

Appendix A: Direct Standardization of Mortality Rates

Direct standardization involves measuring the age- and gender-specific mortality rates for the index population and then applying these rates to the age and gender distribution of a chosen standard population S . Let i be an index of age and gender groups (i.e. males between 0 and 5, females between 35 and 40, etc.). There are S individuals in the standard population with S_i individuals in each age and gender group i , and there are P individuals in the index population with P_i individuals in each age and gender group i . Let $AGDR_{P_i}$ be the mortality rates of age and gender groups i in the index population P . If O_{P_i} is the number of deaths observed in P_i in a given year then:

$$AGDR_{P_i} = \frac{O_{P_i}}{P_i}$$

The directly standardized death rate (*DSDR*) would be:¹

$$DSDR_p = \frac{\sum_i AGDR_{P_i} S_i}{\sum_i S_i}$$

The *SDR* is the crude death rate that would occur in the standard population if it had the same age- and gender-specific mortality rates as the index population. This is often used to calculate the *comparative mortality ratio (CMR)*, which is the ratio of the *DSDR* of P to the *CDR* of S :

¹ Rothman, 44.

$$CMR_P = \frac{DSDR_P}{CDR_S} = \frac{\frac{\sum_i AGDR_{P_i} S_i}{\sum_i S_i}}{\frac{\sum_i AGDR_{S_i}}{\sum_i S_i}} = \frac{\sum_i AGDR_{P_i} S_i}{\sum_i AGDR_{S_i} S_i}$$

The numerator is the number of deaths that would be expected in the standard population S if it were to have the same age- and gender-specific mortality rates as the index population P . The denominator is the number of deaths actually observed in S . This method rigorously controls for age and gender differences in mortality rates. However, when comparing a number of index populations, the $CMRs$ will depend on the standard population that is used for standardization. The World Health Organization and other institutions produce standard sets of standard populations.²

² Newell, 66.