Week 2 Assignment - Week 2 Readings Study Questions

Assignment:

The study questions and pyramid plot will provide practice in the use of standard measures of morbidity and mortality, as well as help in differentiating between the various measures. All work must be shown. You will need access to a scanner if you want to submit handwritten computations.

Study Questions (found in your textbook)

Complete Study Questions Chapter 3, numbers 2-11.

Answer to chapter 3, numbers 2 – 11

Answer to question 2

Age specific death rates for malignant neoplasm of trachea, bronchus and lungs by age group, United States, 2003.

Age specific death rate for age 25 – 34 = 154/ 39,872,598 * 100 000 = 0.386 per 100,000 population.

Age specific death rate for age 35 – 44 = 2,478/ 44,370,594 * 100 000 = 5.58 per 100,000 population.

Age specific death rate for age 45 – 54 = 12,374/ 40,804,599 * 100 000 = 30.32 per 100,000 population.

Age specific death rate for age 55 – 64 = 30,956/ 27,899,736 * 100 000 = 110.95 per 100,000 population.

Age specific death rate for age 65 – 74 = 49,386/ 18,337,044 * 100 000 = 269.32 per 100,000 population.

Age specific death rates for malignant neoplasm of trachea, bronchus and lungs in the United States in 2003 increased as the age groups increased. These three malignant neoplasm’s risk factors include lifestyle, one of which is smoking. As individuals exposed to the risk of these malignant neoplasms grow in age, there is an increase in number of years of exposure and the tendency to develop the disease and die from it increases. This is an indicator of risk (Friis R., Sellers T., 2009 pg 123)
References

Friis R., Sellers T., 2009 Epidemiology for Public Health Practice Jones and Bartlett Publishers Sudbury, Massachusetts

Answer to question 3.

Age specific death rate per 100,000 population for age group 20 – 24 = 19,973/ 20,727,694 * 100 000 = 96.4 per 100, 000.

Age specific death rate per 100,000 population for age group 25 – 34 = 41,300/ 39,872, 598 * 100 000 = 103.6 per 100, 000.

Age specific death rate per 100,000 population for age group 35 – 44 = 89,461/ 44,370,594 * 100 000 = 201.6 per 100,000

Age and female sex specific death rate per 100,000 population for age groups 20 – 24 = 5 009/ 10,063,772 * 100 000 = 49.8 per 100 000

Age and female sex specific death rate per 100,000 population for age groups 25 – 34 = 12 698/ 19 650 112 * 100 000 = 64.6 per 100 000

Age and female sex specific death rate per 100,000 population for age groups 35 – 44 = 33 026/ 22 236 935 * 100 000 = 148.5 per 100 000.

Age and male sex specific death rate per 100,000 population for age groups 20 – 24 = 14 964/ 10 663 922 * 100 000 = 140.3 per 100 000.

Age and male sex specific death rate per 100,000 population for age groups 25 – 34 = 28 602/ 20 222 486 * 100 000 = 141.4 per 100 000.

Age and male sex specific death rate per 100,000 population for age groups 35 – 44 = 56 435/ 22 133 659 * 100 000 = 254.97 per 100 000.

Answer to question 4A.

Crude death rate per 100 000 population = 2 448 288/ 290 810 789 * 100 000 = 841.88 per 100 000.

Cause specific death rate per 100 000 population for accidents = 109 277/ 290 810 789 * 100 000 = 37.57 per 100 000
Cause specific death rate per 100,000 population for malignant neoplasm = \( \frac{556,902}{290,810} \times 100 = 191.5 \) per 100,000

Cause specific death rate per 100,000 population for Alzheimer’s disease = \( \frac{63,457}{290,810} \times 100 = 21.82 \) per 100,000

Cause specific death rate per 100,000 female population for accidents = \( \frac{38,745}{147,773} \times 100 = 26.22 \) per 100,000

Cause specific death rate per 100,000 female population for malignant neoplasm = \( \frac{268,912}{147,773} \times 100 = 181.98 \) per 100,000

Cause specific death rate per 100,000 female population for Alzheimer’s disease = \( \frac{45,122}{147,773} \times 100 = 30.53 \) per 100,000

Cause specific death rate per 100,000 male population for accidents = \( \frac{70,532}{143,037} \times 100 = 49.31 \) per 100,000

Cause specific death rate per 100,000 male population for malignant neoplasm = \( \frac{287,990}{143,037} \times 100 = 201.34 \) per 100,000

Cause specific death rate per 100,000 male population for Alzheimer’s disease = \( \frac{18,335}{143,037} \times 100 = 12.82 \) per 100,000

Answer to question 4B

PMR (%) for accidents = \( \frac{109,277}{2,448} \times 100 = 4.5\% \)

PMR (%) for malignant neoplasm = \( \frac{556,902}{2,448} \times 100 = 22.7\% \)

PMR (%) for Alzheimer’s disease = \( \frac{63,457}{2,448} \times 100 = 2.6\% \)

PMR (%) for accidents in females = \( \frac{38,745}{1,246} \times 100 = 3.1\% \)

PMR (%) for malignant neoplasm in females = \( \frac{268,912}{1,246} \times 100 = 21.6\% \)

PMR (%) for Alzheimer’s disease in females = \( \frac{45,122}{1,246} \times 100 = 3.6\% \)

PMR (%) for accidents in males = \( \frac{70,532}{1,201} \times 100 = 5.9\% \)

PMR (%) for malignant neoplasm in males = \( \frac{287,990}{1,201} \times 100 = 23.96\% \)

PMR (%) for Alzheimer’s disease in males = \( \frac{18,335}{1,201} \times 100 = 1.53\% \)
Answer to question 4C

Maternal mortality rate (per 100,000 live births) = $\frac{495 \times 100,000}{4,089,950} = 12.1$ per 100,000 live births

Answer to question 4D

Infant mortality rate (per 1,000 live births) = $\frac{28,025 \times 1,000}{4,089,950} = 6.85$ per 1,000 live births

Answer to question 4E

Crude birth rate (per 1,000 populations) = $\frac{4,089,950 \times 1,000}{290,810,789} = 14.06$ per 1,000 live births

= 14.06 per 1,000 live births

Answer to question 4F

General fertility rate (per 1,000 women aged 15 to 44 years) = $\frac{6,191,068}{4,089,950 \times 1,000} = \frac{6191068}{61910680} = 66.1$ per 1,000 women aged 15 to 44 years

Answer to question 5

Prevalence rate per 100,000 population = $\frac{4367 \times 100,000}{3,187,463} = 137$ cases of HIV per 100,000 population per year

Incidence rate per 100,000 population = $\frac{768 \times 100,000}{3,187,463} = 24.09$ cases of HIV per 100,000 population per year

Answer to question 6
Incidence describes the rate of development of a disease in a group over a certain period of time; it is synonymous to new cases (Friis R., Sellers T., 2009 pg 101).

Prevalence is the number of existing cases of a disease or health condition at some designated time (Friis R., Sellers T., 2009 pg 97). Prevalence is also defined as a measure of the existing number of cases of disease in a population at a point in time or over a specified period of time (Friis R., Sellers T., 2009 pg 133).

**The appropriate uses of incidence and prevalence data**

Prevalence data are useful for determining the extent of a disease (particularly chronic diseases) or health problem in the community (Friis R., Sellers T., 2009 pg 97 & 108), it is also useful in describing the health burden of a population to estimate the frequency of an exposure and determine the scope of health services needed in the community and allocation of health resources like facilities and personnel (Friis R., Sellers T., 2009 pg 98 & 101).

Incidence data are fundamental tools in research that pursues the etiology of diseases because they provide estimates of risk of developing the disease. They provide estimate of risk of developing the disease (Friis R., Sellers T., 2009 pg 108).

**The relationship among prevalence, incidence and duration of disease**

The designated time of prevalence of a disease can be specified or unspecified. When the duration of a disease becomes short and the incidence is high, the prevalence becomes similar to incidence. The prevalence of a disease is proportional to the incidence rate multiplied by duration of disease. When the duration of a disease becomes short and the incidence is high, the prevalence becomes similar to incidence. The buildups of prevalent cases are eliminated for diseases of short duration like common cold, coryzas which recovers rapidly or are fatal (Friis R., Sellers T., 2009 pg 106). A lot of chronic diseases have a low incidence and long duration, as the disease duration increases, though incidence is low the prevalence of disease increases relative to incidence (Friis R., Sellers T., 2009 pg 107).

References

Friis R., Sellers T., 2009 *Epidemiology for Public Health Practice* Jones and Bartlett, Publishers Sudbury, Massachusetts

**Answer to question 7**

Assuming the data have been age adjusted, it is correct to conclude that women have twice the risk of disease “X”. Rates improve one’s ability to make comparisons (Friis R., Sellers T., 2009 pg 97) and specific rates like age adjusted rates are better indicators of risk (Friis R., Sellers T., 2009 pg 123). The risk of disease “X” in women doubled that of men.
Answer to question 8

a. Sex ratio of male to female regular alcoholic beverage drinkers =

\[
\frac{59300}{44373} = 1.34:1 \text{ male to female regular alcoholic beverage drinkers.}
\]

b. Proportion (percent) of regular alcoholic beverage drinkers that are women =

\[
\frac{44373}{(59300 + 44373)} \times 100 = \frac{44373 \times 100}{103673} = 42.8\%
\]

c. Prevalence per 1 000 of regular alcoholic beverage drinking among men only =

\[
\frac{59300}{(59300 + 44373)} \times 1000 = \frac{59300 \times 1000}{103673} = 571.99
\]

Prevalence per 1 000 of regular alcoholic beverage drinking among women only =

\[
\frac{44373}{(59300 + 44373)} \times 1000 = \frac{44373 \times 1000}{103673} = 427.27
\]

Prevalence per 1 000 of regular alcoholic beverage drinking among the total population aged 18 and older

\[
\frac{(59300 + 44373)}{(104919 + 112855)} \times 1000 = \frac{103673 \times 1000}{217774} = 476.06
\]

Answer to question 9

a. diabetes was stated as prevalence rate.
b. ulcers was stated as prevalence rate.
c. kidney disease was stated as incidence rate.
d. liver disease was stated as incidence rate.

Answer to question 10

It will be correct to say the risk of hearing loss increases with age. Age is a common factor for rate adjustment and an important variable in risk of morbidity and mortality. Members of older population have greater risk of hearing loss than members of younger population (Friis R., Sellers T., 2009 pg 124).

References
Answer to question 11

Percentage of prevalent cases that were newly identified during year 2008 was 0.05%

\[
\frac{5000}{1000000} \times 100 = 0.05\%
\]

CHAPTER 4

Complete Study Questions in Chapter 4, numbers 4-7, 9 as well as the population pyramid plot.

Answer to question 4

Examples of age associations found in epidemiologic research are

- Childhood for example infants, neonates, under 5, etc
- Teenage years; age group 13 to 19 years.
- Adults; age group 20 to 34 years, age group 35 to 44 years.
- Older adults; age group after 45 years (Friis R., Sellers T., 2009 pg 146 & 147)

Four suggested reasons for age associations include;

- The validity of diagnosis across life spans
- Multimodality of trends
- Latency effects
- Action of the human biological clock (Friis R., Sellers T., 2009 pg 147)

Some health conditions show several peaks and declines in disease frequency at various ages “multimodal age- specific incidence curves”. For example, tuberculosis has two peaks one between age 0 and 4 years and another between age 20 and 29 years. This may suggest two different etiological mechanisms which may be;

(i) Increased susceptibility of children to infectious diseases in the early years
(ii) Increased social interaction of individuals in young adulthood or change in immune status due to puberty.
Age effects on mortality reflect the long latency period between environmental exposures and development of disease for example, the passage of several years between the exposure of a potential carcinogen and the appearance of cancer later on in life. “Human biologic clock” is an endogenous process associated with an increase in disease vulnerability. The immune system wanes and produces increased susceptibility to disease, conditions with genetic basis are triggered like Alzheimer’s disease (Friis R., Sellers T., 2009 pg 150).

When comparing mortality rates by age, the possibility of interaction between age effects and gender effects. Age specific rates show greater variation than rates defined by almost any other personal attribute (Friis R., Sellers T., 2009 pg 146). Males have higher all cause age specific mortality rates than females from birth to age 85 and older. Females have higher age standardized morbidity rates for acute and chronic conditions as well as disability due to acute conditions (Friis R., Sellers T., 2009 pg 151).

References

Friis R., Sellers T., 2009 *Epidemiology for Public Health Practice* Jones and Bartlett Publishers Sudbury, Massachusetts

Answer to question 5

Mortality and morbidity differ by sex. Females have higher age standardized morbidity rates for acute conditions, chronic conditions and disability due to acute conditions. This is female paradox. Pain, respiratory ailments like asthma and lung difficulties not induced by cancer and depression are commoner in women. Hearing impairment, smoking associated conditions and cardiovascular diseases are commoner in men. If the same chronic conditions like lung cancer, cancer, cardiovascular diseases and diabetes affect men and women, men are more likely to develop severe forms of these conditions and die from them. Conditions like hypertension and cancer produce increased morbidity rates among men in comparison with women (Friis R., Sellers T., 2009 pg 151).

Greater frequency of smoking, greater prevalence of coronary prone behavior pattern, higher suicide and motor vehicle accident rates and risky behavior pattern expected of and condoned among men are factors contributing to higher mortality attributed to males by Waldron’s venerable research. Endogenous estradiol strongly implicated in cardiovascular changes similar to exercise effects cause the “jogging female heart” which may account for the lower incidence of cardiovascular disease pre menopause and post menopausal increases in rates of cardiac disease (Friis R., Sellers T., 2009 pg 151).

Married individuals especially men have lower rates of morbidity and mortality than single, divorced or widowed men. Divorce and separation are associated with diverse health outcomes like physical impairment amongst older women. Regardless of sex, married adults are generally healthier than adults in other marital status categories. Never married adults are least likely to be overweight or obese; being married is associated with obesity especially among men. Divorce
and widowhood affects men and women differently, men have higher mortality; men have higher mortality risks than women if divorced or widowed. Suicide rates are elevated amongst widowed persons especially young men. Married women have a reduced risk of breast cancer mortality in comparison with single women. Childbearing in married women slightly reduced the risk of breast cancer (Friis R., Sellers T., 2009 pg 155).

References

Friis R., Sellers T., 2009 Epidemiology for Public Health Practice Jones and Bartlett Publishers Sudbury, Massachusetts

Answer to question 6

Marriage may act as either a protective or a selective factor. Marriage contributes positively to health by influencing lifestyle factors, providing mutual psychological and social support and increasing available financial resources. Lower morbidity and mortality rates are observed amongst married persons. Marriage, marital environment and factors associated with marriage reduce mortality rates (Friis R., Sellers T., 2009 pg 155), for example, Married women have a reduced risk of breast cancer and reduced breast cancer mortality in comparison with single women (Friis R., Sellers T., 2009 pg 155).

References

Friis R., Sellers T., 2009 Epidemiology for Public Health Practice Jones and Bartlett Publishers Sudbury, Massachusetts

Answer to question 7

For some patients confronting chronic diseases, religion and spirituality may improve the quality of their lives. Members of the seventh day Adventist church have been reported to have low mortality rates from coronary heart disease, cancer and other chronic diseases as well as significantly lower mean systolic and diastolic blood pressures which is attributable to a lifestyle with health benefits. They are encouraged to feed on a lacto- ovovegetarian diet and abstain from alcohol; tobacco and pork produce (Friis R., Sellers T., 2009 pg 170). Mormons have an unusually low risk for cancer which is attributable to restrictions on the intake of coffee, tea, meats and lifestyle variables related to physical fitness, social support and a stress reducing religious ideology (Friis R., Sellers T., 2009 pg 170).

Health related behaviors associated with a culture may confer protection against morbidity and mortality. Japanese have a low mortality rate their culture, affords a protective influence especially from cancer and coronary heart disease. The Japanese culture is oriented towards conformity and group consensus. They eat a low fat diet and practice stress reducing strategies.
like community bonds and group cohesion. These environmental and behavioural factors influence the rate of chronic diseases and provide a rationale for chronic disease intervention and prevention. When Japanese migrate to diverse cultural and geographical locales, a shift in chronic disease rates occur and it is similar to what is found in host countries, “acculturation hypothesis” (Friis R., Sellers T., 2009 pg 163 & 164).

References

Friis R., Sellers T., 2009 Epidemiology for Public Health Practice Jones and Bartlett Publishers Sudbury, Massachusetts

Answer to question 9

Race is a social and cultural construct (Friis R., Sellers T., 2009 pg 155). Race tends to be synonymous with ethnicity (pg 156). Races have implications for differences in incidence and prevalence of disease (Friis R., Sellers T., 2009 pg 157). African Americans have the highest mortality of any of the racial groups examined. They are afflicted by disparities with respect to many health conditions (Friis R., Sellers T., 2009 160 & 161).

Non Hispanic blacks have a greater burden from mortality and morbidity as well as injury and disability in comparison to non Hispanic whites. AIDS was most common among African Americans and lowest among American Indians/ Alaskan Natives. African Americans have the highest age adjusted female breast cancer death rate which may be due to differences in access to and quality of mammography services and breast cancer treatment. (Friis R., Sellers T., 2009 pg 160). Mortality from hypertension and its related conditions is higher among African Americans due to low consumption of fruits and vegetables, exposure to stress, higher rates of obesity and lack of participation in cardiovascular risk reduction programs (Friis R., Sellers T., 2009 pg 162). American Indians / Alaskan Natives tend to be poorer, have lower rates of college graduation and higher levels of unemployment as a result; they have poorer birth outcomes due to inadequate prenatal care and sudden infant death syndrome, higher rates of chronic diseases, infectious diseases and a decreased life expectancy (Friis R., Sellers T., 2009 pg 162 & 163).

Social class is considered when one is evaluating the occurrence of disease (Friis R., Sellers T., 2009 pg 173). Social class plays a role in association of race and ethnicity with health and it is related to ethnicity and race. Some ethnic groups occupy the lowest social class rankings in the United States. Measures of social class include, prestige of the individual’s occupational or social position, educational qualification, income or a combination of two or more parameters (Friis R., Sellers T., 2009 pg 171). Persons lower in the social hierarchy have mortality rates higher than persons in upper levels. “This dynamic connection between socioeconomic status and risk factors has led to a persistent association between socioeconomic status and mortality”. Low income is consequential for mortality, low social class status is related to lower life expectancy, excess mortality, morbidity and disability rates due to poor housing, crowding, racial disadvantages, increased rates and exposure of infection, nutritional deficiencies, poor sanitary condition, low income, poor education, exposure to environmental and occupational hazards, material and social deprivation, lack of access to healthcare, negative lifestyle and unemployment (Friis R., Sellers T., 2009 pg 170 & 171).
Population Pyramid Plot:

Go to the U.S. Census Bureau’s site on international demographic data, [http://www.census.gov/population/international/data/idb/informationGateway.php](http://www.census.gov/population/international/data/idb/informationGateway.php). Using 1985, 2010, 2025, and 2035 data, create a pyramid plot report for both Afghanistan and the United States. You can do this all at one time. Under Select Report scroll down and click on Population Pyramid Graph. To select more than one country and more than one year, hold down the CTRL button and then select all choices that you want. Once you have created the report, compare the plots both within each individual country by time and between the two countries (place and time). Discuss possible reasons for the observed differences for both. Make sure to include the population plots with assignment.

![Population Pyramid Graph](image)

Figure 1: Pyramid plot of Afghanistan 1985
Figure 2: Population pyramid plot of Afghanistan 2010
Figure 3: Population pyramid plot of Afghanistan 2025

Figure 4: Population pyramid plot of United States 2035
In 1985, the population of Afghanistan decreased as the age groups increased. The population of age 0-4 was the highest and the population of age group 20 – 24 lower, the population decreased as the age groups increased and the lowest was age group 100+. In 2010, ages 0 – 14 had the highest population which decreased and remained stable till age 19 after which it started to decrease from age 20 till 100+ at every age group. In 2025, age group 0 – 4 will have the highest population and the population will start decreasing till age 20 when it will remain stable till age 29 and then the population will start to decrease till age 100+. In 2035, age group 0- 4 will have the highest population and the population will start decreasing till age 30 when it will become stable and then start decreasing till age 100+.

The changes noted in the population of Afghanistan is an indication of the health indices of a developing country where infant mortality is low, a lot of children pass on before their fifth birthday. That is why the age 0- 4 populations is always the highest. The war in Afghanistan might also be a reflection of a decrease in population as age increases. Afghanistan will improve and its life expectancy will be age 20 – 29 by year 2010 and 30 – 39 in year 2035 as off 5- 14 in year 2010. This is a wakeup call to the public health team life expectancy and health indices need to be improved.

Figure 5: Population pyramid plot of United States 1985
Figure 6: Population pyramid plot of United States 2010

Figure 7: Population pyramid plot of United States 2025
In 1985, the population of the United States was highest at age group 20 to 29. In 2010, it became steady at age 0 – 14. This is an indication of improved Infant and childhood mortality rates, vaccination, healthcare and the public health activities. In 2010, the population was steady and highest at ages 45 – 54; this is an indication of improved life expectancy as of 1985 when it was age 20-29. Generally at every age group the population increased in 2010 from 1985. In 2025, the population of the US, will be near steady and a sharp decline will be noticed at age 70 instead of 60 as of year 2010, this may be due to an improvement in geriatric care and medicine as well as access to healthcare. In 2035, the population of the United States will be very near steady from age 0 to 79 when a very obvious decline will be present unlike year 2025 which was obvious at age 70. Life expectancy will be 80 years of age.

The population of the United States was more than that of Afghanistan in 1985 and 2010. It will also be more than that of Afghanistan in 2025 and 2035. This is likely to be because the United States is a bigger country more developed and has more immigrants than Afghanistan. Also, it has better health indices; its mortality rates are lower, life expectancy higher and healthcare, access to healthcare is better than most parts of the world and its public health team is effective. This may account for its higher population. Its public health team is certainly on top of its responsibilities.