Appendix 2: calculation of the risk differences

For countries in the Northern hemisphere, the SCORE equation for low risk countries[1] was used

Step 1:

Calculate the underlying risks for CHD and for non-coronary CVD now and in ten years time

For CHD, now

$S_{0CHD}(age) = \exp(-(\exp(-22.13180))\times(age - 20)^{4.69030})$

$S_{0CHD}(age) = \exp(-(\exp(-29.79199))\times(age - 20)^{6.34317})$ for women

For CHD, in ten years time

$S_{0CHD10}(age+10) = \exp(-(\exp(-22.13180))\times(age - 10)^{4.69030})$

$S_{0CHD10}(age+10) = \exp(-(\exp(-29.79199))\times(age - 10)^{6.34317})$ for women

For non-coronary CVD, now

$S_{0NONCHD}(age) = \exp(-(\exp(-26.73738))\times(age - 20)^{5.64429})$

$S_{0NONCHD}(age) = \exp(-(\exp(-31.03742))\times(age - 20)^{6.60978})$ for women

For non-coronary CVD, in ten years time

$S_{0NONCHD10}(age+10) = \exp(-(\exp(-26.73738))\times(age - 10)^{5.64429})$

$S_{0NONCHD10}(age+10) = \exp(-(\exp(-31.03742))\times(age - 10)^{6.60978})$ for women

Step 2

Calculate the weighted sum w of the risk factors total cholesterol, smoking and SBP. In this case, we replace the original differences for total cholesterol (value – 6) and SBP (SBP – 120) by the seasonal differences observed TC_{sv} and SBP_{sv}, respectively. For smoking, *smoking status* =1 if current smoker, 0 otherwise

$w_{CHD} = 0.236312\times TC_{sv} + 0.017640\times SBP_{sv} + 0.710930\times(\textit{smoking status})$

$w_{NONCHD} = 0.022578\times TC_{sv} + 0.022488\times SBP_{sv} + 0.631960\times(\textit{smoking status})$

Step 3

Combine the underlying risks for now and in ten years time

Now

$S(age)_{CHD} = S_{0CHD}(age)^{\exp(w_{CHD})}$

$S(age)_{NONCHD} = S_{0NONCHD}(age)^{\exp(w_{NONCHD})}$

In ten years time

$S(age10)_{CHD} = S_{0CHD10}(age+10)^{\exp(w_{CHD})}$

$S(age10)_{NONCHD} = S_{0NONCHD10}(age+10)^{\exp(w_{NONCHD})}$

Step 4

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

$S_{10CHD}(age) = S(age10)_{CHD} / S(age)_{CHD}$

$S_{10NONCHD}(age) = S(age10)_{NONCHD} / S(age)_{NONCHD}$

Step 5

Calculate the 10 year risk for each end-point

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

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

Step 6

Combine the risks for CHD and for non-coronary CVD

$CVRrisk_{10}(age\text{-}v.1) = 100\times(Risk_{10CHD} + Risk_{10NONCHD})$

The original publication summed the two risk. Using a revised equation when risks are multiplied (see below) led to similar results (not shown)

$CVRrisk_{10}(age\text{-}v.2) = 100\times(Risk_{10CHD} \times Risk_{10NONCHD})$

For countries of the Southern Hemisphere, the recalibrated SCORE equation as proposed by Chen et al.[2] was used:

$$Risk = 100\% \times [1 - (1 - S_0)^{\exp(B)}]$$

Where

$S_0=\exp(-9.731300 + 0.0956483\times age + 0.0001233\times age^2)$ for men

S_0=exp(-10.23572 + 0.0480764×age + 0.0007904×age^2) for women

and

B=0.0185592× SBP_{sv} + 0.177413× TC_{sv} + 0.721362×(*smoking status* – pSM)

where

pSM= 1/[1+exp(1.2821– 0.02354×age + 0.0004559×age^2)] for men

pSM=1/[1+exp(2.1883 – 0.05043×age + 0.0007435×age^2)] for women

As for the European SCORE equation, the differences (TC – mTC) and (SBP – mSBP) in equation B were replaced by the seasonal differences observed TC_{sv} and SBP_{sv}, respectively.

References

1 Conroy RM, Pyorala K, Fitzgerald AP, et al. Estimation of ten-year risk of fatal cardiovascular disease in Europe: the SCORE project. Eur Heart J. 2003 Jun;**24**:987-1003.

2 Chen L, Tonkin AM, Moon L, et al. Recalibration and validation of the SCORE risk chart in the Australian population: the AusSCORE chart. Eur J Cardiovasc Prev Rehabil. 2009 Oct;**16**:562-70.