ECON 299 EXAMPLE PAPER:

Canadian Pregnancy Rates among Two Age Groups from 1974 to 2005

ECON 299 - ECON 299 (LEC A2 Spring 2022)

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1. Thesis

This paper will analyze the annual teenage pregnancy rates per 1,000 females of two age groups, 15 to 17 years and 18 to 19 years, from the year 1974 to 2005, as well as the relationship between the two age groups' pregnancy rates.

2. Data and Variables

The first variable, pregnancy rates of females aged 15 to 17 years (hereinafter referred to as "15 to 17 PR"), is an annual pregnancy rate defined as the number of pregnancies per 1,000 females within the age group 15 to 17 in Canada.

The second variable, pregnancy rates of females aged 18 to 19 years (hereinafter referred to as "18 to 19 PR"), is an annual pregnancy rate corresponding to the number of pregnancies per 1,000 females within the age group 18 to 19 years in Canada.

According to Statistics Canada, rates are calculated by taking the number of total pregnancies of the same age group divided by the female population of the same age group and then multiplying the result by 1,000. (Statistics Canada)

Statistics Canada defines pregnancies as equal to "the sum of: live births, induced abortions, and fetal loss (including stillbirths and hospitalized cases of miscarriages, illegally induced abortion, other and unspecified abortion). Cases of abnormal products of conception (for example, moles, missed abortions, and ectopic pregnancies) are not included". (Statistics Canada) The number of pregnancies was counted based on the termination date rather than the conception. Statistics Canada gathered all pregnancies from the following databases, surveys, and estimates: (1) Hospital Morbidity Database, which contains data came from provincial ministries of health; (2) Vital Statistics - Birth Database, which contains information on all live births obtained from provincial and territorial registries in Canada; (3) Vital Statistics - Stillbirth Database, which contains information on all stillbirths obtained from provincial and territorial registries in Canada;

and lastly (4) Annual Demographic Estimates: Canada, Provinces, and Territories, which data were obtained by conducting various censuses all across Canada.

Both variables cover data from January 1, 1974 to January 1, 2005. 1974 data refers to pregnancies from January 1, 1973 to December 31, 1973, and the 2005 data refers to pregnancies from January 1, 2004 to December 31, 2004.

3. Literature Review

The journal article, *Teenage Pregnancy in Canada, 1975-1987* by Surinder Wadhera and John Silins, written in 1990, analyzes teenage fertility rates and pregnancy in Canada from 1975 to 1987 among females aged 15 to 17 and 18 to 19.

Wadhera and Silins pointed out that from 1981 to 1987, the teenage pregnancy rate declined by an average of 4.4% per annum. The average annual pregnancy rate for the 18 to 19 age group is two to three times more than that of the 15 to 17 age group. During the 1975-1987 period, there was a declining trend in the teenage pregnancy rate.

Wadhera and Silins imply that the change in teenage pregnancy rates is attributable to the following factors: marital pattern, availability of contraception or lack thereof, the prevalence of contraceptive use, coverage of pregnancies in the media, sex education, provision of clinic contraceptive services, prevention of unwanted pregnancies, sexual behavior, and fertility rates. For example, the marital pattern shows that, as time goes by, women are getting married later in life; as a result, teenage pregnancy rates tend to go down. The article alludes that pregnancy rates have a negative correlation with the availability of contraception, prevalence of contraceptive use, negative coverages of teenage pregnancy rates in the media, sex education, provision of clinic contraceptive services, and prevention of unwanted pregnancies. On the contrary, pregnancy rates have a positive correlation with fertility rates and sexual behaviour. The authors

concluded the article by saying that the association between pregnancy rates and these factors has not been properly documented.

4. Individual Statistical Analysis

	15 to 17 PR	18 to 19 PR
Sample Mean	26.85	68.78
Median	27.30	69.10
Variance	25.98	79.47
Standard Deviation	5.10	8.91
Minimum	15.80	49.00
Maximum	34.40	84.20
Range	18.60	35.20

From the above statistics, we see that the average, median, minimum, and maximum of pregnancy rate among females aged 15 to 17 are higher than the average, median, minimum, and maximum of pregnancy rate among females aged 15 to 17. The average 15 to 17 PR is about 26.85 per year, whereas the average 18 to 19 PR is about 68.78 per year. The median of 15 to 17 PR is 27.30 per year, whereas the median of 18 to 19 PR is about 69.10 per year. The mean of 18 to 19 PR is approximately 2.6 times higher than the mean of 15 to 17 PR. This is consistent with the findings in the literature section. Further, the highest 15 to 17 PR (34.40) is less than the lowest 18 to 19 PR (49.0). The higher pregnancy rates within the older age group can be attributed to the fact that older teenagers are physically and mentally more mature and are more sexually active than younger teenagers. The lowest pregnancy rate among females aged 15 to 17 is 15.80. The lowest pregnancy rate among females aged 18 to 19 is 49.00. On the other hand, the highest pregnancy rate within the 15 to 17 age group is 34.4. The highest pregnancy rate within the 18 to 19 age group is 84.2. As shown in Appendix B-2, the minimum values for both variables are higher than the lower fences; similarly, the maximum values for both variables are less than the upper fences. As such, there are no outliers for both variables.

The trend is similar for both age groups. Referring to Appendix C-1, the pregnancy rate of both groups decreased from 1974 to around 1985 and then increased from 1985 to 1994 and then there was a downward trend from 1994 to 2005. Referring to Appendix C-2, the two graphs are almost parallel to one another, which implies that the difference between each group tends to be constant.

Since the two variables (pregnancy rates of two age groups) are relatively similar, they can be compared using the variance. As 15 to 17 PR has lower variance and standard deviation than the 18 to 19 PR, the 15 to 17 PR distribution is less spread out than the 18 to 19 PR distribution. Referring to Appendix C-1, the graph is consistent with the variance and standard deviation calculations. The graph for the 18 to 19 PR graph has relatively more fluctuations, and the graph for the 15 to 17 PR is relatively flat. Moreover, since there are no outliers in the observations, the two variables' ranges provide evidence of the difference in the degree of dispersion. The range of 18 to 19 PR is 35.2, which is larger than the range of 15 to 17 PR, which is 18.60.

Overall, this data shows that the 18 to 19 PR on average is higher than the 15 to 17 PR, and both age groups tend to follow the same trend. The 18 to 19 PR distribution is more spread out than the 15 to 17 PR distribution.

5. Related Statistical Analysis

COV	42.5945
COR	0.9374

The table above shows the covariance between the pregnancy rates of two age groups is 42.59, with a correlation of 0.94. This indicates a very strong positive correlation since the correlation coefficient is close to 1. This means that if the pregnancy rate of one age group increases at a specific time, the pregnancy rate of the other group tends to increase as well.

However, while these variables are strongly correlated statistically, they are not related. Instead, there are extraneous factors associated with the increase or decrease of pregnancy rates of the two age groups, 15 to 17 and 18 and 19. Wadhera and Silins believe that these extraneous factors include marital pattern, availability of contraception, the prevalence of contraceptive use, coverage of teenage pregnancies in the media, sex education, provision of clinic contraceptive services, prevention of unwanted pregnancies, sexual behaviour, and fertility rates. Moreover, these two age groups are close to one another; therefore, the factors that are associated with one age group are likely associated with the other age group as well. For greater clarity, since this is an observational study, we cannot prove causation. We have no evidence to prove that the increase or decrease of pregnancy rates of one age group causes a decrease or increase in pregnancy rates of another. Instead, we see a comovement between the two variables that are associated with extraneous factors listed above. This comovement is consistent with the graph attached as Appendix C-1 showing the overall trend of the two age groups.

6. Conclusion

This paper aimed to analyze the annual pregnancy rates among females aged 15 to 17 and 18 to 19 with data obtained from Statistics Canada. We found that on average the 18 to 19 PR is higher than the 15 to 17 PR by 41.9. 18 to 19 PR never fell below 49, whereas 15 to 17 PR never went above 34.4. The higher pregnancy rates within the older age group can be attributed to their higher involvement in coitus compared to younger teenagers. Moreover, the two variables are strongly correlated statistically, but they are not related because there are some extraneous factors that are associated with the comovement.

Wadhera and Silins suggested that teenage pregnancy rates have a negative correlation with delay in marriage, the availability of contraception, prevalence of contraceptive use, negative coverage of teenage pregnancy rates in the media, sex education, provision of clinic contraceptive

services, and prevention of unwanted pregnancies and that pregnancy rates have a positive correlation with fertility rates and sexual behavior. Those extraneous factors are associated with the comovement of pregnancy rates of the two age groups, 15 to 17 and 18 to 19.

The limitation of this study is the underrepresentation of pregnancies among the 19-year-old age group. Pregnancies that terminated when the woman was 20 years old (even though the conception took place when she was 19) are counted under the 20-year-old age group. We direct the readers to refer to the footnotes of Appendix B-1, which enumerates other limitations of our data sets.

In conclusion, Wadhera and Sillins said that the extraneous factors mentioned above were not yet properly documented. As such, future studies should collect data and properly document these factors affecting pregnancy rates across Canada. For example, future studies should investigate the relationship between the mean age of marriage for females and teenage pregnancy rates to determine whether there's a relationship between the two variables. Altogether, we need more data on these factors for 2005 and later for further economic research.

Appendix A: Works Cited

Wadhera, Surinder, and John Silins. "Teenage Pregnancy in Canada, 1975-1987." *Family Planning Perspectives*, vol. 22, no. 1, 1990, pp. 27–30. *JSTOR*, https://doi.org/10.2307/2135435. Accessed 23 May 2022.

Statistics Canada. "Pregnancy outcomes, 2003." Modified 29 March 2006. https://www150.statcan.gc.ca/n1/pub/82-224-x/2003000/4069597-eng.htm

(Chass Data Centre) CANSIM. "Pregnancy outcomes (live births, induced abortions, and fetal loss) *Terminated*." Updated 28 January 2020. http://clouddc.chass.utoronto.ca.login.ezproxy.library.ualberta.ca/ds/cansim/olap/displayCube.do?action=browse&a=13100167&lang=

Statistics Canada. "Archived - Pregnancy outcomes (live births, induced abortions, and fetal loss)." Release date October 25, 2010. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310016701

Appendix B: Data

B-1 DATASETS: Pregnancy Rates of Females aged 15 to 17 and Pregnancy Rates of Females aged 18 to 19

Year	15 to 17 PR	18 to 19 PR			
1974	33.9	84.2	1990	29.7	72.5
1975	34.4	83.2	1991	30	73.8
1976	33.1	81.7	1992	30.6	75.1
1977	32.3	78.9	1993	30.3	75.1
1978	31.5	77.1	1994	30.6	76.6
1979	30.7	73.8	1995	28.5	76.1
1980	30.6	73	1996	27.3	73.5
1981	29.5	70	1997	25.4	69.3
1982	29.7	68.9	1998	24.8	68.5
1983	27.3	63.5	1999	22.6	65.9
1984	27.1	62.2	2000	21.4	62.5
1985	26.4	62.7	2001	20.1	59.8
1986	25.8	64.1	2002	18.1	57.1
1987	25.4	64.7	2003	16.8	54.1
1988	25.7	64.9	2004	16.9	50.2
1989	26.9	68.8	2005	15.8	49

Notes:

For data years 1974 to 1992, abortion data for the teen subgroups 15 to 17 years and 18 to 19 years are not available for the Yukon and the Northwest Territories. Consequently, these data are not included in the teen subgroups for total pregnancies.

For 2002 and 2003, Nunavut residents are excluded due to incomplete reporting.

For 2002 and 2003, hospitalized cases of miscarriages, illegal abortion and unspecified abortions in Nunavut are excluded due to incomplete reporting.

In 2004 and 2005, information on induced abortions performed in clinics in Manitoba was not submitted to the Therapeutic Abortion Survey.

B-2 Q1, Q2, IQR, Lower Fence and Upper Fence for Pregnancy Rates of Females aged 15 to 17 and Pregnancy Rates of Females aged 18 to 19

15 to 17 PR	
Q1	25.25
Q3	30.6
IQR	5.35
Lower Fence	17.225
Upper Fence	38.625

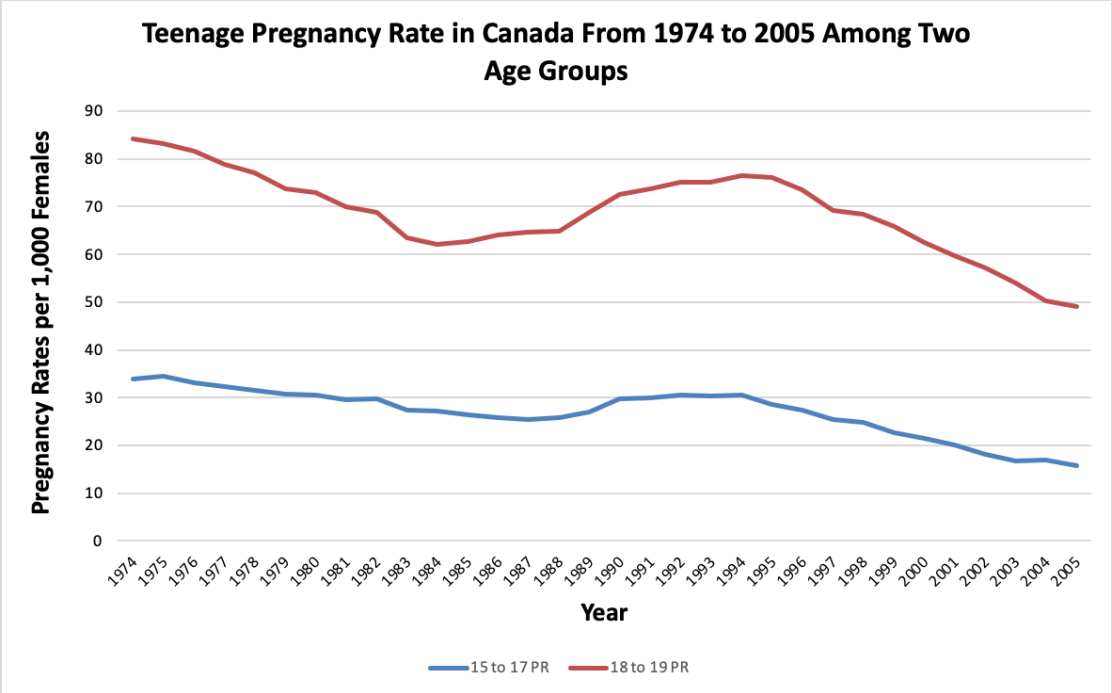
18 to 19 PR	
Q1	63.3
Q3	75.1
IQR	11.8
Lower Fence	45.6
Upper Fence	92.8

B-3 Descriptive Statistics of the Difference between Pregnancy Rates of Females aged 18 to 19 and Pregnancy Rates of Females aged 15 to 17

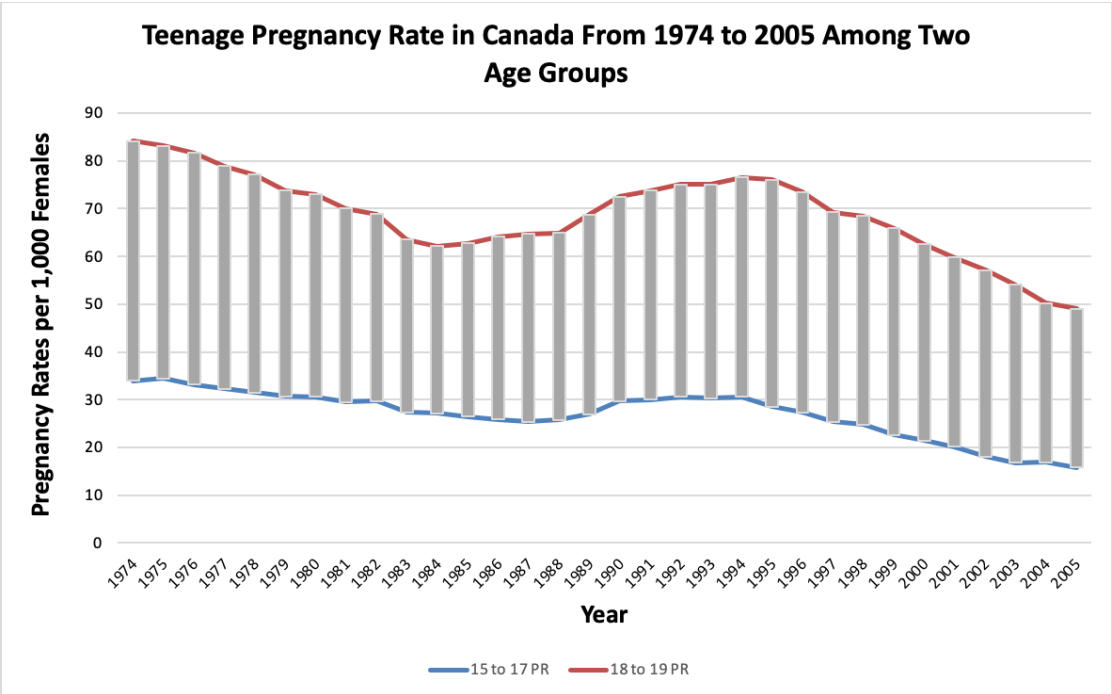
Difference Between 18 to 19 PR and 15 to 17 PR	
Mean	41.925
Standard Error	0.795742198
Median	42.6
Mode	39.2
Standard Deviation	4.501397632
Sample Variance	20.26258065
Range	17.1
Minimum	33.2
Maximum	50.3

Appendix C: Graphs and Charts

C-1 Line Graph 1



C-2 LINE GRAPH 2



C-3 Scatter Plot: Correlation between Pregnancy Rates of Females aged 15 to 17 and Pregnancy Rates of Females aged 18 to 19