



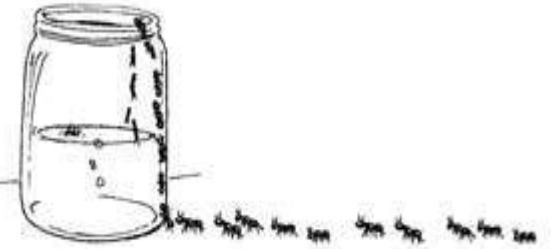
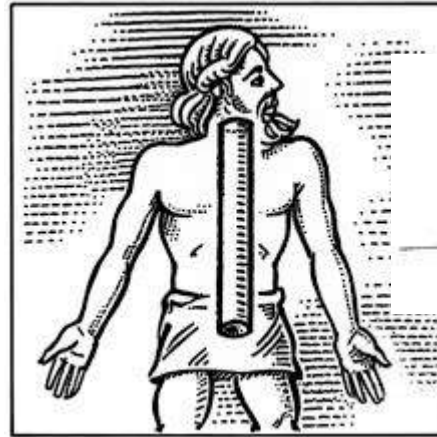
Diabetes Community Health

Dr. Israa Al-Rawashdeh MBBS, MPH, PhD
Faculty of Medicine
Mutah University
2025

Historical background



Diabetes Means Siphon



- The term ***diabetes*** comes from Greek ("to pass through") and *mellitus* from Latin ("sweet"), referring to excessive urination and sugar in urine.
- Diabetes has been known about for many centuries. Early records (5th century AD) noted two types: one in heavier, older individuals and another in thinner people with poorer survival.

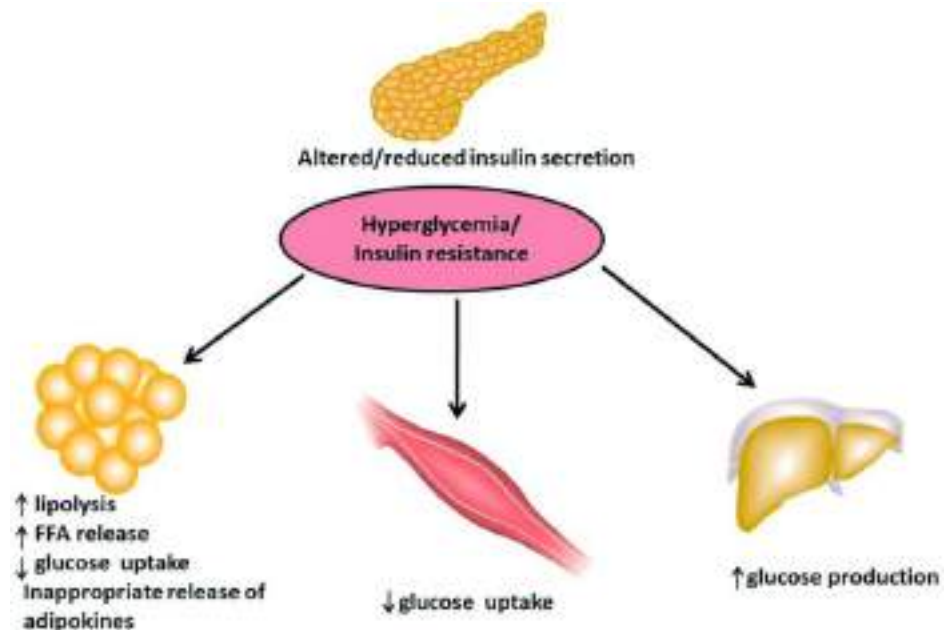
Definition

A group of metabolic disorders marked by **chronic hyperglycemia** when untreated. Its underlying causes vary and may involve:

- Impaired insulin secretion
- Reduced insulin effectiveness
- A combination of both
- These defects lead to disruptions in carbohydrate, fat, and protein metabolism (WHO, 2019)

Aetio- pathology of diabetes

- All diabetes types involve **pancreatic β -cell dysfunction/destruction** (**the human pancreas seems incapable of renewing β -cells after the age of 30 years**)
- **Key Pathways:**
- **Autoimmune in (T1DM):** Anti-GAD65/IA-2 antibodies destroy β -cells.
- **Metabolic in (T2DM):** Insulin resistance + progressive β -cell failure.
- Other Triggers:
 - Genetic/epigenetic factors
 - Chronic inflammation (e.g., obesity-linked)
 - Environmental triggers (viruses, toxins)



Definition



- ▶ **Hyperglycemia** or raised blood sugar is a common effect of uncontrolled diabetes
- **Prediabetes (Intermediate States) Impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG):**
 - **IFG:** Elevated fasting glucose (100-125 mg/dL)
 - **IGT:** Elevated post-meal glucose (140-199 mg/dL OGTT)
- **50% progress to diabetes within 10 years without intervention (ADA 2023).**

Table 3. Stages of Beta-Cell Dysfunction

Stage	Description
Stage 1: Compensation	Associated with higher overall rates of insulin secretion in an attempt to overcome the reduced insulin sensitivity, thereby maintaining normal blood glucose levels
Stage 2: Stable adaptation	While the beta-cells attempt to compensate for the reduced insulin sensitivity in this stage, blood glucose levels still rise between 5.0 and 6.5 mmol/L. At this point, beta-cell mass is lost and the normal functioning of the beta-cells begins to be disrupted
Stage 3: Unstable early decompensation	During this transient phase, glucose levels rise to those seen in stage 4. Associated with an inadequate beta-cell mass, this stage progresses relatively quickly
Stage 4: Stable decompensation	Most individuals with T2DM remain in this stage for the rest of their lives, while some progress to stage 5. Individuals in this stage typically demonstrate severe beta-cell differentiation
Stage 5: Severe decompensation	Represents a profound reduction in beta-cell mass and progression to ketoacidosis

Source: Reference 19.

<https://www.uspharmacist.com/article/prediabetes-management-44469>

WHO Diabetes Classification (2019)

Main types

Type 1 Diabetes

Autoimmune β -cell destruction (absolute insulin deficiency)

Type 2 Diabetes

Insulin resistance + progressive β -cell dysfunction

Hyperglycemia in Pregnancy

Gestational DM (GDM): Onset during pregnancy

Preexisting DM (Type 1/2): Diagnosed during pregnancy

Hybrid/Other Types:

Slowly evolving immune-mediated diabetes (LADA)

Ketosis-prone T2DM

Monogenic diabetes (e.g., MODY, neonatal diabetes)

Secondary causes:

Pancreatic diseases (e.g., pancreatitis)

Endocrine disorders (e.g., Cushing's)

Drug-induced (e.g., steroids)

Unclassified Diabetes

Temporary category for unclear cases at diagnosis

Post-COVID-19 diabetes: Added as new etiology due to SARS-CoV-2 impact on β -cells (WHO 2023)

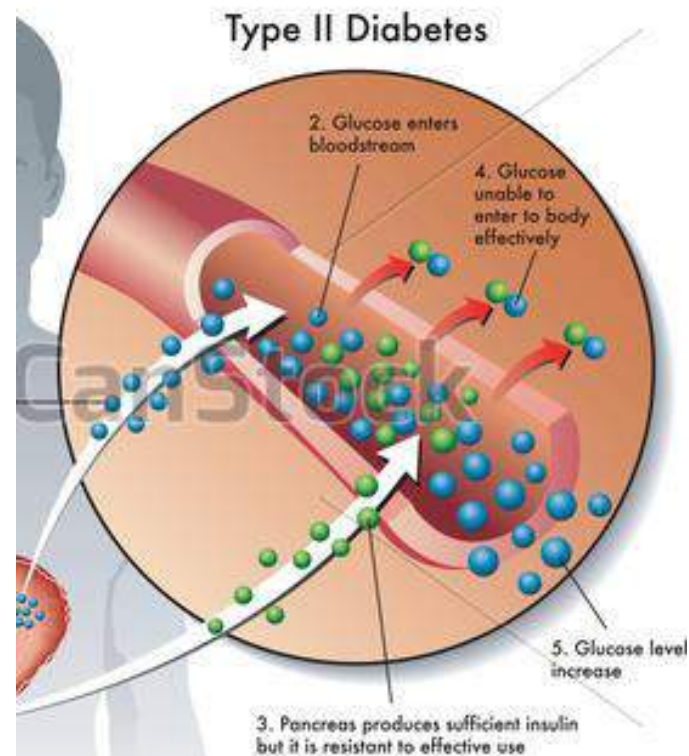
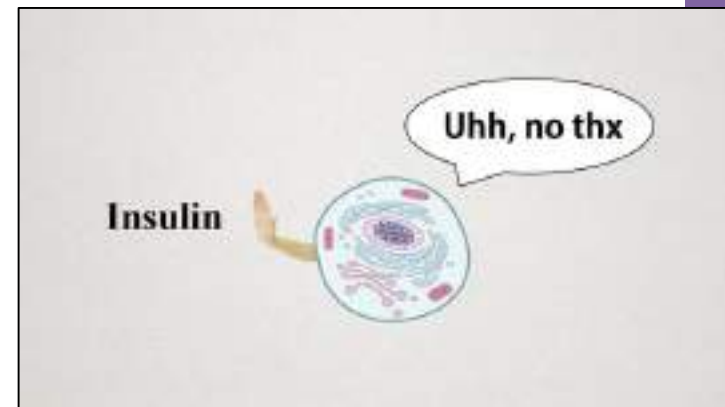
Type 1 diabetes (T1DM):

- ❖ Previously known as insulin-dependent or childhood-onset diabetes IDDM.
- ❖ Pathology: Autoimmune destruction of β -cells (70-80% have anti-GAD65/IA-2/ZnT8 antibodies)
- ❖ Characterized by a lack of insulin production.
- ❖ Onset: Rapid (classic) or slow (LADA); peak ages <25 but can occur at any age.
- ❖ Males and females are equally affected.
- ❖ Absolute insulin deficiency (lifelong insulin required)
- ❖ Lean phenotype (typically)
- ❖ Accounts for 5-10% of global diabetes cases




Type 2 diabetes mellitus (T2DM)

- ❖ Formerly called Non-Insulin-Dependent Diabetes Mellitus (NIDDM) or adult-onset diabetes.
- **Pathology:** Insulin resistance + progressive β -cell failure
- **Onset:** Insidious; usually >35-40 years (now rising in youth)
- **Key Traits:**
 - Obesity/metabolic syndrome (80% cases)
 - Initial management: Lifestyle + oral agents (e.g., metformin)
 - Accounts for **90-95%** of global cases

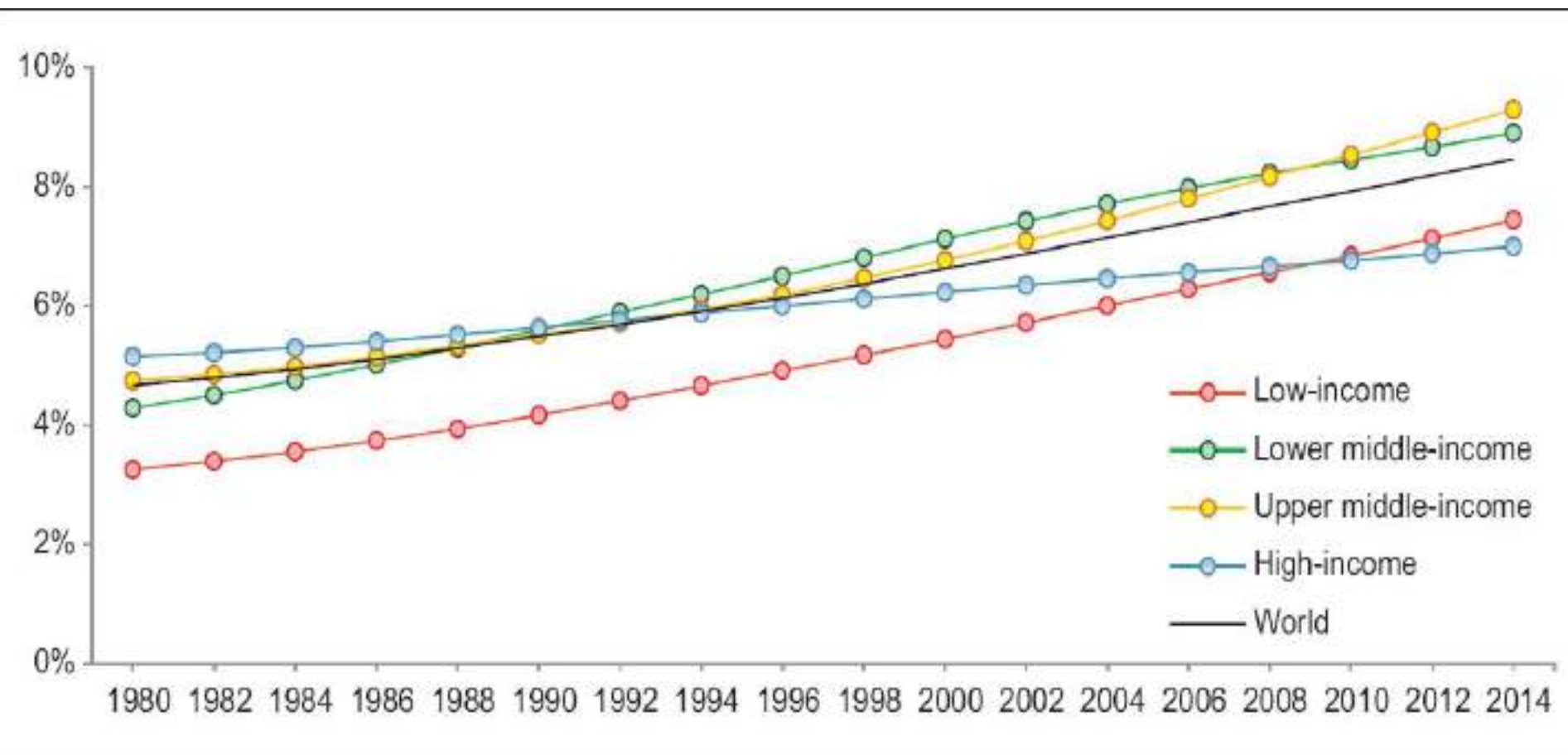


stock Photo - csp19194167

Global & Jordan-Specific Epidemiology

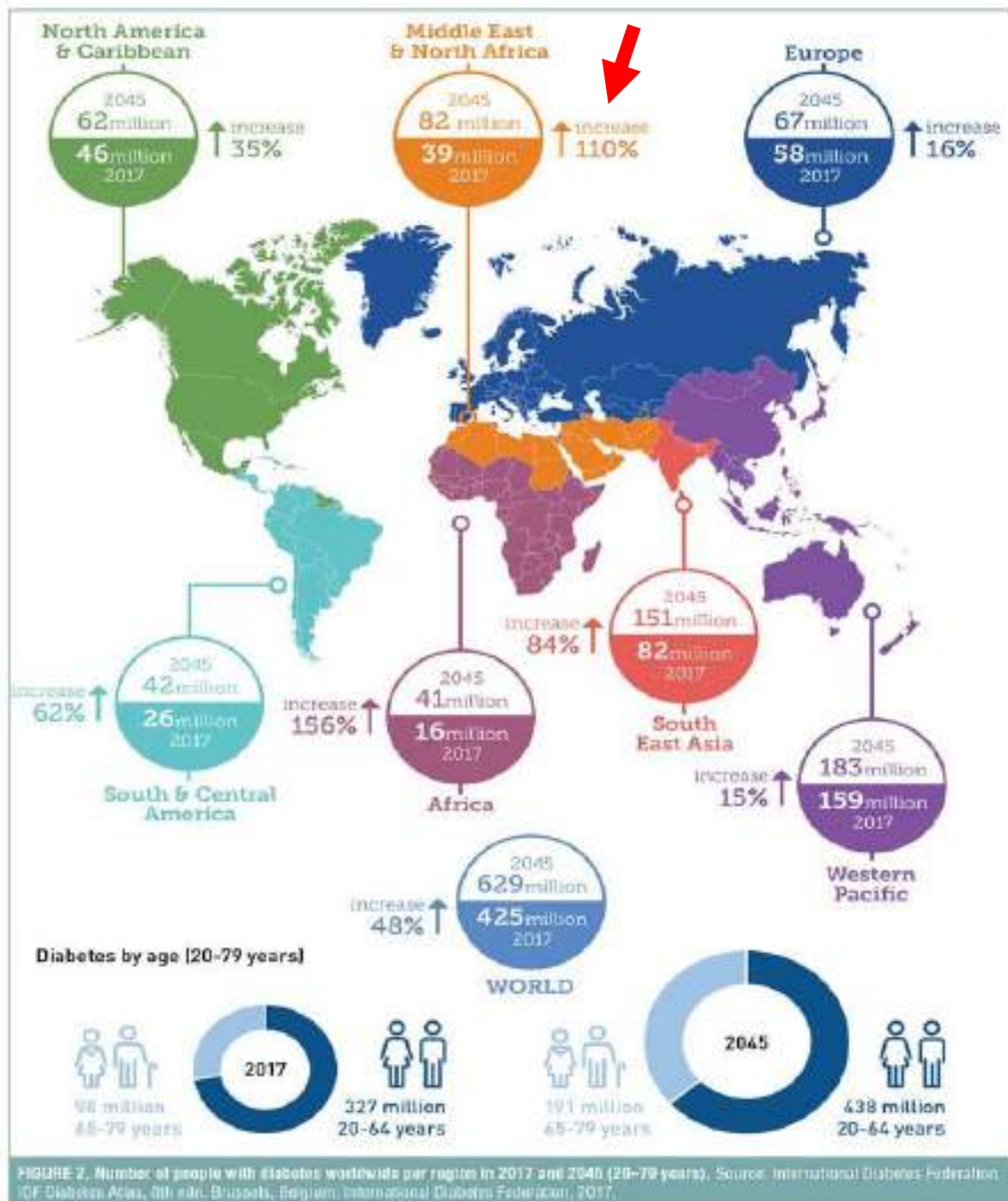
- Diabetes affects all populations and regions worldwide.
- **Global Burden:**
 - 7th leading cause of death (2M+ deaths/year) (WHO 2023)
 - 50% deaths occur prematurely <70 years
 - One in two (50.1%) people living with diabetes do not know that they have diabetes.
- **Jordan's Situation:**
 - **T2DM:** 23% adults (↑42% since 2008) (IDF Atlas 2021; Jordanian Ministry of Health 2023)
 - **Risk Factors:** Obesity (40%) (BMI ≥ 30), **72% overweight (BMI ≥ 25)** (WHO STEPwise Survey 2022)
 - Inactivity (35%)
 - Aging
- Accounts for **12% of annual deaths** in Jordan (Global Burden of Disease 2023)
- **Economic burden:** 15% of healthcare spending directed to diabetes complications
- **Youth-onset T2DM:** Rising cases linked to childhood obesity (18% in adolescents)
- **T1DM: 5.1/100k children (↑40% since 1990s)**
- Male-to-female ratio: 1:1.03
-  **Winter surge:** 2× higher diagnoses in cold months
- 38% present with life-threatening DKA
- Vitamin D deficiency in 85% of cases

Trends in prevalence of diabetes, 1980-2014, by country income group

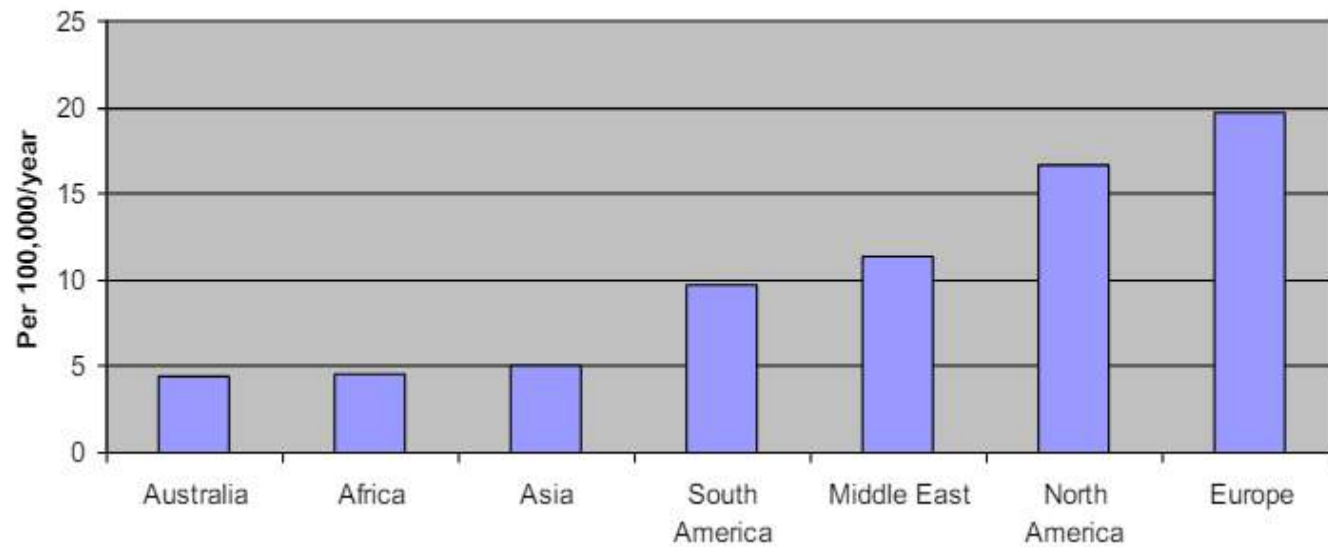


Over the past decades, the greatest rise in low- and middle-income countries compared to high-income countries.

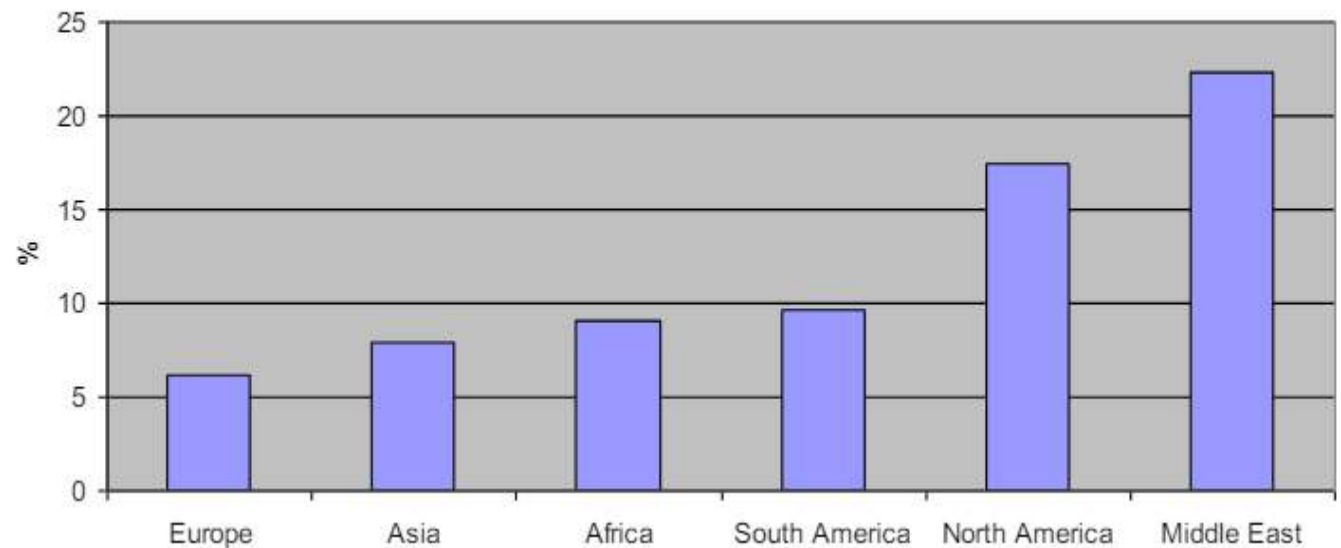
- If trends continue, the IDF predicts that an estimated 629 million people worldwide will be living with diabetes by 2045.



Global Incidence of type I DM



Global prevalence of type II DM



Diabetes mellitus is highly prevalent in the Middle East.

Risk factors for T2DM (2024 Evidence-Based)



Family history



Lack of exercise



Unhealthy eating



Overweight

Aetiology of T2DM is **multifactorial!**

Non-Modifiable factors:

- **Age ≥ 35 years** (or ≥ 18 years for high-risk ethnic groups)
- **Family history:** 1st-degree relative with diabetes
- **Ethnicity:** South Asian, Middle Eastern, African-Caribbean, Hispanic, Pacific Islander
- **History of GDM** or baby >4 kg at birth

Modifiable Risks

- **Obesity:**
 - BMI ≥ 25 kg/m² (≥ 23 for Asians)
 - Waist circumference: >94 cm (M), >80 cm (F) (*IDF 2023 criteria*)
- **Metabolic syndrome:**
 - HDL <40 mg/dL (M), <50 mg/dL (F) + Triglycerides ≥ 150 mg/dL
 - BP $\geq 130/85$ mmHg or treated hypertension
- **Lifestyle:**
 - Sedentary behavior (<150 min/week moderate activity)
 - Processed diet (low fiber, high glycemic load)
- **Emerging Risks:**
- **Sleep disorders** (Obstructive Sleep Apnea, chronic insomnia)
- **Environmental toxins** (e.g., BPA, air pollution)

Hyperglycaemia in pregnancy

1. Diabetes Mellitus in Pregnancy : **defined by the same criteria as in non-pregnant persons.**

2. Gestational Diabetes Mellitus (GDM)

- **Diagnosis (1 abnormal value):**
 - **75g OGTT (24-28 weeks):**
 - Fasting: ≥ 5.1 mmol/L (92 mg/dL)
 - 1-hr: ≥ 10.0 mmol/L (180 mg/dL)
 - 2-hr: ≥ 8.5 mmol/L (153 mg/dL)
- **Long-Term Risks:**
 - 50% risk of T2DM within 10 years
 - 30% recurrence in future pregnancies
- **Screen all pregnant women** (universal screening preferred)
- **Postpartum follow-up:**
 - Repeat OGTT at 6-12 weeks
 - Annual diabetes screening if normal



2. Diagnosis test



Risk factors and risk markers for Gestational diabetes

- **Maternal Factors:**
 - Age ≥ 35 years
 - Pre-pregnancy BMI ≥ 25 (≥ 23 for Asian women) (*IDF 2023*)
 - Excessive pregnancy weight gain
 - **Previous GDM** (7x higher risk)
 - **Macrosomia history** (baby >4.1 kg)
- **Metabolic/Genetic:**
 - First-degree relative with diabetes
 - PCOS or prediabetes (HbA1c 5.7-6.4%)
- **Pregnancy-Related:**
 - Glycosuria in early pregnancy
 - History of stillbirth/unexplained fetal loss

Diabetes in pregnancy and GDM increase the risk of future obesity and type 2 diabetes in offspring.

Diabetes Symptoms & Signs (2024 Clinical Guide)

Symptoms of diabetes:

Classic Symptoms:

Polyuria: Frequent urination (>3L/day)

Polydipsia: Excessive thirst

Polyphagia + weight loss (despite eating)

Fatigue & irritability

Blurred vision (osmotic lens changes)

Signs of Diabetes:

Acute Decompensation (DKA):

Kussmaul breathing (deep, rapid)

Fruity breath (acetone)

Altered consciousness → coma

Chronic Complications:

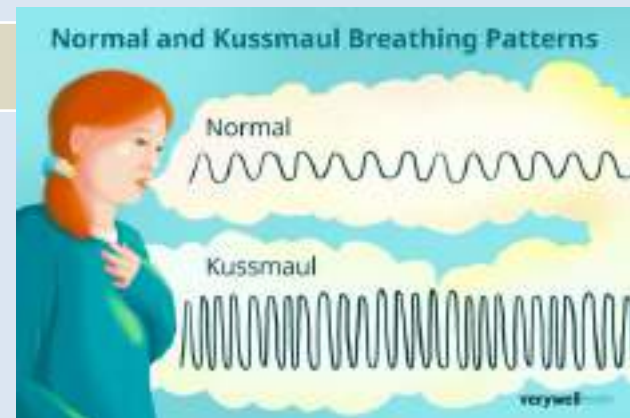
Microvascular:

Non-healing ulcers / recurrent infections (UTI, vulvovaginal, skin)

Vision loss (retinopathy) / numbness (neuropathy)

Macrovascular:

Chest pain (CAD) / sudden weakness (stroke)



Clinical presentation

- The course of T2DM is usually insidious!
- **T2DM Clinical Presentation is**
Often **asymptomatic for years**; 30-50% have complications at diagnosis.
- **Screen early** ($\text{HbA1c} \geq 5.7\%$) to prevent irreversible damage

Diagnosis tests and criteria

- **Diabetes Diagnostic Tests (ADA 2024)**

1. **Fasting Plasma Glucose (FPG)**

- ≥ 126 mg/dL (7.0 mmol/L) (8h fast)

2. **Oral Glucose Tolerance Test (OGTT)**

- 2-hr ≥ 200 mg/dL (11.1 mmol/L) (75g glucose load)

3. **HbA1c**

- $\geq 6.5\%$

4. **Random Glucose**

- ≥ 200 mg/dL + symptoms (polyuria, polydipsia, weight loss)

- **Note:** Confirm with **repeat testing** (unless symptomatic hyperglycemia).



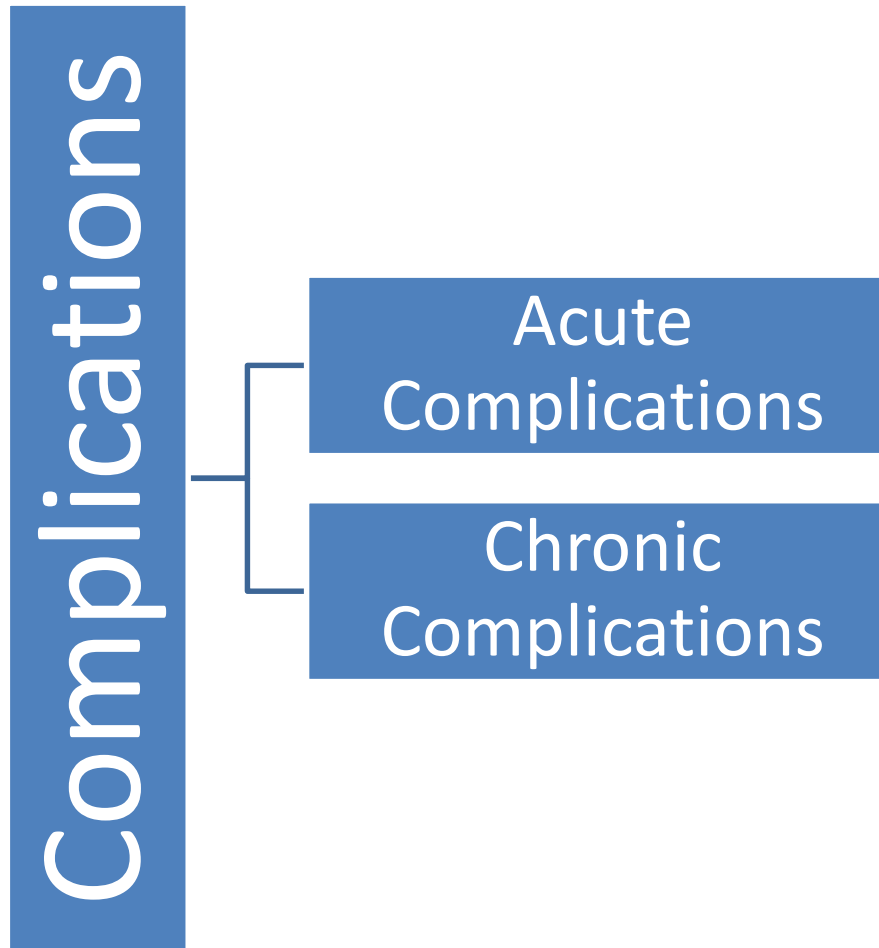
Prediabetes: Key Definitions & Risks

Category	Diagnostic Criteria	10-Year Progression to T2DM	Clinical Action
IFG	Fasting glucose: 100-125 mg/dL	50% risk	Lifestyle intervention (5-7% weight loss)
IGT	2-hr OGTT: 140-199 mg/dL	Higher CVD risk than IFG	+ Metformin if BMI \geq 35 or age $<$ 60
HbA1c Prediabetes	5.7-6.4%	Average progression: $<$ 3 years	Annual monitoring + diabetes prevention program

Road to T2DM

	A1C Test	Fasting Blood Sugar Test	Glucose Tolerance Test
Diabetes	6.5% or Above	126 mg/dl or above	200 mg/dl or above
Prediabetes	5.7 - 6.4%	100 -125 mg/dl	140 - 199 mg/dl
Normal	Below 5.7%	99 mg/dl or below	140 mg/dl or below

Complications



Acute complications of diabetes

- Two important acute complications are hypoglycaemia and hyperglycaemic emergencies:
- **Hypoglycemia** (≤ 70 mg/dL): Hunger, sweating, confusion, seizures, coma
- **Hyperglycemic Crises:**
 - Diabetic ketoacidosis *DKA*: High ketones + pH < 7.3 + glucose > 250 mg/dL
 - hyperosmolar hyperglycaemic state *HHS*: No ketones + osm > 320 + glucose > 600 mg/dL

Chronic complications of diabetes

- **Macro vascular complications:** 2-4× higher risk of heart disease, stroke, limb ischemia
- **Microvascular complications:**
 - ***Retinopathy:*** Leading cause of blindness
 - ***Nephropathy:*** ESRD within 5-7 years if proteinuric
 - ***Neuropathy:*** *The most common forms are distal symmetrical peripheral neuropathy, which is predominantly sensory. Sensory loss → foot ulcers → amputations (Diabetic foot).*

Prevention

- **Type 1 Diabetes**

Currently **no known prevention** methods

- **Type 2 Diabetes (Primary Prevention)**

✓ **Lifestyle Modifications:**

Weight loss: 5-7% of body weight

Physical activity: 150 min/week (e.g., brisk walking)

- By losing 5-7% of their body weight and getting 150 minutes of physical activity a week, people with prediabetes can cut their risk of developing type 2 diabetes by more than half.
- **IDF recommends physical activity at least between three to five days a week, for a minimum of 30-45 minutes.**

Healthy diet: High fiber, low refined carbs & fats

Smoking cessation

✓ **High-Risk Groups (Prediabetes):**

Metformin (if BMI ≥ 35 or age < 60)

Annual screening (HbA1c/OGTT)

✓ **Community Interventions:**

Public health campaigns

Workplace/school wellness programs



Prevention

- **Secondary Prevention of Diabetes:**

- ✓ **Early Detection:**

Regular screening for complications (retinopathy, nephropathy, neuropathy)

Annual HbA1c & lipid profile

- ✓ **Glycemic Control:**

Target HbA1c <7% (individualized)

Continuous glucose monitoring (CGM) for T1DM/unstable T2DM

- ✓ **Acute Complication Prevention:**

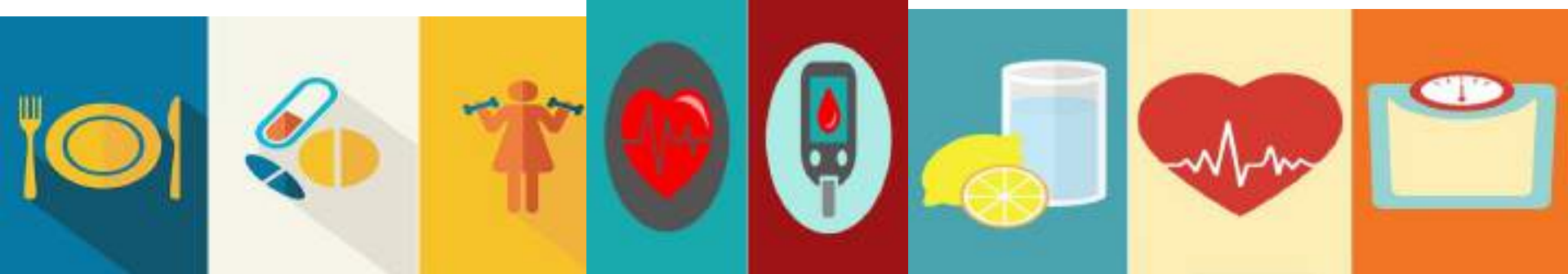
Hypoglycemia: Patient education on recognition/treatment

DKA/HHS: Sick-day management protocols

- ✓ **Cost-Effective Measures:**

Foot care programs → Daily foot check for ulcers, Reduce amputations by 50%

Vaccinations (flu, pneumococcal) → Lower infection risks



Treatment:
The aim is to maintain serum glucose level within normal.

Lifestyle Therapy (All Types)

Pharmacotherapy

💊 T1DM:

Lifelong insulin (basal-bolus or pump therapy)

💊 T2DM:

First-line: Metformin (+ lifestyle)



Add-ons:

Sulfonylureas (increase insulin secretion)

GLP-1 RAs/SGLT2i (cardio-renal benefits)

Insulin (if oral agents fail)

Complications management

- **The aim** is to treat complications and **rehabilitate** patient to lead a life as normal as possible.
- **Complication Prevention**
-  **Annual Screenings:**
- **Retinopathy, Nephropathy and Neuropathy.**
-  **Timing:**
- **T1DM:** Start screenings 5 years post-diagnosis (if age >15)
- **T2DM:** Begin at diagnosis

THANK YOU

<https://www.who.int/publications/i/item/who-ucn-ncd-20.1>

