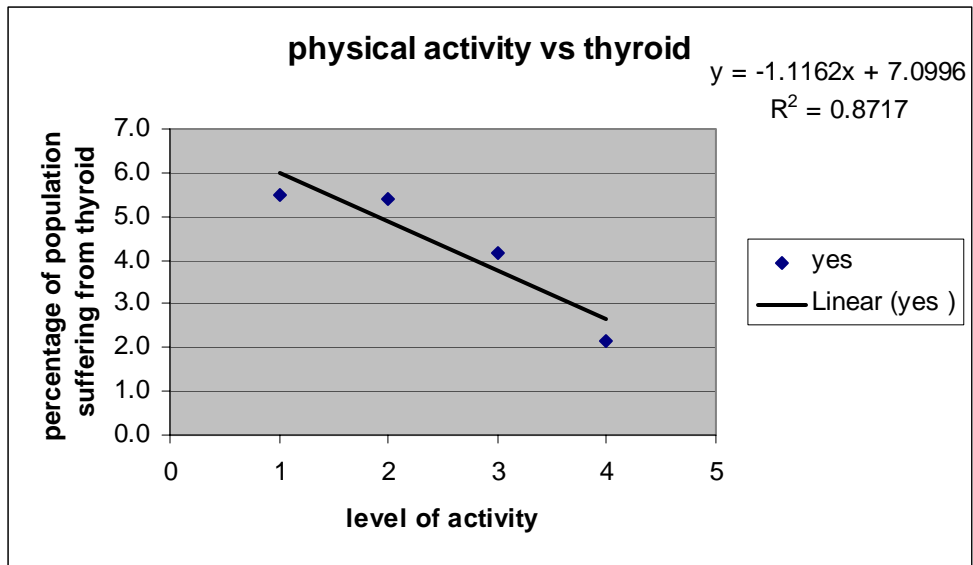
The graph shows 4 different levels of physical activity (level 1 the lowest one and level 4 the highest one). At level 1 the percentage of population suffering from thyroid is highest and the percentage decreases as the level of physical activity increases. Thus it can be concluded that physical activity is important for the efficient functioning of thyroid gland. I compared various physical activity level of the people suffering from thyroid disorder at various age groups.



For each age group the percentage of thyroid cases is less at level 3 and 4 i.e. as level of physical activity increases for each age group less people have thyroid which leads to the idea that physical activity is strongly correlated with thyroid condition. The graphs shows that with age percentage of population who have less physical activity increases and thus the percentage of thyroid disorder increases. To get the better understanding of how less activity leads to high percentage of thyroid disorder I determined the correlation between the two.

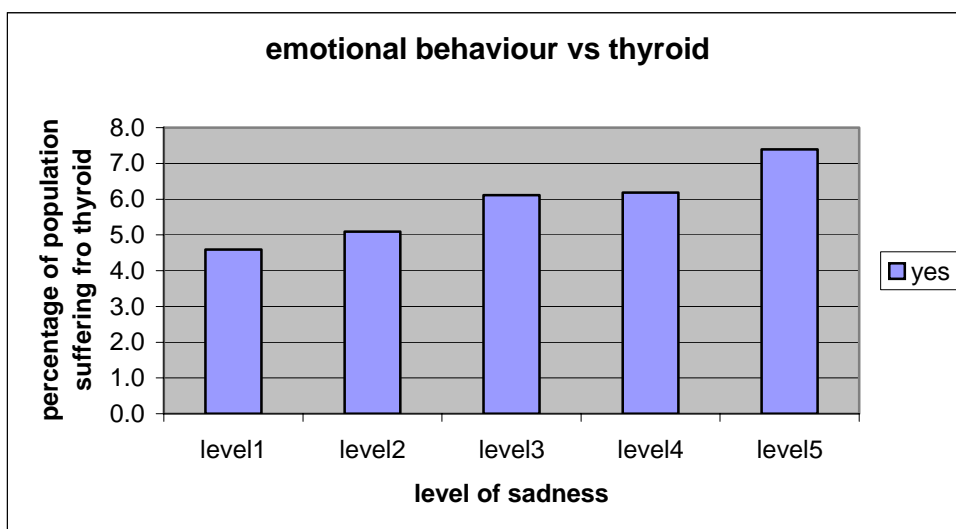


The graph shows strong positive linear correlation between the population suffering from thyroid disease with low physical activity level and age. The relationship is understandable as with age the level of physical activity is likely to fall and this can result in high percentage of population suffering from thyroid disorder. However physical activity itself has a negative correlation with the percentage of population suffering from thyroid. The correlation is negative because increase in the level of physical activity will reduce the percentage of thyroid disorder cases.

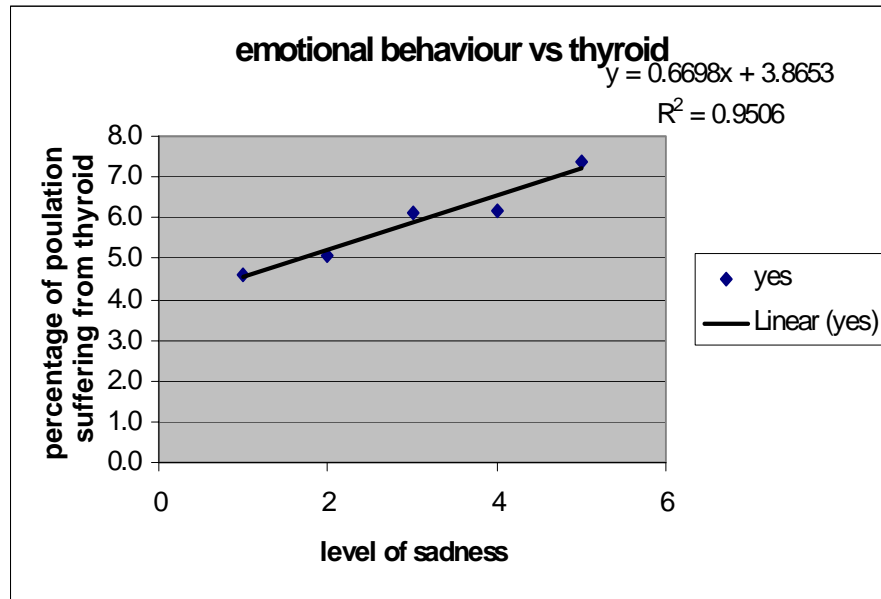


7. Is there a linkage between emotional behavior of a person and thyroid condition?

Thyroid patients are expected to have strong emotional reactions. The following graphs shows the relationship between the emotional behavior and thyroid disease.



The emotional behavior of a person is divided into five levels of sadness. Level 5 being the highest level of sadness has the highest percentage of thyroid disease. Thus from the graph conclusion can be made that the risk of thyroid disease increases with the level of sadness. The relationship between emotional behavior and thyroid shows strong positive linear correlation with the correlation coefficient of coefficient of 0.9506.



The only problem that I had with data analysis was that for some of the factors that I hypothesized I compared them to the male and female population separately instead of comparing the factors to the whole population that suffers from thyroid. The results showed that for all the factors females have strong positive linear correlation than males. The difference in the correlation might be due to the disparity in range thyroid cases of males and females. Later I realized that due to the huge gap between thyroid condition in males and females, its a better idea to compare the factors with different age groups of the population that suffers from this disease.

Conclusion:

Based on my analysis of each factor the conclusion that best fits in is that females are at a high risk of thyroid disorder than males and thyroid condition has strong positive correlation with age, BMI and stress level and emotional behavior . Increase in age, stress or BMI will result in an increase in the percentage of population suffering from thyroid disorder. Emotional behavior of a person indicates how the person feels for his life. People who have thyroid disorder tend to be more dissatisfied with life and my analysis also showed that the percentage of thyroid disease is high for those who have high level f sadness. Thus the emotional behavior has a strong impact on thyroid condition. On the other hand insufficient diet and physical activity have negative correlation with thyroid condition. Percentage of population who did not eat the desired quality of food decreases

as age increases which causes thyroid disease to decrease for those who have careless attitude towards diet and thus the correlation between the two appears negative but strong. Physical activity is one of the major indication of health and has the strong negative correlation with thyroid disease. The relationship is understandable as the increase in the level of physical activity will reduce the percentage of population suffering from this disease. All these factor have an impact on thyroid condition and thus the risk of thyroid for a certain population can be predicted by looking at these factors. Factors that showed a very little or no impact on thyroid condition are health regions and job hours. Both of these factors are not appropriate in predicting the risk of thyroid. Thus out of those eight different factors that I hypothesized, six of them have an impact on thyroid condition.

There is a possibility that the results could be biased because the data from the program CCHS is the result of the survey carried out for the grouped population . As the survey did not provide micro data my analysis could only reveal the trends in the data. It does not include the individual analysis of the people suffering from thyroid disorder. For example I compared physical activity with thyroid condition and determined that people who are at the lower level of physical activity have thyroid disorder but this does not necessarily mean that these are the only people who have thyroid disorder or who have less physical activity level. Thus if the data was surveyed at the micro level it could have resulted in non-biased strong conclusion.