Prevalence of dental caries among Indigenous populations compared to non-Indigenous populations: a quantitative systematic review protocol

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ABSTRACT

Objective: The objective of this review is to evaluate if the prevalence of dental caries is higher among Indigenous populations compared to non-Indigenous populations.

Introduction: Globally, Indigenous populations have experienced substantial inequalities in health, including oral health care, when compared to their non-Indigenous counterparts. Indigenous populations experience a higher prevalence of dental caries, but most of this data has been collected from convenience samples not involving non-Indigenous groups. This review will highlight differences in the prevalence of dental caries globally among Indigenous groups compared to non-Indigenous groups.

Inclusion criteria: The systematic review will include all studies that have compared the prevalence of dental caries (% of decayed teeth>0) and dental caries experience (mean score of decayed, missing, filled teeth) among Indigenous and non-Indigenous populations across all ages.

Methods: Initially, articles will be searched in MEDLINE, followed by a more comprehensive search on Scopus, EBSCO (Dentistry and Oral Sciences Sources), Cochrane Database, and OpenGrey. The search will be conducted independently by two reviewers from database inception to September 2020. A reference list will be made identifying all eligible studies. Titles and abstracts will be reviewed, as well as the full text of articles that meet the inclusion criteria. To assess methodological quality, a standardized critical appraisal checklist for studies reporting prevalence will be selected, followed by standardized data extraction using the JBI tool. The results from included studies will be analyzed using JBI SUMARI.

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Keywords: Aboriginal; dental caries; Indigenous; inequalities; oral health

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Introduction

Indigenous peoples are found in all parts of the world. They represent diversity in cultures, languages, and spirit.[1] According to a United Nations report, Indigenous people comprise around 370 million people globally and reside in around 90 countries.[2,3] The International Labour Organization defines Indigenous people using subjective criteria based on self-identification to indicate belonging to an Indigenous population.[4] The objective criteria for the definition is that a person is descended from populations who inhabited the country or geographical region at the time of conquest, colonization, or establishment of present state boundaries, and irrespective of their legal status, they retain some or all of their own social, economic, cultural, and political institutions.[1] The term ''Indigenous'' is often used synonymously with First Nations, Aboriginal, native, tribal, Adivasi, Janajati, hunter-gatherers, or hill tribes.[5] At a global level, Indigenous peoples have undergone rapid culture changes, marginalization, and absorption into the global economy with little respect for their autonomy. This has been

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linked to high rates of alcoholism, suicide, violence, and depression.[6] Indigenous health inequalities stem from a combination of these historical policies and impacts, and contemporary upstream determinants that impact how Indigenous peoples live, work, and socialize.[6] In colonized countries, Indigenous populations have experienced worse health outcomes when compared to their non-Indigenous counterparts. For example, substantial disparities in life expectancy (around 10 years) have been observed in countries including Australia, New Zealand, Canada, and the United States.[7]

A declaration by the Global Oral Health Inequalities Resrach Network (GOHIRN), Budapest, (October 9–12, 2013) highlighted that "the existing inequalities in oral health within and between countries are unfair, unjust and avoidable."[8(p.120)] Oral diseases affect nearly half the world's population, but up to 80% of the world's Indigenous populations.[9-13] In Indigenous adults, the prevalence of untreated tooth decay is almost three times higher than that of non-Indigenous adults.[10] The findings from a systematic review revealed that Australian children and adults from Indigenous communities have a higher risk of dental caries, with the prevalence ranging from 46% to 93%.[13] According to the Australian National Oral Health Plan 2015–2024, Indigenous Australians are a priority population group for targeting improvements in oral health. Oral health inequalities continue to challenge public health and oral health promotion initiatives.[14]

The reasons behind the existing oral inequalities have been attributed to mainstream health services not meeting the health needs of Indigenous peoples and barriers in affordable access to health services.[7] Crowded and inadequate housing could be determinants of health among Indigenous Australians.[15] Empirical evidence suggests that many Indigenous Australians have poor oral hygiene and a high-sugar diet, contributing to high levels of dental caries.[12]

Understanding the drivers of poor oral health and oral health inequalities is crucial for appropriate and effective health policy and funding. Although awareness and advances in dental care have improved oral conditions in high-income countries, the benefits have not been equally shared among the population. Indigenous populations are one group who carry a disproportionate share of the oral health burden. In almost all countries, Indigenous persons represent a minority of the population, meaning their poor oral health outcomes can be masked by the better health outcomes of the majority group.[2] Global comparisons of the oral health and well-being of Indigenous peoples could provide important insights into these preventable inequalities.

An initial search of PROSPERO, MEDLINE, the Cochrane Database of Systematic Reviews, and *JBI Evidence Synthesis* was conducted to determine if there are existing studies answering the review question and to identify if there are similar published or in-progress systematic reviews addressing the knowledge gap. Currently, there are no systematic reviews that compare dental caries outcomes between Indigenous and non-Indigenous populations at a global level. Few authors have restricted their search to a particular geographical area.[13,16,17] Several reviews[10,12,13,17] have included prevalence data of oral health outcomes on Indigenous populations without comparison to a non-Indigenous population. Therefore, the aim of this systematic review is to identify the dental caries inequalities experienced between Indigenous and non-Indigenous populations.

Review question

Globally (C), is the prevalence of dental caries (C) greater among Indigenous people (P) than non-Indigenous people?

Inclusion criteria

Participants

We will include papers that follow the UN Declaration on the Rights of Indigenous Peoples, Article 33, for identifying Indigenous status; this includes self-identification as Indigenous.[3] We will also include studies that have determined Indigenous status according to country-specific identity registration systems or by parent report.

The review will include studies that have assessed oral health outcomes of dental caries among Indigenous populations and compared them against non-Indigenous populations. Eligible studies will include participants of all age groups including children and adults. The selection of studies will not be restricted to sex or geographic location.

Condition

This review will consider studies that report on either the prevalence and/or extent of dental caries on permanent teeth and deciduous teeth. As recommended

by the World Health Organization, the Decayed (d/D), Missing (m/M), Filled (f/F) Teeth (dmft/DMFT) index score[18] will be used. Prevalence of dental caries will be defined as having a decayed score of more than 0. The term ''dental caries experience'' is used to describe a cumulative score of decayed, missing, and filled teeth over a person's life. The mean DMFT score will be used to define the dental caries experience.

Context

This review will consider studies that are original studies performed in community settings or hospitals. The data from national oral health surveys, government registries, and census data will also be included. This review will not place any geographic restriction on studies and will consider studies from all countries.

Types of studies

Epidemiological cohort, cross-sectional, and case control studies that have oral health data comparing Indigenous with non-Indigenous populations will be considered. If more than one study presents findings for the same geographic area and oral health outcomes using the same datasets, we will include the study with a larger population.

The inclusion criteria for consideration of a review is as follows: studies must i) be an original study; ii) be on an Indigenous population reporting either dental caries prevalence, dental caries experience, or both; and ii) make a comparison to non-Indigenous or the general population. Language, age, sex, and geography will not be barriers to inclusion in the study.

The following exclusion criteria will apply: i) studies are observational or descriptive without any comparison group, ii) papers examine Indigenous and non-Indigenous persons but do not present the findings separately for each group, iii) studies define dental caries by a self-check questionnaire alone, without any clinical examination, iv) are experimental studies, such as randomized controlled clinical trial and quasi-experimental studies, with the exception of baseline data, if it pertained to the research question and data were obtained before the intervention, v) studies are case reports, literature reviews, including systematic reviews and scoping reviews, letters, commentaries, opinion pieces, and editorials.

Methods

The proposed systematic review will be conducted in accordance with JBI methodology for systematic reviews of prevalence.[19] The systematic review protocol is registered in PROSPERO (CRD42020204311). The Preferred Reporting Items for Systematic reviews and Meta-Analyses Protocols (PRISMA-P) guidelines will be followed for reporting of this systematic review.[20]

Search strategy

The search strategy will aim to locate both published and unpublished studies with no language limitations from database inception to September, 2020. For articles other than English, online translating tools may be used, such as Google Translate and Finereader. We will use a three-step search strategy, initially starting with the MEDLINE database. The reviewers will analyze the text words contained in the title and abstract of the relevant articles and the index terms used to describe the articles. A string search will be created using the keywords and synonyms. A second search will then be undertaken using identified keywords and index terms across Scopus, EBSCO (Dentistry and Oral Sciences), and Cochrane (Wiley). The search strategy has been described in Appendix I for MEDLINE (PubMed). In the third step, reference lists will be hand searched to identify additional studies that might have been overlooked by the electronic search. We will also investigate narrative reviews and standard textbooks to identify all other studies. For unpublished data, OpenGrey, national oral health survey reports, and government databases reporting on oral health will be searched.

Study selection

Following the search, all identified citations will be collated and uploaded into EndNote v.X9.3.3 (Clarivate Analytics, PA, USA) and duplicates removed. Titles and abstracts will then be screened by two independent reviewers (SN and LMJ) for assessment against the inclusion criteria for the review. Potentially relevant studies will be retrieved in full and their citation details imported into the JBI System for the Unified Management, Assessment and Review of Information (JBI SUMARI; JBI, Adelaide, Australia). The full text of selected citations will be assessed in detail against the inclusion criteria by two independent reviewers. Reasons for exclusion of

full-text studies that do not meet the inclusion criteria will be recorded and reported in the systematic review. Any disagreements that arise between the reviewers at each stage of the study selection process will be resolved through discussion or with a third reviewer (XJ). The results of the search will be reported in full in the final systematic review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flow diagram.[21]

Assessment of methodological quality

All eligible studies will be critically appraised by two independent reviewers (SN and LMJ) using an adapted critical appraisal instrument for prevalence studies in JBI SUMARI. This instrument provides a standardized checklist to ensure that reviewers consider relevant factors, including sample representativeness, recruitment bias, objectivity, and reliability. All studies will be included in this review regardless of methodological quality. The authors will be contacted via email in the case of missing information or if any additional data is required. Disagreements between reviewers will be resolved by a third reviewer (XJ). The results of the critical appraisal form will be reported in a narrative and table form.

Data extraction

Data will be extracted by two independent reviewers (SN and LMJ) from papers included in the review using the modified data extraction tool for prevalence available in JBI SUMARI. Any disagreements that arise between the reviewers will be resolved through discussion or with a third reviewer (XJ). Authors of papers will be contacted via email to request missing or additional data where required.

The data extracted will include:

i. Study characteristics: Last name of first author, year of publication, country of study, study design, sampling technique, data collection method, and location of study.
ii. Participant characteristics: Number of study participants, age, sex, and description of case and control population.
iii. Outcome measures: The primary outcome is the prevalence of dental caries measured in percentage, mean DMFT score. The secondary outcome is the mean number of missing teeth, mean number of decayed teeth, and mean number of filled teeth.

Data synthesis

Papers will, where possible, be pooled in statistical meta-analysis using JBI SUMARI. The effect sizes evaluated will be proportions (eg, prevalence of caries, mean DFMT/dmft score), presented with 95% confidence intervals. Heterogeneity will be assessed statistically using the standard χ^2, τ^2, and I^2 tests. A random effects model using the double arcsine transformation approach will be used. Subgroup analyses will be conducted for DMFT/dmft score by country of publication, study design, and sampling methods. Sensitivity analyses will be conducted to test decisions made. The publication bias will also be assessed using Egger's test and visualized using funnel plots. Where statistical pooling is not possible, findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

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Appendix I: Search strategy

MEDLINE (PubMed)

(Dental caries [MH] OR Caries [TW] OR Dental decay [TW] OR Tooth decay[tw] OR Carious[tw] OR Decayed teeth [tw]) AND ((''first nation'' OR ''first nations'' OR ''pacific islander'' OR ''pacific islanders'' OR ''torres strait islander'' OR ''torres strait islanders'' OR aborigin* OR alaska* OR aleut* OR amerind* OR arctic OR Aymara OR bushmen OR chukchi OR chukotka* OR circumpolar OR eskimo* OR greenland* OR hmong OR indian* OR indigen* OR inuit* OR inupiaq OR Inupiat OR Khanty OR maori* OR mapuche OR metis OR native* OR Navaho* OR navajo* OR nenets OR quechua OR sami OR sami OR samoan* OR siberia* OR skold OR tribal OR tribe* OR xingu* OR yup'ik OR yupik OR zuni OR ''African continental ancestry group'' OR ''African continental ancestry group'' OR ''Asian continental ancestry group'' OR ''Health Services, Indigenous'' OR ''Indigenous Health Services'' OR ''Oceanic ancestry group'' OR ''arctic regions'' OR ''ethnic groups'')).

The search resulted in 2925 results as of September 31, 2020. A similar search strategy was used for all other databases.