



مرکز تحقیقات بیماریهای قلب و عروق

دانشگاه علوم پزشکی
و خدمات بهداشتی درمانی گیلان



CVD risk assessment tools

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ESC GUIDELINES

2023 ESC Guidelines for the management of cardiovascular disease in patients with diabetes

Developed by the task force on the management of cardiovascular disease in patients with diabetes of the European Society of Cardiology (ESC)

Assessing CV risk in individuals with T2DM

- ▶ it is important to consider :

medical and family history

symptoms

findings from examination

laboratory and other diagnostic test results

the presence of ASCVD or severe TOD

There is not enough robust evidence to suggest that

- ▶ assessment of coronary artery calcium (CAC)
- ▶ intima media thickness

▶ 2021 ESC Guidelines:

ADVANCE model

DIAL model

- ▶ some limitations for use in Europe
 - ▶ do not allow for substantial variations of risk across countries
 - ▶ these models have been developed from a narrow set of studies
- 

**TABLE 1. BETA COEFFICIENTS (95% CONFIDENCE INTERVAL)
AND STANDARD ERRORS FOR PREDICTORS IN THE
ADVANCE CVD PREDICTION MODEL¹⁴**

<i>Variable</i>	<i>Parameter estimate (standard error)</i>	<i>p-value*</i>
Age at diagnosis (per 1-year increase)	0.062 (0.008)	< 0.001
Gender (women vs men)	−0.474 (0.098)	< 0.001
Known duration of diabetes (per 1-year increase)	0.083 (0.010)	< 0.001
Pulse pressure (per 1-mmHg increase)	0.007 (0.003)	0.016
Retinopathy (yes vs no)	0.383 (0.101)	< 0.001
Atrial fibrillation (present vs absent)	0.601 (0.154)	< 0.001
HbA _{1c} (per 1% increase)	0.099 (0.027)	Click on image to enlarge
Log of urinary albumin/creatinine ratio (per 1-log mg/g increase)	0.193 (0.033)	< 0.001
Non-HDL cholesterol (per 1-mmol/l increase)	0.126 (0.034)	< 0.001
Treated hypertension (yes vs no)	0.242 (0.106)	0.022

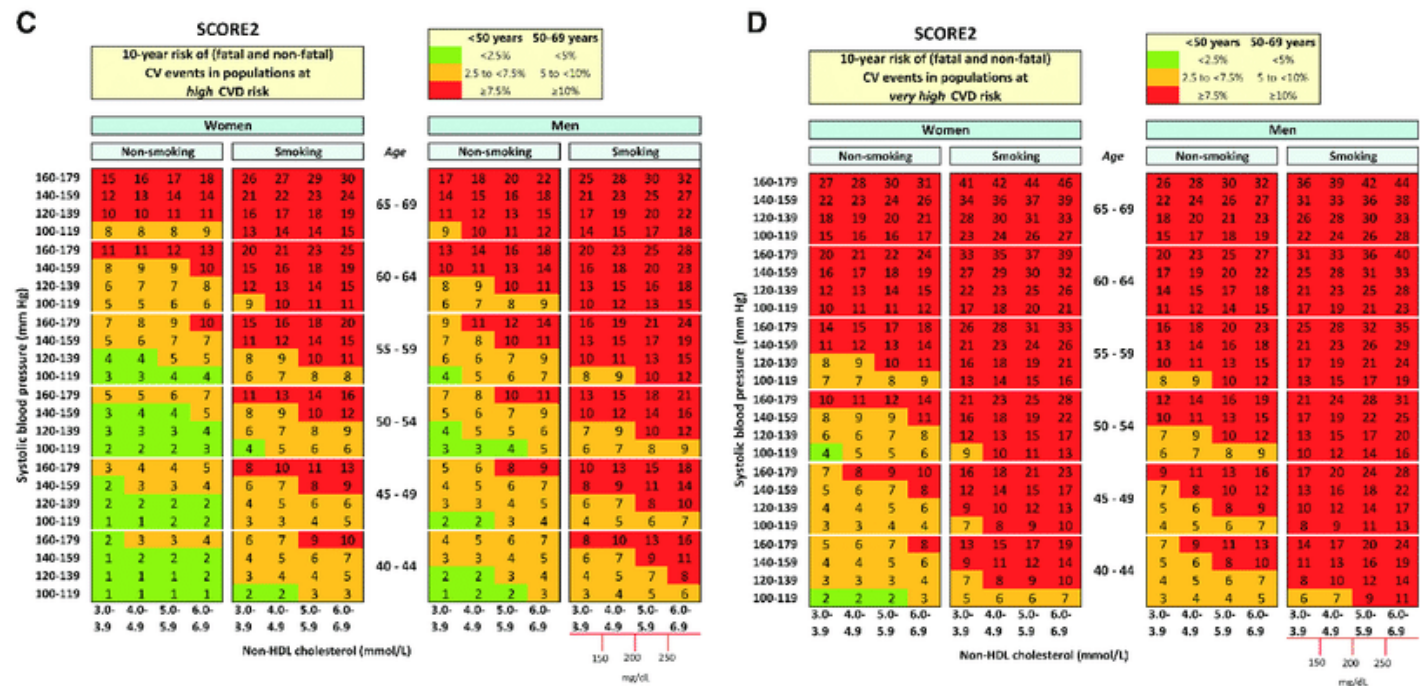
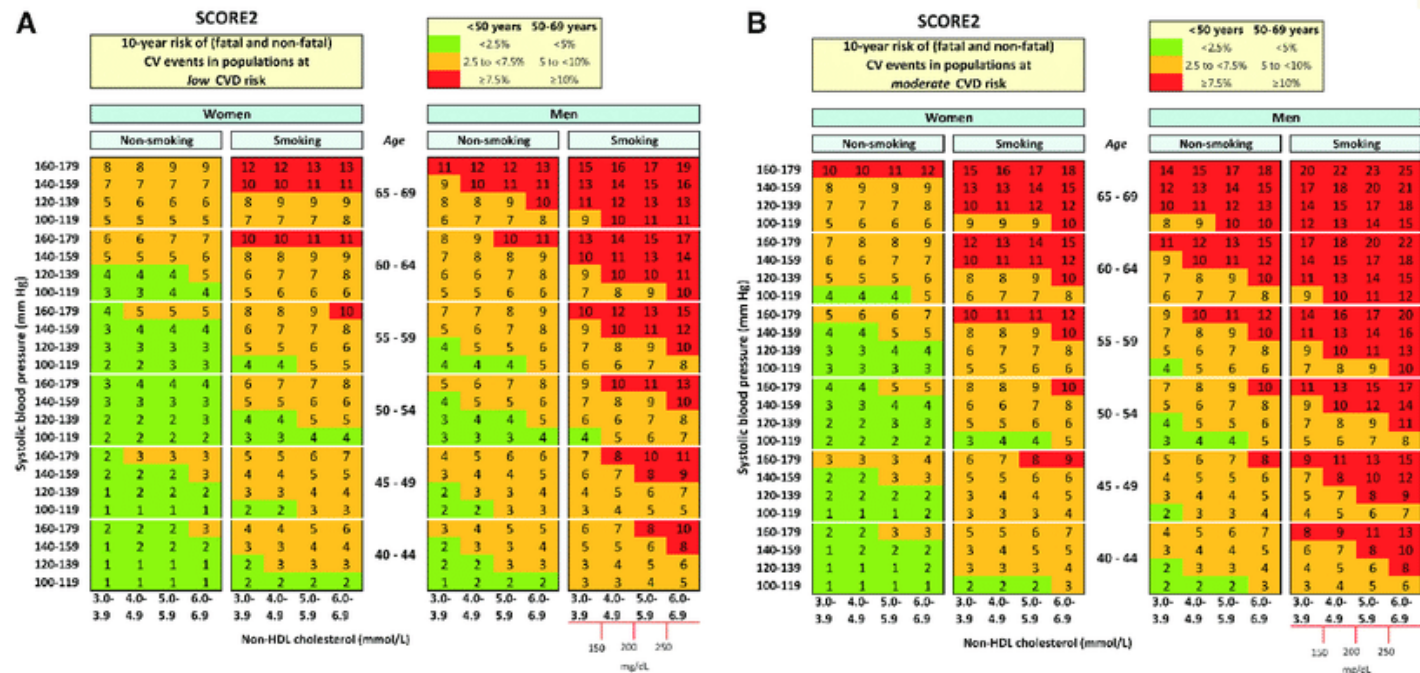
*Mutually adjusted. Baseline survival probability at four years: $S_0(4) = 0.951044$.
Based on the Cox model, the probability \hat{P} of an event at t years of follow up is
defined by the following formula:

In patients aged ≥ 40 years with T2DM without ASCVD or severe TOD

- ▶ it is recommended to estimate **10-year CVD risk** using the **SCORE2**-Diabetes algorithm

SCORE2-Diabetes model

- ▶ in individuals with T2DM aged **40–69 years** without ASCVD or severe TOD
- ▶ 10-year risk of **fatal and non-fatal** CVD events (MI, stroke)
- ▶ conventional CVD risk factors:
 - age
 - smoking status
 - systolic blood pressure
 - total and high-density lipoprotein [HDL]-cholesterol
 - age at diabetes diagnosis
 - HbA1c
 - eGFR



Download the app

The app is available in the App Store and Google Play.

Look for 'ESC CVD Risk Calculation' in your store or click on your store icon below.



What's in the app

The ESC CVD Risk Calculation App is available in English. It is intended for healthcare professionals and includes calculators for primary and secondary prevention in various populations:

- SCORE2
- SCORE2-OP
- SCORE2-Diabetes
- ASCVD
- ADVANCE
- SMART
- SMART-REACH*
- DIAI *



Home

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All risk calculators

No previous cardiovascular disease or
type 2 diabetes

SCORE2
(Europe)
<70 years

SCORE2-OP
(Europe)
≥70 years

SCORE2-Diabetes
(Europe)
Type 2 Diabetes

**SMART
risk score**
Previous
cardiovascular
disease


ASCVD
(North America)
No previous
cardiovascular disease

**Lifetime risk
calculators**

2013 ACC/AHA Guideline on the Assessment of Cardiovascular Risk

- ▶ community-based cohorts of adults
- ▶ Endpoints:
 - CHD death
 - nonfatal myocardial infarction
 - and fatal or nonfatal stroke
- ▶ African-American or white participants
- ▶ **12 years of follow-up**
- ▶ (<http://www.cardiosource.org/en/Science-And-Quality/Practice-Guidelines-and-Quality-Standards/2013-Prevention-Guideline-Tools.aspx>)

ACC/AHA CVD risk :

- ▶ Age
 - ▶ total cholesterol
 - ▶ high-density lipoprotein cholesterol
 - ▶ systolic BP (including treated or untreated status)
 - ▶ diabetes mellitus (diabetes)
 - ▶ and current smoking status
- 

► Recommendation 1

The race- and sex-specific Pooled Cohort Equations* to predict

10-year risk of a first hard ASCVD event should be used

in **non-Hispanic African Americans** and

non-Hispanic whites

40 to 79 years of age

- ▶ A Web-based application enabling estimation of 10-year and life- time risk of ASCVD is available at
- ▶ <http://my.americanheart.org/cvriskcalculator>
<http://www.cardiosource.org/en/Science-And-Quality/Practice-Guidelines-and-Quality-Standards/2013-Prevention-Guideline-Tools.aspx>.

patients – including those with known ASCVD. This calculator is for use only in adult patients without known ASCVD and LDL 70-189 mg/dL (1.81-4.90 mmol/L).

When to Use ▾

Pearls/Pitfalls ▾

Why Use ▾

Age

This calculator only applies to individuals 40-75 years of age.

Norm: 20 - 79

years

Diabetes

No

Yes

Sex

Female

Male

Smoker

No

Yes

Total cholesterol

Norm: 150 - 200

mg/dL ↔

HDL cholesterol

Norm: 0 - 60

mg/dL ↔

Systolic blood pressure

Norm: 100 - 120

mm Hg

Treatment for hypertension

No

Yes

Race

Race may/may not provide better estimates of CV risk; optional

White

African American

Other

► <https://www.mdcalc.com/calc/3398/ascvd-atherosclerotic-cardiovascular-disease-2013-risk-calculator-aha-acc>

Result:

Please fill out required fields.



App should be used for primary prevention patients (those without ASCVD) only.

Current Age ⓘ *

Age must be between 20-79

Sex *

Male

Female

Race *

White

African American

Other

Systolic Blood Pressure (mm Hg) *

Value must be between 90-200

Diastolic Blood Pressure (mm Hg) *

Value must be between 60-130

Total Cholesterol (mg/dL) *

Value must be between 130 - 320

HDL Cholesterol (mg/dL) *

Value must be between 20 - 100

LDL Cholesterol (mg/dL) ⓘ ○

Value must be between 30-300

History of Diabetes? *

Yes

No

Smoker? ⓘ *

Current ⓘ

Former ⓘ

Never ⓘ

On Hypertension Treatment? *

Yes

No

On a Statin? ⓘ ○

Yes

No

On Aspirin Therapy? ⓘ ○

Yes

No

Do you want to refine current risk estimation using data from a previous visit? ⓘ ○

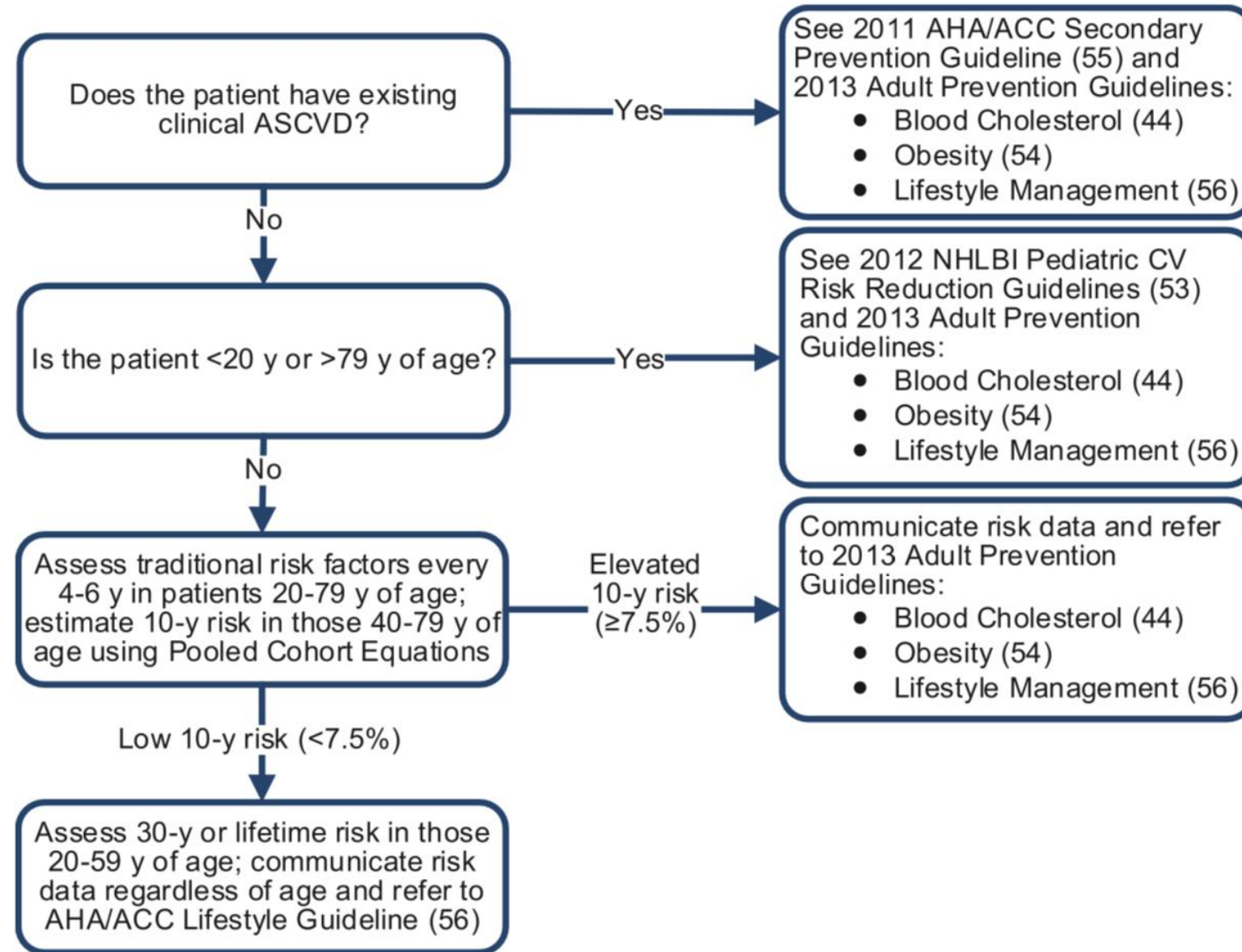
<https://tools.acc.org/ascvd-risk-estimator-plus/#!/calculate/estimate/>

► It is reasonable

to assess traditional ASCVD risk factors **every 4 to 6 years**
in **adults 20 to 79 years of age** who are free from ASCVD


to estimate 10-year ASCVD risk **every 4 to 6 years**
in **adults 40 to 79 years of age** who are free from ASCVD.

Assessment of **30-year or lifetime ASCVD risk** on the basis of
traditional risk factors may be considered
in **adults 20 to 59** years of age who are free from ASCVD



The Framingham Heart Study

- ▶ risk of clinical coronary heart disease (CHD) events
- ▶ major CHD risk factors:
 - sex
 - age
 - blood pressure
 - total cholesterol
 - LDL-C
 - HDL-C
 - smoking behaviour
 - diabetes status

- ▶ identifying those patients who are likely to benefit from **aggressive primary prevention strategies**
 - ▶ FHS prediction functions work reasonably well among **white and black men and women**
 - ▶ When applied to Japanese American and Hispanic men and Native American women, **recalibration was needed**
- 

INSTRUCTIONS

There are several distinct Framingham risk models. MDCalc uses the 'Hard' coronary Framingham outcomes model, which is intended for use in **non-diabetic** patients age 30-79 years with no prior history of coronary heart disease or intermittent claudication, as it is the most widely applicable to patients without previous cardiac events. See the [official Framingham website](#) for additional Framingham risk models.

When to Use ▾

Pearls/Pitfalls ▾

Age	<input type="text"/>	years
Sex	<input type="button" value="Female"/>	<input type="button" value="Male"/>
Smoker	<input type="button" value="No"/>	<input type="button" value="Yes"/>
Total cholesterol	Norm: 150 - 200	mg/dL ⇄
HDL cholesterol	Norm: 0 - 60	mg/dL ⇄
Systolic BP	Norm: 100 - 120	mm Hg
Blood pressure being treated with medicines	<input type="button" value="No"/>	<input type="button" value="Yes"/>

Result:

Please fill out required fields.

<https://www.mdcalc.com/calc/38/framingham-risk-score-hard-coronary-heart-disease>

WHO CVD risk charts

- ▶ 10-year risk of a fatal or non-fatal major cardiovascular event (myocardial infarction or stroke)

age

sex

blood pressure

smoking status

total blood cholesterol

presence or absence of diabetes mellitus

- ▶ <https://myket.ir/app/hosseini.bonab.irapen>

Figure 11. WHO/ISH risk prediction chart for EMR B. 10-year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressure, total blood cholesterol, smoking status and presence or absence of diabetes mellitus.

Risk Level ■ <10% ■ 10% to <20% ■ 20% to <30% ■ 30% to <40% ■ ≥40%

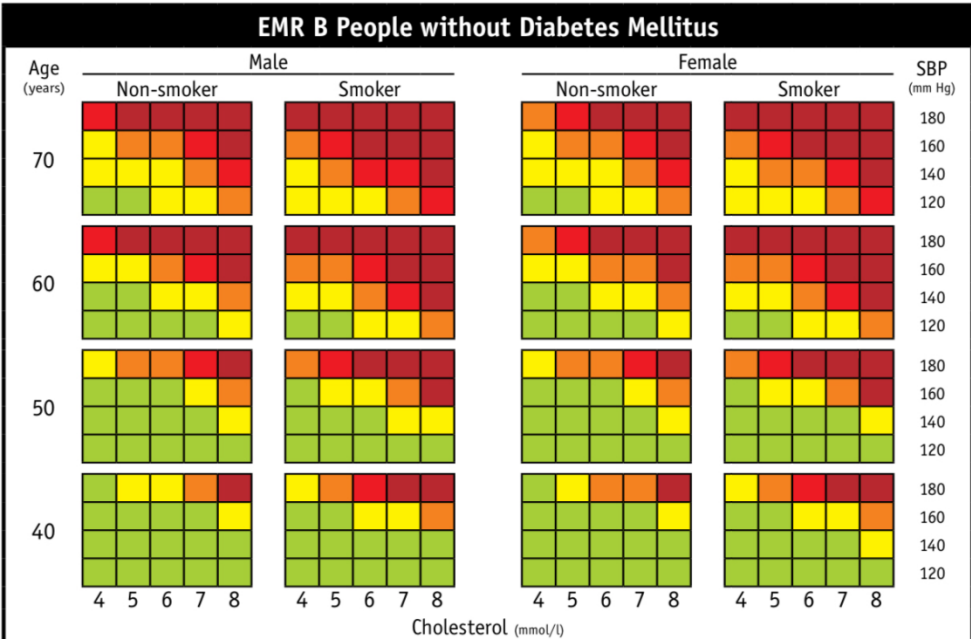
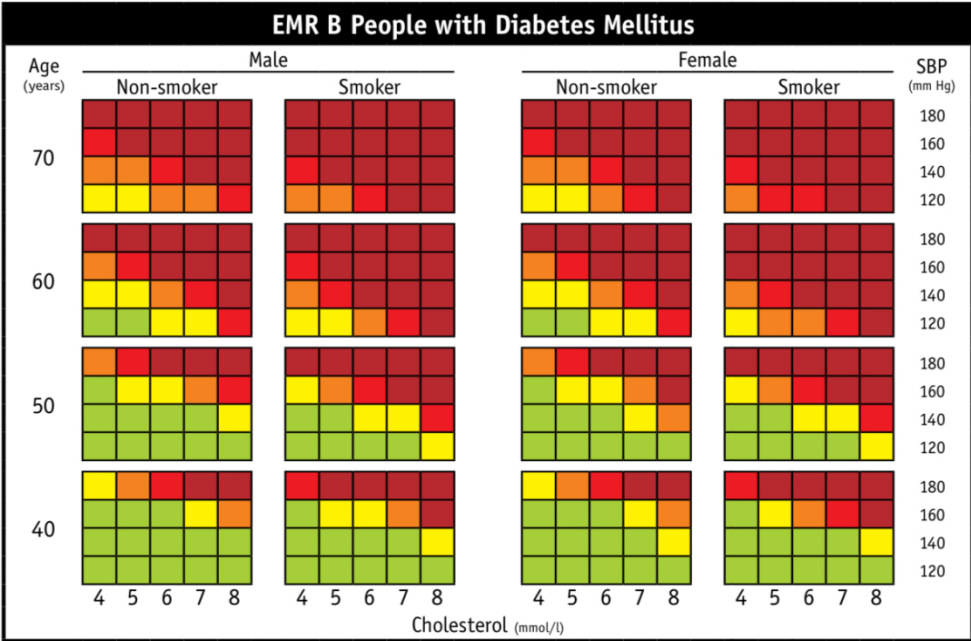
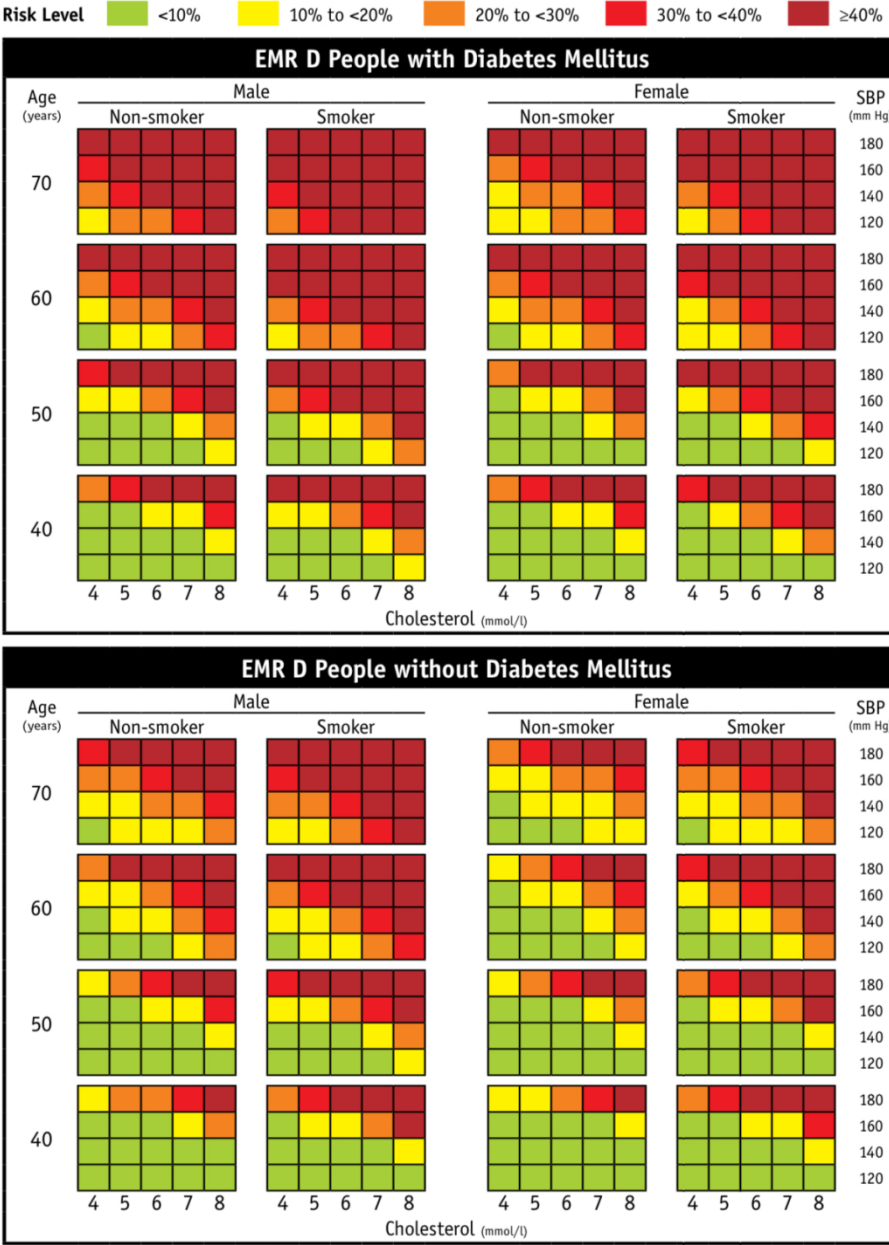


Figure 12. WHO/ISH risk prediction chart for EMR D. 10-year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressure, total blood cholesterol, smoking status and presence or absence of diabetes mellitus.



This chart can only be used for countries of the WHO Region of Eastern Mediterranean, sub-region D, in settings where blood cholesterol can be measured (see Table 1).

Figure 13. WHO/ISH risk prediction chart for EMR B. 10-year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressure, smoking status and presence or absence of diabetes mellitus.

Risk Level <10% 10% to <20% 20% to <30% 30% to <40% ≥40%

