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FIRST PEOPLE LOST: DETERMINING THE STATE OF STATUS FIRST NATIONS MORTALITY IN CANADA USING ADMINISTRATIVE DATA

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Keywords: Mortality, First Nations, Native American, Status First Nation, gender bias
JEL Classifications: J15, J16, I15, I14

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Abstract

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1 Introduction

Avoiding an early death is one of the greatest advantages of being born in a wealthy country (Deaton, 2013). However, this advantage is not shared equally. In Canada there is evidence of substantial health disparities between First Nations peoples and the general population, but existing statistics are at best sparse (Truth and Reconciliation Commission of Canada (TRC), 2015, p 161). In this work we provide the most comprehensive analysis of the patterns and trends in mortality rates for the largest First Nation's population in Canada – Status First Nations – to date.[1] We do this by using administrative data from Indigenous and Northern Affairs Canada (INAC) from 1974 to 2013 which, to our knowledge, is the most complete and consistent source of First Nations vital statistics data available. Our goal in this work is to provide a benchmark set of stylized facts on Status First Nation's mortality in Canada that can be used for future academic and policy research.

This work was conducted in response to the recent calls in Canada for reconciliation between Indigenous and non-Indigenous peoples by the Truth and Reconciliation Commission of Canada: the commission called for all Canadians to contribute to the process of reconciliation and called for the establishment of comprehensive measures of well-being for Indigenous peoples (TRC, 2015, p 161). The commission also called for cooperation between the federal government and Indigenous groups to establish measurable goals to identify and close the gaps in health outcomes between Indigenous and non-Indigenous communities and to publish annual progress reports and assess long-term trends (TRC, 2015, p 322). It is our hope that this work helps to establish a foundation for the dialogue and that it takes a step towards establishing comprehensive measures of well-being for Indigenous peoples.

Using administrative data on births and deaths for Status First Nations people that

[1] "Status First Nations" are individuals who are governed explicitly under the *Indian Act* as "Indians". "Indian Status" is determined through genetic relation to the first peoples classified by the federal government as "Indians."

includes information on the gender, age, band of membership, and whether an individual resides on or off reserve, allows us to create measures of mortality rates at the national level and by location on and off reserves. We also link patterns in mortality over time, and at the regional level, with data available from the 1991-2006 Canadian Census and 2011 National Household Survey.[2] With this data we make three main contributions: 1) we provide the first national and regional level estimates of mortality among Status youth; 2) we provide the first modern estimates of how Status mortality rates differ by reserve residence and province and the correlation with province-level economic factors; and 3) we provide the first description of how Status mortality rates have changed since the 1970s and how this is correlated with economic changes and to changes in Status First Nations definitions. Despite the relative simplicity of our analysis, we find striking and unsettling results.

We begin by confirming the findings of earlier, less comprehensive studies using our data: age-standardized mortality is higher for Status males than Status females, and Status First Nations age-standardized mortality are always higher than for the general population. Using the most recent data available, 2010 to 2013, we find that age-standardized mortality rates are close to twice that of the general population. However these aggregate statistics mask significant differences by age: Status women and girls have mortality rates that are three to four times that of the general female mortality rates between the ages of 10 and 44. These relative mortality rates are statistically higher than the relative mortality rates for Status males, which are themselves two to two and half times that of the general population. While previous researchers have found higher rates of relative mortality for Status women, to our knowledge no one has identified the disproportionately high mortality rates borne by Status women and girls at such young ages at the national level (Health Canada, 2008, 2014; Mao et al., 1992; Park et al., 2015; Tjepkema et al., 2009). We also demonstrate that the proportional difference in mor-

[2]Unfortunately, the data does not provide information on cause of death or detailed individual socio-economic characteristics and we do not report on these causes in the current analysis.

tality between Status peoples and the general Canadian population is larger than the proportional difference in mortality between Native Americans and non-Hispanic Whites and the difference between African Americans and non-Hispanic Whites in the United States. We also demonstrate that the gender bias in relative mortality rates for Status First Nations women and girls is not present among either Native Americans or African Americans relative to non-Hispanic American Whites.[3]

Next, we examine the patterns in mortality by place of residence. We show mortality rates are higher on-reserve relative to off-reserve: between the ages of 15 and 19 in 2010 and 2013, the mortality rate of Status First Nations girls was *five times* the rate for girls in the general population. The mortality rates of boys on-reserve was also notably higher, nearly four times that of boys in the general population. We also show that absolute and relative mortality vary significantly by province and age. While First Nations mortality rates are highest in Alberta, Manitoba and Saskatchewan, we find that Alberta and Ontario exhibit the highest relative mortality rates. We provide evidence that this regional variation is associated with economic differences between Status peoples and the general population.

Finally, we examine trends in mortality rates from 1974 to 2013 (the years for which we have data). We find that here has been no improvement in relative, age standardized mortality rates between Status peoples on-reserve and the general population in the past 40 years. In absolute terms, mortality rates for Status women and girls below age 40 have not changed in the past 30 years and may have even increased for some age groups. We present suggestive evidence that this lack of convergence in female mortality rates relative to male mortality rates is not easily explained by differential convergence in economic characteristics. If anything, Status women have converged economically to the general population more quickly than Status men. While off-reserve mortality rates have exhibited some improvement, this change occurs primarily in the Status First Nation

[3]This is not simply due to relatively higher female, non-Hispanic white mortality rates in the United States.

male population.

We believe our findings have implications for the recently called Canadian National Inquiry into Missing and Murdered Indigenous Women and Girls which has gained international attention (Amnesty International, 2015; Levin, 2016; The Economist, 2014; The Government of Canada, 2015). The inquiry was called to investigate the extremely high rates of disappearance and homicide experienced by Indigenous women and girls. Our findings suggest that the marginalization of Indigenous women and girls is more widespread and systemic than previously documented; our mortality rate estimates are generally larger than previous analysis for Status First Nations females. We are also able to document relatively high mortality rates for Status men relative to the general male population as well; the on-reserve Status male probability of death was 31 percent on average by age 64, while it was only 14 percent for the general population. The on-reserve Status female probability of death was 21 percent before the age of 65 while it was 13 percent for the general population.

This work also makes a more general contribution to the literature on "missing women."[4] Since the seminal work of Sen (1992) nearly 30 years ago, high male-to-female gender ratios in the developing world have been associated with excess female mortality (Bulte et al., 2011; Das-Gupta, 2005, 2006; Duflo, 2012; Jha et al., 2006; Klasen and Wink., 2002; Rosenblum, 2013; Sen, 1992).[5] However in our context, we see notably low male-to-female gender ratios in survey data, but high rates of relative female mortality.[6] This is a similar result as found by Anderson and Ray (2010) who identify excess mortality among women in developing countries with relatively balanced gender ratios; our results are novel in that we identify relatively high female mortality in a wealthy,

[4]The term "missing women" has been used differential in the demography, economics, and sociology literature than recently in Canada in the National Inquiry for Missing and Murdered Indigenous Women and Girls. The term missing in this literature has tended to refer to excess female mortality from all sources, not just murder or women who have gone missing from their communities.

[5]This effect has also been observed among Asian immigrant families in Canada and the United States (Abrevaya, 2009; Almond and Edlund, 2008; Almond et al., 2009).

[6]See Akee and Feir (2016) for an early working paper that includes previous mortality estimates and argues that high rates of institutionalization and homelessness of Status men skew result in the low male to female gender ratio.

developed country with low male-to-female gender ratios.

In the next section, we provide some important background information on Status First Nations in Canada and discuss prior estimates of Indigenous mortality in Canada. In Section 3 we discuss the data that we use to estimate First Nation mortality rates and note both the benefits and drawbacks of the data. We also briefly discuss the economic characteristics data that we use in an associative manner with the estimated mortality rates. In Section 4 we discuss the methods used to estimate the Status First Nation and general mortality rates. In Section 5 we present our main results. We discuss variation in mortality by age, gender, location, and discuss the factors that are closely associated with observed mortality rates. Finally, we contrast our results with previous estimates of Status First Nations mortality. In the last section, Section 6, we summarize the set of facts we establish, the questions they raise, and conclude.

2 The Canadian Context and Existing Estimates of Registered Indian Mortality

As of 2016, the Status First Nations Population in Canada was approximately 744,855 which represents roughly 76 percent of the total First Nations population in the country.[7] Overall, this figure represents about two percent of the Canadian population (Statistics Canada, 2017).

It is well established that First Nations are among the most economically marginalized populations in Canada – in 2006, 37 percent of First Nations women off-reserve were living below the low income cut-off, compared to 16 percent of non-Aboriginal women (O'Donnell and Wallace, 2011). For other figures on the degree of First Nations income disparity see, for example, AANDC (2015); George and Kuhn (1994); Pendakur and Pendakur (1998, 2011). Indigenous peoples elsewhere also face economic and social

[7]Some First Nations people may not meet the full legal requirement for Status under Canada's *Indian Act* which is largely based on ancestry yet still either ethnically, culturally, or politically identify as First Nations (Feir and Hancock, 2016).

marginalization.[8] Status First Nations, especially those living on-reserve are systematically poorer than non-Aboriginal people, or the Metis or Inuit in terms of health and income (Pendakur and Pendakur, 2011; Tjepkema et al., 2009).[9] However, much of the work in Aboriginal health and mortality rates in Canada suffers from major data limitations (Feir and Hancock, 2016).

We first begin by defining important terms for the First Nations population in Canada. The *Indian Act* is the legal framework that defines who has "Status" and outlines the set of laws that govern "Status Indians" (referred to here as Status First Nations). Status confers certain rights and benefits. For example, Status confers the right to live on-reserve, vote in band elections, receive money from one's band, and own or inherit property on-reserve (Furi and Wherrett, 2003). However, Status has also historically limited other rights and access to benefits available to non-Status peoples. Until 1960 Status peoples were unable to vote in Canadian elections, did not have access to usual opportunities to acquire credit, and were not eligible for the same educational or health care opportunities (The Government of Canada, 2011). The federal government also has jurisdiction over many services provided to Status peoples that would typically be provided by the provinces.[10] Status can also be lost through out-marriage with non-Status peoples. In 1985 all women (and their children) who lost their First Nations Status through out-marriage had their Status rights reinstated (Hurley and Simeone, 2014). In 2011, there was also reinstatement of the grandchildren of women who lost Status. Both these points will be important for interpreting the results presented later.

Indigenous and Northern Affairs Canada (INAC) implements the *Indian Act* and is the Canadian Federal agency overseeing Indian peoples in Canada. The *Indian Act* estab-

[8] See United Nations (2009) for a global discussion of Indigenous economic disparity.

[9] The Métis and Inuit are the two other legally defined "Aboriginal" peoples in Canada under *The Constitution Act 1982*. While there are legal infrastructures surrounding these groups as well, to our knowledge, there is nothing as systematic and pervasive as that governing Status First Nations (Feir and Hancock, 2016).

[10] For example, up until the late 1960s, the provincial health care systems were not the main source of medical care and the federal government had responsibility for medical care for Status First Nations provided often through Indian Hospitals (Waldram et al., 2006).

lishes Status peoples as wards of the state for whom the Canadian Federal government has the responsibility of managing, defining, and documenting. In 1951, a centralized Indian Register was established to more consistently document who has "Status". Before this, the lists of Status First Nations individuals were created and maintained by government agents at the band-level.[11] The Indian Register is the official record identifying all Status First Nations in Canada and everyone who is classified as a Status person is listed in the Indian Register (Indigenous and Northern Affairs Canada (2010)). The Indian Register is kept up to date by band-level Indian Registry Administrators (IRAs); they are tasked with collecting and reporting vital statistics event data for their community.[12] Death events must also be reported to the Indian Register in order to execute a will of a Status person or make other arrangements for the administration of that person's estate and to determine appropriate funding levels for the band.

To date, five reports document modern Status First Nation mortality rates in Canada: Health Canada (2008, 2014); Mao et al. (1992); Park et al. (2015); Tjepkema et al. (2009). One important advantage of this previous research is that they are able to identify the cause of death in the cases that they describe. Tjepkema et al. (2009) and Park et al. (2015) use the 1991 Canadian Census and Cancer follow-up survey and are able to link mortality and cause of death to individual level demographics available from the long-form Census in 2001 and 2006.[13] Health Canada (2008) and Health Canada (2014) use vital statistics data from the provinces or sub-provincial areas that have identifiers for people with Status to examine mortality rates by age and gender averaged over 2001-2003 and later averaged over 2003-2007. The Health Canada studies include cause of death but do not include individual level demographics. Mao et al. (1992) uses data from

[11]Bands are the political unit defined in the *Indian Act* that the federal government uses to discern different groups of First Nations peoples.

[12]This was determined through conversations of the head of the Indian Register through email correspondence. No public record of this could be found.

[13]Tjepkema et al. (2009) and Park et al. (2015) differ in the precise population and time frame they study: Tjepkema et al. (2009) focuses on Status First Nations peoples, Métis, and non-Status peoples and uses data linked between the 1991 and 2001 Census to determine mortality rates. Park et al. (2015) focuses on all First Nations people and non-Status peoples and uses data linked between the 1991 and 2006 Census to determine mortality rates.

the Indian Register as we do, but their data only includes the two time periods 1979-83 and 1984-88. They match the Indian register with data from the Canadian Generalized Iterative Record Linkage System to obtain cause of death for 1981.[14] To our knowledge, it is not currently possible to link these records.

A significant drawback to these studies is that they are unable to describe the entire population of Status First Nations peoples. First, both Tjepkema et al. (2009) and Park et al. (2015) necessarily exclude First Nations peoples living on reserves that were not enumerated in the 1991 Census (approximately 98 reserves were not enumerated). Those two studies include individuals linked across Census data and tax-filer data in order to obtain their cause of death. The record matching was not complete, however, and differed significantly by gender and First Nations status. The match rates were 47 percent for Status men, 59 percent for Status women, 79 percent for non-Aboriginal men, and 75 percent for non-Aboriginal women. Their sample also excludes anyone without an address or those living in shelters, collective dwellings, or institutions such as prisons. In addition, both Tjepkema et al. (2009) and Park et al. (2015) consider only the population aged 25 to 75 and thus are unable to estimate mortality rates for the youngest age cohorts - which we later show have some of the highest mortality rates overall relative to the general population.

The Health Canada (2008, 2014) analysis includes people of all ages, however, their data does not cover all Canadian provinces or sub-provincial areas. Their analysis includes two provinces (British Columbia and Alberta) and the on-reserve population for Manitoba and Saskatchewan. The substantial difference in population coverage between these studies makes interpreting the differences in their results difficult for national statistics comparisons. For example, the findings of Health Canada (2008) are most comparable in time frame to Tjepkema et al. (2009), but the estimates of life expectancy in Health Canada (2008) are much shorter than those in Tjepkema et al. (2009). It is difficult to conclude whether the difference is due to the different regions included or due to the

[14]The match rate for males was 90 percent for males and 88 percent of females.

differential population match rates. Similar issues arise when comparing the results of Health Canada (2014) to Park et al. (2015).

While Mao et al. (1992) used data that covered the entire Status population, there was a significant change in 1985 in the Status First Nations qualification requirements. Specifically, all women (and their children) who lost Status through out-marriage had their Status rights reinstated (Hurley and Simeone, 2014). Therefore, the estimates of Mao et al. (1992) are not generalizable to the current population governed by the *Indian Act* given that there are likely compositional differences between Status women who out-married and Status women who did not out-marry. We return to the importance of this in Section 5.4. In Table 1 we summarize how our work differs from prior work and contrasts the time periods and populations covered in each study.

Despite the literature's shortcomings, these are important foundational statistics that provide critical information about Indigenous mortality in Canada. The literature currently suggests that Status people over the age of 25 have mortality rates one and a half to two and a half times higher than the average population for both men and women. The mortality rates of Status men are the highest; Status women's are the second highest and comparable to non-Status men; and non-Status women have the lowest mortality rates. The existing evidence suggests that the differences between Status and non-Status peoples' mortality is higher at younger ages (although this evidence is only available for specific sub-regions of Canada). While estimates of the ratio of Status to non-Status mortality rates are often higher for women than for men, there is only sporadic evidence of statistically significant gender differences (Health Canada, 2008, 2014; Mao et al., 1992; Park et al., 2015).

The studies summarized here attribute from 50 to 70 percent of the differences in mortality rates between Status and non-Status peoples to the differential incidence in endocrine and digestive system diseases and to the differential incidence in death from external causes (such as accidental death, suicide, or homicide). Tjepkema et al. (2009) and Park et al. (2015) find that while differences in income, education, occupation, and

urban residence can explain two thirds of the differences in the probability of death between the ages of 25-75 between Status and non-Status men, these factors can explain less than one third of the difference for women.

Table 1: Summary of Previous Literature Regarding Status First Nations Mortality Contrasted with Current Paper

Source	**Years**	**Population Coverage**	**Data Source**	**Advantages**
Health Canada (2008, 2014)	Averaged ; 2001/2002; 2003/2007	On reserve in SK, and MN, & all off-reserve AB & BC	CVSDD^{+}	Information on cause of death
Park et al. (2015)	Death between 1991 & 2006	15% Sample of Long-form Census pop. tax filers over 25	CCMFS*	Data on cause of death & individual level demographic data
Tjepkema et al. (2009)	Death between 1991 & 2001	15% Sample of Long-form Census pop. tax filers over 25	CCMFS*	Data on cause of death & individual level demographic data
Mao et al. (1992) 1984-1988	1979-83	All Status First Nations matched via CGIRLS**	Indian Register	Data on cause of death
This Paper	1974-2013	All Status First Nations, band members	Indian Register	Total Status pop by gender, band, and location

$^{+}$ = Canadian Vital Statistics and Deaths Databases ; *CCMFS = Canadian Census Mortality Follow Up Study; **CGIRLS = Canadian Generalized Iterative Record Linkage System

3 Data Description

3.1 Data from the Indian Register

The primary data set for our analysis comes from the Indian Register at INAC. The register contains two separate types of information: the first data set is a population count for all Status First Nations for each year from 1974 to 2013 in 5-year age groups for everyone 64 and below, gender, place of residence (whether they live on or off-reserve), as well as First Nation band of membership over this time period. The second data set contains an accounting of every death event by date of birth, year of death, gender, place of residence at the time of death (whether they live on or off-reserve) and First Nation band membership. We combine these two data sets and estimate Status mortality by gender and age group. Unfortunately, the death event data collected by INAC does not contain the cause of death.

3.2 Indian Register Data Limitations and a Validation Exercise

In this section we discuss the potential limitations of using the Indian Register data and use supplemental data collected by Health Canada to gauge the accuracy of reporting to the Indian Register. We conclude from this exercise that the Indian Register data is able to provide accurate estimates of mortality on-average between the ages of 5 and 64.

While the Indian Register data contains the official count of Status peoples, there may be concerns about its accuracy as there are often delays in the reporting of births or deaths. The register relies on band-level Indian Registry Administrators (IRAs) to report deaths. Births are under reported on average by about three years. Additionally, infants that die before being registered are not required to have a death certificate submitted to the Indian Register. Therefore, it is possible that there is an under-reporting of infants and infant deaths.

A second potential limitation is that if deaths go unreported for adults or older chil-

dren, then the Indian Register will have a larger than actual population count since those who have already died will still be included in the data set. For example, if someone dies in 1970 at age 69 and their death is not recorded, that individual will still be included in the Register in 2000 and will be reported as 99 years old. This under-reporting of deaths would result in an under-estimation of mortality rates at older ages.

A third potential limitation of our data is that while the Indian Register has provided population counts in five-year age groups for most ages, the population count of those over age 64 is reported as one large age category. As a result, comparisons of mortality rates between Status peoples and the general population will be confounded by differential age distributions within the "65 and over" age category.

Another concern is that some Status people are not members of a First Nation band recognized by INAC and therefore vital statistics are not recorded by an IRA in a band office. The vital statistics for these individuals are administered by a regional administrative body for multiple bands. This may result in a greater degree of under-reporting of deaths for this population. In addition, some bands have their governmental affairs and data administered by a regional body, and thus again, these deaths may be less likely to be recorded. Thus we will consider only Status peoples who are members of a First Nation.[15]

In order to assess the degree of under-reporting of deaths to the Indian Register, we compare the mortality rates estimates from our data, to the most credible, independently collected data we are aware of: the data collected by Health Canada Vital Statistics from Alberta, British Columbia, and on-reserve in Manitoba and Saskatchewan. We restrict our Indian Register data to the same regions and time periods as that in Health Canada (2008, 2014). Then we estimate mortality rates from our data by age and gender and

[15]Including all Status peoples has little impact on our conclusions. Upon the suggestion of INAC Indian Register officials, we also estimated our results including and excluding First Nations in the Yukon, North West Territories, and Nunavut and there is no effect on our main conclusions. However, when assessing regional or First Nations level variation in mortality rates, we exclude the Territories because of concerns with under-reporting. We inquired about a list of vital statistics data for these Territories, but, according to our discussions with Indian Register, no list for these territories and provinces has been kept over time.

calculate a simple ratio of Health Canada's estimates to our estimates.

Figure A1 depicts the results of restricting the Register sample to the same sub-regions of Canada and years available in Health Canada (2008, 2014) and generating the ratio of Health Canada's mortality rates to our own. The mortality rates are computed in each year via the estimation method described later in Section 4 and averaged over either 2001-2002 or 2003-2007. The time variation is used to construct the standard errors for the estimated ratio. Ratios above one indicates the extent to which the Indian Register data under-reports deaths in those age groups assuming the Health Canada data is accurate. We see in Figure A1 that in most age groups, our mortality estimates are statistically indistinguishable from Health Canada's. However, as expected, the Indian Register data likely under-reports both infant mortality and mortality over the age of 65.[16] It appears that on average, the Health Canada estimates of the mortality rate between zero and four years of age is twice as high as ours. There also seems to be some under-reporting of deaths over the age of 65 in both periods, with Health Canada's estimates 1.30 to 1.45 times as large as our estimates. For these reasons, in most of what follows, we focus on estimating mortality rates between the ages of 5 and 64.[17] Overall, however, we find that our results from the Indian Register align with the independently collected data from Health Canada and thus we have confidence in our results for the age range 5 to 64 years.

3.3 Additional Data

To construct comparable estimates of mortality for the general population, we use population and death count data compiled by gender, province, and five-year age group from Health Canada Vital Statistics. These data are available for the general population by age, gender, and province from 1974 to 2013. In order to gain a sense of whether time and regional patterns in mortality are correlated with basic economic characteristics, we

[16]The result regarding infant mortality is unsurprising given that if infants die before they are registered, neither their birth nor death will be registered.

[17]There is also some evidence is marginal under-reporting of deaths over the age of 40 in 2001-2002 and over 60 in 2003-2007, particularly for males. However, this small degree of potential under-reporting would not change the conclusion of this work in a substantive fashion.

use data from the 1991, 1996, 2001, and 2006 Long Form Census and the 2011 National Household Survey. To our knowledge, the Long Form Census and National Household survey contain the most complete population coverage of Status and non-Status peoples in Canada. For a more complete description of the advantages and disadvantages of Census and National Household survey as it relates to Indigenous peoples, see Feir and Hancock (2016). For a summary of the data sources and how they are used, see Table 2.

Table 2: Summary of Data Sources and Use

Data Source	**Use**
Indian Register	Population and death counts used to construct mortality rates for Status peoples
Health Canada Vital Statistics Compiled by Statistics Canada	Population and death counts used to construct mortality rates for general Canadian population
1991-2006 Census & 2011 NHS	Used to construct basic socio-economic information by Status, gender, province and age group over time to assess the correlation with trends and regional patterns

Notes: INAC is Indigenous and Northern Affairs Canada; NHS is the National Household Survey.

4 Methodology

Our analysis focuses on estimating mortality for Status First Nations. We use the INAC data with the methods described below to produce First Nations and Canadian average mortality rates overall, in five-year age-groups, across provinces, First Nations reserves and over time.

4.1 Estimating Mortality By Age Group, Age-Standardized Mortality Rates, and the Probability of Death

We estimate mortality rates for Status peoples and the general population separately by age and gender by calculating

$$\eta_{agt} = \frac{\#deaths_{agt(endofperiod)}}{population_{agt(startofperiod)}} \times 100,000 \tag{1}$$

where a denotes five-year age group, g denotes gender, and t denotes year. Reporting deaths per 100,000 is consistent with prior literature. Data for the numerator and the denominator in Equation 1 come from the Indian Register for the Status population and from Health Canada Vital Statistics for the general population. The Indian Register provides information on the date of birth, the age of death, and the year of death, thus even if a death is reported a few years after it occurs, we are still able to identify the year and age group to which that death belongs. Late reporting of death appears to be a very minor concern for the age groups we focus on.

In addition to these simple five-year age range mortality rates, we also compute age standardized mortality rates (ASMR) between the ages of 5 and 64. These age standardized mortality rates are useful when comparing populations over time or across populations with very different underlying age distributions. Since mortality rates are highly age-dependent and the Status population is much younger than the general Canadian population, comparing the overall mortality rates of the general Canada population with the Status population may provide an overly optimistic view of equality of mortality rates. This skew towards younger ages in the Status population alone could result in lower mortality rates for Status populations. Therefore, we calculate a direct age standardization (Ahmad et al., 2001) using the age distribution approximated in five-year age bands with the base population of Status First Nations people of all genders in 2010. Let the proportion of the population age a for all Status First Nations in 2010 be denoted as p_{a2010}. Thus the age standardized mortality rate (ASMR) is given by:

$$\eta_{gt} = \sum_{a=5to9}^{60to64} p_{a2010} \times \eta_{agt}. \tag{2}$$

We compute the ASMR for both genders, for all years, for Status peoples and the general population. It is worth noting that different base age distributions will emphasize differences in different parts of the life cycle across the populations. We also present our results by each five-year age group as well, rather than only the ASMR.

Our final estimates of interest are the estimated probabilities of dying before a particular age is reached. The probability of dying before one reaches age $a+1$ is computed as follows with a set of synthetic cohorts:

$$\rho_{a+1gt} = 1 - \frac{population_{agt(endofperiod)}}{initialpopulation_{gt(startofperiod)}} \tag{3}$$

These tables estimate the period life expectancy which provide mortality rates over a specific time period for each age group of individuals.[18] These period life tables (in our case we invert them to show the probability of death) show the overall mortality conditions operating over this particular time period (when the deaths occur). This implies that if all conditions were to remain constant over time and over age cohorts, then a cohort born in this time period could expect mortality rates as provided in these tables. However, to interpret these estimates in this way, we need to assume that there are no differential genetic endowment effects across birth cohorts or time period effects (for example, being born during a famine, war, or boom periods). We also need to assume that there is no selection with regard to unobserved characteristics of the individuals in each age cohort. We acknowledge that these are strong assumptions, but they are standard ones for the computation of these tables in the literature (Guillot, 2011).

Data used to calculate the probabilities estimated in Equation 3 come from the Indian

[18]The other alternative method for computing life expectancy tables is to estimate a cohort life expectancy for a single birth cohort over their entire lifetime. We are unable to do this as the data quality is complete for more recently born cohorts – specifically cohorts born after 1940. Cohort life expectancy tables require all or almost all of the cohort to have died in order to conduct such analysis and would require cohorts born from the early 1900s.

Register for the Status population and from Health Canada Vital Statistics for the general population. These probabilities are presented for each age group up to age 64 by gender for the Status and general population. Note that to compute the number of deaths from age zero to four for the Status population, we also inflate the number of deaths in the register in this age group by the factor computed in 2003-2007 presented in Figure A1 to adjust for under-reporting in the register. In doing this, we assume that the extent of under-reporting of deaths between the ages of zero and four on-reserve in Manitoba, Saskatchewan, Alberta and British Columbia are the same as elsewhere in Canada.

4.2 Associative Analysis

We perform two sets of associative exercises. These exercises are not intended to be causal, but rather useful for identifying potential correlates of mortality rates for the Status First Nations population. The first exercise creates measures of the ASMR by province, Status, age,and gender between 2000 to 2011 and measures of economic characteristics by province, Status, age, and gender from the 2001, 2006 and 2011 Censuses. We then use this data to examine the association between these economic characteristics and mortality rates across Canadian provinces.

The second exercise adds in two additional Canadian Censuses for 1991 and 1996. We regress mortality rates on economic and social characteristics from the Census data as well. In this analysis, we focus on changes in mortality rates over time by gender and First Nations Status.[19] We focus on the time period 1991-2011 in particular as this was a period of stability in how First Nations Status was defined; there were changes in definitions and Status requirements earlier in 1985 and subsequently in 2010-2011. The covariates of interest in this analysis are educational attainment and income levels, therefore we only analyze the population over the age of 25 in this exercise.

A third potential analysis would be to conduct a Oaxaca-Blinder decomposition to

[19]We create mortality rates by averaging over three years spanning each Census year for a more stable mortality estimate. For instance, we average over the years 1990, 1991 and 1992 to create an estimate of the mortality rate for the 1991 Census year

explain the differences in mortality rates between the Status and non-Status populations. There are two reasons that we do not conduct such analysis. First, the finest level available for Canadian mortality rates is at the health region level and they are aggregated up to the age of 75. This aggregation makes it difficult to compare to the Status mortality data we have available. Second, and perhaps more importantly, in order to perform a meaningful decomposition analysis, the characteristics of the groups one compares must overlap one another (Fortin et al., 2011). However, in our data there are no Health Regions with economic characteristics that significantly span the economic characteristics of First Nations communities. In other words, Status First Nations communities can be perfectly predicted based on their economic characteristics alone. Thus the results of any decomposition analysis would be difficult to interpret. As discussed in Section 2, the studies conducted at the individual level among a more selected population suggest that differences in income, education, occupational skill, and urban residence can account for two thirds of the difference in the probability of death between Status men and non-Status men between the ages of 25-75 and about a third of the difference for women (Park et al., 2015; Tjepkema et al., 2009).

5 Results

5.1 A Snapshot of Mortality by Gender, Age and Status in 2010-2013

In this section we provide an overview of Status First Nations mortality rates averaged over 2010 to 2013 and compare them with the mortality rates in the general population by gender and age.[20] Our analysis focuses on the most recent years where there is a consistent definition of First Nations Status. For the analysis over time we directly

[20]We focus on these years since they are the most recent years for which we have data. We report the average of three years in order to reduce noise in the yearly mortality rate. The results are unchanged if 2010 is excluded.

address the issue of changes in the definition of First Nations Status in section 5.3.

In Table 3 we provide the overall age standardized mortality rates calculated as specified in Equation 2 as well as the five-year age group mortality rates by gender for Status First Nations and the Canadian average. The age standardized mortality rates (ASMR) are provided in the first row. Between ages 5 and 65, the ASMR is 226 deaths per 100,000 for the Status First Nations male population, and 161 deaths per 100,000 for the general Canadian male population averaged over 2010 to 2013. For the Status female population, the ASMR is 165 deaths per 100,000 and for the general female population it is 101 deaths per 100,000. Note that these ASMR estimates are not strictly comparable to other studies because we have age standardized to the Status First Nation age distribution in 2010; thus we provide the mortality rates in five-year age groups for males and females in the remaining rows. We find that Status men consistently have the highest mortality rates at almost all age groups. It is worth noting, however, that the mortality rate of Status girls between the ages of 10 to 14 is actually higher (36 per 100,000 as compared to 24 per 100,000) than that of Status boys. This is the only age for which the mortality rate of Status females is above that of Status males. Next, notice that Status females have mortality rates that are higher than both non-Status males and non-Status females.[21]

To more clearly illustrate the relative patterns in Table 3, we present in Figure 1 the ratio of the Status First Nations mortality rate to the General population mortality rate. The dashed horizontal line at one represents parity with the average Canadian in terms of mortality rates at the various age groupings. The figure indicates that the relative mortality rates (or, equivalently, mortality rate ratios) are above one in all cases and above two in most age and gender groups. This indicates that Status First Nations have nearly

[21]In Table A1 we show the mortality rates for Status First Nations and the General population by age and gender computed by year and averaged over 2000 to 2009 and demonstrate that the patterns observed in 2010-2013 are not anomalies. The estimates in this table show that the patterns described above are characteristic over the decade of the 2000s: Status male mortality rates are higher than the general population and Status female mortality rates are lower than Status men in most age groups but significantly higher than for women and comparable to the general male population in many age groups. In addition, the mortality rate ratios are more significantly biased against Status women between 10 to 39.

Table 3: Summary of Mortality Rates per 100,000, 2010-2013

	Males		Females	
Age Group	Canadian Average	All Status First Nations	Canadian Average	All Status First Nations
ASMR (5 to 64)	160.71 (1.94)	225.89 (9.26)	100.81 (0.92)	165.41 (1.62)
05 to 09	9.12 (0.8)	13.51 (5.67)	7.88 (0.73)	12.83 (2.92)
10 to 14	11.97 (1.23)	23.85 (12.08)	10.77 (1.24)	35.62 (10.73)
15 to 19	46.9 (4.31)	123.22 (8.66)	24.72 (1.17)	92.85 (18.35)
20 to 24	73.18 (3.93)	172.05 (38.84)	30.42 (0.44)	113.25 (3.89)
25 to 29	75.64 (2.19)	204.53 (15.5)	32.95 (0.98)	112.84 (19.72)
30 to 34	81.15 (2.43)	217.34 (17.09)	43.46 (1.16)	165.46 (3.82)
35 to 39	101.44 (2.89)	241.24 (18.74)	59.04 (1.6)	191.98 (24.67)
40 to 44	149.58 (5.4)	358.6 (28.48)	93.61 (2.32)	257.43 (33.35)
45 to 49	232.3 (4.94)	459.84 (20.93)	155 (2.81)	324.95 (18.45)
50 to 54	372.6 (9.52)	593.2 (53.19)	247.96 (8.35)	408.75 (41.4)
55 to 59	595.89 (10.49)	926.5 (26.97)	383.4 (4.18)	493.62 (52.78)
60 to 64	926.3 (10.41)	1,288.04 (49.34)	576.24 (9.44)	883.98 (76.01)

Notes: Data comes from the Indian Register and Health Canada Vital Statistics Births and Death Database. The age standardized mortality rates (ASMR) are standardized to the age distribution of Status people in 2010.

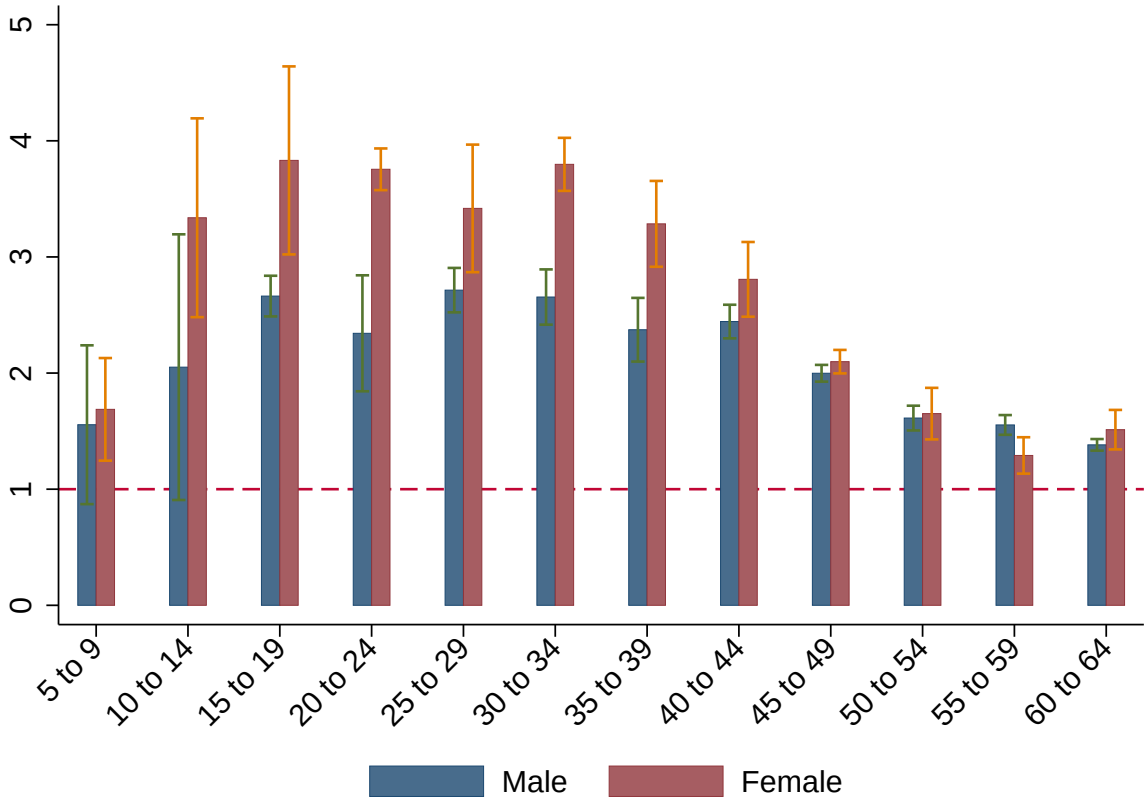
double the mortality rate as compared to their relevant reference group for the population as a whole. The mortality rate ratio is particularly high for females (approaching a ratio of four) starting at age 15 and going through 39 years of age. Status males have higher levels of mortality in this age range as compared to the average Canadian male and have a ratio approaching three. We note that the difference in the male and female mortality ratios shown here are statistically different from one another from ages 10 to 44.[22]

To our knowledge, we are the first to document these gender-biased mortality rate ratios at such young ages across Canada. These high rates of female mortality are not identifiable in survey data through imbalances in male-female gender ratios. Our results echo the finding of female-bias relative mortality rates in developing countries (Anderson and Ray, 2010) where there are relatively balanced gender ratios.[23]

[22]If we were to inflate our estimates of male and female mortality by fraction suggested in the first panel of Figure A1, this conclusion would not change.

[23]In the case of Status First Nations, the high rates of institutionalization and homelessness among Status First Nation men (Akee and Feir, 2016) actually skew the gender ratio in the Status First Nation population towards women.

Figure 1: Mortality Rate Ratio (Status First Nation Mortality per 100,000 divided by Average Canadian Mortality Rate per 100,000) averaged over 2010 to 2013 By Gender and Age



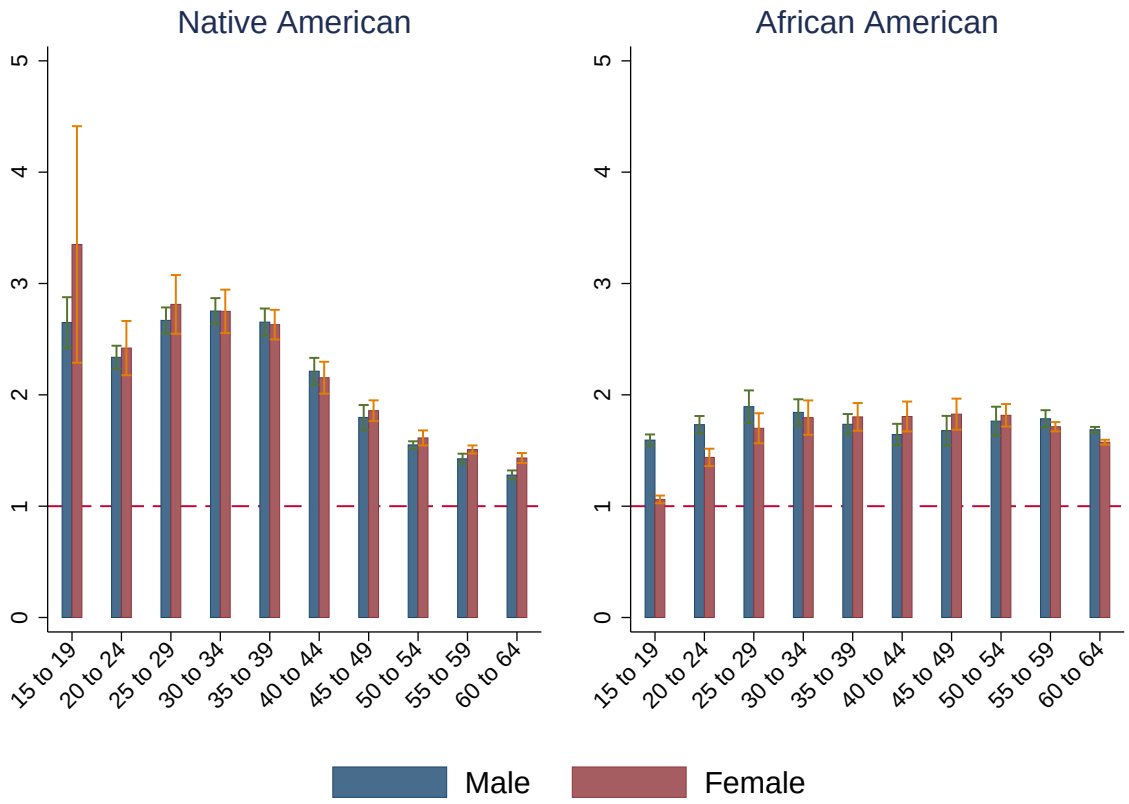
Notes: This figure shows the mortality rate ratio between Status First Nations and all Canadians with their 95 percent confidence intervals averaged over 2010 to 2013. The data is from the Indian Register on population size and death rates by age and gender and from Vital Statistics data from Health Canada.

We contrast our results for Status First Nations populations relative mortality rates with those of Native Americans and African Americans in the U.S. relative to the majority population in that country. In Figure 2, we estimate the relative mortality rates by gender for Native Americans and African Americans using data from the National Center for Health Statistics.[24] The first panel depicts the mortality rate ratios for Native Americans relative to the majority population in the US across the range of ages 15-64; the mortality rate ratios are particularly high in the young adult years and are approximately of equal

[24]http://www.cdc.gov/nchs/hus/american.htm#deaths

magnitude for both males and females.[25]

Figure 2: Mortality Rate Ratio of Native and African Americans to White Americans, 2010-2013



Notes: The y-axis denotes ratio of either Native American or African mortality rates divided by the non-Hispanic white mortality rate. The data on mortality rates by race were computed using counts on number of deaths and population from CDC Wonder data files on Underlying Cause of Death, 1999-2015 Centers for Disease Control and Prevention. https://wonder.cdc.gov/ucd-icd10.html.

The mortality rate ratio for Native Americans exceeds three for females in the age group 15-19 and hovers around three until about age 40 for both male and females. These are quite high mortality rate ratios, but they are smaller than those found for the

[25] Schulhofer-Wohl and Todd (2015) find high female mortality rates for a few select counties in the U.S. with relatively high American Indian populations. While their estimates include non-American Indians, the implication is that a large proportion are most likely American Indian females. They report that "for the four decades since the late 1960s, the age-adjusted mortality rate for women (of all races) in American Indian-dominated Menominee County, Wisconsin, has ranged between the highest and fourth-highest among all counties in the 48 states." However, the mortality rate ratios we presented for Canada are substantially higher than for North American Indians and African Americans in the United Status on average.

Status First Nations population in Canada, especially for Status First Nations women and girls.[26] The next panel provides similar data for African Americans. At younger ages, there appears to be higher mortality rate ratios for males than for females especially at ages 15-19 and the mortality rate ratio hovers around two. The comparison of the Status First Nations mortality rates to these two US-based groups suggests the extreme nature of the former's conditions in Canada. We find that the ratio of the Native Americans' and African Americans' mortality rates compared to white Americans is lower than the ratio of First Nations mortality to the general population in Canada; it should be noted that Native Americans and African Americans are among the most at-risk and impoverished groups in the US. Additionally, the mortality ratios are approximately similar by gender for these two groups in the US and we do not observe the extreme mortality rate ratios for First Nations females. However, the mortality rates we estimate (as opposed to mortality rate ratios) for Status First Nations men are roughly comparable to those in the African American population before the age of 35 while Status First Nations women have higher mortality rates than those in the African American population.

Given that we have information on the year of birth and death, we compute the probability of death for the Status First Nations populations. In Table 4 we provide the Canadian Average and the First Nations average probability of dying before a certain age (in five year intervals) for each gender. For this analysis we use the most recent data available on mortality for 2010-2013. For instance, in the first row of the table, the probability of dying for a Canadian male by age five is 0.6 percent and it is also 0.6 percent for Status First Nations males. For females, the probability of death is 0.5 percent for a Canadian female but it is slightly higher for a Status First Nations female at 0.7 percent. Differences in the probability of dying before a specific age begin to appear by age 20 with Status First Nations individuals having consistently higher probabilities of death as

[26]To determine if this simply due to the general female population in Canada having significantly better outcomes than their American or Status counterparts, we re-compute Figure 2 using the Canadian mortality rate as the denominator. Figure A2 shows that the differences across countries in the gender bias in the mortality rate ratios are not due to relatively low young female Canadian mortality rates.

compared to the general Canadian population. By age 50, a Status First Nation male has about a 10 percent chance of dying while his Canadian counterpart has about a 5 percent chance of death; for females it is 7.3 percent and 2.8 percent respectively. Finally, in the bottom row of the table, we find that by age 65 Status First Nations men have a 24 percent chance of dying as compared to a 14 percent chance of dying for their Canadian counterparts. For Status First Nations women there is a 16.2 percent chance of dying by age 65 while it is 9 percent for Canadian women. These are quite large differences in the probability of death and this data has implications on the continuity of households and communities.

Table 4: Probability of Dying Before Age X, 2010-2013

	Male		Female	
Age	General	All Status	General	All Status
5	0.006	0.006	0.005	0.007
10	0.007	0.007	0.006	0.008
15	0.007	0.008	0.006	0.01
20	0.009	0.015	0.007	0.014
25	0.013	0.023	0.009	0.02
30	0.017	0.033	0.011	0.026
35	0.021	0.044	0.013	0.034
40	0.026	0.056	0.016	0.044
45	0.034	0.075	0.02	0.057
50	0.045	0.098	0.028	0.073
55	0.064	0.128	0.04	0.093
60	0.094	0.174	0.06	0.118
65	0.14	0.238	0.088	0.162

Notes: The probability of death before a given age group is given in each of the cells. The probabilities are calculated over five year age groups. It is computed from the average mortality rate between 2010 to 2013 for each age group. The standard errors are given below in parenthesis. The data is taken from the Indian Registrar.

5.2 A Snapshot of Mortality by Location - On- or Off-Reserve and by Province in 2010-2013

In this section, we examine differences in Status First Nations and average Canadian mortality rates by geographic location. We examine two different geographic areas: Canadian provinces and location on and off First Nations reserves. Our analysis provides deeper insight into the differences in mortality rates across these different geographic regions in Canada. Later, we will conduct analysis to show whether these differences are due to an association with specific regional or geographic endowments or other characteristics. While this analysis is not causal, it does illuminate several potential paths for future research on this topic. This is also the first, to our knowledge, display of differences in mortality rates between the on- and off-reserve population of Status First Nations.

In Table 5 we provide the mortality rates for Status First Nations males and females residing on and off of reserves and the average Canadian mortality rates. This analysis is similar to Table 3 with the added dimension of geographic differences. The first item to note is that the ASMR for males and females are higher for the on-reserve population as compared to both the off-reserve and Canadian averages. The off-reserve Status First Nations population also has a higher ASMR than the Canadian average. Overall the mortality rates for the on-reserve population tend to be almost always twice that of the Canadian average for males across most of the five-year age groups; the rate for females on-reserve is often triple to quadruple the Canadian average at many ages.

We depict these mortality rates in Figure 3 as a ratio of the on and off reserve Status First Nations' mortality rates divided by the relevant Canadian average. Once again, the horizontal line at one indicates parity with the Canadian average mortality for the age group and location. In the first panel we present the results for males. The on-reserve mortality rate ratios are consistently above two for ages 10 to 49 for Status First Nations males. In young adulthood the ratio is above three. The ratios for off-reserve Status First Nations males is consistently above one except for at ages 60 to 64 where it is slightly

Table 5: Summary of Mortality Rates per 100,000, 2010-2013

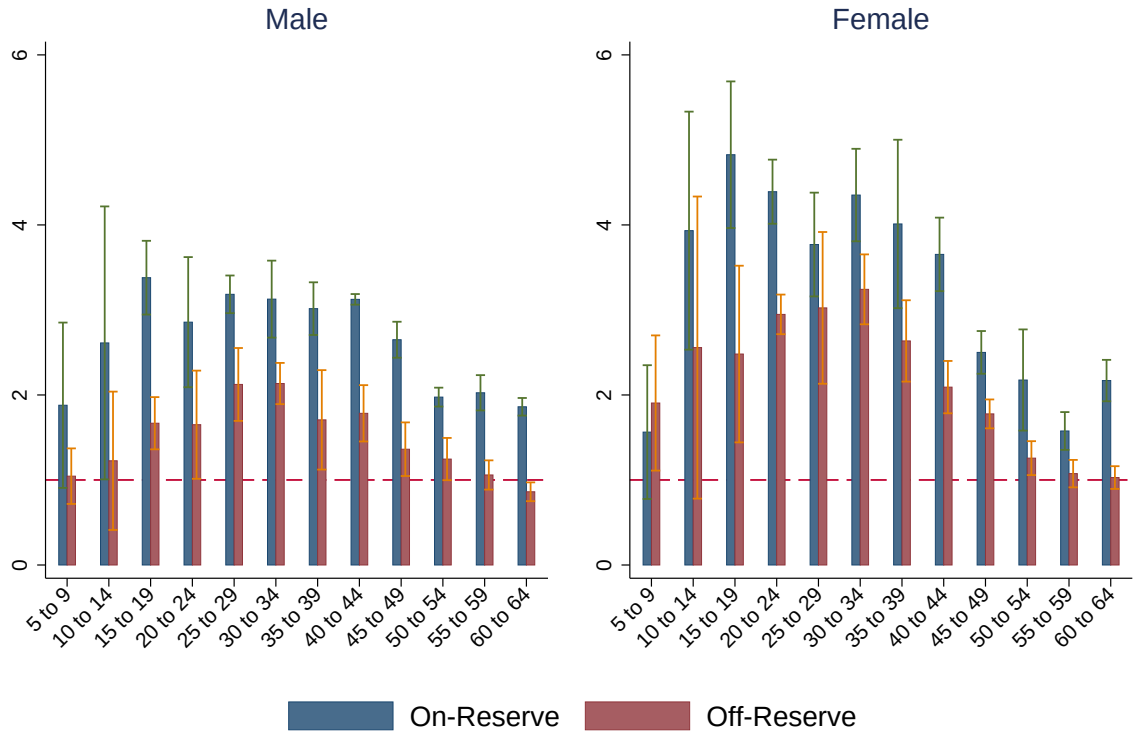
	Males			Females		
	Canadian Average	On-Reserve	Off-Reserve	Canadian Average	On-Reserve	Off Reserve
ASMR	160.71	261.06	181.36	100.81	179.79	149.56
(5 to 64)	(1.94)	(9.34)	(17.2)	(0.92)	(12)	(10.77)
Age Group						
05 to 09	9.12	16.23	9.25	7.88	11.65	14.80
	(0.8)	(8.07)	(2.99)	(0.73)	(5.21)	(7.01)
10 to 14	11.97	29.32	16.00	10.77	42.09	27.20
	(1.23)	(16.46)	(11.38)	(1.24)	(17.99)	(15.66)
15 to 19	46.9	152.02	82.75	24.72	114.95	62.49
	(4.31)	(11.76)	(17.61)	(1.17)	(17.83)	(24.29)
20 to 24	73.18	204.38	127.88	30.42	129.92	91.97
	(3.93)	(61.19)	(43.21)	(0.44)	(11.23)	(5.98)
25 to 29	75.64	233.64	167.65	32.95	121.24	103.39
	(2.19)	(18.26)	(29.05)	(0.98)	(19.24)	(34.67)
30 to 34	81.15	244.91	186.93	43.46	182.23	148.54
	(2.43)	(36.87)	(11.77)	(1.16)	(22.3)	(17.56)
35 to 39	101.44	296.71	183.17	59.04	228.07	159.53
	(2.89)	(33.98)	(46.44)	(1.6)	(56.85)	(29.68)
40 to 44	149.58	448.19	270.6	93.61	328.15	196.95
	(5.4)	(17.76)	(56.65)	(2.32)	(38.29)	(35.48)
45 to 49	232.3	590.52	329.79	155	372.12	286.82
	(4.94)	(57.94)	(67.54)	(2.81)	(43.53)	(23.89)
50 to 54	372.6	708.02	474.83	247.96	514.52	328.41
	(9.52)	(54.75)	(97.96)	(8.35)	(132.62)	(34.18)
55 to 59	595.89	1162.71	675.77	383.4	581.86	425.98
	(10.49)	(111.74)	(108.54)	(4.18)	(86.86)	(50.28)
60 to 64	926.3	1657.44	876.77	576.24	1200.03	648.05
	(10.41)	(105.32)	(135.39)	(9.44)	(128.8)	(63.75)

Notes: Data comes from the Indian Register and Health Canada Vital Statistics Births and Death Database. The age standardized mortality rates (ASMR) are standardized to the age distribution of Status people in 2010.

below one. In general the mortality rate ratio for the off-reserve Status First Nations is more muted than the on-reserve populations.

For females, the on-reserve population has mortality rate ratios that are around four4 for ages 10 through 44. The ratio declines after that but increases again at ages 60 to 64. The off-reserve Status First Nations women all have high mortality ratios relative to their Canadian counterparts. Overall, there is evidence that Status First Nations females have higher relative mortality rates (both on and off reserve) than their male counterparts.

Figure 3: Mortality Rate Ratio (Status First Nation Mortality Rate divided by Canadian Average Mortality Rate) averaged over 2010 to 2013 By Place of Residence, Gender, and Age



Notes: This figure shows the difference between women and men in the ratio of mortality rates between Status First Nations and all Canadians with their 95 percent confidence intervals averaged over 2010 to 2013 using Data from the Indian Register on population size and death rates by age and gender and from Vital Statistics data from Health Canada. The label "on-reserve" indicates the figure that provides the relative mortality rates calculated for the population reported to be living on legally defined reserve land and the label "off-reserve" indicates the figure that provides the relative mortality rates calculated for the population reported to be living off legally defined reserves.

Table 6 provides the probability of death for the on and off reserve populations by select ages. This analysis is comparable to Table 4 except we calculate the on and off reserve probability of death in this table. The first column provides the probability of death for all Canadian males and the next two columns provide the probability of death for Status First Nations males residing on- and off-reserve respectively. The next three columns provide data for females. The data indicate that the on-reserve population has the highest probability of death for both Status First Nations males and females. The difference in probability of death diverges for males around age 20 for the on-reserve and off-reserve population as compared to the Canadian average. The divergence appears to start slightly earlier for females around age 15, but the most dramatic differences emerge by age 20. By age 50, the on-reserve population has a probability of death that is at least two times as high as for the Canadian average for both genders.

Table 6: Probability of Dying Before Age X On- and Off-Reserve, 2010-2013

	Male			Female		
Age	Canadian Average	Status On-reserve	Status Off-Reserve	Canadian Average	Status On-reserve	Status Off-Reserve
5	0.006	0.006	0.007	0.005	0.008	0.005
10	0.007	0.007	0.007	0.006	0.009	0.006
15	0.007	0.009	0.008	0.006	0.011	0.007
20	0.009	0.017	0.012	0.007	0.017	0.01
25	0.013	0.027	0.018	0.009	0.024	0.015
30	0.017	0.039	0.026	0.011	0.03	0.02
35	0.021	0.052	0.034	0.013	0.039	0.027
40	0.026	0.067	0.043	0.016	0.051	0.035
45	0.034	0.091	0.056	0.020	0.068	0.045
50	0.045	0.121	0.072	0.028	0.088	0.059
55	0.064	0.158	0.095	0.040	0.115	0.076
60	0.094	0.218	0.127	0.060	0.145	0.098
65	0.140	0.305	0.167	0.088	0.207	0.131

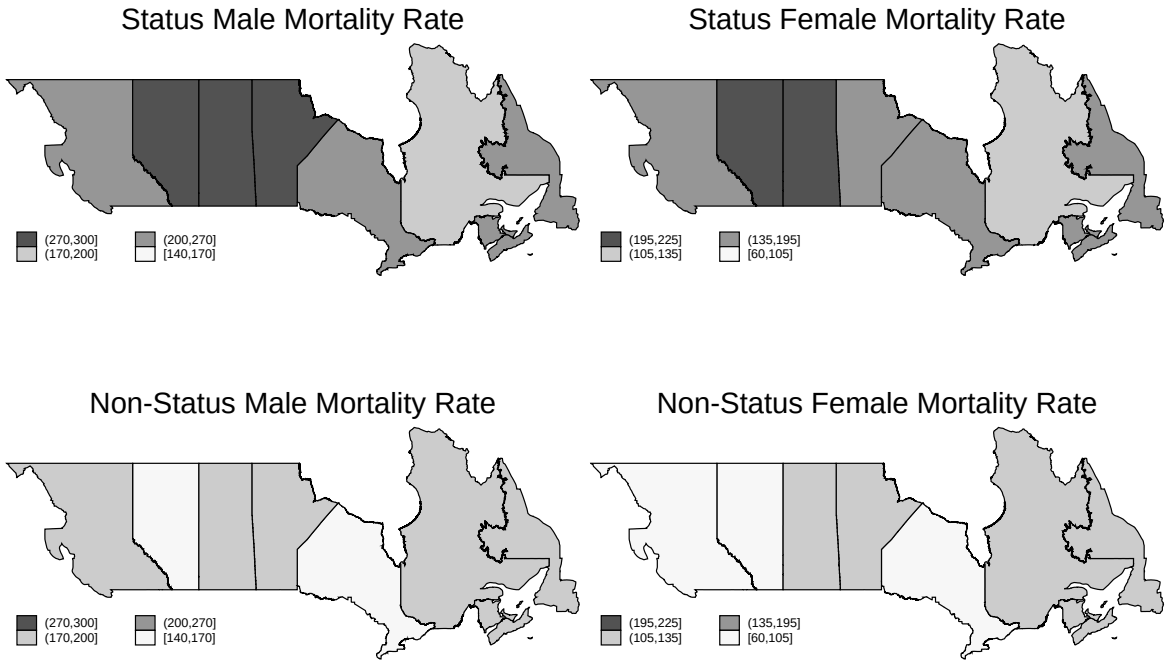
Notes: The probability of death before a given age group is given in each of the cells. The probabilities are calculated over five-year age groups. It is computed from the average mortality rate between 2010 to 2013 for each age group. The standard errors are given below in parenthesis. The data is taken from the Indian Registrar.

Previous work suggests several reasons why mortality rates are higher on-reserve than off-reserve: economic conditions for those living on-reserve in Canada are systematically poorer than for those living off-reserve (AANDC, 2015; Feir, 2013; Pendakur and Pen-

dakur, 2011), unsafe drinking water is a reality for many communities (Simeone, 2010), and access to emergency medical care is limited (Lavoie et al., 2010).

Next, we present age-standardized mortality rates by province. Figure 4 provides the observed ASMR for Status First Nations individuals across the Canadian provinces in the first row and for the average Canadian population in the bottom row. This data provides an augmented view of geographic differences in mortality rates for the Status First Nations population. For instance, the mortality rates for the average Canadian is relatively low across all provinces, but it is particularly low for both males and females in places such as Alberta. Conversely, Alberta, along with Manitoba and Saskatchewan, have the highest mortality rates for both Status First Nations males and females; as a result, the relative mortality rates are exacerbated when one compares First Nations to average Canadian mortality in different provinces (the results can be see in Figure A3). We also show that provinces vary in the extent to which Status people have higher mortality rates than the general population by age group. The details of this can be found in Figure A4.

Figure 4: Age Standardized Mortality Rates by Province, 2010-2013



Age-standardized mortality rate: Status First Nations Rate and General population.

Table 7 provides some associative analysis for the differences in mortality rates across provinces with their respective province-level characteristics. This associative analysis relates the differences in mortality rates between Status and non-Status peoples by province to the differences between Status and non-Status peoples in the Atlantic provinces (omitted group). The first three columns provide results for male mortality rates for all provincial residents across the time period 2000 to 2011 and the next three columns for females. We include province and age-group fixed-effects in all analyses.

In the first column we find that Status First Nation males in Alberta, Manitoba and Saskatchewan have higher relative (Status compared to non-Status) mortality rates as compared to their counterparts in the Atlantic provinces. Relative mortality rates are statistically significantly lower for Status First Nations males in Quebec relative to their counterparts in the Atlantic provinces. Including additional covariates such as average

household income percentiles, proportion female and proportion single in column 2 reduces the size of the estimated coefficient for Alberta, however, the estimated coefficient increases in magnitude for both Saskatchewan and Quebec and are still statistically significant. In the third column we include measures of the share of provincial employment in manufacturing or primary industries; this reduces the magnitude and statistical significance of the estimated coefficients for the Status x Alberta and Status x Saskatchewan variables but increases the magnitude of the estimated coefficient on the Status x Quebec variable.

In the next three columns we provide a similar analysis for females. There appears to be higher relative mortality rates for Status First Nations females in Alberta; however, this estimated coefficient decreases in magnitude and statistical significance once additional controls are added in columns 5 and 6. Relative mortality rates are consistently lower in Quebec for Status First Nations females in all three specifications. These results show that the high relative mortality rates for Status First Nations females in Alberta and Saskatchewan are closely tied to economic and social conditions in those two provinces; the same does not hold for Status First Nations males in those same provinces.

Table 7: Regional Variation Explained by Observable Characteristics?

	Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)
AB X Status	137.4***	120.6***	95.49*	123.6*	38.52	21.02
	(38.66)	(42.534)	(51.206)	(69.14)	(96.117)	(105.034)
BC X Status	42.18	30.33	32.97	-70.9	-137.0*	-116.1
	(38.184)	(37.852)	(39.108)	(61.84)	(75.677)	(72.742)
MN X Status	93.82**	85.35**	45.52	41.24	-21.72	-66.92
	(40.733)	(38.74)	(49.476)	(62.766)	(89.085)	(112.714)
ON X Status	9.37	-22.32	-47.78	-48.71	-97.01	-112.9
	(37.733)	(39.317)	(42.851)	(54.271)	(63.941)	(74.449)
QB X Status	-67.58*	-106.5**	-137.7**	-185.7***	-218.7***	-229.0***
	(36.277)	(50.598)	(55.682)	(54.464)	(79.499)	(81.119)
SK X Status	142.6***	174.9***	132.1**	25.6	9.38	-30.51
	(50.212)	(46.277)	(56.697)	(59.132)	(78.025)	(109.77)
Dropout		312.4***	361.4***		356.1*	397.7**
		(118.678)	(124.04)		(183.917)	(187.361)
Employed		496.1***	498.4***		368.5**	336.9*
		(140.216)	(134.628)		(184.702)	(184.536)
10-p Family Income		-0.345	0.364		0.65	-1.155
		(5.31)	(5.267)		(4.481)	(4.748)
50-p Family Income		-1.596	-1.682		-1.563	-1.398
		(1.374)	(1.516)		(2.214)	(2.047)
90-p Family Income		-1.336	-1.375		0.229	0.214
		(1.198)	(1.174)		(1.216)	(1.214)
Prop. Lone Parents		-278.6	-244.3		-300	-224.5
		(200.303)	(189.639)		(382.977)	(383.458)
Prop. Female		346.6*	370.3*		-192.6	-249.1
		(206.614)	(198.674)		(316.276)	(302.272)
Prop. Single		-61.27	-48.69		426.5***	396.4***
		(119.614)	(114.214)		(137.028)	(138.938)
Share employed			-519.9			-379.8**
in Manufacturing			(316.69)			(170.127)
Share employed			-501.4			-171.5
in Primary Industries			(366.257)			(273.853)
Status	143.8***	174.7***	160.5***	296.3***	316.1***	280.6***
	(27.816)	(46.03)	(45.72)	(47.693)	(53.738)	(63.098)
Year	-8.737***	-6.981***	-9.141***	-13.34***	-11.70***	-14.15***
	(1.525)	(1.87)	(2.373)	(1.812)	(2.912)	(2.943)
Province FE	X	X	X	X	X	X
Age Group FE	X	X	X	X	X	X
Observations	378	378	378	378	378	378
Adjusted R^2	0.877	0.89	0.892	0.899	0.905	0.906

Notes: The outcome variables is the mortality rate obtained from the Indian Register averaged over the three years surrounding each Census year by Status, gender, age-group, province and year. Census years included are 2001, 2006, and 2010. Data on economic characteristics comes from the Census and the National Household Survey. The omitted provinces are the Atlantic provinces. The omitted age category is 15 to 19. Family income is in 2002 dollars. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.3 First Nations Mortality across time 2010-2013

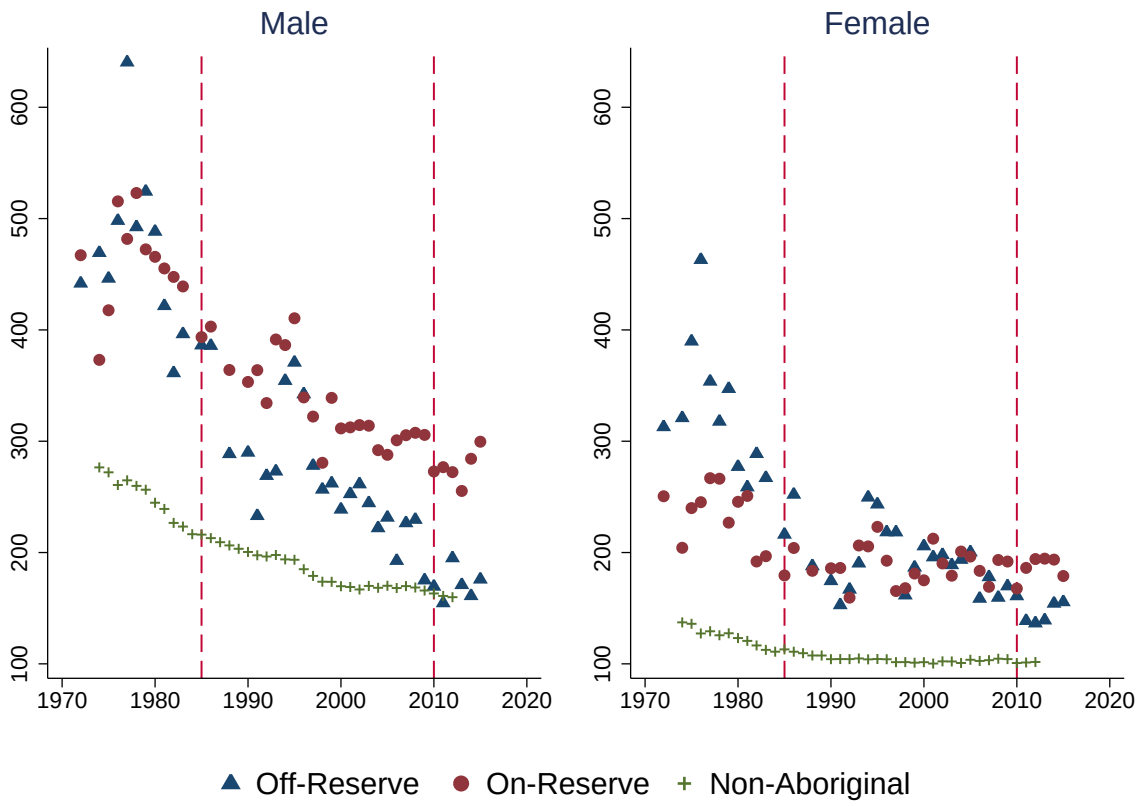
In this section we describe changes in the observed mortality rates for Status First Nations populations in Canada across several decades. In Figure 5 we show the age-standardized mortality rates for Status males and females and for the general population between 1974 to 2013. The vertical lines indicate the year of Bill C-31 and Bill C-3, which both resulted in significant changes in the definitions of the Status First Nation population. There are distinct increases in population counts off-reserve after these changes are made to the definition of Status First Nations and are shown in Figure A5.[27]

We first note that mortality has declined significantly for Canadian males from the 1970s onward. A similar decline in mortality rates is observed for both the on and off-reserve Status First Nations male populations. Two points are worth noting in regard to the decline for Status First Nations males. First, there is higher variability in mortality rates primarily due to the fact that these estimates are based off of much smaller populations than for the average Canadian male. Second, while it appears that the average mortality rate has converged for the off-reserve Status First Nation male population, it is consistently higher for the on-reserve population.

There is a relative reduction in average mortality rates for Canadian females over time but it is smaller than for men. For the Status First Nation females, before 1985, there appears to be significant declines in the ASMR but there is quite a lot of variability. After 1985 there appears to be a level-shift in mortality for Status First Nations females. There has been virtually no change in ASMR for women subsequently. One reason for this shift downward in mortality rates could be compositional changes of the First Nations populations as a result of changes to the definition of First Nations Status in 1985.

[27] We address the importance of this further in Section 5.4.

Figure 5: The Status First Nation Mortality Rates and the General Population per 100,000



Notes: All populations are standardized to have the age distribution common to all Status First Nations at the national level in 1991.The vertical lines indicate the year of Bill C-31 and Bill C-3.

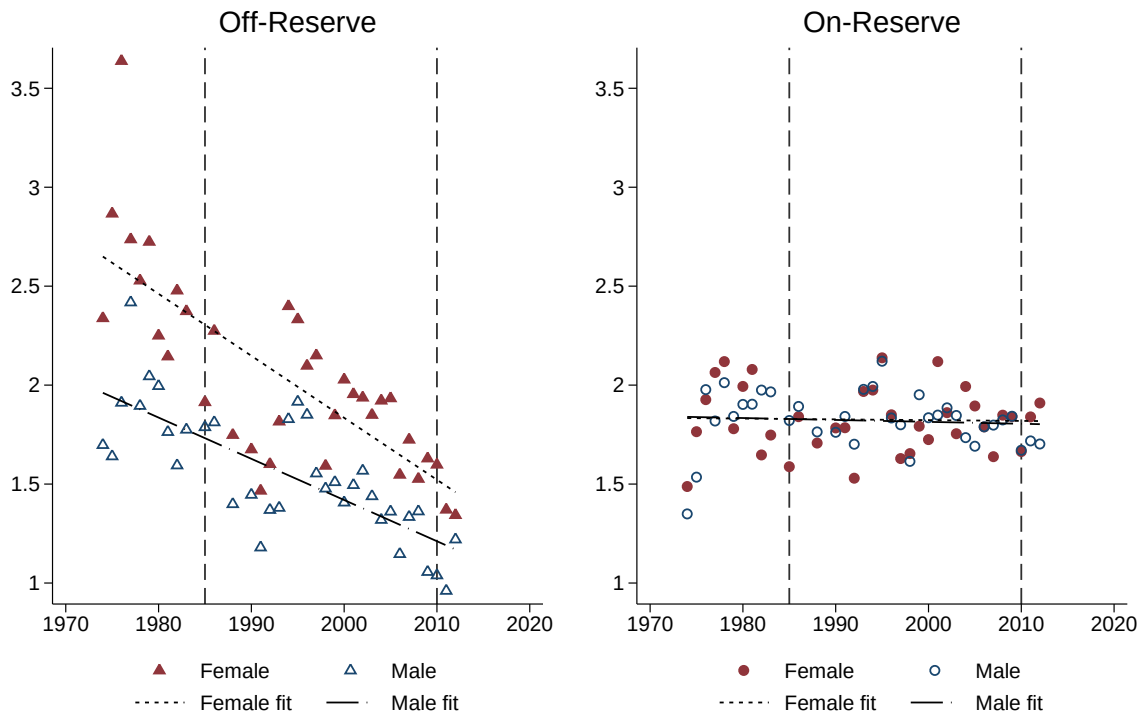
In Figure 6 we present the ratio of the ASMR in the Status to non-Status ASMR to highlight the extent to which trends in mortality have mirrored those in the general population. We have fitted a line to the data by gender and location on or off the reserve. The first panel presents results for the off-reserve population and the second panel for the on-reserve population. In the first panel, we observe that the off-reserve population of both males and females has experienced a significant reduction in the ASMR ratio (which is indicated by the two downward sloping fitted-lines in the graph). There are still level differences in the ASMR ratio between males and females (with females having higher mortality rate ratios), but both appear to have decreased at approximately the same rate

from the 1970s onward relative to the general population (allowing for a linear trend).

In the second panel, we fit two lines to the data points for Status female and male mortality rates for the on-reserve population. These two lines are both horizontal lines. This result indicates that over time the ratio of the on-reserve Status to non-Status ASMR has not changed in over 40 years. However, given that there were significant changes in the definition of Status during the mid-1980s, we next consider what has happened over time from 1991 to 2011; this time period is subsequent to the largest change to First Nations Status which occurred in 1985 for women. Our intention in this analysis is to investigate whether there have been systematic changes in Status First Nations female mortality over time holding the definition of "Status" constant. Over this period, Status male mortality rates decreased more quickly than those of Status females. We also include variation by age group. In Figures A6 and A7 we show trends in the mortality rate by age group. While generally all figures show a similar pattern, improvements in mortality tend to be greatest among older age groups and start earlier for men. On the other hand, in some age groups, on-reserve female mortality appears to be rising.

Table 8 continues this same analysis in a regression setting. We investigate whether there are associative differences in mortality rates by gender and Status over time. Once again, we use data for the time period 1991-2011 where there is a single, consistent definition of "Status". The outcome variables in these three regressions are the average mortality rates by year, gender, and Status. All three models include province and age-group fixed effects. The first column provides estimated results for the variables Status, Year and Female and their interactions. Column 2 and 3 add in additional control variables for income levels, employment, and high school dropout rates and proportion of the province that is single or female, respectively. There are several points that can be made from the estimates in this table. First, Status peoples have higher mortality rates in all three specifications under a time period with consistently defined Status. Second, mortality rates have been falling for Status and non-Status men over time even controlling for economic factors. Third, non-Status women have lower mortality rates

Figure 6: The Ratio of Status Mortality Rates to General Mortality



Notes: Ratio of 5 to 64, age-standardized mortality rate: Status First Nations Rate/General population.

than non-Status men, but their mortality rates are not falling over time at the same rate as non-Status mens'.

However, we think the estimated coefficient on the interaction term, Status X Female X Year, is of the most interest. This coefficient suggests that since the 1990s, Status females have experienced a relative increase in their mortality rates over time relative to non-Status peoples and Status men. We have noted the relatively higher mortality for Status females and Table 8 indicates that this difference is increasing over time. This increase is not explained by readily available, observable factors. In fact, Status women's relative economic well-being has been improving faster than for men over this time period (Feir, 2013) and we would have predicted a reduction in their mortality rates as a result.[28] Nor is the increase explained by changes in the composition of the population due to changes in the definition of First Nations Status after 1985 since this analysis explicitly holds that factor constant by focusing on the time period 1991-2011.

5.4 Reconciliation and Comparison with Previous Estimates

In this section we compare our estimates of Status First Nations mortality rates to that of previous research. Our findings are broadly consistent with the patterns observed in previous work (for example, the age and gender distribution of mortality over the age of 25). However, we do differ with the Mao et al. (1992) findings that mortality rates on-reserve are significantly lower than those off-reserve in data. Our results show that on-reserve mortality rates are much higher than off-reserve mortality rates.

In order to reconcile this stark difference with the findings of Mao et al. (1992), we restrict analysis to the pre-1985 period prior to the change in the definition of First Nations Status and a time frame that is consistent with that in Mao et al. (1992). The data from this time period can be seen in Figure 5. Examining the data points to the left of 1985 (the first vertical line in the figure) it is immediately clear that the mortality

[28] We show trends in the employment, the 10th percentile of income, and the proportion of dropouts for both Status and non-Status men and women in Figure A8 to illustrate this point.

Table 8: Correlation between Mortality rate and Observable Characteristics 1991-2011

	(1)	(2)	(3)
Status	269.5***	207.6***	209.1***
	(16.381)	(20.086)	(20.610)
Year	-1.951***	-3.745***	-3.855***
	(0.404)	(0.579)	(0.564)
Female	-81.27***	-95.26***	-82.93***
	(7.254)	(8.355)	(10.909)
Status X Year	-6.215***	-4.623***	-5.271***
	(1.139)	(1.102)	(1.114)
Status X Female	-125.3***	-120.8***	-132.8***
	(20.087)	(19.614)	(20.726)
Status X Female X Year	4.392***	4.148***	3.843***
	(1.422)	(1.397)	(1.367)
Female X Year	1.595***	1.984***	1.861***
	(0.577)	(0.570)	(0.548)
Dropout		-14.18	14.22
		(43.507)	(43.934)
Employed		-46.60	-38.11
		(44.971)	(45.750)
10-p Family Income		-3.170**	-3.306***
		(1.273)	(1.250)
50-p Family Income		-1.635***	-0.949
		(0.575)	(0.618)
90-p Family Income		0.366	0.224
		(0.400)	(0.402)
Prop. Lone Parents			77.81
			(71.290)
Prop. Female			-1.364
			(105.389)
Prop. Single			153.1***
			(41.223)
Province FE	X	X	X
Age Group FE	X	X	X
Observations	700	700	700
Adjusted R^2	0.775	0.786	0.792

Notes: The outcome variables is the mortality rate obtained from the Indian Register averaged over the three years surrounding each Census year Status, gender, age-group, and year. Census years included are 1991, 1996, 2001, 2006, and 2010. Data on economic characteristics comes from the Census and the National Household Survey. The omitted provinces are the Atlantic provinces. The omitted age category is 15 to 19. Family income is in 2002 dollars. Robust standard errors in parentheses. $^{*}p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

rates for off-reserve Status females are higher than their on-reserve Status counterparts. For males, it is a bit more mixed, but there are several high mortality years for off-reserve Status males prior to 1985. Subsequently, there is an inversion in the mortality rates with off-reserve Status males experiencing a lower mortality rate over time and approximately similar result for off-reserve Status females relative to their on-reserve counterparts. We see this as being primarily driven by compositional changes in the Status First Nations populations both on and off reserves subsequent to the change in the definition of Status in 1985.[29]

A second potential explanation for the observed differences in mortality rates over time by residence on reserves is the availability and access to quality health care services. Until the late 1960s, Status peoples' health care was the responsibility of the Federal government and Status First Nations people were cared for in racially segregated federal "Indian hospitals" (Waldram et al., 2006). During the 1960s, 70s and 80s, there was significant reform in the delivery of health care to Status peoples and a shift of responsibility towards the provinces. We see a constant trend downward in the ASMR during this period which would be consistent with these reforms improving Status peoples' health. These declines are also much stronger for those living off-reserve which is the population that may gain the most from these reforms (specifically, they would have the greatest degree of access to pre-existing provincial systems of health care). We believe the ultimate reasons for this decline are of significant interest and would be an interesting and fruitful area for research.

It is informative to compare our findings to those of Tjepkema et al. (2009) and Park et al. (2015) and to discuss the Health Canada findings more broadly. As noted earlier,

[29]Recall that before 1985, if a Status woman married a non-Status man, then she (and her children after the age of 21) would lose their Status, thus implying she (and they) would no longer be included in the Indian Register. The woman and her children would also lose the right to live on-reserve. Thus, the only off-reserve First Nations women who are included in the data are women who are either single or married to Status men. This applies to their children as well - whether they are male or female. Thus the "off-reserve" population is a very select group. We can see that after 1985, the mortality rates off-reserve plummet rapidly for women and men. This suggests that differential composition of the on/off-reserve populations is at least in part responsible for the change in mortality rates over time.

a significant drawback of the Health Canada studies is that they only have data on Status peoples' mortality in British Columbia and Alberta, and on-reserve in Manitoba and Saskatchewan. As we have shown in Section 5.2, Status mortality rates in Alberta, Manitoba, and Saskatchewan are the highest in the country, and the on-reserve population is also subject to higher mortality rates. Thus the national level estimates are lower than those published by Health Canada for the sub-regions they report on, even accounting for the potential under-reporting to the Indian Register at older ages.

We also provide evidence that the mortality estimates in Tjepkema et al. (2009) and Park et al. (2015) likely over-estimate mortality rates for the general Status population. In Table 9 we show our estimates of Status and non-Status mortality rates relative to Tjepkema et al. (2009) using the same age standardization to the Status population in 1991 and excluding from our sample members of bands who did not participate in the 1991 Census to make our sample as comparable to Tjepkema et al. (2009) as possible. We cannot match their sample completely because they excluded individuals that were not matched between Census records and tax records. This creates an unknown sample selection and we are unable to replicate this sample in our data for comparison, unfortunately. We exclude the estimates of Park et al. (2015) since they pool both the Status and non-Status First Nations population and thus are obviously not strictly comparable.

The first thing to note in Table 9 is that between the ages of 25-34 (for both women and men) our mortality rate estimates are either slightly higher or empirically indistinguishable from Tjepkema et al. (2009). Our estimates are lower on average for older age groups and this difference becomes more pronounced at older ages. If we scaled our estimates up by the amount suggested in Figure A1, it still would not fully account for the difference between our estimates and Tjepkema's estimates. Recall that the sample in Tjepkema et al. (2009) was potentially heavily selected. The table below suggests one of two things: 1) the sample in (Park et al., 2015; Tjepkema et al., 2009) may be such that individuals with a higher probability of death are more likely to be observed in their data due to their sample selection, or 2) the under-reporting in the Indian Register is greater

than the comparison with the Health Canada data suggests. Should the latter be the case, our estimates should be thought of as conservative estimates of Status mortality.

Finally, all of these findings taken together provide an explanation for why the estimates of mortality in Health Canada (2008, 2014) are greater than those in Park et al. (2015); Tjepkema et al. (2009): the difference is likely due to both the regional selection inherent in Health Canada (2008, 2014) and the population selection in Park et al. (2015); Tjepkema et al. (2009).

Table 9: Age Standardized Mortality Rate Reconciliation with (Tjepkema et al., 2009))

	Tjepkema et al. 2009		Our Best Comparable Estimates	
Men	Status	General Pop	Status	General Pop
25-34	310.2	105.1	340.8	110.9
	(18.02)	(1.73)	(51.77)	(14.82)
35-44	508.9	207.3	440.1	175.7
	(28.22)	(2.39)	(82.15)	(18.3)
45-54	1077	573	760.4	377.9
	(54.26)	(4.87)	(112.32)	(26.86)
55-64	2411.1	1621.3	1652.3	1053.1
	(113.45)	(9.34)	(223.66)	(105.77)
Women				
25-34	168.3	52	175.4	44.1
	(11.32)	(1.17)	(27.78)	(3.11)
35-44	335.3	131.2	270	94.6
	(20.15)	(1.88)	(47.92)	(3.59)
45-54	766	336.1	482.1	233.3
	(41.17)	(3.86)	(45.49)	(12.05)
55-64	1837.5	844	1050.9	607.6
	(90.51)	(7.26)	(126.48)	(42.21)

Notes: Age-standardized mortality Rates per 100,000 from 1991 to 2001 age standardized to the 1991 Status age distribution as per Tjepkema et al. (2009). Our "best comparable estimates" refer to restricting the analysis to the same time period, standardizing by the closest age distribution we have available (we cannot fully replicate the sample selection in Tjepkema et al. (2009)) and doing the same age groups.

6 Conclusion

In this work we provided novel estimates of Status youth mortality, evidence on variation in mortality by region and residence, and longitudinal estimates of First Nations mortality. We established several stylized facts about Status First Nations mortality in Canada:

1. On-reserve mortality rates are higher on average than off-reserve mortality rates for Status First Nations peoples.

2. The highest mortality rates are observed for Status youth under the age of 25 – the mortality rates of on-reserve Status girls between 15 and 19 are nearly five times as high as the general population.

3. Status women and girls between the ages of 10 to 44 have higher mortality rate ratios (compared to the general Canadian population) than Status men.

4. With the exception of the 10 to 14 year old age group, Status men have the highest overall probability of death: while there is 14 percent chance of dying before the age of 65 for the average Canadian man, there is a 24 percent chance of dying before the age of 65 for a Status man living on-reserve.

5. There is significant regional variation in mortality rates that are correlated with economic factors and the highest mortality rates are found in the prairie provinces.

6. Mortality rates have not improved for women and girls on reservation in the last 30 years, and relative mortality rates have not improved on-reserve for all Status people in the past 40 years. However, absolute and relative mortality rates have fallen for off-reserve Status men and women over time.

Based on these findings, we believe productive research in the future would examine the early, most dramatic declines in off-reserve Status mortality rates and discern the effects

of dramatic shifts in policy from dramatic shifts in selection. Developing a further understanding of differences between on- and off-reserve mortality rates and the shockingly high relative mortality rates of women and girls would also be a major contribution, as would be a more complete understanding of the regional distribution of mortality. Future work should continue with the recommendations of the Truth and Reconciliation Commission by tracking trends in mortality and other health statistics and work to improve the relative state of First Nations' health in Canada.

Compliance with Ethical Standards:

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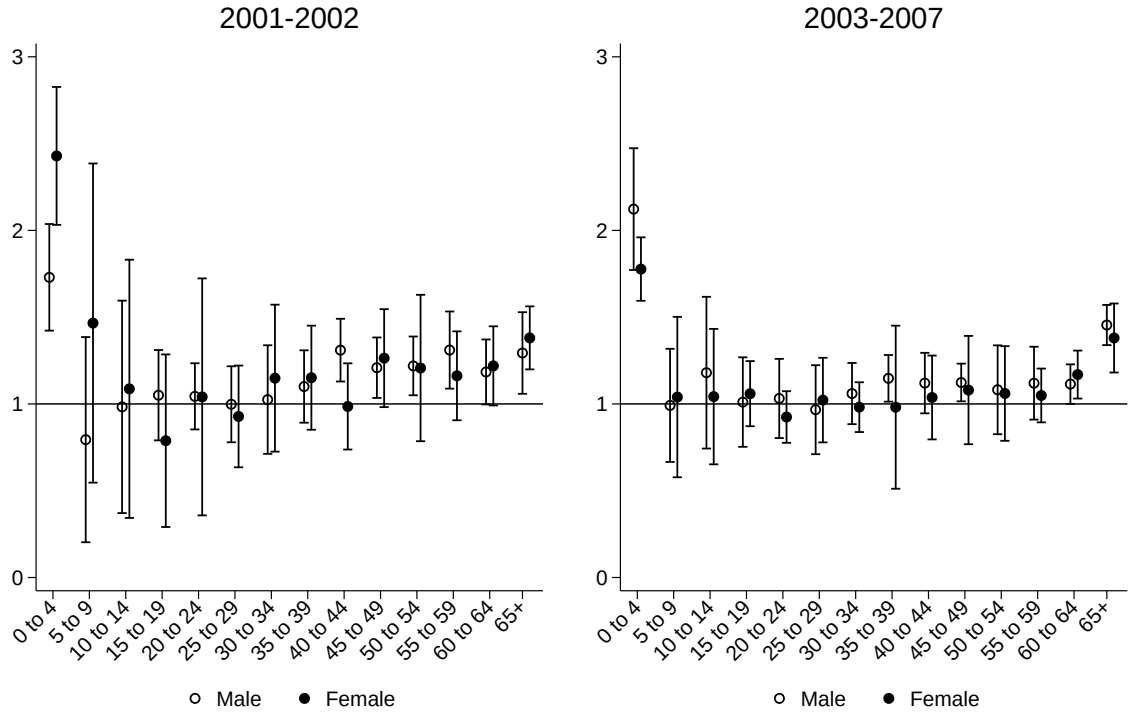
Appendix For 'Status First Nations and General Mortality in Canada: From 1974 to 2013."

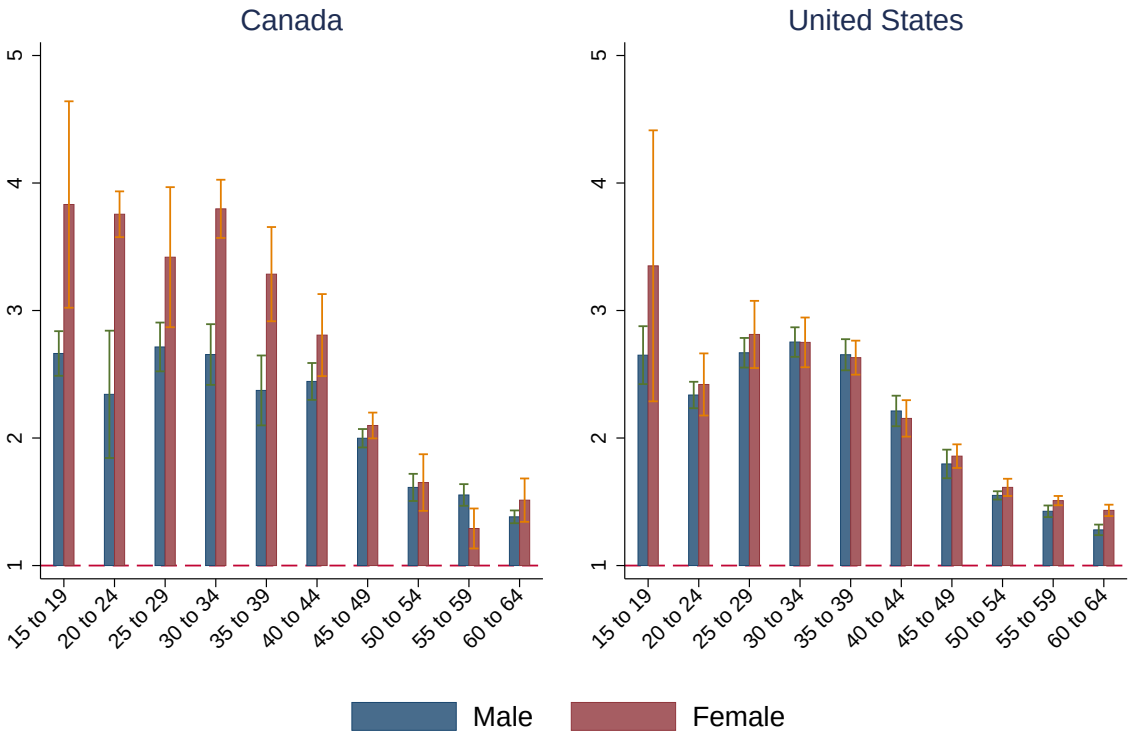
A Appendix Figures

Figure A1: Comparing Indian Register Mortality Rates per 100,000 Relative to Vital Statistics Rate of Death for Status First Nations in Alberta, British Columbia, and on-reserve in Manitoba and Saskatchewan



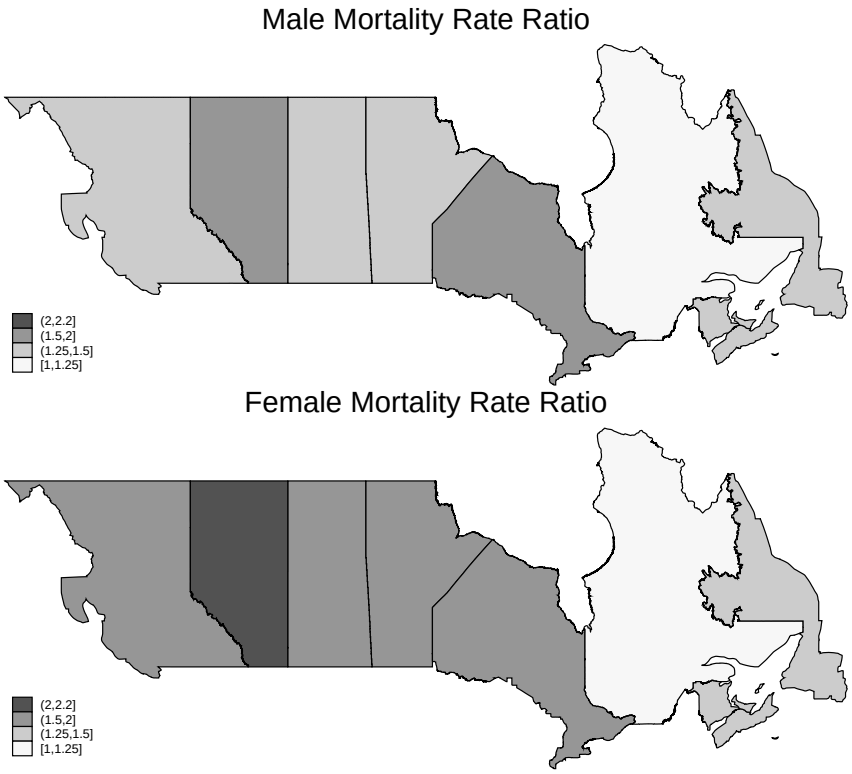
Notes: These are the ratios of the mortality rates from the vital statistics data in for First Nations in Alberta, British Columbia and on-reserve in Manitoba and Saskatchewan compared with those computed from Indigenous and Northern Affairs Indian Register for the same geographies and times periods. The mortality rate from Vital statistics is the numerator and the mortality rate from the Indian Register is the denominator.

Figure A2: Mortality Rate Ratio of Native and African Americans to General Canadian Population, 2010-2013



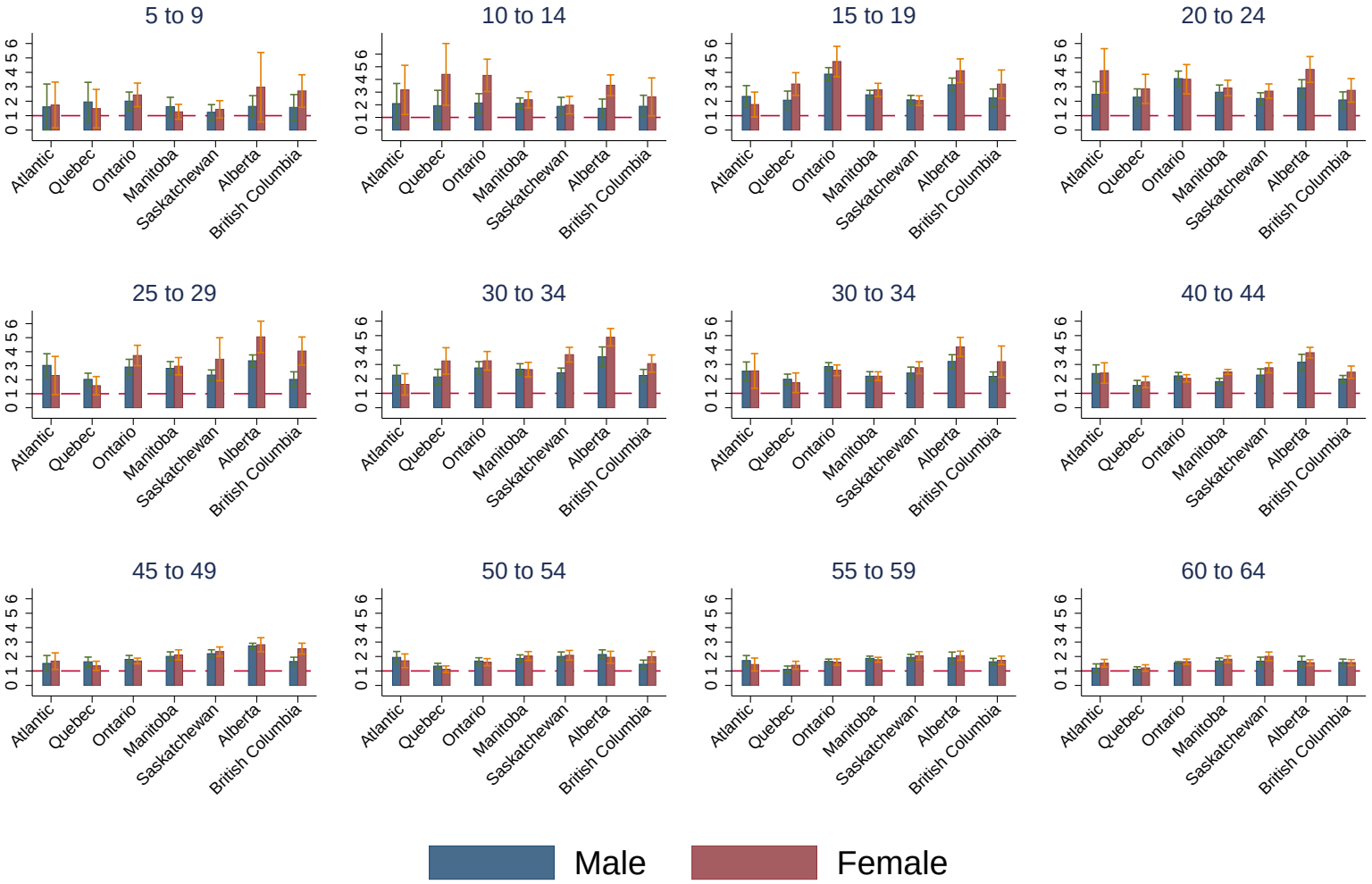
Notes: The y-axis denotes ratio of either Native American or African mortality rates divided by the general Canadian mortality rate. The data on by race mortality rates were computed using counts on number of deaths and population from CDC Wonder datafiles on Underlying Cause of Death, 1999-2015 Centers for Disease Control and Prevention. https://wonder.cdc.gov/ucd-icd10.html. The Canadian mortality rates are generated using data from Health Canada Vital Statistics Birth and Death database compiled by Statistics Canada.

Figure A3: Age Standardized Mortality Rates by Province, 2010-2013



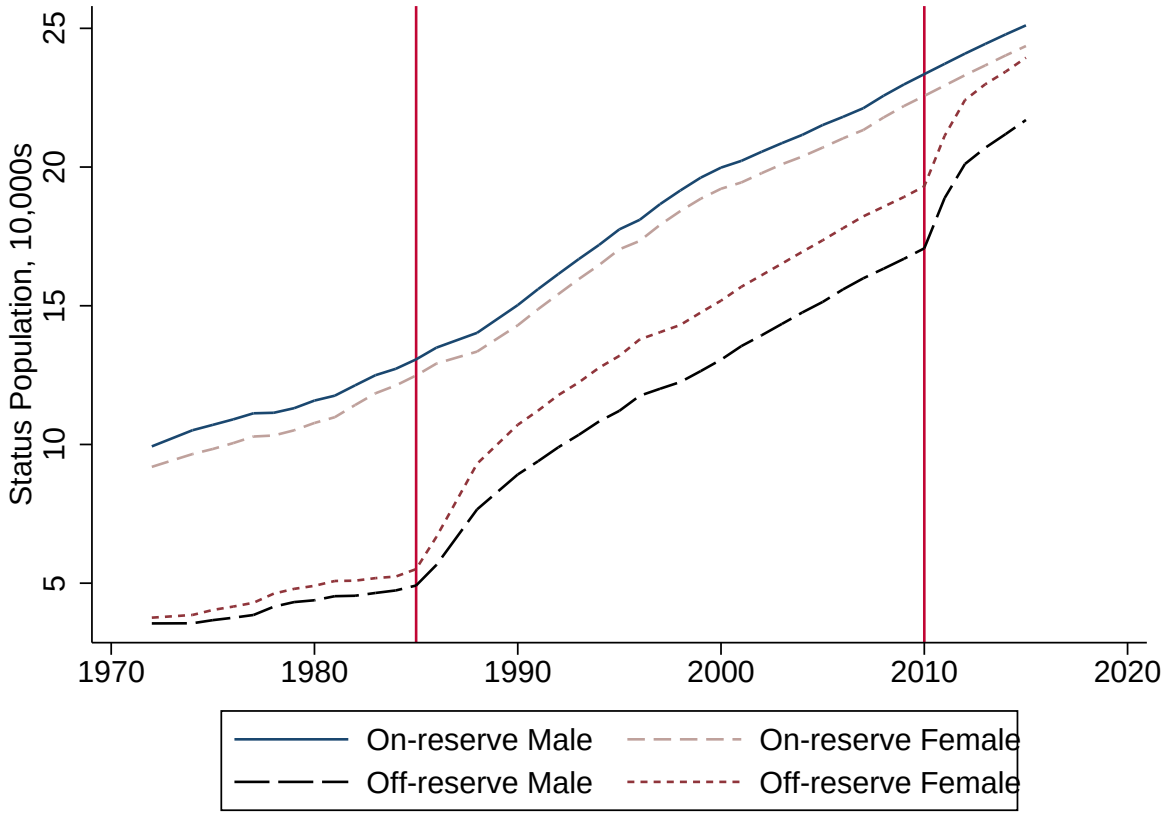
Age-standardized mortality rate: Status First Nations Rate/General population.

Figure A4: Mortality Rate Ratio by Province and Age Group



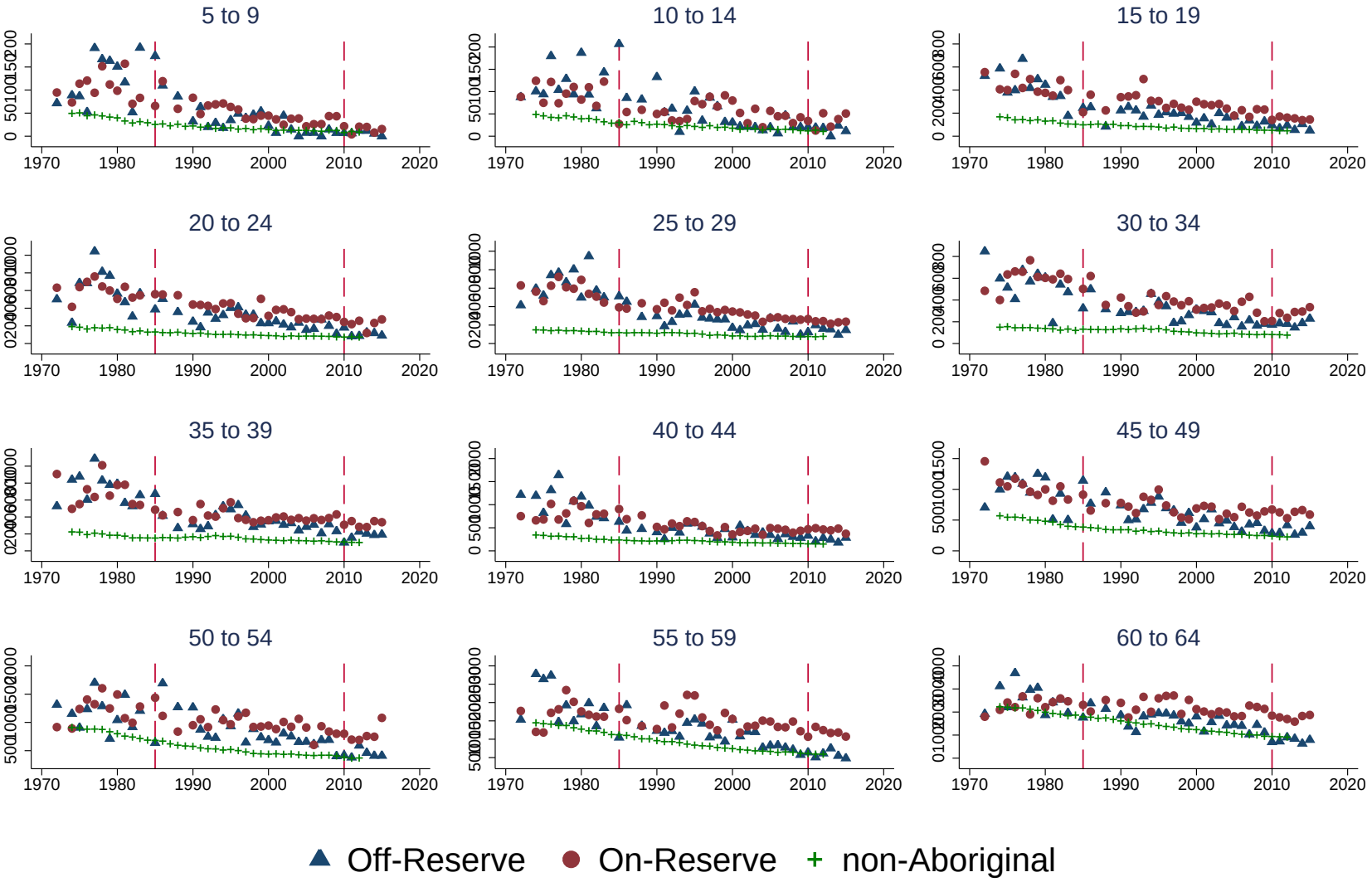
Ratio of 5 to 64, age-standardized mortality rate: Status First Nations Rate/General population.

Figure A5: The Status First Nation Population, 100,000s



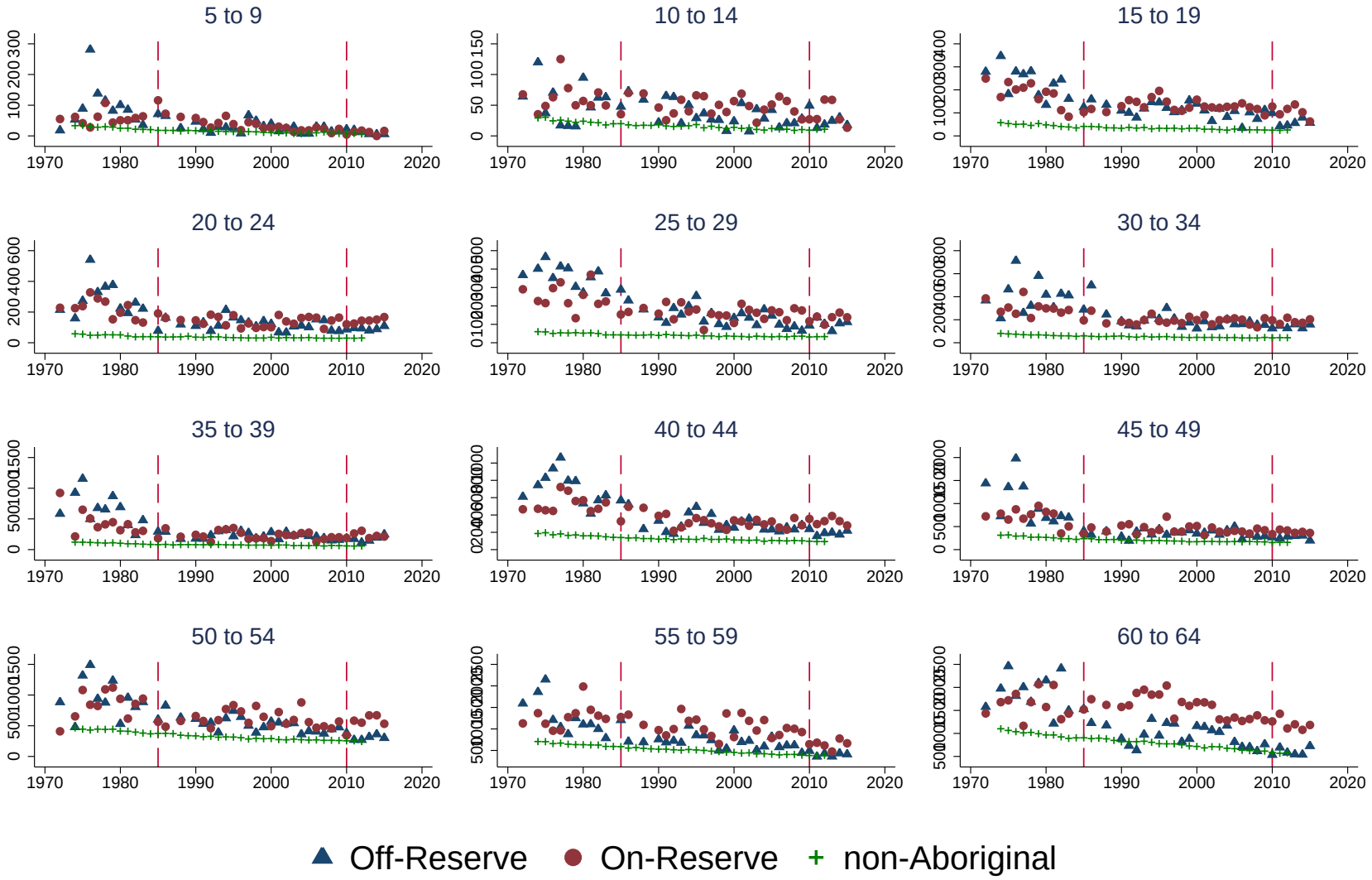
Notes: This figure shows the increase in the Status First Nation population from 1970 to 2016. The vertical lines indicate the year of Bill C-31 and Bill C-3.

Figure A6: The Status Male Mortality Rates and the General Population per 100,000 by Age Group



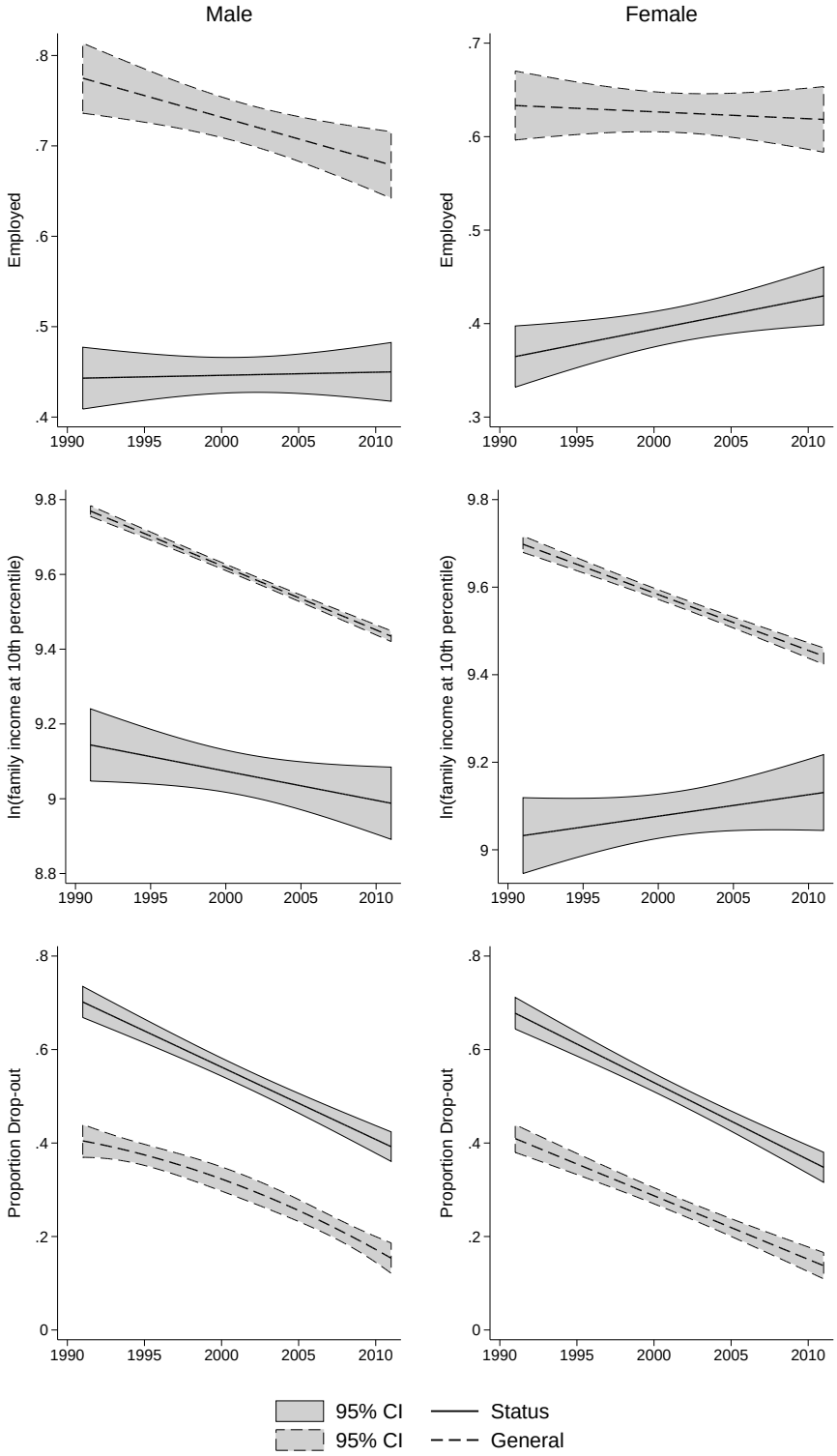
Notes: The mortality rate per 100,000 is on the y-axis. All data comes from the Indian Register. The vertical lines indicate the year of Bill C-31 and Bill C-3.

Figure A7: The Status Female Mortality Rates and the General Population per 100,000 by Age Group



Notes: The mortality rate per 100,000 is on the y-axis. All data comes from the Indian Register. The vertical lines indicate the year of Bill C-31 and Bill C-3.

Figure A8: Trends in Economic Observable Characteristics by Status and Gender



Data from the 1991, 1996, 2001, and 2006 Census and 2011 NHS.

B Appendix Tables

Table A1: Summary of Mortality Rates per 100,000, 2000-2009

	Males				Females			
	Canadian Average	All Status First Nations	Off-Reserve	On-Reserve	Canadian Average	All Status First Nations	Off-Reserve	On-Reserve
ASMR	129.89	229.08	199.55	249.72	76.56	154.15	156.16	152.59
(05 to 64)	(2.22)	(18.68)	(29.3)	(14.5)	(1.05)	(10.83)	(13.56)	(12.11)
Age Group								
05 to 09	12.04	24.21	12.26	31.18	9.35	19.81	21.35	18.82
	(1.52)	(6.36)	(11.86)	(8.6)	(1.56)	(6.96)	(10.08)	(8.06)
10 to 14	15.13	33.75	22.78	40.3	10.89	39.12	32.21	43.29
	(1.83)	(10.07)	(12)	(12.76)	(1.41)	(9.73)	(14.09)	(15.55)
15 to 19	58.73	186.73	138.43	216.63	27.41	109.63	94.98	119.01
	(5.06)	(35.47)	(37.55)	(45.86)	(1.89)	(8.67)	(24.9)	(12.98)
20 to 24	82.16	264.89	212.77	299.78	31.37	127.57	108.96	140.9
	(4.62)	(41.3)	(56.06)	(46.76)	(1.6)	(16.64)	(34.34)	(26.73)
25 to 29	79.78	235.26	186.59	271.98	33.69	140.29	119.6	157.59
	(3.05)	(30.53)	(50.16)	(29.01)	(1.63)	(24.35)	(35.98)	(28.51)
30 to 34	88.78	270.35	228.42	306.16	44.45	180.31	176.02	184.38
	(5.15)	(46.45)	(56.42)	(69.28)	(1.99)	(24.56)	(30.66)	(29.85)
35 to 39	116.98	325.96	284.42	363.29	66.92	210.45	211.97	208.87
	(7.3)	(45.1)	(71.76)	(31.7)	(4.93)	(35.85)	(42.74)	(45.25)
40 to 44	167.85	403.76	382.68	423.65	104.15	284.57	276.59	293.42
	(8.37)	(37.37)	(85.69)	(42.83)	(4.85)	(33.36)	(49.4)	(42.65)
45 to 49	264.06	540.13	460.92	609.5	171.69	363.37	352.01	376.38
	(14.82)	(74.24)	(119.59)	(71.15)	(7.07)	(51.45)	(77.97)	(49.66)
50 to 54	421.8	768.91	674.99	843.97	268.26	499.81	466.22	540.03
	(17.14)	(108)	(129.63)	(122.53)	(7.84)	(83.23)	(68.74)	(144.12)
55 to 59	662.51	1123.07	921.67	1279.66	412.69	776.27	624.33	961.25
	(34.38)	(132.06)	(218.51)	(138.25)	(19.63)	(136.6)	(121.94)	(206.19)
60 to 64	1064.92	1707.91	1425.78	1919.47	654.06	1095.68	904.22	1324.76
	(90.64)	(175.33)	(326.69)	(161.32)	(43.32)	(171.82)	(223.69)	(136.95)

Notes: Data comes from the Indian Register and Health Canada Vital Statistics Births and Death Database. The age standardized mortality rates (ASMR) are standardized to the age distribution of Status people in 2010.