LEC 5 Q – EPIDEMIOLOGY

Hard Multiple Choice Questions

1. **Which of the following best describes a direct causal association?**

   a) A single risk factor contributes to multiple diseases.
   b) One variable directly influences another without mediation.
   c) An observed relationship is purely coincidental.
   d) A relationship that is influenced by external variables.

2. **In evaluating associations, which statistical measure is commonly used to assess the strength of the relationship?**

   a) Confidence intervals
   b) Mean differences
   c) P-values
   d) Odds ratios

3. **Which of the following is a crucial step in causal relationship testing?**

   a) Excluding all participants from the study.
   b) Including confounding variables in the analysis.
   c) Excluding confounders and testing the direct relationship.
   d) Ignoring non-significant results entirely.

4. **Which of Hill's Criteria suggests that a causal relationship must align with existing biological knowledge?**

   a) Strength of Association
   b) Consistency
   c) Biological Plausibility
   d) Coherence

5. **What role does confounding play in epidemiological studies?**

   a) It strengthens the observed association.
   b) It simplifies the analysis of data.
   c) It distorts the true relationship between exposure and disease.
   d) It eliminates the need for randomization.

6. **Which type of bias occurs when certain participants are more likely to be selected for a study than others?**

   a) Information Bias
   b) Measurement Bias
   c) Selection Bias
   d) Confirmation Bias

7. **According to the text, what is the importance of an adequate sample size in establishing an association?**

   a) It ensures the absence of bias in selection.
   b) It increases the likelihood of finding a significant result purely by chance.
   c) It provides the necessary power to detect true associations.
   d) It allows for more confounding variables to be included.

8. **What does the term "biological gradient" imply in the context of causation?**

   a) There is no dose-response relationship.
   b) Increased exposure leads to a decrease in disease incidence.
   c) Higher levels of exposure correlate with higher rates of disease occurrence.
   d) Biological responses are inconsistent across different populations.

Answers

1. b
2. c
3. c
4. c
5. c
6. c
7. c
8. c

1. **What is the primary purpose of using multivariate analysis in epidemiological studies?**

   a) To increase the sample size.
   b) To control for multiple confounding variables simultaneously.
   c) To establish direct causal relationships without bias.
   d) To simplify the data interpretation process.

2. **Which type of association would be most directly implicated in the causal chain of events leading to disease?**

   a) Spurious Association
   b) Indirect Association
   c) Multi-factorial Causal Association
   d) Direct (Causal) Association

3. **In the context of epidemiological studies, what does the term "coherence" refer to?**

   a) The clarity of statistical findings.
   b) The alignment of study results with established biological theories.
   c) The necessity for statistical significance.
   d) The consistency of data across similar studies.

4. **What is the significance of confidence intervals in statistical evaluation?**

   a) They provide a measure of the association's strength.
   b) They indicate the range within which the true effect size lies with a certain level of confidence.
   c) They confirm the absence of confounding.
   d) They serve as a substitute for p-values.

5. **Which of the following best illustrates a situation where confounding might occur in dietary studies?**

   a) Measuring only one dietary component's effect on cancer risk.
   b) Analyzing data from multiple populations with similar diets.
   c) Examining the effects of exercise while not considering its relationship with diet.
   d) Conducting randomized trials to establish cause and effect.

6. **Why is the concept of 'analogy' important in Hill's Criteria for Causation?**

   a) It provides alternative explanations for observed relationships.
   b) It establishes a precedent for similar causal relationships in other contexts.
   c) It reduces the complexity of causal inference.
   d) It confirms the significance of statistical findings.

7. **In evaluating dietary changes and cancer risk, which methodological approach is most effective in controlling for selection bias?**

   a) Using a cross-sectional study design.
   b) Implementing randomization during participant selection.
   c) Relying solely on retrospective data collection.
   d) Conducting case-control studies.

8. **Which of the following statements about the strength of association is true in the context of Hill's Criteria?**

   a) A weak association can be considered causal if supported by other criteria.
   b) A strong association is always indicative of causality.
   c) Strength of association is irrelevant when other criteria are met.
   d) A strong relative risk significantly enhances the likelihood of a causal inference.

Answers

1. b
2. d
3. b
4. b

5. c
6. b
7. b
8. d

1. **Which step is crucial in ensuring the reliability of study results in epidemiological research?**

   a) Excluding all non-significant findings.
   b) Validating the methods used in the study.
   c) Limiting the sample size to reduce variability.
   d) Focusing only on direct associations.

2. **What does the term "biological plausibility" signify in the context of establishing causation?**

   a) The relationship can be explained through statistical analysis.
   b) The proposed causal relationship is consistent with existing biological knowledge.
   c) The results are consistent across various populations.
   d) The findings are derived from experimental evidence.

3. **In what way does confounding affect the interpretation of epidemiological study results?**

   a) It strengthens the evidence for a causal relationship.
   b) It introduces uncertainty regarding the true nature of the association.
   c) It clarifies the direct effects of dietary changes.
   d) It eliminates the need for further research.

4. **What is the primary function of stratification in the analysis stage of epidemiological studies?**

   a) To ensure equal representation of all demographic groups.
   b) To separate data into subgroups to control for confounding variables.
   c) To establish a causal relationship without bias.
   d) To increase the overall sample size for analysis.

5. **According to Hill's Criteria, which aspect of a causal relationship does "consistency" refer to?**

   a) Repeated findings across similar studies in different contexts.
   b) The ability to replicate results in a single study.
   c) The lack of conflicting data.
   d) The strength of the observed association.

6. **What is a potential limitation of relying solely on observational studies to establish dietary impacts on cancer risk?**

a) They often have large sample sizes.
b) They can identify causal relationships without bias.
c) They may not adequately control for confounding factors.
d) They typically offer strong experimental evidence.

7. **Why is the control of bias essential in epidemiological studies?**

   a) To ensure that the study aligns with public health guidelines.
   b) To accurately estimate the true effect of exposure on health outcomes.
   c) To simplify the statistical analysis process.
   d) To guarantee that results are statistically significant.

8. **What does the presence of a "biological gradient" suggest about the exposure-disease relationship?**

   a) There is no clear connection between exposure and disease.
   b) Increasing levels of exposure correspond to decreasing disease rates.
   c) There is a dose-response relationship where higher exposure leads to higher rates of disease.
   d) The relationship is only relevant in specific populations.

Answers

1. b
2. b
3. b
4. b
5. a
6. c
7. b
8. c

1. **What is a primary limitation of using case-control studies in examining dietary effects on cancer risk?**

   a) They often lack sufficient sample size.
   b) They cannot establish temporality between diet and cancer.
   c) They are too expensive to conduct.
   d) They require long follow-up periods.

2. **In the context of confounding variables, which of the following statements is correct?**

   a) Confounders only affect the outcome, not the exposure.
   b) All confounders must be measured to draw valid conclusions.
   c) Confounding is irrelevant if a large sample size is used.
   d) Confounders can be ignored if they are statistically insignificant.

3. **What does it mean when a study has "non-significant results"?**

   a) The results indicate a strong association between variables.
   b) The sample size was too large.
   c) There is not enough evidence to support a relationship between the exposure and the outcome.
   d) The study has confirmed the hypothesis.

4. **Why might the analogy criterion in Hill's Criteria be considered less robust than other criteria?**

   a) It is based on subjective comparisons.
   b) It lacks empirical support.
   c) It does not address direct causation.
   d) It is easily misinterpreted.

5. **Which methodological approach is likely to provide the strongest evidence for a causal relationship between diet and cancer risk?**

   a) Observational studies
   b) Case-control studies
   c) Randomized controlled trials
   d) Cross-sectional studies

6. **What role does "strength of association" play in evaluating causal relationships?**

   a) It confirms the existence of a confounding variable.
   b) It provides a measure of the likelihood of a causal link.
   c) It indicates the need for more data collection.
   d) It is irrelevant if other criteria are met.

7. **In terms of bias, which of the following best describes "information bias"?**

   a) It arises from the selection of participants.
   b) It occurs due to inaccurate data collection or reporting.
   c) It is caused by the influence of confounders.
   d) It reflects differences in sample size across groups.

8. **What is the significance of establishing a biological plausibility for a proposed causal link?**

   a) It guarantees that the relationship is statistically significant.
   b) It aligns the findings with existing scientific knowledge, supporting the causal inference.
   c) It provides evidence from observational studies.
   d) It ensures that all confounding variables are controlled for.

Answers

1. b
2. b
3. c
4. a
5. c
6. b
7. b
8. b

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