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Diabetes among Indigenous Peoples

Acknowledgements

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Authors: Type 2 diabetes among Indigenous Peoples under the age of 30

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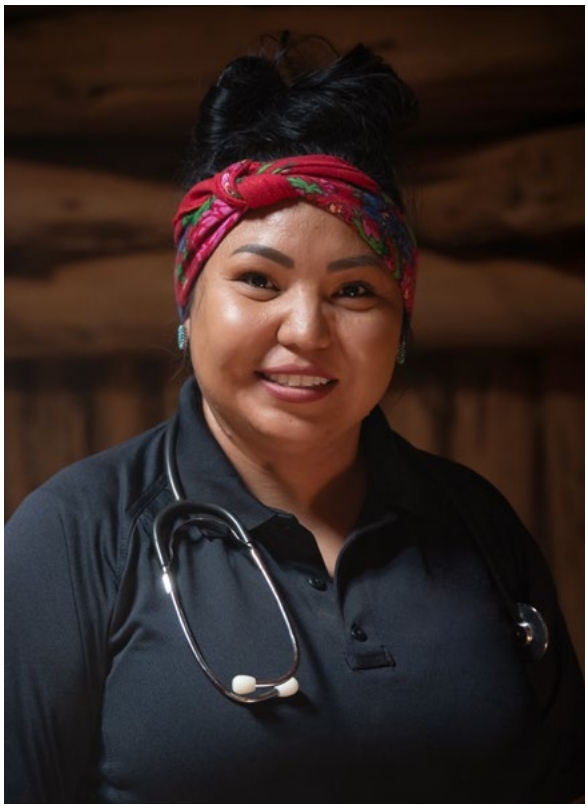
Introduction

Indigenous Peoples account for 6.2% of the global population, with over 476 million Indigenous Peoples in 90 countries and more than 5,000 distinct groups across the globe.[1] There is not one single definition for Indigenous populations, thus the most respectful approach is to identify rather than define Indigenous Peoples with criteria that are regionally appropriate and approved by Indigenous Nations.[2] Another respectful practice is to refer to each diverse group by the name each Nation uses to refer to themselves rather than names imposed upon them by others. Colonisation[3] has disrupted the traditional life practices of Indigenous Peoples through forced assimilation, land and resource displacement, loss of language, restricted cultural practices, and historical and intergenerational trauma.[4] This has contributed to disparate health outcomes that continue to impact Indigenous populations across the globe.[4–6] Diabetes is now one of the most common health disparities that disproportionately impacts Indigenous populations worldwide.[5–7] Although there is incredible diversity within and across each populations' culture, history, and relationship with member states and national governments, one of the most consistent observations has been an increase in type 2 diabetes (T2D) among many Indigenous Nations over time.[6]



Our objective in this report is to provide a summary of the prevalence of type 2 diabetes in Indigenous Peoples among both youth and adult populations. This was achieved by systematically reviewing the literature reporting T2D prevalence in Indigenous populations. We present separate analyses on adults (≥18 years) and on youth (defined ≤30 years) presented in individual sections below. The age criteria used for the youth section overlapped with the age criteria used for the adult section as many studies reported diabetes prevalence for adolescents and young adults combined. Medline and Embase were searched to identify studies published in English from January 1, 1980, to October 13, 2021. The full search strategy (see Appendix 1) was developed using internal expert knowledge and the United Nations Indigenous Peoples criteria as a guide to identify studies reporting Indigenous population prevalence data.[2] Among the included studies, diabetes was defined by self-report, clinician diagnosis or case detection during community screening using Haemoglobin A1c (HbA1c), fasting glucose, random glucose or from a two-hour 75g oral glucose tolerance test (OGTT). 2,055 articles were identified through our search strategy. Each abstract was screened by two reviewers and any disagreements were resolved through discussion with a third reviewer.

3 Colonisation, often referred to as colonialism, very broadly, "occurs when one nation subjugates another,"[3] foreign invaders exploit the population, "often while forcing [their] own language and cultural values upon [other] people."[3] Many Indigenous Nations have experienced colonisation on varying levels over time and have resiliently maintained inherent strengths, knowledge and culture despite genocidal colonial efforts.

The American Diabetes Association (ADA)[2] recommends diagnosing "prediabetes" with HbA1c values between 39 and 47 mmol/mol (5.7–6.4%) and impaired fasting glucose when the fasting plasma glucose is between 5.6 and 6.9mmol/L (100–125mg/dL).

Type 2 Diabetes among Indigenous adult populations

Key messages

- **In 76% of studies that reported sex-specific data (19 of 25 studies), Indigenous women had higher T2D prevalence than Indigenous men. In a few examples, T2D prevalence among Indigenous women was more than double the prevalence among Indigenous men.**
- **There is variability in T2D prevalence geographically by Indigenous Nation and across time periods. Approximately 70% of all studies reviewed reported T2D prevalence over 10%.**
- **Recent T2D prevalence data are sparse when considering the vast number of Indigenous Peoples across the globe. This review only represents 16 out of 90 countries with known Indigenous populations.**

Of the 2,055 initial abstracts screened, full texts were reviewed for 573 articles, and 168 articles fulfilled the a priori data inclusion criteria. For studies that reported prevalence from the same data set, we included the most recent published study for extraction. Studies were excluded if diabetes prevalence was reported for type 1 diabetes (T1D), populations aged <18 years, specific population studies (i.e., based on occupation, specific diseases, pregnancy, or gestational diabetes) and non-Indigenous population studies.

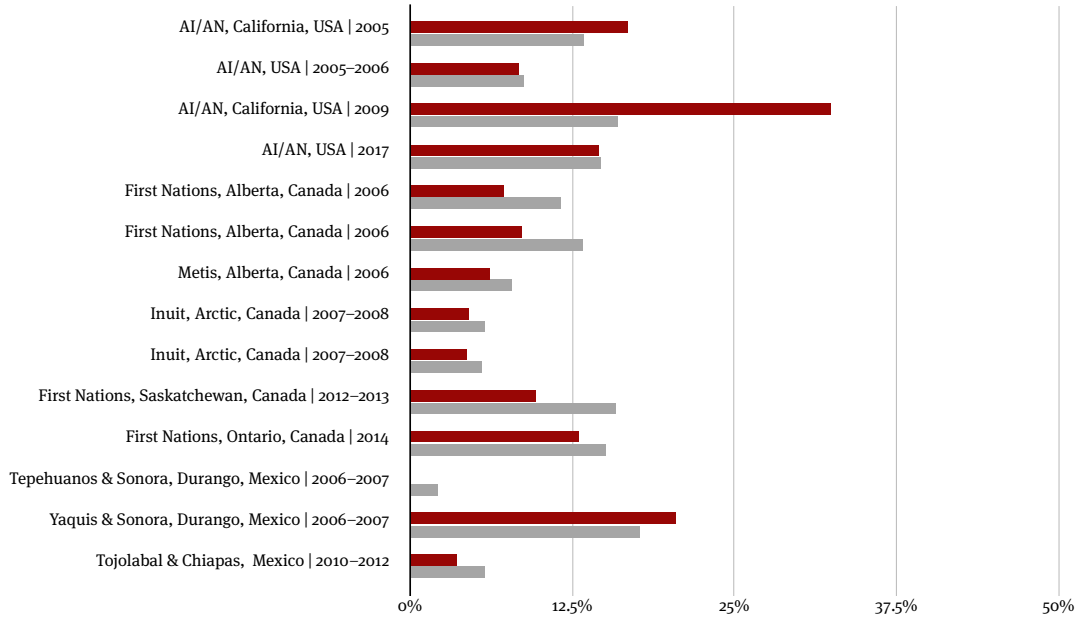
Additionally, studies were excluded if study quality was poor and reliable prevalence data could not be extracted, or if the sample size was <200. Data extracted included publication characteristics (i.e., authors, publication year, year of data collection), study design/type of sample, T2D diagnostic criteria, country/region, Indigenous Nation/Tribe/population, total sample size, overall prevalence, sex-specific prevalence, age group, response rate, and population used to calculate age-standardised prevalence (i.e., census data).

For the purposes of this publication, we analysed a subset of the 168 full-text articles to provide the most recent prevalence data collected between 2005 and 2019. The subset included 49 articles reporting prevalence data from 16 countries. The lowest prevalence was 0.0% for both the Tapuwai (overall) of the Solomon Islands[8] and the Tepehuanos and Sonora (men) of Durango, Mexico.[9] The highest reported prevalence was 40.6% (age-adjusted) among the Xavante (women) of Mato Grosso, Brazil.[10]

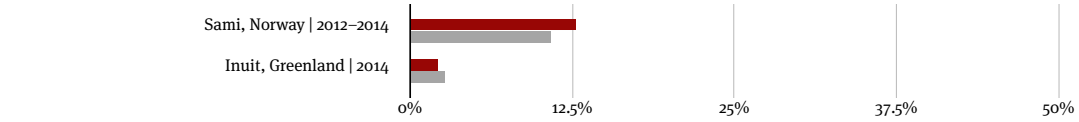
Among our selected studies, 25 reported sex-specific prevalence data. Of these, 76% reported higher diabetes prevalence for women compared to men.
This was especially true for the Xavante of Mato Grosso, Brazil where age-adjusted prevalence among women (40.6%) was more than two times higher than men (18.4%).[10] The same pattern of significantly higher prevalence for women was seen in a study with the Jaguapiru Village of Mato Grosso do Sul, Brazil with 2.7 times higher prevalence for women (7.8%) compared to men (2.9%).[11] Variability of T2D prevalence among Indigenous populations is a common theme recognized in the literature that was also prominent in our review[6]. This can be seen in the range of prevalence for geographic regions, for example 0.0% to 38.9% across the North America and Caribbean (NAC) region, 0.0% to 39.3% among the Western Pacific (WP) region, and 4.3% to 33.1% among the South-East Asia (SEA) region. Given that there are 5,000 distinct Indigenous Nations across 90 countries, the current data demonstrates the scarcity of recent prevalence data in the published literature, with only 16 countries represented in our review.[1] Our review is limited by factors relating to the inclusion of studies that used various diabetes diagnostic criteria. This included self-reported diagnosis of diabetes which may have contributed to variability in reported prevalence.

Indigenous Adult Diabetes Prevalence by Gender 2005 – 2019

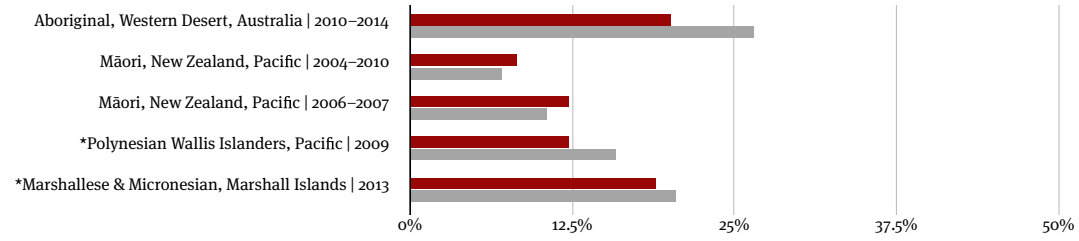
North America



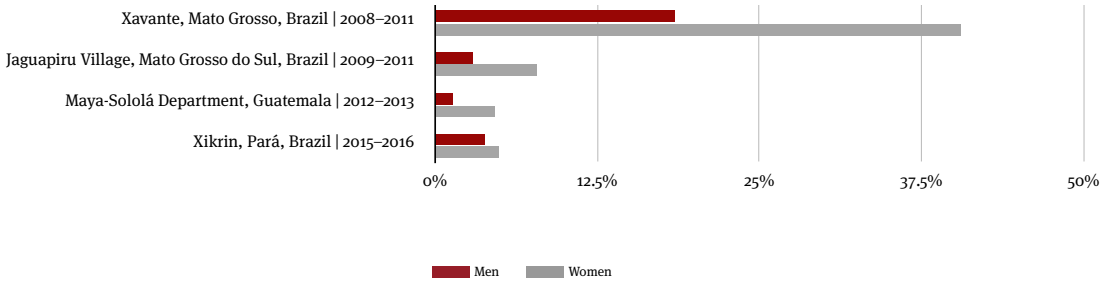
Europe



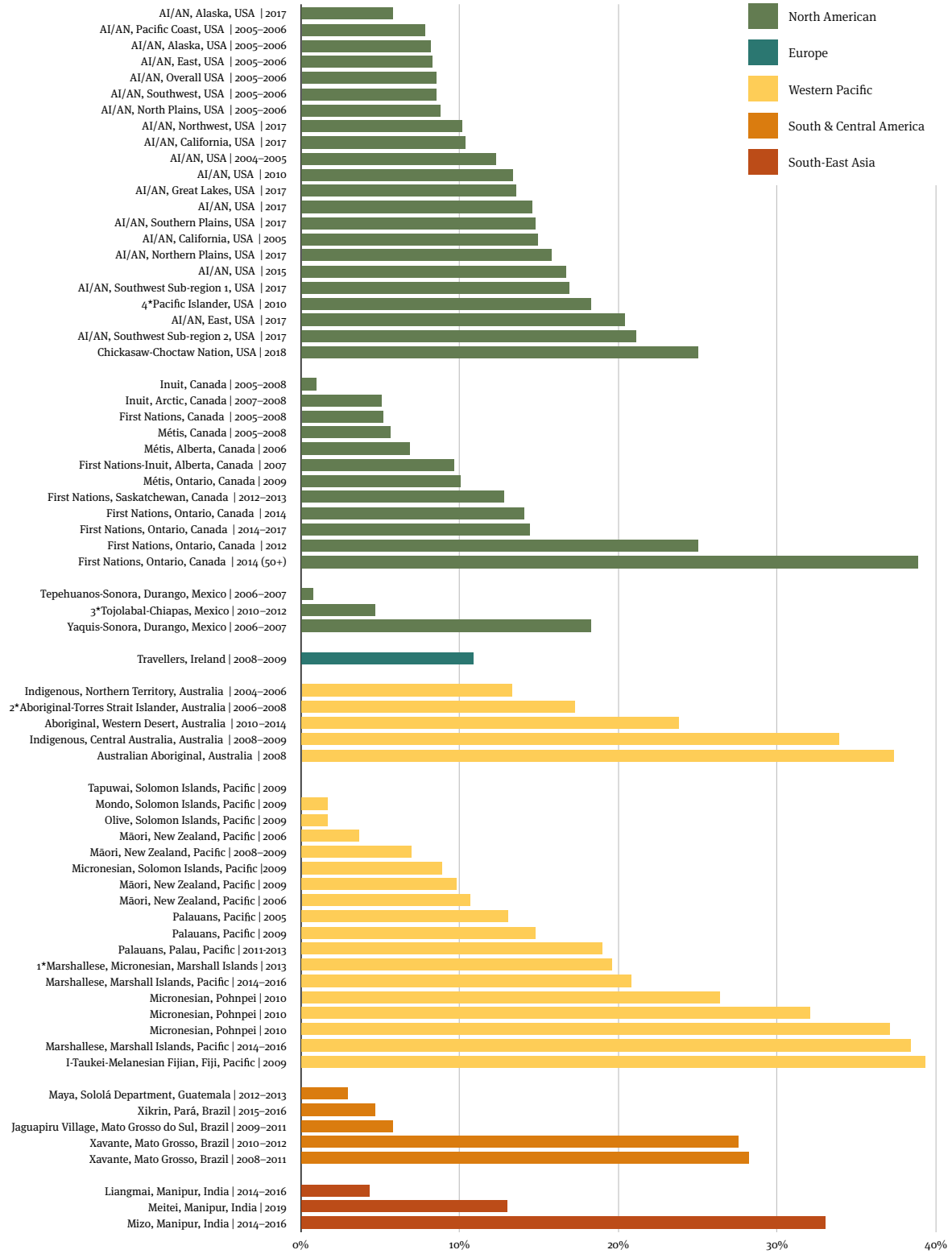
Western Pacific



South and Central America



Indigenous Adult Diabetes Prevalence 2005–2019



Additional Geographic Context:

1. Marshallese-Micronesian, Ebeye Island of Kwajelein Atoll, Marshall Islands 2. Aboriginal-Torres Strait Islander, New South Wales, Australia
3. Tojolabal-Chiapas, Comitan de Dominguez, Mexico 4. Hawaiian/Guamanian/Samoan/other Pacific Islander,USA

Summary

Overall, available data from Indigenous populations shows great variability in T2D prevalence, with some studies reporting very high prevalence (approximately 70% of all studies reviewed reported T2D prevalence above 10%). Most studies reported higher prevalence in Indigenous women compared to Indigenous men. Many Indigenous populations are living across multiple geographic locations and jurisdictions, making it challenging to accurately capture the prevalence of diabetes for individual Indigenous Nations. Future research and health initiatives should be conducted by and with Indigenous communities to provide representative data from properly identified Indigenous populations. Furthermore, the lack of recent prevalence data from many Indigenous populations not represented in this review highlights the need for future initiatives to identify Indigenous populations who might be at high risk for diabetes and its complications. The rich socio-cultural diversity within and between each Indigenous Nation calls for culturally responsive and community tailored approaches to T2D screening, prevention, and management.

Most studies reported higher prevalence in Indigenous women compared to Indigenous men

Key messages

- There were only a few studies reporting T2D prevalence among Indigenous children and adolescents.
- T2D is uncommon in children under 10 years and prevalence increases with age. Very high prevalence is reported in Central Australia (31.1 per 1,000), Torres Strait Islands (21 per 1,000) and the Great Plains region in the US (10 per 1,000).
- Detailed prevalence data across age ranges that approximate pre-, peri- and post-pubertal phases is required to track age- and sex-specific diabetes prevalence over time.

A key limitation of this systematic review is that most studies report prevalence of all types of diabetes combined

Of the identified 2,055 articles, 145 included data on children, adolescents and/or young adults aged ≤30 years. Bibliographies were also hand searched to identify additional eligible papers. Data were collected from studies conducted from January 1, 2000 to provide the most recent T2D prevalence. A total of 21 articles met all inclusion criteria and were from four countries: Canada, US, Australia, and New Zealand. Data was derived from community surveys or registry-based administrative studies. Prevalence is reported per 1,000 Indigenous Peoples.

T2D in children under 10 years is uncommon. Between 2001 and 2014, T2D prevalence among children aged <10 years ranged from 0–1 per 1,000 among First Nations Canadian, Māori and American Indian children [12-14] to four per 1,000 among Cherokee Indian children from North-eastern Oklahoma.[15]

T2D prevalence in young people increased with age. Among Canadian First Nations in Ontario in 2014, prevalence was 2.9 per 1,000 among children 6–12 years and 9.8 per 1,000 in 13–19-year-olds, respectively.[12] This pattern was also observed among Māori youth in 2007, with a prevalence of 2 and 9 per 1,000 among 10–19 and 20–29-year-olds, respectively.[13] The highest prevalence of diabetes was reported in Central Australia in 2016–17 among youth aged 15–24 years (31.1 per 1,000), 11-fold higher compared with children under 15 years from the same region (2.8 per 1,000).[16] In those under 18 years, the highest prevalence of T2D was reported in Torres Strait Islander children (21 per 1,000) in 2001–2017, and American Indian/Alaska Native youth in the Great Plains region in the US in 2007–10, (10 per 1,000).[18]

Among the small number of studies exploring sex-specific differences, prevalence was slightly higher in female youth with the greatest difference observed among Australian First Nations females ≤24 years (9.4 in females vs. 4.2 per 1,000 in males).[16] Higher rates in females in this population may relate to universal screening recommendations in pregnancy and post-partum.

A key limitation of this systematic review is that most studies report prevalence of all types of diabetes combined. Although T1D is the most common diabetes type in youth,[19] among Indigenous youth with diabetes, only 2–7% have been documented as having T1D.[20–22] T2D prevalence is not always reported according to ethnicity and age-range, thus the availability of data in youth is scarce.

Prevalence of T2D among youth from Indigenous Nations in USA, Canada, Australia and New Zealand according to age group 1999–2018

prevalence per 1000

Summary

Overall, data to inform the global burden of youth-onset T2D among Indigenous populations are sparse. Among the data available, there is considerable regional and population variation in T2D prevalence. Additionally, data were only available for four countries, despite the United Nations Permanent Forum estimating that Indigenous Peoples live in at least 90 countries[1]. T2D prevalence was greater in Indigenous adolescents and young adults (10–25 years) vs children (<10 years), and some studies indicated that T2D prevalence was greater for Indigenous females than Indigenous males.

Differences in the way diabetes was defined among the studies may account for variability between reported prevalence. Future surveillance should report age-specific T2D prevalence to capture differences that might be associated with age-related physiological changes in childhood and adolescence. Furthermore, future research on factors contributing to diabetes prevalence, such as childhood obesity prevalence, genetic, epigenetic, in-utero, culture, timing and impact of colonization, social and economic factors, and health access are needed to inform targeted screening and prevention initiatives for young people.

Among the data available, there is considerable regional and population variation in T2D prevalence

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Appendix 1: Search strategy

(((MH "Diabetes Mellitus, Type 2+") OR (MH "Diabetes Mellitus+") OR (MH "Noncommunicable Diseases") OR AB type 2 diabetes OR TI type 2 diabetes OR AB type 2 diabetes mellitus OR TI type 2 diabetes mellitus OR AB type 2 dm OR TI type 2 dm OR AB t2dm OR TI t2dm OR AB type ii diabet* OR TI type ii diabet* OR AB type-ii diabet* OR TI type-ii diabet* OR AB t2d) AND

((MH "Prevalence") OR (MH "Cross-Sectional Studies") OR AB prevalence OR TI prevalence OR AB prevalen* OR TI prevalen* OR AB screen* OR TI screen* OR AB cross sectional OR TI cross sectional OR AB cross-sectional OR TI cross-sectional)

AND ((MH “Indigenous Peoples”) OR “Indigenous Peoples” OR Indigenous OR indigen* OR aborig* OR aboriginal* OR aboriginal OR ATSI OR Australoid OR native people OR Original inhabitants OR First people OR First Nation OR OR Torres strait* OR Māori OR Māori OR māori-polynesian OR Melanesia* OR pacific island* OR inuit OR (MH “Alaska Natives”) OR “Alaska Natives” OR Alaska* india* OR American Indian OR North American Indian OR (MH “Indians, North American”) OR Aotearoa OR tangata whenua OR Metis OR Métis OR Native American OR Native Canadian))

NOT (AB animal OR TI animal OR AB rat OR TI rat OR AB rats OR TI rats OR AB mice OR TI mice OR AB mouse OR TI mouse OR AB monkey OR TI monkey OR AB monkeys OR TI monkeys OR AB trial OR TI trial OR AB trials OR TI trials OR AB case-control OR TI case-control OR AB case control OR TI case control OR AB case series OR TI case series OR TI case series OR AB genetic OR TI genetic OR AB editorial OR TI editorial OR AB covid-19 OR TI covid-19 OR AB coronavirus OR TI coronavirus OR TI hospital OR AB inpatient OR TI inpatient OR AB patient OR TI patient OR AB patients OR TI patients)

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