7: Rate Adjustment ("Standardization")

For uniformity of language, "rate" will be used to refer to any incidence or prevalence measure.

Direct Standardization

The directly adjusted rate (aR_{direct}), is a weighted average of strata-specific rates with weights coming from a reference population:

$$aR_{direct} = \sum w_i r_i$$

where $w_i = \dfrac{N_i}{\sum N_i}$ and

N_i represents the size of strata *i* of the reference population. (Capital letters denote values from the reference population)

r_i represents rate in strata *i* of the study population. (Lower case letters denote values from the study population.)

Indirect Standardization

The **Standardized Mortality Ratio (SMR)**

$$\text{SMR} = \frac{\text{Observed}}{\text{Expected}}$$

The "Observed" is merely the observed number of cases and the $\text{Expected} = \sum R_i n_i$ where R_i represents the rate in strata *i* of the reference population and n_i represents the number of people stata *i* of the study population. This formula can be understood in terms of the expected number of cases in strata *i* , which is merely $Expected_i = R_i n_i$.

The SMR is a fundamental population based relative risk estimate, with "1" representing a population with an observed rate that is as expected.

You can use the SMR to derive the indirectly adjusted rate $aR_{indirect} = (\text{crude rate}) \times SMR$.