Mortality from NCDs

Target: 25% relative reduction in overall mortality from cardiovascular disease, cancer, diabetes, or chronic respiratory disease

Indicator: Unconditional probability of dying between ages 30-70 from, cardiovascular disease, cancer, diabetes, or chronic respiratory disease

Public health relevance: Of the 57 million global deaths in 2008, 36 million (63%) of these were due to noncommunicable diseases. Nearly 80% of these NCD deaths occurred in low and middle income countries (29 million deaths). The leading causes of NCD deaths in 2008 were cardiovascular diseases (17 million deaths, or 48% of all NCD deaths), cancers (7.6 million, or 13% of all NCD deaths), and respiratory diseases, including asthma and chronic obstructive pulmonary disease (4.2 million). Diabetes caused another 1.3 million deaths.

Indicator choice: This indicator is calculated from age-specific death rates for the combined four cause categories (typically in terms of 5-year age groups 30-34,…, 65-69). A life table method allows calculation of the risk of death between exact ages 30 and 70 from any of these causes, in the absence of other causes of death. This form of indicator was chosen to exclude confounding across countries or over time due to differences or changes in mortality rates for other competing causes and to control for differences in population age structure.

The lower age limit for the indicator of 30 years represents the point in the life cycle where the mortality risk for the four selected chronic diseases starts to rise in most populations from very low levels at younger ages. The upper limit of 70 years was chosen for two reasons:

(a) to identify an age range in which these chronic disease deaths can truly be considered premature deaths in almost all regions of the world. Table 1 shows estimated regional life expectancies at age 30 for the year 2009; in all regions except the African region, the average expected age at death for 30 year olds already exceeds 70 years.

(b) estimation of cause-specific death rates becomes increasingly uncertain at older ages because of increasing proportions of deaths coded to ill-defined causes, increasing levels of co-morbidity, and increasing rates of age mis-statement in mortality and population data sources.

Target setting: The proposed target for a 25% relative reduction over the 15 year period 2010 - 2025 was based on an analysis of the historically achieved trends in the indicator in recent decades. To set this target, we analysed data from 80 member states with at least 15 years of vital registration data between 1981-2010 that passed quality criteria on completeness and cause-of-death assignment. We calculated the average annual rate of decline in the unconditional probability of dying from the four causes between ages 30 and 70 (both sexes
combined) for each country from the available data within this 30 year time period. This was calculated as follows:

We first calculated age-specific mortality rate for each five-year age group and country, for each 5-year age range between 30 and 70:

\[ 5M_x = \frac{\text{Total deaths from four NCD causes between exact age } x \text{ and exact age } x + 5}{\text{Total population between exact age } x \text{ and exact age } x + 5} \]

We then translated the 5-year death rate to the probability of death in each 5-year age range:

\[ 5q_x = \frac{5M_x \times 5}{1 + 5M_x \times 2.5} \]

We then calculated unconditional probability of death from age 30 to age 70:

\[ 40q_{30} = 1 - \prod_{x=30}^{65} (1 - 5q_x) \]

At this point we have the unconditional probability of death from exact age 30 to exact age 70 for every country and year in our database. We next calculate the average annual rate of decline for each country by regressing log probability of death on year using ordinary least squares regression:

\[ \ln(40q_{30}) = \beta \cdot \text{year} + \alpha \]

This generates a coefficient (\( \beta \)) for each country, from which we calculate the equivalent 15-year relative decline for that country as follows:

\[ \text{Annual average change in } 40q_{30} = 1 - e^\beta \]

Finally, to set the target, we wished to identify the 10th percentile of all 193 Member states, which approximately corresponds to the 19th best-performing country (ranked from largest decrease in \( 40q_{30} \) to largest increase in \( 40q_{30} \)). Since we have data for only 80 countries, we conservatively assumed that all of the top 19 performing countries would collect high-quality mortality data and thus would be included in our dataset. The 19th best-performing country in our dataset experienced an annual average decline of the order of 2% per year. The target for the 15-year period 2010-2025 was thus set at a 25% relative reduction (2% annual reduction compounded for 15 years).