Guidance on global monitoring for diabetes prevention and control

Framework, indicators and application

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ISBN 978-92-4-010224-8 (electronic version)
ISBN 978-92-4-010225-5 (print version)

Suggested citation. Guidance on global monitoring for diabetes prevention and control: framework, indicators and application. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at https://iris.who.int/.

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Foreword

Diabetes presents a significant global health challenge, affecting millions worldwide and contributing to premature mortality and morbidity. The prevalence of diabetes is increasing globally and is among the top 10 leading causes of death. In addition, diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower-extremity amputation leading to debilitating complications. Much of the burden caused by diabetes can be prevented with evidence-based, individual-level and population-level interventions.

The World Health Organization (WHO) is committed to supporting countries in tackling diabetes and its morbidity and mortality burden. The WHO Global Diabetes Compact, launched in 2021, is a central focus of these efforts. The Compact has the vision of reducing the risk of diabetes and ensuring that all people who are diagnosed with diabetes have access to equitable, comprehensive, affordable and quality treatment and care. The work undertaken as part of the Compact will also support the prevention of type 2 diabetes from obesity, unhealthy diet and physical inactivity. One of the key components of the Compact is to strengthen the monitoring and evaluation of diabetes responses through country-level surveillance and monitoring systems.

The *Guidance on global monitoring for diabetes prevention and control* builds on the WHO global monitoring framework on noncommunicable diseases with diabetes-related targets, endorsed by the World Health Assembly in May 2013, as well as the recently adopted five global diabetes coverage targets in 2022. The proposed diabetes indicators in this guidance reflect multiple domains, including health system determinants, service delivery, risk factor control, and outcome and impact. The indicators were designed to be relevant to people living with diabetes and the general population.

Robust diabetes monitoring indicators are important because they provide insights into where we are and where we need to go. Beyond measuring progress, they can also help to ensure accountability—guiding us towards a future with improved life for people with diabetes. Let us build this future together.

Dr Jerôme Salomon
Assistant Director-General
Universal Health Coverage/ Communicable and Noncommunicable Disease

Acknowledgements

The World Health Organization (WHO) would like to thank the many individuals who contributed to the development of this guidance document.

The preparation of this document was coordinated by Farshad Farzadfar, Bianca Hemmingsen, Arlene Quiambao and Leanne Riley from the Department of Noncommunicable Diseases, Rehabilitation and Disability, WHO.

The design and implementation of the systematic review and modified Delphi process were carried out by a team of WHO staff and consultants including Dominika Bhatia, Farshad Farzadfar, Bianca Hemmingsen, Mohammad-Reza Malekpour, Arlene Quiambao, Leanne Riley and Slim Slama (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland). Additionally, Edward Gregg, Samira Jabakhanji, Steven James, Maisoon Mairghani and John McCaffrey from the School of Population Health, RCSI University of Medicine and Health Sciences, Ireland were involved in this effort.

Additionally, the following WHO staff and consultants also contributed to the development of the guidance: Kouamivi Agboyibor (Universal Health Coverage Communicable and Noncommunicable Diseases Cluster, Regional Office for Africa, Congo), Abdulwahab Al-Nehmi (Country Office, Yemen), Carmen Antini Irribarra (Department of Noncommunicable Diseases and Mental Health, Regional Office for the Americas, United States of America), Armando Antonio (Universal Health Coverage Communicable and Noncommunicable Diseases Cluster, Regional Office for Africa, Congo), Prebo Barango (Universal Health Coverage Communicable and Noncommunicable Diseases Cluster, Regional Office for Africa, Congo), Tsogzolmaa Bayandorj (Country Office, Solomon Islands), Lubna Bhatti (Country Office, Indonesia), Fiona Bull (Department of Health Promotion, Switzerland), Roberta Caixeta (Department of Noncommunicable Diseases and Mental Health, Regional Office for the Americas, United States of America), Shelly Chadha (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Sulia Celebi (Special Initiative on NCDs and Innovation, Regional Office for Europe, Denmark), Li-ling Chen (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Hong Anh Chu (Department of Data and Analytics, Switzerland), Alarcos Cieza (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Alison Commar (Department of Health Promotion, Switzerland), Melanie Cowan (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Dana Darwish (Country Office, Jordan), Nadim Dawoud (WHO Office for West Bank and Gaza (oPt)), Wouter De Groote (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Cheick Diallo (Universal Health Coverage Communicable and Noncommunicable Diseases Cluster, Regional Office for Africa, Congo), Rolando Enrique Domingo (Division of Programmes for Disease Control, Department of Regional Office for the Western Pacific, Philippines), Farzana Dorin (Country Office, Bangladesh), Hicham El Berri (Country Office, Sudan), James Elliott (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Mai Eltigany (Department of Noncommunicable Diseases,

Rehabilitation and Disability, Switzerland), Katrin Engelhardt (Department of Nutrition and Food Safety, Switzerland), Kaia Engesveen (Department of Nutrition and Food Safety, Switzerland), Bashier Enoos (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Jill Farrington (Special Initiative on NCDs and Innovation, Regional Office for Europe, Denmark), David Flood (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Heba Fouad (Department of Noncommunicable Diseases and Mental Health, Egypt), Nalika Gunawardena (Department of Noncommunicable Diseases and Mental Health, Regional Office for South-East Asia, India), Martyna Hogendorf (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Swathi Bhargav Iyengar (Department of Health Product Policy and Standards, Switzerland), Tomo Kanda (Division of Pacific Technical Support, Fiji), Laura Kann (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Pradeep Joshi, Stuart Keel (Department of Noncommunicable Diseases and Mental Health, Regional Office for South-East Asia, India), Kafi Lubis (Country Office, Indonesia), Aye Moe Moe Lwin (Country Office, Myanmar), Sanjana Marpadga (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Bente Mikkelsen (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Elick Narayan (Division of Programmes for Disease Control, Department of Regional Office for the Western Pacific, Philippines), Esther Njinembo (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Kofi Nyarko (Universal Health Coverage Communicable and Noncommunicable Diseases Cluster, Regional Office for Africa, Congo), Pedro Ordunez, Farrukh Qureshi, Ivo Rakovac (Special Initiative on NCDs and Innovation, Regional Office for Europe, Denmark), Patricia Rarau (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Gojka Roglic (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Olfa Saidi (Country Office, Tunis), Rauell John Santos (Country Office, Philippines), Gretchen Stevens (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Fatima Suleman (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Douangkeo Thochongliachi (Country Office, Lao People's Democratic Republic), Josaia Tiko (Country Office, Papua New Guinea), Klara Tisocki (Department of Health Product Policy and Standards, Switzerland), Cherian Varghese (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland), Wendy Venter (Department of Data and Analytics, Switzerland), Juana Willumsen and Hongyi Xu (Department of Noncommunicable Diseases, Rehabilitation and Disability, Switzerland).

WHO acknowledges the generous contribution of the following external experts: Mohammed Ali (Emory University, United States of America), Ranjit Mohan Anjana (Madras Diabetes Research Foundation, India), Felicia Anumah (University of Abuja, Nigeria), Goodarz Danaei (Harvard University, United States of America), Justine Davies (University of Birmingham, United Kingdom of Great Britain and Northern Ireland), Paula Andrea Diaz-Valencia (University of Antioquia, Colombia), Bruce Duncan (Universidade Federal do Rio Grande do Sul, Brazil), Majid Ezzati (Imperial College London, United Kingdom of Great Britain and Northern Ireland), Ibtihal Fadhil (Eastern Mediterranean NCD Alliance, Kuwait), Leyden Florido (Philippine Association of Diabetes Educators, Philippines), Dismand Houinato (Laboratoire d'Epidémiologie des Maladies Non Transmissibles, Benin), Khaleda Islam (Directorate General of Health Services, Bangladesh), Bagher Larijani (Tehran University of Medical Sciences, Iran (Islamic Republic of)), Molly Lepeska (Health Action International, Netherlands (Kingdom of the)), Naomi Levitt (University of Cape Town, South Africa), Lee-Ling Lim (Universiti Malaya, Malaysia), Jaana Lindström (Finnish Institute for Health and Welfare, THL, Finland), Dianna Magliano (Baker

Heart and Diabetes Institute, Australia), Jennifer Manne-Goehler (Brigham and Women's Hospital, United States of America), Ivy Boyose Nolasco (Humanity and Inclusion - Handicap International, Philippines), Patrick O'Connor (Health Partners Institute, United States of America), Joao Filipe Raposo (APDP-Diabetes Portugal), Jonathan Shaw (Baker Heart and Diabetes Institute, Australia), Abha Shrestha (Dhulikhel Hospital-Kathmandu University School of Medical Sciences, Nepal), Nikhil Tandon (All India Institute of Medical Sciences, India), Neo Tapela (International Consortium for Health Outcomes Measurement, United States of America), Marcello Tonelli (University of Calgary, Canada), Douglas Villarroel (Unidad de Diabetes Medical Center, Bolivia) and Bin Zhou (Imperial College London, United Kingdom of Great Britain and Northern Ireland).

Funding from The Leona M. and Harry B. Helmsley Charitable Trust is gratefully acknowledged.

Disclosure of interests

All external collaborators who acted in their individual capacity submitted to WHO a declaration of interest disclosing potential conflicts of interest that might affect, or might reasonably be perceived to affect, their objectivity and independence in relation to the development of the global monitoring framework for diabetes prevention and control. WHO reviewed each of the declarations related to professional undertakings on pharmacological and nutritional management of diabetes and concluded that none could give rise to a potential or reasonably perceived conflict of interest related to the scope of the diabetes monitoring framework.

Abbreviations

BMI	body mass index
CRVS	civil registration and vital statistics
CVD	cardiovascular disease
DBP	diastolic blood pressure
FPG	fasting plasma glucose
GFR	glomerular filtration rate
HbA1c	glycated haemoglobin
HHFA	harmonized health facility assessment
ICD	International Classification of Diseases
LPGW	lowest paid government sector worker
NCD	noncommunicable disease
NPL	national poverty line
SBP	systolic blood pressure
SD	standard deviation
STEPS	WHO STEPwise approach to NCD risk factor surveillance
WHO	World Health Organization

1. Background

Diabetes is a chronic condition characterized by elevated blood glucose levels due to inadequate insulin production by the pancreas or the body's inability to properly utilize the insulin it produces. Insulin is a hormone that regulates levels of blood glucose. Over time, high blood glucose levels can lead to damage of several body systems, particularly the nerves and blood vessels. These changes increase the risk of blindness, kidney failure, heart attack, stroke, and lower-extremity amputation *(1)*.

The prevalence of diabetes has been increasing in the past few decades, and more rapidly in low- and middle-income countries than high-income countries *(2)*. Not only is the prevalence of diabetes increasing, but also related mortality. Between 2000 and 2019, there was an 8% increase in age-standardized mortality rates from diabetes *(3)*. By contrast, the risk of dying from any one of the four main noncommunicable diseases (NCDs) (i.e. cardiovascular diseases, cancers, chronic respiratory diseases or diabetes) between the ages of 30 and 70 decreased by 20% globally in the same period *(3)*. In lower middle-income countries, the mortality rate due to diabetes increased by 33% *(3)*.

For people with type 1 diabetes, whose pancreas produces little or no insulin, continued access to insulin is a matter of survival. Type 2 diabetes occurs most commonly in adults and is characterized by insulin resistance and some insulin deficiency. More than 95% of people with diabetes have type 2 diabetes *(4)*. Gestational diabetes occurs in pregnancy with blood glucose values above normal but below those that are characteristic of diabetes.

In response to the increasing burden of diabetes, the World Health Organization (WHO) launched the Global Diabetes Compact in 2021 *(5)*. The launch was chosen to coincide with the 100th anniversary of the discovery of insulin. The overarching objective of the Global Diabetes Compact is reducing the risk of diabetes and ensuring that all people who are diagnosed with diabetes have access to equitable, comprehensive, affordable and quality treatment and care.

Building on momentum created by the launch of the Global Diabetes Compact, in May 2021, the World Health Assembly agreed on a historic resolution entitled *Reducing the burden of noncommunicable diseases through strengthening prevention and control of diabetes*, which urges Member States to prioritize the prevention and control of diabetes, including responses addressing diabetes risk factors such as obesity and diabetes complications *(5,6)*. Delegates requested WHO to develop recommendations to strengthen and monitor diabetes responses within national noncommunicable disease programmes. This included the development of global diabetes targets and pathways, and guidance to Member States on strengthening diabetes care within existing health systems as well as in humanitarian emergencies.

Subsequently, in May 2022, the World Health Assembly supported the adoption of five global diabetes coverage targets for achievement by 2030: (i) 80% of people with diabetes are diagnosed; (ii) 80% of people with diagnosed diabetes have good control of glycaemia; (iii) 80% of people with diagnosed diabetes have good

control of blood pressure; (iv) 60% of people with diabetes of 40 years or older receive statins; and (v) 100% of people with type 1 diabetes have access to affordable insulin treatment and blood glucose self-monitoring *(7,8)*. These targets build on the global NCD targets established in 2013 *(9)*, which include the target on 'halt the rise in diabetes' through monitoring prevalence of raised blood glucose/diabetes based on fasting plasma glucose (FPG) or medication for raised blood glucose, as well as specific targets for diabetes-related risk factors such as physical inactivity, tobacco use, obesity and hypertension. In addition, a number of complementary metrics were proposed that had limited data availability but warranted consideration for future investments in diabetes population monitoring *(10,11)*.

The diabetes programme spearheaded by the Global Diabetes Compact is aligned with the overarching objectives of WHO Global action plan for the prevention and control of noncommunicable diseases *(12)*, which are aimed at enhancing the prevention, management and monitoring of NCDs, including diabetes. This is addressed by the WHO Package of essential noncommunicable (PEN) disease interventions for primary health care *(13),* the WHO HEARTS-D module on the diagnosis and management of type 2 diabetes *(14),* the WHO Noncommunicable diseases global monitoring framework *(15)*, the WHO Noncommunicable disease facility-based monitoring guidance *(16)*, the WHO STEPwise approach to noncommunicable disease risk-factor surveillance *(17)*, and other guidance.

2. Introduction

The *Guidance on global monitoring for diabetes prevention and control* represents a crucial step towards addressing the escalating burden of diabetes worldwide. Its monitoring framework provides a structured approach to monitoring and evaluating diabetes prevention, care, and related outcomes across diverse health systems. It encompasses a comprehensive range of indicators designed to track progress in diabetes prevention and control, including glycaemic control, hypertension and lipid management among individuals with diabetes, access to essential medicines, and affordability of insulin and blood glucose monitoring devices.

The objectives of the guidance are multi-faceted. Firstly, it aims to establish standardized indicators that enable consistent monitoring and comparison of diabetes responses and outcomes across countries and regions. By doing so, it facilitates the identification of variations in diabetes prevention and treatment practices, and disparities in access to care, thus informing targeted interventions and policy initiatives.

Secondly, the guidance seeks to enhance the capacity of health systems to collect, analyse and utilize diabetes-related data effectively. This involves strengthening health information systems to ensure routine collection and reporting of diabetes indicators and promoting data-driven decision-making at all health system levels.

Thirdly, the guidance aims to support countries in achieving global targets including the coverage targets for diabetes care and management, as well as related risk factors outlined in the global NCD targets and NCD premature mortality target indicated in the Sustainable Development Goals. By providing a standardized approach to monitoring progress towards these targets, it empowers countries to prioritize and allocate resources effectively, driving improvements in diabetes prevention and care and outcomes.

The introduction of the monitoring framework for diabetes prevention and control marks a pivotal step towards realizing these objectives on a global scale. By offering a structured methodology for data collection, analysis and utilization, the framework seeks to empower policymakers, health care providers and other stakeholders to strengthen diabetes prevention and control, thereby achieving better health outcomes worldwide. Through comprehensive monitoring and evaluation, the framework enables countries to track progress towards established global targets, pinpoint policy, service delivery gaps, and deploy targeted interventions to mitigate disparities in diabetes prevention, diagnosis and management. Furthermore, it emphasizes the critical role of diabetes monitoring and surveillance in advancing towards universal health coverage and ensuring that no individual is left behind.

To maximize the impact of this monitoring guidance, its application and adaptation within national contexts must be carefully considered. Countries are encouraged to align the framework with their national diabetes programmes, tailoring it to fit their specific health care infrastructures, policies, and priorities. This entails selecting indicators that align with national health priorities and capacities, establishing baseline values, and

setting realistic thresholds and targets for each indicator. Moreover, addressing data quality and accessibility challenges is crucial. Countries need to prioritize indicators based on current data availability, and employ innovative data collection and improvement methods, including digital technologies, to fill existing gaps.

A comprehensive strategy for the phased integration of the framework and indicators, continuous evaluation of data quality, and regular policy reviews will ensure the framework's effectiveness and relevance over time. Strengthening capacities for data analysis, interpretation and dissemination further supports evidence-based decision-making and health system strengthening. By adopting a flexible, adaptive approach to the implementation of the framework, countries can make significant strides towards improving diabetes care and outcomes, thereby contributing to the global effort to combat the diabetes epidemic and move closer to achieving the ambitious targets set forth by the international community.

In summary, the *Guidance on global monitoring for diabetes prevention and control* serves as a critical tool for advancing diabetes prevention and control on a global scale. Through its systematic approach to data collection, analysis and utilization, the guidance facilitates evidence-based decision-making, strengthens health systems, and accelerates progress towards achieving universal access to quality diabetes care.

3. The global framework for diabetes prevention and control

Development process

The development of the global monitoring framework including the selection and prioritization of indicators involved a multi-step approach. The process included: (i) systematic review of related literature; (ii) global prioritization to ensure alignment with targets, recommendations, and priority global workstreams; and (iii) expert consensus using a modified Delphi method.

A systematic review of reviews was conducted to identify existing indicators designed for surveillance, monitoring and evaluation in the diabetes context. A search of peer-reviewed published literature as of 15 September 2023 in various databases such as PubMed *(18)*, Embase *(19)*, Cochrane Reviews *(20)*, Cumulative Index to Nursing and Allied Health Literature *(21)* and Latin American and Caribbean Literature on Health Sciences *(22)* was implemented using search terms related to diabetes, monitoring, surveillance, evaluation metrics and indicators, filtered by 'review' (Annex A). This produced over 4500 unique titles/abstracts for screening, from which over 200 full text articles were selected for further review. Ultimately, 58 studies collectively identified approximately 300 distinct diabetes indicators.

Indicators derived from the systematic review were synthesized and refined to reflect key priorities of the Global Diabetes Compact and WHO diabetes prevention and control work in Member States. Indicators specific to gestational diabetes mellitus and diabetes in pregnancy were omitted to ensure that the retained indicators were universally applicable across all types of diabetes. Additionally, indicators related to testing for insulin resistance, intermediate hyperglycaemia, and continuous glucose monitoring were omitted. Generic indicators were discarded in favour of more specific and measurable indicators that represented similar constructs (e.g. general self-management behaviour versus physical activity for diabetes self-management). This refinement process reduced the number of indicators to 178.

A series of global technical consultations using a modified Delphi method were conducted to obtain consensus on these indicators from a broad group of experts identified from WHO networks at the global, regional and national levels. Experts were based in academic institutions, research organizations, diabetes care centres, diabetes associations and international development agencies across different WHO regions and countries, in order to leverage their extensive knowledge and diverse experience in health systems, health promotion and education, clinical management of diabetes, health service delivery, diabetes surveillance, monitoring, evaluation and research. Additionally, some experts provided insights that inherently reflected the perspectives of people with diabetes, as they themselves were living with the condition.

The modified Delphi process comprised two online surveys conducted through the WHO DataForm survey platform, a virtual meeting featuring polling and focus groups, and a follow-up email consultation. The initial survey aimed to enable experts to assess indicators identified from the systematic review indicating which to include or exclude and to identify any additional indicators necessary for inclusion in the framework. The second survey was conducted to gather experts' opinions on the framework and on each indicator metadata for all indicators retained following the first survey. The virtual meeting was designed to address any issues regarding indicator definitions and to facilitate consensus on unresolved indicator inclusions. The follow-up email consultation served to finalize the framework, indicators and definitions, confirming consensus on the final adjustments. Ethical approval was not required for the Delphi process.

In the initial online survey, conducted from 28 October to 11 November 2023, over 60 experts assessed which indicators should ultimately be included in the framework, considering the objectives of the global monitoring framework, parsimony of indicators and six important characteristics of indicators: validity; having clear and standard definition; sensitivity to performance; importance to stakeholders; collectability; and ease of interpretation and use. These criteria were presented to the expert panel during an introductory technical expert meeting held on 25 October 2023, prior to the survey launch. Following the survey, 60 indicators were retained, including top-rated indicators derived from the review and additional indicators suggested by experts during the survey process.

A preliminary framework structure, which drew on the WHO NCD facility-based monitoring framework *(16)* used for diabetes monitoring in primary care settings, was then expanded to include additional domains in order to accommodate the full suite of the identified 60 indicators. The framework also incorporated the findings from a WHO-commissioned study *(11)* that developed the targets used for the WHO Global Diabetes Compact. The metadata for each indicator, including definition, numerator, denominator, method of estimation and data sources, was developed based on systematic review descriptions and related WHO indicator metadata *(16, 23–25)*, WHO guidelines *(13,14)*, and existing WHO data collection and standardized tools *(26–28)* and national health data systems *(29)*.

The second online survey was conducted from 12 December 2023 to 27 January 2024 to further examine the remaining indicators, during which over 50 experts evaluated each indicator against the six key characteristics and offered feedback on the indicator metadata and the overall structure. Indicators that achieved the specified threshold for technical validity and feasibility were incorporated into the framework. Feedback that was clear, specific and common across more than one expert was considered and led to adjustments in the indicator metadata.

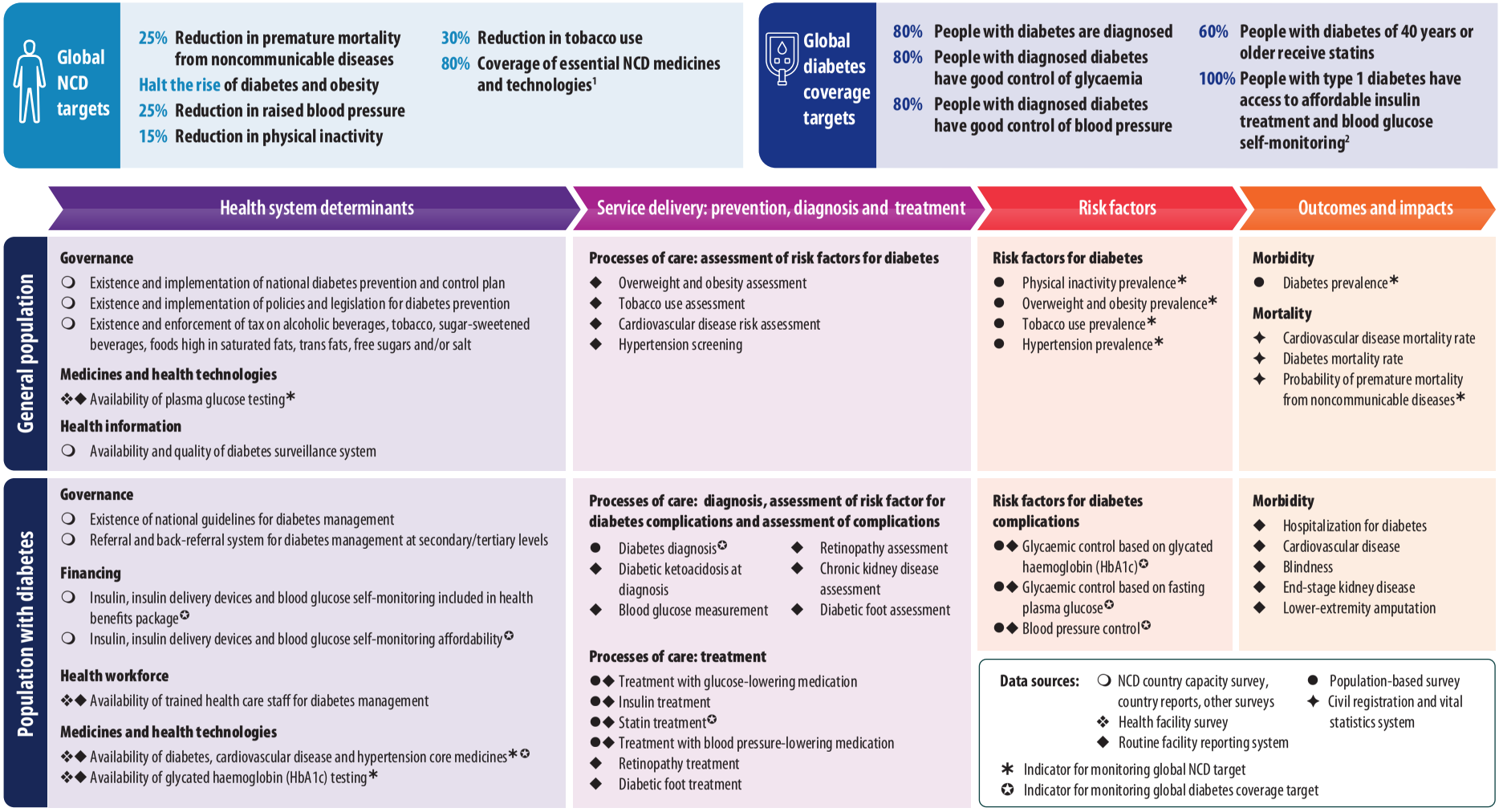
On 19 February 2024, a follow-up meeting with technical experts took place to tackle unresolved issues surrounding 'grey-zone' indicators (i.e. those which did not meet the threshold for retention in the framework but did receive acceptable validity and feasibility ratings), and to clarify ambiguous or conflicting feedback on indicator metadata in order to finalize the framework. Specifically, experts were tasked with ranking these grey-zone indicators and engaging in focus group discussions to reach an agreement on critical aspects of indicator metadata. Subsequently, an email consultation was conducted from 9 to 23 July 2024 to obtain input on the revisions integrated into the final framework and indicator metadata.

Following a comprehensive assessment of the expert feedback from online surveys, focus groups and email consultation, along with a systematic review and consideration of global priorities, the framework was completed, ultimately incorporating a carefully evaluated set of 44 indicators.

Framework

The global monitoring framework for diabetes prevention and control (Fig. 1) aims to enhance global and national monitoring of diabetes, focusing on tracking the progress of interventions for people living with diabetes and for the general population, including those who are healthy, at-risk of diabetes and with diabetes. It intends to streamline the collection and analysis of data related to diabetes prevention, management, and care, facilitating informed decision-making and policy formulation to combat the diabetes epidemic effectively. The framework represents a pivotal initiative designed to confront the escalating challenge of diabetes on a worldwide scale. Its overarching goal is to integrate and improve the surveillance, monitoring and management of diabetes across various national health care systems, thereby enabling a more coordinated and effective global response to this chronic disease.

Fig 1. Global monitoring framework for diabetes prevention and control



[1] Proxy indicators to monitor the NCD global target on coverage of essential NCD medicines and technologies include availability of diabetes, cardiovascular disease and hypertension core medicines, availability of glycated haemoglobin (HbA1c) testing, and availability of plasma glucose testing.

[2] Proxy indicators to monitor the global diabetes coverage target on access to affordable insulin treatment and blood glucose self-monitoring include availability of diabetes, cardiovascular disease and hypertension core medicines and insulin, insulin delivery devices and blood glucose self-monitoring affordability. In the absence of data on affordability, insulin, insulin delivery devices and blood glucose self-monitoring included in health benefits package indicator may be used.

Global targets

The framework comprehensively addresses various facets of diabetes prevention and control through an integrative approach that encompasses health system determinants and population health-related indicators. It is aligned with the NCD global targets endorsed by the World Health Assembly in 2013 *(9)*, which are aimed at halting the rise in diabetes, reducing diabetes risk factors, expanding access to NCD medicines and technologies, and decreasing premature mortality from NCDs, including diabetes. These targets provide a broad agenda for improving health outcomes globally, reflecting a commitment to tackling the growing burden of diabetes and other NCDs through concerted and coordinated efforts.

In addition to aligning with broader NCD targets, the framework incorporates the five global coverage targets for diabetes that Member States recently adopted in 2022 *(7)*. These targets are part of the recommendations to strengthen and monitor diabetes responses within national NCD programmes, ensuring that specific measures are in place to address diabetes more effectively. The global coverage targets focus on critical areas such as improving the diagnosis and treatment of diabetes, increasing the accessibility of essential medicines and health products, addressing relevant risk factors, and reducing morbidity and mortality associated with diabetes.

The framework provides a structured and detailed approach to address diabetes burden and includes important indicators that are designed to contribute to the achievement of the following global targets:

Global NCD targets relevant to global diabetes monitoring framework

- 25% reduction in premature mortality from NCDs.
- Halt the rise in diabetes and obesity.
- 25% reduction in raised blood pressure.
- 15% reduction in physical inactivity, updated 2018 *(30)*.
- 30% reduction in tobacco use.
- 80% coverage of essential NCD medicines and technologies.

Global coverage targets for diabetes

- 80% of people with diabetes are diagnosed.
- 80% of people with diagnosed diabetes have good control of glycaemia.
- 80% of people with diagnosed diabetes have good control of blood pressure.
- 60% of people with diabetes of 40 years or older receive statins.
- 100% of people with type 1 diabetes have access to affordable insulin treatment and blood glucose self-monitoring.

Framework domains

Health system determinants

This domain underscores the essential components needed for effective diabetes prevention and control. It includes governance, finance, health workforce, medicine and technology availability, and establishment of health information systems, with a focus on the level of health care facilities.

Service delivery

This domain highlights the execution of health care services for prevention, detection and management of diabetes, including detection and prevention strategies for diabetes and its risk factors, such as hypertension and cardiovascular disease risk assessment, complication assessment, preventive measures and monitoring for diabetes-related complications (e.g. retinopathy, chronic kidney disease, and diabetic foot), and processes of care. This emphasizes integration of comprehensive care processes, from diagnosis to treatment, including glucose-lowering interventions.

Risk factors

Focusing on reducing the prevalence of modifiable risk factors for diabetes and diabetes complications, this domain includes monitoring of physical inactivity, obesity and overweight, tobacco use and hypertension in the general population as well as glycaemic control and having good control of blood pressure and lipid levels among people with diabetes.

Outcomes and impacts

This domain assesses the results of interventions and the overall performance of the health system in the prevention and control of diabetes, including morbidity, hospitalization and mortality associated with diabetes and complications such as cardiovascular diseases. The aim is to assess the effectiveness of health care interventions and policy actions.

Data sources

The sources specified for each indicator (Table 1) are based on existing global and national data systems, as well as feasible data collection mechanisms with standardized measurements. Governance, financing, and health information indicators can be collected through NCD country capacity surveys, other related surveys or country reports. Indicators related to health workforce, medicines and health technologies can be generated from routine health facility reporting systems or health facility surveys. Service delivery, risk factors for diabetes complications and morbidity indicators can be extracted from routine facility reporting systems or population-based surveys. Risk factor prevalence can be estimated from population-based surveys, while mortality indicators can be derived from civil registration and vital statistics (CRVS) systems with cause-of-death certification. For indicators that can be generated from various sources, the data source that can produce the most reliable estimates that can meet reporting requirements is the preferred source. Moreover, while frequency of data collection differs by source (Table 2) – being continuous or periodic – the frequency of reporting should align with monitoring objectives. The frequency of each indicator can be determined by the country in accordance with their reporting requirements and integrated into their regular reviews.

Table 1. Key data sources for reporting diabetes indicators

❍ NCD country capacity survey, country reports, other surveys
❖ Health facility survey
◆ Routine facility reporting system
● Population-based survey
✦ CRVS

Key data sources	Indicators[3]	
	General population	Population with diabetes
❍ NCD country capacity survey, country reports, other surveys	❍ Existence and implementation of national diabetes prevention and control plan ❍ Existence and implementation of policies and legislation for diabetes prevention ❍ Existence and enforcement of tax on alcoholic beverages, tobacco, sugar-sweetened beverages, foods high in saturated fats, trans fats, free sugars and/or salt	❍ Existence of national guidelines for diabetes management ❍ Referral and back-referral system for diabetes management ❍ Insulin, insulin delivery devices and blood glucoses self-monitoring included in health benefits package ❍ Insulin, insulin delivery devices and blood glucose self-monitoring affordability
❖ Health facility survey	❖◆ Availability of plasma glucose testing	❖◆ Availability of trained health care staff for diabetes management ❖◆ Availability of diabetes, cardiovascular disease and hypertension core medicines ❖◆ Availability of glycated haemoglobin (HbA_{1c}) testing
◆ Routine facility reporting system	❖◆ Availability of plasma glucose testing ◆ Overweight and obesity assessment ◆ Tobacco use assessment ◆ Cardiovascular disease risk assessment ◆ Hypertension screening	❖◆ Availability of trained health care staff for diabetes management ❖◆ Availability of diabetes, cardiovascular disease and hypertension core medicines ❖◆ Availability of glycated haemoglobin (HbA_{1c}) testing ◆ Diabetic ketoacidosis at diagnosis ◆ Blood glucose measurement ◆ Retinopathy assessment ◆ Chronic kidney disease assessment ◆ Diabetic foot assessment ●◆ Treatment with glucose-lowering medication ●◆ Insulin treatment ●◆ Statin treatment ●◆ Treatment with blood pressure-lowering medication ◆ Retinopathy treatment ◆ Diabetic foot treatment ●◆ Glycaemic control based on glycated haemoglobin (HbA_{1c}) ●◆ Glycaemic control based on fasting plasma glucose ●◆ Blood pressure control ◆ Hospitalization for diabetes ◆ Cardiovascular disease ◆ Blindness ◆ End-stage kidney disease ◆ Lower-extremity amputation

[3] For indicators that can be generated from multiple data sources, the preferred data source icon is listed first (e.g. vu Availability of plasma glucose testing, the preferred source is health facility survey and if that is unavailable, the alternative is routine facility reporting system).

Table 1. Key data sources for reporting diabetes indicators (con't)

Key data sources	Indicators[3]	
	General population	Population with diabetes
● Population-based survey	● Physical inactivity prevalence ● Obesity and overweight prevalence ● Tobacco use prevalence ● Hypertension prevalence ● Diabetes prevalence	● Diabetes diagnosis ●◆ Treatment with glucose-lowering medication ●◆ Insulin treatment ●◆ Statin treatment ●◆ Treatment with blood pressure-lowering medication ●◆ Glycaemic control based on glycated haemoglobin (HbA1c) ●◆ Glycaemic control based on fasting plasma glucose ●◆ Blood pressure control
✦ CRVS	✦ Cardiovascular disease mortality rate ✦ Diabetes mortality rate ✦ Probability of premature mortality from NCDs	

Table 2. Data collection frequency of key data sources

Key data source	Data collection frequency
NCD country capacity survey and other surveys	Every 2 years
Health facility survey	Every 3 to 5 years
Routine facility reporting system	Continuous
Population-based survey	Every 3 to 5 years
CRVS	Continuous

NCD country capacity survey

The NCD country capacity survey *(26)* is a global survey on national capacity for NCD prevention and control that is conducted regularly by WHO. This enables Member States and the global community to monitor progress and achievements in improving their capacities in responding to the epidemic of NCDs including diabetes. NCD country focal points respond to a standard online questionnaire depicting various aspects on health system infrastructure, financing, governance, surveillance, primary health care, partnerships and collaborations, specific to NCDs. It has been conducted in 2001, 2005, 2010 and biennially since 2013 and with 193 countries participating in the most recently conducted survey in 2023 *(31)*.

Health facility survey

Periodic health facility surveys are used for monitoring service availability and readiness for diabetes care including availability of trained resources, medicines and technologies that are essential for providing quality and effective care. Approximately 50% of countries *(32)* have a moderate to sustainable capacity to monitor service availability, quality and effectiveness. The WHO Harmonized health facility assessment (HHFA) *(28)* is a comprehensive survey to assess the availability of health facility services and assess capacities of facilities to provide services at required standards of care. The HHFA questionnaire includes questions on NCDs including diabetes service availability and readiness. Alternatively, a health facility survey for NCDs including diabetes, can be conducted if resources are limited.

Routine facility reporting system

A key source of health services data is the routine facility reporting system that regularly collects data on health care resources, health service use, health outcomes and patterns that can generate aggregated statistics at different levels of the health system *(33)*. Based on the 2020 SCORE global report *(32)*, about 80 countries possess a moderate to sustainable capacity for routine facility reporting with patient monitoring. Patient monitoring systems are important for capturing aggregate facility-based statistics for NCDs. In the 2021 NCD country capacity survey *(31)*, about 55% of countries reported collecting individual-level data on NCDs in primary health centres, using paper-based, electronic or mixed systems, with the majority of electronic systems more prevalent in high-income countries. The Noncommunicable disease facility-based monitoring guidance *(16)* provides indicator standards and an approach for improving routine facility reporting systems with person-level monitoring, for assessing service delivery for NCDs including diabetes in primary care settings.

Population-based survey

Population-based surveys are important for measuring disease risk factors and other social determinants that cannot be generated reliably from routine facility reporting systems *(34)*. At least 120 countries have conducted population-based surveys to measure risk factors for NCDs using the WHO STEPwise approach to NCD risk factor surveillance (STEPS) *(27)*. STEPS is a simple standardized method for collecting, analysing and disseminating data on key NCD risk factors in countries. The STEPS questionnaire includes assessment of behavioural and biological risk factors relevant to diabetes such as tobacco use, physical inactivity, overweight and obesity, raised blood pressure and raised blood glucose. It can also be used to generate estimates on the care cascade for people with diabetes from diagnosis and treatment to achieving glycaemic control.

Civil registration and vital statistics system

Generation of reliable estimates of mortality burden for diabetes is possible with a well-functioning CRVS system with standardized medical certification of cause of death *(35)* and coding based on the International Classification of Diseases (ICD*) (36)*. The WHO mortality database contains data on registered deaths including cause of death, disaggregated by age, sex and ICD code submitted by over 120 countries *(37)*. The quality of mortality data varies by country and year, with some country-reported deaths unregistered, and/or with incomplete or incorrect cause-of-death information, making the data unreliable. Deaths due to diabetes are often recorded as cardiovascular deaths as the underlying cause of death, particularly when diabetes contributes alongside multiple other causes *(38)*.

WHO Global health estimates of mortality by cause *(39)* provide comparable estimates across countries and time, adjusting for completeness and quality of cause-of-death data from CRVS, and using data from multiple sources, including WHO technical programmes, United Nations partners and inter-agency data and scientific studies, and well-established data estimation methods.

Other sources

Some indicators may be generated from other sources, such as medicines and health products price survey *(40)*, logistics information system, health workforce information system, national health insurance claims database, poverty assessments (national statistics office reports) *(41)*, and population census.

4. Application of the Guidance on global monitoring for diabetes prevention and control in countries

The *Guidance on global monitoring for diabetes prevention and control* provides a structured approach to tackle diabetes across the globe, focusing on improving health outcomes through effective prevention, management, and control strategies. Its successful application within national contexts necessitates a tailored approach, aligning the framework with existing health care infrastructures, policies, and priorities. Countries can develop a roadmap for the adaptation of the framework, through integrating diabetes indicators into their existing national monitoring framework, adopting innovative methods and digital solutions to improve data quality and access, and conducting regular data quality audits, supervisory visits, and based on feedback and audit outcomes, adapting data improvement and indicator integration strategies to address emerging needs and challenges.

Adopting/aligning the framework with national diabetes programmes and review processes

Countries should start by aligning the framework with their national diabetes programmes, ensuring that the framework complements and enhances existing efforts. This involves integrating goals and targets into national health strategies and plans, making necessary adjustments to accommodate local contexts and health care systems. Regular review processes, involving stakeholders from various sectors, can ensure alignment remains relevant and effective over time.

Selecting indicators according to priorities and capacities

Each country has unique health priorities and capacities. Selecting indicators from the framework should thus reflect national priorities for diabetes control and the available resources. Countries might prioritize different aspects of diabetes care based on their epidemiological profile, health care system capabilities, and other health determinants. The selection process should be inclusive, leveraging input from health care professionals, policy-makers, patients and community leaders to ensure it meets the country's specific needs.

Countries should initially assess the quality and accessibility of their existing data sources. This assessment can help identify which indicators from the framework can be immediately adopted and reliably measured. Prioritization should align with national health priorities, focusing on indicators that can drive significant improvements in diabetes prevention and control. Indicators with readily available data enable immediate action and monitoring, setting a foundation for the framework's application.

Setting baseline values, thresholds, and targets for each indicator

Establishing baseline values for selected indicators is crucial for monitoring progress over time. Countries should use recent, reliable data to set these baselines, along with thresholds for triggering immediate responses, and realistic targets that reflect both national ambitions and international goals.

Address major gaps in data using standards, innovative methods, and digital technologies

Accurate, reliable and timely data depends on robustness of data systems. To enhance health information systems, it is essential to invest in human resources and infrastructure, engage stakeholders such as the private sector and civil society, establish data policies and adopt global standards, tools, innovative methods and digital technologies. These strategic actions are crucial to sustainably and effectively monitoring health programmes. Specifically for national diabetes programmes, strategic initiatives may include implementing standardized methods outlined in WHO STEPS for conducting NCD and risk factor population-based surveys, enhancing effective longitudinal monitoring systems for people with diabetes through the use of electronic health records and interoperability standards, implementing ICD-11 for systematic recording and reporting of mortality and morbidity data, establishing private–public partnerships, adopting data governance policies, training staff across all levels of the health system to improve capacity for data collection, analysis, interpretation and use.

Strengthening capacities for data analysis, interpretation, and dissemination

Building local capacities in data analysis and interpretation is essential for turning data into actionable insights. This includes training for health care professionals and policy-makers in epidemiological methods, statistics and health informatics. Moreover, creating effective channels for data dissemination ensures that insights reach all relevant stakeholders, facilitating informed decision-making at all levels of the health system.

Conducting regular reviews to guide decisions and actions

Continuous evaluation of the national diabetes programme's effectiveness is key to adaptive management and improvement. Regularly scheduled reviews, informed by the latest data and analysis, can identify areas of success and aspects needing adjustment. These reviews should culminate in actionable recommendations, guiding policy adjustments, resource allocation and other strategic decisions to enhance the national response to diabetes.

Implementing the framework at a national level offers a comprehensive strategy to combat diabetes through structured monitoring and evaluation. By tailoring the framework to fit national contexts and priorities, countries can ensure a coordinated, evidence-based approach to diabetes prevention, management and control, ultimately leading to better health outcomes for their populations.

5. Indicators and metadata

Metadata offers critical details for each indicator, encompassing its purpose and definition, target population, estimation method, variables for disaggregation, and data sources. This foundational information ensures uniform understanding and application across different settings, enhancing the comparability and reliability of data collected for monitoring and evaluation purposes.

Health system determinants

Subdomain	Indicator
Governance	1. Existence and implementation of national diabetes prevention and control plan 2. Existence and implementation of policies and legislation for diabetes prevention 3. Existence and enforcement of tax on alcoholic beverages, tobacco, sugar-sweetened beverages, foods high in saturated fats, trans fats, free sugars and/or salt 4. Existence of national guidelines for diabetes management 5. Referral and back-referral system for diabetes management
Financing	6. Insulin, insulin delivery devices and blood glucoses self-monitoring included in health benefits package 7. Insulin, insulin delivery devices and blood glucose self-monitoring affordability
Health workforce	8. Availability of trained health care staff for diabetes management
Medicines and health technologies	9. Availability of diabetes, cardiovascular disease and hypertension core medicines 10. Availability of plasma glucose testing 11. Availability of glycated haemoglobin (HbA1c) testing
Health information	12. Availability and quality of diabetes surveillance system

General population. Population with diabetes.

1. Existence and implementation of national diabetes prevention and control plan

Indicator name	**Existence and implementation of national diabetes prevention and control plan**
Purpose	To assess the availability of governance mechanisms for diabetes prevention and control at national level.
Definition	Country has a national diabetes prevention and control plan developed/updated within the past 5 years and the plan is currently implemented. • A national diabetes prevention and control plan includes a set of specific strategic actions to be taken to achieve the goals of the national diabetes prevention and control programme. The plan may be an independent diabetes prevention and control plan or part of a comprehensive national plan for noncommunicable diseases.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	Country can respond "Yes" to the question "Does the country have a national plan that includes prevention, early detection, treatment and/or care for diabetes?" and needs to provide a copy of the plan and the latest report on the implementation of the plan. Existence of the plan is validated by examining the plan document and implementation is validated by examining the latest report detailing the execution of at least one strategic action outlined in the plan. The indicator is considered "Yes" if the country has a national diabetes prevention and control plan developed/updated within the past 5 years and the plan is currently being implemented. The indicator is considered "Partially yes" if the country has a national diabetes prevention and control plan developed/updated within the past 5 years, but it is not currently being implemented. The indicator is considered "No" if the country does not have a national diabetes prevention and control plan developed/updated within the past 5 years.
Disaggregation	Type of diabetes included in the plan
Sources of data	NCD country capacity survey, other survey, country report
Limitations/comments	An acceptable minimum number of strategic actions completed according to plan must be defined at every evaluation period to consider the plan as currently implemented.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024).

2. Existence and implementation of policies and/or legislation for diabetes prevention

Indicator name	**Existence and implementation of policies and/or legislation for diabetes prevention**
Purpose	To assess the availability of governance mechanisms for diabetes prevention.
Definition	Country has adopted policies and/or legislation aimed at preventing diabetes and its risk factors, and the policies and/or legislation are currently being implemented. National diabetes prevention policies include the country's vision, priorities, budgetary decisions and course of action for diabetes prevention. A policy or legislation may be an independent diabetes prevention policy/legislation or part of a comprehensive noncommunicable diseases policy/legislation. This indicator excludes assessment of tax laws.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	Country can respond "Yes" to the question "Has the country adopted national policies and/or legislation aimed at preventing diabetes and its risk factors?" and needs to provide a copy of the policies and legislations and the latest report on their implementation. Existence of policies and/or legislation is validated by examining policy/legislation documents and implementation is validated by examining the latest report detailing the execution of policies and legislations. The indicator is considered "Yes" if the country has adopted policies and/or legislation aimed at preventing diabetes and its risk factors, that are currently being implemented. The indicator is considered "Partially yes" if the country has adopted policies and/or legislation aimed at preventing diabetes and its risk factors, but these are not currently being implemented. The indicator is considered "No" if the country has not adopted policies and/or legislation.
Disaggregation	Policy/legislation
Sources of data	NCD country capacity survey, other survey, country report
Limitations/comments	An acceptable minimum number of policies and/or legislation implemented according to plan must be defined every evaluation period to consider the policies and/or legislation as currently implemented.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024).

3. Existence and enforcement of health taxes on alcoholic beverages, tobacco, sugar-sweetened beverages, foods high in saturated fats, trans fats, free sugars and/or salt

Indicator name	**Existence and enforcement of health taxes on alcoholic beverages, tobacco, sugar-sweetened beverages, ultra-processed food, foods high in saturated fats, trans fats, free sugars and/or salt**
Purpose	To assess the availability of governance mechanisms for reducing risk factors for diabetes and diabetes-related complications.
Definition	Country has adopted health taxes on one or more of the following items: alcoholic beverages, tobacco, sugar-sweetened beverages, foods high in saturated fats, trans fats, foods high in free sugars, foods high in salt, and these health taxes are being enforced. • Health taxes are excise taxes levied on products that have a negative public health impact, for example, tobacco, alcohol and other non-alcoholic beverages and food products high in sugar, saturated fats, trans fats and/or salt.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	Country can respond "Yes" to the question "Has the country adopted health taxes on alcoholic beverages, tobacco, sugar-sweetened beverages, ultra-processed foods, foods high in saturated fats, trans fats, free sugars and/or salt?", and needs to provide a copy of the tax policy/legislation and the latest report on enforcement of health taxes. Existence of health taxes is validated by examining tax legislation documents and implementation is validated by examining the latest report(s) detailing the enforcement of health taxes. The indicator is considered "Yes" if the country has adopted health taxes on at least one type of forementioned products and the health taxes are being enforced. The indicator is considered "Partially yes" if the country has adopted health taxes on at least one type of forementioned products, but the health taxes are not being enforced. The indicator is considered "No" if the country has not adopted health taxes on at least one type of forementioned products.
Disaggregation	Type of product, administrative level (district, provincial, or national)
Sources of data	NCD country capacity survey, other survey, country report
Limitations/comments	None
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024). WHO Global Health Observatory: Health taxes [website]. Geneva: World Health Organization; 2024 (https://www.who.int/data/gho/data/themes/health-taxes, accessed 26 May 2024).

4. Existence of national guidelines for diabetes management

Indicator name	**Existence of national guidelines for diabetes management**
Purpose	To assess the availability of governance mechanisms for diabetes management.
Definition	The country has evidence-based national guidelines, protocols, standards, or technical guidance for diabetes management in primary health care settings, developed/updated within the past 5 years. • National guidelines, protocols, standards or technical guidance are information products endorsed by the ministry of health containing recommendations for clinical management/practice.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	Country can respond "Yes" to the question "Does the country have evidence-based national guidelines, protocols, standards, or technical guidance for diabetes management in primary health care settings?" and needs to provide a copy of the national guidelines and the latest report on enforcement of health taxes. Existence of evidence-based national guidelines, protocols, standards or technical guidance is validated by examining documents that outline the scientific steps that were taken to develop the national guidelines, protocol, standards or technical guidance.
Disaggregation	Type of diabetes, type of services (e.g. diagnosis, treatment, diabetic foot management, retinopathy management), type of diabetes complications
Sources of data	NCD country capacity survey, other survey, country report
Limitations/comments	None
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024).

5. Referral system for diabetes management

Indicator name	**Referral system for diabetes management**
Purpose	To assess the availability of referral and back-referral systems for clinical services for advanced diabetes.
Definition	The country has a clearly defined and well-established functional referral and back-referral system for diabetes management, facilitating the seamless transition between primary care, secondary and tertiary care.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	Country can respond "Yes" to the question "Does the country have a clearly defined and well-established referral system between primary care, secondary and tertiary care for diabetes management?" and needs to provide a copy of relevant documents about the referral system. Existence of a clearly defined, well-established functional referral system is validated by examining documents that outline mechanisms for referral from primary care to secondary and tertiary care, as well as feedback mechanisms from higher to lower levels of care.
Disaggregation	Type of diabetes
Sources of data	NCD country capacity survey, other survey, country report
Limitations/comments	None
Related links	Continuity and coordination of care: a practice brief to support implementation of the WHO Framework on integrated people-centred health services. Geneva: World Health Organization; 2018 (https://iris.who.int/handle/10665/274628). WHO Framework on integrated, people-centred health services: report by the Secretariat. Geneva: World Health Organization; 2016 (https://iris.who.int/handle/10665/252698). WHO Noncommunicable disease surveillance, monitoring and reporting: NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024).

6. Inclusion of insulin, insulin delivery devices and blood glucose self-monitoring in national health benefit package

Indicator name	**Inclusion of insulin, insulin delivery devices and blood glucose self-monitoring in national health benefit package**
Purpose	To assess integration of insulin, insulin delivery devices and blood glucose self-monitoring into national health benefit packages.
Definition	Country has a national health benefit package that includes insulin, insulin delivery devices and blood glucose self-monitoring. Health benefit packages define the high priority services in a country that should be made available to all citizens from public funds.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	Country can respond "Yes" to the question "Does the country have a national health benefit package that includes insulin, insulin delivery devices and blood glucose self-monitoring?" and needs to provide a copy of the national health benefit package. Inclusion of insulin and insulin delivery devices in the national health benefit package is validated by examining the national health benefit package document for insulin, insulin delivery devices and blood glucose self-monitoring coverage. The indicator is considered "Yes" if the country has a national health benefit package that includes insulin, insulin delivery devices and blood glucose self-monitoring. The indicator is considered "Partially yes" if the country has a national health benefit package that includes either insulin or insulin delivery devices or blood glucose self-monitoring but not all. The indicator is considered "No" if the country has a national health benefit package, but it does not include insulin, insulin delivery devices or blood glucose self-monitoring.
Disaggregation	Component of the indicator (insulin or insulin delivery devices or blood glucose self-monitoring), type of diabetes, type of insulin, level of reimbursement (fully reimbursed or partially reimbursed), age group of people who are included in the benefit package, administrative level (national provincial/state/region or district).
Sources of data	NCD country capacity survey, other survey, country report (national health benefit package list)
Limitations/comments	None
Related links	Keeping the 100-year-old promise: making insulin access universal. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/348384). Principles of health benefit packages. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/340723). WHO Noncommunicable disease surveillance, monitoring and reporting: NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024).

7. Insulin, insulin delivery devices and blood glucose self-monitoring affordability

Indicator name	**Insulin, its delivery devices, and blood glucose self-monitoring affordability**
Purpose	To assess the affordability of insulin, insulin delivery devices and blood glucose self-monitoring.
Definition	Country has affordable insulin, insulin delivery devices and blood glucose self-monitoring for people with diabetes. Affordability means that the monthly expenses for people living with diabetes or their families, including expenditures on basic needs represented by national poverty line (NPL), do not exceed the minimum wage for the lowest paid government sector worker (LPGW).
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	The indicator is considered "Yes", that is, affordable, if: [(NPL +monthly cost for insulin, insulin devices and blood glucose self-monitoring to person with diabetes) /LPGW wage] ≤1
Disaggregation	Type of diabetes, type of insulin, type of insulin delivery device, type of blood glucose self-monitoring.
Sources of data	Country report, survey, national health insurance claims database
Limitations/comments	A population-weighted average can be used to address differences in prices, wages and size of population at sub-national levels. When estimated expenses and wages are derived from different years, general inflation rate and health care inflation rate must be included in the calculation.
Related links	Keeping the 100-year-old promise: making insulin access universal. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/348384). SDG indicator metadata. New York: United Nations; 2019 (https://unstats.un.org/sdgs/metadata/files/Metadata-03-0B-03.pdf, accessed 26 May 2024).

8. Availability of trained health care staff for diabetes management

Indicator name	**Availability of trained health care staff for diabetes management**
Purpose	To assess the availability of high-quality services for diabetes management.
Definition	Proportion of health facilities in which staff have been trained in the latest WHO or national guidelines on diabetes clinical management.
Numerator	Number of health facilities in which staff have been trained in the latest WHO or national guidelines on diabetes clinical management during the reporting period. "Staff" refers to physicians or other nationally authorized health professionals for diabetes management. A multidisciplinary care team for diabetes management may include the following: • cardiologist • diabetes nurse • endocrinologist • general practitioner • homecare nurse • nephrologist • nutritionist • ophthalmologist • physiotherapist • podiatrist
Denominator	Total number of health facilities
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Facility level of care type, provider ownership type (public/private), facility location type (urban/rural), training topic, type of health professional
Sources of data	Health facility report, health workforce information system or survey
Limitations/comments	Frequency of training depends on the date of the last version of WHO or national guidelines, as well as the staff turnover at the health care facility.
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186). Harmonized health facility assessment (HHFA): core questions. Geneva: World Health Organization; 2021 (https://www.who.int/publications/i/item/harmonized-health-facility-assessment-(hhfa), accessed 26 May 2024). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). Service availability and readiness assessment (SARA): an annual monitoring system for service delivery (reference manual, Version 2.2). Geneva: World Health Organization; 2014 (Revised July 2015) (https://apps.who.int/iris/handle/10665/149025).

9. Availability of diabetes, cardiovascular disease and hypertension core medicines

Indicator name	**Availability of diabetes, cardiovascular disease and hypertension core medicines**
Purpose	To monitor supply of essential medicines for diabetes management.
Definition	Proportion of health facilities that have diabetes, cardiovascular disease, and hypertension core medicines based on WHO or national treatment guidelines. Diabetes core medicines include: • metformin • sulfonylurea • insulin Cardiovascular disease core medicines include: • aspirin • beta blockers • statins Hypertension core medicines include the following classes of medications: • angiotensin-converting enzyme inhibitors • angiotensin-receptor blockers • long-acting dihydropyridine calcium channel blockers • thiazide and thiazide-like agents Other core medicines may be added to the list as WHO and national guidelines are updated.
Numerator	Number of health facilities reporting "no stock-out" of diabetes, cardiovascular disease and hypertension core medicines during the reporting period.
Denominator	Total number of health facilities
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Type of medicine, type of insulin (short-acting human, intermediate acting human, long-acting analogue), facility level of care type, provider ownership type (public/private), facility location type (urban/rural).
Sources of data	Health facility medicine stock register, health facility report, logistics information system or survey
Limitations/comments	In some settings, health facilities do not dispense medicines so the reporting units may be community medicine dispensaries/pharmacies. The preferred data source among the sources listed for this indicator depends on the data source quality in the local context.

Related links	Harmonized health facility assessment (HHFA): comprehensive guide. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/365534). HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Guideline for the pharmacological treatment of hypertension in adults. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/344424). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). Technical package for cardiovascular disease management in primary health care: evidence-based treatment protocols (https://iris.who.int/handle/10665/260421). The selection and use of essential medicines 2023: web annex A: World Health Organization model list of essential medicines: 23rd list. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/371090).

10. Availability of plasma glucose testing

Indicator name	Availability of plasma glucose testing
Purpose	To assess the availability of testing services for diabetes diagnosis and management.
Definition	Proportion of health facilities that are providing diabetes service and performing plasma glucose measurement through laboratory-based or point-of-care testing.
Numerator	Number of health facilities that are providing diabetes service and performing plasma glucose measurement through laboratory-based method or point-of-care testing during the reporting period.
Denominator	Total number of health facilities
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Facility level of care type, provider ownership type (public/private), facility location type (urban/rural), plasma glucose testing site (point-of-care or laboratory)
Sources of data	Health facility reports, logistics information system or survey
Limitations/comments	In some settings, the health facilities do not provide laboratory services, so the reporting units will need to come from other laboratory service providers, or health facilities only collect samples on site and perform the test off site.
Related links	Harmonized health facility assessment (HHFA): core questions. Geneva: World Health Organization; 2021 (https://www.who.int/publications/i/item/harmonized-health-facility-assessment-(hhfa), accessed 26 May 2024). Service availability and readiness assessment (SARA): an annual monitoring system for service delivery (reference manual, Version 2.2). Geneva: World Health Organization; 2014 (Revised July 2015) (https://apps.who.int/iris/handle/10665/149025, accessed 26 May 2024). The selection and use of essential in vitro diagnostics: report of the fourth meeting of the WHO Strategic Advisory Group of Experts on In Vitro Diagnostics, 2022 (including the fourth WHO model list of essential in vitro diagnostics). Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/373322, accessed 26 May 2024). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379).

11. Availability of glycated haemoglobin testing

Indicator name	**Availability of glycated haemoglobin (HbA1c) testing**
Purpose	To assess the availability of testing services for diabetes diagnosis and management.
Definition	Proportion of health facilities that are providing diabetes service and performing HbA1c test.
Numerator	Number of health facilities that are providing diabetes service and performing HbA1c test during the reporting period.
Denominator	Total number of health facilities
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Facility level of care type, provider ownership type (public/private), facility location type (urban/rural), HbA1c testing site (laboratory-based or point-of-care testing)
Sources of data	Health facility reports, logistics information system or survey
Limitations/comments	In some settings, the health facilities do not provide laboratory services, so the reporting units will need to come from other laboratory service providers, or health facilities only collect samples on site and perform the test off site.
Related links	Harmonized health facility assessment (HHFA): core questions. Geneva: World Health Organization; 2021 (https://www.who.int/publications/i/item/harmonized-health-facility-assessment-(hhfa), accessed 26 May 2024). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). The selection and use of essential in vitro diagnostics: report of the fourth meeting of the WHO Strategic Advisory Group of Experts on In Vitro Diagnostics, 2022 (including the fourth WHO model list of essential in vitro diagnostics) Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/373322).

12. Availability and quality of diabetes surveillance system

Indicator name	**Availability and quality of a diabetes surveillance system**
Purpose	To assess the availability of quality and comprehensive surveillance data for diabetes programme management.
Definition	Country has an established diabetes surveillance system comprising of all essential components if: • Country conducts a standardized population-based health survey that includes availability and quality of diabetes services every 3 to 5 years. • Country has an electronic, standardized system for recording person- and facility-level data that includes diabetes, with high level of coverage. • Country has a type 1 diabetes registry with national level coverage. • Country conducts regular standardized health facility surveys on availability of health facility services including diabetes management services and on capacities of health facilities to provide these services at required standards of quality, every 1 to 3 years. • Country has a well-functioning CRVS system for generating reliable cause-specific mortality data on a routine basis. The International Form of Medical Certificate of the Cause of Death is completed by certifiers. The International Classification of Diseases (ICD) is used to code the causes of death. Cause-of-death data are accessible to policy-makers and researchers.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	1. Country can respond "Yes" to the following questions: • "Does your country conduct a population-based survey that includes diabetes?". The country indicates frequency of conducting the population-based survey (the country is considered to have available a regular standardized population-based survey that includes diabetes if there are published survey statistics at least every 3 to 5 years). • "Does your country have an electronic standardized system for recording person-and facility-level data that includes diabetes in public facilities?"(The country is considered to have an electronic standardized system if it has an electronic type of system that covers more than 50% of facilities). • "Does your country have a type 1 diabetes registry?", indicate coverage (national, sub-national or others) and type (population- or hospital-based). • "Does your country conduct standardized surveys of facilities to assess availability of health facility services including diabetes management services and on capacities of health facilities to provide these services at required standards of quality?" – indicate the year of last facility survey (The country has available regular standardized health facility surveys, if there are published survey statistics on availability, readiness, quality, management, and financing of diabetes management services, every 1 to 3 years). Country needs to provide a copy of documents to support their response to abovementioned questions.

Method of estimation (con't)	2. Availability and quality of national civil registration and vital statistic systems are assessed through submissions to the WHO mortality database. WHO collects mortality data, including cause of death, from civil registration systems in the WHO mortality database through a routine annual call for data. Data quality is assessed through usability defined as percentage of all deaths which are registered with meaningful cause-of-death information. The system is considered to generate reliable cause-specific mortality data on a routine basis if: • Data from the five most recent reporting years are, on average, at least 70% usable. Usability is calculated as: [(Completeness (%))*(1- Deaths assigned to a garbage code (%)]. • At least 5 years of cause-of-death data have been reported to WHO in the last 10 years. • The most recent year of data reported to WHO is no more than 5 years old. The availability and quality of a diabetes surveillance system is validated by examining documents that describe or evidence the existence of the abovementioned essential components of a diabetes surveillance system. The indicator is considered "Yes" if the country has all the essential components of a diabetes surveillance system. The indicator is considered "Partially yes" if the country has one or more, but not all the essential components of a diabetes surveillance system. The indicator is considered "No" if the country has none of the essential components of a diabetes surveillance system.
Disaggregation	Type of surveillance system components
Sources of data	NCD country capacity survey, other survey, country report
Limitations/comments	None
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024). WHO Noncommunicable disease surveillance, monitoring and reporting: NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024). WHO Mortality Database. Geneva: World Health Organization; 2024 (https://platform.who.int/mortality, accessed 26 May 2024). Harmonized health facility assessment (HHFA): comprehensive guide. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/rest/bitstreams/1487289/retrieve). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application (https://apps.who.int/iris/handle/10665/364379). WHO Noncommunicable disease surveillance, monitoring and reporting; NCD country capacity survey [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/ncds/surveillance/monitoring-capacity/ncdccs, accessed 26 May 2024).

Service delivery

Subdomain	Indicator
Processes of care: assessment of risk factors for diabetes	13. Overweight and obesity assessment 14. Tobacco use assessment 15. Cardiovascular disease risk assessment 16. Hypertension screening
Processes of care: diagnosis	17. Diabetes diagnosis 18. Diabetic ketoacidosis at diagnosis
Processes of care: assessment of risk factor for diabetes complications	19. Blood glucose measurement
Processes of care: assessment of complications	20. Retinopathy assessment 21. Chronic kidney disease assessment 22. Diabetic foot assessment
Processes of care: treatment	23. Treatment with glucose-lowering medication 24. Insulin treatment 25. Statin treatment 26. Treatment with blood pressure-lowering medication 27. Retinopathy treatment 28. Diabetic foot treatment

General population. Population with diabetes.

13. Overweight and obesity assessment

Indicator name	Overweight and obesity assessment
Purpose	To assess the level of overweight and obesity assessment in health facilities.
Definition	Proportion of people who were attending health facilities and assessed for overweight and obesity using height, weight and/or body mass index (BMI) measurements.
Numerator	Number of people who were attending health facilities and were assessed for overweight and obesity using height, weight and/or BMI measurements during the reporting period.
Denominator	Total number of people who attended health facilities in the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by diabetes status, obesity or overweight status and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	For any comparison over time or with other populations, age standardization is needed.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024).

14. Tobacco use assessment

Indicator name	Tobacco use assessment
Purpose	To assess the level of tobacco use assessment
Definition	Proportion of people with diabetes who were attending health facilities and were assessed for tobacco use by a health professional in the facility during the reporting period. Tobacco products include cigarettes, pipes, cigars, cigarillos, waterpipes (hookah, shisha), bidis, kretek, heated tobacco products, and all forms of smokeless (oral and nasal) tobacco. Tobacco products exclude products that do not contain tobacco, such as electronic nicotine delivery system (ENDS) of which e-cigarettes are a common type, as well as 'e-cigars', 'e-hookahs', JUUL and 'e-pipes'. Currently using means either daily or non-daily (occasional) use at the time of visit. The assessment of tobacco use, defined as a series of questions on intensity, prolongation, type of product and method of consumption, in the current and in the past.
Numerator	Number of people with diabetes who were attending health facilities and were assessed for tobacco use during the reporting period
Denominator	Number of people with diabetes who attended health facilities during the reporting period
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	Non-age-standardized estimates of current tobacco use, tobacco smoking and cigarette smoking (Tobacco control: Monitor) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-tobacco-control-monitor-current-tobaccouse-tobaccosmoking-cigarrettesmoking-nonagestd-tobnonagestdcurr, accessed 26 May 2024). HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Non-age-standardized estimates of current tobacco use, tobacco smoking and cigarette smoking (Tobacco control: Monitor). [website]. Geneva: World Health Organization; 2024 (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-tobacco-control-monitor-current-tobaccouse-tobaccosmoking-cigarrettesmoking-nonagestd-tobnonagestdcurr, accessed 26 May 2024). Strengthening health systems for treating tobacco dependence in primary care. Geneva: World Health Organization; 2013 (https://apps.who.int/iris/handle/10665/84388). WHO Framework Convention on Tobacco Control. Geneva: World Health Organization; 2003 (https://iris.who.int/handle/10665/42811). WHO Framework Convention on Tobacco Control: guidelines for implementation article 5.3; Article 8; Articles 9 and 10; Article 11; Article 12; Article 13; Article 14, 2013 edition. Geneva: World Health Organization; 2013 (https://iris.who.int/handle/10665/80510).

15. Cardiovascular disease risk assessment

Indicator name	Cardiovascular disease risk assessment
Purpose	To assess the level of cardiovascular disease risk assessment among people aged 40 years and over in health facilities.
Definition	Proportion of people aged 40 years and over who were attending health facilities and assessed for cardiovascular disease risk using WHO CVD risk charts.
Numerator	Number of people aged 40 years and over who were attending health facilities and were assessed for cardiovascular disease risk using WHO CVD risk charts during the reporting period.
Denominator	Total number of people aged 40 years and over who attended health facilities during the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by diabetes status within each facility, facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186).

16. Hypertension screening

Indicator name	Hypertension screening
Purpose	To determine the level of opportunistic screening for hypertension.
Definition	Proportion of people aged 18 years and over who were attending health facilities and were screened for hypertension based on WHO or national guidelines.
Numerator	Number of people aged 18 years and over who were attending health facilities and were screened for hypertension during the reporting period.
Denominator	Total number of people aged 18 years and over who attended health facilities during the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	Guideline for the pharmacological treatment of hypertension in adults. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/344424). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379).

17. Diabetes diagnosis

Indicator name	Diabetes diagnosis
Purpose	To determine the level of effectiveness of the programme on early detection of diabetes.
Definition	Proportion of people with diabetes who have been diagnosed with diabetes based on WHO or national guidelines.
Numerator	Number of respondents who reported having been diagnosed with diabetes by a health professional.
Denominator	Total number of respondents, who have been identified as people with diabetes (on treatment or raised blood glucose ≥ 126 mg/dl or 7.0 mmol/L).
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024).

18. Diabetic ketoacidosis at diagnosis

Indicator name	Diabetic ketoacidosis at diagnosis
Purpose	To determine the level of effectiveness of the programme on early detection of diabetes.
Definition	Proportion of people who were diagnosed with diabetes during their emergency hospital/department admission due to diabetic ketoacidosis condition.
Numerator	Number of people who were diagnosed with diabetes during their emergency department admission due to diabetic ketoacidosis during the reporting period.
Denominator	Total number of people who were admitted to the emergency department due to diabetic ketoacidosis during the reporting period.
Method of calculation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by health facility, provider ownership type (public/private), and individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710).

19. Blood glucose measurement among people with diabetes

Indicator name	**Fasting plasma glucose measurement among people with diabetes**
Purpose	To assess the level of blood glucose measurement among people with diabetes in health facilities.
Definition	Proportion of people with diabetes registered in health facilities who were tested for glycaemic control using glycated haemoglobin (HbA_{1c}) or fasting plasma glucose (FPG) measurement.
Numerator	Number of people with diabetes registered in health facilities who were tested for glycaemic control using HbA1c or FPG measurement during the reporting period.
Denominator	Total number of people with diabetes registered in health facilities.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Type of measurement (HbA1c or FPG) and where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710).

20. Retinopathy assessment among people with diabetes

Indicator name	Retinopathy assessment among people with diabetes
Purpose	To assess the level of retinopathy assessment among people with diabetes in health facilities.
Definition	Proportion of people with diabetes registered in health facilities who were due for their screening for diabetic retinopathy and who received the screening involving: • visual acuity; and • direct/indirect ophthalmoscopy (dilated pupils) or retinal fundus photography. The frequency of screening can be defined in accordance with WHO (biennial screening) or national guidelines.
Numerator	Number of people with diabetes registered in health facilities who were due for their biennial screening for diabetic retinopathy and who received the screening during the reporting period.
Denominator	Total number of people with diabetes registered in health facilities who were due for their biennial screening for diabetic retinopathy during the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186).

21. Chronic kidney disease assessment among people with diabetes

Indicator name	**Chronic kidney disease assessment among people with diabetes**
Purpose	To assess the level of chronic kidney disease assessment among people with diabetes in health facilities.
Definition	The proportion of people with diabetes registered in health facilities who were assessed for diabetic kidney disease based on the following criteria: • Presence of an estimated glomerular filtration rate (eGFR) of <60mL/min per 1.73m^2 on at least two occasions, 1 to 3 months apart; and/or • Presence of albuminuria in at least two urine samples, 1 to 3 months apart. Urinary albumin excretion can be estimated in a spot urine sample using several tests (from most preferred to least preferred): • urine albumin-to-creatinine ratio (ACR) • urine protein-to-creatinine ratio (PCR) • reagent strip ("dipstick") urine analysis for albumin or total protein with automated reading • reagent strip ("dipstick") urine analysis for albumin or total protein with manual reading.
Numerator	Number of people with diabetes registered in health facilities who were assessed for diabetic chronic kidney disease during the reporting period.
Denominator	Total number of people with diabetes registered in health facilities.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186).

22. Assessment for diabetic foot among people with diabetes

Indicator name	**Assessment for diabetic foot among people with diabetes**
Purpose	To assess the level of diabetic foot assessment among people with diabetes in health facilities.
Definition	Proportion of people with diabetes registered in health facilities who were clinically assessed for diabetic foot using foot assessment methods according to WHO or national guidelines during the reporting period.
Numerator	Number of people with diabetes registered in health facilities who were clinically assessed for diabetic foot during the reporting period.
Denominator	Total number of people with diabetes registered in health facilities.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186). `

23. Treatment with glucose-lowering medication among people with diabetes

Indicator name	**Treatment with glucose-lowering medication among people with diabetes**
Purpose	To assess the level of treatment with glucose-lowering medication among people with diabetes.
Definition	Proportion of people with diabetes who required glucose-lowering medication and were receiving it according to WHO or national guidelines: • This indicator can be derived from population-level surveys or health facility-based reporting systems. "Receiving medication" will be assessed through self-reports in a population-based survey, while in health facility-based reporting system, it will be assessed through prescription data.
Numerator	Population survey data: number of respondents with diabetes who required glucose-lowering medication and were receiving it according to guidelines. Facility data: number of people with diabetes registered in health facilities who required glucose-lowering medication and were receiving it according to guidelines during the reporting period.
Denominator	Population survey data: total number of respondents with diabetes who required glucose-lowering medication according to guidelines. Facility data: total number of people with diabetes registered in health facilities who required glucose-lowering medication according to guidelines during the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records, population-based survey
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). The selection and use of essential medicines 2023: web annex A: World Health Organization model list of essential medicines: 23rd list. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/371090).

24. Insulin treatment among people with diabetes

Indicator name	**Insulin treatment among people with diabetes**
Purpose	To assess the level of insulin treatment among people with diabetes.
Definition	Proportion of people with diabetes who required insulin treatment and were receiving it according to WHO or national guidelines. • This indicator can be derived from population-level surveys or health facility-based reporting systems. "Receiving treatment" will be assessed through self-reports in a population-based survey, while in health facility-based reporting system, it will be assessed through prescription data.
Numerator	Population survey data: number of respondents with diabetes who required insulin treatment and were receiving it according to guidelines. Facility data: number of people with diabetes registered in health facilities who required insulin treatment and were receiving it according to guidelines during the reporting period.
Denominator	Population survey data: total number of respondents with diabetes who required insulin treatment according to guidelines. Facility data: total number of people with diabetes registered in health facilities who required insulin treatment according to guidelines.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, type of diabetes and type of insulin, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records, population-based survey
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). The selection and use of essential medicines 2023: web annex A: World Health Organization model list of essential medicines: 23rd list. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/371090).

25. Statin treatment among people with diabetes

Indicator name	**Statin treatment among people with diabetes**
Purpose	To assess compliance with WHO or national guidelines regarding the initiation and continuation of statin treatment among individuals diagnosed with diabetes.
Definition	Proportion of people with diabetes aged 40 years and over who required statin treatment and were receiving it according to WHO or national treatment guidelines. • This indicator can be derived from population-level surveys or health facility-based reporting systems. "Receiving treatment" will be assessed through self-reports in a population-based survey, while in health facility-based reporting system, it will be assessed through prescription data.
Numerator	Population survey data: number of respondents with diabetes aged 40 years and over who required statin treatment and were receiving it according to guidelines. Facility data: number of people with diabetes aged 40 years and over registered in health facilities who required statin treatment and were receiving it according to guidelines during the reporting period.
Denominator	Population survey data: total number of respondents with diabetes aged 40 years and over who required statin treatment according to guidelines. Facility data: total number of people with diabetes aged 40 years and over registered in health facilities who required statin treatment according to guidelines.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records, population-based survey
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). The selection and use of essential medicines 2023: web annex A: World Health Organization model list of essential medicines: 23rd list. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/371090).

26. Treatment with blood pressure-lowering medication among people with diabetes and raised blood pressure

Indicator name	**Treatment with blood pressure-lowering medication among people with diabetes and raised blood pressure**
Purpose	To assess the level of treatment with blood pressure-lowering medication among people with diabetes.
Definition	Proportion of people with diabetes and raised blood pressure who required blood pressure-lowering medication and were receiving it according to WHO or national guidelines. • This indicator can be derived from population-level surveys or health facility-based reporting systems. "Receiving medication" will be assessed through self-reports in a population-based survey, while in health facility-based reporting system, it will be assessed through prescription data.
Numerator	Population survey data: number of respondents with diabetes and raised blood pressure who required blood pressure-lowering medication and were receiving it according to guidelines. Facility data: number of people with diabetes and raised blood pressure registered in health facilities who required blood pressure-lowering medication and were receiving it according to guidelines during the reporting period.
Denominator	Population survey data: total number of respondents with diabetes and raised blood pressure who required blood pressure-lowering medication according to guidelines. Facility data: total number of people with diabetes and raised blood pressure registered in health facilities who required blood pressure-lowering medication according to guidelines during the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records, population-based survey
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). The selection and use of essential medicines 2023: web annex A: World Health Organization model list of essential medicines: 23rd list. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/371090).

27. Retinopathy treatment among people with diabetes

Indicator name	**Retinopathy treatment among people with diabetes**
Purpose	To assess the level of retinopathy treatment among people with diabetes in health facilities.
Definition	Proportion of people with diabetes and retinopathy who received retinopathy treatment based on guidelines.
Numerator	Number of people with diabetes and retinopathy registered in health facilities who received retinopathy treatment according to guidelines during the reporting period.
Denominator	Total number of people with diabetes and retinopathy registered in health facilities during the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186).

28. Diabetic foot treatment

Indicator name	Diabetic foot treatment
Purpose	To assess the level of diabetic foot treatment in health facilities.
Definition	Proportion of people with diabetes who developed diabetic foot and received clinical treatment for diabetic foot according to WHO or national guidelines.
Numerator	Number of people with diabetes registered in health facilities who developed diabetic foot and received clinical treatment for diabetic foot according to guidelines during the reporting period.
Denominator	Total number of people with diabetes registered in health facilities who developed diabetic foot during the reporting period.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	None
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186).

Risk factors

Subdomain	Indicator
Risk factors for diabetes	29. Physical inactivity prevalence 30. Overweight and obesity prevalence 31. Tobacco use prevalence 32. Hypertension prevalence
Risk factors for diabetes complications	33. Glycaemic control based on glycated haemoglobin (HbA1c) 34. Glycaemic control based on fasting plasma glucose 35. Blood pressure control

General population. Population with diabetes.

29. Physical inactivity prevalence

Indicator name	Physical inactivity prevalence
Purpose	To measure the prevalence of physical inactivity among people aged 18 years and over.
Definition	Proportion of people aged 18 years and over who are insufficiently physically active (i.e. not meeting WHO recommendation on physical activity for health, which is equivalent to at least 150 minutes of moderate-intensity physical activity per week or equivalent). Throughout a week, including activity for work, during transport and leisure time, adults should do at least: • 150 minutes of moderate-intensity physical activity; or • 75 minutes of vigorous-intensity physical activity; or • an equivalent combination of moderate- and vigorous-intensity physical activity achieving at least 600 metabolic equivalents (MET)-minutes. Physical inactivity can be measured using the Global physical activity questionnaire.
Numerator	Number of respondents aged 18 years and over, who were insufficiently physically active.
Denominator	Total number of respondents aged 18 years and over.
Method of calculation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys with data on physical activity using standard measurement tool.
Limitations/comments	For any comparison over time or with other populations, age standardization is needed.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024). Physical activity surveillance [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/physical-activity-surveillance, accessed 26 May 2024).

30. Overweight and obesity prevalence

Indicator name	**Overweight and obesity prevalence**
Purpose	To measure the prevalence of overweight and obesity.
Definition	Proportion of people overweight or obese. • Criteria for people aged 18 years and over: • overweight if body mass index (BMI)=25 to <30; obese if BMI>=30.[4] • Criteria for school-aged children and adolescents using WHO Growth reference: overweight if BMI-for-age is greater than 1 standard deviation (SD) above the median; obese if BMI-for-age is greater than 2 SDs above the median. • Criterion for children under 5 years of age using WHO Child growth standards: overweight if weight for height is above 2 SDs from the median.
Numerator	Number of respondents who were classified with overweight or obesity.
Denominator	Total number of respondents
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify individuals with or without diabetes, by obesity or overweight, individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys with height and weight measurement.
Limitations/comments	For any comparison over time or with other populations, age standardization is needed. Method of assessment of overweight and obesity may vary in countries.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024). WHO Global Health Observatory: Prevalence of overweight among children and adolescents, BMI>+1 standard deviations above the median (crude estimate) (%) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-overweight-among-children-and-adolescents-bmi-1-standard-deviations-above-the-median-(crude-estimate)-(-), accessed 26 May 2024). WHO Global Health Observatory: Prevalence of obesity among children and adolescents, BMI>+2 standard deviations above the median (crude estimate) (%) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/prevalence-of-obesity-among-children-and-adolescents-bmi-2-standard-deviations-above-the-median-(crude-estimate)-(-), accessed 26 May 2024). WHO Global Health Observatory: Overweight prevalence among children under 5 years of age (% weight-for-height>+2SD) [website. Geneva: World Health Organization; 2024 (https://www.who.int/data/gho/data/indicators/indicator-details/GHO/gho-jme-country-children-aged-5-years-overweight-(-weight-for-height-2-sd), accessed 26 May 2024).

[4] BMI = weight (kg)/height (m)2.

31. Tobacco use prevalence

Indicator name	Tobacco use prevalence
Purpose	To measure the prevalence of current tobacco use among individuals aged 18 years and over.
Definition	Proportion of people aged 18 years and over who are currently using tobacco products, including cigarettes, pipes, cigars, cigarillos, waterpipes (hookah, shisha), bidis, kretek, heated tobacco products, and all forms of smokeless (oral and nasal) tobacco. • Tobacco products exclude products that do not contain tobacco, such as electronic nicotine delivery system (ENDS) of which e-cigarettes are a common type, as well as 'e-cigars', 'e-hookahs', JUUL and 'e-pipes'. • Currently using means either daily or non-daily (occasional) use at the time of visit.
Numerator	Number of respondents aged 18 years and over who were current tobacco users.
Denominator	Total number of respondents aged 18 years and over.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by individuals with or without diabetes, type of tobacco products, individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys with a question regarding current tobacco use.
Limitations/comments	For any comparison over time or with other populations, age standardization is needed.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024). Global Adult Tobacco Survey [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/global-adult-tobacco-survey, accessed 13 August 2024).

32. Hypertension prevalence

Indicator name	Hypertension prevalence
Purpose	To measure the prevalence of hypertension among people aged 18 years and over.
Definition	Proportion of people aged 18 years and over with raised blood pressure or on medication for hypertension. Raised blood pressure criteria: • systolic blood pressure (SBP) ≥140 mmHg; or • diastolic blood pressure (DBP) ≥90 mmHg.
Numerator	Number of respondents aged 18 years and over with raised blood pressure or on medication for hypertension.
Denominator	Total number of respondents aged 18 years and over.
Method of calculation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys with blood pressure measurement.
Limitations/comments	For any comparison over time or with other populations, age standardization is needed.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024).

33. Glycaemic control among people with diabetes based on glycated haemoglobin (HbA1c)

Indicator name	**Glycaemic control among people with diabetes based on glycated haemoglobin (HbA1c)**
Purpose	To measure the effectiveness of clinical services for people with diabetes for achieving glycaemic control.
Definition	Proportion of people living with diabetes with good glycaemic control based on HbA1c measurement. Based on WHO guidelines: Clinical target: <7% (53mmol/mol) Global target: <8% (64mmol/mol) • Glycaemic control can be alternatively defined in accordance with national targets and guidelines. • This indicator can be derived from population-level surveys or health facility-based routine data.
Numerator	Population survey data: Number of respondents with diabetes with good glycaemic control using HbA1c measurement. Facility data: Number of people with diabetes registered in health facilities with good glycaemic control using HbA1c measurement at the last clinical visit during the reporting period, excluding those who were newly diagnosed with less than three months of treatment.
Denominator	Population survey data: Total number of respondents with diabetes. Facility data: Total number of people with diabetes registered in health facilities during the reporting period, excluding those who were newly diagnosed with less than three months of treatment.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by type of diabetes, facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys, with HbA1c measurement, health facility patient registers, health records.
Limitations/comments	People with unknown status of glycaemic control (e.g. missed appointment/dropped out) and patients referred to higher-level care facilities during the reporting quarter will be counted in the denominator and their glycaemic control status will be counted as not controlled. Patients known to have transferred to another facility during the reporting quarter will be counted in the denominator and their last known status prior to transfer will be used. For comparison with other health care facilities the indicator needs to be age-standardized.

Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Gregg E, Buckley J, Ali M, Davies J, Flood D, Griffiths B et al (for the For the Diabetes Targets Expert Consultation Group). Improving health outcomes of people with diabetes mellitus: target setting to reduce the global burden of diabetes mellitus by 2030. Lancet. 2023;401(10384): 1302–1312. doi:10.1016/S0140-6736(23)00001-6. Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). Draft recommendations to strengthen and monitor diabetes responses within national noncommunicable disease programmes including potential targets. WHO discussion paper (9 August 2021) (https://cdn.who.int/media/docs/default-source/searo/eb150---annex-2-(diabetes).pdf), accessed 26 May 2024).

34. Glycaemic control among people with diabetes based on fasting plasma glucose

Indicator name	**Glycaemic control among people with diabetes based on fasting plasma glucose**
Purpose	To measure the effectiveness of clinical services for people with diabetes for achieving glycaemic control.
Definition	Proportion of people with diabetes with good glycaemic control based on FPG measurement. Based on WHO guidelines: Clinical target: <126 mg/dl (7 mmol/l) Global target: <178 mg/dl (9.9 mmol/l) • Glycaemic control can be alternatively defined in accordance with national targets and guidelines. • This indicator can be derived from population-based surveys or health facility-based routine data.
Numerator	Population survey data: Number of respondents with diabetes with good glycaemic control using FPG measurement. Facility data: Number of people with diabetes registered in health facilities with good glycaemic control using FPG measurement at the last clinical visit during the reporting period, excluding those who were newly diagnosed with less than 3 months of treatment.
Denominator	Population survey data: Total number of respondents with diabetes. Facility data: Total number of people with diabetes registered in health facilities during the reporting period, excluding those who were newly diagnosed with less than 3 months of treatment.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population -based surveys, with FPG measurement, health facility patient registers, health records.
Limitations/comments	This indicator could be used only for countries with very limited resources, in which HbA1c is not available or accessible. People with unknown status of glycaemic control (e.g. missed appointment/ dropped out) and patients referred to higher-level care facilities during the reporting quarter, will be counted in the denominator and their glycaemic control status will be counted as not controlled. Patients known to have transferred to another facility during the reporting quarter will be counted in the denominator and their last known status prior to transfer will be used. For comparison with other health care facilities the indicator needs to be age-standardized.

Related links	Gregg E, Buckley J, Ali M, Davies J, Flood D, Griffiths B et al (for the For the Diabetes Targets Expert Consultation Group). Improving health outcomes of people with diabetes mellitus: target setting to reduce the global burden of diabetes mellitus by 2030. Lancet. 2023;401(10384): 1302–1312. doi:10.1016/S0140-6736(23)00001-6. HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application (https://iris.who.int/handle/10665/364379). Draft recommendations to strengthen and monitor diabetes responses within national noncommunicable disease programmes including potential targets. WHO discussion paper. Geneva: World Health Organization; 2021 (https://www.who.int/publications/m/item/who-discussion-paper-draft-recommendations-to-strengthen-and-monitor-diabetes-responses-within-national-noncommunicable-disease-programmes-including-potential-targets, accessed 26 May 2024). Wei N, Zheng H, Nathan DM. Empirically establishing blood glucose targets to achieve HbA1c goals. Diabetes Care. 2014;37(4): 1048–1051. doi:10.2337/dc13-2173.

35. Blood pressure control among people with diabetes

Indicator name	Blood pressure control among people with diabetes
Purpose	To measure effectiveness of clinical services for people with diabetes and raised blood pressure for achieving blood pressure control.
Definition	Proportion of people with diabetes with good control of blood pressure based on WHO or national treatment guidelines. Based on WHO guidelines: BP is considered controlled when SBP <130 mmHg among people with diabetes. • Blood pressure control can alternatively be defined in accordance with national targets and guidelines. • This indicator can be derived from population-level surveys or health facility-based routine data.
Numerator	Population survey data: Number of respondents with diabetes, with good control of blood pressure. Facility data: Number of people with diabetes registered in health facilities, with good control of blood pressure at the last clinical visit during the reporting period, excluding those who were newly diagnosed with raised blood pressure with less than 3 months of treatment.
Denominator	Facility data: Total number of people with diabetes registered in health facilities during the reporting period, excluding those who were newly diagnosed with raised blood pressure with less than three months of treatment. Population survey data: Total number of respondents with diabetes.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by type of diabetes, individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys, with plasma glucose or HbA1c and blood pressure measurement, health facility patient registers, health records.
Limitations/comments	For any comparison over time or with other populations, age standardization is needed.
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024).

Outcomes and impacts

Subdomain	Indicator
Morbidity	36. Diabetes prevalence
	37. Hospitalization for diabetes
	38. Cardiovascular disease
	39. Blindness
	40. End-stage kidney disease
	41. Lower-extremity amputation
Mortality	42. Cardiovascular disease mortality rate
	43. Diabetes mortality rate
	44. Probability of premature mortality from noncommunicable diseases

General population. Population with diabetes.

36. Diabetes prevalence

Indicator name	Diabetes prevalence
Purpose	To measure outcome of diabetes prevention interventions.
Definition	Proportion of people aged 18 years and over with raised blood glucose or on medication for diabetes. Raised blood glucose criteria: • FPG ≥ 126 mg/dl (7 mmol/L); or • HbA1c ≥ 6.5% (48 mmol/mol).
Numerator	Number of respondents aged 18 years and over with raised blood glucose or on medication for diabetes.
Denominator	Total number of respondents aged 18 years and over.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Nationally or sub-nationally representative population-based surveys, with blood glucose measurements and a questionnaire, which investigates receiving medicines for diabetes.
Limitations/comments	For any comparison over time with other populations, age standardization is needed.
Related links	WHO Noncommunicable disease surveillance, monitoring and reporting: STEPwise approach to NCD risk factor surveillance (STEPS) [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps, accessed 26 May 2024).

37. Hospitalization for diabetes

Indicator name	**Hospitalization for diabetes**
Purpose	To assess outcome of diabetes management.
Definition	Proportion of people with diabetes who were admitted to hospital due to following conditions: 1. Severe hypoglycaemia 2. Diabetic ketoacidosis 3. Hyperosmolar hyperglycaemic state 4. Myocardial infarction 5. Stroke 6. Lower-extremity amputation 7. Kidney failure
Numerator	Number of people with diabetes registered in the facility who were admitted to hospital due to diabetes-related complications including cardiovascular disease during the reporting period.
Denominator	Total number of people with diabetes registered in the facility.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by cause of admission, facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	For comparison with other health care facilities the indicator needs to be age-standardized.
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186). ICD-11 for mortality and morbidity statistics: Acute complications of diabetes mellitus [website]. Geneva: World Health Organization; 2024 (https://icd.who.int/browse/2024-01/mms/en#1304552818, accessed 26 May 2024). ICD-11 for mortality and morbidity statistics: Diabetic retinopathy [website]. Geneva: World Health Organization; 2024 (https://icd.who.int/browse/2024-01/mms/en#1006882070, accessed 26 May 2024). ICD-11 for mortality and morbidity statistics: Chronic kidney disease [website]. Geneva: World Health Organization; 2024 (https://icd.who.int/browse/2024-01/mms/en#412389819, accessed 26 May 2024).

38. Cardiovascular disease among people with diabetes

Indicator name	Cardiovascular disease among people with diabetes
Purpose	To assess outcome of diabetes management.
Definition	Proportion of people with diabetes who were diagnosed with cardiovascular disease based on WHO or national guidelines. Cardiovascular disease among people with diabetes, includes: • myocardial infarction; • stroke; and • lower-extremity vascular occlusion.
Numerator	Number of people with diabetes registered in the facility who were diagnosed with cardiovascular disease during the reporting period.
Denominator	Total number of people with diabetes registered in the facility.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	For comparison with other health care facilities the indicator needs to be age-standardized.
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). ICD 11 mortality and morbidity statistics: GB61 Chronic kidney disease [website]. Geneva: World Health Organization; 2024 (https://icd.who.int/browse/2024-01/mms/en#412389819, accessed 26 May 2024).

39. Blindness among people with diabetes

Indicator name	**Blindness among people with diabetes**
Purpose	To assess outcome of diabetes management.
Definition	Proportion of people with diabetes who experienced blindness based on WHO or national guidelines.
Numerator	Number of people with diabetes registered in the facility who experienced blindness during the reporting period. Blindness is defined by WHO as having a visual acuity in the better eye of 3/60 (at 3 metres from the vision chart, a person can read a letter that someone with a normal vision would be able to see at 60 metres).
Denominator	Total number of people with diabetes registered in the facility.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	For comparison with other health care facilities the indicator needs to be age-standardized.
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). World report on vision. Geneva: World Health Organization; 2019 (https://iris.who.int/handle/10665/328717). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186).

40. End-stage kidney disease among people with diabetes

Indicator name	**End-stage kidney disease among people with diabetes**
Purpose	To assess outcome of diabetes management.
Definition	Proportion of people with diabetes who were newly diagnosed with end-stage kidney disease based on WHO or national guidelines. End-stage kidney disease is defined as a glomerular filtration rate (GFR) of less than 15 mL/min/1.73m^2.
Numerator	Number of people with diabetes registered in the facility who were newly diagnosed with end-stage kidney disease during the reporting period.
Denominator	Total number of people with diabetes registered in the facility.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Health facility patient registers, health records
Limitations/comments	For comparison with other health care facilities the indicator needs to be age-standardized.
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). ICD-11 for mortality and morbidity statistics: Chronic kidney disease [website]. Geneva: World Health Organization; 2024 (https://icd.who.int/browse/2024-01/mms/en#412389819, accessed 26 May 2024). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379).

41. Lower-extremity amputation among people with diabetes

Indicator name	**Lower-extremity amputation among people with diabetes**
Purpose	To assess outcome of diabetes management.
Definition	Proportion of people with diabetes who had a lower-extremity amputation.
Numerator	Number of people with diabetes registered in the facility who had a lower-extremity amputation due to diabetic foot during the reporting period.
Denominator	Total number of people with diabetes registered in the facility.
Method of estimation	Numerator ÷ denominator × 100
Disaggregation	Where possible and applicable, stratify by facility level of care type, provider ownership type (public/private), and individual-level characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type, type of lower-extremity amputation.
Sources of data	Health facility patient registers, health records
Limitations/comments	For comparison with other health care facilities the indicator needs to be age-standardized.
Related links	HEARTS-D: diagnosis and management of type 2 diabetes. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331710). ICD 11 for mortality and morbidity statistics: ND55 Other injuries of leg, level unspecified [website]. Geneva: World Health Organization; 2024 (https://icd.who.int/browse/2024-01/mms/en#507000791, accessed 26 May 2024). Noncommunicable disease facility-based monitoring guidance: framework, indicators and application. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364379). WHO package of essential noncommunicable (PEN) disease interventions for primary health care. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334186).

42. Cardiovascular disease mortality rate

Indicator name	**Cardiovascular disease mortality rate**
Purpose	To measure impact of diabetes programme.
Definition	Number of cardiovascular disease deaths per 100 000 population.
Numerator	Number of cardiovascular disease deaths in a given period.
Denominator	Total population.
Method of estimation	Numerator ÷ denominator × 100 000 Countries using ICD-10 can include the codes: I00-I99 in the calculation of cardiovascular disease mortality. Countries using ICD-11 can include the codes: 8B00-8B2Z, BA00-BE2Z in the calculation of cardiovascular disease mortality.
Disaggregation	Where possible and applicable, stratify by type of CVD, individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Civil registration with complete coverage and medical certification of cause of death.
Limitations/comments	For any comparison over time or with other populations, age standardisation is needed. When calculating deaths by cause using ICD-10, WHO reassigns deaths assigned to ill-defined causes of death, such as those assigned to signs and symptoms (R00-R94, R96- R99), heart failure (I50), unspecified cardiac arrest (I46), and unspecified respiratory failure (J96).
Related links	ICD-11 for mortality and morbidity statistics. Geneva: World Health Organization; 2024 (https://icd.who.int/browse11/l-m/en, accessed 26 May 2024). WHO methods and data sources for country-level causes of death. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/374896).

43. Diabetes mortality rate

Indicator name	Diabetes mortality rate
Purpose	To measure impact of diabetes programme.
Definition	Number of diabetes deaths per 100 000 population.
Numerator	Number of diabetes deaths in a given period.
Denominator	Total population.
Method of estimation	Numerator ÷ denominator × 100 000 Countries using ICD-10 can include the codes: E10-E14 in the calculation of diabetes mortality. Countries using ICD-11 can include the codes: 5A10-5A2Y in the calculation of diabetes mortality.
Disaggregation	Where possible and applicable, stratify by type of diabetes, individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Civil registration with complete coverage and medical certification of cause of death
Limitations/comments	For any comparison over time or with other populations, age standardization is needed. Inconsistent cause-of-death assignment practices for diabetes limit comparability of diabetes mortality over time and by geography. When calculating deaths by cause using ICD-10, WHO reassigns deaths assigned to ill-defined causes of death, such as those assigned to signs and symptoms (R00-R94, R96- R99), heart failure (I50), unspecified cardiac arrest (I46), and unspecified respiratory failure (J96).
Related links	ICD-11 for mortality and morbidity statistics [website] (https://icd.who.int/browse/2024-01/mms/en#465177735, accessed 26 May 2024). WHO methods and data sources for country-level causes of death. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/374896).

44. Probability of premature mortality from noncommunicable diseases

Indicator name	**Probability of premature mortality from noncommunicable diseases**
Purpose	To measure impact of diabetes programme.
Definition	Probability of dying between the exact ages 30 and 70 years from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases.
Numerator	Not applicable
Denominator	Not applicable
Method of estimation	Probability of death between exact age 30 and exact age 70 are calculated using cause-specific mortality rates in each 5-year age group and standard life table methods. The estimates are derived from the WHO Global health estimates (GHE). These estimates represent the best estimates of WHO, computed using standard categories, definitions and methods to ensure cross-country comparability, and may not be the same as official national estimates.
Disaggregation	Where possible and applicable, stratify by type of diabetes, individual characteristics such as age, sex, race/ethnicity, comorbidity status, high-risk groups, socioeconomic status, residence type (urban/rural), and health insurance type.
Sources of data	Civil registration with complete coverage and medical certification of cause of death.
Limitations/comments	The ICD codes to be included in the calculation are: cardiovascular disease: I00-I99, Cancer: C00-C97, Diabetes: E10-E14, Chronic respiratory: J30-J98. When calculating deaths by cause, WHO reassigns deaths assigned to ill-defined causes of death, such as those assigned to signs and symptoms (ICD10 codes R00-R94, R96- R99), heart failure (I50), unspecified cardiac arrest (I46), and unspecified respiratory failure (J96).
Related links	Noncommunicable diseases global monitoring framework: indicator definitions and specifications. Geneva: World Health Organization; 2014 (https://cdn.who.int/media/docs/default-source/inaugural-who-partners-forum/gmf_indicator_definitions_version_nov2014438a791b-16d3-46f3-a398-88dee12e796b.pdf, accessed 26 May 2024). WHO methods and data sources for country-level causes of death. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/374896, accessed 26 May 2024).

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Annex

Annex A

Electronic database search strategies

Database	Search
PubMed (n = 2307)	(((“Diabetes”) AND (“Evaluation Indicator*”[Title/Abstract] OR “Evaluation Benchmark*”[Title/Abstract] OR “Evaluation Metric*”[Title/Abstract] OR “Evaluation Index”[Title/Abstract] OR “Evaluation Indices”[Title/Abstract] OR “Process Indicator*”[Title/Abstract] OR “Process Benchmark*”[Title/Abstract] OR “Process Metric*”[Title/Abstract] OR “Process Index”[Title/Abstract] OR “Process Indices”[Title/Abstract] OR “Outcome Indicator*”[Title/Abstract] OR “Outcome Benchmark*”[Title/Abstract] OR “Outcome Metric*”[Title/Abstract] OR “Outcome Index”[Title/Abstract] OR “Outcome Indices”[Title/Abstract] OR “Performance Indicator*”[Title/Abstract] OR “Performance Benchmark*”[Title/Abstract] OR “Performance Metric*”[Title/Abstract] OR “Performance Index”[Title/Abstract] OR “Performance Indices”[Title/Abstract] OR “Surveillance Indicator*”[Title/Abstract] OR “Surveillance Benchmark*”[Title/Abstract] OR “Surveillance Metric*”[Title/Abstract] OR “Surveillance Index”[Title/Abstract] OR “Surveillance Indices”[Title/Abstract] OR “Monitoring Indicator*”[Title/Abstract] OR “Monitoring Benchmark*”[Title/Abstract] OR “Monitoring Metric*”[Title/Abstract] OR “Monitoring Index”[Title/Abstract] OR “Monitoring Indices”[Title/Abstract] OR “Quality Indicator*”[Title/Abstract] OR “Quality Benchmark*”[Title/Abstract] OR “Quality Metric*”[Title/Abstract] OR “Quality Index”[Title/Abstract] OR “Quality Indices”[Title/Abstract] OR “Capacity Indicator*”[Title/Abstract] OR “Capacity Benchmark*”[Title/Abstract] OR “Capacity Metric*”[Title/Abstract] OR “Capacity Index”[Title/Abstract] OR “Capacity Indices”[Title/Abstract] OR “Governance Indicator*”[Title/Abstract] OR “Governance Benchmark*”[Title/Abstract] OR “Governance Metric*”[Title/Abstract] OR “Governance Index”[Title/Abstract] OR “Governance Indices”[Title/Abstract] OR “Availability Indicator*”[Title/Abstract] OR “Availability Benchmark*”[Title/Abstract] OR “Availability Metric*”[Title/Abstract] OR “Availability Index”[Title/Abstract] OR “Availability Indices”[Title/Abstract] OR “Affordability Indicator*”[Title/Abstract] OR “Affordability Benchmark*”[Title/Abstract] OR “Affordability Metric*”[Title/Abstract] OR “Affordability Index”[Title/Abstract] OR “Affordability Indices”[Title/Abstract] OR “Risk Management Indicator*”[Title/Abstract] OR “Risk Management Benchmark*”[Title/Abstract] OR “Risk Management Metric*”[Title/Abstract] OR “Risk Management Index”[Title/Abstract] OR “Risk Management Indices”[Title/Abstract] OR “Service Delivery Indicator*”[Title/Abstract] OR “Service Delivery Benchmark*”[Title/Abstract] OR “Service Delivery Metric*”[Title/Abstract] OR “Service Delivery Index”[Title/Abstract] OR “Service Delivery Indices”[Title/Abstract] OR “Impact Indicator*”[Title/Abstract] OR “Impact Benchmark*”[Title/Abstract] OR “Impact Metric*”[Title/Abstract] OR “Impact Index”[Title/Abstract] OR “Impact Indices”[Title/Abstract] OR “Care Indicator*”[Title/Abstract] OR “Care Benchmark*”[Title/Abstract] OR “Care Metric*”[Title/Abstract] OR “Care Index”[Title/Abstract] OR “Care Indices”[Title/Abstract] OR “Health System Indicator*”[Title/Abstract] OR “Health System Benchmark*”[Title/Abstract] OR “Health System Metric*”[Title/Abstract] OR “Health System Index”[Title/Abstract] OR “Health System Indices”[Title/Abstract] OR “Health Facility Indicator*”[Title/Abstract] OR “Health Facility Benchmark*”[Title/Abstract] OR “Health Facility Metric*”[Title/Abstract] OR “Health Facility Index”[Title/Abstract] OR “Health Facility Indices”[Title/Abstract] OR “Monitoring framework*”[Title/ Abstract] OR “Clinical management guideline*”[Title/Abstract] OR “Core outcome set*”[Title/Abstract] OR “Metric Selection Process*”[Title/Abstract] OR “Clinical control parameter*”[Title/Abstract] OR “National registr*”[Title/Abstract] OR “National database*”[Title/Abstract] OR “Diabetes audit*”[Title/Abstract] OR “Access to healthcare”[Title/Abstract] OR “Access to health care”[Title/Abstract] OR

Database	Search
	"Healthcare service* availability"[Title/Abstract] OR "Health care service* availability"[Title/Abstract] OR "Healthcare access"[Title/Abstract] OR "Health care access"[Title/Abstract] OR "Health economic indicator*"[Title/Abstract] OR "Productivity loss"[Title/Abstract] OR "Budget impact"[Title/Abstract] OR "Absenteeism"[Title/Abstract] OR "Economic evaluation"[Title/Abstract] OR "Cost of diabetes"[Title/Abstract] OR "Socioeconomic disparit*"[Title/Abstract] OR "Health equity"[Title/Abstract] OR "Socioeconomic factor*"[Title/Abstract] OR "Socio-economic factor*"[Title/Abstract] OR "Social determinant* of health"[Title/Abstract] OR "Prevention strateg*"[Title/Abstract] OR "Risk management strateg*"[Title/Abstract] OR "Risk factor management"[Title/Abstract] OR "Risk factor reduction"[Title/Abstract] OR "Self-management strateg*"[Title/Abstract] OR "Modifiable risk behavi*"[Title/Abstract] OR "Behavioral determinant*"[Title/Abstract] OR "Behavioural determinant*"[Title/Abstract] OR "Behavioral risk*"[Title/Abstract] OR "Behavioural risk*"[Title/Abstract] OR "Healthcare professional engagement*"[Title/Abstract] OR "Health professional engagement*"[Title/Abstract] OR "Public health impact*"[Title/Abstract] OR "Health policy effectiveness"[Title/Abstract] OR "Policy impact metric*"[Title/Abstract])) OR (("Diabetes Evaluation"[Title/Abstract] OR "Diabetes Mellitus Evaluation"[Title/Abstract] OR "Diabetes Surveillance"[Title/Abstract] OR "Diabetes Mellitus Surveillance"[Title/Abstract] OR "Diabetes Monitoring"[Title/Abstract] OR "Diabetes Mellitus Monitoring"[Title/Abstract]) AND ("Indicator*"[Title/Abstract] OR "Benchmark*"[Title/Abstract] OR "Metric*"[Title/Abstract] OR "Index"[Title/Abstract] OR "Indices"[Title/Abstract]))) AND ("Consensus"[Title/Abstract] OR "Framework*"[Title/Abstract] OR "Review*"[Title/Abstract] OR "Delphi"[Title/Abstract])
Cochrane Database of Systematic Reviews (n = 20)	(((Diabetes) AND ((Evaluation NEXT Indicator*):ab,ti OR (Evaluation NEXT Benchmark*):ab,ti OR (Evaluation NEXT Metric*):ab,ti OR (Evaluation NEXT Index):ab,ti OR (Evaluation NEXT Indices):ab,ti OR (Process NEXT Indicator*):ab,ti OR (Process NEXT Benchmark*):ab,ti OR (Process NEXT Metric*):ab,ti OR (Process NEXT Index):ab,ti OR (Process NEXT Indices):ab,ti OR (Outcome NEXT Indicator*):ab,ti OR (Outcome NEXT Benchmark*):ab,ti OR (Outcome NEXT Metric*):ab,ti OR (Outcome NEXT Index):ab,ti OR (Outcome NEXT Indices):ab,ti OR (Performance NEXT Indicator*):ab,ti OR (Performance NEXT Benchmark*):ab,ti OR (Performance NEXT Metric*):ab,ti OR (Performance NEXT Index):ab,ti OR (Performance NEXT Indices):ab,ti OR (Surveillance NEXT Indicator*):ab,ti OR (Surveillance NEXT Benchmark*):ab,ti OR (Surveillance NEXT Metric*):ab,ti OR (Surveillance NEXT Index):ab,ti OR (Surveillance NEXT Indices):ab,ti OR (Monitoring NEXT Indicator*):ab,ti OR (Monitoring NEXT Benchmark*):ab,ti OR (Monitoring NEXT Metric*):ab,ti OR (Monitoring NEXT Index):ab,ti OR (Monitoring NEXT Indices):ab,ti OR (Quality NEXT Indicator*):ab,ti OR (Quality NEXT Benchmark*):ab,ti OR (Quality NEXT Metric*):ab,ti OR (Quality NEXT Index):ab,ti OR (Quality NEXT Indices):ab,ti OR (Capacity NEXT Indicator*):ab,ti OR (Capacity NEXT Benchmark*):ab,ti OR (Capacity NEXT Metric*):ab,ti OR (Capacity NEXT Index):ab,ti OR (Capacity NEXT Indices):ab,ti OR (Governance NEXT Indicator*):ab,ti OR (Governance NEXT Benchmark*):ab,ti OR (Governance NEXT Metric*):ab,ti OR (Governance NEXT Index):ab,ti OR (Governance NEXT Indices):ab,ti OR (Availability NEXT Indicator*):ab,ti OR (Availability NEXT Benchmark*):ab,ti OR (Availability NEXT Metric*):ab,ti OR (Availability NEXT Index):ab,ti OR (Availability NEXT Indices):ab,ti OR (Affordability NEXT Indicator*):ab,ti OR (Affordability NEXT Benchmark*):ab,ti OR (Affordability NEXT Metric*):ab,ti OR (Affordability NEXT Index):ab,ti OR (Affordability NEXT Indices):ab,ti OR ("Risk Management" NEXT Indicator*):ab,ti OR ("Risk Management" NEXT Benchmark*):ab,ti OR ("Risk Management" NEXT Metric*):ab,ti OR ("Risk Management" NEXT Index):ab,ti OR ("Risk Management" NEXT Indices):ab,ti OR ("Service Delivery" NEXT Indicator*):ab,ti OR ("Service Delivery" NEXT Benchmark*):ab,ti OR ("Service Delivery" NEXT Metric*):ab,ti OR ("Service Delivery" NEXT Index):ab,ti OR ("Service Delivery" NEXT Indices):ab,ti OR (Impact NEXT Indicator*):ab,ti OR (Impact NEXT Benchmark*):ab,ti OR (Impact NEXT Metric*):ab,ti OR (Impact NEXT Index):ab,ti OR (Impact NEXT Indices):ab,ti OR (Care NEXT Indicator*):ab,ti OR (Care NEXT Benchmark*):ab,ti OR (Care NEXT Metric*):ab,ti OR (Care NEXT Index):ab,ti OR (Care NEXT Indices):ab,ti OR ("Health System" NEXT Indicator*):ab,ti OR ("Health System" NEXT Benchmark*):ab,ti OR ("Health System" NEXT Metric*):ab,ti OR ("Health System" NEXT Index):ab,ti OR ("Health System" NEXT Indices):ab,ti OR ("Health Facility" NEXT Indicator*):ab,ti OR ("Health Facility" NEXT Benchmark*):ab,ti OR ("Health Facility" NEXT Metric*):ab,ti OR ("Health Facility" NEXT Index):ab,ti OR ("Health Facility" NEXT Indices):ab,ti OR (Monitoring NEXT framework*):ab,ti OR ("Clinical management" NEXT

Database	Search
	guideline*):ab,ti OR ("Core outcome" NEXT set*):ab,ti OR ("Metric Selection" NEXT Process*):ab,ti OR ("Clinical control" NEXT parameter*):ab,ti OR (National NEXT registr*):ab,ti OR (National NEXT database*):ab,ti OR (Diabetes NEXT audit*):ab,ti OR ("Access to healthcare"):ab,ti OR ("Access to health care"):ab,ti OR (Healthcare NEXT service* NEXT availability):ab,ti OR ("Health care" NEXT service* NEXT availability):ab,ti OR (Healthcare NEXT access):ab,ti OR ("Health care" NEXT access):ab,ti OR ("Health economic" NEXT indicator*):ab,ti OR ("Productivity loss"):ab,ti OR ("Budget impact"):ab,ti OR ("Absenteeism"):ab,ti OR ("Economic evaluation"):ab,ti OR ("Cost of diabetes"):ab,ti OR (Socioeconomic NEXT disparit*):ab,ti OR ("Health equity"):ab,ti OR (Socioeconomic NEXT factor*):ab,ti OR ("Socio-economic" NEXT factor*):ab,ti OR (Social NEXT determinant* NEXT "of health"):ab,ti OR (Prevention NEXT strateg*):ab,ti OR ("Risk management" NEXT strateg*):ab,ti OR ("Risk factor management"):ab,ti OR ("Risk factor reduction"):ab,ti OR ("Self-management" NEXT strateg*):ab,ti OR ("Modifiable risk" NEXT behavi*):ab,ti OR (Behavioral NEXT determinant*):ab,ti OR (Behavioural NEXT determinant*):ab,ti OR (Behavioral NEXT risk*):ab,ti OR (Behavioural NEXT risk*):ab,ti OR ("Healthcare professional" NEXT engagement*):ab,ti OR ("Health professional" NEXT engagement*):ab,ti OR ("Public health" NEXT impact*):ab,ti OR ("Health policy effectiveness"):ab,ti OR ("Policy impact" NEXT metric*):ab,ti)) OR ((("Diabetes Evaluation"):ab,ti OR ("Diabetes Mellitus Evaluation"):ab,ti OR ("Diabetes Surveillance"):ab,ti OR ("Diabetes Mellitus Surveillance"):ab,ti OR ("Diabetes Monitoring"):ab,ti OR ("Diabetes Mellitus Monitoring"):ab,ti) AND ((Indicator*):ab,ti OR (Benchmark*):ab,ti OR (Metric*):ab,ti OR (Index):ab,ti OR (Indices):ab,ti))) AND ((Consensus):ab,ti OR (Framework*):ab,ti OR (Review*):ab,ti OR (Delphi):ab,ti)
Embase (n = 3859)	('diabetes' AND ('evaluation indicator*':ab,ti OR 'evaluation benchmark*':ab,ti OR 'evaluation metric*':ab,ti OR 'evaluation index':ab,ti OR 'evaluation indices':ab,ti OR 'process indicator*':ab,ti OR 'process benchmark*':ab,ti OR 'process metric*':ab,ti OR 'process index':ab,ti OR 'process indices':ab,ti OR 'outcome indicator*':ab,ti OR 'outcome benchmark*':ab,ti OR 'outcome metric*':ab,ti OR 'outcome index':ab,ti OR 'outcome indices':ab,ti OR 'performance indicator*':ab,ti OR 'performance benchmark*':ab,ti OR 'performance metric*':ab,ti OR 'performance index':ab,ti OR 'performance indices':ab,ti OR 'surveillance indicator*':ab,ti OR 'surveillance benchmark*':ab,ti OR 'surveillance metric*':ab,ti OR 'surveillance index':ab,ti OR 'surveillance indices':ab,ti OR 'monitoring indicator*':ab,ti OR 'monitoring benchmark*':ab,ti OR 'monitoring metric*':ab,ti OR 'monitoring index':ab,ti OR 'monitoring indices':ab,ti OR 'quality indicator*':ab,ti OR 'quality benchmark*':ab,ti OR 'quality metric*':ab,ti OR 'quality index':ab,ti OR 'quality indices':ab,ti OR 'capacity indicator*':ab,ti OR 'capacity benchmark*':ab,ti OR 'capacity metric*':ab,ti OR 'capacity index':ab,ti OR 'capacity indices':ab,ti OR 'governance indicator*':ab,ti OR 'governance benchmark*':ab,ti OR 'governance metric*':ab,ti OR 'governance index':ab,ti OR 'governance indices':ab,ti OR 'availability indicator*':ab,ti OR 'availability benchmark*':ab,ti OR 'availability metric*':ab,ti OR 'availability index':ab,ti OR 'availability indices':ab,ti OR 'affordability indicator*':ab,ti OR 'affordability benchmark*':ab,ti OR 'affordability metric*':ab,ti OR 'affordability index':ab,ti OR 'affordability indices':ab,ti OR 'risk management indicator*':ab,ti OR 'risk management benchmark*':ab,ti OR 'risk management metric*':ab,ti OR 'risk management index':ab,ti OR 'risk management indices':ab,ti OR 'service delivery indicator*':ab,ti OR 'service delivery benchmark*':ab,ti OR 'service delivery metric*':ab,ti OR 'service delivery index':ab,ti OR 'service delivery indices':ab,ti OR 'impact indicator*':ab,ti OR 'impact benchmark*':ab,ti OR 'impact metric*':ab,ti OR 'impact index':ab,ti OR 'impact indices':ab,ti OR 'care indicator*':ab,ti OR 'care benchmark*':ab,ti OR 'care metric*':ab,ti OR 'care index':ab,ti OR 'care indices':ab,ti OR 'health system indicator*':ab,ti OR 'health system benchmark*':ab,ti OR 'health system metric*':ab,ti OR 'health system index':ab,ti OR 'health system indices':ab,ti OR 'health facility indicator*':ab,ti OR 'health facility benchmark*':ab,ti OR 'health facility metric*':ab,ti OR 'health facility index':ab,ti OR 'health facility indices':ab,ti OR 'monitoring framework*':ab,ti OR 'clinical management guideline*':ab,ti OR 'core outcome set*':ab,ti OR 'metric selection process*':ab,ti OR 'clinical control parameter*':ab,ti OR 'national registr*':ab,ti OR 'national database*':ab,ti OR 'diabetes audit*':ab,ti OR 'access to healthcare':ab,ti OR 'access to health care':ab,ti OR 'healthcare service* availability':ab,ti OR 'health care service* availability':ab,ti OR 'healthcare access':ab,ti OR 'health care access':ab,ti OR 'health economic indicator*':ab,ti OR 'productivity loss':ab,ti OR 'budget impact':ab,ti OR 'absenteeism':ab,ti OR 'economic evaluation':ab,ti OR 'cost of diabetes':ab,ti OR 'socioeconomic disparit*':ab,ti OR 'health equity':ab,ti OR 'socioeconomic factor*':ab,ti OR 'socio-economic factor*':ab,ti OR 'social determinant* of health':ab,ti OR 'prevention strateg*':ab,ti OR 'risk management strateg*':ab,ti OR 'risk factor management':ab,ti OR 'risk factor reduction':ab,ti

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	OR 'self-management strateg*':ab,ti OR 'modifiable risk behavi*':ab,ti OR 'behavioral determinant*':ab,ti OR 'behavioural determinant*':ab,ti OR 'behavioral risk*':ab,ti OR 'behavioural risk*':ab,ti OR 'healthcare professional engagement*':ab,ti OR 'health professional engagement*':ab,ti OR 'public health impact*':ab,ti OR 'health policy effectiveness':ab,ti OR 'policy impact metric*':ab,ti) OR (('diabetes evaluation':ab,ti OR 'diabetes mellitus evaluation':ab,ti OR 'diabetes surveillance':ab,ti OR 'diabetes mellitus surveillance':ab,ti OR 'diabetes monitoring':ab,ti OR 'diabetes mellitus monitoring':ab,ti) AND ('indicator*':ab,ti OR 'benchmark*':ab,ti OR 'metric*':ab,ti OR 'index':ab,ti OR 'indices':ab,ti))) AND ('consensus':ab,ti OR 'framework*':ab,ti OR 'review*':ab,ti OR 'delphi':ab,ti)
CINAHL (n = 920)	((("Diabetes") AND (TI "Evaluation Indicator*" OR AB "Evaluation Indicator*" OR TI "Evaluation Benchmark*" OR AB "Evaluation Benchmark*" OR TI "Evaluation Metric*" OR AB "Evaluation Metric*" OR TI "Evaluation Index" OR AB "Evaluation Index" OR TI "Evaluation Indices" OR AB "Evaluation Indices" OR TI "Process Indicator*" OR AB "Process Indicator*" OR TI "Process Benchmark*" OR AB "Process Benchmark*" OR TI "Process Metric*" OR AB "Process Metric*" OR TI "Process Index" OR AB "Process Index" OR TI "Process Indices" OR AB "Process Indices" OR TI "Outcome Indicator*" OR AB "Outcome Indicator*" OR TI "Outcome Benchmark*" OR AB "Outcome Benchmark*" OR TI "Outcome Metric*" OR AB "Outcome Metric*" OR TI "Outcome Index" OR AB "Outcome Index" OR TI "Outcome Indices" OR AB "Outcome Indices" OR TI "Performance Indicator*" OR AB "Performance Indicator*" OR TI "Performance Benchmark*" OR AB "Performance Benchmark*" OR TI "Performance Metric*" OR AB "Performance Metric*" OR TI "Performance Index" OR AB "Performance Index" OR TI "Performance Indices" OR AB "Performance Indices" OR TI "Surveillance Indicator*" OR AB "Surveillance Indicator*" OR TI "Surveillance Benchmark*" OR AB "Surveillance Benchmark*" OR TI "Surveillance Metric*" OR AB "Surveillance Metric*" OR TI "Surveillance Index" OR AB "Surveillance Index" OR TI "Surveillance Indices" OR AB "Surveillance Indices" OR TI "Monitoring Indicator*" OR AB "Monitoring Indicator*" OR TI "Monitoring Benchmark*" OR AB "Monitoring Benchmark*" OR TI "Monitoring Metric*" OR AB "Monitoring Metric*" OR TI "Monitoring Index" OR AB "Monitoring Index" OR TI "Monitoring Indices" OR AB "Monitoring Indices" OR TI "Quality Indicator*" OR AB "Quality Indicator*" OR TI "Quality Benchmark*" OR AB "Quality Benchmark*" OR TI "Quality Metric*" OR AB "Quality Metric*" OR TI "Quality Index" OR AB "Quality Index" OR TI "Quality Indices" OR AB "Quality Indices" OR TI "Capacity Indicator*" OR AB "Capacity Indicator*" OR TI "Capacity Benchmark*" OR AB "Capacity Benchmark*" OR TI "Capacity Metric*" OR AB "Capacity Metric*" OR TI "Capacity Index" OR AB "Capacity Index" OR TI "Capacity Indices" OR AB "Capacity Indices" OR TI "Governance Indicator*" OR AB "Governance Indicator*" OR TI "Governance Benchmark*" OR AB "Governance Benchmark*" OR TI "Governance Metric*" OR AB "Governance Metric*" OR TI "Governance Index" OR AB "Governance Index" OR TI "Governance Indices" OR AB "Governance Indices" OR TI "Availability Indicator*" OR AB "Availability Indicator*" OR TI "Availability Benchmark*" OR AB "Availability Benchmark*" OR TI "Availability Metric*" OR AB "Availability Metric*" OR TI "Availability Index" OR AB "Availability Index" OR TI "Availability Indices" OR AB "Availability Indices" OR TI "Affordability Indicator*" OR AB "Affordability Indicator*" OR TI "Affordability Benchmark*" OR AB "Affordability Benchmark*" OR TI "Affordability Metric*" OR AB "Affordability Metric*" OR TI "Affordability Index" OR AB "Affordability Index" OR TI "Affordability Indices" OR AB "Affordability Indices" OR TI "Risk Management Indicator*" OR AB "Risk Management Indicator*" OR TI "Risk Management Benchmark*" OR AB "Risk Management Benchmark*" OR TI "Risk Management Metric*" OR AB "Risk Management Metric*" OR TI "Risk Management Index" OR AB "Risk Management Index" OR TI "Risk Management Indices" OR AB "Risk Management Indices" OR TI "Service Delivery Indicator*" OR AB "Service Delivery Indicator*" OR TI "Service Delivery Benchmark*" OR AB "Service Delivery Benchmark*" OR TI "Service Delivery Metric*" OR AB "Service Delivery Metric*" OR TI "Service Delivery Index" OR AB "Service Delivery Index" OR TI "Service Delivery Indices" OR AB "Service Delivery Indices" OR TI "Impact Indicator*" OR AB "Impact Indicator*" OR TI "Impact Benchmark*" OR AB "Impact Benchmark*" OR TI "Impact Metric*" OR AB "Impact Metric*" OR TI "Impact Index" OR AB "Impact Index" OR TI "Impact Indices" OR AB "Impact Indices" OR TI "Care Indicator*" OR AB "Care Indicator*" OR TI "Care Benchmark*" OR AB "Care Benchmark*" OR TI "Care Metric*" OR AB "Care Metric*" OR TI "Care Index" OR AB "Care Index" OR TI "Care Indices" OR AB "Care Indices" OR TI "Health System Indicator*" OR AB "Health System Indicator*" OR TI "Health System Benchmark*" OR AB "Health System Benchmark*" OR TI "Health System Metric*" OR AB "Health System Metric*" OR TI "Health System Index" OR AB "Health System Index" OR TI "Health System Indices"

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	OR AB “Health System Indices” OR TI “Health Facility Indicator*” OR AB “Health Facility Indicator*” OR TI “Health Facility Benchmark*” OR AB “Health Facility Benchmark*” OR TI “Health Facility Metric*” OR AB “Health Facility Metric*” OR TI “Health Facility Index” OR AB “Health Facility Index” OR TI “Health Facility Indices” OR AB “Health Facility Indices” OR TI “Monitoring framework*” OR AB “Monitoring framework*” OR TI “Clinical management guideline*” OR AB “Clinical management guideline*” OR TI “Core outcome set*” OR AB “Core outcome set*” OR TI “Metric Selection Process*” OR AB “Metric Selection Process*” OR TI “Clinical control parameter*” OR AB “Clinical control parameter*” OR TI “National registr*” OR AB “National registr*” OR TI “National database*” OR AB “National database*” OR TI “Diabetes audit*” OR AB “Diabetes audit*” OR TI “Access to healthcare” OR AB “Access to healthcare” OR TI “Access to health care” OR AB “Access to health care” OR TI “Healthcare service* availability” OR AB “Healthcare service* availability” OR TI “Health care service* availability” OR AB “Health care service* availability” OR TI “Healthcare access” OR AB “Healthcare access” OR TI “Health care access” OR AB “Health care access” OR TI “Health economic indicator*” OR AB “Health economic indicator*” OR TI “Productivity loss” OR AB “Productivity loss” OR TI “Budget impact” OR AB “Budget impact” OR TI “Absenteeism” OR AB “Absenteeism” OR TI “Economic evaluation” OR AB “Economic evaluation” OR TI “Cost of diabetes” OR AB “Cost of diabetes” OR TI “Socioeconomic disparit*” OR AB “Socioeconomic disparit*” OR TI “Health equity” OR AB “Health equity” OR TI “Socioeconomic factor*” OR AB “Socioeconomic factor*” OR TI “Socio-economic factor*” OR AB “Socio-economic factor*” OR TI “Social determinant* of health” OR AB “Social determinant* of health” OR TI “Prevention strateg*” OR AB “Prevention strateg*” OR TI “Risk management strateg*” OR AB “Risk management strateg*” OR TI “Risk factor management” OR AB “Risk factor management” OR TI “Risk factor reduction” OR AB “Risk factor reduction” OR TI “Self-management strateg*” OR AB “Self-management strateg*” OR TI “Modifiable risk behavi*” OR AB “Modifiable risk behavi*” OR TI “Behavioral determinant*” OR AB “Behavioral determinant*” OR TI “Behavioural determinant*” OR AB “Behavioural determinant*” OR TI “Behavioral risk*” OR AB “Behavioral risk*” OR TI “Behavioural risk*” OR AB “Behavioural risk*” OR TI “Healthcare professional engagement*” OR AB “Healthcare professional engagement*” OR TI “Health professional engagement*” OR AB “Health professional engagement*” OR TI “Public health impact*” OR AB “Public health impact*” OR TI “Health policy effectiveness” OR AB “Health policy effectiveness” OR TI “Policy impact metric*” OR AB “Policy impact metric*”)) OR ((TI “Diabetes Evaluation” OR AB “Diabetes Evaluation” OR TI “Diabetes Mellitus Evaluation” OR AB “Diabetes Mellitus Evaluation” OR TI “Diabetes Surveillance” OR AB “Diabetes Surveillance” OR TI “Diabetes Mellitus Surveillance” OR AB “Diabetes Mellitus Surveillance” OR TI “Diabetes Monitoring” OR AB “Diabetes Monitoring” OR TI “Diabetes Mellitus Monitoring” OR AB “Diabetes Mellitus Monitoring”) AND (TI “Indicator*” OR AB “Indicator*” OR TI “Benchmark*” OR AB “Benchmark*” OR TI “Metric*” OR AB “Metric*” OR TI “Index” OR AB “Index” OR TI “Indices” OR AB “Indices”))) AND (TI “Consensus” OR AB “Consensus” OR TI “Framework*” OR AB “Framework*” OR TI “Review*” OR AB “Review*” OR TI “Delphi” OR AB “Delphi”)
LILACS (n = 10)	‘(((“Diabetes”) AND ((ti:(“Evaluation Indicator”) OR ti:(“Evaluation Indicators”)) OR (ab:(“Evaluation Indicator”) OR ab:(“Evaluation Indicators”)) OR (ti:(“Evaluation Benchmark”) OR ti:(“Evaluation Benchmarks”)) OR (ab:(“Evaluation Benchmark”) OR ab:(“Evaluation Benchmarks”)) OR (ti:(“Evaluation Metric”) OR ti:(“Evaluation Metrics”)) OR (ab:(“Evaluation Metric”) OR ab:(“Evaluation Metrics”)) OR (ti:(“Evaluation Index”)) OR (ab:(“Evaluation Index”)) OR (ti:(“Evaluation Indices”)) OR (ab:(“Evaluation Indices”)) OR (ti:(“Process Indicator”) OR ti:(“Process Indicators”)) OR (ab:(“Process Indicator”) OR ab:(“Process Indicators”)) OR (ti:(“Process Benchmark”) OR ti:(“Process Benchmarks”)) OR (ab:(“Process Benchmark”) OR ab:(“Process Benchmarks”)) OR (ti:(“Process Metric”) OR ti:(“Process Metrics”)) OR (ab:(“Process Metric”) OR ab:(“Process Metrics”)) OR (ti:(“Process Index”)) OR (ab:(“Process Index”)) OR (ti:(“Process Indices”)) OR (ab:(“Process Indices”)) OR (ti:(“Outcome Indicator”) OR ti:(“Outcome Indicators”)) OR (ab:(“Outcome Indicator”) OR ab:(“Outcome Indicators”)) OR (ti:(“Outcome Benchmark”) OR ti:(“Outcome Benchmarks”)) OR (ab:(“Outcome Benchmark”) OR ab:(“Outcome Benchmarks”)) OR (ti:(“Outcome Metric”) OR ti:(“Outcome Metrics”)) OR (ab:(“Outcome Metric”) OR ab:(“Outcome Metrics”)) OR (ti:(“Outcome Index”)) OR (ab:(“Outcome Index”)) OR (ti:(“Outcome Indices”)) OR (ab:(“Outcome Indices”)) OR (ti:(“Performance Indicator”) OR ti:(“Performance Indicators”)) OR (ab:(“Performance Indicator”) OR ab:(“Performance Indicators”)) OR (ti:(“Performance Benchmark”) OR ti:(“Performance Benchmarks”)) OR (ab:(“Performance Benchmark”) OR ab:(“Performance Benchmarks”)) OR (ti:(“Performance Metric”) OR ti:(“Performance Metrics”)) OR (ab:(“Performance Metric”) OR

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health") OR ab:("Social determinants of health")) OR (ti:("Prevention strategy") OR ti:("Prevention strategies")) OR (ab:("Prevention strategy") OR ab:("Prevention strategies")) OR (ti:("Risk management strategy") OR ti:("Risk management strategies")) OR (ab:("Risk management strategy") OR ab:("Risk management strategies")) OR (ti:("Risk factor management")) OR (ab:("Risk factor management")) OR (ti:("Risk factor reduction")) OR (ab:("Risk factor reduction")) OR (ti:("Self-management strategy") OR ti:("Self-management strategies")) OR (ab:("Self-management strategy") OR ab:("Self-management strategies")) OR (ti:("Modifiable risk behavior") OR ti:("Modifiable risk behaviour") OR ti:("Modifiable risk behaviors") OR ti:("Modifiable risk behaviours")) OR (ab:("Modifiable risk behavior") OR ab:("Modifiable risk behaviour") OR ab:("Modifiable risk behaviors") OR ab:("Modifiable risk behaviours")) OR (ti:("Behavioral determinant") OR ti:("Behavioral determinants")) OR (ab:("Behavioral determinant") OR ab:("Behavioral determinants")) OR (ti:("Behavioural determinant") OR ti:("Behavioural determinants")) OR (ab:("Behavioural determinant") OR ab:("Behavioural determinants")) OR (ti:("Behavioral risk") OR ti:("Behavioral risks")) OR (ab:("Behavioral risk") OR ab:("Behavioral risks")) OR (ti:("Behavioural risk") OR ti:("Behavioural risks")) OR (ab:("Behavioural risk") OR ab:("Behavioural risks")) OR (ti:("Healthcare professional engagement") OR ti:("Healthcare professional engagements")) OR

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	(ab:("Healthcare professional engagement") OR ab:("Healthcare professional engagements")) OR (ti:("Health professional engagement") OR ti:("Health professional engagements")) OR (ab:("Health professional engagement") OR ab:("Health professional engagements")) OR (ti:("Public health impact") OR ti:("Public health impacts")) OR (ab:("Public health impact") OR ab:("Public health impacts")) OR (ti:("Health policy effectiveness")) OR (ab:("Health policy effectiveness")) OR (ti:("Policy impact metric") OR ti:("Policy impact metrics")) OR (ab:("Policy impact metric") OR ab:("Policy impact metrics")))) OR (((ti:("Diabetes Evaluation")) OR (ab:("Diabetes Evaluation")) OR (ti:("Diabetes Mellitus Evaluation")) OR (ab:("Diabetes Mellitus Evaluation")) OR (ti:("Diabetes Surveillance")) OR (ab:("Diabetes Surveillance")) OR (ti:("Diabetes Mellitus Surveillance")) OR (ab:("Diabetes Mellitus Surveillance")) OR (ti:("Diabetes Monitoring")) OR (ab:("Diabetes Monitoring")) OR (ti:("Diabetes Mellitus Monitoring")) OR (ab:("Diabetes Mellitus Monitoring"))) AND ((ti:("Indicator") OR ti:("Indicators")) OR (ab:("Indicator") OR ab:("Indicators")) OR (ti:("Benchmark") OR ti:("Benchmarks")) OR (ab:("Benchmark") OR ab:("Benchmarks")) OR (ti:("Metric") OR ti:("Metrics")) OR (ab:("Metric") OR ab:("Metrics")) OR (ti:("Index")) OR (ab:("Index")) OR (ti:("Indices")) OR (ab:("Indices"))))) AND ((ti:("Consensus")) OR (ab:("Consensus")) OR (ti:("Framework") OR ti:("Frameworks")) OR (ab:("Framework") OR ab:("Frameworks")) OR (ti:("Review") OR ti:("Reviews")) OR (ab:("Review") OR ab:("Reviews")) OR (ti:("Delphi")) OR (ab:("Delphi"))) Limited to English language

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