Impact of Risk Factor Modifications on Coronary Heart Disease Mortality in Turkish Adults for 2025

Authors: Ceyda Sahan\textsuperscript{1}, Kaan Sozmen\textsuperscript{2}, Belgin Unal\textsuperscript{1}, Julia Critchley\textsuperscript{3}

\textsuperscript{1} Department of Public Health, Dokuz Eylul University, Izmir, Turkey.
\textsuperscript{2} Department of Public Health, Katip Celebi University, Izmir, Turkey.
\textsuperscript{3} Division of Population Health Sciences and Education, St Georges University of London, London, UK.
Background

• CVDs are the leading cause of death in the world
• Low-middle income countries are disproportionately affected from
• More than 80% of global CVD deaths take place in these countries
• 80% of premature deaths from CVDs can be prevented
Background

- 24000 CHD deaths were prevented or postponed by risk factor changes in Turkey between 1995 and 2008 (Unal B, et al. 2013)

- CHD mortality rates in Turkey can be decreased much more by interfering to the policies.
Objectives

• To appraise the potential reductions in CHD mortality achievable by modest and optimistic decreases in
  – smoking,
  – diabetes,
  – physical inactivity,
  – BMI,
  – consumption of saturated fat,
  – salt

• and increases in
  – consumption of fruit and vegetables
Methods

**IMPACT-CHD mortality model**

- Previously developed and validated in Turkey was extended to predict potential reductions in CHD mortality from 2008 (baseline year) to 2025.
- Using risk factor trends data from recent surveys as a baseline, we modelled alternative future risk factor scenarios.
Estimating future trends in CHD mortality to 2025

• CHD mortality trends
  – TURKSTAT’s CHD mortality data between 1995-2008

• Population projections
  – from TURKSTAT’s projections for 2025

• Analysis presented by assumptions
  – the indirect standardized mortality rates ("no change in mortality")
  – the exponential decay model counterfactual ("continuing decline in mortality")
Table 1. **Predicted** Scenarios in Risk Factor Changes for 2025, in Turkey

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Modest</th>
<th>Optimistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary salt</td>
<td>20 %</td>
<td>30 %</td>
</tr>
<tr>
<td>Saturated fat by energy intake</td>
<td>2 %</td>
<td>3 %</td>
</tr>
<tr>
<td>BMI</td>
<td>5 %</td>
<td>10 %</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5 %</td>
<td>10 %</td>
</tr>
<tr>
<td>Smoking</td>
<td>10 %</td>
<td>15 %</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>5 %</td>
<td>10 %</td>
</tr>
<tr>
<td>F/V intake</td>
<td>5 %</td>
<td>10 %</td>
</tr>
</tbody>
</table>
• **Probabilistic sensitivity analyses**
  – were conducted to overcome uncertainties on model parameters.
Probabilistic sensitivity analyses

• The uncertainty intervals based on **1,000 draws** taking the 95% uncertainty intervals as the 2.5th and 97.5th percentiles.

• Input variables taken from external sources (e.g. **beta coefficients** and **relative risk reductions**) were randomly drawn from specified distributions.
Results

• Projected populations in 2025 (adults aged 25-84) were 54 million in Turkey

• If no risk factor changes – increase in mortality due to population ageing (of about 30%)

• With modest changes in risk factors about 50,000 deaths prevented and optimistic 76,000

• The half of these deaths prevented were due to
  – diabetes
  – sat/unsaturated fat intake
Predicted Decreases in Deaths

Graph 1. Assumed no mortality change in 2025

Graph 2. Assumed mortality decline (exponential decay model) in 2025
Table 1. Estimated CHD deaths prevented by achieving risk factor policy options for no mortality change scenario, by sex, in Turkey

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Modest scenario</th>
<th>Optimistic scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men (95% CI)</td>
<td>Women (95% CI)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>6270 (5199-7434)</td>
<td>6550 (5154-7884)</td>
</tr>
<tr>
<td>Sat/unsat fat</td>
<td>7160 (6918-7418)</td>
<td>3684 (3567-3828)</td>
</tr>
<tr>
<td>Salt intake</td>
<td>3737 (3469-4002)</td>
<td>4829 (4279-5363)</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>3885 (3239-4692)</td>
<td>2389 (2078-2785)</td>
</tr>
<tr>
<td>Smoking</td>
<td>4221 (3613-4883)</td>
<td>1788 (1461-2158)</td>
</tr>
<tr>
<td>BMI</td>
<td>1703 (1066-2363)</td>
<td>1409 (632-2177)</td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>410 (255-566)</td>
<td>343 (177-515)</td>
</tr>
<tr>
<td>Total</td>
<td>27387 (23758-31358)</td>
<td>20993 (17347-24709)</td>
</tr>
</tbody>
</table>
Table 2. Estimated CHD deaths prevented by achieving risk factor policy options for lower mortality change scenario, by sex, in Turkey

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Modest scenario</th>
<th>Optimistic scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men (95% CI)</td>
<td>Women (95% CI)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>3512 (2824-4228)</td>
<td>3421 (2571-4270)</td>
</tr>
<tr>
<td>Sat/unsat fat</td>
<td>4186 (4039-4349)</td>
<td>2122 (2059-2175)</td>
</tr>
<tr>
<td>Salt intake</td>
<td>1921 (1771-2065)</td>
<td>2663 (2333-2980)</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>2082 (1719-2535)</td>
<td>1188 (1028-1396)</td>
</tr>
<tr>
<td>Smoking</td>
<td>2204 (1841-2622)</td>
<td>816 (663-987)</td>
</tr>
<tr>
<td>BMI</td>
<td>918 (548-1318)</td>
<td>775 (295-1267)</td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>232 (142-326)</td>
<td>193 (90-300)</td>
</tr>
<tr>
<td>Total</td>
<td>15055 (12883-17443)</td>
<td>11178 (9039-13374)</td>
</tr>
</tbody>
</table>
Strengths-limitations

• Country specific data
• Multiple risk factors evaluated
• First study of policy scenarios for CHD in Turkey

• Uncertainty in model parameters e.g. Mortality trends (probabilistic uncertainty analyses used)
• Uncertainty in model assumptions e.g. Lag times
• Trends in treatment not included
Conclusion

• Only modest risk factor reductions in
  – diabetes,
  – sat/unsat fat
  – salt reduction

 Population based,
 Multisectoral interventions (to reduce diabetes, saturated fat and salt consumption) should be scaled up

The government + Food industry

32000 CHD deaths
Main messages

1900 CHD deaths per year

Modest scenario options

Policies on diabetes and healthy food consumption were the most effective options for preventing CHD mortality.
Acknowledgements

RESCAP-MED fellowship team
Simon Capewell
Martin O'Flaherty
Piotr Bandosz
Maria Guzman Castillo
Thank you for your attention