Prevalence of type 2 diabetes and pre-diabetes in Sri Lanka: a systematic review and meta-analysis

Sohail Akhtar, Aqsa Ali, Mubeen Asghar, Ibrar Hussain, Aqsa Sarwar

ABSTRACT

Objective The purpose of this research was to determine the prevalence of diabetes and pre-diabetes in Sri Lanka.

Design Systematic review and meta-analysis.

Data sources MEDLINE (via PubMed), Web of Science, Sri Lankan Journals online and Google Scholar were searched for relevant articles published between January 1990 and June 2022 investigating the prevalence of pre-diabetes and diabetes in Sri Lanka.

Methods Random effect meta-analyses were conducted to derive the pooled prevalence of pre-diabetes and diabetes and their 95% CIs. Heterogeneity was explored by subgroup and meta-regression analyses. Sensitivity analyses were used to evaluate the impact of any single study on the pooled estimates. Two authors screened articles, extracted data and evaluated the quality of selected studies.

Results A total of 479 articles were reviewed, and 15 studies (n=30137 participants) were selected in the final analysis. The overall pooled prevalence of diabetes was 12.07% (95% CI, 8.71% to 15.89%; prediction interval: 1.28–31.35). The pooled pre-diabetes prevalence was 15.57% (95% CI, 9.45% to 22.88%; prediction interval: 0.02–49.87). The pooled type 2 diabetes prevalence was the highest in the latest period of 2011–2021 (17.25%) than in the period of 2000s (11.84%) and 1990s (5.62%).

Conclusions The growing trend of diabetes and pre-diabetes over the last 30 years is alarming in Sri Lanka. The government of Sri Lanka needs to take steps to improve diabetes education, screening, diagnosis and treatment. PROSPERO registration number CRD42021288591.

INTRODUCTION

Diabetes is a leading cause of morbidity, mortality and reduced life expectancy. According to the International Diabetes Federation (IDF), 540 million (10.5%) adults worldwide have diabetes in 2021, with a forecasted increase to 783 million (12.2%) by 2045 if no efficient prevention strategies are implemented. In 2021, diabetes was responsible for 6.7 million fatalities and an estimated US$966 billion in healthcare costs, representing a 316% increase over the previous 15 years. Diabetes is a major cause of blindness, kidney failure, lower limbs amputation and other long-term effects that have a considerable influence on the quality of life. Similarly, pre-diabetes is estimated to affect 541 million of the worldwide population in 2021, which places them at a very high risk of developing type 2 diabetes. Diabetes is a major public health problem in all nations, but in the last three decades, low-income and middle-income countries have seen far faster growth than high-income countries. Approximately three out of every four individuals with diabetes live in poor countries, with a great majority believed to remain undiagnosed.

Sri Lanka is an Asian country with a population of 22 million and is experiencing a continuous increase in the prevalence of diabetes and pre-diabetes. Pre-diabetes or diabetes affects 20% of Sri Lankan adults (20–79), and one-third of those with diabetes have not yet been diagnosed. Ageing populations, expanding waistlines, expanding cities and declining opportunities for exercise all contribute to a rising tide of diabetes in Sri Lanka. The type 2 diabetes prevalence rose from 7.6% in 2011 to 11.3% in 2021, with a 68.3% rise. Quantifying diabetes and pre-diabetes prevalence is essential to allow rational planning and allocation of resources. The purpose of this study is to find, select,
summarise and estimate the overall pooled prevalence of pre-diabetes and diabetes in Sri Lanka using studies published between 1990 and 2021. To our knowledge, no study to date has pooled diabetes and pre-diabetes data from population-based cross-sectional studies from Sri Lanka.

METHODS

Patient and public involvement
No patient involved in this study as this is a meta-analysis.

Study protocol and registration
In November 2021, the study protocol was registered with PROSPERO. This investigation was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.10

Search strategy
AA and MA searched for the studies on the prevalence of pre-diabetes and type 2 diabetes in Sri Lanka published between 1 January 1990 and 30 June 2022. We conducted a thorough search of electronic databases like Google Scholar, MEDLINE (PubMed), Web of Science and online Sri Lankan journals. We also looked through the research's cited sources to see whether any others would have been suitable. We also screened the reference lists of the included studies for additional relevant articles. These keywords were incorporated into the search strategy's creation (online supplemental table 1): ‘diabetes’, ‘T2D’, ‘type-2 diabetes’, ‘prediabetes’, ‘type-II diabetes’, ‘prevalence’, ‘noncommunicable diseases’, ‘impaired fasting glucose’, ‘impaired glucose tolerance’, ‘risk factor’, ‘glucose intolerance’, ‘Sri Lanka’ and ‘Sri Lankan’, as well as variations thereof.

Inclusion and exclusion criteria
For this review, articles were included if they were (1) published in peer-reviewed journals and provided the prevalence of pre-diabetes or type 2 diabetes; (2) provided sufficient information to determine pre-diabetes and diabetes prevalence; (3) based on research that was conducted on populations and was published in English anytime between January 1990 and June 2022; (4) individuals residing in Sri Lanka. The following studies were omitted if (1) they were a letter to the editor, review articles, case studies, case series, qualitative studies, abstracts and intervention studies; (2) studies were based on the Sri Lankans living outside Sri Lanka; (3) they did not provide enough information; (4) they were unrelated to diabetes; (5) they were based on duplicated information (data).

Data extraction
Two authors (MA and AA) extracted the following information from each study independently using a standardised and preconceived data extraction form: first author, publication year, investigation year, research design, location where the research was conducted, the median or mean age of individuals, the proportion of men, sample size, the number of participant with diabetes and pre-diabetes, percentage of participants with hypertension, percentage of smokers, sampling strategy, setting, diagnostic criteria for diabetes and pre-diabetes and percentage of overweight participants. Uncertainties and disagreements were resolved by consultation with the third author (SA).

Methodological quality assessment
Using the Joanna Briggs Institute Critical Appraisal Checklist for Studies Reporting Prevalence Data, two writers (AA and MA) independently evaluated each study.11 Scores on the quality evaluation were discussed and settled by a third author (SA) if there was a disagreement. A total of 0–9 was assigned to each research. Using a scale from 1 to 9, we determined which studies posed a high (1–3), moderate (4) or low (5) risk of bias.

Statistical analysis
To produce pooled estimates for the prevalence of pre-diabetes, type 2 diabetes and forest plots and meta-regression, we used R (V.4.3.0) and its meta and metafor packages for all statistical analyses. Prior to the analysis, the observed prevalence for each study was transformed using the Freeman-Tukey double arcsine transformation to stabilise the variance. Due to expected high heterogeneity, we used the DerSimonian and Laird inverse of variance random-effects method to generate the overall pooled estimates, with 95% CIs throughout this meta-analysis.12 13 Forest plots were used to summarise the results graphically. We evaluated the heterogeneity between studies by Q statistic and quantified by the I² index, which was interpreted as low heterogeneity (<25%), moderate heterogeneity (26–75%) and substantial heterogeneity (>75%).14 15 A visual examination of funnel plots was conducted to investigate the possibility of publication bias. Egger test16 and Begg test17 were also used to quantitatively estimate publication bias.

The possible causes of the significant heterogeneity were investigated using subgroup meta-analysis. We divided the meta-analysis into subgroups based on participants’ places of residence (urban vs rural), participants’ ages, genders, regions and study periods. Univariate random-effects meta-regression models were also conducted to determine the association between the effect size with study characteristics. Study location (state), year of publication, location of participants (rural vs urban), number of participants, baseline year of data collection, mean age of participants, quality of methodology and gender were all considered as factors in the meta-regression. Sensitivity analyses were conducted by serially eliminating each study from the analysis to examine the influence of individual studies on the pooled diabetes and pre-diabetes estimates. Kappa statistics were used to determine the level of consensus between authors.18
RESULT

As described in the PRISMA flowchart (figure 1), our systematic literature search identified a total of 474 potential studies, and an additional 5 studies were found by reviewing reference lists. After eliminating the duplicates (n=265), we reviewed 214 studies by title and abstract and eliminated 167 irrelevant studies. We reviewed the full texts of the remaining 47 articles for eligibility, 32 were not eligible for full-text assessment. Thus, 15 studies were included in the meta-analysis. Inter-rater agreement for study selection among the authors was very high (kappa=0.833, p<0.01).

The general characteristics of the included 15 studies\(^{19-33}\) with 30,137 participants are described in online supplemental table 2. In total, 30,137 individuals were included in the study. Seven (46.7%) studies\(^{19-25}\) are conducted in the Western province, 2 (13.3%) studies\(^{26,27}\) were conducted at the national level, 2 (13.3%) studies were conducted in Central province,\(^{28,29}\) 1 (6.7%) each in Southern,\(^{30}\) Northern,\(^{31}\) North-Central\(^{32}\) and 1 study\(^{31}\) was conducted jointly in four provinces (Western, North-Central, Uva and Southern). Regarding the study design, a cross-sectional research design was employed in 10 of the 15 studies and 5 studies did not clearly label a study design, it can be inferred that these studies used a cross-sectional research design. Out of 15 studies, 3 (20%) studies were conducted in urban areas\(^{27,28,32}\) (20%) in rural areas,\(^{19,24,33}\) 7 (47%) studies in urban-rural mixed settings\(^{21-23,25,26,29,31}\) and 2 (13.3%) studies in a suburban area.\(^{21-30}\) Study sample sizes ranged range from 199 to 60,472 individuals, with a median of 1,234. The average age of participants from the 6 studies was 47.55 years. The gender type of the participants was recorded in 13 studies. Regarding risk of bias assessment, 13 studies\(^{20,22-33}\) were rated to have a low risk of bias, 2 studies\(^{19,21}\) were rated to have a moderate risk of bias and none were rated to have a high risk of bias. Kappa score=0.85, p=0.001 shows that the reviewers agreed on the extracted data.
Table (online supplemental table 3) summarises the results of overall and subgroup meta-analyses. The prevalence of type 2 diabetes was stated in 15 articles, with a total of 30,137 participants. The prevalence of type 2 diabetes ranged from 2.51% (95% CI, 0.82% to 5.77%) to 27.65% (95% CI, 23.62% to 31.96%). The pooled type 2 diabetes prevalence was 12.07% (95% CI, 8.71% to 15.88%; prediction interval: 1.28–31.35). There was significant evidence of substantial heterogeneity (p<0.01), with an I² of 97.2% (95% CI, 96.4% to 97.9%) (figure 2). The visual inspection (online supplemental figure 1) of the funnel plot shows the symmetry of estimates suggesting no publication bias. Egger’s regression test (p=0.9239) and Begg’s rank test (p=0.9605) also revealed no publication bias in the analysis. The sensitivity analysis indicated that the pooled type 2 diabetes prevalence varied from 11.18% (95% CI, 8.17% to 14.59%) to 12.90% (95% CI, 9.58% to 16.62%) by excluding each study step by step (online supplemental figure 2). The sensitivity analysis revealed that no individual study had an extreme influence on the pooled diabetes prevalence. The pooled prevalence of newly diagnosed diabetes was 8.86% (95% prediction interval 3.12–17.04; I²=87.5%), based on six studies.

The subgroup meta-analysis revealed a significant difference in type 2 diabetes prevalence among the general population by age group. The pooled prevalence of diabetes in the age groups 30–39, 40–49, 50–59 and 60 and over were 4.78% (95% CI, 1.78% to 9.04%), 12.85% (95% CI, 6.28% to 23.18%), 18.09% (95% CI, 6.72% to 33.34%) and 20.11% (95% CI, 6.56% to 38.49%), respectively. The highest diabetes prevalence was detected in the 60 and over age group, and the overall diabetes prevalence was raised with increasing age. When stratified by publication year, a rising trend in the pooled prevalence of type 2 diabetes was noted, by which the pooled prevalence of type 2 diabetes was the highest in the recent period of 2011–2021 (17.25%; 95% CI, 12.53% to 22.55%) than the period of 2000s (11.84%; 95% CI, 9.84% to 13.99%) and 1990s (5.62%; 95% CI, 3.85% to 7.69%). For over 31 years (1990–2021), diabetes prevalence has significantly increased from 5.62% to 17.25%. Comparing our prevalence estimates for diabetes by setting (urban vs rural) subgroup suggests that the studies from urban areas reported a higher prevalence (16.60%; 95% CI, 11.22% to 22.88%) compared with studies from rural areas (8.86%; 95% CI, 6.79% to 11.16%).

Subgroup meta-analysis by location exposed that the type 2 diabetes was highest in a study conducted in the Northern province (16.41%; 95% CI, 13.34% to 19.73%), followed by Southern province (13.34%; 95% CI, 8.82% to 18.63%), North-Central (8.14%; 95% CI, 5.08% to 11.84%) and Central (6.64%; 95% CI, 4.33% to 9.38%) and lowest prevalence was found in Uva (6.52%; 95% CI, 4.94% to 8.29%). There was no statistical evidence of publication bias in the subgroup meta-analyses. Stratification by gender subgroup, the meta-analysis did not show any differences in the prevalence of diabetes.

The univariable meta-regression models (table 1) indicated that the prevalence of type 2 diabetes increased with the year of publication (β=0.0084; 95% CI, 0.0043–0.0125) and was significantly higher in studies conducted in the last decade (9.84%; 95% CI, 6.82% to 12.86%) than in the first decade (5.62%; 95% CI, 3.85% to 7.69%).
to 0.0126; p<0.01, with R²=53.58%). The year of investigation (β=0.0099; 95% CI, 0.0023 to 0.0175; p=0.0106, with R²=59.30%) and setting (β=0.1732; 95% CI, 0.0000 to 0.3464; p=0.049, with R²=36.79%). The findings also indicated that the prevalence of type 2 diabetes was not statistically associated with the male ratio in the sample, sample size, average age, assessment tool or methodological quality of studies.

**Pooled prevalence of pre-diabetes**

The pre-diabetes prevalence was reported in 12 studies with a total of 21,402 participants. Prevalence estimates for pre-diabetes derived by meta-analysis are shown in [figure 3](#). The prevalence of pre-diabetes ranged from 4.00% (95% CI, 1.74% to 7.73%) to 42.26% (95% CI, 40.48% to 44.06%). The random-effects meta-analysis estimated the pooled prevalence of pre-diabetes was 15.57% (95% CI, 9.45% to 22.88%; prediction interval: 0.02–49.87), with substantial heterogeneity (I²=99.2%; p<0.001). There was no evidence for significant publication bias based on the funnel plot (online supplemental figure 3), the Egger test (p=0.8862) and the Begg test (p=0.2726).

The results of the sensitivity analysis showed that the pooled pre-diabetes prevalence varied from 13.60% (95% CI, 8.46% to 19.71%) to 16.88% (95% CI, 10.44% to 24.50%) by eliminating each individual study step-by-step (online supplemental figure 4). The results revealed that no study had an extreme impact on the pooled prevalence of pre-diabetes.

**DISCUSSION**

We report herein the first meta-analyses to comprehensively describes the prevalence of type 2 diabetes, pre-diabetes and undiagnosed among the general population in Sri Lanka based on available data published from January 1990 to November 2021. The study’s findings will help the Sri Lankan government to design public health policies and strategies to minimise the prevalence of type 2 diabetes and pre-diabetes. The present study compiled data from 15 unique data sets with 30,137 participants.
The type 2 diabetes prevalence in Sri Lankan population was revealed to be higher than in Pakistan (11.43%), Cameroon (7.1%), Malaysia (11.62%) and Nepal (10.3%) but lower than USA (34.5%). This disparity might be due to the differences in ethnicity, different lifestyles of different populations, life expectancy differences and methodology they used.

The pooled pre-diabetes prevalence was 15.57% (95% CI, 9.45% to 22.88%). The pooled prevalence of pre-diabetes is notably higher than diabetes, which places them at increased risk of type 2 diabetes, stroke and cardiovascular disease. A potential reason might be urbanisation, a sedentary lifestyle and increased life expectancy. The pooled pre-diabetes prevalence in Sri Lankan was revealed to be higher than in Pakistan (11.43%), Cameroon (6.4%) and Ethiopia (6.5%).

Our meta-analysis also revealed that the pooled prevalence of undiagnosed diabetes was 8.86–73% of patients with diabetes were unaware they had diabetes, meaning almost three-in-four adults with type 2 diabetes are unaware they have the type 2 diabetes condition. The figure for undiagnosed diabetes is higher than the percentage reported by the IDF (51%).

There was high heterogeneity in the studies addressing the type 2 diabetes prevalence. We explored sources of heterogeneity by subgroup analyses: subgroup analysis by age showed that the prevalence of diabetes was significantly higher in older age (age ≥260) years as linked to the older age (aged 29–30 years). The type 2 diabetes prevalence increases with age, and individuals aged 60 and up have more than four times the risk of those aged 20–29. This is because Sri Lanka is one of the fastest-ageing nations in the world. The population aged 60 and more increased from 6.6% to 12.4% between 1981 and 2012.

The subgroup analysis by setting revealed that the pooled type 2 diabetes prevalence in urban areas (16.60%) is significantly higher than in rural areas (8.86%). Most countries report a higher type 2 diabetes prevalence in urban regions than in rural areas. Urbanisation is linked to changes in eating habits, exercise and physical activity, alcohol intake and smoking habits, all of which are risk factors for diabetes and obesity. Furthermore, during the last three decades (1990–2021), a positive secular trend in diabetes prevalence was detected. Between 1990–2000 and 2011–2020, the prevalence of diabetes increased from 5.62% to 17.25% among the general Sri Lankan population.

In the subgroup meta-analysis by geographical location, the analysis revealed that the type 2 diabetes prevalence was highest in Northern province (16.41%) and lowest in Central province (6.64%). The disparity in the prevalence estimates might be variations in research methods, sample size, social, environmental and genetic factors.

The study has several strengths as well as some limitations. We employed thorough search strategies, stringent selection criteria and a dual review process. Sufficient data from the included studies enabled us to provide robust prevalence estimates. Our study revealed no evidence of publication bias, indicating that we did not overlook any study that could have altered the conclusions of our meta-analysis. Additionally, all studies selected in this review had a low or medium risk of bias due to their methodological excellence. The meta-regression models revealed that the total prevalence estimate was unaffected by the studies’ methodological quality.

This study has some limitations. First, the meta-analyses, as expected, found statistically significant between-study heterogeneity in the estimated pooled diabetes prevalence. Subgroup and meta-regression analyses were conducted with factors added to the univariate model to address the problem of excessive heterogeneity. Because of the significant degree of heterogeneity, the findings of this analysis should be regarded with caution. Second, a few selected articles did not distinguish between type 2 and type 1 diabetes. As a result, we assumed that all reported instances of diabetes were type 2, which accounts for 90–95% of all diabetes cases. Third, we limited our studies search to articles published in English only. Fourth, we only considered published reports and ignored the unpublished grey literature that may contain additional helpful information that could influence the conclusion of this study. Furthermore, we did not consider different measures of diabetes and pre-diabetes separately due to insufficient common data. Because of the small number of studies eligible in this study, univariate meta-regression models rather than a multivariable meta-regression model were used to investigate the significance of each covariate.

Conclusions

In conclusion, this meta-analysis provides pooled type 2 diabetes and pre-diabetes estimates, showing that type 2 diabetes is a significant public health issue in Sri Lanka. The type 2 diabetes prevalence in Sri Lankan population has risen over the last three decades, and this tendency may persist in the future. Therefore, Sri Lankan government should implement diabetes prevention and control programmes across the country. Sri Lankans should also maintain their conventional and more active lifestyle, including more physical activity and a balanced diet.

Contributors SA, AA, IH and MA conceived, designed and wrote the manuscript. SA, AS and IH conducted the data collection analysis and edited the manuscript.


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from geologically diverse populations. The results of this meta-analysis will aid valuable information for the improvement of public health strategies to minimise the prevalence of type 2 diabetes and pre-diabetes. The pooled diabetes prevalence was 12.07% (95% CI, 8.71% to 15.89%), which is quite close to what was reported in a recent similar study conducted on another Asian country Afghanistan (12.2%). The pooled diabetes prevalence in this study is notably higher when compared with similar meta-analyses conducted on Bangladesh (7.74%), Cameroon (6.4%) and Ethiopia (6.5%). On the other side, the magnitude of pooled prevalence of type 2 diabetes in this study is lower than the similar study result conducted in Pakistan (14.62%), Malaysia (14.39%) and Thailand (16.8%). This disparity might be due to the differences in ethnicity, different lifestyles of different populations, life expectancy differences and methodology they used.

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Apidechkul T. Prevalence and factors associated with type 2 diabetes mellitus and hypertension among the hill tribe elderly populations in northern Thailand. *BMC Public Health* 2018;18.


Supplementary Content

1. Supplemental Table 1. Search Strategies for Electronic Databases
2. Supplemental Table 2. General characteristics studies selected in the systematic review (n=15)
3. Supplemental Table 3: Summary Estimates from Meta-analyses of Diabetes and Prediabetes
4. Supplemental Figure S1: Funnel plot of the prevalence of type-2 diabetes in Sri Lanka
5. Supplemental Figure S2: Funnel plot of the prevalence of prediabetes in Sri Lanka
6. Supplemental Figure S3. Forest plot of the sensitivity analysis for the prevalence of type-2 diabetes in Sri Lanka.
7. Supplemental Figure S4. Forest plot of the sensitivity analysis for the prevalence of prediabetes in Sri Lanka.

Supplemental Table 1. Search Strategies for Electronic Databases

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<td>(Diabetes OR &quot;type-II diabetes&quot; OR &quot;type 2 diabetes&quot; OR prediabetes OR T2D OR &quot;non-communicable diseases&quot; OR &quot;impaired fasting glucose&quot; OR &quot;impaired glucose tolerance&quot; OR &quot;risk factors&quot; OR &quot;risk factor&quot; OR &quot;glucose abnormalities&quot; OR &quot;glucose intolerance&quot;) AND (Prevalence OR Epidemiolog*) AND (Observat* OR &quot;cross-sectional&quot; NOT (review)) AND (&quot;Sri Lanka&quot;)</td>
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Supplemental Table 2. General characteristics studies selected in the systematic review (n=15)

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<td>Western</td>
<td>Stratified Multistage Cluster</td>
<td>Good</td>
<td></td>
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<tr>
<td>Somasundaram et al.</td>
<td>2019 2014-2015</td>
<td>463</td>
<td>27.6</td>
<td>12</td>
<td>8</td>
<td>30.3</td>
<td>140</td>
<td>50.4</td>
<td>Urban</td>
<td>30.0</td>
<td>FPG&gt;126 mg/dl, 2hrpp≥200 mg/dl, HBA1c&gt;6.5</td>
<td>Western</td>
<td>Stratified Random</td>
<td>Good</td>
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<tr>
<td>Illangasekera et al.</td>
<td>1993</td>
<td>199</td>
<td>2.51</td>
<td>5</td>
<td>8</td>
<td>16</td>
<td>Rural</td>
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<td></td>
<td></td>
<td>National</td>
<td></td>
<td>Medium</td>
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### Supplemental Table 3: Summary Estimates from Meta-analyses of Diabetes and Prediabetes

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of Articles</th>
<th>No. of Participants</th>
<th>No. of Cases</th>
<th>Prevalence, (95% CI)</th>
<th>I², %</th>
<th>95% Prediction interval</th>
<th>Subgroup Difference</th>
<th>Q-test</th>
<th>Egger test</th>
<th>Begg test</th>
<th>P-Value</th>
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<tr>
<td><strong>Prediabetes</strong></td>
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<tr>
<td>Male-prediabetes</td>
<td>7</td>
<td>7609</td>
<td>843</td>
<td>11.03 (6.34–16.82)</td>
<td>96.5</td>
<td>(0.04–36.05)</td>
<td>&lt; 0.001</td>
<td>0.8862</td>
<td>0.2726</td>
<td>0.6316</td>
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<tr>
<td>Female-prediabetes</td>
<td>7</td>
<td>9556</td>
<td>1176</td>
<td>13.10 (7.29–20.28)</td>
<td>79.9</td>
<td>(0.00-44.02)</td>
<td>&lt; 0.001</td>
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<tr>
<td>Diabetes</td>
<td>15</td>
<td>30137</td>
<td>3788</td>
<td>12.07 (8.71–15.89)</td>
<td>97.2</td>
<td>(1.28–31.35)</td>
<td>&lt; 0.001</td>
<td>0.9239</td>
<td>0.9605</td>
<td>&lt; 0.001</td>
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<td>Undiagnosed</td>
<td>6</td>
<td>9468</td>
<td>902</td>
<td>8.86 (6.79–11.16)</td>
<td>87.5</td>
<td>(3.12–17.04)</td>
<td>&lt; 0.001</td>
<td>0.7920</td>
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</tr>
</tbody>
</table>

### Abbreviations; HbA1C, glycated haemoglobin; FPG, fasting plasma glucose; CS, Cross-sectional; 2hFBG, 2-hour oral glucose; NA, not available.
Supplemental Figure 1: Funnel plot of the prevalence of type-2 diabetes in Sri Lanka.

Supplemental Figure 2: Funnel plot of the prevalence of prediabetes in Sri Lanka.
Supplemental Figure 3: Forest plot of the sensitivity analysis for prevalence of type 2 diabetes in Sri Lanka

Supplemental Figure 4: Forest plot of the sensitivity analysis for prevalence prediabetes in
Sri Lanka