

Epidemiology of Diabetes Mellitus

Dr Ambreen Kazi Kamran

Assistant Professor

Princess Nora Research Chair for Women Health

Dept. of Family & Community Medicine

College of Medicine, KSU

Objectives

- To list the types of Diabetes Mellitus
- To describe the prevalence of Diabetes Mellitus
- To recognize the importance of diagnostic criteria for estimating the prevalence of diabetes mellitus
- To discuss the risk factors and complications of type II diabetes mellitus

Definition

A metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both

Types of diabetes

- Type 1: sudden onset absolute deficiency in insulin. Usually affects younger age group (not always)
- Type 2: gradual onset of relative insulin insensitivity. Usually older age group (not always)
- Gestational diabetes: Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy

Types of diabetes

- Secondary diabetes: The diabetes is not the main illness, a secondary condition that results because of the main illness. If it is possible to treat the main illness successfully the diabetes may/will disappear e.g. cystic fibrosis, chronic pancreatitis, infections.
- Pre-diabetes: Impaired glucose tolerance A person with pre-diabetes has a blood sugar level higher than normal, but not high enough for a diagnosis of diabetes; & is at higher risk for developing type 2 diabetes. May remain undiagnosed for years; risk of complications same as for T2DM

Diagnosis

- Thirst
- Passing lots of urine
- Malaise
- Infections (thrush)
- Weight loss

Diagnosis:

- Random plasma glucose
- Fasting plasma glucose
- Oral glucose tolerance test – 2h glucose

Diagnosis

1. Symptoms of diabetes plus casual plasma glucose concentration ≥ 200 mg/dl (11.1 mmol/l). Casual is defined as any time of day without regard to time since last meal. The classic symptoms of diabetes include polyuria, polydipsia, and unexplained weight loss. OR

2. FPG ≥ 126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 h. OR

3. 2-h postload glucose ≥ 200 mg/dl (11.1 mmol/l) during an OGTT. The test should be performed as described by WHO, using a glucose load containing the equivalent of 75 gms glucose dissolved in water.

Ref: Diagnosis and Classification of Diabetes Mellitus American Diabetes Association Diabetes Care 2006 Jan; 29(suppl 1): s43-s48

Diagnosis

- The corresponding categories when the OGTT is used are the following:
- 2-h postload glucose <140 mg/dl (7.8 mmol/l) = normal glucose tolerance;
- 2-h postload glucose 140–199 mg/dl (7.8–11.1 mmol/l) = IGT (impaired glucose tolerance);
- 2-h postload glucose ≥ 200 mg/dl (11.1 mmol/l) = provisional diagnosis of diabetes (the diagnosis must be confirmed)

Diagnosis

- The International committee on DM, recognized an intermediate group of subjects whose glucose levels, although not meeting criteria for diabetes, are nevertheless too high to be considered normal.

The categories of FPG values are as follows:

- FPG <100 mg/dl (5.6 mmol/l) = normal fasting glucose;
- FPG 100–125 mg/dl (5.6–6.9 mmol/l) = IFG (impaired fasting glucose);
- FPG ≥ 126 mg/dl (7.0 mmol/l) = provisional diagnosis of diabetes (the diagnosis must be confirmed)

Why is diabetes so important?

- The burden to patients and the family
- Burden for the health system

Complications

- Cardiovascular
- Eyes
- Renal - Hypertension, renal failure
- Feet and Skin infections,
- sexual, psycho-sexual, depression
- Quality of life
- Premature mortality

Global Prevalence of Diabetes

- Prevalence worldwide is increasing
- 2.8% in 2000;4.4% in 2030 worldwide (171 million in 2000; 366 million in 2030)
- DM worldwide was already 366 million by 2011
- The prevalence increased to 382 millions (8.2%) by 2013
- There is a large % that is undiagnosed as well as a large % at high risk of developing DM
- A huge percentage of the reported diabetics are in the 40-59 age group, among whom 80% live in countries with low and middle-income economies

Global Prevalence of Diabetes

- In 2013, about half of all diabetes-related deaths in adults were in the age group below 60 years.
- Every six seconds there is a diabetes-related death and in the more poorly-developed regions
- 35 out of 219 countries [16% of the total] show very high prevalence of diabetes, more than 12%
- These countries fall mainly in the regions of the Western Pacific, North Africa and Middle East

Estimated prevalence and number of people with diabetes (adults 18+ years)

| WHO Region | Prevalence (%) | | Number (millions) | |
|------------------------------|----------------|-------------|-------------------|------------|
| | 1980 | 2014 | 1980 | 2014 |
| African Region | 3.1% | 7.1% | 4 | 25 |
| Region of the Americas | 5% | 8.3% | 18 | 62 |
| Eastern Mediterranean Region | 5.9% | 13.7% | 6 | 43 |
| European Region | 5.3% | 7.3% | 33 | 64 |
| South-East Asia Region | 4.1% | 8.6% | 17 | 96 |
| Western Pacific Region | 4.4% | 8.4% | 29 | 131 |
| Total^a | 4.7% | 8.5% | 108 | 422 |

a. Totals include non-Member States.

Source: (4).

Regional and local prevalence

- Six of the top ten countries having the highest prevalence rates of diabetes globally are found in the Gulf region, viz., Kuwait, Lebanon, Qatar, Bahrain, UAE and Saudi Arabia
- Bahrain 15.4%; Kuwait 14.6%; UAE 18.7%; Qatar 15.4%
- There are 20 Arab countries in which nearly 20.5 million people are living with diabetes and another 13.7 million are in the pre-diabetes stage, with Impaired Glucose Tolerance (IGT)
- The number of deaths attributed to diabetes in Saudi Arabia is about 170,000 adults, which is greater than 10% of all deaths in the country

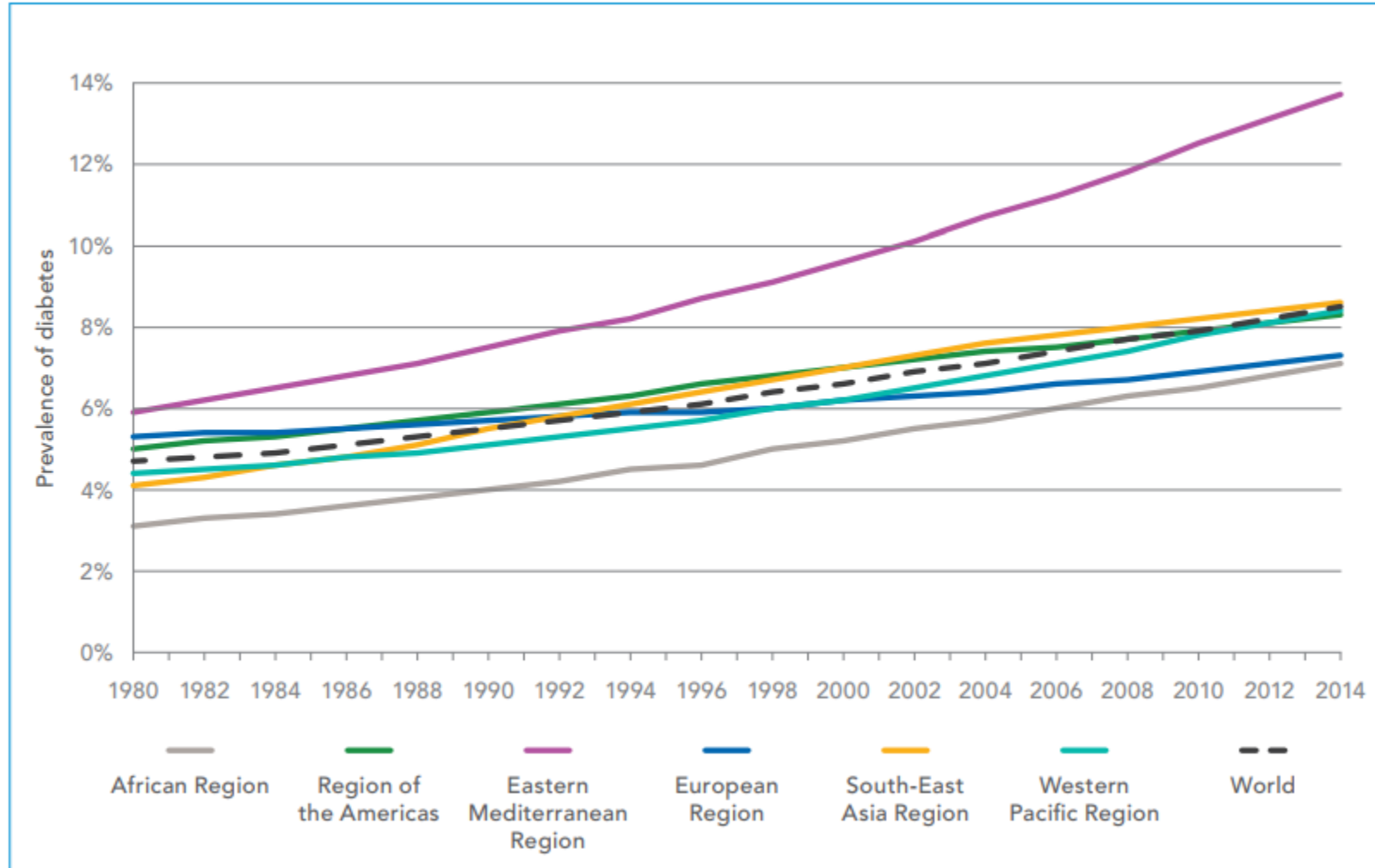
Diabetes prevalence (% of population ages 20 to 79)

| Rank | Country | % | Year |
|------|--------------------------------------|-------|------|
| 1 | Tuvalu | 27.25 | 2017 |
| 2 | Nauru | 24.07 | 2017 |
| 3 | New Caledonia | 23.36 | 2017 |
| 4 | Kiribati | 22.66 | 2017 |
| 5 | Mauritius | 22.02 | 2017 |
| 6 | Solomon Islands | 18.68 | 2017 |
| 7 | Saudi Arabia | 17.72 | 2017 |
| 8 | Papua New Guinea | 17.65 | 2017 |
| 9 | Egypt | 17.31 | 2017 |
| 10 | United Arab Emirates | 17.26 | 2017 |

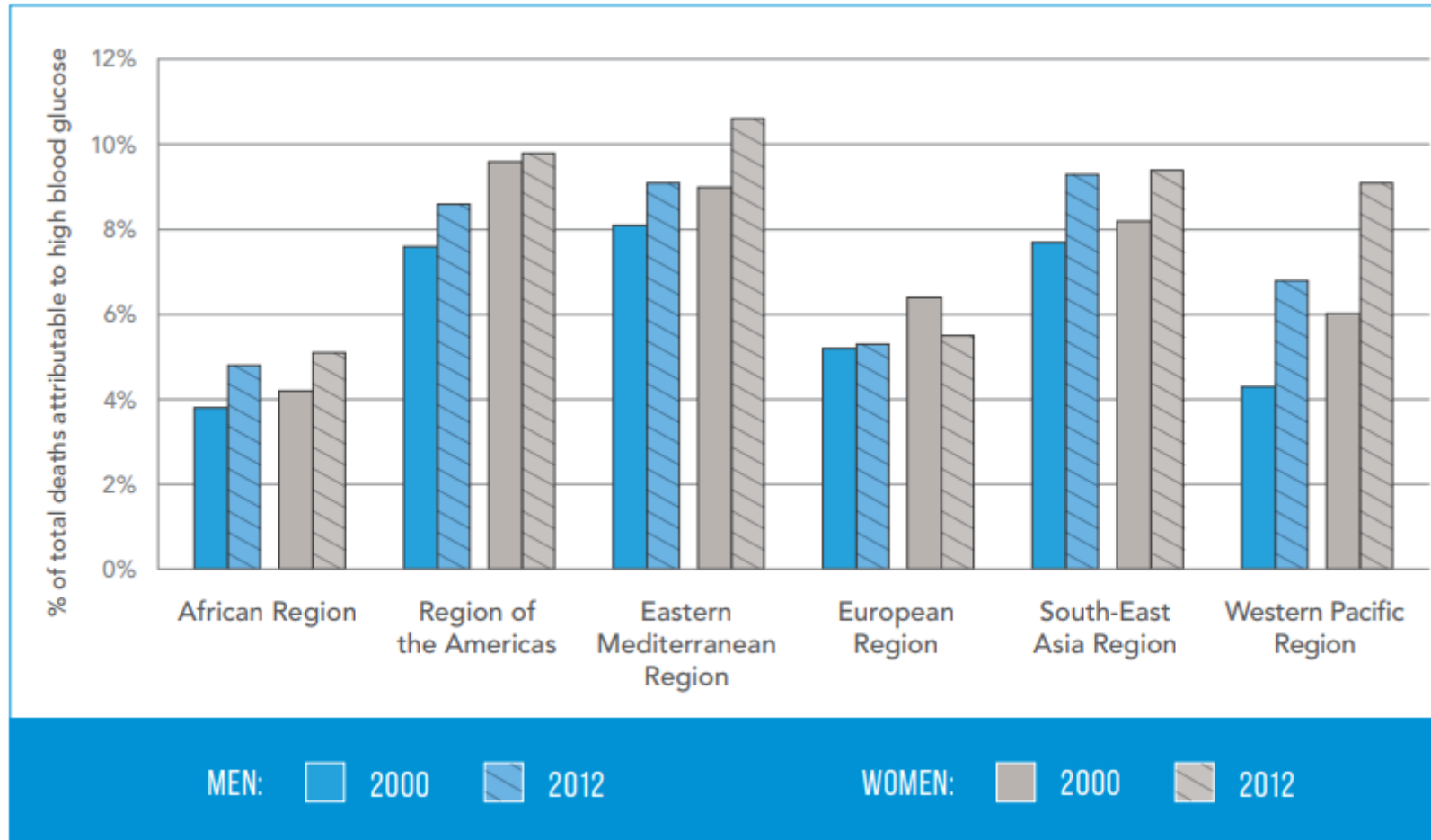
High blood glucose age-standardized mortality rates per 100000 by WHO region, age 20+, 2012

| | Both sexes | Female | Male |
|------------------------------|------------|--------|-------|
| African Region | 111.3 | 110.9 | 111.1 |
| Region of the Americas | 72.6 | 63.9 | 82.8 |
| Eastern Mediterranean Region | 139.6 | 140.2 | 138.3 |
| European Region | 55.7 | 46.5 | 64.5 |
| South-East Asia Region | 115.3 | 101.8 | 129.1 |
| Western Pacific Region | 67 | 65.8 | 67.8 |

Trends in prevalence of diabetes, 1980–2014, by WHO region

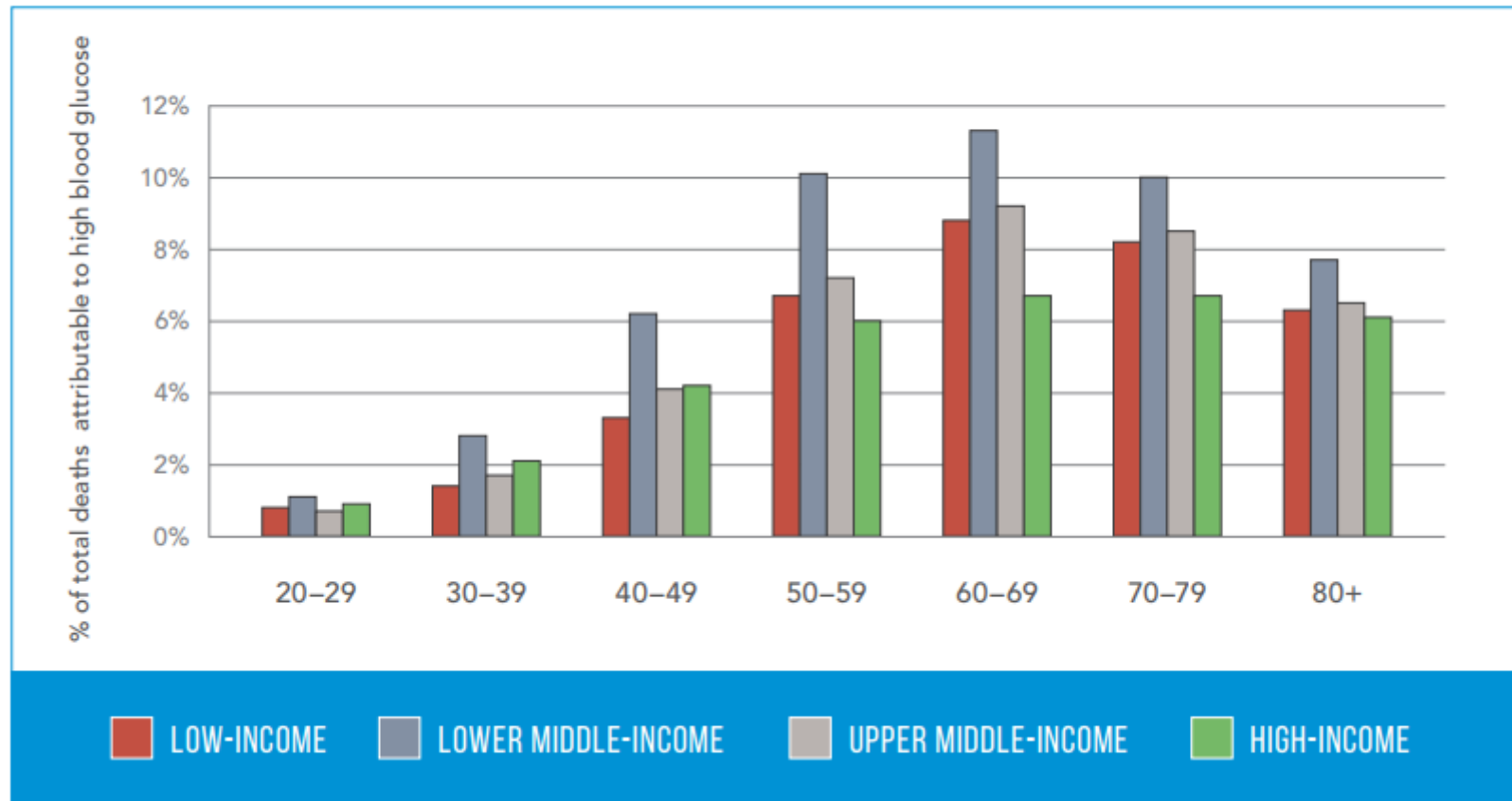


Percentage of all deaths attributable to high blood glucose for adults aged 20–69 years, by WHO region and sex, 2000 and 2012



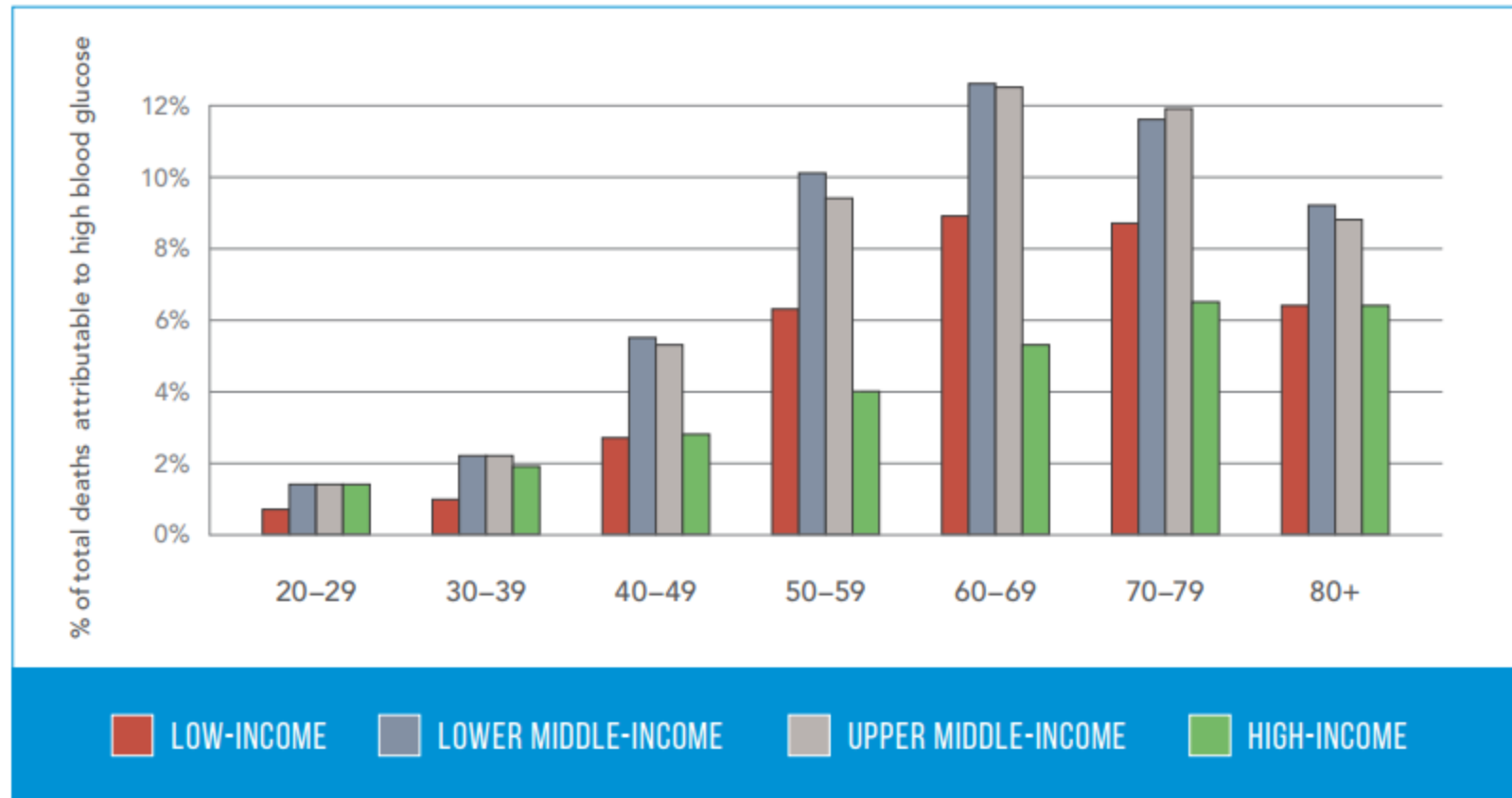
Percentage of all-cause deaths globally attributed to high blood glucose in men, 2012

A (MEN)



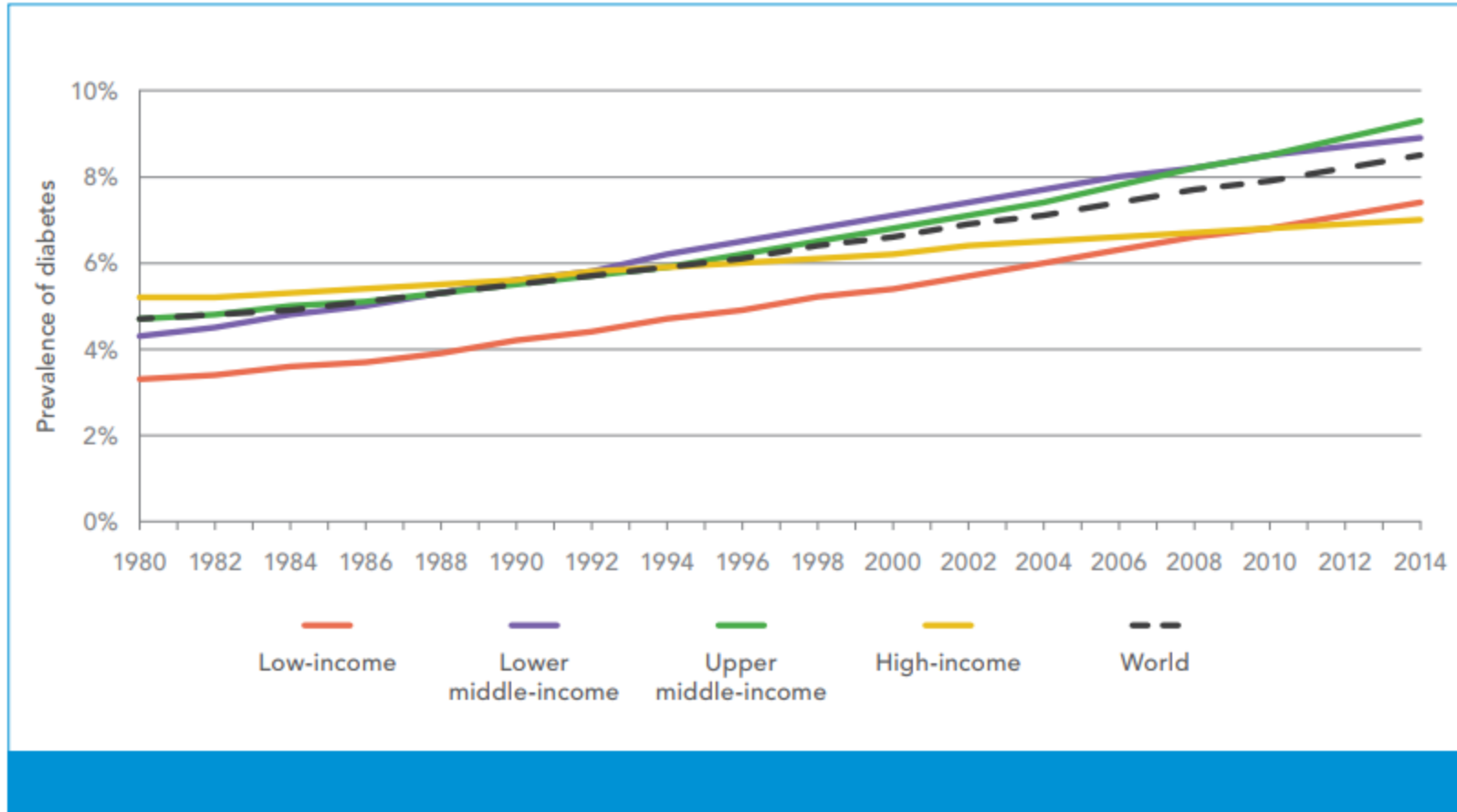
Percentage of all-cause deaths globally attributed to high blood glucose in women, 2012

B (WOMEN)



a. As categorized by the World Bank for 2012.

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



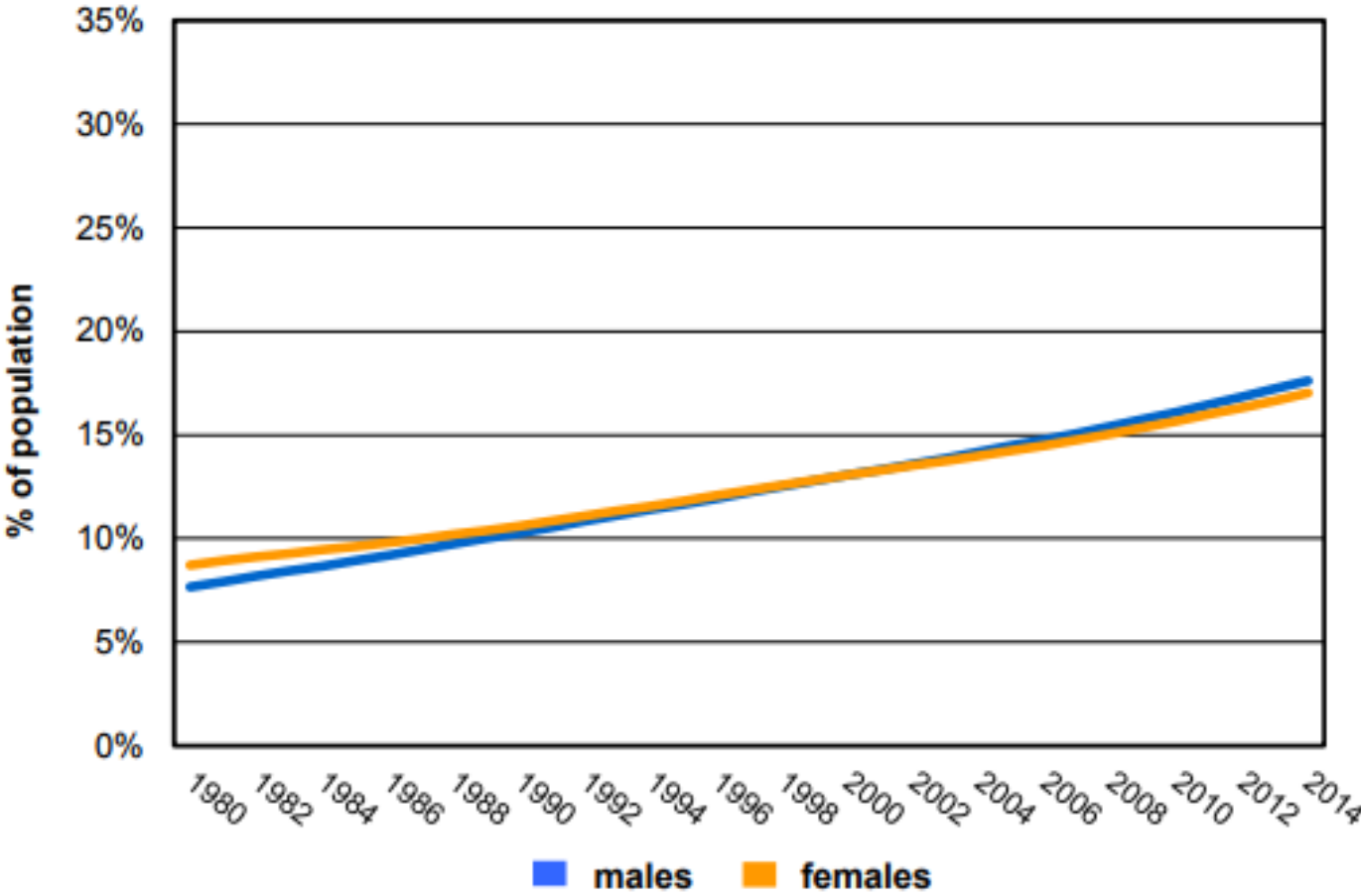
Diabetes Mellitus and KSA

- WHO ranks SA second in the prevalence of diabetes in the Middle East region
- KSA has reached a point where DM is considered an epidemic
- A more recent study reported that the prevalence of diabetes had risen to 34.1% in males and 27.6% in females.
- The mean reported age for diabetes onset in males and females was 57.5 and 53.4 years, respectively

Diabetes - an escalating problem in the Kingdom of Saudi Arabia

| | | |
|------|----------------------|------------------------------|
| 1982 | 2.5% (age >15) | <i>Bacchus & Madkour</i> |
| 1987 | 4.3% | <i>Fatani</i> |
| 1992 | 4.6% | <i>AbuZaid</i> |
| 1996 | 9.5% (age >14 years) | <i>Hazmi</i> |
| 1997 | 17% (age >30 years) | <i>Nuaim</i> |
| 2004 | 24% (age >30 years) | <i>Nozha</i> |
| 2014 | 25% (age >30 years) | <i>MOH</i> |

Trends in age-standardized prevalence of diabetes in Saudi Arabia



Diabetes mellitus and KSA

- The overall prevalence of DM in Saudi Arabia, and especially in the central region (Riyadh), was 23.7% (age group 30-70 years), while another 14.1% had IFG
- The incidence of diabetes was significantly higher in the urban regions (25.5% vs 19.5% in the rural areas)
- The incidence of T1DM is on the increase over the last 30 years
- The prevalence of T1DM among the Saudi children and adolescents is 109.5 per 100,000

Complications

- Diabetes accounts for more than 5% of the global deaths, which are mostly due to CVD
- Diabetes is responsible for over one third of end-stage renal disease requiring dialysis
- Amputations are at least 10 times more common in people with diabetes
- A leading cause of blindness & visual impairment
- Diabetics are 20 times more likely to develop blindness than non-diabetics

Risk factors

Risk factors for Type 2 DM are complex including

- obesity

- Genetics

- Life style factors (overfeeding and sedentary life)

- There are patho-physiological changes (weight gain insulin resistance and reduction of insulin secretion) may lead to glucose intolerance and diabetes

- Important factors are physical inactivity, dietary imbalance and infections

Risk factors

- Autoimmune disease and viral infections may be risk factors for T1DM
- Physiologic or emotional stress: causes prolonged elevation of stress hormone levels (cortisol, epinephrine, glucagon and growth hormone), which raises blood glucose levels
- Pregnancy as predisposing factor causes weight gain and increases levels of estrogen and placental hormones, which antagonize insulin
- Medications that are known to antagonize the effects of insulin: thiazide diuretics, adrenal corticosteroids, oral contraceptives

Future Directions

- Tackling environmental factors and lifestyle
- Appropriate use of screening tools to control diabetes mellitus
- Early interventions in high risk populations
- Therapeutic and management choices and updated criteria for treatment
- Rehabilitation services for complications

References

1. Al Dawish MA, Robert AA, Braham R, Al Hayek AA, Al Saeed A, Ahmed RA, Al Sabaan FS. Diabetes Mellitus in Saudi Arabia: A Review of the Recent Literature. Curr Diabetes Rev. 2016;12(4):359-368. Review.
2. Asirvatham Alwin Robert , Abdulrahman Al-Dawish, Muhammad Mujammami, and Mohamed Abdulaziz Al Dawish. Type 1 Diabetes Mellitus in Saudi Arabia: A Soaring Epidemic. International Journal of Pediatrics Volume 2018, Article ID 9408370, 9 pages <https://doi.org/10.1155/2018/9408370>
3. Zahid Naeem. Burden of Diabetes Mellitus in Saudi Arabia. International Journal of Health Sciences, Qassim University, Vol. 9, No. 3 (July-Sept 2015)