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REVIEW ARTICLE

Intervention strategies for type 2 diabetes prevention targeting low socioeconomic groups: protocol for a scoping review

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Abstract

***Introduction*:** Type 2 diabetes (T2D) is a public health issue with increasing prevalence, projected to affect 1.27 billion people in 2050. Its onset can largely be prevented or delayed by lifestyle changes. Access to screening is crucial for early diagnosis and treatment to avoid complications due to long-term elevated blood glucose levels. Studies have shown that populations with low socioeconomic status (SES) are among those groups that are more prone to developing T2D. With rising incidence and prevalence of the disease, prevention measures specifically targeting vulnerable groups such as socioeconomically disadvantaged populations, become increasingly relevant. The objective of the scoping review is to investigate what types of interventions have been tested and reported regarding prevention of T2D targeting low socioeconomic populations and that are applicable in a high-income country.

***Methods*:** Studies addressing T2D prevention interventions tailored for populations with low SES that are applicable in high-income countries will be included. A systematic search strategy to identify peer-reviewed literature was developed in consultation with research librarians. Databases searched are Cinahl, PubMed and Web of Science. Interventional studies of various designs will be included and the researchers will independently assess studies for inclusion. The results of the study inclusion process will be reported in the final scoping review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram. Analysis of the data will be presented using a narrative approach, as studies are expected to have heterogeneous design features and variable outcome measures.

***Discussion*:** The results will provide an overview of tested T2D prevention intervention studies targeting populations with low SES and will be used to inform and guide the research team and healthcare management for future interventions in Malmö.

Keywords: *intervention studies*; *low socioeconomic status*; *prediabetes*; *type 2 diabetes*

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Type 2 diabetes (T2D) is a heterogeneous disease characterised by elevated blood glucose concentrations due to increasing insulin resistance and dysfunction in insulin secretion.[1] Typically, the disease evolves asymptomatically over the years and is detected only if biochemical testing is performed.[2] Globally, it is estimated that nearly one in two cases in adults is undetected.[3] Since long-term elevated blood glucose leads to damage of the vascular and nervous systems, with risk of severe complications, access to screening and testing is crucial for the diagnosis and early treatment of T2D and prediabetic states.[2–4]

T2D is associated with genetic predisposition and old age as well as with modifiable lifestyle factors influencing visceral fat storage.[4] Visceral fat storage can be prevented and reversed with a healthy diet and a non-sedentary lifestyle.[5–7] Even remission of early stages of T2D is possible if substantial weight loss (>10 kg) is achieved.[6] Public health trends are, however, pointing in the opposite direction with diabetes projected to affect 783 million people in 2045, compared to 537 million people in 2021, according to the International Diabetes Federation.[8] An even higher rise is indicated by a global burden of disease study published in 2023,[9] which estimates that 1.31 billion people will be affected by diabetes in 2050, with T2D expected to account for 96% of all diabetes cases, equating to 1.27 billion people in 2050.[9] High body mass index (BMI), caused by multiple factors, is identified as the main driver of the expected increase in prevalence of T2D.[9] However, there is a considerable variation in T2D prevalence worldwide, related to socioeconomic factors, patterns in obesity and genetic predisposition that varies in frequency among different racial and ethnic subgroups.[9] The Middle East is one of the most vulnerable regions in this context, with an

age-standardised total diabetes prevalence rate of 9.3% compared to global age-standardised prevalence of 6.1% in 2021.[9] In Malmö, the third largest city in Sweden, around one-third of the residents were born in another country, with the largest group among those born outside Sweden coming from the Middle East.[10]

Low socioeconomic status (SES) is linked to worse health literacy, which in turn associates with poorer health and is identified as an independent T2D risk factor.[11] An international clinical tool to measure SES is not available, but SES is usually assessed based on educational level, occupation, and income.[12] There are studies indicating an inverse association between T2D and low SES in developing countries[13,14] and establishing the inverted risk in high-income countries.[13] In Western Europe, the prevalence of T2D is lower than the global average,[9] but within the region there are populations with low SES that are more affected by the disease than the more privileged population in this area.[15–17] In Malmö, one of the most segregated cities in Sweden,[18] the prevalence of T2D doubled between 2011 and 2018. While the average prevalence of T2D in the city was 4.3% in 2018, there were significant differences between neighbourhoods ranging from 2.6 to 6.4%. Areas with the highest prevalence rates had residents with lower educational levels as well as lower average incomes.[15]

Although the main drivers of T2D are well known[9] and there is consensus that lifestyle change is essential in preventing and managing the disease,[2,19] preventing and controlling T2D remains an ongoing challenge.[9] Research findings based on the estimated dramatic increase in T2D prevalence urge the development of more effective measures to prevent T2D.[9] Generic guidelines for diabetes prevention and management may not be appropriate for different subpopulations and therefore must be adapted to individuals.[4] People with low SES face more challenges in making healthy choices in everyday life due to, for example, lack of health literacy,[12] material deprivation, and chronic stress.[20,21] Clearly, these obesogenic and T2D-driving risk factors associated with low SES, require an integrated and holistic approach involving interventions at different societal levels.[12] There is a need to approach T2D prevention by shifting the responsibility from individual willpower to addressing the diabetogenicity of society.[20,22]

With the rising incidence and prevalence of T2D, prevention measures targeting vulnerable groups such as socioeconomically disadvantaged populations, are becoming increasingly relevant. The objective of the scoping review is to assess the extent of the literature on reported and tested interventions in the field of T2D prevention that target socioeconomically disadvantaged populations. The interventions should be applicable in a high-income country with primarily publicly funded healthcare. For this rather broad objective, which seeks an overview of interventions, a scoping review is considered the most suitable approach.

Review question

The aim of the scoping review is to investigate the types of interventions that have been tested and reported regarding the prevention of T2D targeting populations with lower SES, and that are applicable in a high-income country.

Methods and analysis

A preliminary search of CINAHL, PubMed and the Cochrane Database of Systematic Reviews was conducted and no current or underway systematic reviews or scoping reviews on the topic were identified.

This protocol was prepared according to best practice guidance and reporting items for the development of scoping review protocols.[23] The scoping review will be conducted following Peters et al.'s methodological guidance for conducting a scoping review[24] and The Joanna Briggs Institute Reviewers' Manual 2015.[25] Inspired by Levac et al.'s[26] recommendations regarding enhancing scoping study methodology, stakeholders (representing a patient association, policymakers, and healthcare institutions) will be provided with an overview of the preliminary results. The purpose of the consultation is to provide insights beyond those found in the literature.

Eligibility criteria

Inclusion criteria

- Socioeconomically disadvantaged populations and individuals, SES as defined by the authors of the articles
- Aged over 18 years
- At risk of T2D, tested according to the standard biochemically methods (fasting blood glucose, HbA1c, and/or oral glucose tolerance test), and/or estimated by a questionnaire tool for T2D prediction, and/or identified as being at higher risk due to ethnical predisposition and being overweight or obese
- Interventions for prevention and screening targeting populations with low SES living in high-income or upper-middle income countries, as defined and listed in the World Bank classification.[27]

Exclusion criteria

- General interventions with no context of low SES will be excluded
- Studies performed in low- or lower-middle income countries will be excluded

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- Protocols for planned studies will be excluded

Eligibility criteria are additionally outlined in the Population, Concept, Context (PCC) mnemonic in Table 1. There will be no restrictions regarding date of publication. Studies must be written in English. In the included studies, the definition of SES may vary but must be clearly explained in the articles.

The 'Population, Concept, and Context' mnemonic was used to establish effective search and inclusion criteria (Table 1) as recommended by the Joanna Briggs Institute.[25]

Types of sources

For the scoping review, studies with a quantitative design that meet the inclusion criteria will be considered.

Search strategy

The authors have recruited the expertise of research librarians in the development of the search strategy, which was also checked according to the Peer Review of Electronic Search Strategies (PRESS) guideline.[28] The search strategy aims to locate published studies. An initial limited search of PubMed and CINAHL was conducted to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy for the scoping review. The search strategy is adapted for each included database (Appendix 1).

The reference lists of all included sources of evidence will be screened for additional studies. Grey literature will not be included in the scoping review since we aim for a systematic, transparent and reproducible search strategy, which cannot be ensured regarding grey literature,[29] and that the focus is on investigating studies of tested and reported T2D preventive interventions.

A language restriction will be applied and included studies must be written in English and available in full text. At this stage, no restrictions are planned regarding the date of publication.

Study selection

Following the search, all identified citations will be collated and uploaded into Covidence,[30] where duplicates will be removed. Titles and abstracts will then be screened independently by two reviewers from the research team for assessment against the inclusion criteria for the review. Subsequently, the full text of selected citations will be assessed in detail by the reviewers against the inclusion criteria. Reasons for exclusion of studies at the full text stage that do not meet the inclusion criteria will be recorded and reported in the scoping review. The results of the search and the study inclusion process will be reported in full in the final scoping review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram.[31]

Table 1. The population, concept and context mnemonic

Population	Concept	Context
People at risk for T2D Low socio-economic status	Intervention Prevention	Applicable in high-income countries

Data extraction

Data will be extracted from articles included in the scoping review by two reviewers from the research team using the platform Covidence.[31] The data extracted will include information of the source, such as author and reference, specific details about the participants, concept, context, study methods and key findings relevant to the review question.

Any disagreements that arise between the reviewers will be resolved through discussion or with an additional reviewer. If appropriate, authors of article will be contacted to request missing or additional data, where required.

Data analysis and presentation

The analysis will be presented as a narrative thematic summary of the data collected as studies are expected to have heterogeneous designs and variable outcome measures. We will report both quantitative and qualitative results from the studies and visualise the results using tables and/or figures. Furthermore, we will explore and seek to explain gaps in the research area.

Patient and public involvement

The results will be shared and discussed with stakeholders representing a patient association, policymakers, and healthcare institutions. Stakeholders' perspectives will be integrated in the discussion of the scoping review. The purpose of the consultation is to provide insights beyond those found in the literature.[26]

Ethics and dissemination

Research ethics approval is not required for the scoping review. Information will only be extracted from public databases. The protocol will form the basis for conducting a scoping review of T2D preventative interventions targeting populations with low socioeconomic setting, that are applicable in high-income countries. The results will be presented at conferences and published in a peer-reviewed journal.

Authors' contributions

JT drafted the protocol. MAG, EM and SZ were involved in the review design and provided feedback on the methodology and the manuscript. All authors read and approved the final manuscript.

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Appendix 1

Search strategy adapted for each included database:

PubMed on 9 January 2024 with 1177 results:

((((((((((diabetes mellitus, type 2[MeSH Terms]) OR ("type 2 diabetes"[Title/Abstract])) OR ("diabetes type 2"[Title/Abstract])) OR ("type 2 diabetes mellitus"[Title/Abstract])) OR ("diabetes mellitus type 2"[Title/Abstract])) OR (prediabetic state[MeSH Terms])) OR (prediabetes[Title/Abstract])) OR (diabetes, gestational[MeSH Terms])) OR ("gestational diabetes"[Title/Abstract])) OR (glucose intolerance[MeSH Terms])) OR ("impaired glucose tolerance"[Title/Abstract])) AND (((((((((low socioeconomic status[MeSH Terms]) OR ("low socioeconomic status"[Title/Abstract])) OR (poverty[MeSH Terms])) OR (vulnerable[Title/Abstract])) OR ("low income population"[Title/Abstract])) OR ("low education"[Title/Abstract])) OR ("deprived neighbo*"[Title/Abstract])) OR ("disadvantaged population"[Title/Abstract])) OR ("disadvantaged area*"[Title/Abstract])) AND (((((((primary prevention[MeSH Terms]) OR (prevent*[Title/Abstract])) OR (life style[MeSH Terms])) OR (lifestyle[Title/Abstract])) OR (screening[Title/Abstract])) OR (intervention*[Title/Abstract])) OR (program*[Title/Abstract])) OR (strateg*[Title/Abstract]))

CINAHL on 12 January 2024 with 724 results:

(MH "Diabetes Mellitus, Type 2") OR (MH "Diabetes Mellitus, Gestational") OR (MH "Prediabetic State") OR (MH "Glucose Intolerance") OR type 2 diabetes OR diabetes type 2 OR prediabetes OR gestational diabetes OR impaired glucose intolerance

(MH "Low Socioeconomic Status") OR (MH "Poverty+") OR (MH "Poverty Areas") OR low socioeconomic status OR vulnerable OR low income population OR low education OR deprived neighbo* OR disadvantaged population OR disadvantaged area

(MH "Life Style+") OR (MH "Health Screening+") OR (MH "Intervention Trials") OR prevent* OR lifestyle OR screening OR intervention* OR program* OR strateg*

Web of science on 12 January 2024 with 788 results:

TS=("Prediabetic State" OR "Glucose Intolerance" OR "type 2 diabetes" OR "diabetes type 2" OR prediabetes OR "gestational diabetes" OR "impaired glucose intolerance")

TS=("low socioeconomic status" OR vulnerable OR "low income population" OR "low education" OR "deprived neighbo*" OR "disadvantaged population" OR "disadvantaged area")

TS=(prevent* OR lifestyle OR screening OR intervention* OR program* OR strateg*)

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