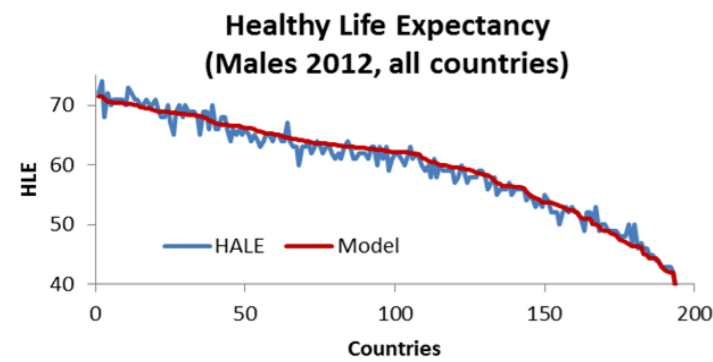# Verifying the HALE Measurements of the Global Burden of Disease Study: Quantitative Methods Proposed

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Healthy Life Expectancy (Males 2012, all countries)

Introduction

Starting from 1990 the Global Burden of Disease Study (GBD) produced important estimates for the Loss of Healthy Life Years (LHLY) and for the Healthy Life Expectancy (HLE) under the term HALE.

The GBD system is very heavy and laborious thus making difficult the reproduction and validation of results

It is not possible to estimate the LHLY and the HLE for the past time periods when no GBD data are available

The main finding is that the longer we live the more the years with poor health (LHLY) tend to increase.

Another important point is that although women live longer than men their Healthy Life Years Lost are higher than man

Research Aim

Proposing and applying methods to estimate the LHLY and the HLE using data only from the Life Tables

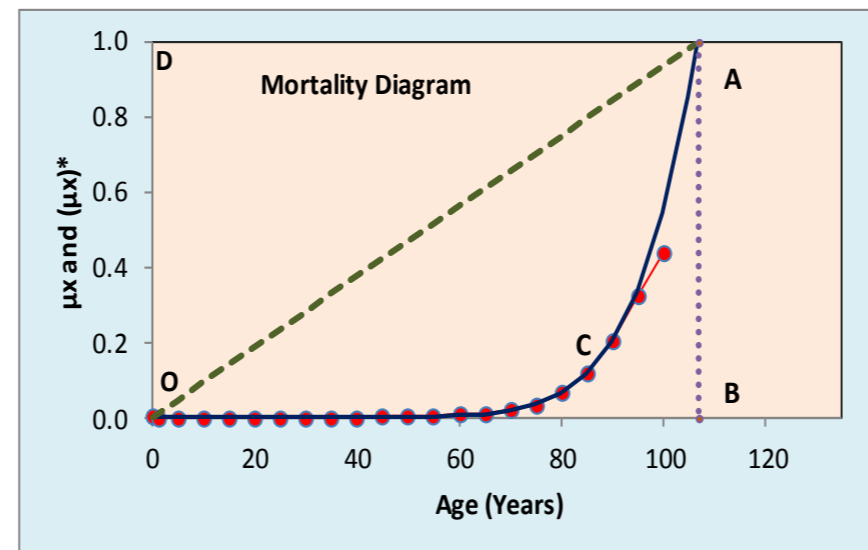Comparing our results with the related HALE measures from the World Health Organization (WHO)

To support the previous applications based on the Health State Function by a new Mortality Model

The Simpler Health State Model $H_x = l - \left(\frac{x}{T}\right)^b$

The Health State Function and the Relative Impact of the Mortality Area (USA, males 2000)
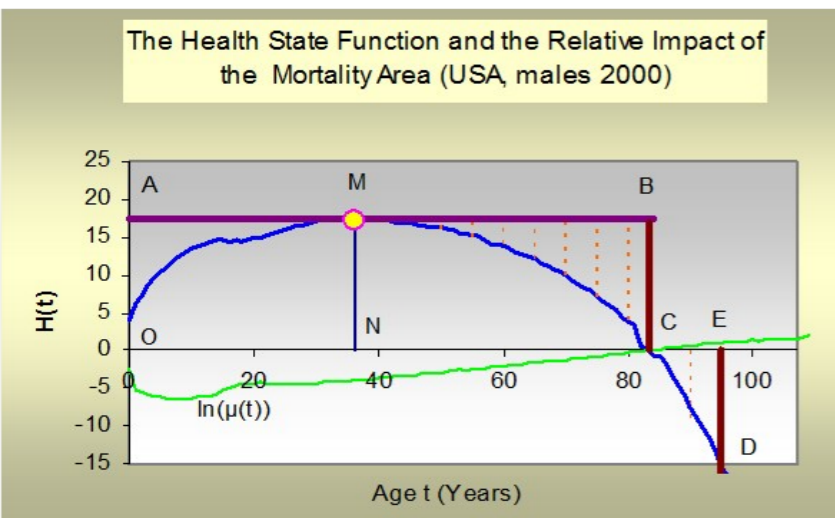
The Mortality Diagram to Estimate the Loss of Healthy Life Years.

(Use µx, mx or nMx data)   arXiv:1510.07346 [q-bio.PE]

Mortality Diagram

Comparisons

Model (M) and HALE (H) results for mean Loss of Healthy Life Years in all WHO Countries (Males 1990-2013)

Model (M) and HALE (H) results for mean Loss of Healthy Life Years in all WHO Countries (Females 1990-2013)

Characteristics of the Mortality Model from the Graph

1. The Mortality Area (OCABO)
2. The Health Area (ODACO)
3. The Total Area (ODABO)
4. Equation $$\mu_x = \left(\frac{x}{T}\right)^b$$
5. Mortality Area $$E_{mortality} = \frac{T}{(b+1)}$$
6. Health Area $$E_{health} = \frac{bT}{b+1}$$
7. Total Area $$E_{total} = T$$
8. Fraction of Health / Mortality $$\frac{E_{health}}{E_{mortality}} = b$$
9. Fraction of Total Area / Mortality $$\frac{E_{total}}{E_{mortality}} = b+1$$
10. The last two fractions express the relative influence of Health and Mortality to the overall public opinion. Thus the parameter *b* is an estimator of the Loss of Healthy Life Years. This parameter is proportional to Ehealth and inversely related to Emortality.
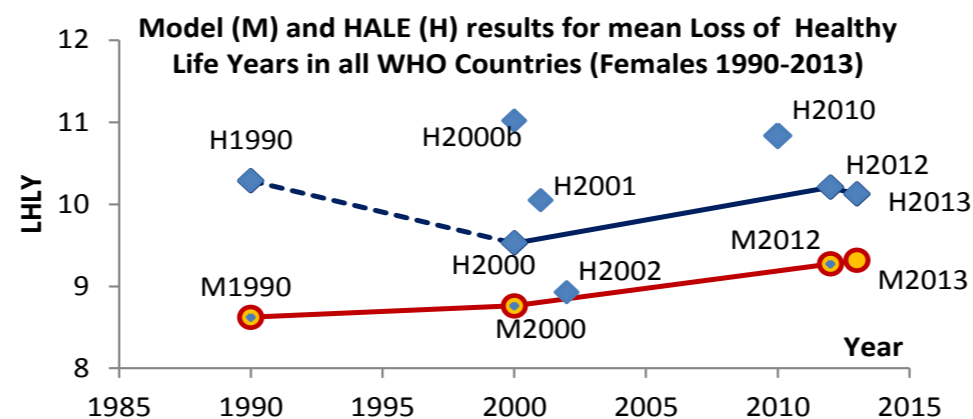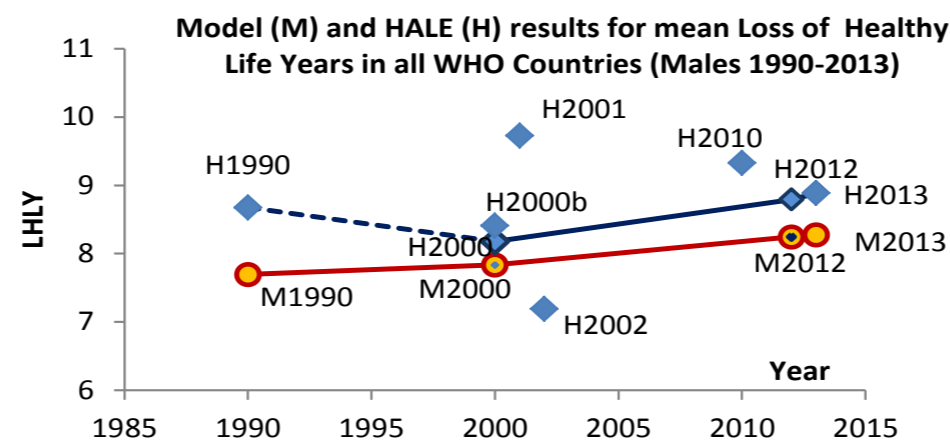
Key Points of the Models and Methods

Proposing and applying a simple mortality model based on the µx, mx or nMx data sets;

Proposing and applying a health state model based on the ndx, µx, mx, nMx, or Death and Population data sets;

We use the abridged life tables provided by WHO;

Our estimates are compared with the HALE estimates for the WHO member countries;

The results suggest improved WHO estimates in recent years for the majority of the cases and comparative figures with our estimates;

Paper: Christos H Skiadas, Verifying the HALE measures of the Global Burden of Disease Study: Quantitative Methods Proposed. arXiv:1510.07346 [pdf], Oct. 2015;

Presentation in the 5th Demographics Workshop in a Special Session devoted HALE and the Global Burden of Disease Study: Call for Papers at:

http://www.smtda.net/demographics2016.html

http://www.cmsim.net