Declining Stroke and Myocardial Infarction Mortality Between 1989 and 2010 in a Country of the African Region

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Background and aim of study

- In LMICs, CVD burden predicted to increase due to aging populations and “expected detrimental lifestyle changes”
- Few data available on CVD mortality in LMICs because of lack of vital statistics, census data or otherwise reliable information.
- **No population-based data on CVD trends in the African region.**

- **Aim of study:** to examine trends in crude & age-standardized mortality for stroke and MI in Seychelles between 1989-2010

- Emphasis on stroke/MI that can be ascertained with minimal investigations & reporting likely reliable in 1989-2010.
**Settings**

- East Africa, population of 86’000, mainly on 3 islands
- Population mostly of African descent
- GDP/cap US$ 700 in 1970s to 8’000 in 2010
- Industrial fishing, tourism and services

- Population data from censuses
- All deaths medically certified (vital statistics)
- National health system (free health care to all inhabitants)
Rapid demographic transition in Seychelles

![Graph showing the population distribution by age from 1971 to 2030. The graph compares the population distribution in thousands across different age groups: 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, and 80+. The data points for each year are marked with different symbols: blue diamonds for 1971, pink squares for 1989, red triangles for 2009, and green circles for 2030. The graph illustrates a significant decrease in the population of younger age groups and a corresponding increase in the population of older age groups, indicating a demographic transition.]
Methods

- All original death certificates in 1989-2010 (n=13’163) were reviewed and re-coded manually according to ICD-10.
- Deaths certificates are not validated (i.e. sequence appears as written by certifying doctors): stroke and MI considered as causes of death if diagnosis appears in any of 4 fields for immediate, intermediate, underlying, and contributory causes of death.
- Yearly distribution of population by age and sex available.
- Age-, sex-, and year-specific mortality rates calculated for each cause of death and directly standardized to the WHO 2001 standard population.
- Secular trends in mortality rates were also analyzed using Poisson regression.
Absolute number of deaths in 1989-91 and 2008-10

- Total number of deaths increased by 18% in men and by 24% in women.
- Number of CVD deaths increased by 10%.
- Absolute number of stroke and MI deaths did not increase over time.
All-cause mortality decreased by 33% in men and by 25% in women.

CVD mortality decreased by 44% in men and 28% in women.

Stroke mortality decreased by 44% in men and 39% in women.

MI mortality decreased by 50% in men and by 53% in women.
Trends in age-standardized stroke and MI mortality between 1989-91 and 2008-10

[Graph showing trends in mortality per 100,000 for men and women for stroke and myocardial infarction from 1990 to 2010.]
Change in age-standardized mortality between 1989-91 and in 2008-10

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes</td>
<td>1669</td>
<td>1113</td>
<td>-33%</td>
<td>-2.4%</td>
<td>710</td>
<td>535</td>
<td>-25%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Stroke</td>
<td>250</td>
<td>141</td>
<td>-44%</td>
<td>-3.3%</td>
<td>140</td>
<td>86</td>
<td>-39%</td>
<td>-2.7%</td>
</tr>
<tr>
<td>MI</td>
<td>117</td>
<td>59</td>
<td>-50%</td>
<td>-3.0%</td>
<td>51</td>
<td>24</td>
<td>-53%</td>
<td>-3.8%</td>
</tr>
</tbody>
</table>

Stroke and MI mortality decreased more than all-cause mortality
## Change in age-standardized mortality between 1989-91 and in 2008-10, by age category

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Age</th>
<th>1989-91</th>
<th>2008-10</th>
<th>Total change</th>
<th>Yearly change</th>
<th>1989-91</th>
<th>2008-10</th>
<th>Total change</th>
<th>Yearly change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>&lt;55</td>
<td>22</td>
<td>20</td>
<td>-1%</td>
<td>0.1%</td>
<td>16</td>
<td>13</td>
<td>-2%</td>
<td>-1.0%</td>
</tr>
<tr>
<td></td>
<td>55-75</td>
<td>102</td>
<td>59</td>
<td>-42%</td>
<td>-3.2%</td>
<td>50</td>
<td>25</td>
<td>-50%</td>
<td>-4.1%</td>
</tr>
<tr>
<td></td>
<td>&gt;75</td>
<td>126</td>
<td>63</td>
<td>-50%</td>
<td>-4.5%</td>
<td>75</td>
<td>48</td>
<td>-36%</td>
<td>-2.2%</td>
</tr>
<tr>
<td>MI</td>
<td>&lt;55</td>
<td>17</td>
<td>7</td>
<td>-60%</td>
<td>-2.9%</td>
<td>8</td>
<td>5</td>
<td>-37%</td>
<td>-4.3%</td>
</tr>
<tr>
<td></td>
<td>55-75</td>
<td>70</td>
<td>30</td>
<td>-57%</td>
<td>-3.7%</td>
<td>27</td>
<td>11</td>
<td>-24%</td>
<td>-4.2%</td>
</tr>
<tr>
<td></td>
<td>&gt;75</td>
<td>30</td>
<td>21</td>
<td>-30%</td>
<td>-1.9%</td>
<td>15</td>
<td>8</td>
<td>-47%</td>
<td>-3.1%</td>
</tr>
<tr>
<td>Other CVD</td>
<td>&lt;55</td>
<td>77</td>
<td>28</td>
<td>-64%</td>
<td>-6.1%</td>
<td>21</td>
<td>14</td>
<td>-33%</td>
<td>-1.1%</td>
</tr>
<tr>
<td></td>
<td>55-75</td>
<td>116</td>
<td>83</td>
<td>-28%</td>
<td>-1.5%</td>
<td>49</td>
<td>37</td>
<td>-67%</td>
<td>-0.3%</td>
</tr>
<tr>
<td></td>
<td>&gt;75</td>
<td>189</td>
<td>111</td>
<td>-41%</td>
<td>-4.6%</td>
<td>78</td>
<td>85</td>
<td>10%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Stroke and MI mortality decreased in all age categories
Discussion

- Decline in stroke and MI compatible with substantial decrease of all-cause mortality in Seychelles (likely occurring in most LMICs)

- Yet steeper than overall mortality decline

- Comparable with data from other middle income of similar GDP as Seychelles (e.g. Brazil, Argentina)
Discussion

MEN, age 35-64

- Smoking
- BMI ≥ 25 kg/m²
- Blood Pressure ≥ 140/90 mmHg
- Cholesterol ≥ 6.5 mmol/l
- Diabetes FBG ≥ 7 or aware

WOMEN, age 35-64

- Smoking
- BMI ≥ 25 kg/m²
- Blood Pressure ≥ 140/90 mmHg
- Cholesterol ≥ 6.5 mmol/l
- Diabetes FBG ≥ 7 or aware

- Arterioscl & Thrombosis 1991;11:1730-36
- BMC Public Health 2006;6:9
- Cardiovasc Diab 2009, 8:34
Discussion

- Improved living conditions (reduced age-adjusted all-cause mortality)
- National health care system did not change markedly, but possibly some role of larger use of medication (likely modest)
- Population levels of risk factors:
  - BP decreased slightly (including in children)
  - Smoking decreased largely (programs, legislation)
  - Cholesterol, obesity and DM increased
  - Diet: staple diet of rice and fish (~6 g salt/day), but diet increasingly diverse
- National CVD/NCD program since 1989: high awareness of CVD, programs, policies (tobacco)
Conclusions

- Seychelles provide a good case study in a LMIC: complete vital statistics and population census data
- Sharp decline in age-standardized stroke and MI mortality during the past two decades in Seychelles
- Decline in CVD is steeper than decline in all-cause mortality
- Changes in conventional risk factors explain only part of decline; limited tertiary care; supporting health policies
  - Favorable role of overall socio-economic development
  - Suggests that peak of CVD mortality has already occurred in Seychelles and country is in advanced stage of epi transition
  - Epidemiological transition in LMICs, at least in some MICs and/or in small island states, may progress more rapidly than initially thought
Thank you for your attention