

M507 – Health effects of hazardous substances – Revision questions

Section 7 – Epidemiology

1. Why do we undertake epidemiological studies?
(Page 81)
 - Establish a link between exposure to a substance and the development of a disease or ill-health
 - Other forms of information gathering such as animal tests, in-vitro tests, chemical analogy suffer from many potential drawbacks
 - Epidemiological studies are often the only valid technique to establish actual health risks in a human population

2. What are the potential problems / limitations of epidemiological studies?
(Pages 81 and 82)
 - Tend to be complex and expensive
 - Historical data may be incomplete or not valid
 - Problems of bias or other confounding factors in the selection and monitoring of the groups under study

3. What do you understand by the terms ‘incidence’ and ‘prevalence’ rates?
(Page 82)
 - Incidence rates – number of new cases of ill-health or disease. Usually expressed as number of new cases per 1000 people in group under study per year
 - Prevalence rates – total number of cases of ill-health or disease that exist in the population at a particular point in time. Affected by incidence and duration of effects.

4. What do you understand by the term ‘standardised mortality ratio’?
(Pages 82 to 84)
 - Ratio of number of events observed in a population to the number that would be expected in a reference population. (If no difference to reference group standardised mortality ratio would be 1.

5. What do you understand by the terms ‘association’ and ‘causation’?
(Page 84)
 - Association – a study may show a link between a factor such as exposure and a health effect. However, it may be spurious or indirect through other factors or variables
 - Causation – When there is a direct causal link between the exposure and the health effect

6. What are the Bradford-Hill criteria and how are they used? (Pages 84 to 86)
- Criteria developed to provide support for a direct causal link. The more criteria that are met the greater the support for the cause and effect hypothesis.
7. What do you understand by the term 'bias'? (Page 86)
- Selection bias – can occur in the selection of the group under study and / or the control group
 - Information bias – relates to the quality and accuracy of the information / data gathered
8. What do you understand by the term 'statistical significance'? (Page 86)
- Statistical tests establish whether the apparent causal link is likely to be down to chance or not. Statistically significant is usually taken as 95% or better confidence that results are not due to chance (i.e. less than 1 in 20 chance that results are due to chance).
9. What are the main types of epidemiological studies? What are their main advantages and disadvantages? (Pages 87 to 89)
- Longitudinal studies – follow group of people over a period of time
 - Case-control studies – used to identify factors that may have caused a particular effect.
 1. Tend to be retrospective
 2. Study group of people who have the effect ('cases')
 3. Compare with another group who do not have the effect ('controls').
 4. Difficulties getting accurate historical data / information
 5. Difficult to select the control group to avoid confounding factors.
 - Cohort studies
 1. Tend to be prospective
 2. Cohort group identified before effect occurs
 3. Comparison group also identified who are not exposed to substance
 4. Potentially most robust type of study
 5. Tend to take a long time to complete and be expensive
 - Cross-sectional studies
 1. Observes group of people at a particular point in time, compares prevalence of an effect against a similar comparison group
 2. Relatively quick and inexpensive
 3. Cannot give information on time dependant relationships
 4. Not suited to study of effects that are uncommon