**Summary applies to quantitative studies only!**

**Sources of bias**

* When conducting an epidemiological study, if a systematic error occurs which leads to misinterpretation of the effect measure (for example, relative risk, exposure odds-ratio, or attributable rate) this misinterpretation is called bias. If there is no misinterpretation the effect measure is called valid (or unbiased).
* There are three main types of bias: selection bias, information bias, and confounding bias.
* Selection bias refers to a distortion in the effect measure, resulting from the manner in which the people are selected for the sample. Thus, selection bias may be introduced if sampling techniques are inappropriate. If selection bias occurs, the sample(s) do not represent the target population.
* Information bias refers to a distortion in the effect measure, which is due to measurement error or misclassification of participants for one or more variables. Information bias occurs when the measurement of either the study factor or the outcome is systematically inaccurate.
* We distinguish between two types of misclassification: non-differential misclassification and differential misclassification. In non-differential misclassification, the misclassification acts identically on exposed and unexposed groups or diseased and disease free groups. In differential misclassification, the misclassification acts differently on diseased and disease free groups or on exposed and unexposed groups, or the misclassification occurs only with certain combinations of the exposure and the outcome.
* Confounding bias is a type of bias that may occur when the effect that the study factor has on the outcome is mixed in the data with the effect of a third variable (= confounder). A potential confounder has to be (1) related to the study factor, (2) related to the outcome, and (3) not an intermediate variable.
* Confounding bias means that the stratum-specific estimates are different from the overall crude estimate of the effect measure. A confounder is called an effect modifier, if the stratum-specific estimates of the effect measure are different from each other.
* Stratification for a potential confounder enables detection of confounding and controlling for confounding.
* A bias is called towards the null-value, if the estimate of the effect measure of the sample is closer to the null-value than the true effect measure in the target population. Bias towards the null means an underestimation of the true effect measure in the target population. A bias is called away from the null-value, if the estimate of the effect measure from the sample is further away from the null-value than the true effect measure in the target population. Bias away from the null means an overestimation of the true effect measure in the target population. A bias causes a switch-over if the estimate of the effect measure of the sample is one side of the null-value and the true effect measure of the target population is on the other side.
* A non-differential misclassification bias is always towards the null-value.