Epidemiology of cardiovascular diseases

Assistant Prof.
Dr. Alaa A.Salih –FICMS(FM)-2025

FRAMEWORK

1. What are the cardiovascular disorders
2. Public Health importance
3. Burden of disease
4. Risk factors of cardiovascular disorders
5. Causation
6. Prevention strategies
7. Global Action Plan for the Prevention and Control of NCDs
8. National programme (NPCDCS)

- Cardiovascular Diseases Include The Following:

- Cardiovascular Diseases Include The Following:
- Coronary Heart Disease
- Cerebrovascular Disease
- Peripheral Arterial Disease

- Rheumatic Heart Disease
- Congenital Heart Disease
- Deep Vein Thrombosis
- Pulmonary Embolism

CHD may manifest itself in many presentations :

A. **Angina pectoris**
B. **Myocardial infarction**
C. **Arrhythmia**
D. **Heart failure**
E. **Sudden death.**

Myocardial infarction is specific to CHD:

Angina pectoris and sudden death are not.

Rheumatic heart disease and cardiomyopathy are potential sources of diagnostic confusion.

The natural history of CHD is very variable.

Death may occur in the first episode or after a long history of disease.

Coronary heart disease (Ischaemic heart disease)

Defined as ".impairment of heart function due to inadequate blood flow to the heart compared to its needs, caused by obstructive changes in the coronary circulation to the heart" .

It is the cause of 25-30 percent of deaths in pop.

The WHO has drawn attention to the fact that CHD is our modern "epidemic'', i.e., a disease that affects populations, not an unavoidable aging attribute.

Up to 80% of premature heart attacks and strokes can be prevented.

The world has the tools and knowledge to mitigate harm to cardiovascular health, particularly with the advances in cardiovascular medicine in the last 50 years.

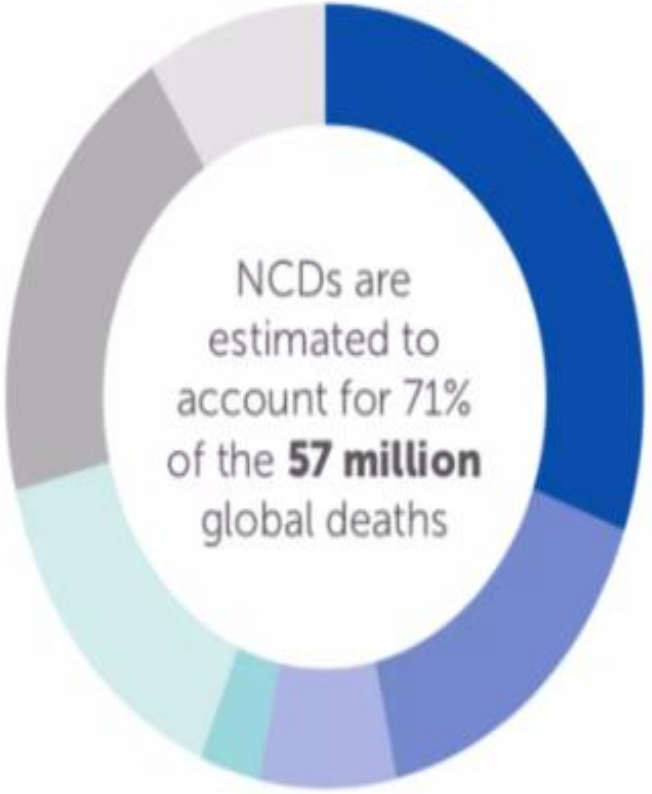
But too often the tools that can help diagnose, prevent, and treat CVDs are not benefitting the communities who need them most.

Around 4 in every 5 CVD deaths occur in low- and middle-income countries and progress in cardiovascular health is increasingly concentrated in High-Income countries - a glaring health inequity that must urgently be addressed.

PUBLIC HEALTH IMPORTANCE

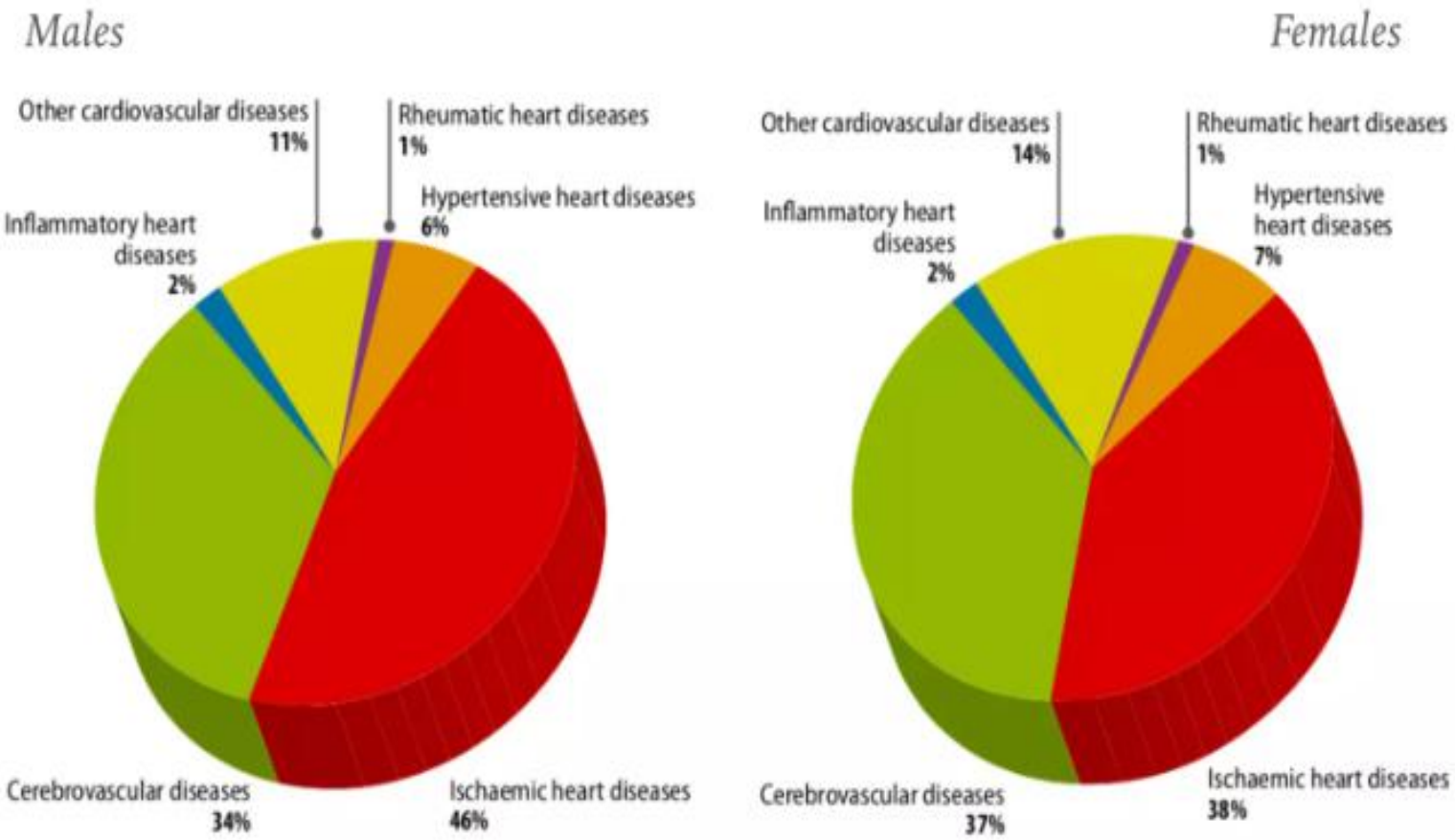
GLOBAL MORTALITY (% OF TOTAL DEATHS), ALL AGES, BOTH SEXES, 2016

- 31% Cardiovascular diseases
- 16% Cancers
- 7% Chronic respiratory diseases
- 3% Diabetes
- 15% Other NCDs
- 20% Communicable, maternal, perinatal and nutritional conditions
- 9% Injuries



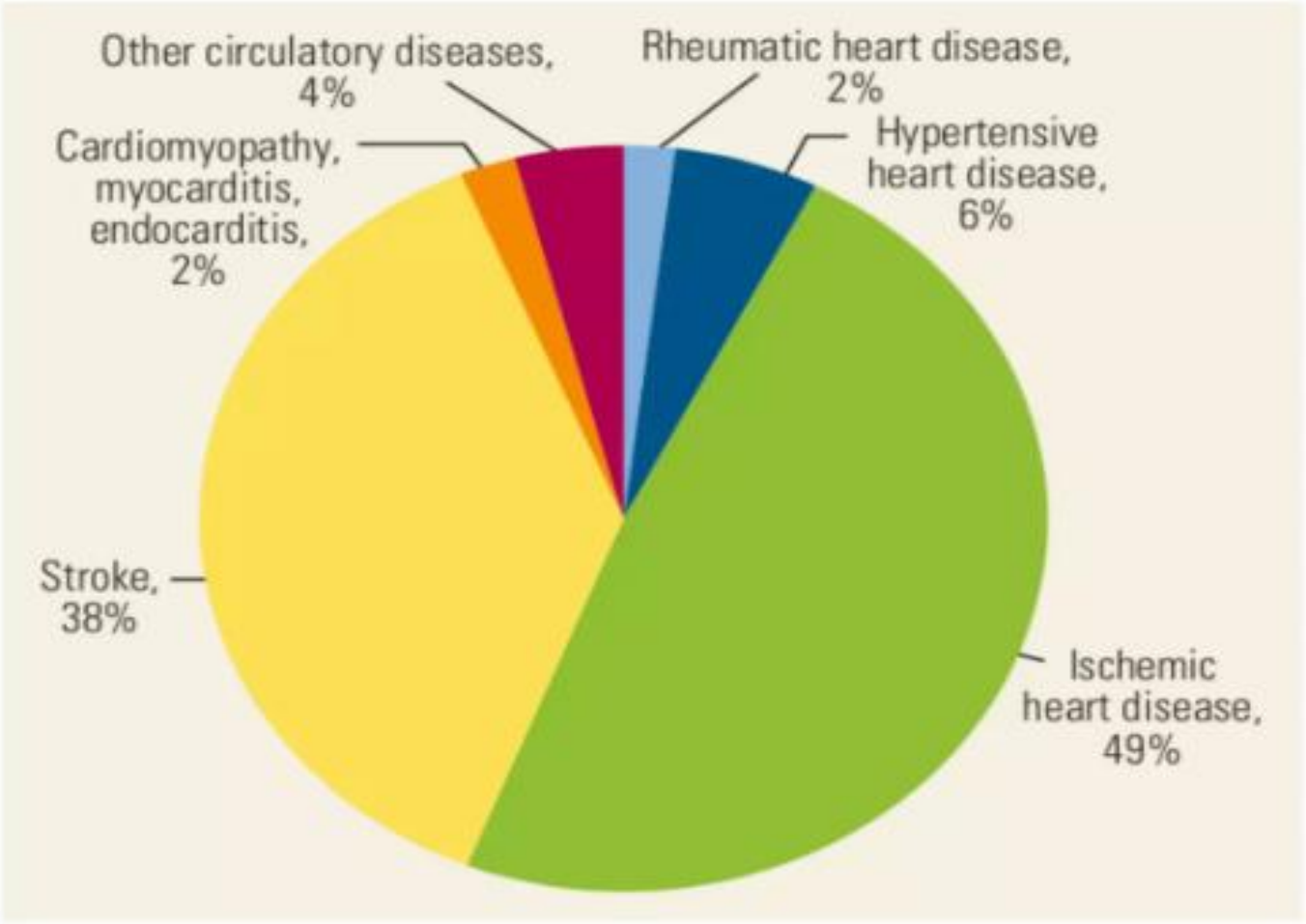
World Health Organization - Noncommunicable Diseases (NCD) Country Profiles, 2018

DISTRIBUTION OF CVD DEATHS



Global atlas on cardiovascular disease prevention and control, World Health Organisation

Cause of CVD-Related Deaths 2015



Source: WHO 2016.

RISK FACTORS

Non-modifiable	Modifiable	Lifestyle	Social
• Age • Gender • Family history of CVD • Ethnicity • Genetic evidence • Previous history of CVD	• Blood pressure • Total cholesterol • HDL cholesterol • Smoking • Blood sugar/diabetes • BMI • Markers of chronic inflammation	• Smoking • Diet • Exercise • Stress	• Income • Social deprivation • Environment

New Emerging Cardiovascular Risk Factors

The common emerging cardiovascular risk factors included:

- Coronary artery calcium score
- Lipoprotein (a)
- Homocysteine
- C-reactive protein
- Fibrinogen
- Plasminogen activator inhibitor 1

Behavioural Risk Factors

- **Physical inactivity** : Insufficient physical activity can be defined as less than 5 times 30 minutes of moderate activity per week, or less than 3 times 20 minutes of vigorous activity per week, or equivalent.
- Increases risk of heart disease and stroke by 50%.

- 150 minutes of moderate physical activity each week reduce the risk of IHD by approximately 30% and risk of DM by 27%.

Behavioural risk factors

- **Unhealthy diet:** Low fruit and vegetable intake is estimated to cause about 31% of CHD and 11% of stroke worldwide.

- WHO recommends a population salt intake of less than 5 grams/person/day to help the prevention of CVD

- **Harmful use of alcohol** : 60 or more grams of pure alcohol per day is associated with the risk of CVD.

Metabolic risk factors

- **Obesity:** Risks of coronary heart disease, ischaemic stroke and type 2 diabetes mellitus increase steadily with an increasing BMI.
- Data from Demographic and Health Surveys1996-2006, prevalence of obesity increase from 11% to 15% in India
- **BMI** to be maintained in the range 18.5–24.9 kg/m^2.
- **Raised blood sugar (Diabetes):** CVD accounts for about 60% of all mortality in people with diabetes.
- Risk of cardiovascular events is 2 - 3 times higher in people with diabetes .

Metabolic risk factor

- **Raised blood pressure (Hypertension):**
  For every 20 mmHg systolic or 10 mmHg diastolic increase in BP, there is doubling of mortality from both IHD and stroke.

- Longitudinal data from Framingham Heart Study indicated that BP values between 130–139/85–89 mmHg are associated with more than two fold increase in relative risk from CVD as compared with those with BP levels below 120/80 mmHg.

Metabolic Risk Factors

- **Raised blood cholesterol** : Raised blood cholesterol increases the risk of heart disease and stroke.

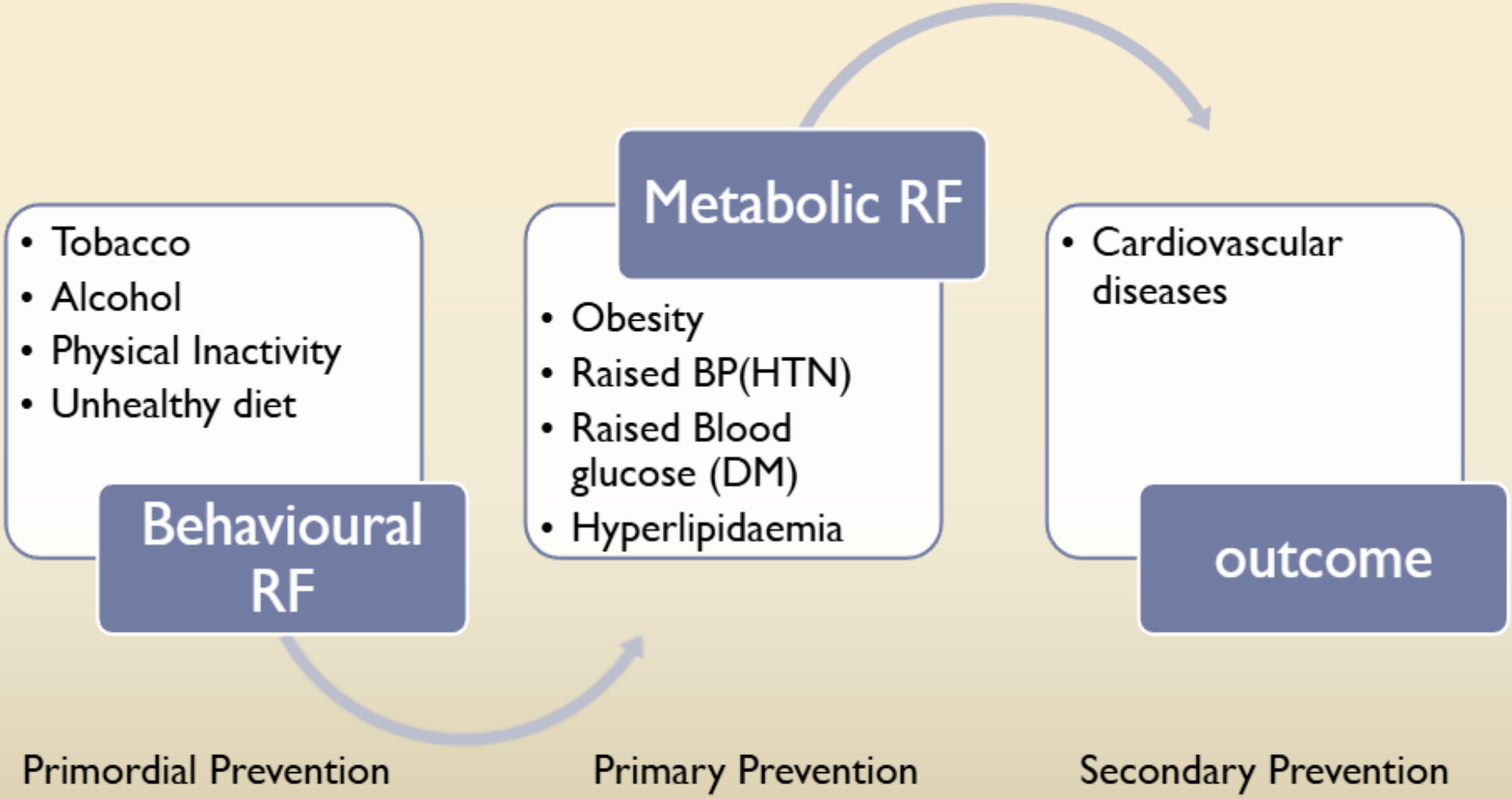
- 10% reduction in serum cholesterol in 40-year old men has been reported to result in 50% reduction in heart disease within five years

Other factors

- **Fetal programming** : Low birth weight is associated with an increased risk of adult diabetes and CVD.

- **Hereditary or family history:** Increased risk if a first-degree blood relative has had CHD or stroke before the age of 55 years (for a male relative) or 65 years (for a female relative).

Conceptual framework of risk factors and level of prevention and management of Cardiovascular Diseases:



What Increases **YOUR RISK**?

Certain factors raise your chance of developing heart disease. Some you can't change – your age, sex, race – and others you can change such as:

BLOOD PRESSURE

CHOLESTEROL

DIABETES

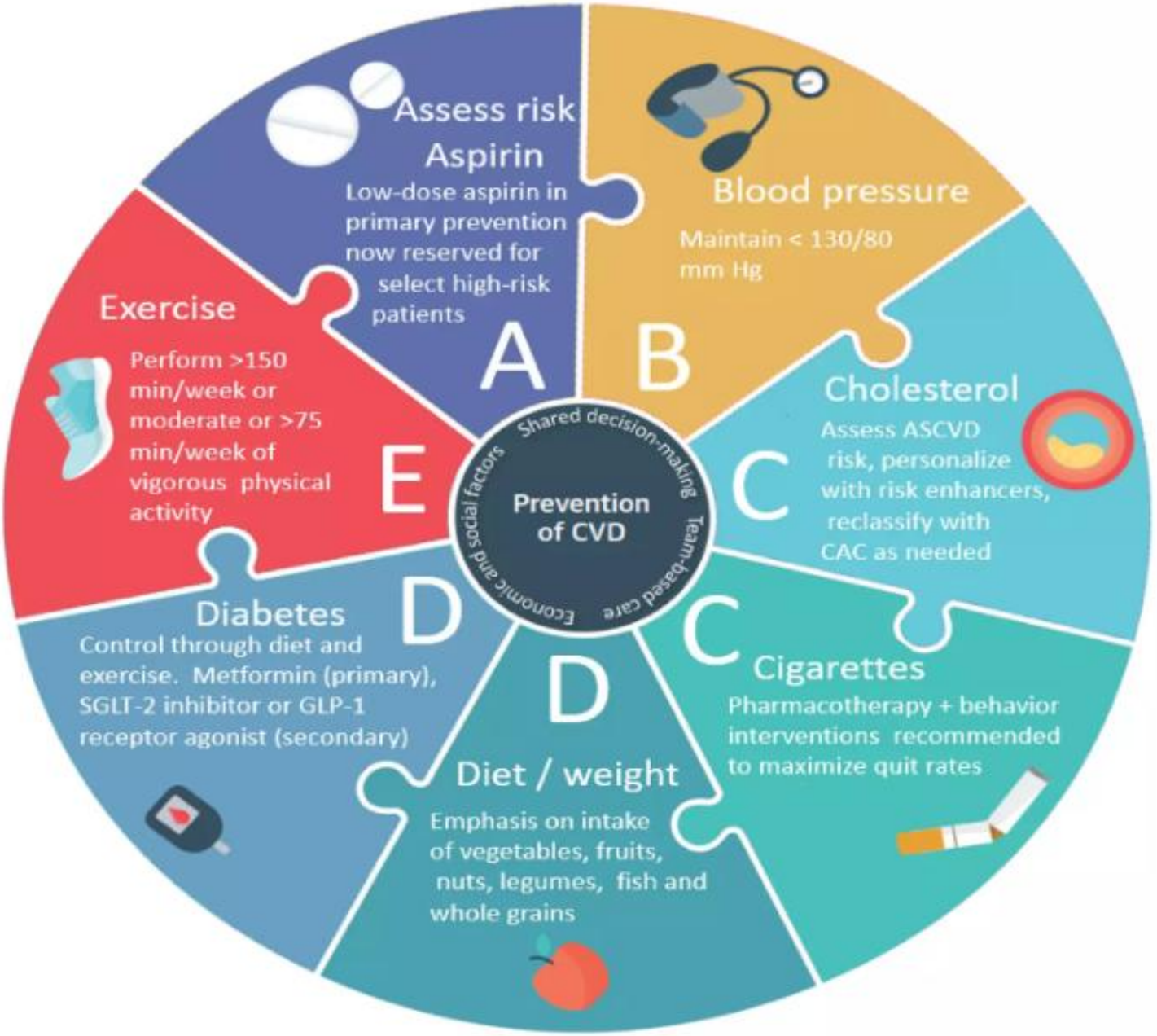
WEIGHT

DIET

PHYSICAL ACTIVITY

SMOKING

Figure 1. ABCDE of Primary Prevention: Lifestyle Changes and Team-Based Care



STATUS IN IRAQ

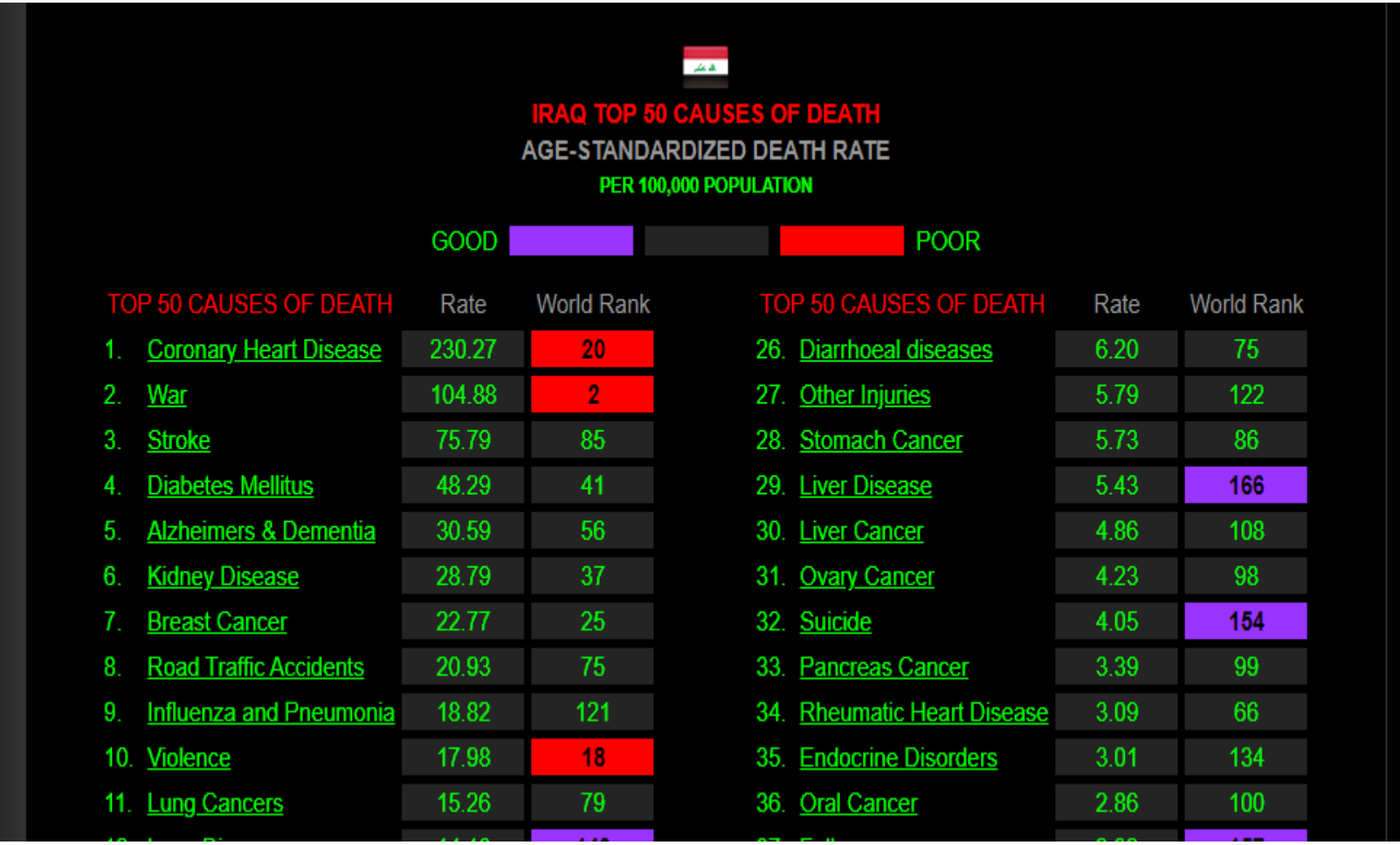
In December 2020 the WHO published data on causes of death across the WHO member states covering 2019.

The data stated that in 2019 there were 36,600 deaths caused by Ischaemic heart disease, 2500 deaths caused by hypertensive heart disease and 300 deaths caused by rheumatic heart disease in Iraq.

According to the WHO data, heart disease was the leading cause of death in Iraq in 2019

“Noncommunicable diseases (NCDs) are the leading cause of morbidity and death in Iraq (Iraqi Ministry of Health, 2019). It is estimated that 30% of Iraqis have high blood pressure, 14% have diabetes, and more than 30% are obese. Some 38% of Iraqi males smoke and a growing number of schoolchildren – 20% of males and 9% of females aged between 13 and 15 years – are tobacco users.”

IRAQ 2021 CAUSES OF DEATH



TOP 50 CAUSES OF DEATH	Rate	World Rank
1. Coronary Heart Disease	230.27	20
2. War	104.88	2
3. Stroke	75.79	85
4. Diabetes Mellitus	48.29	41
5. Alzheimers & Dementia	30.59	56
6. Kidney Disease	28.79	37
7. Breast Cancer	22.77	25
8. Road Traffic Accidents	20.93	75
9. Influenza and Pneumonia	18.82	121
10. Violence	17.98	18
11. Lung Cancers	15.26	79

TOP 50 CAUSES OF DEATH	Rate	World Rank
26. Diarrhoeal diseases	6.20	75
27. Other Injuries	5.79	122
28. Stomach Cancer	5.73	86
29. Liver Disease	5.43	166
30. Liver Cancer	4.86	108
31. Ovary Cancer	4.23	98
32. Suicide	4.05	154
33. Pancreas Cancer	3.39	99
34. Rheumatic Heart Disease	3.09	66
35. Endocrine Disorders	3.01	134
36. Oral Cancer	2.86	100

AHA Life's Simple 7

Life's Simple 7

1. Get active
2. Eat better
3. Lose weight
4. Stop smoking
5. Control cholesterol
6. Manage blood pressure
7. Reduce blood sugar

1. ≥150 minutes moderate activity /week or ≥75 minutes vigorous activity/week
2. Eat a healthy diet (4–5 components of healthy diet score*)
3. Have a normal body weight (BMI<25)
4. Never smoked or quit >1 year ago
5. Total cholesterol <200 mg/dL
6. Blood pressure <120/<80 mm Hg
7. Fasting blood glucose <100 mg/dL

*1) 4.5 cups or more of fruits and vegetables per day; 2) two or more 3.5-oz servings of fish per week; 3) three servings per day of whole grains; 4) less than 1500 mg of sodium per day; and 5) 36 ounces or less of sugar-sweetened beverages per

PRIMARY PREVENTION GUIDELINES

Top 10 Messages

1. Promote a healthy lifestyle throughout life.

2. Clinicians should evaluate the social determinants of health that affect individuals to inform treatment decisions.

3. Adults who are 40 to 75 years of age and are being evaluated for CVD prevention should undergo a 10-year ASCVD risk estimation and have a clinician-patient risk discussion before starting on pharmacological therapy, such as antihypertensive therapy, a statin, or aspirin.

4. All adults should consume a healthy diet :

Vegetables, fruits, nuts, whole grains, lean vegetable or animal protein, and fish and minimizes the intake of *trans* fats, red meat and processed red meats, refined carbohydrates, and sweetened beverages.

5. **Adults should engage in :**

at least 150 minutes per week of accumulated moderate-intensity physical activity

Or 75 minutes per week of vigorous-intensity physical activity.

Table 4. Definitions and Examples of Different Intensities of Physical Activity

Intensity	METs	Examples
Sedentary behavior*	1–1.5	Sitting, reclining, or lying; watching television
Light	1.6–2.9	Walking slowly, cooking, light housework
Moderate	3.0 –5.9	Brisk walking (2.4–4 mph), biking (5–9 mph), ballroom dancing, active yoga, recreational swimming
Vigorous	≥6	Jogging/running, biking (≥10 mph), singles tennis, swimming laps

******Sedentary behavior* **is defined as any waking behavior characterized by an energy expenditure ≤1.5 metabolic equivalent (METs) while in a sitting, reclining, or lying posture. Standing is a sedentary activity in that it involves ≤1.5 METs, but it is not considered a component of sedentary behavior.**

6. For adults with type 2 diabetes mellitus, lifestyle changes, such as improving dietary habits and achieving exercise recommendations, are crucial.

If medication is indicated

metformin is first-line therapy

followed by consideration of a sodium-glucose cotransporter 2 inhibitor –SGLT-2

or a glucagon-like peptide-1 receptor agonist. –GLP-1

7. All adults should be assessed at every healthcare visit for tobacco use, and those who use tobacco should be assisted and strongly advised to quit.

8. Aspirin should be used infrequently in the routine primary prevention of ASCVD because of lack of net benefit.

9. **Statin therapy is first-line treatment for the primary prevention of ASCVD in patients with**

Elevated LDL-C levels (≥190 mg/dL) those with diabetes mellitus who are 40 to 75 years of age

10. **Nonpharmacological interventions are recommended for all adults with elevated blood pressure or hypertension.**

For those requiring pharmacological therapy, the target blood pressure should generally be <130/80 mm Hg.

Secondary prevention

Secondary prevention refers to the effort to treat known, clinically significant ASCVD, and to prevent or delay the onset of disease manifestations.

Target Population

The target population for secondary prevention of ASCVD is patients who have been diagnosed with ASCVD.

This guideline addresses treatment of underlying ASCVD only, and does not address treatment of any associated conditions.

Goals

Reduce recurrent cardiovascular events and decrease coronary mortality.

Preventive factors of Cardiovascular Diseases

SECONDARY PREVENTION:

- Treatment with the following Medications are necessary:
  - Aspirin
  - Beta-Blockers
  - Angiotensin-Converting Enzyme Inhibitors
  - Statins

Preventive factors of Cardiovascular Diseases

SECONDARY PREVENTION:

- Angioplasty
- Coronary Artery Bypass Graft (CABG)

Table 3. Risk-Enhancing Factors for Clinician-Patient Risk Discussion

Risk-Enhancing Factors
• **Family history of premature ASCVD** (males, age <55 y; females, age <65 y) • **Primary hypercholesterolemia** (LDL-C 160–189 mg/dL [4.1–4.8 mmol/L]; non–HDL-C 190–219 mg/dL [4.9–5.6 mmol/L])* • **Metabolic syndrome** (increased waist circumference [by ethnically appropriate cut points], elevated triglycerides [>150 mg/dL, nonfasting], elevated blood pressure, elevated glucose, and low HDL-C [<40 mg/dL in men; <50 mg/dL in women] are factors; a tally of 3 makes the diagnosis) • **Chronic kidney disease** (eGFR 15–59 mL/min/1.73 m^2 with or without albuminuria; not treated with dialysis or kidney transplantation) • **Chronic inflammatory conditions,** such as psoriasis, RA, lupus, or HIV/AIDS

Table 3. Risk-Enhancing Factors for Clinician-Patient Risk Discussion (cont'd)

Risk-Enhancing Factors
• **History of premature menopause (before age 40 y) and history of pregnancy-associated conditions that increase later ASCVD risk, such as preeclampsia** • **High-risk race/ethnicity** (e.g., South Asian ancestry) • **Lipids/biomarkers**: associated with increased ASCVD risk • Persistently elevated,* primary hypertriglyceridemia (≥175 mg/dL, nonfasting); • **If measured:** ▪ **Elevated high-sensitivity C-reactive protein** (≥2.0 mg/L) ▪ **Elevated Lp(a):** A relative indication for its measurement is family history of premature ASCVD. An Lp(a) ≥50 mg/dL . ▪ **Elevated apoB** (≥130 mg/dL): A relative indication for its measurement would be triglyceride ≥200 mg/dL. A level ≥130 mg/dL corresponds to an LDL-C >160 mg/dL and constitutes a risk-enhancing factor ▪ **ABI** (<0.9)= ankle brachial index

New	Previous
SGLT2 inhibitors are recommended for patients with type 2 diabetes and established ASCVD (in addition to or after metformin therapy) due to their ability to reduce the risk of major cardiovascular events.	**SGLT2 inhibitors were not included in the guideline.**

SGLT2 inhibitors =Sodium-glucose transport protein 2 inhibitors

Lipid screening tests

Lipid panel: for most patients

The results of a **lipid panel** are total cholesterol, HDL, and LDL, and the patient's 10-year risk calculation for cardiovascular disease is included.

It is recommended that the patient be non-fasting for the lipid panel, as this is much easier for the patient and does not require a return visit.

Any patient with a triglyceride level > 400 mg/dL (regardless of LDL level) must return for a fasting lipid panel.

hs-CRP: consider for patients at 7.5–14.9% risk

Table 1. Lipid screening for patients not already on statins

Eligible population	Test	Frequency
Under age 40	Routine screening is not recommended unless patient has a major cardiovascular risk factor (e.g., diabetes, hypertension, family history, smoking).	
Age 40–75	Non-fasting lipid panel	Every 5 years at a minimum [1]
Over age 75	Routine screening is not recommended.	Upon patient request or based on other ASCVD risk factors

Consider re-screening intervals based on ASCVD risk:

- **Every 5 years if ASCVD risk < 7.5% over 10 years**
- **Every 2 years if ASCVD risk 7.5–14.9% over 10 years**
- **Annually if ASCVD risk ≥ 15% over 10 years and not on statin**

Statin Therapy

Table 3. Overview of statin therapy recommendations for primary prevention of ASCVD	
Population	**Statin therapy**
ASCVD risk 5–7.4% over 10 years	**Use shared decision-making. Consider treatment with a moderate-intensity statin.**
ASCVD risk 7.5–14.9% over 10 years	**Use shared decision-making. Consider treatment with a moderate- to high-intensity statin.**
ASCVD risk ≥ 15% over 10 years	**Initiate or continue moderate- to high-intensity statin.**
People with diabetes, aged 40–75, with ASCVD risk ≥ 7.5% over 10 years	**Initiate or continue moderate-intensity statin. Consider use of a high-intensity statin.**
People with diabetes, aged 40–75, with LDL cholesterol 70–189 mg/dL	**Initiate or continue moderate-intensity statin.**
LDL cholesterol ≥ 190 mg/dL	**Initiate or continue high-intensity statin.**

Eat **BETTER**

Eat more **FRUITS, VEGETABLES, NUTS, WHOLE GRAINS, FISH OR LEAN MEATS.**

LIMIT OR AVOID	EXAMPLES
 **Saturated fat**	Red meat, Whole-fat dairy products
 **Processed meats**	Deli meat, hot dogs, sausages, bacon
 **Refined carbohydrates**	Candy, cakes and ice cream
 **Sugar-sweetened beverages**	Soda pop, juices
 **Salt**	Often found in frozen meals, canned foods, pickles, chips

Move **MORE**

Adults should get **AT LEAST 150 MINUTES OF MODERATE-INTENSITY EXERCISE OR 75 MINUTES OF VIGOROUS EXERCISE** each week to promote good health. If you can't reach that goal at first, some activity – **EVEN JUST 10 MINUTES AT A TIME** – can help.

INTENSITY	EXAMPLES
Light	Walking slowly, cooking, light housework
Moderate	Brisk walking (2.4 mph–4 mph), ballroom dancing, recreational swimming
Vigorous	Jogging, biking (≥10 mph), singles tennis, swimming laps

MANAGE Stress

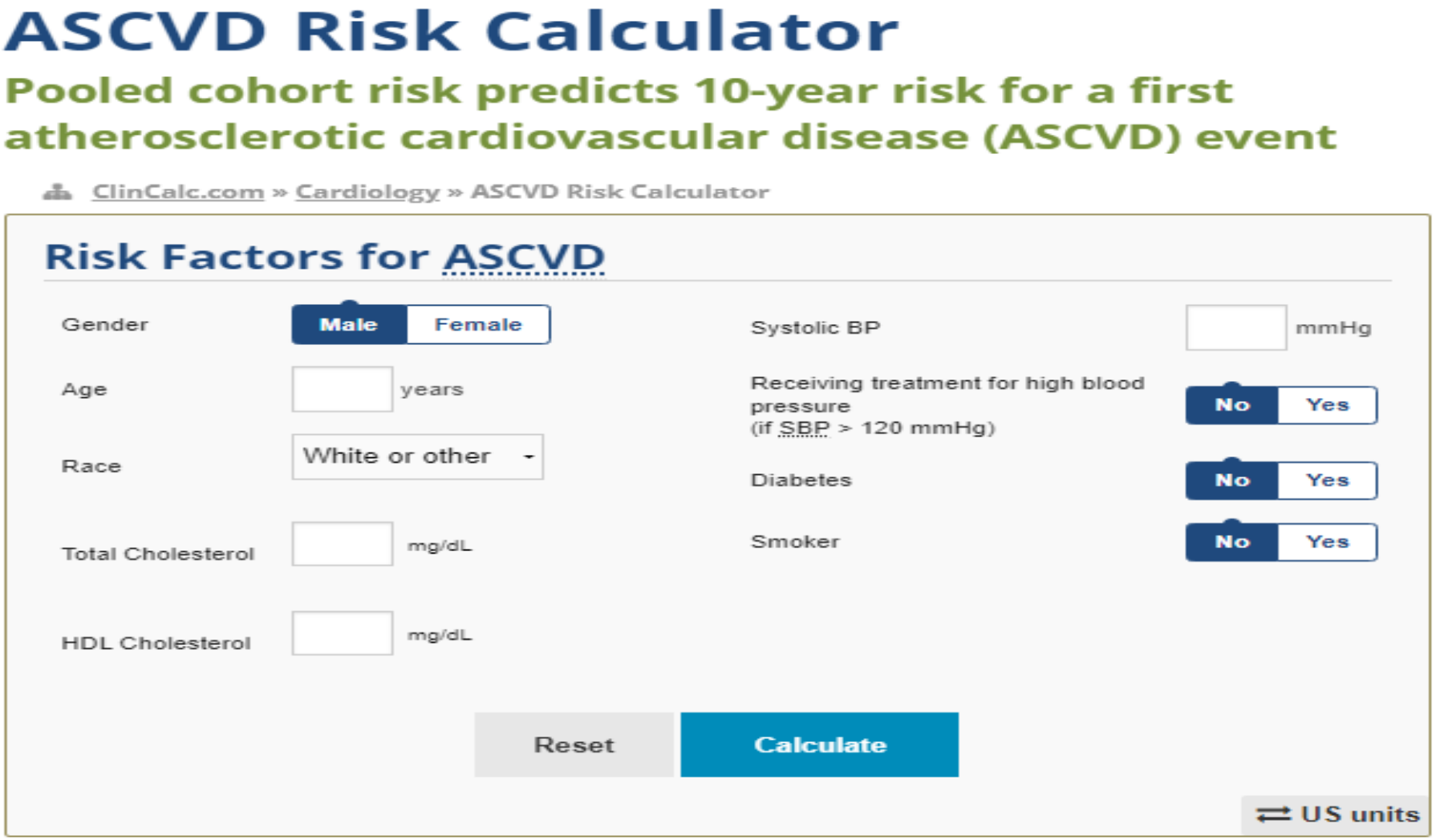
Too much **STRESS MAY BE HARMFUL TO THE HEART.** Handling stress in a healthy way and staying connected are key to heart health.

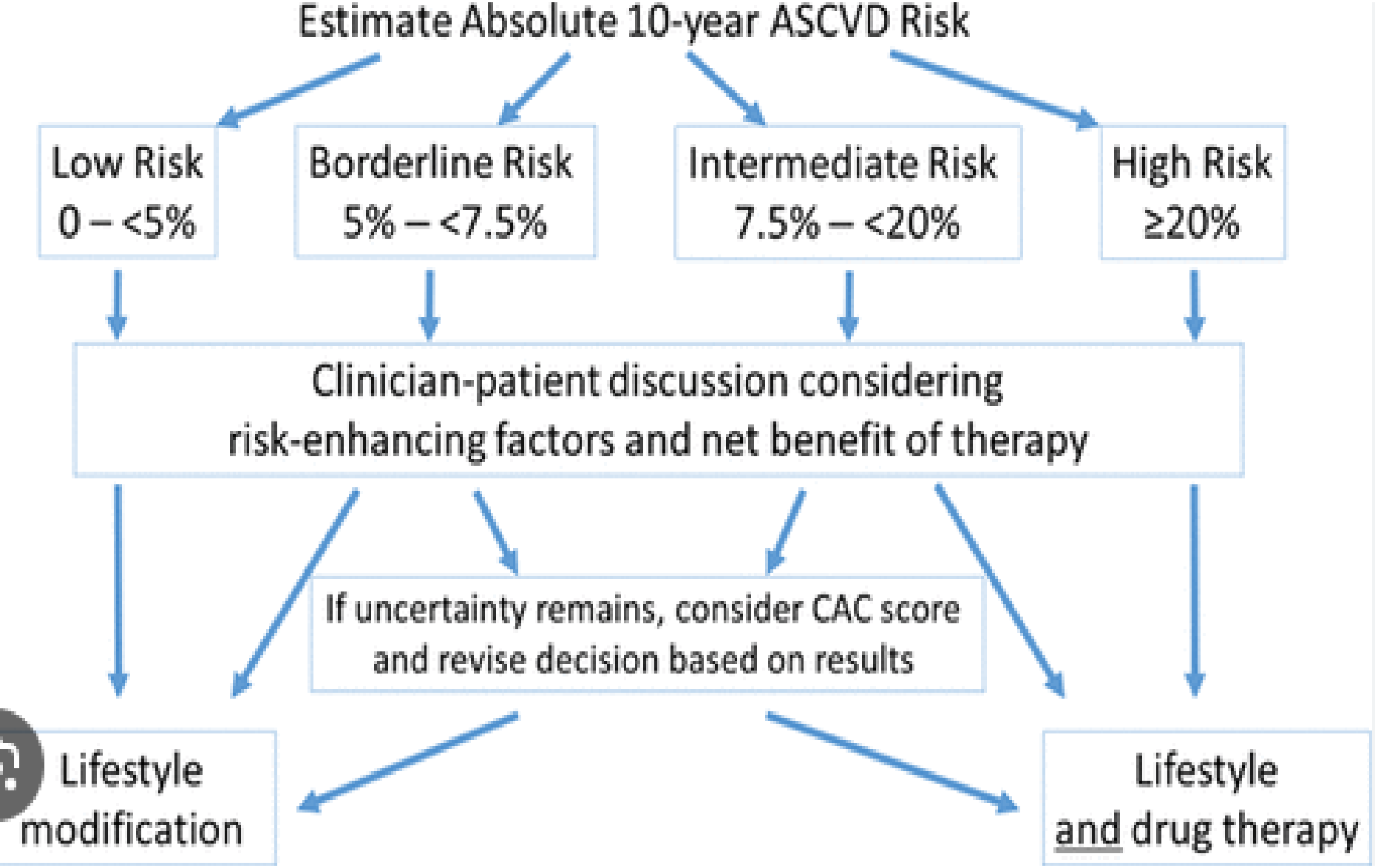
DE-STRESS: For some people, taking deep breaths, meditating or yoga can help.

GET ENOUGH SLEEP: Try to get at least seven hours of sleep each night. Not sleeping enough has been linked to a greater risk for heart disease, obesity, and other health issues.

CONNECT MORE: Loneliness has been linked to poorer health. If you have no one to talk to in times of need or feel alone, ask your health care professional about support groups.

https://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx




Estimate Absolute 10-year ASCVD Risk
Low Risk
0 – <5%
Borderline Risk
5% – <7.5%
Intermediate Risk
7.5% – <20%
High Risk
≥20%
Clinician-patient discussion considering
risk-enhancing factors and net benefit of therapy
If uncertainty remains, consider CAC score
and revise decision based on results
Lifestyle
modification
Lifestyle
and drug therapy

THANK YOU