

## Definition

The European System for Cardiac Operative Risk Evaluation was published 1999. It was based on a datasets of 12 cohort studies (205 000 people) and ten-year risk of fatal cardiovascular disease was calculated using a Weibull model, where age is used as a measure of exposure time to risk rather than a risk factor. It uses 2 different risk equation: theres a model for coronary heart disease and non-coronary heart disease and they're mainly based on total cholesterol (it's also based on systolic blood pressure, age, sex and smoking status).

## Coefficients

		CHD		Non-CHD CVD	
		$\alpha$	$p$	$\alpha$	$p$
Low risk	Men	-22.1	4.71	-26.7	5.64
	Women	-29.8	6.36	-31.0	6.62
High risk	Men	-21.0	4.62	-25.7	5.47
	Women	-28.7	6.23	-30.0	6.42

table A

	CHD	Non-CHD CVD
Current smoker	0.71	0.63
Cholesterol (mmol/L)	0.24	0.02
Systolic BP (mmHg)	0.018	0.022

table B

**Algorithm** (Calculating 10-year estimates for fatal cardiovascular disease)

### Step 1)

Calculate the underlying risks for coronary heart disease and for non-coronary heart disease sepaetely for the person's age now and for their age in 10 years time

**NB:** you need to use the values for *alpha* and *p* shown in table A

$$S_0(\text{age}) = \exp\{-(\exp(\alpha))(\text{age} - 20)^p\}$$

$$S_0(\text{age} + 10) = \exp\{-(\exp(\alpha))(\text{age} - 10)^p\}^*$$

### Step 2)

Calculate the sum  $w$  using the coefficients  $\beta$  in table B.

You have to calculate two weighted sum, one for coronary heart disease and one for non coronary heart disease.

- Smoking is coded as 1 or 0 (1 for smoker and 0 for not)
- cholesterol is measured in mmol//L
- *SBP* (*Systolic Blood Pressure*) is measured in mmm

$$w = \beta_{\text{chol}}(\text{cholesterol} - 6) + \beta_{\text{SBP}}(\text{SBP} - 120) + \beta_{\text{smoker}}(\text{current}) \quad (2)$$

**Step 3)**

Combine the risks for coronary heart disease and non-coronary cardiovascular disease, at the person's age and at their age in ten years from now (**four calculations**) which were calculated in *step 1* with the weighted sum of a person's risk factor from *step 2*

$$S(age) = \{S_0(age)\}^{\exp(w)}$$

$$S(age+10) = \{S_0(age+10)\}^{\exp(w)}$$

**Step 4)**

For each cause, calculate the 10-year survival probability based on the survival probability for the person's current age and their age in 10 years time:

$$S_{10}(age) = S(age+10) / S(age)$$

**Step 5**

Calculate the 10 year risk for each end-point

$$Risk_{10} = 1 - S_{10}(age)$$

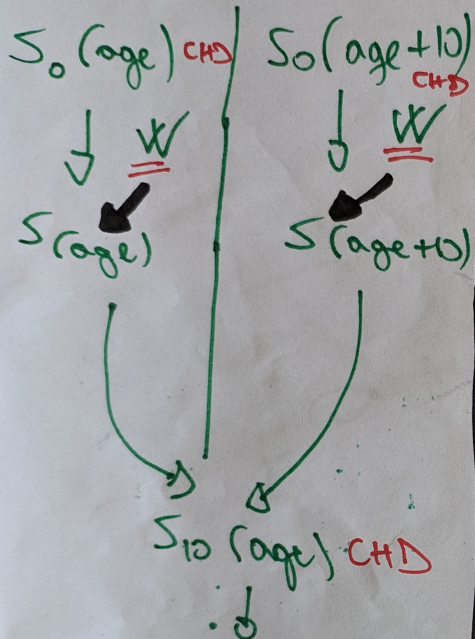
**Step 6**

Combine the risks for coronary heart disease and non-coronary cardiovascular disease by adding them:

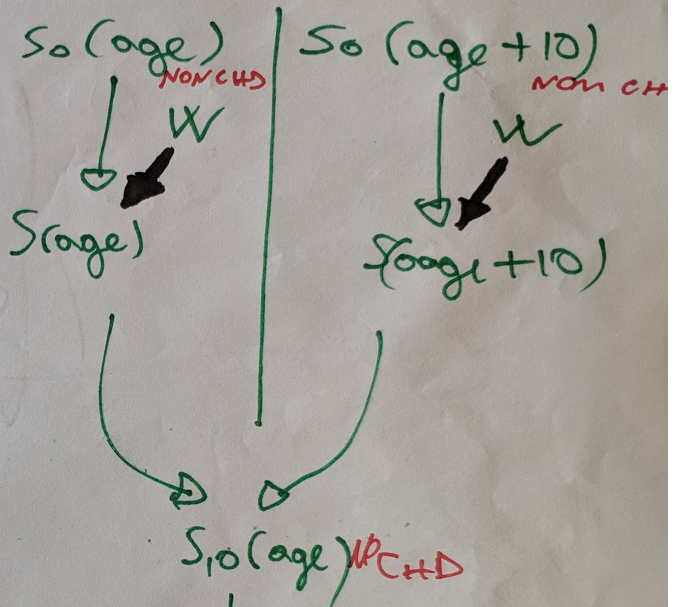
$$CVDRisk_{10}(age) = [CHDRisk(age)] \\ + [Non-CHDRisk(age)]$$

# CHD

# NON CHD



$$1 - S_{10} = \text{Risk}(\text{age}) \text{ CHD}$$



$$1 - S_{10} = \text{Risk}(\text{age}) \text{ NON CHD}$$

NEEDED VARIABLES:

- Age  $\rightarrow$  main variable
- Cholesterol  $\rightarrow$   $W(\text{age})$
- SBP  $\rightarrow$   $R_{\text{CHD}}(\text{age}) + R_{\text{NON CHD}}(\text{age})$
- Smoker / Non Smoker

TOTAL RISK =