Answers to Selected Study Questions and Calculation Problems

Chapter 1

Study Questions

1. Epidemiology
2. Framingham Heart Study
3. John Snow’s
4. Determinants
5. population
6. morbidity; mortality
7. Quantification
8. Qualitative
9. epidemic
10. Love Canal
11. pandemic
12. endemic
13. surveillance
14. plague
15. Edward Jenner
Chapter 2

Study Questions
1. Primary; prepathogenesis
2. secondary prevention
3. pathogenesis
4. Tertiary
5. demographic transition
6. epidemiologic transition

Chapter 3

Study Questions
1. count
2. ratio
3. proportion
4. rate
5. incidence rate
6. attack rate
7. proportional mortality ratio

Calculation Problems
8. a) Definition: The number of deaths in a given year divided by the reference population during the midpoint of the year (expressed as a rate per 1,000 or 100,000)

Formula: Crude death rate = \( \frac{\text{Number of deaths in a given year}}{\text{Reference population}} \times 100,000 \)

b) Calculation (using 100,000 as a multiplier):
The number of deaths in 2006 was 2,426,264.
The population as of July 1, 2006 was 299,398,484.

\[
\text{Crude death rate} = \frac{2,426,264}{299,398,484} \times 100,000 = 810.4 \text{ per 100,000}
\]
9. Calculation (using 1,000 as a multiplier)

Formula: Crude death rate = \( \frac{\text{Number of deaths in a given year}}{\text{Reference population during midpoint of the year}} \times 1,000 \)

The number of deaths in 2009 was 34,650.
The population as of June 30, 2009 was 1,123,913.

Crude death rate = \( \frac{34,650}{1,123,913} \times 1,000 = 30.8 \) per 1,000

10. a) Definition: The number of ill cases during a time period divided by the number of ill plus well during the same time period \( \times 100 \)

Formula: Attack rate = \( \frac{\text{Ill}}{\text{Ill + well}} \times 100 \) during a time period

b) Calculation: The number of ill males was 12.
The total number of males was 43.

Attack rate (males) = \( \frac{12}{43} \times 100 = 27.9\% \)

The number of ill females was 39.
The total number of females was 99.

Attack rate (females) = \( \frac{39}{99} \times 100 = 39.4\% \)

The number of ill employees was 51.
The total number of employees was 142.

Attack rate (all employees) = \( \frac{12 + 39}{43 + 99} \times 100 = 35.9\% \)

c) Proportion of male cases = \( \frac{12}{51} = 0.235 \times 100 = 25.5\% \)

11. a) Definition: The number of existing cases of a disease or health condition in a population at some designated time.

b) Formula: Point prevalence = \( \frac{\text{Number of persons ill}}{\text{Total number in the group}} \) at a time point

c) The prevalence of smoking 3 months before pregnancy was highest among persons from West Virginia (approximately 47\%). The lowest was among persons from Utah (approximately 10\%).
12. a) The prevalence of physical limitations increases with age.

13. a) Definition: The number of live births during a specified period of time per the resident population during the midpoint of the time period (expressed as rate per 1,000).

\[
\text{Formula: Crude birth rate} = \frac{\text{Number of live births}}{\text{Population size at the middle of that period}} \times 1,000 \text{ population}
\]

b) Calculation: The number of live births in 2006 was 4,265,555. The population as of July 1, 2006 was 299,398,484.

\[
\text{Crude birth rate} = \frac{4,265,555}{299,398,484} \times 1,000 = 14.2 \text{ per 1,000}
\]

14. a) Definition: The number of live births reported in an area during a given time interval divided by the number of women aged 15–44 years in that area (expressed as a rate per 1,000 women aged 15–44 years).

\[
\text{Formula: General fertility rate} = \frac{\text{Number of live births within a year}}{\text{Number of women aged 15–44 years during the midpoint of the year}} \times 1,000 \text{ women aged 15–44 years}
\]

b) Calculation: The number of live births in 2006 was 4,265,555. The number of women aged 15–44 as of July 1, 2006 was 62,258,466.

\[
\text{General fertility rate} = \frac{4,265,555}{62,258,466} \times 1,000 = 68.5 \text{ per 1,000 women aged 15 to 44 years.}
\]

15. a) Definition: The number of deaths within a population due to a specific disease or cause divided by the total number of deaths in the population during a time period such as a year.

\[
\text{Formula: PMR} (%) = \frac{\text{Mortality due to a specific cause during a time period}}{\text{Mortality due to all causes during the same time period}} \times 100
\]
b) Calculation: Mortality due to diseases of the heart in 2006 was 631,636.
Mortality due to all causes in 2006 was 2,426,264.
PMR (Diseases of the heart) = \( \frac{631,636}{2,426,264} \times 100 = 26.0\% \)
PMR (Malignant neoplasms) = 23.1%
PMR (Cerebrovascular diseases) = 5.7%
PMR (Chronic lower respiratory diseases) = 5.1%
PMR (Accidents/unintentional injuries) = 5.0%
c) Definition: The number of deaths (mortality) assigned to a specific cause during a year divided by the estimated population size during the midpoint of that same year (expressed as the rate per 100,000 population). Table 3.3 shows 631,636 deaths for diseases of the heart. The estimated population was 299,398,484.
Formula: Cause-specific mortality rate
\[
\text{Cause-specific mortality rate} = \frac{\text{Mortality from a given disease}}{\text{Population size at midpoint of time period}} \times 100,000
\]
d) Calculation: Cause-specific mortality rate for diseases of the heart = \( \frac{631,636}{299,398,484} \times 100,000 = 210.97 \)
16. a) Definition: The number of infant deaths among infants aged 0 to 365 days during a year divided by the number of live births during the same year (expressed as the rate per 1,000 live births). Formula:
\[
\text{Infant mortality rate} = \frac{\text{Number of infant deaths among infants aged 0 – 365 days during a year}}{\text{Number of live births during the year}} \times 1,000
\]
b) Calculation: The number of infant deaths during 2006 was 28,527. The number of live births during 2006 was 4,265,555.
Infant mortality rate = \( \frac{28,527}{4,265,555} \times 1,000 = 6.69 \) per 1,000 live births.
Chapter 4

Study Questions

1. Descriptive
2. Analytic
3. Descriptive; analytic
4. case reports (counts), case series, and cross-sectional studies
5. Cyclic fluctuations
6. Secular trends
7. Case clustering
8. spatial clustering
9. temporal clustering
10. acculturation

Chapter 5

Study Questions

1. Multiphasic screening
2. nature of the data
3. availability of the data
4. thoroughness
5. record linkage
6. California Health Interview Survey (CHIS)
7. life insurance
8. registry
9. reportable and notifiable diseases
10. HIPAA

Chapter 6

Study Questions

1. Manipulation
2. Randomization
3. experimental
4. clinical trial
5. Community interventions
6. Quasi-experimental
7. observational
8. descriptive studies; analytic studies
9. 2 by 2
10. ecologic
11. ecologic fallacy
12. case-control
13. case-control studies
14. odds ratio
15. a) Definition: Measure of association between frequency of exposure and frequency of outcome used in case-control studies.
   Formula: \( \frac{AD}{BC} \), where A is the number of subjects who have the disease and have been exposed, B is the number who do not have the disease and have been exposed, C is the number who have the disease and have not been exposed, and D is the number who do not have the disease and have not been exposed.
   b) Calculation: \( \frac{64 \times 117}{56 \times 27} = 4.95 \)

Chapter 7

Study Questions
1. temporality
2. cohort
3. period life
4. life expectancy
5. population-based cohort
6. prospective cohort
7. retrospective cohort
8. relative risk
9. nested case-control
10. a) Definition: Ratio of the risk of disease or death among the exposed to the risk among the unexposed.
    Formula: (Refer to Chapter 7.) Relative risk = \( \frac{A/(A + B)}{C/(C + D)} \)
    b) \( RR = \frac{23/70}{121/822} = 2.23 \)

© 2014 Jones & Bartlett Learning
Chapter 8

Study Questions
1. prophylactic
2. therapeutic
3. formative evaluation, process evaluation, impact evaluation, outcome evaluation
4. Impact
5. Formative
6. crossover
7. clinical trial
8. double-blind
9. blinding (masking)

Chapter 9

Study Questions
1. Population risk difference
2. P value
3. risk difference
4. etiologic fraction
5. population etiologic fraction
6. confidence interval

Chapter 10

Study Questions
1. validity
2. internal
3. External
4. Sampling error
5. bias
6. Selection
7. Recall
8. Prevarication (lying)
9. Confounding
10. prevention; analysis
Chapter 11

Study Questions

1. Screening
2. Mass
3. Selective
4. simple; rapid; inexpensive; safe; acceptable
5. Reliability
6. validity
7. Construct
8. Predictive value (+)
9. Specificity
10. Accuracy

Chapter 12

Study Questions

1. Infectivity
2. Virulence
3. Resistance
4. Pathogenicity
5. Natural, active
6. Artificial, passive
7. Direct transmission

FIGURE APPENDIX A–1 Answer to epidemiologic triangle
9. Portals of exit
10. incubation period
11. generation time
12. secondary attack rate
13. case fatality rate

Calculation Problems

14. a) Incidence rate = \( \frac{\text{Number of new cases over a time period}}{\text{Total population at risk during the same time period}} \times \text{multiplier (e.g., 100,000)} \)

The time period was March–May, 2009.
The number of new cases of H1N1 was 5,337.
The population at risk (Mexico) was 107,550,697.
Incidence rate = \( \frac{5,337}{107,550,697} \times 100,000 = 4.9 \text{ per 100,000} \)

b) Case fatality rate = \( \frac{\text{Number of deaths due to H1N1}}{\text{Number of cases of H1N1}} \times 100 \)

The time period was March–May, 2009.
The number of deaths from H1N1 was 97.
The number of laboratory-confirmed cases of H1N1 was 5,337.
Case fatality rate = \( \frac{97}{5,337} \times 100 = 1.8\% \)

15. a) The number of new cases of a disease or other condition in a population divided by the total population at risk over a time period times a multiplier (e.g., 100,000).

\[
\text{Incidence rate} = \frac{\text{Number of new cases over a time period}}{\text{Total population at risk during the same time period}} \times \text{multiplier (e.g., 100,000)}
\]

b) The incidence was highest among persons within the 25–29 year age group for both males and females (males = 1.6%, females = 1.3%).
Chapter 13

Study Questions
1. healthy worker effect
2. threshold
3. Latency
4. Synergism
5. dose–response relationship
6. sick building syndrome
7. passive smoking

Chapter 14

Study Questions
1. genetic epidemiology
2. Segregation analysis
3. autosomal dominant
4. Autosomal recessive
5. Molecular
6. proband
7. men; women
8. recombination

Chapter 15

Study Questions
1. operationalization
2. social support; social network ties
3. Social networks
4. person-environment fit
5. type A behavior pattern

Chapter 16

Study Questions
1. Reproductive epidemiology
2. Nutrition epidemiology
3. Pharmacoepidemiology

© 2014 Jones & Bartlett Learning