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3 1 Diabetes during pregnancy and perinatal outcomes among First Nations women in Ontario: A
4 2 population-based cohort study, 2002-2014
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3 **38 Abstract**
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6 **39 Background:** Diabetes during pregnancy is a significant risk factor for maternal and perinatal
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8 **40** adverse events. In Canada, there are an increasing number of women, especially First Nations
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10 **41** women, who are affected by diabetes during pregnancy.
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13 **42 Methods:** Using administrative healthcare databases, we identified annual cohorts of pregnant
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15 **43** women from 2002 to 2014 and identified those with pre-existing diabetes and gestational
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17 **44** diabetes (GDM). We used the Indian Register to identify women who were First Nations. We
18
19 **45** estimated rates of maternal and infant adverse outcomes and measures of health care utilization
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21 **46** in each population.
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26 **47 Results:** First Nations women have a higher prevalence of pre-existing diabetes and GDM than
27
28 **48** other women in Ontario. We found significantly higher rates of preeclampsia, labour induction,
29
30 **49** and Caesarean deliveries in First Nations women. First Nations women were not at a higher risk
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32 **50** of pre-term birth compared to other women in Ontario and although First Nations babies were
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34 **51** larger for gestational age, obstructed labor rates were similar in First Nations women and other
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36 **52** women. While almost all First Nations women, regardless of diabetes status, were seen by a
37
38 **53** primary care provider during pregnancy, they had less utilization of speciality care. Only 15% of
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40 **54** all pregnant women with pre-existing diabetes visited an ophthalmologist during pregnancy.
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45 **55 Interpretation:** Our results confirm disparities in maternal and perinatal outcomes between First
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47 **56** Nations women and other women in Ontario. Access to primary care for pregnant women seems
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49 **57** adequate; access to specialized care especially for women with pre-existing diabetes needs to
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51 **58** improve.
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59 Introduction

60 Diabetes during pregnancy, either pre-existing diabetes mellitus or gestational diabetes mellitus
61 (GDM), is a major contributor of maternal and perinatal adverse events. In Canada, the number of
62 women affected by diabetes during pregnancy has increased over time, which is associated with
63 an increased risk of adverse maternal and perinatal outcomes. (1, 2) First Nations women have a
64 high prevalence of diabetes, 2 to 5 times greater than other Canadian populations, (3-6) and a
65 higher risk of adverse pregnancy outcomes. (7-10) There are complex social and historical factors
66 that impact the lived experience of First Nations women, including the impacts of
67 multigenerational trauma, residential schools, systemic racism, material deprivation and risks of
68 violence, as described in major national inquiries (11, 12) and the academic literature. (13, 14)
69 These factors must always be considered in any discussion of the health of First Nations women.
70 In Canada, a handful of population-based studies have assessed health outcomes of pregnant First
71 Nations women with diabetes. In Manitoba, data from 1985-2004, reported an increase in GDM
72 prevalence over time with the prevalence in First Nations women 3-times greater than other
73 populations. (15) In Ontario, data from 2002-2010, reported a higher prevalence of diabetes during
74 pregnancy, less pregnancy care, and higher rates of adverse outcomes in First Nations women
75 compared to the other population. (16) In Alberta, a recent study documented a higher prevalence
76 of pre-existing diabetes and GDM among First Nations women, with the resulting higher rate of
77 adverse pregnancy outcomes. (17) In Quebec, a recent study of births from 1996 to 2010 reported
78 a higher prevalence of diabetes during pregnancy in First Nations women, and an increased risk of
79 perinatal death in women with pre-existing diabetes largely in First Nations women. (18)

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80 The objective of the present study is to examine temporal trends in pregnancy outcomes, including
81 both maternal and neonatal outcomes, and health services utilisation in a population-based cohort
82 of First Nations women with diabetes during pregnancy compared with other women in Ontario.

Confidential

84 **Methods**

85 We conducted a population-based cohort study of all hospital deliveries from women 13-50 years
86 old in Ontario from April 1, 2002 to March 31, 2015 using the comprehensive administrative health
87 datasets housed by ICES. The general approach to the creation of the cohorts and description of
88 the major dataset used are described elsewhere. (19) We identified mothers and newborns through
89 the MomBaby2016 dataset, (20) which includes records derived from the Discharge Abstracts
90 Database (DAD) for all mother-newborn pairs delivered in fiscal year 2002/2003 onward. We
91 identified women who were First Nations using the Indian Register, which includes people who
92 are recognized and registered as First Nations people by the Federal Government under the Indian
93 Act. (21)

94 Exposures: We used the Ontario Diabetes Dataset (ODD) to identify mothers with pre-existing
95 diabetes, defined as diagnosis of diabetes at any point before pregnancy. GDM was defined as the
96 presence of one or more diagnostic codes of diabetes from hospital discharge abstract records or
97 ≥ 2 OHIP billings with diagnosis of diabetes (OHIP code 250) in the last 120 days of pregnancy,
98 in the absence of pre-existing diabetes, a definition adapted from Booth et al., (22).

99 Outcomes: We compared the prevalence of pre-existing diabetes and GDM in First Nations women
100 versus other women in Ontario. To estimate rates of maternal and infant outcomes, we linked data
101 for mothers and their newborns using the DAD. Maternal outcomes included preeclampsia,
102 induction of labor, obstructed labor, and caesarean deliveries. Infant outcomes included preterm
103 birth (PTB, < 37 weeks in gestational age), large for gestational age (LGA, defined as birth weight
104 > 90 th percentile for gestational age according to Canadian growth curves), (23) and stillbirths.
105 Health services utilization during pregnancy, including visits to internal medicine or
106 endocrinology (for women with GDM or pre-existing diabetes), ophthalmology or optometry (for

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3 107 women with pre-existing diabetes), obstetrics and gynecology, and primary care was determined
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5 108 by examining physician billing claims in the Ontario Health Insurance Plan database for the period
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8 109 up to 280 days prior to delivery.
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11 110 Analysis and ethics considerations: Maternal age was captured at time of delivery. Each delivery
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13 111 was counted separately. Estimates of prevalence and maternal and infant outcomes were age-
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15 112 standardized to 2002. The prevalence (per 1000 deliveries) of pre-existing diabetes and GDM in
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17 113 First Nations women and other women in Ontario was estimated yearly from 2002/03 to 2014/15.
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20 114 The frequency of maternal and neonatal outcomes and their 95% CIs in each group were expressed
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22 115 using rates (per 100 deliveries) for three periods (2002-2005, 2006-2009, 2010-2014). Age-
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24 116 standardized rate ratios and 95% CI were used to contrast rates in different years and between First
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27 117 Nations women and other women in Ontario. The Cochran-Armitage Trend Test was used to assess
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29 118 temporal trends.
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32 119 Privacy considerations required the suppression of cells with small values (≤ 5). All analyses were
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34 120 carried out using SAS Enterprise Guide version 7.1 (SAS Institute, Cary, NC). The project
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37 121 received approval from the Chiefs of Ontario Data Governance Committee and the Research Ethics
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39 122 Boards of Queen's University and Laurentian University.
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125 **Results**

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127 Between 2002 and 2014, there were a total 1,671,337 deliveries amongst 1,065,950 women in
128 Ontario. Of these deliveries, 31,417 were in First Nations women (2%), and 1,639,920 in other
129 women (98%). Mean age at delivery was 25.22 years (± 5.95) in First Nations women and 30.12
130 years (± 5.46) among other women in Ontario. The prevalence of pre-existing diabetes and GDM
131 was higher in First Nations pregnant women than other women in each of the years studied (Table
132 1, Figure 1). During the study period, the rate of GDM increased among all women while the rate
133 of pre-existing diabetes stayed the same in First Nations women and increased among other
134 women.

135 Maternal outcomes are shown in Table 2. Rates of preeclampsia and labour induction were higher
136 in First Nations women than other women, regardless of diabetes status. The differences were
137 greater among those with diabetes than among women with no diabetes. Rates of obstructed labour
138 were similar between First Nations women and other women with diabetes. Among women with
139 no diabetes, the rates of obstructed labour were lower in First Nations women compared to other
140 women. Rates of Caesarean deliveries were similar among First Nations women and other women
141 with no diabetes. For women with diabetes, First Nations women have a higher rate of cesarean
142 deliveries compared to other women.

143 Neonatal outcomes are shown in Table 3. First Nations women had similar rates of preterm birth
144 compared to other women, regardless of diabetes status. Rates of LGA births were higher in First
145 Nations women than other women; the gap was greater among those with diabetes than in women
146 with no diabetes (half of First Nations women with diabetes had LGA infants). First Nations
147 women with pre-existing diabetes had a higher rate of congenital anomalies compared to other
148 women. Stillbirth rates were higher in First Nations women compared to other women regardless

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3 149 of diabetes status. Stillbirth rates for both groups were highest among those with pre-existing
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5 150 diabetes.

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8 151 Table 4 presents health services utilization data. While the majority of women, independent of
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10 152 diabetes status, are seen by a primary care provider at least once during pregnancy, the rate is
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12 153 significantly lower in First Nations women with no diabetes and GDM. Most women with pre-
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14 154 existing diabetes and GDM have seen an obstetrician or gynecologist, but the proportion is
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16 155 significantly lower in First Nations women compared to other women in Ontario, as is the
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18 156 proportion of women with diabetes who are seen by an internal medicine or endocrinology
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20 157 specialist. Among women with pre-existing diabetes, there was no difference in visits to
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22 158 ophthalmology or optometrist between First Nations women and other women; however, only 15%
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24 159 of women with pre-existing diabetes saw an ophthalmologist or optometrist during pregnancy.
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30 **Interpretation**

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32 161 In line with previous population-based studies in Canada, (15, 16, 18, 24) our study indicates that
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34 162 the prevalence of pre-existing diabetes and GDM is higher in pregnant First Nations women than
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36 163 in other women in Ontario. As a result, pregnant First Nations women with diabetes are at a higher
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38 164 risk of adverse maternal and perinatal outcomes that, if managed through appropriate health care
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40 165 before and during pregnancy, may improve health inequalities in this population and its future
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42 166 generations. Indeed, offspring to mothers with diabetes during pregnancy are likely to develop
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44 167 diabetes at a younger age and may further propagate this intergenerational risk. (4, 25) This may
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46 168 be one factor that contributes to the increasing incidence in diabetes in First Nations children noted
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48 169 recently by our team. (26)
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53 170 In relation to maternal outcomes, preeclampsia rates were higher in First Nations women than in
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55 171 other women in Ontario regardless of diabetes status, though the difference is greater among
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3 172 women with pre-existing diabetes and GDM than in women with no diabetes. Oster et al. (17)
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5 173 reported a lower rate of pregnancy-induced hypertension in First Nations women compared to
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7 174 other women in Alberta, and no difference between both populations in women with diabetes
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9 175 during pregnancy. In our study, labour induction rates were higher in First Nations women than
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11 176 among other women, especially for those with pre-existing diabetes and GDM. Oster et al. (17)
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13 177 did not find higher rates of labour induction if First Nations women, independently of diabetes
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15 178 status, compared to the other populations. Our finding that among women with pre-existing
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17 179 diabetes and GDM, First Nations women had a higher rate of caesarean deliveries compared to
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19 180 other women, also diverges from Oster et al. (17) who reported lower caesarean rates in First
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21 181 Nations women independent of diabetes status. Differences in the health of First Nations women
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23 182 from Ontario and Alberta, as well as in access to health care, could explain the differences between
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25 183 our study and Oster et al. (17)
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31 184 In terms of perinatal outcomes, First Nations women with diabetes had similar rates of preterm
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33 185 birth compared to other women in Ontario. This finding differs from data reported by Liu et al. in
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35 186 Ontario, (16) and Chen et al. in Quebec, (18), who both found a higher rate of preterm birth in
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37 187 First Nations women with diabetes. Contrary to Liu et al. (27) we did not distinguish First Nations
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39 188 women living in or outside of First Nations communities in our study, however, the majority of
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41 189 First Nations women in Ontario live outside of First Nations communities, which could explain
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43 190 the difference between both studies. Differences between First Nations populations in Ontario
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45 191 versus Quebec, as well as in health services access/utilization could explain the divergence
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47 192 between our finding and those of Chen et al. (18) First Nations offspring were more likely to be
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49 193 LGA compared to the other population, as reported by Oster et al. in Alberta, (17) and Chen et al.
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51 194 in Quebec. (18) LGA is associated with worse glycemc control during pregnancy, so this
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3 195 observation may reflect that First Nations women with pre-existing diabetes or GDM may not be
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5 196 achieving as good glycemic control in pregnancy as other women. Nevertheless, despite of higher
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7 197 rates of LGA babies, we did not find differences in obstructed labor rates between First Nations
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10 198 women and other women, a finding that deserves further studies. First Nations women with pre-
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12 199 existing diabetes, had a higher rate of congenital anomalies compared to the other population, as
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14 200 reported by Oster et al., in Alberta. (17) and Chen et al. in Quebec. (18) In our study, even First
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16 201 Nations women with GDM had an increased risk of congenital anomalies than the other
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18 202 population. It is usually thought that GDM does not increased the risk for anomalies since the
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20 203 glucose intolerance occurs after organogenesis has finished. This finding suggests there may be a
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22 204 burden of undiagnosed type 2 diabetes among those First Nations women labelled as GDM,
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24 205 supporting the need of greater screening for type 2 diabetes in First Nations women of reproductive
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26 206 age. Stillbirth rates were higher in First Nations women compared to other women, as reported by
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28 207 others. (10, 18, 28, 29) The gap was greater in women with pre-existing diabetes, a known risk
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30 208 factor for stillbirths.
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36 209 With regard to health services access/utilization, almost all First Nations women, independent of
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38 210 diabetes status, were seen by a primary care provider during pregnancy. While almost 100% of
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40 211 non-First Nations women with pre-existing diabetes and GDM consulted an obstetrician or
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42 212 gynecologist during pregnancy, the rate was about 85% in First Nations women, higher than what
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44 213 was previously reported in on-reserve First Nations women in Ontario (64%). (16) First Nations
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46 214 women with pre-existing diabetes had less access to specialized care (internal medicine, or
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48 215 endocrinology) during pregnancy compared to other women, as reported by others, (16) which
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50 216 may contribute to worse glycemic control in First Nations women with diabetes and therefore
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52 217 adverse maternal and offspring outcomes. In women with pre-existing diabetes, there was no
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3 218 difference in consults to ophthalmology or optometrist between First Nations women and other
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5 219 women in Ontario; however, only about 15% of women visited these specialist during pregnancy,
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8 220 a very low proportion considering that current guidelines recommend evaluation by an
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10 221 ophthalmologist in all pregnant women with pre-existing diabetes. (30) While the reasons for this
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12 222 disparity in access to care are not addressed in our study, others have identified a number of
13
14 223 important factors including rurality and geographic isolation, culturally unsafe care and poor health
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16 224 care experiences, a lack of a holistic approach to care, significant power imbalances within the
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18 225 patient-provider relationship, and a lack of understanding from health care providers, among
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20 226 others. (14, 24)
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25 227 **Limitations**

26 228 Our study has some limitations. First, women with pre-existing diabetes may have been
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28 229 misclassified as having GDM due to incomplete capture of such cases by the Ontario Diabetes
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30 230 Database. In addition, the Ontario Diabetes Database (ODD) algorithm does not distinguish
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32 231 between type 1 or type 2 diabetes. However, First Nations women with pre-existing diabetes likely
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34 232 have a much greater proportion of type 2 diabetes than in the other population, and this may be
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36 233 driving some of the difference in adverse outcomes between First Nations women and the other
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38 234 population with pre-existing diabetes. Second, due to low numbers for some of the outcomes
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40 235 studied, we were not able to analyse our data based on rurality or location of residence being in or
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42 236 outside of a First Nations community. Also, some women, especially in northwestern Ontario, may
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44 237 have receive their pregnancy care in Winnipeg, so their health service utilization will be
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46 238 underestimated.
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51 239 **Conclusion**

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3 240 Our results confirm disparities in maternal and perinatal outcomes between First Nations women
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5 241 and other women in Ontario. While health services access/utilization at the primary care level
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7 242 seems adequate, access to specialized care especially for women with pre-existing diabetes needs
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9 243 to improve. In light of recent national inquiries into the treatment of Indigenous women in Canada
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11 244 (11, 12), it is important that efforts to improve the quality of care and maternal and neonatal
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13 245 outcomes in First Nations women with diabetes acknowledge the agency of First Nations women
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15 246 and be grounded in an understanding of ongoing, intergenerational impacts of colonization.
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Table 1: Temporal trend in diabetes during pregnancy among First Nations women compared to the other population. 2002-2014. Rates are age-standardized per 1000 women

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	P for trend
Pre-existing Diabetes														
Other Population	13.9 (13.2 - 14.5)	14.9 (14.2 - 15.6)	16.3 (15.6 - 17.0)	15.6 (15.0 - 16.3)	17.9 (17.2 - 18.7)	18.4 (17.7 - 19.1)	19.1 (18.4 - 19.9)	19.4 (18.6 - 20.1)	19.0 (18.3 - 19.8)	20.0 (19.2 - 20.7)	20.4 (19.6 - 21.2)	20.3 (19.6 - 21.1)	20.5 (19.8 - 21.3)	<.0001
First Nations	52.3 (39.6 - 67.9)	51.9 (39.5 - 66.9)	45.4 (34.1 - 59.4)	57.8 (44.7 - 73.5)	48.3 (36.8 - 62.2)	47.1 (36.2 - 60.2)	46.7 (35.8 - 59.8)	47.9 (36.7 - 61.6)	44.0 (33.4 - 56.9)	56.3 (44.6 - 70.2)	59.5 (47.3 - 73.8)	49.8 (38.8 - 62.8)	40.7 (31.1 - 52.2)	0.6549
Rate Ratio (95% CI)*	3.8 (2.9 - 4.9)	3.5 (2.7 - 4.5)	2.8 (2.1 - 3.7)	3.7 (2.9 - 4.7)	2.7 (2.1 - 3.5)	2.6 (2.0 - 3.3)	2.4 (1.9 - 3.1)	2.5 (1.9 - 3.2)	2.3 (1.8 - 3.0)	2.8 (2.3 - 3.5)	2.9 (2.3 - 3.6)	2.4 (1.9 - 3.1)	2.0 (1.5 - 2.6)	
Gestational Diabetes Mellitus														
Other Population	36.6 (35.5 - 37.7)	36.1 (35.1 - 37.2)	42.3 (41.2 - 43.5)	43.5 (42.3 - 44.6)	47.2 (46.0 - 48.4)	46.1 (45.0 - 47.3)	51.1 (49.9 - 52.3)	54.2 (53.0 - 55.5)	52.3 (51.0 - 53.5)	52.3 (51.1 - 53.5)	55.1 (53.8 - 56.4)	55.6 (54.4 - 56.9)	60.7 (59.4 - 62.0)	<.0001
First Nations	80.8 (65.3 - 99.0)	83.8 (67.7 - 102.4)	83.9 (68.3 - 102.0)	92.1 (75.9 - 110.8)	76.2 (61.4 - 93.5)	87.7 (73.0 - 104.6)	68.9 (55.8 - 84.2)	84.7 (70.0 - 101.6)	85.9 (71.2 - 102.7)	85.0 (70.5 - 101.6)	93.2 (78.5 - 109.8)	85.0 (70.9 - 101.0)	108.9 (93.3 - 126.2)	0.0034
Rate Ratio (95% CI)*	2.2 (1.8 - 2.7)	2.3 (1.9 - 2.8)	2.0 (1.6 - 2.4)	2.1 (1.8 - 2.6)	1.6 (1.3 - 2.0)	1.9 (1.6 - 2.3)	1.3 (1.1 - 1.7)	1.6 (1.3 - 1.9)	1.6 (1.4 - 2.0)	1.6 (1.4 - 2.0)	1.7 (1.4 - 2.0)	1.5 (1.3 - 1.8)	1.8 (1.5 - 2.1)	

* Rate Ratio First Nations compared to other Population

Table 2. Diabetes during pregnancy and Maternal/Labour outcomes in First Nations women and other women in Ontario

Maternal/Labour Outcomes	No Diabetes Mellitus						Pre-existing Diabetes						Gestational Diabetes Mellitus					
	Other Women			First Nations Women			Other Women			First Nations Women			Other Women			First Nations Women		
	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014
Preeclampsia																		
Rate per 100 deliveries (95%CI)	1.1 (1.1 - 1.1)	1.0 (1.0 - 1.1)	1.3 (1.2 - 1.3)	1.4 (1.1 - 1.8)	1.3 (1.0 - 1.7)	1.7 (1.4 - 2.1)	3.1 (2.6 - 3.7)	2.8 (2.4 - 3.3)	3.7 (3.3 - 4.3)	5.6 (3.2 - 9.1)	4.9 (2.7 - 8.1)	3.2 (1.8 - 5.4)	1.9 (1.7 - 2.1)	1.6 (1.4 - 1.8)	2.1 (1.9 - 2.3)	3.2 (1.8 - 5.2)	4.7 (3.0 - 7.1)	4.4 (3.1 - 6.1)
RR (95%CI)				1.32 (1.04 - 1.66)	1.29 (1.01 - 1.65)	1.36 (1.13 - 1.63)				1.80 (1.07 - 3.03)	1.73 (1.01 - 2.95)	0.86 (0.50 - 1.48)				1.66 (1.00 - 2.77)	2.96 (1.93 - 4.55)	2.09 (1.49 - 2.93)
P for trend 2002-2014	<.0001			0.2214					0.0002	0.1922			<.0001			0.2548		
Labour induction																		
Rate per 100 deliveries (95%CI)	20.6 (20.5 - 20.7)	20.8 (20.6 - 20.9)	24.1 (23.9 - 24.2)	22.5 (21.1 - 23.9)	23.7 (22.4 - 25.0)	26.4 (25.2 - 27.7)	28.6 (27.2 - 30.1)	30.7 (29.4 - 32.0)	35.1 (33.8 - 36.4)	33.4 (27.1 - 40.8)	40.1 (33.2 - 48.0)	42.9 (36.7 - 49.9)	30.0 (29.1 - 30.9)	30.7 (29.9 - 31.5)	37.5 (36.7 - 38.3)	38.5(3.2 - 44.4)	42.4 (36.9 - 48.6)	46.9 (42.3 - 51.8)
RR (95%CI)				1.09 (1.03 - 1.16)	1.14 (1.08 - 1.21)	1.10 (1.05 - 1.15)				1.17 (0.95 - 1.43)	1.31 (1.08 - 1.57)	1.22 (1.05 - 1.43)				1.28 (1.11 - 1.49)	1.38 (1.20 - 1.59)	1.25 (1.13 - 1.38)
P for trend 2002-2014	<.0001			<.0001					<.0001	0.0481			<.0001			0.0013		
Obstructed Labour																		
Rate per 100 deliveries (95%CI)	5.7 (5.6 - 5.7)	6.2 (6.1 - 6.3)	6.2 (6.1 - 6.3)	4.6 (4.0 - 5.3)	5.5 (4.9 - 6.2)	5.3 (4.8 - 5.9)	5.8 (5.2 - 6.4)	6.4 (5.8 - 7.1)	6.3 (5.8 - 6.9)	3.6 (1.8 - 6.4)	6.2 (3.7 - 9.8)	3.7 (2.1 - 6.2)	5.8 (5.4 - 6.2)	6.5 (6.1 - 6.8)	6.6 (6.2 - 6.9)	4.6 (2.9 - 6.9)	5.8 (3.9 - 8.3)	5.5 (4.1 - 7.4)
RR (95%CI)				0.81 (0.71 - 0.93)	0.89 (0.79 - 1.00)	0.86 (0.78 - 0.95)				0.62 (0.34 - 1.13)	0.97 (0.61 - 1.54)	0.59 (0.35 - 1.00)				0.79 (0.52 - 1.21)	0.90 (0.63 - 1.30)	0.84 (0.63 - 1.13)
P for trend 2002-2014	<.0001			0.027					0.5034	0.6858			0.0004			0.3899		
Caesarean delivery																		
Rate per 100 deliveries (95%CI)	26.5 (26.4 - 26.7)	28.3 (28.2 - 28.5)	27.8 (27.7 - 27.9)	27.4 (25.8 - 29.0)	28.9 (27.4 - 30.4)	28.5 (27.2 - 29.8)	42.6 (41.0 - 44.3)	44.2 (42.7 - 45.8)	43.6 (42.3 - 45.0)	53.7 (45.6 - 62.9)	47.8 (40.2 - 56.5)	53.1 (46.2 - 60.7)	35.4 (34.5 - 36.3)	37.4 (36.6 - 38.2)	36.4 (35.7 - 37.1)	41.8 (36.2 - 48.1)	41.4 (36.0 - 47.4)	43.4 (38.9 - 48.3)
RR (95%CI)				1.03 (0.98 - 1.10)	1.02 (0.97 - 1.07)	1.02 (0.98 - 1.07)				1.26 (1.07 - 1.48)	1.08 (0.91 - 1.28)	1.22 (1.06 - 1.40)				1.18 (1.03 - 1.36)	1.11 (0.97 - 1.27)	1.19 (1.07 - 1.33)
P for trend 2002-2014	<.0001			0.0094					0.0163	0.4941			0.1459			0.6206		

Table 3. Diabetes during pregnancy and Neonatal outcomes in First Nations women and other women in Ontario

Neonatal Outcomes	No Diabetes Mellitus						Pre-existing Diabetes						Gestational Diabetes Mellitus					
	Other Women			First Nations Women			Other Women			First Nations Women			Other Women			First Nations Women		
	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014
Preterm delivery																		
Rates per 100 births (95%CI)	7.5 (7.4 - 7.6)	7.8 (7.7 - 7.9)	7.5 (7.4 - 7.6)	7.7 (6.9 - 8.6)	8.5 (7.7 - 9.4)	8.8 (8.0 - 9.5)	17.5 (16.2 - 18.8)	16.9 (15.9 - 17.9)	16.9 (16.0 - 17.8)	20.5 (15.5 - 26.5)	19.8 (15.0 - 25.8)	19.0 (15.0 - 23.7)	12.1 (11.5 - 12.6)	12.1 (11.6 - 12.5)	11.8 (11.4 - 12.3)	11.9 (9.0 - 15.5)	11.8 (8.9 - 15.3)	14.4 (11.8 - 17.3)
RR (95% CI)				1.03 (0.92 - 1.14)	1.10 (0.99 - 1.21)	1.17 (1.07 - 1.27)				1.17 (0.90 - 1.54)	1.18 (0.90 - 1.54)	1.12 (0.89 - 1.41)				0.99 (0.76 - 1.29)	0.98 (0.75 - 1.27)	1.21 (1.00 - 1.47)
P for trend 2002-2014	0.9417			0.0151			0.6404			0.4751			0.6158			0.1198		
Large Gestation Age																		
Rates per 100 births (95%CI)	11.0 (10.9 - 11.1)	10.2 (10.1 - 10.3)	9.5 (9.4 - 9.6)	24.2 (22.7 - 25.8)	23.7 (22.3 - 25.1)	21.2 (20.0 - 22.3)	25.3 (23.9 - 26.8)	24.4 (23.2 - 25.7)	24.3 (23.1 - 25.4)	50.7 (42.4 - 60.0)	50.9 (42.7 - 60.3)	46.1 (39.5 - 53.4)	16.3 (15.6 - 17.0)	15.0 (14.4 - 15.6)	14.0 (13.5 - 14.5)	49.4 (43.2 - 56.3)	50.1 (43.9 - 56.9)	45.9 (41.2 - 51.1)
RR (95% CI)				2.21 (2.08 - 2.35)	2.31 (2.18 - 2.45)	2.23 (2.11 - 2.36)				2.00 (1.67 - 2.40)	2.09 (1.75 - 2.49)	1.90 (1.63 - 2.22)				3.03 (2.65 - 3.48)	3.34 (2.92 - 3.82)	3.27 (2.93 - 3.66)
P for trend 2002-2014	<.0001			<.0001			0.0064			0.3482			<.0001			0.1264		
Congenital Anomalies																		
Rates per 100 births (95%CI)	5.1 (5.0 - 5.2)	4.8 (4.7 - 4.8)	5.6 (5.5 - 5.6)	5.4 (4.7 - 6.1)	4.7 (4.1 - 5.4)	5.2 (4.7 - 5.8)	7.6 (6.9 - 8.4)	8.2 (7.5 - 9.0)	8.9 (8.2 - 9.6)	16.8 (12.3 - 22.4)	14.2 (10.1 - 19.3)	14.4 (10.8 - 18.7)	5.7 (5.3 - 6.1)	5.3 (5.0 - 5.6)	6.0 (5.7 - 6.3)	8.0 (5.7 - 11.0)	5.4 (3.5 - 8.0)	8.0 (6.2 - 10.3)
RR (95% CI)				1.05 (0.92 - 1.19)	0.99 (0.87 - 1.13)	0.94 (0.85 - 1.05)				2.20 (1.62 - 2.99)	1.73 (1.25 - 2.39)	1.62 (1.23 - 2.13)				1.40 (1.02 - 1.93)	1.03 (0.70 - 1.53)	1.34 (1.04 - 1.72)
P for trend 2002-2014	<.0001			0.5652			0.0013			0.278			0.0009			0.8487		
Stillbirths																		
Rates per 100 births (95%CI)	0.6 (0.6 - 0.7)	0.6 (0.5 - 0.6)	0.5 (0.5 - 0.6)	0.8 (0.6 - 1.2)	0.8 (0.6 - 1.2)	0.9 (0.7 - 1.2)	1.4 (1.1 - 1.8)	1.3 (1.1 - 1.7)	1.2 (1.0 - 1.5)	3.1 (1.4 - 5.8)	5.1 (2.9 - 8.4)	1.1 (0.4 - 2.6)	0.5 (0.4 - 0.6)	0.5 (0.4 - 0.7)	0.4 (0.3 - 0.5)	1.1 (0.4 - 2.5)	1.6 (0.7 - 3.2)	1.0 (0.4 - 2.1)
RR (95% CI)				1.34 (0.97 - 1.86)	1.49 (1.08 - 2.05)	1.66 (1.28 - 2.15)				2.19 (1.09 - 4.40)	3.81 (2.21 - 6.56)	0.92 (0.38 - 2.20)				2.13 (0.89 - 5.11)	3.06 (1.49 - 6.25)	2.64 (1.20 - 5.81)
P for trend 2002-2014	<.0001			0.8247			0.4968			0.1669			0.005			0.3483		

Table 4. Diabetes during pregnancy and health services utilization in First Nations women and other women in Ontario

Health Services	No Diabetes Mellitus						Pre-existing Diabetes						Gestational Diabetes Mellitus					
	Other Women			First Nations Women			Other Women			First Nations Women			Other Women			First Nations Women		
	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014	2002-2005	2006-2009	2010-2014
Primary Care																		
Rate per 100 deliveries (95%CI)	95.0 (94.7-95.2)	95.3 (95.1-95.6)	94.0 (93.8-94.3)	89.1 (86.4-91.9)	87.4 (84.9-89.9)	82.7 (80.5-84.8)	96.8 (94.3-99.5)	97.2 (94.9-99.5)	96.5 (94.4-98.5)	93.7 (82.8-105.6)	91.0 (80.3-102.6)	84.0 (75.2-93.5)	97.4 (95.8-99.0)	97.7 (96.3-99.1)	96.2 (95.0-97.5)	89.6 (81.3-98.4)	84.0 (76.2-92.3)	79.2 (73.1-85.6)
RR (95%CI)				0.94 (0.91-0.97)	0.92 (0.89-0.94)	0.88 (0.86-0.90)				0.97 (0.86-1.09)	0.94 (0.83-1.06)	0.87 (0.78-0.97)				0.92 (0.84-1.01)	0.86 (0.78-0.95)	0.82 (0.76-0.89)
P for trend 2002-2014	<.0001			<.0001					<.0001	<.0001			<.0001			<.0001		
Obstetrics/Gynecology																		
Rate per 100 deliveries (95%CI)	85.6 (85.4-85.9)	88.2 (88.0-88.5)	87.8 (87.6-88.1)	69.1 (66.6-71.6)	68.2 (65.9-70.5)	67.1 (65.2-69.1)	95.2 (92.7-97.7)	96.7 (94.5-99.0)	97.2 (95.2-99.3)	78.3 (68.5-89.3)	81.5 (71.4-92.6)	81.5 (72.9-90.8)	94.7 (93.2-96.3)	97.0 (95.6-98.3)	97.8 (96.5-99.1)	76.4 (68.7-84.7)	78.7 (71.2-86.9)	81.6 (75.4-88.1)
RR (95%CI)				0.81 (0.78-0.84)	0.77 (0.75-0.80)	0.76 (0.74-0.79)				0.82 (0.72-0.94)	0.84 (0.74-0.96)	0.84 (0.75-0.94)				0.81 (0.73-0.89)	0.81 (0.74-0.90)	0.83 (0.77-0.90)
P for trend 2002-2014	<.0001			0.2478					<.0001	0.2605			<.0001			0.0405		
Internist/Endocrinology																		
Rate per 100 deliveries (95%CI)							57.4 (55.5-59.5)	59.8 (58.0-61.6)	60.1 (58.5-61.7)	39.9 (33.0-47.9)	47.3 (39.7-56.0)	49.1 (42.5-56.4)	68.9 (67.7-70.2)	72.8 (71.6-73.9)	75.2 (74.2-76.3)	32.1 (27.2-37.7)	35.0 (29.9-40.7)	38.3 (34.0-42.9)
RR (95%CI)										0.70 (0.58-0.84)	0.79 (0.67-0.94)	0.82 (0.71-0.94)				0.47 (0.40-0.55)	0.48 (0.41-0.56)	0.51 (0.45-0.57)
P for trend 2002-2014									<.0001	0.0038			<.0001			0.0237		
Ophthalmologist/optometrist																		
Rate per 100 deliveries (95%CI)							17.5 (16.3-18.7)	12.9 (12.1-13.8)	10.2 (9.6-10.9)	14.2 (10.2-19.3)	12.3 (8.6-17.1)	13.5 (10.2-17.7)						
RR (95%CI)										0.81 (0.59-1.11)	0.95 (0.68-1.33)	1.32 (1.00-1.74)						
P for trend 2002-2014									<.0001	0.8226								

Figure 1. Temporal trends in pre-existing (A) and gestational diabetes (B) during pregnancy among First Nations women and other women in Ontario, 2002-2014

