

## STROBE Statement—checklist of items that should be included in reports of observational studies

**Title:** Psychological distress and suicidal behaviours in Indigenous and non-Indigenous adults living off-reserve in Canada: What explains the differences?

	Item No	Recommendation
Title and abstract	1	<p><u>(a) Indicate the study's design with a commonly used term in the title or the abstract:</u></p> <p><i>Using data from the 2012 Canadian Community Health Survey–Mental Health (CCHS–MH, n=18,300 adults aged ≥18 years) we measured the differences in psychological distress (10-item Kessler Psychological Distress Scale [K10], score range 0–50) and the prevalence of lifetime suicidal ideation and suicide plan between Indigenous peoples living off-reserve in Canada and the non-Indigenous population. The Blinder–Oaxaca approach was used to explain these differences in mental health outcomes between the two populations.</i></p>
		<p><u>(b) Provide in the abstract an informative and balanced summary of what was done and what was found</u></p> <p><i>We found higher mean scores of psychological distress among Indigenous peoples compared to the non-Indigenous population (16.04 v. 15.05, <math>P &lt; 0.001</math>), and a higher prevalence of lifetime suicidal ideation (9.2% v. 16.8%, <math>P &lt; 0.001</math>) and plan (2.3% v. 6.8%, <math>P &lt; 0.001</math>). Results indicated that 60% (women: 51.2%; men: 78.3%) of the variation in psychological distress was explained by the differences in demographic, socioeconomic and geographical factors between the two populations. The group differences in response to the characteristics and unobserved characteristics mainly explained the differences in suicidal behaviours. We found if socioeconomic status in Indigenous peoples were made to be similar to non-Indigenous population, the differences in mean distress scores, prevalence of lifetime suicide ideation and plan would have been reduced by 25.7% (women: 20.8%; men 36.9%), 10.2% (women: 11.2%; men 11.9%) and 5.8% (women: 7.8%; men 8.1%), respectively.</i></p>
<b>Introduction</b>		
Background/rationale	2	<p><u>Explain the scientific background and rationale for the investigation being reported</u></p> <p><i>While there is well-documented information about inequalities in health between Indigenous and non-Indigenous populations, there is scant literature that aims to explain inequalities in mental health outcomes between the two populations in Canada. To assist effective policy making based on the emerging evidence of the extent of inequalities, it is critical to understand what explains these inequalities. In this study, for the first time, we</i></p>

*analysed data from the most recent Canadian Community Health Survey – Mental Health (CCHS–MH) conducted in 2012 to quantify the extent and explain various demographic, socioeconomic and geographical factors that account for inequalities in psychological distress, suicidal ideation, and suicide plans between Indigenous peoples living off-reserve in Canada and non-Indigenous Canadians. [See the Introduction section, pages 3 and 4]*

Objective s	3	<p><u>State specific objectives, including any prespecified hypotheses</u></p> <p><i>We aimed to explain inequalities in mental health outcomes between Indigenous and non-Indigenous population Canada. Specifically, we analysed data from the most recent Canadian Community Health Survey – Mental Health (CCHS–MH) conducted in 2012 to quantify the extent and explain various demographic, socioeconomic and geographical factors that account for inequalities in psychological distress, suicidal ideation, and suicide plans between Indigenous peoples living off-reserve in Canada and non-Indigenous Canadians. [See Introduction section, pages 3 and 4]</i></p>
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## Methods

Study design	4	<p><u>Present key elements of study design early in the paper</u></p> <p><i>We indicated that we used the CCHS–MH to quantify and the extent and explain factors explaining inequalities in mental health in the Introduction section of the paper. [Introduction section, pages 3 and 4]</i></p>
Setting	5	<p><u>Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection</u></p> <p><i>We used the CCHS–MH in the study. [See Methods section, page 4]</i></p>
Participa nts	6	<p><u>(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up</u></p> <p><u>Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls</u></p> <p><u>Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants</u></p> <hr/> <p><u>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed</u></p> <p><u>Case-control study—For matched studies, give matching criteria and the number of controls per case</u></p> <p><i>Data for the study were derived from the 2012 CCHS–MH. This is the most recent population-based survey that collected in-depth information on major mental health issues such as psychological distress and suicidal behaviours and the provision of mental health care services from the Canadian population.</i></p>

*The survey is a large nationally representative cross-sectional survey of individuals aged 15 or older living in the ten provinces in Canada, except those living on reserves and other Indigenous settlements, full-time members of the Canadian Forces, and the institutionalized population. These exclusions approximately represent 3% of the target population. The response rate of the survey was 68.9%, yielding a sample of 25,113 representing 28.3 million Canadians.<sup>1,2</sup> After we excluded individuals aged less than 18 years and individuals with missing values in outcomes or explanatory variables, our final sample consisted of 18,300 (Indigenous: 933 and non-Indigenous: 17,367) individuals, representing 18,573,280 (Indigenous: 754,982 and non-Indigenous: 17,818,298) Canadian. [See Data sub-section, page 4]*

Variables	7	<p><u>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable</u></p> <p><i>The <u>outcome variables</u> included psychological distress, lifetime suicide ideation and lifetime suicide plan. The 10-item Kessler Psychological Distress Scale (K10, see Appendices A and B in online supplementary)<sup>3</sup> was used to identify psychological distress of individuals. The K10 is comprised of items evaluating psychological and physiological symptoms of depression and anxiety. The overall K10 scores range from 10 (no distress) to 50 (severe distress). The K10 is shown to be appropriate and valid for use in Indigenous populations living on and off-reserve in Canada.<sup>3-6</sup> Based on the information available in the CCHS–MH, we constructed two binary variables (yes or no) assessing lifetime suicidal ideation and suicide plan. Indigenous populations in this study refers to all Inuit, Métis and First Nations peoples living off-reserve in Canada. As per the existing literature<sup>7-17</sup> and availability of questions assessed in the CCHS–MH, we considered a variety of demographics (sex, age and marital status), socioeconomic (equivalized household income, education, employment status, household arrangement and homeownership status) and geographic (urbanicity and region) variables known to be associated with mental health outcomes (<u>independent variables</u>). We equivalized annual household income by dividing it by the square root of household size.<sup>18</sup> [See Measures sub-section (page 4) and Appendices A and B in online supplementary file]</i></p>
Data sources/ measurement	8*	<p><u>For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group</u></p> <p><i>The Measures sub-section (page 4) and Appendix B in online supplementary file present the definitions and descriptive statistics of all the variables used in the study.</i></p>
Bias	9	<p><u>Describe any efforts to address potential sources of bias</u></p> <p><i>We used the BO decomposition for a linear model to assess the differences in the mean psychological distress. An extended</i></p>

version of the BO technique for a non-linear logit model<sup>19</sup> was used to examine the difference in the prevalence of suicidal ideation and suicide plans. To acknowledge potential differential results by sex, we stratified all analyses by sex. All analyses were weighted to represent all adults living off-reserve in Canada. [See Statistical Analysis, pages 4 and 5].

Study size	10	<p><u>Explain how the study size was arrived at</u></p> <p><i>The total number of observations in the CCHS-MH is 25,113 representing 28.3 million Canadians.<sup>1,2</sup> After we excluded individuals aged less than 18 years and individuals with missing values in outcomes or explanatory variables, our final sample consisted of 18,300 (Indigenous: 933 and non-Indigenous: 17,367) individuals, representing 18,573,280 (Indigenous: 754,982 and non-Indigenous: 17,818,298) Canadian. <u>[see Sample characteristics sub-section, page 6]</u></i></p>
Quantitative variables	11	<p><u>Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why</u></p> <p><u>[See Measures sub-section (page 4) and Appendices A and B in online supplementary file]</u></p>
Statistical methods	12	<p><u>(a) Describe all statistical methods, including those used to control for confounding</u></p> <p><i>We first performed the ordinary least squares (OLS) and non-linear logit regressions to investigate the effect of determinants on the continuous psychological distress, and two binary suicidal behaviours, respectively. Subsequently, we used the Blinder-Oaxaca (BO) decomposition method<sup>20,21</sup> to understand the contribution of each factor to the overall differences in the three mental health outcomes between non-Indigenous and Indigenous peoples. The BO technique enabled us to decompose the observed gaps between Indigenous and non-Indigenous peoples into explained and unexplained components. The explained (endowment) component captures the part of the difference in a given outcome explained by differences between groups in the level of observed characteristics (determinants) that were assessed (i.e., demographic, socioeconomic and geographic variables). The unexplained component captures the portion attributable to differences in the effects (response or return) of these characteristics and unobserved determinants on the outcome of interest in non-Indigenous and Indigenous population. The absolute value of the explained component for income factor, for example, can determine how much the gap in the mean of psychological distress levels between non-Indigenous and Indigenous populations would have been reduced if the income of Indigenous peoples is set to be at the similar level of non-Indigenous Canadian, ceteris paribus.<sup>19-21</sup> We used the BO decomposition for a linear model to assess the differences in the mean psychological distress. An extended version of the BO technique for a non-linear logit model<sup>19</sup> was used to examine the</i></p>

*difference in the prevalence of suicidal ideation and suicide plans. Appendix C in online supplementary file provides a detailed description of our regression and decomposition analyses.*

*The t-test and chi-square statistics were used to test the differences in continuous (i.e., psychological distress) and categorical (i.e., suicidal ideation and lifetime suicide plan) variables between non-Indigenous and Indigenous populations, respectively. We considered  $p < 0.05$  as statistically significant. [See Statistical Analysis sub-section, pages 4 and 5]*

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(b) Describe any methods used to examine subgroups and interactions

N/A

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(c) Explain how missing data were addressed

*We did not include missing observations in our analysis.*

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(d) Cohort study—If applicable, explain how loss to follow-up was addressed

Case-control study—If applicable, explain how matching of cases and controls was addressed

Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy

*As per Statistics Canada’s Research Data Centre guidelines, all analyses were weighted to represent all adults living off-reserve in Canada. [See the Statistical Analysis sub-section, pages 6]*

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(e) Describe any sensitivity analyses

*To acknowledge potential differential results by sex, we stratified all analyses by sex.*

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## Results

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Participants	13*	<u>(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed</u>
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(b) Give reasons for non-participation at each stage

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(c) Consider use of a flow diagram

*The total number of observations in the CCHS-MH is 25,113 representing 28.3 million Canadians.<sup>1,2</sup> After we excluded individuals aged less than 18 years and individuals with missing values in outcomes or explanatory variables, our final sample consisted of 18,300 (Indigenous: 933 and non-Indigenous: 17,367) individuals, representing 18,573,280 (Indigenous: 754,982 and non-Indigenous: 17,818,298) Canadian. [see Sample characteristics sub-section, page 6]*

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Descripti	14*	<u>(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential</u>
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ve data	<u>confounders</u>
	<i>Appendix B in the online Supplementary file presents the definitions and descriptive statistics of all the variables used in the study. Table 1 reports summary statistics of variables used in the study.</i>
	<u>(b) Indicate number of participants with missing data for each variable of interest</u>
	<i>We excluded individuals aged less than 18 years and individuals with missing values in outcomes or explanatory variables, our final sample consisted of 18,300. [see Sample characteristics sub-section, page 6]</i>
	<u>(c) Cohort study—Summarise follow-up time (eg, average and total amount)</u>
	<u>N/A</u>
Outcome data	15*
	<u>Cohort study—Report numbers of outcome events or summary measures over time</u>
	<u>N/A</u>
	<u>Case-control study—Report numbers in each exposure category, or summary measures of exposure</u>
	<u>N/A</u>
	<u>Cross-sectional study—Report numbers of outcome events or summary measures</u>
	<i>We reported summary measures of the outcome and independent variables in Table 1.</i>
Main results	16
	<u>(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included</u>
	<i>As per the existing literature<sup>7,8,17,9–16</sup> and availability of questions assessed in the CCHS–MH, we considered a variety of demographics (sex, age and marital status), socioeconomic (equivalized household income, education, employment status, household arrangement and homeownership status) and geographic (urbanicity and region) variables known to be associated with mental health outcomes (i.e. independent variables). We equivalized annual household income by dividing it by the square root of household size.<sup>18</sup> Appendix B in online supplementary file presents the definitions and descriptive statistics of all the variables used in the study. [see Variables sub-section, pages 4]</i>
	<u>(b) Report category boundaries when continuous variables were categorized</u>
	<u>N/A</u>
	<u>(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period.</u>

*Estimates are reported in marginal effects in Table 2.*

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses  <i>We stratified our analysis by sex.</i>
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## Discussion

Key results	18	<u>Summarise key results with reference to study objectives</u>  <i>We found a high prevalence of psychological distress and suicidal behaviours among Indigenous peoples living off-reserve in Canada. We found that mean psychological distress scores among Indigenous peoples was 6.59% higher compared to the non-Indigenous population. The prevalence of lifetime suicidal ideation (suicide plan) among Indigenous peoples was also found to be 1.61 (3) times higher than the corresponding figures for the non-Indigenous population.</i>  <i>Results indicated that the difference in the mean levels of psychological distress between Indigenous and non-Indigenous was mostly explained by the differences between groups in levels of the explanatory variables that were assessed, particularly for men. The group differences in response to the characteristics and unobserved characteristics mainly explained the differences in suicidal behaviours. [see Interpretation section, pages 8 and 9]</i>
Limitations	19	<u>Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias</u>  <i>We discussed the limitations of our study in the Interpretation section. [see pages 9-10]</i>
Interpretation	20	<u>Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence</u>  <i>We discussed the limitations and interpretations of our results in the Interpretation section of the paper. [see pages 9 and 10]</i>
Generalisability	21	<u>Discuss the generalisability (external validity) of the study results</u>  <i>With the inclusion of sampling weights, our results are generalizable to the off-reserve population of Canada.</i>

## Other information

Funding	22	<u>Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based</u>  <i>The authors acknowledge funding for this research provided by the Research Nova Scotia – Establishment Grant program (Grant No: 1017).</i>
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## References

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