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Trends in Canadian National and Provincial/Territorial Teen Pregnancy Rates: 2001-2010

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Trends in Canadian national and provincial/territorial teen pregnancy rates: 2001-2010

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Abstract: Trends in teen pregnancy rates are a key indicator of young women's sexual and reproductive health and overall well-being. Previously available published data on teen pregnancy rates for Canada included the years 1974 to 2006. The current study extends these data by calculating teen pregnancy rates at the provincial/territorial and national levels for the years 2007 to 2010. For analytical purposes, teen pregnancy rate trend data were generated for the periods 2001 to 2010, 2001 to 2005, and 2006 to 2010. From 2001 to 2010, the Canadian teen pregnancy rate declined by 20.3%. During the period 2006 to 2010, the national teen pregnancy rate increased by 1.1% and in four provinces the rate increased by 15.1% or more (New Brunswick, Newfoundland, Nova Scotia, Manitoba). Longer-term (1990 to 2010) trend data indicates that the teen pregnancy rate in Canada increased 4.9% from 1990 to 1994, then declined in each consecutive year to 2006, a decrease of 40.8%, and then increased slightly from 2006 to 2010. The overall teen pregnancy rate in Canada remains significantly lower than in the United States and in England and Wales where rates have also fallen since 2001. Abortion rate data for Canada are subject to a number of limitations. A particular limitation of this study is that teen pregnancy rate calculations were affected by the underreporting of abortions in some settings and the lack of precise age-related data on abortions conducted in some parts of Canada. For the current study, adjustments were made to the British Columbia clinic abortion data to compensate for underreporting. Imputation methods previously used to calculate teen pregnancy rates in Canada were employed when age data on clinic abortions were not available. The findings are discussed in relation to effective policies and programs to reduce unwanted teen pregnancy that include a focus on youth development and socioeconomic factors, access to effective contraception, and broadly-based sexual health education.

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Introduction

Trends in teenage pregnancy rates are an important indicator of young women's sexual and reproductive health and overall well-being (Darroch, Frost, Singh & Study Group, 2001; Gavin et al., 2009; Kearney & Levine, 2012; Ministry of Health and Long-Term Care, 2008; SIECCAN, 2004). At a proximal level, tracking teen pregnancy rates can provide an indication of changing levels of effective contraceptive use among sexually active young women and their partners. In turn, levels of effective contraceptive use among young women are determined by factors such as access to effective

and affordable contraception, reproductive health services, and to high-quality sexual health education. At a broader distal level, trends in teen pregnancy rates can also reflect shifts in population composition and community socio-cultural norms and values related to adolescent sexuality and teenage childbearing. In addition, trends in teen pregnancy and childbearing are important indicators of the economic status of young women in that teen pregnancy rates are partially determined by young women's perceived and actual economic opportunities. Given that trends in teen pregnancy are a key indicator of the sexual and reproductive health and overall well-being of young women in Canada, up-to-date teen pregnancy trend

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data is important information for educators, service providers, and policy makers at the provincial/territorial and national levels.

From 1974, when Statistics Canada first began disseminating teen pregnancy data, to 1999, the combined birth and abortion rate per 1,000 women aged 15 to 19 fell from 49.6 to 39.1, a decline of 21.2% (Statistics Canada, n.d.a., CANSIM Table 106-9002). The teen pregnancy rate in Canada had thus declined substantially during the last quarter of the 20th century (McKay, 2006). That downward trend continued into the early 2000s (McKay & Barrett, 2010) but at present there are no published Canadian teen pregnancy rates for 2007-2010.

The current study

The primary objective of the current study was to calculate and report on teen pregnancy rates in Canada at the provincial/territorial and national level for the years 2007, 2008, 2009, and 2010. For the purpose of continuity with previous trend data, methods used to calculate data on Canadian teen pregnancy rates in earlier reports were replicated as closely as possible in the current study. A broader objective of this report is to analyze trends in teen pregnancy rates during the period 2001 to 2010 and 1990 to 2010 with a particular analytic focus on shorter-term trends from 2001 to 2005 and from 2006 to 2010. The new data for the years 2007 to 2010 will indicate whether the previously reported trends in teen pregnancy rates from 2000-2006 (McKay and Barrett, 2010) have continued, slowed, or reversed.

Teen pregnancy rate data collection in Canada

In Canada, the teen pregnancy rate has traditionally been calculated and published by Statistics Canada using data from its own Canadian Vital Statistics Birth Database and Stillbirth Database and data from the Canadian Institute for Health Information's (CIHI) Therapeutic Abortion Database (teen pregnancy rates have been calculated by combining the number of live births, still births and therapeutic abortions). Utilizing these data sources, Statistics Canada calculated provincial/territorial and national teen pregnancy rates beginning in 1974. However, Statistics Canada ceased calculating and publishing

teen pregnancy statistics in 2005. As a result, Statistics Canada produced its final Canadian teen pregnancy rate statistics for the year 2005 and ended its dissemination of therapeutic abortion rate data with the year 2006. Using the 2006 Statistics Canada birth rate data and the 2006 therapeutic abortion data collected by CIHI and disseminated by Statistics Canada, the Sex Information and Education Council of Canada (SIECCAN) calculated a Canadian teen pregnancy rate for the year 2006 (McKay & Barrett, 2010). At present Statistics Canada continues to publish annual numbers and rates of teen births. CIHI has published, based on the data available to it, the numbers, but not rates, of abortions occurring in Canada from 2007 onwards. In other words, the last year for which Canadian teen pregnancy rate data is available is 2006. The lack of teen pregnancy rate data for Canada and at the provincial/territorial level since 2006 constitutes a significant gap in our knowledge of the sexual and reproductive health of young women in Canada.

With the exception of a brief analysis of longer-term trends in Canadian teen birth, abortion, and pregnancy rates from 1990 to 2010, the primary emphases of the present study are the periods from 2001 to 2010, 2001 to 2005, 2006 to 2010, and the new, previously unpublished teen pregnancy rate data for 2007-2010 (including yearly provincial/territorial birth, abortion, pregnancy rates).

Methods

Data sources

The provincial/territorial and national teen birth rate data for the years 2000 to 2010 utilized in this study were obtained by entering the appropriate inputs into the Statistics Canada (n.d.b.) CANSIM Table 102-4505.

Data on teen abortion rates in Canada for the years 2000 to 2005 were obtained by entering the appropriate inputs into the Statistics Canada (n.d.a.) CANSIM Table 106-9002. For the year 2006, teen abortion rate data were obtained from Statistics Canada (n.d.c.) CANSIM Table 106-9034.

Calculations, estimations, adjustments and imputation methods

Subsequent to 2006, new data on teen abortion for the years 2007-2010 have been made available on the Canadian Institute for Health Information (CIHI) website (CIHI, n.d.a.; n.d.b.; n.d.c.; n.d.d.). Teen pregnancy rates are calculated and presented as a rate (number) per 1,000 women aged 15 to 19 within the population in question. Beginning with the 2007 abortion statistics, CIHI has provided documentation of the total number of abortions but the abortion rate per 1,000 is not provided. Therefore, in order to calculate a teen pregnancy rate, the total number of abortions for women aged 19 and under in each province/territory for a given year must be applied to the total population of women aged 15 to 19 in that province/territory in that year. The provincial/territorial population counts for females aged 15-19 for the years 2007-2010 were obtained from Statistics Canada (n.d.d.) CANSIM Table 051-0001. Thus, the number of abortions reported by CIHI was used in conjunction with population statistics from Statistics Canada to calculate the provincial/territorial and national teen abortion rates for the years 2007-2010.

Imputation and adjustment for incomplete abortion data

A number of provinces (New Brunswick, Quebec, Manitoba and British Columbia) do not currently provide age breakdowns for abortions reported by clinics. Therefore estimates of the number of clinic abortions among women aged 19 and under must be imputed (i.e., estimated) based on the percentages of hospital abortions that were among women age 19 or under in each of these provinces. This imputation method was employed previously to calculate teen abortion rates for provinces in which age specific data for abortions occurring in clinic settings were not available (Canadian Institute for Health Information, 2006; Statistics Canada, 2005). The calculations for the provincial/territorial and national teen abortion rates for the years 2007-2010 are provided in Appendix 1.

The CIHI (n.d.b., n.d.c., n.d.d.) has noted that the clinic abortion data contained in their reports for British Columbia are incomplete beginning in 2008 and continuing thereafter. This results in an unusually large estimated decline in teen abortions reported by clinics in the province from 2007 to 2008. Calculating teen abortion rates using the

data reported by CIHI results in marked declines in the teen abortion rate from the levels seen in 2007 (and prior years) compared to 2008 and the years thereafter. There are several types of comparisons with other provinces that allow us to make estimates about the impact of incomplete reporting of clinic abortions on the overall teen abortion rates in British Columbia in the years after 2007. First, we can compare the 2007-2008 fluctuation in the number of teen abortions occurring in British Columbia with other provinces with relatively large populations (for provincial/territorial population numbers for females aged 15-19, see Appendix 1). The estimated number of clinic abortions among teens decreased by 17 from 2007 to 2008 in Quebec, decreased by 72 in Ontario, increased by 172 in Alberta and decreased by 650 in British Columbia. The relative size of the decrease in British Columbia compared to the smaller fluctuations in other provinces suggests that a large part of the decline in reported clinic abortions in British Columbia is due to incomplete reporting in 2008. Second, to estimate the proportion of the decline in teen abortion rates in British Columbia that is due to incomplete reporting from clinics, the fluctuations in the overall teen abortion rates in the other provinces from 2007 to 2008 can be compared to British Columbia. Without making adjustments for the incompleteness of the clinic data, the teen abortion rate in British Columbia declined from 23.1 per 1,000 in 2007 to 17.1 in 2008, a difference of - 6.0. If the fluctuations in the teen abortion rate from 2007 to 2008 in Quebec (- 1.0), Ontario (- 0.3), and Alberta (- 0.4) are averaged, the corresponding fluctuation in teen abortion rates for these three provinces is - 0.6 per 1,000. Assuming that these modest declines in the teen abortion rates in Quebec, Ontario, and Alberta from 2007 to 2008 are a general reflection of the actual fluctuation that occurred in British Columbia when incomplete reporting is taken into account, the British Columbia teen abortion rates for the years 2008, 2009, and 2010 can be adjusted for incomplete reporting by adding 5.4 per 1,000 to the rates for these three years. With the exception of Appendix 1, all calculations of abortion and teen pregnancy statistics presented in this study include this adjustment to the British Columbia data.

Exclusion of fetal loss from pregnancy rate calculation

From 1974 to 2005, Statistics Canada calculated the pregnancy rate as the sum of live birth, abortion, and fetal loss rates. Consistent with our previous analysis of trends in teen pregnancy rates in Canada (McKay & Barrett, 2010), fetal loss data is not included in the calculations for this study which focuses exclusively on birth and abortion rates. Fetal loss data are excluded for several reasons. First, fetal loss is calculated in different ways in different countries, resulting in data sets that are not equivalent for the purposes of comparison. This is particularly the case for the United States and Canada which use different methods for collecting fetal loss data (For elaboration see McKay & Barrett, 2010). Second, national fetal loss data are not available after 2005. It should be noted that the rate of teen pregnancies resulting in fetal loss declined significantly during the period that Statistics Canada published data on fetal loss. For example, the rate of fetal loss among young women aged 15-19 in Canada in 1975 was 4.1 per 1,000 compared to 2.5 in 1985, 1.7 in 1995, and 0.5 in 2005 (Statistics Canada, n.d.a., CANSIM Table 106-9002). Because fetal loss makes up a relatively minor component of all teen pregnancies, it is very unlikely that fluctuations in the fetal loss rate at current levels would significantly impact trends in a teen pregnancy rate that included fetal loss. Given the trends in the fetal loss evident for the years for which data are available, it would be likely that including fetal loss would exert a very small downward influence on the teen pregnancy rate. For the purposes of this research, the combined birth and abortion rate is referred to as the pregnancy rate.

Results***Canadian teen pregnancy rates: 2001 to 2010***

As seen in Table 1, teen birth and abortion rates both declined from 2001 to 2010. During this period, the teen birth rate declined by 15.6% and the abortion rate declined by 24.2%. The combined birth/abortion rate among Canadian teens fell 20.3% from 2001 to 2010 (See also Table 2). It should be noted that the 2.4 per 1,000 fluctuation in teen abortion rates between 2006 and 2007 is higher than in the other year-to-year fluctuations found for abortion rates documented for the years 2001 to 2010 in this study. Some portion

of the fluctuation in the teen abortion rates between 2006 and 2007 may be due to the use of different procedures for the generation of the abortion rate statistic for these two years (See Limitations for elaboration).

Table 2 provides data on the percentage change in teen birth/abortion rates for Canada, the provinces, and territories for the periods 2001 to 2005, 2006 to 2010, and 2001 to 2010. It should be noted that in provinces and territories with small populations of females aged 15 to 19 (PEI, n=5,007; YK, n=1,081; NWT, n=1822; NV, n=1568: Appendix 1) a relatively small increase or decrease in the number of births and or abortions can result in relatively large fluctuations in the birth/abortion rate. From 2001 to 2005, the teen birth/abortion rate declined in every province and territory and in 10 out of 12 provinces/territories the decrease was 14.8% or more. The largest percentage decline for these years was seen in the Yukon, followed by Ontario, Manitoba, and New Brunswick. The smallest percentage decline for the years 2001 to 2005 occurred in Saskatchewan, followed by Nunavut, Quebec, and Newfoundland. For Canada overall, there was a substantial percentage decline of 19.2% in the teen birth/abortion rate from 2001 to 2005.

For the years 2006 to 2010, the teen birth/abortion rate declined in seven provinces/territories (Northwest Territories, Nunavut, Quebec, Ontario, British Columbia, Prince Edward Island, Saskatchewan) and increased in six (New Brunswick, Newfoundland, Nova Scotia, Manitoba, Yukon, Alberta) (Table 2). From 2006 to 2010, the teen birth/abortion rate increased by more than 15.1% in New Brunswick, Newfoundland, Nova Scotia, and Manitoba. For Canada overall, there was a slight increase of 1.1% in the teen birth/abortion rate from 2006 to 2010.

From 2001 to 2010, eight of thirteen provinces and territories saw their teen birth/abortion rates decline, led by the Northwest Territories, followed by Prince Edward Island, Ontario, Quebec, Nunavut, Alberta, British Columbia, and Manitoba (Table 2). However, birth/abortion rates rose in five provinces/territories from 2001 to 2010, led by Newfoundland (+23.9%), followed by Yukon, New Brunswick, and Nova Scotia, and Saskatchewan (+1.6). From 2001 to 2010, the teen birth/abortion rate increased by 12.8% or

Table 1 Birth/abortion, pregnancy rates per 1,000, ages 15-19, Canada, 2001-2010, Canada. Bold = New Data

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Birth Rate	16.0	14.9	14.4	13.6	13.3	13.7	14.0	14.3	14.2	13.5
Abortion Rate	19.4	18.4	17.1	16.3	15.3	14.2	16.6	16.2	15.5	14.7
Pregnancy Rate	35.4	33.3	31.5	29.9	28.6	27.9	30.6	30.5	29.7	28.2

Sources: Statistics Canada, CANSIM Table 051-0001, Estimates of population, by age group and sex for July 1, Canada provinces and territories. CANSIM Table 102-4505, Crude birth rate, age-specific and total fertility rates (live births), Canada, provinces and territories. <http://www.statcan.gc.ca> (accessed:2012-10-04); Canadian Institute for Health Information, Induced Abortions Reported in Canada, 2007, 2008, 2009, 2010. <http://www.cihi.ca> (accessed: 2012-10-04). Statistics Canada, CANSIM Table 106-9002, Pregnancy outcomes. By age group, Canada, provinces and territories, CANSIM Table 106-9034, Induced abortions in hospitals and clinics, by age group and area of residence of patient, Canada, provinces and territories, cited in McKay, A. & Barrett, M. (2010). Trends in teen pregnancy rates from 1996-2006: a comparison of Canada, Sweden, U.S.A., and England/Wales. *The Canadian Journal of Human Sexuality*, 19, (1-2), 43-52.

Table 2 Provincial/territorial/national pregnancy rates per 1,000, ages 15-19, 2001-2010

	2001	2005	2006	2010	% change 2001-2005	% change 2006-2010	% change 2001-2010
NFLD	26.4	22.5	24.1	32.7	-14.8	+35.7	+23.9
PEI <i>t</i>	23.3	18.9	15.2	14.9	-18.9	-2.0	-36.0
NS	28.2	23.7	27.1	31.8	-15.6	+17.4	+12.8
NB <i>t</i>	29.6	22.6	24.9	34.8	-23.6	+39.8	+17.6
QUE*	37.7	32.4	31.1	28.5	-14.1	-8.3	-24.4
ON	30.6	23.0	22.8	21.2	-24.8	-7.0	-30.7
MN <i>t</i>	53.6	40.5	42.3	48.7	-24.4	+15.1	-9.1
SK	43.4	42.4	44.5	44.1	-2.3	-0.9	+1.6
AB	42.1	33.0	34.4	34.8	-21.6	+1.2	-17.3
BC <i>t</i> **	34.7	29.3	30.3	29.5	-15.6	-2.6	-15.0
YK	49.8	31.4	56.4	59.5	-36.4	+5.5	+19.5
NWT***	89.4	73.0	75.2	40.0	-18.3	-46.8	-55.3
NV***	148.3	139.4	149.8	115.2	-6.0	-23.1	-22.3
CAN	35.4	28.6	27.9	28.2	-19.2	+1.1	-20.3

t Prince Edward Island, New Brunswick, Manitoba, and British Columbia birth/abortion rates for 2006 utilize 2005 abortion data. *Quebec 2010 birth/abortion rate utilizes 2009 abortion data **BC abortion data for 2010 has been adjusted for incomplete reporting ***NWT and NV birth/abortion rates for 2005 utilize 2006 abortion data **** Sources: CANSIM Table 106-9002, Pregnancy outcomes. By age group, Canada, provinces and territories. <http://www.statcan.gc.ca> (accessed:2012-10-05); CANSIM Table 102-4505, Crude birth rate, age-specific and total fertility rates (live births), Canada, provinces and territories. <http://www.statcan.gc.ca> (accessed:2012-10-04); Canadian Institute for Health Information, Induced Abortions Reported in Canada, 2007, 2008, 2009, 2010. <http://www.cihi.ca> (accessed: 2012-10-04).

more in Newfoundland, Yukon, New Brunswick, and Nova Scotia. It should be noted that the increase in the raw number of teen births and abortions in the Yukon from 2001 to 2010 is quite small (58 vs. 65, data not shown) but the population of females aged 15-19 is also quite small, approximately 1,000 to 1,100, depending on the specific year. Thus, the teen birth/abortion rate in the Yukon can be substantially affected by small increases or decreases in the number of births and/or abortions.

Provincial/territorial teen birth, abortion, and pregnancy rates: 2007 to 2010

Table 3 presents detailed data on birth, abortion, and pregnancy rates among 15- to 19-year-old women at the provincial/territorial level for the years 2007 to 2010, the most recent years for which teen pregnancy data were previously unavailable. Four provinces/territories saw their teen pregnancy rates increase during this period (YK, NFLD, NS, NB). With respect to the Yukon, the teen birth rate increased by 15.7% and the abortion rate increased 40.1%.

Table 3 Provincial/Territorial abortion, birth, and pregnancy rates per 1,000, ages 15-19, 2007, 2008, 2009, 2010
AR=Abortion Rate, BR=Birth Rate, PR=Pregnancy Rate (abortion rate + birth rate)

	2007	2008	2009	2010		2007	2008	2009	2010
Newfoundland					Saskatchewan				
AR	10.4	9.2	9.6	10.9	AR	11.1	10.5	12.5	9.7
BR	17.0	19.4	19.2	21.8	BR	35.2	36.3	34.3	34.4
PR	27.4	28.6	28.8	32.7	PR	46.3	46.8	46.8	44.1
Prince Edward Island					Alberta				
AR	0.0	0.0	0.0	0.0	AR	18.6	18.2	17.3	16.5
BR	17.0	15.4	16.9	14.9	BR	20.9	20.5	20.0	18.3
PR	17.0	15.4	16.9	14.9	PR	39.5	38.7	37.3	34.8
Nova Scotia					British Columbia				
AR	14.2	13.3	12.3	13.9	AR	23.1	22.5×	22.5×	19.9×
BR	16.5	18.7	18.3	17.9	BR	10.7	10.7	10.3	9.6
PR	30.7	32.0	30.6	31.8	PR	33.8	33.2	32.8	29.5
New Brunswick					Yukon				
AR	10.8	11.2	11.8	11.6	AR	28.7	31.2	27.3	40.3
BR	19.9	20.8	20.9	23.2	BR	16.6	26.3	23.3	19.2
PR	30.6	32.0	32.7	34.8	PR	45.3	57.5	50.6	59.5
Quebec					Northwest Territories				
AR	20.1	19.1	18.5	18.7*	AR	42.3	19.4	4.5	2.9
BR	9.7	10.1	11.0	9.8	BR	35.7	31.0	34.3	37.5
PR	29.8	29.2	29.5	28.5	PR	78.0	50.4	38.8	40.4
Ontario					Nunavut				
AR	13.0	12.7	11.6	10.7	AR	10.8	14.2	15.6	10.5
BR	10.8	11.1	10.8	10.5	BR	116.7	117.8	111.5	104.7
PR	23.8	23.8	22.4	21.2	PR	127.5	132.0	127.1	115.2
Manitoba					Canada				
AR	20.0	21.8	19.5	19.1	AR	16.6	16.2	15.5	14.7
BR	31.9	31.3	32.7	29.6	BR	14.0	14.3	14.2	13.5
PR	51.9	53.1	52.2	48.7	PR	30.6	30.5	29.7	28.2

*Data on the number of abortions occurring in Quebec in 2010 is not available. The 2010 Quebec abortion rate is calculated using the number of abortions recorded in 2009. ×BC abortion data are adjusted to account for incomplete reporting for 2008/2009/2010. Sources: Statistics Canada, CANSIM Table 051-0001, Estimates of population, by age group and sex for July 1, Canada provinces and territories. CANSIM Table 102-4505, Crude birth rate, age-specific and total fertility rates (live births), Canada, provinces and territories. <http://www.statcan.gc.ca> (accessed:2012-10-04); Canadian Institute for Health Information, Induced Abortions Reported in Canada, 2007, 2008, 2009, 2010. <http://www.cihi.ca> (accessed: 2012-10-04).

It should be noted however, that in a territory with a very small population of females aged 15 to 19 (YK, n = 1081), a modest increase in the number of abortions will result in a substantial increase in the abortion rate. While the teen abortion rate in the Yukon increased substantially from 2007 to 2010, it was the result of an increase from 31 teen abortions in 2007 to 44 in 2010.

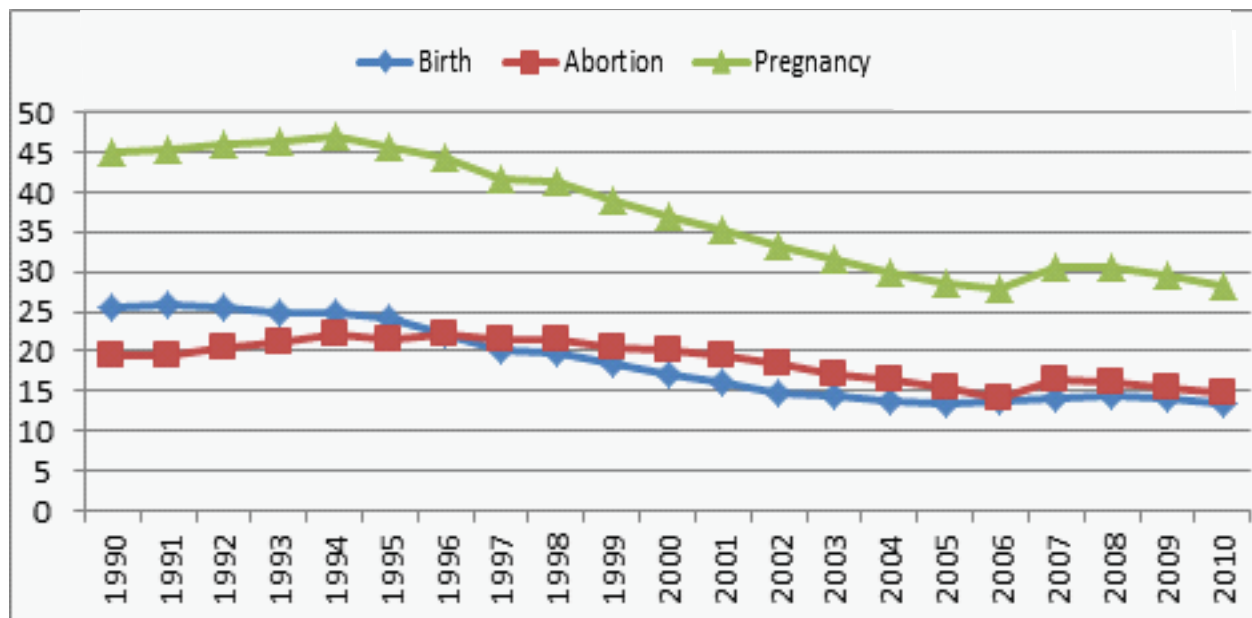
When the data from the three Atlantic provinces with increasing teen pregnancy rates is examined (Table 3), it is notable that the increase in the rate is disproportionately reflects increases in the birth rate, more so than fluctuations in the abortion rate. In Newfoundland and New Brunswick, the teen

abortion rate increased 4.8% and 7.4% respectively from 2007 to 2010 and in Nova Scotia it decreased 2.1%. However the birth rate increased 28.2% in Newfoundland, 16.6% in New Brunswick, and 8.5% in Nova Scotia. Thus, the increase in teen pregnancy rates in the Atlantic provinces primarily reflects an increase in birth rates.

Longer-term trends in Canadian teen birth, abortion, and pregnancy rates: 1990-2010

Figure 1 illustrates longer-term teen birth, abortion, and pregnancy rates from 1990 to 2010. Overall, the combined teen birth and abortion rate in Canada went from 44.9 per 1,000 in 1990 to 28.2 in 2010,

Figure 1 Birth/abortion/pregnancy rates per 1,000, Canada, ages 15-19, 1990-2010



Sources: Statistics Canada, CANSIM Table 051-0001, Estimates of population, by age group and sex for July 1, Canada provinces and territories. CANSIM Table 102-4505, Crude birth rate, age-specific and total fertility rates (live births), Canada, provinces and territories. <http://www.statcan.gc.ca> (accessed:2012-10-04); Canadian Institute for Health Information, Induced Abortions Reported in Canada, 2007, 2008, 2009, 2010. <http://www.cihi.ca> (accessed: 2012-10-04). Statistics Canada, CANSIM Table 106-9002, Pregnancy outcomes. By age group, Canada, provinces and territories, CANSIM Table 106-9034, Induced abortions in hospitals and clinics, by age group and area of residence of patient, Canada, provinces and territories, cited in McKay, A & Barrett, M. (2010). Trends in teen pregnancy rates from 1996-2006: a comparison of Canada, Sweden, U.S.A., and England/Wales. *The Canadian Journal of Human Sexuality*, 19, (1-2), 43-52.

a decline of 37.2%. The decline in the birth rate represented a greater proportion of the overall decline in teen pregnancy rates during this period than did the decline in abortion rates. From 1990 to 2010, the teen birth rate in Canada declined 47.1%, from 25.5 per 1,000 to 13.5, whereas the teen abortion rate declined 24.2%, from 19.4 to 14.7.

Within the 1990 to 2010 data period for teen pregnancy rates, shorter-term trends are evident. The teen pregnancy rate rose from 44.9 per 1,000 in 1990 to 47.1 in 1994, an increase of 4.9%. The teen pregnancy rate then fell for 12 consecutive years, from 1994 to 2006, reaching a level of 27.9, a decline of 40.8%. The rate then rose by 1.1% to 28.2 from 2006 to 2010, the most recent year for which data are available. In sum, after over a decade of declining teen pregnancy rates from the mid 1990's to the mid 2000's, rates stabilized thereafter.

International Comparisons

There are few other Western industrialized countries for which data on teen pregnancy rates are directly comparable to Canadian data and that are available up to 2010. One jurisdiction where such data is available is England and Wales which has collected and published data on conception rates (live births, still births, and abortions) among women under age 20 from 1990 to 2010. From 2001 to 2010 the teen conception rate declined from 60.8 per 1,000 to 54.6, a decline of 10.2% (Office for National Statistics, 2012). Thus, although similar to Canada in that the teen pregnancy rate declined in England and Wales during this period, the rates have been significantly higher in England and Wales than in Canada and have fallen less. Looking at shorter time periods, the teen pregnancy rate in England and Wales fell slightly from 60.8 in 2001 to 60.0 in 2005 (-1.3%) and then fell more precipitously from 60.2 in 2006 to 54.6 in 2010 (-9.3%) (Office for National Statistics). For these two five-year time periods, the patterns of

decline are quite different when Canada and England and Wales are compared. That is, over the ten-year period from 2001 to 2010, a larger proportion of percentage decline in the teen pregnancy rate in Canada occurred from 2001 to 2005 compared to 2006 to 2010, whereas the reverse was true for England and Wales where the larger share of the decline occurred more recently, from 2006 to 2010.

Data on teen birth rates from the United States are available up to 2010 but data on teen abortions is available up to 2008 only (Hamilton & Ventura, 2012; Ventura, Curtin, Abma, & Henshaw, 2012). Therefore, combined teen birth/abortion (pregnancy) rates for the United States can be calculated up to 2008. From 2001 to 2008, the teen pregnancy rate in the United States declined 14.1% from 67.5 per 1,000 to 58.0. In comparison, the teen pregnancy rate in Canada for this same period declined 13.8% from 35.4 per 1,000 in 2001 to 30.5 in 2008. It is noteworthy that from 2005 to 2008, the teen pregnancy rate in the United States was essentially unchanged, decreasing 0.7%. In sum, during the period 2001 to 2008, the teen pregnancy rates in Canada and the United States declined in percentage terms by a similar amount. It also appears that in both countries, long-term declines in the teen pregnancy rate began to level-off in the mid-2000's. Nevertheless, at all points in time the teen pregnancy rate has been substantially lower in Canada than in the United States.

If the analysis is confined to birth rates, a much wider international comparison is possible. According to statistics published in the United Nations (2012) *2011 Demographic Yearbook*, within Europe, countries that had a lower teen birth rate than Canada in 2010 (13.5 per 1,000) included Germany (8.9), Finland (8.5), Norway (8.4), Sweden (5.9), Netherlands (5.1), Denmark (5.0), and Switzerland (3.9), while countries with a higher teen birth rates than Canada in 2010 included Russia (27.3), the United Kingdom (25.0), and Ireland (21.6). In 2010, the teen birth rate in the United States was 34.4 (Hamilton and Ventura, 2012), a rate that was more than two times higher than in Canada. It should be noted that teen pregnancy rates cannot be accurately extrapolated from teen birth rates because the proportion of teen pregnancies that end in a live birth versus the proportion that end in an abortion varies from country to country. For

example, teen pregnancy rates in Canada and Sweden have been similar in recent years because the teen abortion rate in Sweden has been considerably higher than in Canada (McKay & Barrett, 2010).

Discussion

Previous research on trends in teen pregnancy in Canada (McKay & Barrett, 2010; McKay, 2006) showed a clear pattern of secular declines in birth, abortion, and pregnancy rates among Canadian teens beginning in the 1970's, when teen pregnancy data became available, and extending to the mid-2000's. The current study updated Canadian teen pregnancy statistics for the years 2007, 2008, 2009, and 2010 by employing methods that approximated as closely as possible the methods used to make previous Canadian teen pregnancy rate calculations in order to ascertain if recent, medium, and longer term trends have continued, abated, or reversed.

Teen pregnancy rates

Looking at the combined teen birth/abortion (pregnancy) rates from 2001 to 2010, the national rate declined 20.3% from 35.4 per 1,000 to 28.2. These data are consistent with longer-term data, dating back to the mid 1970's, indicating a secular decline in teen pregnancy rates. However, during the 2001 to 2010 period, the teen pregnancy rate increased by more than 10% Newfoundland, Yukon, New Brunswick, and Nova Scotia (Given it's small population size, the increase in the actual number of teen pregnancies in the Yukon during this period is small). For the most recent time period for which data are available (2006-2010), the national teen pregnancy rate edged up slightly, by 1.1% and six provinces and territories saw their teen pregnancy rates increase. While some of these increases in the teen pregnancy rate were less than 10% (Alberta, Yukon), four provinces saw their teen pregnancy rate increase by 15% or more from 2006 to 2010 (New Brunswick, Newfoundland, Nova Scotia, Manitoba). In sum, while the national teen pregnancy rate appears to have shifted from a clear downward trend that occurred over several decades to one of relative stability, for some regions of Canada, teen pregnancy rates are trending upwards.

Against the back-drop of a long-term trend of declining teen pregnancy rates in Canada from the

mid-1970s to 2006, followed by what appears to be a subsequent leveling off of rates, and given the relatively lower rates in Canada compared to England and Wales and the United States, it is possible that teen pregnancy rates in Canada have reached a lower-level floor. That is, in the absence of significant demographic, social-cultural, or economic shifts in Canadian society, teen pregnancy rates are unlikely to fall substantially lower from current levels. European countries that have substantially lower birth rates than Canada, while similar in overall levels of economic and technological development may differ demographically, culturally, and in terms of social and economic policies from Canada in ways that influence teen pregnancy rates. It should also be noted that teen abortion rate data is unavailable for many of these countries. In addition to England and Wales, one European country where more comprehensive data on teen pregnancy is available is Sweden. While Sweden has a considerably lower teen birth rate than Canada, its teen abortion rate is higher. The combined teen birth/abortion (pregnancy) rate in Sweden for 2008, the year for which the most recent data is available, was 30.1 per 1,000, almost identical to the 30.5 for Canada in that year (For 1996-2008 Swedish teen birth, abortion, and pregnancy rates see McKay & Barrett, 2010). In sum, Canada's teen pregnancy rate was considerably lower in 2010 than in 2001, and declined by over a third from 1990 to 2010. Thus, the relative stability of teen pregnancy rates since reaching a low in 2006 may represent a leveling off at the lower end of a range of teen pregnancy rate levels that might be expected in Canada and other developed Western countries.

Teen birth rates

The teen birth rate in Canada has been in a trend of long-term decline since the mid-1970's (McKay, 2006, McKay & Barrett, 2010). For the period 2001 to 2010, this trend continued with the teen birth rate declining by 15.6%. However, it is noteworthy that from 2006 to 2010, the teen birth rate decreased by only 1.5%. In comparison, teen birth rates in the United States are consistently over twice as high as in Canada. However, while teen birth rates in Canada have stabilized, teen birth rates in the United States, also in long-term decline, continued to decline during the period 2006 to 2010, falling from 41.1 per 1,000 to 34.4, a decline of 16.3% (data to

make this calculation were derived from Hamilton & Ventura, 2012 and Ventura, Curtin, Abma, & Henshaw, 2012). In sum, while teen birth rates in Canada appear to have leveled off after an extended period of pronounced decline, teen birth rates in the United States have continued to fall at a relatively rapid pace. In the current study, teen birth rates were examined at provincial/territorial level for the years 2007 to 2010. While the teen birth rate was stable or fell slightly during these years in some provinces/territories, the rate rose by 28.2% in Newfoundland, 16.6% in New Brunswick, 15.7% in the Yukon, 8.5% in Nova Scotia, and 5.0% in the Northwest Territories (Note: low populations of females aged 15 to 19 in the Yukon and Northwest Territories results in a substantial increase in birth rates with only a relatively small increase in the number of births). In sum, the long-term trend, spanning several decades, in which the Canadian teen birth rate was in decline appears to have leveled off after reaching its low in 2005 and teen birth rates increased in some regions of the country, most notably Atlantic Canada, in recent years.

Teen abortion rates

It is estimated that about 30% of Canadian women have at least one abortion in their lifetime (Norman, 2012). In a summary review of CIHI data up to 2009, Sabourin and Burnett (2012) concluded that abortion rates among Canadian women have been declining over an extended period of time. With respect to abortions among teens, the current analysis supports this conclusion. From 2001 to 2010, the abortion rate among Canadian teens declined 24.2% from 19.4 per 1,000 to 14.7 per 1,000. According to the calculations made for the current study, in 2010, abortions made up just over half (52.1%) of the teen pregnancy rate as it typically has in previous years. It is likely, however, that current methods for tabulating the number of non-hospital abortions occurring in Canada results in an underestimate of the teen abortion rate (see limitations below).

Relative to pregnancies that result in birth, teen pregnancies that result in abortion are more likely to be unintended and, therefore, unwanted. Research from France, for example, indicates that over 80% of French teens who had an abortion reported that their pregnancy was unplanned

(Moreau, Trussel, & Bajos, 2012). Currently, over 15,000 young women aged 15 to 19 in Canada have an abortion each year and it can be reliably assumed that the vast majority of these pregnancies were unplanned.

Preventing unwanted teen pregnancy

Teen pregnancy is often viewed as a public policy and social concern because teen pregnancy results, in just under half of cases in Canada, in teen childbearing. However, before examining the issue of teenage childbearing in Canada within the context of teen pregnancy prevention, it should be recognized that not all teen pregnancies are unwanted and that teenage women who choose to become mothers are capable of raising healthy children and doing well in life (Best Start, 2007, 2008; Bissell, 2000).

To the extent that the leveling off of teen pregnancy rates in Canada, after decades of decline, as well as an evident increase in teen pregnancy in recent years in some regions of Canada requires a public policy response, it is important to understand both the determinants of unwanted teen pregnancy and effective public policy and programming to prevent it. There is an expansive literature on the determinants and prevention of unwanted teen pregnancy (e.g., Best Start, 2007, 2008; Brindis, 2006; Kirby, 2007; Lavin & Cox, 2012). A now well-established body of research findings indicates that an effective policy approach to the prevention of unwanted teen pregnancy must focus on three areas: 1) Enhancing youth development programming and support for economic advancement among teenage women at risk for unwanted pregnancy; 2) Ensuring access of teen women to affordable and effective contraception and reproductive health services and; 3) provision of broadly-based sexual health education.

Although young women from all economic backgrounds experience unwanted pregnancy, research from the United States has consistently shown that higher levels of teen fertility are associated with poverty (Santelli & Melnikas, 2010). Research from Canada similarly indicates that teen mothers were more likely than average age mothers to have low socio-economic status and also that they preferred to become pregnant later in adulthood (Al-Sahab, Heifetz, Tamim, Bohr, & Connolly, 2012).

A recent analysis of teen pregnancy rates in the province of Manitoba examined income quintiles in different areas of the province and found that for both rural and urban areas, teen pregnancy rates were progressively higher with each decrease in income quintile (Brownell et al., 2012). From an examination of the evidence on the association between teenage childbearing and low economic status, Kearney and Levine (2012) concluded that becoming a teen mother does not, in-of-itself, lead to lower economic outcomes. Rather, their research suggests that young women on a low economic trajectory are more likely to have children than young women who perceive that they will be able to advance economically. In other words, according to this perspective, rising teen birth rates may be a marker for a growing number of young women perceiving a lack of economic opportunity. Therefore, as Brindis (2006) suggests, "A key ingredient in reducing adolescent pregnancy is providing youth with a supportive environment and a positive sense of the future" (p. 286). In this respect teen pregnancy prevention initiatives should include broader youth development programming that offers, among other things, access to job training, academic tutoring, and life skills training (Brindis). Youth development programming that addresses a broad range of protective factors are most likely to be effective. As Kirby (2007) notes, "Research clearly suggests that improving teenage girls' performance in school, their plans for the future, and their connections to family, school, and faith community all reduce pregnancy and birth rates" (p. 158).

It is estimated that half of unplanned pregnancies in the United States are due to the non-use of contraception, and half are the result of inconsistent or incorrect use of contraception and contraceptive failure (Frost, Darroch, & Ramez, 1998). A recent study of women seeking abortion found that only 11% reported using contraception consistently and when asked for their reasons for having unprotected intercourse in the three months before conception, the most common responses were that they did not think they would become pregnant (42%), they had difficulty obtaining a contraceptive method (40%), and they weren't planning on having sex (38%) (Greene Foster, Higgins, Karasek, Ma, & Grossman, 2012). These results suggest that efforts to reduce the prevalence of unwanted teen pregnancy should

include a focus on sexual health education combined with improved access to effective contraception.

Condoms are the most commonly used form of contraception among young women in Canada (Black et al., 2009). Relatively inexpensive and accessible as well as effective in preventing pregnancy and reducing the risk of sexually transmitted infections, condom use education and promotion is an important component of efforts to reduce unwanted teen pregnancy. Oral contraception is also a common, highly effective method of contraception for young women in Canada (Black et al.). There are a number of factors that may inhibit condom and/or oral contraceptive use among sexually active young women. For example, a male partner may refuse to use a condom or other relational or contextual factors may prevent condom use from occurring. Oral contraception requires a regular schedule of pill taking and may be prohibitively expensive for young women without adequate financial resources. Some young women at high risk for unintended pregnancy may require facilitated access to other contraceptive methods, particularly long-acting reversible methods such as the IUD. A recent U.S. study found that women who were offered free post-abortion contraception were most likely to choose long acting reversible methods (IUD, implant) compared to other contraceptive methods (Madden, Secura, Allsworth, & Peipert, 2011) (note: implant contraceptives are not available in Canada).

A recent program in the United States for female adolescents and women at risk for unintended pregnancy that provided contraceptive counseling, emphasizing IUDs and implants, in combination with the provision of no-cost contraception resulted in a statistically significant reduction in abortion rates and teen birth rates (Peipert, Madden, Allsworth, & Secura, 2012). In sum, there is considerable evidence that providing teen women at high risk for unwanted pregnancy with no-cost or low-cost access to a range of contraceptive methods, including long-acting reversible methods may be a critical component of effective strategies to reduce unwanted pregnancies among teen women in Canada. Ongoing access to reproductive healthcare services is essential to reduce unwanted teen pregnancy (Brindis, 2006; Ralph & Brindis, 2010; Santelli & Melnikas, 2010).

Provision of broadly-based sexual health education, accessible to all youth, is a third critical component of an effective strategy to reduce unwanted teen pregnancy. There is extensive research evidence that implementation of well-developed and evaluated educational interventions, including school-based programs, can reduce sexual risk behaviour and improve contraceptive use among youth. This body of research evidence indicates that programs that are effective are delivered by well-trained personal, provide relevant goal specific information, motivation, and behavioural skills, and are broadly-based, focusing on the delay of first intercourse and risk reduction behaviours including contraceptive use; there is insufficient evidence to support the use of abstinence-only education (Chin et al., 2012; Kirby, 2007; Lavin & Cox, 2012; Public Health Agency of Canada, 2008; SIECCAN, 2010). It is important to note that interventions targeting young men can play a role in unwanted pregnancy prevention programming (e.g., Gruchow & Brown, 2011).

Limitations

The principle limitations of this study relate to the teen abortion data. Both CIHI and Statistics Canada have specified a number of limitations to the abortion data they have published and these data were used as the sources for the calculations made in this study. These limitations are noted in the footnotes to the Statistics Canada CANSIM tables and CIHI induced abortion tables cited in this study. As has been the case for all years that abortion rate data has been published for Canada, the rates generated for the current study should be viewed with caution.

Where abortion data age breakdowns were not available, estimates were calculated. In most cases, this was done by estimating the percentage of clinic abortions among teens by applying the percentage of abortions occurring among teens in hospital settings to the overall number of abortions occurring at clinics. For the four provinces where this imputation method was required, the estimates for the number of clinic abortions should be viewed with additional caution. Nevertheless, the current study sought to employ as closely as possible the same methods for estimating teen abortion rates for provinces where age breakdowns were not available as did previously published calculations of teen pregnancy

rates. Therefore, this method was suitable for the main objective of this study which was to determine whether and how existing trends based on previous calculations and methods changed with the addition of the years 2007-2010.

Second, an additional limitation to the teen abortion data is the problem of incomplete reporting in British Columbia. According to CIHI (n.d.b., n.d.c., n.d.d.) data on clinic abortions performed in British Columbia for the years 2008-2010 are incomplete. The extent to which the British Columbia data is incomplete is not known, but clearly significant. In the current study, the fluctuation in teen abortion rates from 2007 to 2008 in other provinces with large teen populations (Quebec, Ontario, Alberta) was averaged and then added to the British Columbia rate for the years 2008, 2009, and 2010 in order to adjust for incomplete reporting. As a result, the British Columbia teen abortion rates reported in the current study for 2008, 2009, and 2010 should be viewed with caution.

As noted in the results, according to the calculations made for this study, the national teen abortion rate rose from 14.2 per 1,000 in 2006 to 16.6 in 2007 and that the magnitude of this fluctuation (2.4) in abortion rates from one year to another is greater compared to all other year-to-year abortion rate fluctuations for the years included in this study. This is noteworthy because 2006 is the last year in which the teen abortion rate was published by Statistics Canada (CANSIM Table 106-9034), while the abortion rate statistic for 2007 and subsequent years was generated by the current author. While the current study attempted to approximate previously used methods to calculate Canadian teen abortion rates as closely as possible, some portion of the fluctuation in the abortion rate from 2006 to 2007 may be a reflection of different procedures for the calculation of the abortion statistics generated for these two years.

The CIHI (e.g., n.d.c.) notes that Ontario clinic and Quebec hospital and clinic abortion data in their reports only include induced abortions covered by the provincial health insurance plans. As Dunn et al. (2011) point out in their study of women's reproductive and gynecological health in Ontario, abortions not directly funded by the Ontario Ministry

of Health and Long-Term Care, or paid for by the women themselves, or conducted in a private doctor's office are not included in statistics based solely on the Ontario Health Insurance Plan data. Using a wider range of data sources to account for abortions not included in OHIP data, Dunn et al. calculated an Ontario teen abortion rate for 2007 of 18.0 per 1,000. In contrast, the current study, based on the OHIP data reported by CIHI, calculated an Ontario teen abortion rate for the same year of 13.0. This discrepancy suggests that the current study as well as teen abortion statistics from past years has likely underestimated teen abortion rates. CIHI also notes that their data do not include abortions occurring outside of clinics or hospitals in Canada. However, the primary purpose of the current study was to calculate teen pregnancy rates for 2007 to 2010, replicating as closely as possible past methodology, in order to discern whether prior trends had continued. Thus, the conclusions presented in this study regarding current trends in teen pregnancy rates are unaffected by the apparent under reporting of teen abortion data which was in place in prior years for the provinces in question. Nevertheless, given the limitations in the available abortion data we can conclude that the teen abortion rates presented in the current study are likely underestimates of the actual number of teen abortions that have occurred during the years covered by the current study.

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Appendix 1 Calculation of Canadian Provincial/Territorial/National Abortion Rates Per 1,000, Ages 15-19.
 H = number of reported hospital abortions; C = number of reported clinic abortions; Pop = number of females aged 15-19; Rate = number of abortions per 1,000 of population

2007	H	C	Pop	Rate	2008	H	C	Pop	Rate	2009	H	C	Pop	Rate	2010	H	C	Pop	Rate
NL	55	114	16,306	10.4	NL	51	95	15,882	9.2	NL	45	104	15,476	9.6	NL	47	115	14,796	10.9
PEI	0	0	5,007	0	PEI	0	0	5,067	0	PEI	0	0	5,090	0	PEI	0	0	5,041	0
NB	97	160	23,728	10.8	NB	113	152	23,627	11.2	NB	123	155	23,478	11.8	NB	108	158	23,056	11.6
NS	443	0	31,256	14.2	NS	413	0	30,997	13.3	NS	377	0	30,572	12.3	NS	415	0	29,765	13.9
QUE	2,621	2,209	240,268	20.1	QUE	2,505	2,192	245,354	19.1	QUE	2,371	2,185	246,605	18.5	QUE	2,371	2,185	243,994	18.7
ON	2,794	2,816	430,006	13.0	ON	2,754	2,744	433,814	12.7	ON	2,389	2,651	433,350	11.6	ON	2,228	2,397	430,384	10.7
MIN	619	247	43,274	20.0	MIN	638	315	43,684	21.8	MIN	560	297	43,887	19.5	MIN	511	324	43,653	19.1
SK	413	0	37,308	11.1	SK	391	0	37,336	10.5	SK	562	0	36,867	12.5	SK	353	0	36,207	9.7
AB	681	1,555	120,350	18.6	AB	467	1,733	120,759	18.2	AB	407	1,669	119,881	17.3	AB	357	1,592	118,130	16.5
BC	1,195	1,984	137,567	23.1	BC	1,045	1,334	138,746	17.1	BC	972	1,401	138,430	17.1	BC	777	1,215	137,510	14.5
YK	31	0	1,081	28.7	YK	33	0	1,059	31.2	YK	29	0	1,063	27.3	YK	44	0	1,093	40.3
NWT	77	0	1,822	42.3	NWT	35	0	1,802	19.4	NWT	8	0	1,778	4.5	NWT	5	0	1,733	2.9
NV	17	0	1,568	10.8	NV	22	0	1,551	14.2	NV	25	0	1,604	15.6	NV	17	0	1,614	10.5
CAN	9,043	9,085	1,089,541	16.6	CAN	8,467	8,565	1,099,678	15.5	CAN	7,868	8,462	1,098,081	14.9	CAN	7,233	7,986	1,086,958	14.0

Notes: All numbers in bold are imputed (see Methods). The proportion of the total number of Quebec Hospital and Clinic abortions attributed to 15-19 year-olds are imputed from the Ontario percentages of abortions occurring among women under age 20. Quebec abortion data is not available for 2010. Statistics presented for 2010 use 2009 data. Clinic abortions do not occur in PEI, Nova Scotia, Saskatchewan, Yukon, NWT, or Nunavut. BC clinic abortion data are incomplete for 2008/2009/2010. Sources: Statistics Canada, CANSIM Table 051-0001, Estimates of population, by age group and sex for July 1, Canada provinces and territories. <http://www.statcan.gc.ca> (accessed:2012-10-04); Canadian Institute for Health Information, Induced Abortions Reported in Canada, 2007, 2008, 2009, 2010. <http://www.chi.ca> (accessed: 2012-10-04).