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3 **Suicide and suicide attempts among women in the Manitoba Mothers FASD Cohort: A**
4 **retrospective cohort analysis utilizing linked administrative data**
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Abstract

Background: Women who give birth to children with FASD may be at increased risk for suicide, however there is little data in this area. Linked administrative data were used to investigate suicide attempt and completion rates among women who gave birth to a child with an FASD diagnosis.

Methods: We conducted a retrospective cohort analysis of all children born in Manitoba between April 1, 1984 and March 31, 2012 who had an FASD diagnosis from April 1st, 1999 to March 31st 2012, with follow-up till December 1, 2013 (study group; n=702). We generated a comparison group of women (n=2097) matched 1:3 on date of birth of index child, region of residence, and SES. Regression modeling produced relative rates adjusted for SES, and maternal age at birth and was used to assess risk for suicide among mothers.

Results: A total of 2,799 women produced 40,390.21 person years till the end of the study period. Rates were higher among the study group for suicide completion (adjusted RR 6.20, 95% confidence interval (CI) 2.36-16.31), number of women attempting suicide (adjusted RR 4.62, 95% CI 2.53-8.43) and number of attempts after the postpartum period till the end of the study period (adjusted RR 3.92, 95% CI 2.30-6.09).

Interpretation: This study identifies a group of women with increased rates of social complexities, mental disorders and alcohol use that places them at risk for suicide and highlights the need for mental health supports.

Key Words: Prenatal alcohol use, suicide, attempted suicide, administrative data, maternal death.

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3 Suicide is also the most common cause of maternal death in developed countries(1). Maternal
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5 deaths are defined as deaths occurring from direct (obstetric complications) and indirect
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7 (conditions not directly related to obstetric) causes between 42 and 356 days postpartum(1, 2).
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10 Few Canadian studies have examined the rates of maternal death due to suicide, and there is no
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12 individual level investigation of maternal deaths to identify contributing factors(3). Identifying
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14 groups of vulnerable women who are at risk for suicidal behaviour is crucial for the development
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16 of effective prevention strategies.
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22 Women who give birth to children with Fetal Alcohol Spectrum Disorder (FASD) may be at
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24 increased risk of suicide. These women have histories of frequent and heavy alcohol use and
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26 there is a strong association between alcohol dependence and suicide(4-10). They also have
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28 complex histories that may place them at risk for suicide including: abuse, poverty, substance use
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30 disorders, intergenerational trauma (11-16), and high rates of psychiatric disorders(17-20). These
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32 women often experience stigma and are afraid of losing their children to child welfare
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34 systems(13, 21-23) which can lead to hopelessness and helplessness; strong risk factors for
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36 suicidal behaviour(10, 24). To the best of our knowledge there is no Canadian data that
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38 quantifies the burden of suicide in this population.
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46 The objective of this study is to compare rates of suicide among women who have given birth to
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48 children with FASD relative to women who have not given birth to children with FASD during
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50 critical times periods in their lives, including: before pregnancy, during pregnancy, during the
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52 postpartum period (maternal death) and till the end of the study period (April 1, 1979 to
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54 December 1, 2013). The identification of suicide risk in critical time periods in these women's
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3 lives aids to the development of targeted prevention and support programs. It is important to note
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5 that we are not drawing associations between the diagnosis of FASD in a child and maternal
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8 suicide, as children may be diagnosed years prior to the suicide attempt. We are using the FASD
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10 diagnosis in children to identify a potentially vulnerable group of women with alcohol use issues
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12 who may require targeted, multifactorial interventions to decrease suicide risk in this population.
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16 17 **Methods**

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19 **Study Setting & Design:** This is a retrospective analysis of the Manitoba Mothers and FASD
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21 (MBMomsFASD) cohort(25), which consists of mothers of children born in Manitoba between
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23 April 1, 1984 and March 31, 2012 who had an FASD diagnosis between April 1st, 1999 to March
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25 31st 2012, with follow-up till December 1, 2013. The year 1999 was chosen as the first year to
26
27 ascertain FASD diagnosis, as this is when accurate FASD diagnosis data was attainable. Suicide
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29 attempts were investigated five years before and one year after the birth of the child, till the end
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31 of the study period, resulting in a total study period of April 1st 1979 to December 1st, 2013.
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35 Ethical approval was received from the University of Manitoba's Health Research Ethics Board.
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41 **Data Sources:** Administrative data from the Population Health Research Data Repository
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43 housed at the Manitoba Centre for Health Policy (MCHP) and clinical assessment data from the
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45 Manitoba FASD Centre, which is a referral/diagnostic centre for FASD in the province was used
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47 as the primary data sources. De-identified health records are transferred to the MCHP from the
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49 government department that administers the universal health insurance programme for the
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51 province and contain scrambled identifiers that allow for linkages across multiple databases.
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55 Linkages are preformed using de-identified, unique personal health identification numbers. Data
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3 on suicide attempts and completions, as well as all cause mortality from: Vital Certificates of
4 mortality, (include cause of death), physician reimbursement claims and hospital discharge
5 abstracts (Appendix 1). Data in the Repository have been widely utilized for health research and
6 the reliability of the databases have been well established(26-33). The Repository contains
7 information for all persons eligible or registered for health insurance benefits through the
8 Manitoba Health Services Insurance Plan. Aside from residents insured by the federal
9 government (such as military personnel and federal inmates, which account for less than 0.5% if
10 the provincial population), the Repository identifies all residents in the province.
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25 **Cohort formulation:** Women were drawn from the entire population of women whose child was
26 born in Manitoba between April 1, 1984 and March 31, 2012; two groups were generated (Figure
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31 **Study Group: Women who gave birth to a child with FASD:** Clinical data from the MB
32 FASD Centre were used to ascertain all children and youth (birth to 21 years of age) who have
33 been diagnosed with FASD between 1999 and 2012. The mean age of the child's diagnosis was
34 8.2 years (SD 4.89, birth to 26.43 years). This database was linked to administrative data from
35 the MCHP Repository to identify these children's birth mothers. Only mothers who could be
36 linked to their children, who had postal code information, and who were Manitoba residents
37 registered to receive health care in the province and covered from the birth of their child till
38 December 2013 were included.
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53 **Comparison group:** Women whose children did not receive an FASD diagnosis from the MB
54 FASD Centre, with no record of prenatal alcohol, whose children had no evidence of FASD from
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3 the Repository were drawn from the Repository and were matched up to 3 to 1 with women in
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5 the study group on: date of month of birth of the index child, socioeconomic status, and region of
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7 residence. To decrease the likelihood that the comparison women had children with undiagnosed
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9 FASD, the following exclusion criteria were used: (1) women with any children assessed at the
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11 Manitoba FASD Centre; (2) women with children who had a diagnosis of FASD as recorded in
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13 hospital or physician claims data using the following ICD codes: a hospital visit with ICD 9CM
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15 code 760.71, ICD 10CCA code of 86.0 or a physician visit with any ICD 9 code 760; (3) women
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17 who had children who had prescriptions for psychostimulants or risperidone; (4) women with
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19 children diagnosed with ADHD (due to high comorbidity of FASD and ADHD diagnoses(34,
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21 35); (5) women involved in the InSight Mentoring program (a program that provides support for
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23 women with alcohol and substance abuse issues); (6) women with a history of substance abuse
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25 disorder (including alcohol) during pregnancy as indicated by the physician and hospital claims;
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27 (7) women whose newborn risk screen indicated they had used alcohol during pregnancy; and,
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29 (8) women whose children received special education funding indicating they had severe to
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31 profound disabilities.
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41 Suicidal Behaviour:

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43 **Attempts:** We analyzed the total number of suicide attempts (defined as any hospital admission
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45 with any diagnosis of a suicide attempt, including accidental and self-inflicted poisoning,
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47 poisoning with undetermined intent, and self-inflicted injuries (Appendix 2 for ICD codes) and
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49 total number of women who attempted suicide at least once in both our study groups during the
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51 following time periods: (1) five years before the pregnancy of the index child; (2) during
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53 pregnancy (date of conception to date of birth); (3) postpartum (birth to one year after birth); (4)
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3 from one year after birth to the end of the study period.
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8 **Completions:** We analysed the number of suicide completions (see Appendix 2) during the
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10 postpartum period (maternal death due to suicide) and after the birth of the child until the end of
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12 the study period.
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17 **Data Analysis:** Adjusted relative rates (aRRs) for the outcome variables were modeled using
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19 generalized linear models (GLM) with a Poisson or Negative Binomial distribution. All analyses
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21 tested for differences between groups and adjusted for covariates. To model the rate of events for
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23 our two groups, a summary dataset for the total number of events (e.g. total number of suicide
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25 attempts before birth) for unique strata, and the total number of person-years at risk for the strata
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27 was created. We included the log of the total number of person-years as an offset in the model to
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29 produce an analysis of rates of events, rather than simple counts, and to generate estimates of
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31 aRRs of events.
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39 **Covariates:** The following variables were included as potential covariates in each of the models
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41 generating rates of suicide attempts and completions: age of mother at birth of child, and SES at
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43 the time of the birth of the index child. SES was defined according to area level data from census
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45 information. Area-level income quintiles were ranked from 1 (low) to 5 (high) on the basis of
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47 ranges of mean household income from census information, and grouped into five categories,
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49 with approximately 20% of the population assigned to each quintile(36). For models
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51 investigating rates of women who attempted or completed suicide we adjusted for suicide
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3 attempts five years before the birth of the index child to account for pre-existing mental health
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11 **Results**

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13 Our study groups consisted of women born from 1946 to 1992 with ages ranging from 14 to 46
14 years at the time of the birth of the index child (Table 1). Women in our study group were more
15 likely to be lone parents, younger age at first birth, and tended to have lower SES, higher
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Our study groups consisted of women born from 1946 to 1992 with ages ranging from 14 to 46 years at the time of the birth of the index child (Table 1). Women in our study group were more likely to be lone parents, younger age at first birth, and tended to have lower SES, higher gravidity and higher parity and higher proportion of mental disorders versus women in our comparison group (Table 1). Among the course of our study period a total of 101 women died; 75% of these women were from our study group. The most common cause of death among the study group was intentional self poisoning/harm.

Attempts: There were a total of 10103.40 person years for our study group, and 29331.55 person years for the comparison group when examining suicide attempts till the end of the study period. Less than 6 women attempted suicide during pregnancy or during the postpartum period (these numbers are not reported in order to adhere to MCHP privacy policy of suppressing results under 6 events). The study group had significantly higher adjusted rates of women who attempted suicide (adjusted RR 4.62, 95% CI 2.52-8.43) and number of attempts (adjusted RR 3.93, 95% CI 2.30-6.09) after the postpartum period (Table 2).

Completion: There were a total of 10694.56 person years for our study group, and 29695.65 person years for the comparison group when examining suicide completions till the end of the study period. Study group women had significantly higher adjusted rates of women who

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3 completed suicide after the post-partum period (adjusted RR 6.20, 95% CI 2.36-16.31). Study
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5 group women had a higher mean age of suicide, 37.46 (SD 6.13, range 29.00-51.49) versus 25.75
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7 (SD (20.85, 34.55)), and the mean number of years after the birth of the child for the suicide was
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9 12 years (SD 5.13, range 4.07-20.19) (Table 2).
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14 15 **Interpretation**

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17 The results of our study indicate women who give birth to children with FASD have increased
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19 social complexities including low SES, lone parents, and higher gravidity and parity, and higher
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21 rates of mental health disorders that may place them at higher risk for suicide attempts and
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23 completions later in life. These women also have higher rates of all cause mortality, highlighting
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25 the overall high-risk nature of this cohort.
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32 Women in the study group did not have an increased risk for maternal death due to suicide
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34 during pregnancy and the postpartum period, however they did have higher rates of prenatal and
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36 postpartum psychological distress than the comparison group. Furthermore, women in the study
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38 group had a higher proportion of mental disorders, and prenatal and postpartum psychological
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40 distress compared to women in our comparison group (Table 2). These results emphasize the
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42 complex relationship between mental health disorders, high levels of alcohol consumption and
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44 suicide.
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50 Our results are consistent with a previous study of women who give birth to children with FASD
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52 conducted in a Northern Plains Indians population that reported a 40% rate of attempted suicides
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54 and high rates of intentional and accidental injuries(22). Our study enhances the sparse
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3 knowledge base in this area by reinforcing women who give birth to children with FASD are at
4 increased risk for suicide attempts and completions later in life using validated population-level
5 data and the largest sample size to date; which enhances the generalizability of our results.
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10 Previous studies have utilized survey and interview data, which are limited by recall bias(22).
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15 A limitation of this study is the use of a clinically referred sample, as opposed to a population-
16 based sample, limiting the generalizability of the findings. However, the use of this clinically
17 based sample is also a strength, as confirmation of prenatal alcohol use at a level associated with
18 teratogenicity (ie. a diagnosis of FASD) is required as part of the clinical assessment. However,
19 the study group does not include women with alcohol use disorders who do not have children
20 referred for FASD assessment. Moreover, although we have taken great care in excluding all
21 mothers with possible prenatal alcohol exposure, we cannot be certain that there were no women
22 in our comparison group that do not have un-reported prenatal alcohol use. However, this would
23 serve to weaken rather than strengthen our findings.
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39 Suicide attempts are often under-coded in administrative databases as physicians may list
40 underlying mental illness as the diagnosis or not accurately chart the occurrence of suicidal
41 behaviour(37). There is low sensitivity in the use of these data to track the prevalence of suicide
42 outcomes; findings of a validation study comparing emergency department and patient coding
43 for suicide and self-harm attempts versus clinical assessment data suggest that research using
44 hospital and physician claims to identify suicidal outcomes in patients is missing up to one half
45 to two thirds of outcomes(37). Furthermore, only women who received medical care owing to a
46 suicide attempt or whose death has been classified as a suicide would be included in this study.
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3 These data also do not capture suicidal ideations, further underestimating the burden of suicidal
4 behaviour in this population. Moreover, in regards to the mental health outcomes investigated in
5 this study, we are not reporting the true prevalence of psychiatric disorders in our cohort, but the
6 prevalence of physician health service use for psychiatric illness; as MCHP data are dependent
7 on women making contact with the health care system. Therefore, this study excludes women
8 with undiagnosed psychiatric disorders and women who have not been assigned with relevant
9 diagnostic codes. Mental disorders among women who have only sought care from a
10 psychologist or support group would not be captured.
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24 These data are not collected for research purposes and there may be unmeasured risk factors that
25 develop or change in the time to suicide that our analysis could not account for. Future research
26 exploring factors that place women at higher risk for suicide that could not be investigated using
27 administrative data should be conducted. We also could not identify what proportions of women
28 from our study population were from Indigenous communities. Given that suicide is a significant
29 issue in these communities(38, 39) it would be important to conduct this analysis to describe the
30 burden of suicide among women who give birth to children with FASD who are Indigenous.
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44 Finally, contrary to our hypothesis, the results of this study indicate that women with substantial
45 prenatal alcohol use are not at higher risk for maternal death due to suicide. Further analysis
46 using a larger sample size should be conducted to confirm this finding, as suicide attempts are
47 difficult to study in shorter time periods.
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3 **Conclusions:** Women who give birth to children with FASD are at an increased risk of suicide
4 attempts and completions; which is likely a reflection of intersection of the social complexities
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6 faced by this group of women, as well as the high rates of mental disorders and the high levels of
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8 alcohol consumption in this cohort. Interventions are needed that: (1) screen for suicidal
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10 behaviour in women who are at high risk to consume alcohol during pregnancy and are
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12 diagnosed with mental disorders; (2) provide mental health support for women who have alcohol
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14 exposed pregnancies to help prevent suicide later in life.
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Table 1: Characteristics of women whose children are diagnosed with FASD and a matched sample of women whose children do not have FASD

Characteristic	Exposed Cases (N = 702)	Comparison Group (N = 2,097)
Maternal age at birth of index child		
Mean year, (SD)	24.43 (6.14)	29.24 (5.69)
Range	14 - 43	14 - 46
Maternal age at birth of index child		
< 18 years	72 (10.26)	231 (11.02)
18-24 years	333 (47.44)	831 (39.63)
25- 29 years	146 (20.80)	525 (25.04)
30-34 years	96 (13.68)	367 (17.50)
35 + and missing ¹	55 (7.83)	143 (6.82)
Missing	< 5 ¹	0
Maternal Age at first birth		
< 18 years	266 (37.89)	246 (11.73)
18-24 years	340 (48.43)	854 (43.06)
25- 29 years	54 (7.69)	530 (25.27)
30-34 years	29 (4.13)	306 (14.59)
35 + and missing ¹	13 (1.85)	112 (5.34)
Missing	< 5 ¹	0
History of teen pregnancy	266 (37.89)	246 (11.73)
Region of residence		
Rural	251 (35.75)	764 (36.43)
Urban	451 (64.24)	1333 (63.57)
Mean household income		
Q1 (lowest)	466 (64.38)	1398 (66.67)
Q2	104 (14.81)	312 (14.88)
Q3	57 (8.12)	171 (8.15)
Q4	36 (5.13)	108 (5.15)
Q5 (highest)	26 (3.70)	78 (3.72)
Missing	13 (1.85)	30 (1.43)
Receipt of Income assistance five years before birth of the index child²	N = 345 ²	N=1026 ²
SES	63 (18.26)	98 (9.55)
Low (Q1)	466 (66.38)	1398 (66.67)
Middle (Q2 & Q3)	161 (22.93)	483 (23.03)
High (Q4 & Q5)	62 (8.83)	186 (8.87)
Missing	13 (1.85)	30 (1.43)
Married at the birth of child	66 (9.40)	773 (36.86)
Gravidity		
0-3	357 (50.85)	1966 (93.75)
=>4	306 (43.59)	113 (5.39)
Missing	39 (5.56)	18 (0.86)
Parity		
0-3	524 (74.64)	2063 (98.38)
=>4	139 (19.80)	16 (0.76)
Missing	39 (5.56)	18 (0.86)
Involvement with child and family services three years before the birth of the child³	N=345 ⁴	N=1026 ⁴
Diagnosis of psychiatric disorder three years before the birth of the child⁵	228 (66.09)	136 (13.26)
Substance abuse⁶	580 (82.62)	566 (26.99)
Personality Disorder⁶	179 (25.49)	49 (2.32)
Mood & Anxiety Disorder⁶	22 (3.13)	6 (0.29)
Schizophrenia⁶	237 (33.76)	397 (18.93)
Prenatal psychological distress⁷	< 5 ¹	7 (0.33)
Postnatal psychological distress⁸	529 (75.36)	293 (13.97)
	528 (75.21)	923 (44.01)

¹ Number of missing women was < 6, therefore the number of missing women was combined with the "over 35 age group" to ensure privacy rules of MCHP data were adhered to.

² Income assistance data is available after 1995; therefore women the denominator was limited to women who had babies after 1998 to ensure three years of data were available before the birth of the child to evaluate the number of women who had income assistance three years before the birth of their children: 345 women in the study group and 1026 women in the control group had babies after 1998

³ Includes voluntary or involuntary involvement with child and family services of any children of the mother or the mother herself (if she was under the age of 18 at the time), including any support services or out of home placements.

⁴ Child and family services data is available after 1995, therefore, the denominator was limited to women who had babies after 1998 to ensure three years of data were available before the birth of the child: 345 women in the study group and 1026 women in the control group had babies after 1998.

⁵ Includes diagnosis of: substance abuse, personality disorder, mood and anxiety disorder, schizophrenia, prenatal psychological distress

⁶Diagnosis three years before the birth of the child

⁷Diagnosis 8 months before the birth of the child

⁸Diagnosis 12 months after the birth of the child

Table 2: Rates of suicide attempts and completions of women who have given birth to children diagnosed with FASD and a matched sample of women who have not give birth to children diagnosed with FASD

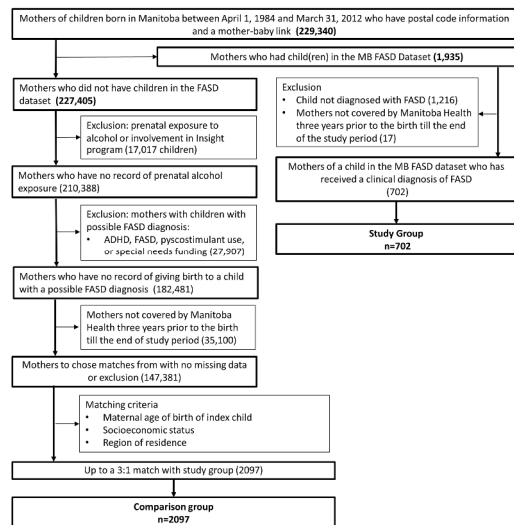
Outcome	Study Cohort; no. of cohort (Crude rate per 1000 person years)		aRR (95% CI)
	Study Group N = 702	Comparison Group N = 2097	
Suicide attempts five years before the birth of the index child			
Number of women who attempted suicide	47 (13.97)	34 (3.27)	5.23 (2.63-10.42) ¹
Number of attempts	71 (20.76)	48 (4.61)	7.05 (3.23-4.04) ¹
Suicide attempts after the postpartum period till the end of study period			
Number of women who attempted suicide	64 (6.33)	39 (1.32)	4.62 (2.53-8.43)³
Number of attempts	102 (10.10)	104 (3.55)	3.92 (2.30-6.09)³
Suicide completion			
Number of women who committed suicide ²	14 (1.39)	6 (0.20)	6.20 (2.36,16.31)³

Note: CI = 95% confidence interval, RR = relative rate

¹ Adjusted for age at birth of index child and socioeconomic status (SES)

² From entire study period i.e. five years before the birth of the child till December 1st, 2013

³ Adjusted for age at birth of index child, SES, and suicide attempts in the 5 years before the birth of the index child



451x338mm (300 x 300 DPI)

Appendix 1: Description of datasets used for analysis

Name of Dataset	Description of Dataset	Years of Data Used	Information retrieved
Population Registry	A registry maintained by Manitoba Health of all Manitobans eligible to receive health services since 1970 and includes demographic information and 6-digit residential postal code.	1970/71 to June 2013	Demographic information: region of residence
Canada Census Information	Social data based on the Statistics Canada Population Census. These data were used to determine area-level income, with Manitoba population divided into income quintiles according to average-level household income, composed of five possible income groupings with Q1 being the lowest and Q5 being the highest income quintile.	1996, 2001, 2006, 2013	Socioeconomic status information
Employment and Income Assistance Data	Data maintained by Department of Families that provide information on Manitoba residences who receive provincial employment and income Assistance.	1995/96 to 2012/2013	Receipt of income assistance
Babies First/Families First Screening Program data	Newborn risk screen data collected as part of a home visiting program conducted by Healthy Child Manitoba. The screen is filled out by Public Health Nurses on all families with newborns in Manitoba and captures data on biological, social and demographic risk factors and alcohol use during pregnancy.	2003 to 2013 = Families First 2000 to 2002 = Baby First	Alcohol and drug use during pregnancy Social isolation
Insight Program data	Includes data from an outreach program where mentors provide intensive support to women who are pregnant or have recently had a baby and use substances. This dataset includes information on women who have prenatal alcohol use	1999 to 2012/2013	Alcohol and substance use during pregnancy
Hospital Abstracts	Health data maintained by Manitoba Health consisting of all hospitalizations in Manitoba, including up to 16 ICD-9-CM diagnostic codes for discharges before April 1, 2004 and up to 25 ICD-10-CM diagnostic codes for discharges on or after April 1, 2004.	1984 to 2012/13	Physical and mental health diagnoses Antenatal hospitalizations Suicide attempts
Medical/Physician reimbursement claims	Health data maintained by Manitoba Health consisting of all ambulatory physician visits in Manitoba and include a single ICD-9 diagnostic code associated with each visit, coded to the third digit.	1984 to 2012/13	Physical and mental health diagnoses Physician visits Prenatal care
Prescription claims data: Drug Programs Information Network	Data maintained by Manitoba Health containing all prescription drug claims from the Drug Programs Information Network (DPIN, an electronic, on-line, point-of-sale prescription drug database that connects Manitoba Health and all pharmacies in Manitoba). Contains information on all prescription drugs dispensed in Manitoba.	1995/96 to 2012/13	Physical and mental health conditions
Manitoba FASD Centre data	Includes clinical assessments and diagnoses received under the FASD umbrella for all children referred to the MB FASD Centre	1999 to 2012/2013	FASD diagnosis Children diagnosed with FASD
Vital Statistics data	A longitudinal population-based registry maintained by Manitoba's Vital Statistics Agency that includes all Manitobans who have died since January 1970 to present and the cause of death.	1970 to 2012/2013	Cause of premature death Suicide completion
Education data: Enrolment, Marks and Assessments	Education data maintained by the Department of Education and Training that provides information on enrolment, marks, and high school completion, and special funding. Special education funding is provided to children with severe to profound disabilities.	1995/96 to 2012/2013	High school completion, level of special education funding
Child and Family Services Information System (CFSIS)	A data management system that supports case tracking and reporting of services provided to children and families as they pass through the Manitoba Child and Family services (CFS) System. This database includes information on children in care as well as information of families receiving protective and support services.	1992/1993 to 2012/2013	Involvement with child and family services

Appendix 2: Definitions of outcome variables

Outcome	Definition
Suicide	<p>A women was considered to have completed suicide if the following ICD codes were used in the “cause of death” field in the Vital Statistics Mortality Data (our definition includes accidental poisonings):</p> <p>1) accidental poisoning: ICD-9 codes E850-E854, E858, E862, E868; 2) ICD-10 codes X40-X42, X46, X47 OR poisoning with undetermined intent: ICD-10 codes Y10-Y12, Y16, Y17 OR 3) self-inflicted poisoning: ICD-9 codes E950-E952, ICD-10 codes X60-X69 OR 4) self-inflicted injury by hanging, strangulation and suffocation: ICD-9 code E953, ICD-10 code X70 OR 5) self-inflicted injury by drowning: ICD-9 code E954, ICD-10 code X71 OR 6) self-inflicted injury by firearms and explosives: ICD-9 code E955, ICD-10 codes X72-X75 OR 7) self-inflicted injury by smoke, fire, flames, steam, hot vapours and hot objects: ICD-9 codes E958.1, E958.2; ICD-10 codes X76, X77 OR 8) self-inflicted injury by cutting and piecing instruments: ICD-9 code E956; ICD-10 codes X78, X79 OR 9) self-inflicted injury by jumping from high places: ICD-9 code E957, ICD-10 code X80 OR 10) self-inflicted injury by jumping or lying before a moving object: ICD-9 code E958.0, ICD-10 code X81 OR 11) self-inflicted injury by crashing of motor vehicle: ICD-9 code E958.5, ICD-10-CA code X82 OR 12) self-inflicted injury by other and unspecified means: ICD-9 codes E958.3, E958.4, E958.6-E958.9; ICD-10 codes X83, X84 OR 13) late effects of self-inflicted injury: ICD-9 code E959</p>
Suicide attempts	<p>A women was considered to have attempted suicide if 5 years prior to the birth of the child she had:</p> <p>1) one hospitalization with a diagnosis for suicide and self-inflicted injury: ICD-9-CM codes E950-E959, ICD-10-CA codes X60-X84; OR □</p> <p>2) one hospitalization with a diagnosis code for accidental poisoning: ICD-9-CM codes 965, 967, 969, 977.9, 986, E850-E854, E858, E862, E868; ICD-10-CA codes T39, T40, T42.3, T42.4, T42.7, T43, T50.9, T58, X40-X42, X44, X46, X47, Y10-Y12, Y16, Y17, only if there is a physician visit with a diagnosis code for accidental poisoning and a psychiatric tariff code either during the hospital stay or within 30 days post-discharge. Psychiatric tariff codes are as follows: □</p> <p>From the psychiatric schedule:</p> <p>8444 Psychotherapy - group of two to four patients 8446 Psychotherapy - group of five or more patients 8472 Child and Youth Management Conference 8475 Psychiatry - Patient Care Family Conference 8476 Psychiatric Social Interview 8503 Complete history and psychiatric examination - adult 8504 Complete history and psychiatric examination - child 8553 Psychiatry Consultation - adult 8554 Psychiatry Consultation - child 8581 Psychotherapy - individual 8584 Psychiatric care - individual 8588 Electroshock therapy 8596 Consultation - Unassigned patient – child</p> <p>From the general schedule:</p> <p>8580 Psychotherapy - individual 8587 Electroshock therapy 8589 Psychotherapy - group</p>

Appendix 3: Definitions of mental disorder covariates

Covariate	Definition
Substance abuse	<p>A woman was considered to have a substance use disorder if 5 years prior to the birth of the child she had:</p> <p>1) one or more hospitalizations with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs (ICD-9-CM codes 291, 292, 303, 304, 305, ICD-10-CM codes: F10-F19 and F55) OR</p> <p>2) one or more physician visits with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs using the same ICD-9-CM codes listed above.</p>
Personality Disorder	<p>A women was considered to have a personality disorders if in the five years prior to giving birth to the child she had the following:</p> <p>1) one or more hospitalizations with a diagnosis of personality disorder (ICD-9-CM code 301 or ICD-10- CA codes F34.0, F60, F61, F62, F68.1, F68.8, or F69) OR □</p> <p>2) one or more physician visits with a diagnosis of personality disorder: (ICD-9-CM code 301)</p>
Mood & Anxiety Disorder	<p>A women was considered to have mood or anxiety disorder if in the five years prior to giving birth to the child she had the following:</p> <p>1) one or more hospitalizations with a diagnosis for depressive disorder, affective psychoses, neurotic depression or adjustment reaction: ICD-9-CM codes 296.1-296.8, 300.4, 309 or 311; ICD-10-CA codes F31, F32, F33, F34.1, F38.0, F38.1, F41.2, F43.1, F43.2, F43.8, F53.0, F93.0 or with a diagnosis for an anxiety state, phobic disorders or obsessive-compulsive disorders: ICD-9-CM codes 300.0, 300.2, 300.3, 300.7; ICD-10-CA codes F40, F41.0, F41.1, F41.3, F41.8, F41.9, F42, F45.2; □ OR</p> <p>2) one or more hospitalizations with a diagnosis for anxiety disorders: ICD-9-CM code 300; ICD-10-CA codes F32, F34.1, F40, F41, F42, F44, F45.0, F45.1, F45.2, F48, F68.0, or F99 AND one or more prescriptions for an antidepressant or mood stabilizer, including medications with the ATC codes N05AN01, N05BA, N06A; OR</p> <p>3) one or more physician visits with a diagnosis for depressive disorder or affective psychoses: ICD-9-CM codes 296, 311; □ OR</p> <p>4) one or more physician visits with a diagnosis for anxiety disorders: ICD-9-CM code 300 AND one or more prescriptions for an antidepressant or mood stabilizer, including medications with the ATC codes N05AN01, N05BA, N06A; OR</p> <p>5) three or more physician visits with a diagnosis for anxiety disorders or adjustment reaction: ICD-9-CM code 300, 309</p>
Prenatal psychological distress	<p>A woman was considered to have prenatal psychological distress if in the eight months prior to giving birth she had:</p> <p>1) one or more hospitalizations with a diagnosis for depressive disorder, affective psychoses, neurotic depression, or adjustment reaction (ICD-9-CM codes 296.2-296.8, 300.4, 309, 311; ICD-10-CA codes F31, F32, F33, F34.1, F38.0, F38.1, F41.2, F43.1, F43.2, F43.8, F53.0, F93.0) OR</p> <p>2) one or more physician visits with a diagnosis for depressive disorder, affective psychoses, neurotic depression, or adjustment reaction (ICD-9-CM codes 296, 309 or 311) OR</p> <p>3) one or more hospitalizations with a diagnosis for anxiety disorders (ICD-9-CM code 300 ICD-10-CD codes F32.0, F34.1, F40, F41, F42, F44, F45.0, F45.1, F45.2, F48, F68.0, F99) OR</p> <p>4) one or more prescriptions for an antidepressant or mood stabilizer (ATC codes N03AB02, N03AB52, N03AF01, N05AN01, N06A) OR</p> <p>5) one or more physician visits with a diagnosis of anxiety disorders one or more physician visits with a diagnosis for anxiety disorders (ICD-9-CM code 300) and one or more prescriptions for an antidepressant or mood stabilizer (ATC codes N03AB02, N03AB52, N03AF01, N05AN01, N06A) OR □</p>

	<p>6) one or more hospitalizations with a diagnosis for anxiety states, phobic disorders, or obsessive-compulsive disorders (ICD-9-CM codes 300.0, 300.2, 300.3; ICD-10-CA codes F40, F41.0, F41.1, F41.3, F41.8, F41.9, F42) OR</p> <p>7) two or more physician visits with a diagnosis for anxiety disorders (ICD--CM code 300)</p>
Postnatal psychological distress	<p>A woman was considered to have postnatal psychological distress if in the 12 months prior to giving birth she had:</p> <p>1) one or more hospitalizations with a diagnosis for depressive disorder, affective psychoses, neurotic depression, or adjustment reaction (ICD-9-CM codes 296.2-296.8, 300.4, 309, 311; ICD-10-CA codes F31, F32, F33, F341, F38.0, F38.1, F41.2, F43.1, F43.2, F43.8, F53.0, F93.0) OR</p> <p>2) one or more physician visits with a diagnosis for depressive disorder, affective psychoses, neurotic depression, or adjustment reaction (ICD-9-CM codes 296, 309 or 311) OR</p> <p>3) one or more hospitalizations with a diagnosis for anxiety disorders (ICD-9-CM code 300 ICD-10-CD codes F32.0, F34.1, F40, F41, F42, F44, F45.0, F451, F452, F48, F68.0, F99) OR</p> <p>4) one or more prescriptions for an antidepressant or mood stabilizer (ATC codes N03AB02, N03AB52, N03AF01, N05AN01, N06A) OR</p> <p>5) one or more physician visits with a diagnosis of anxiety disorders one or more physician visits with a diagnosis for anxiety disorders (ICD-9-CM code 300) and one or more prescriptions for an antidepressant or mood stabilizer (ATC codes N03AB02, N03AB52, N03AF01, N05AN01, N06A) OR <input type="checkbox"/></p> <p>6) one or more hospitalizations with a diagnosis for anxiety states, phobic disorders, or obsessive-compulsive disorders (ICD-9-CM codes 300.0, 300.2, 300.3; ICD-10-CA codes F40, F41.0, F41.1, F41.3, F41.8, F41.9, F42) OR</p> <p>7) two or more physician visits with a diagnosis for anxiety disorders (ICD--CM code 300)</p>
Schizophrenia	<p>A women was considered to have schizophrenia if in the five years prior to giving birth to the child she had:</p> <p>1) one or more hospitalizations or physician visits with a diagnosis of schizophrenia: ICD-9-CM code 295 or ICD-10-CA codes F20, F21, F23.2, F25; OR <input type="checkbox"/></p> <p>one or more physician visits with a diagnosis of schizophrenia: ICD-9-CM code 295.</p>