Week 2 Assignment - Week 1 Readings Study Questions

1. Explain the statement that epidemiology is interdisciplinary.

   Different disciplines tell the cause of casualty of a disease in a population (Friis R., Sellers T., 2009 pg 13). Epidemiology draws from statistical science, social science, behavioral science, biosciences, toxicology, pathology, virology, genetics, microbiology and clinical medicine. Statistical science evaluates epidemiological data, measures risk and uncertainty. Social sciences elucidate the role of race, social class, education, cultural group membership and behavioral practices in health. Methodology of sampling, measurement, questionnaire development, design and delivery, and methods of group comparison are borrowed from social sciences. Microbiology provides information about disease agent its morphology and modes of transmission. A virologist will be needed if it is a virus that is studied. Toxicology identifies the presence and health effects of chemical agents; it also helps to determine if health effects observed are consistent with known effects of exposure to toxic agents. Pathology differentiates normal and diseased tissue. Clinical medicine diagnoses patient’s state of health. All of these disciplines unravel factors associated with a disease (Friis R., Sellers T., 2009 pg 14).

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

2. What are the characteristics that distinguish pandemic disease from epidemic and endemic disease? Identify some infectious diseases that could reach pandemic occurrence during the 21st century. What conditions do you believe exist at present that could incite the occurrence of pandemics?

   Characteristics that distinguish pandemic, epidemic and endemic diseases include;

   - The infectious agent
   - The rate of infection in a population.
   - The number of people involved
   - The geographical region(s), rate and areas affected
   - The size and type of population exposed (Friis R., Sellers T., 2009 pg 18)

   Endemic diseases are diseases habitually present in a particular geographical region. An epidemic is the excessive occurrence of a disease in a community or region. Pandemic is epidemic on a wide scale (Friis R., Sellers T., 2009 pg 18). Pandemic diseases are widespread not confined to a particular area or region. In the most extreme cases, the entire global population
would be affected by a pandemic. It involves a far higher population and a much larger region than epidemic and or endemic diseases. Epidemic diseases can turn into pandemic diseases by growing exponentially.

HIV/AIDS, Influenza and Tuberculosis are infectious diseases that can reach pandemic occurrence during the 21st century. Poverty, lack of education, lack of political will to public health issues (nations existing in a state of anarchy) which exist at present can incite the occurrence of pandemics. Ability of HIV/AIDS and Influenza viruses to mutate can also incite the occurrence of a pandemic. The pandemic potential of HIV/AIDS and diabetes mellitus can increase the risk of tuberculosis an opportunistic infection commonly seen in immunosuppressed individuals.

3. Why have public health officials been concerned about the emergence of new diseases such as “avian flu”: Speculate about what might happen to organized society and the health care system should an outbreak of pandemic influenza occurs.

Avian flu virus is one of the subtypes of influenza virus. It is highly pathogenic can cause severe disease and death in humans. In the past decade Avian flu virus caused widespread sickness and death in domestic and wild bird populations around the world. As it spreads among birds it increases its risk of transmission to humans. Mutations in the virus can develop allowing efficient human-to-human transmission. The severity of this disease, its potential for sustained and efficient human-to-human spread, its pandemic potential and its ability to mutate rapidly acquiring genes from flu viruses that infect other animal species are great concerns for public health. If avian and human influenza viruses simultaneously infect a person or animal, the two viruses may swap genes resulting in a new virus that is readily transmissible between humans and against which humans will have no natural immunity triggering a worldwide influenza pandemic (NAID, 2007). With the speed of plane, ships, trains and automobiles travel today, an influenza pandemic can spread much more quickly occurring in waves; all parts of the world may not be affected at the same time (WHO, 2013).

Should an outbreak of pandemic influenza occur, approximately 30% (90 million) of the population worldwide could be infected. In projection, 45 million people in need of outpatient care; between 1 and 10 million people will be in need of hospitalization; 130,000 to 1.5 million people will be in need of intensive care; 65,000 to 750,000 patients will be requiring mechanical ventilation; and deaths numbering from 200,000 to 2 million. Hospital emergency departments will reach their limits and there will be little room for a patient surge in either emergency rooms or inpatient beds. This will overwhelm the public health and health-care delivery systems. There will be significant surge in need for healthcare staffing, drugs and hospital supplies and alternate means to provide care (home care) and other additional healthcare resources. There would be serious shortages of health-care facilities, equipment (ventilators etc), pharmaceuticals, and personnel. Health-care staff will be afraid to report to work due to family and personal safety. The demand for medical necessities could become an ugly scramble among different communities, hospitals, patients, and doctors' consciences and ethical issues will arise. Mortality rates will be high. Facilities and equipments will be abandoned; it will negatively affect the
economy with serious impact on local and global economies and international trade. Workers and the output of goods and services will be affected (Levin P., Gebbie N., Qureshi K., 2007). A pandemic may come and go in waves, each of which can last for months at a time. Everyday life will be disrupted people in communities across the country will be ill at the same time. Schools and businesses will close down, basic services like public transportation and health care will be interrupted. It can lead to high levels of illness, death, social disruption and economic loss (NDDPI, 2013).

References


North Dakota Department of Public Instruction (NDDPI), 2013 Pandemic Planning Retrieved from http://www.dpi.state.nd.us/pandemic.shtm#pandemic


Chapter 2 Questions

Using Appendix 2 as well as the CDC’s preliminary data for 2009, answer the following questions:

1. Calculate the percentage of change (±) in the death rate for all causes from 1900 to 2003 to 2009. [e.g. 1900 death rate – 2003 death rate/1900 death rate]. What generalizations can be made about changes in disease rates that have occurred from 1900 to 2003 to 2009?

Death rate for all causes in 1900 – 1,719.1
Death rate for all causes in 2003 – 841.9
Death rate for all causes in 2009 – 741.0
Change in death rate for all causes from 1900 to 2003 = 1,719.1 - 841.9/ 1,719.1 * 100 = 877.2/ 1,719.1* 100 = 51.02%
The percentage change in death rate for all causes from 1900 to 2003 is 51.02%.

Change in death rate for all causes from 2003 to 2009 = 841.9 - 741.0/ 841.9 * 100 = 100.9/ 841.9 * 100 = 0.119848 * 100 = 11.9%.
The percentage change in death rate for all causes from 2003 to 2009 is 11.9%.

There has been a reduction in disease rates from 1900 to 2003 to 2009 due to improved nutrition and public health measures which has resulted in improved immunity and prevention of the spread of disease. Mortality reductions are also attributed to rising incomes and improved medical care. This decline in death rate is also attributable to improvement in general hygiene and social conditions (Friis R., Sellers T., 2009 pg 58).

References

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

2. Contrast the changes in death rates due to cancer, heart disease, and cerebrovascular diseases for the three years. What additional information would be useful to specify better the changes in these conditions?

<table>
<thead>
<tr>
<th>Cause of death in rates (per 100,000 population)</th>
<th>1990</th>
<th>2003</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>64.0</td>
<td>191.5</td>
<td>185.2</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>106.9</td>
<td>54.2</td>
<td>41.9</td>
</tr>
<tr>
<td>Heart diseases</td>
<td>137.4</td>
<td>235.6</td>
<td>195.0</td>
</tr>
</tbody>
</table>

Death rates from cancer and heart disease increased from 1990 to 2003 and decreased from 2003 to 2009. The increase in death rates from cancer and heart diseases from 1990 to 2003 might be due to public health concentration in infectious disease prevention which may have resulted in a neglect in non communicable diseases like (cancer, heart disease) but this increase will have prompted public health system to concentrate on these disease conditions which resulted in a decrease in 2009. Also it is assumed that the population is aging and members of older populations have a much greater risk of mortality than when the population is younger (Friis R., Sellers T., 2009 pg 58) that is why death rates of cancer and heart disease increased from 1990 to 2003. The death rates of cerebrovascular disease decreased from 1990 to 2003 to
2009. This is most likely due to the success of the public health team in preventing cerebrovascular disease and the advances in health care in preventing deaths from cerebrovascular disease.

References

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

3. Note the decline in mortality for the four communicable diseases (1,2,3,10 – Appendix 2). With the exception of pneumonia and influenza, these are no longer among the 10 leading causes of death. Can you speculate regarding how much of each is due to environmental improvements and how much to specific preventive and curative practices.

The decline in mortality of four communicable diseases (influenza and pneumonia, tuberculosis, gastroenteritis, diphtheria) are due to a combined effort of environmental improvements, specific preventive and curative practices but more to specific preventive practices part of which is environmental improvements.

4. List and describe the trends in death rates by the 10 leading causes of death.

The 10 leading causes of death in 1990 and 2003 in the United States
- Influenza and pneumonia except pneumonia of newborn
- Tuberculosis of all forms
- Gastroenteritis
- Disease of the heart
- Cerebrovascular diseases
- Chronic nephritis
- Accidents and adverse effects
- Malignant neoplasm
- Certain diseases of early infancy
- Diphtheria

The 10 leading causes of death in 2009 in the United States
- Diseases of heart (heart disease)
- Malignant neoplasms (cancer)
- Chronic lower respiratory diseases
- Cerebrovascular diseases (stroke)
- Accidents (unintentional injuries)
- Alzheimer’s disease
- Diabetes mellitus (diabetes)
- Influenza and pneumonia
• Nephritis, nephritic syndrome and nephrosis (kidney disease)
• Intentional (self-harm, suicide)

The trend changed in death rates of the 10 leading causes of death in 2009. In 1990 and 2003 infectious diseases where the leading causes of death followed by non communicable diseases but in 2009, non communicable diseases were the leading causes of death this trend describes *epidemiologic transition* (Friis R., Sellers T., 2009 pg 58). This is largely due to environmental improvement and improved public health practices. Also, these non communicable diseases are “chronic degenerative diseases which have several contributing factors which include lifestyle, operating over long periods” (Friis R., Sellers T., 2009 pg 50) changes in diagnostic procedures; aging of the general population as a result of reduced impact of infectious diseases, improved medical care and a decline in death rate (Friis R., Sellers T., 2009 pg 54). In general, chronic conditions have replaced acute infectious diseases as the major causes of mortality in contemporary industrialized societies like the United States (Friis R., Sellers T., 2009 pg 53).

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

5. Describe the trend for hypertension and Parkinson’s disease. Suggest an explanation for the trends in hypertension and Parkinson’s disease deaths?

There was no change in the trend of hypertension and Parkinson’s disease from 2008 to 2009. This may be due to a short duration of study one year. Both diseases are chronic non communicable diseases that need to be studied over a longer duration. Also increased and improved public health practices and advances in healthcare will reduce incidence of hypertension and Parkinson’s disease. With continuing advances in medical care comes expansion of preventive care in the early years and direct care in the older years (Friis R., Sellers T., 2009 pg 58).

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

6. What is the trend for Alzheimer’s disease? Offer an explanation

The trend for Alzheimer’s disease decreased. This may be due to improved public health services and healthcare. With continuing advances in medical care comes expansion of preventive care in the early years and direct care in the older years (Friis R., Sellers T., 2009 pg 58).
References

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

Go to [http://webappa.cdc.gov/sasweb/ncipc/leadcaus10.html](http://webappa.cdc.gov/sasweb/ncipc/leadcaus10.html). Select a specific race, adult age group (10-year age group between 25-65), and sex and download the leading causes of death reports for 1983, 1995, and 2007. Answer the following questions:

1. List and describe the trends in death rates by the 10 leading causes of death for the three years. Suggest an explanation for these trends.

   Leading Causes of Death, United States
   1983 - 1995, Black, Males

   Age Groups 35 - 44
   
   Human Immunodeficiency Virus
   Heart disease
   Unintentional injury and adverse effects
   Homicide and legal
   Malignant neoplasm
   Liver disease
   Cerebrovascular accidents
   Suicide
   Pneumonia and Influenza

   Leading Causes of Death, United States
   2007, Black, Males

   Age Groups 35 - 44

   Heart disease
   Unintentional injury
   Human Immunodeficiency Virus
   Homicide

These leading causes of death are indicators of health status of black men aged 35 to 44 in 1983, 1995 and 2007 in the United States. It also shows the impact of acute conditions and quality of medical care available to this population. Education on prevention of Human Immunodeficiency Virus and the availability of highly active antiretrovirals reduced HIV from the 1st leading cause of death in black men aged 35 – 44years in 1983 and 1985 to the 3rd leading cause in 2007. The epidemic of obesity in the black community in the United States may be a reason why heart disease is a leading cause of death in this group in 2007. Black men in the
United States are more often likely to be irresponsible, involved in drugs, gangs etc, this might be an explanation for unintentional injury and homicide falling into the category of one of the first four leading causes in death.

2. Compare and contrast the leading causes of death for your specific population with the leading causes of death for all ages – all races – both sexes. Note significant differences and possible explanations. Discuss the need for segmentation of populations for a more accurate “picture” of mortality issues in this country.

Leading Causes of Death, United States
1983 - 1995, Black, Males

Age Groups 35 - 44

- Human Immunodeficiency Virus
- Heart disease
- Unintentional injury and adverse effects
- Homicide and legal
- Malignant neoplasm
- Liver disease
- Cerebrovascular accidents
- Suicide
- Pneumonia and Influenza

Leading Causes of Death, United States
1983 - 1995, All races, both sexes

All ages

- Heart disease
- Malignant neoplasm
- Cerebrovascular

The leading causes of death differ in black men in the age range of 35 - 44 from all races and all ages in the United States. The leading causes are non communicable diseases in all ages and all races but in black men within the age range 35 – 44; Human Immunodeficiency Virus is top on the list which may be due to the their lifestyles. Heart disease being the second on the list may be due high obesity rates in black men. Unintentional injury and adverse effects as well homicide and legal is also due to lifestyles of black men.
Leading Causes of Death, United States
2007, Black, Males

Age Groups 35 - 44

Heart disease
Unintentional injury
Human Immunodeficiency Virus
Homicide

Leading Causes of Death, United States
2007, All races, both sexes

All ages

Heart disease
Malignant neoplasm
Cerebrovascular
Chronic low respiratory disease
Unintentional injury
Alzheimer’s disease
Diabetes mellitus
Influenza and pneumonia
Nephritis
Septicemia

The success of the public health system in HIV/AIDS prevention has reduced HIV as the third leading cause of death in black men in 2007 in the age group 35 – 44. Heart disease now being the leading cause in both black men in the age group 35 – 44 and all ages. Non communicable diseases are the leading cause of death in all age groups which describes *epidemiologic transition* (Friis R., Sellers T., 2009 pg 58) when comparing it to the leading cause of death in the 1900. This is due to improved public health practices.

There is a need for segmentation of population for a more accurate “picture” of mortality issues in the United States. This segmentation will allow health administrators to determine priorities and planning. These differences in leading causes of death in populations may indicate an area for further study. Can the differences be due to access to health care or certain lifestyle patterns? (Friis R., Sellers T., 2009 pg 120). Population segmentation rates (sex, race, age) are much better indicators of risk; do not mask differences in populations that differ in age, race and sex and are satisfactory for comparing health outcomes (Friis R., Sellers T., 2009 pg 123 & 124).

References

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