**HealthBurden Module**

*6th June 2019*

The aggregate impact of all causes of mortality and morbidity in the population is summarised using ‘Disability-adjusted Life-Years’ (DALYS) (for which developments over several years have been summarised in [1]).

DALYS represent the burden of a diseases in terms of premature death (those would have been alive and in this group but for their premature death) and in terms of the disability experienced by the persons living with a particular condition, for a period and age-group. These components are denoted, respectively, ‘Years of Live Lost (YLL)’ (due to premature deaths) and ‘Years Lived with Disability (YLD)’. These components can be added together to give a total value for the DALYS: $DALY=YLL+YLD$

Modelling Years of Live Lost (YLL)

At the point when an individual in the model dies, the time, the age at death and the cause of death is recorded. If that death occurs before their 70th birthday, a day of ‘lost life’ is recorded as being attributed to the cause of their death each day until the day that would have been the 70th birthday of the deceased. The choice of 70th birthday is arbitrary and represents the point before which a death may be considered as ‘premature’.

Modelling Years Lived with Disability (YLD)

Each month, the average disability burden that each disease has imposed during the previous month on each living individual is recorded. It is assumed that this monthly average has applied equally to each day in the previous month. In the case of an individual suffering from causes of disability from multiple different diseases ($d\_{j}$), the total disability is: $min⁡\left(1,\sum\_{j}^{}d\_{j}\right)$ and the disability that is attributed to each disease is: $\frac{d\_{j}.min⁡\left(1,\sum\_{j}^{}d\_{j}\right)}{\sum\_{j}^{}d\_{j}}$.

The disability weights that are used are taken from the Global Burden of Disease Study [2]. The method description for each disease module gives details as to how these were applied for each disease.

Total DALYS

In the way described above, the total YLL and YLD is recorded for each day and for each person that has ever lived in the simulated population. The composition of these by the time-period, age and cause can be examined.

**References**

[1] Salomon, J. A., Haagsma, J. A., Davis, A., de Noordhout, C. M., Polinder, S., Havelaar, A. H., … Vos, T. (2015). Disability weights for the Global Burden of Disease 2013 study. *The Lancet Global Health*. https://doi.org/10.1016/S2214-109X(15)00069-8

[2] Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2016 (GBD 2016) Disability Weights. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2017. [Accessed 9-3-19]