HEALTH AND ILLNESS IN SOCIETY- THE HISTORICAL TRANSFORMATION OF MORTALITY PATTERNS- lecture 2

Important terms in alphabetical

Endemics an infectious disease that exists permanently in a particular region or population.

Epidemics an outbreak of disease that infects many people at about the same time and may spread through one or several communities. It is more localised than a pandemic.

Epidemiological periods/ phases/ stages periods when death rates, life expectancy and types of disease are fairly constant. Average life expectancy and causes of mortality don't change much in that period.

Epidemiological transitions Profound changes of death rates and life expectancies through history. When there is a change from one epidemiological period to the next.

epidemiological triangle of infectious disease. According to this theory infectious disease is the result of an interaction between agent, host and environment. The agents are the germs whose presence is necessary to produce the disease. Host factors include the immunological status, behaviour, personal and social characteristics of the person who comes in contact with the agent. The environment is the collection of external social and physical factors influencing the onset and outcome of the disease. For our purposes, whether or not medical science can deal with the disease is also an environmental factor. According to this theory, in order to die from malaria, the mosquitoes that carry the parasite (agent) must be present, which also depend on the environment. Whether or not the person who is infected dies from it also depends on host factors like being resistant enough.

Epidemiology It looks at disease and death patterns at the population level. Which group of people got sick/ died? When? Where? Of what? It is the study of the distribution and determinants of health-related states or events (including disease).

GDP per capita -Gross Domestic Product is the total value of everything produced in the country divided by the country's population. It is supposed to be a measure of a country's standard of living.

Life expectancy Life expectancy refers to the number of years people born in a given period and region are expected to live based on the statistical average. It is a measure of population health. The calculation of life expectancy includes infant and child mortality as well, so if there

is a lot of babies and children dying life expectancy will be very low even if surviving adults live a long time. Don't confuse life expectancy with average age when adults die.

Mortality rate a measure of the number of deaths (in general, or due to a specific cause) in a particular population, scaled to the size of that population, per unit of time.

Pandemics When an epidemic spreads throughout very large regions or even the world. It stretches over a larger area, infects more people and causes more deaths than an epidemic. A notorious example is the Black Death. An other is the Spanish Flu, which infected 500 million people around the world, and resulted in the deaths of 50 to 100 million in 1918.

Public health- the science and art of preventing disease, prolonging life and promoting human health through organized efforts and informed choices of society, organizations, public and private, communities and individuals. Working for people's health outside of a medical setting. Trying to provide clean, health promoting environments, for example. It uses laws for example to make a country or city healthier. Public health efforts are very much needed even today to achieve sanitation, safe food standards etc…

Short summary

Most of this chapter will be concerned with infectious disease. Understanding how socioeconomic factors influence infectious disease and mortality from infectious disease is easier if we keep in mind **the epidemiological triangle** of infectious disease. It is clear to understand that social factors play a role in whether or not an agent (germ) is present (for example sanitation), the immunological status of the host (is he or she well-nourished or starving) and the environment (is there a cure for that condition, is the environment healthy etc..)

In this lecture we will use evidence of changing disease and mortality patterns throughout human history to convince you that social forces have a major effect on mortality (death) and morbidity (illness) rates. How people lived, under what conditions, how they produced their livelihood and what they did to combat death and disease greatly influenced mortality and morbidity patterns. Our aim is to illustrate that death rates and disease patterns characteristic of an area or historical period are not just a question of biology, cells and micro-organisms but culture and socio-economic factors as well.

In the span of human history, we can differentiate among four different **epidemiological periods**, each with characteristic, stable mortality and morbidity patterns. (Just to confuse you,

we will talk about 5 periods, but hunters and gatherers are prehistoric and are before the epidemiological periods.) In some, people died of **pandemics, epidemics** or **endemics** of infectious diseases. in others, in accidents or chronic, non-infectious diseases. In some, average life expectancy was very low, in others high. Some periods lasted centuries, others decades. And then social, economic and technological variations led to significant changes in these patterns. This is what is called **epidemiological transitions**.

https://www.gapminder.org/tools/#$state$time$value=2018;;&chart-type=bubbles

Take a look at the animated graph on the link above and see how life expectancies increased together with **per capita GDP** and population size in each and every country in the past 200 years. Find your country, think of what you know about history, and try to figure out what might have led to the spikes and drops in average life expectancy.

The epidemiological periods.

0. - **hunters and gatherers:** (this was before recorded history, before the first epidemiological period)

There was no agriculture or permanent settlement in this pre-historical period. Tribes were more or less on the move in search of animals to hunt and berries, fruit, roots to collect.

From archaeological evidence, scientist conclude that infectious disease was not very common. People were on the move, so they did not contaminate their environment with faeces. Populations were small (approx. 6 million on the whole planet), groups were isolated, so various groups did not infect each other as they hardly met.

People mostly died due to accidents and injuries and not being able to protect themselves from the elements. They had no good shelters, inadequate clothing, not very good tools. Starvation was a major cause of mortality.

Average life expectancy was about 20 years. Infant and child mortality were very high. That is why life expectancy was so low.

1. **the first epidemiological period- The Age of Pestilence and Famine (from about 9000 BCE or 4000 BCE to the middle of 19 Century CE)**

Over a very long period, humans settled down. More and more, they domesticated animals and grew their own food. The First Agricultural Revolution was the wide-scale transition of many human cultures during the Neolithic period from a lifestyle of hunting and gathering to one of agriculture and settlement, making an increasingly larger population possible. Villages, cities,

agriculture, industry, trade and civilisation started. This was a very long time but it is still one epidemiological period.

As people started to produce their own food through farming, there was a steadier food supply, making larger populations possible. But as populations grew and there was more contact between groups of people, there was a bigger chance for infectious diseases. Also, due to being settled down, people were more likely to contaminate water and soil, leading to infectious diseases. The bigger the settlement was, the more probable it was that they contaminated drinking water and land with feces and other harmful waste material. Crowded cities were the most hazardous.

In general, the larger part of the population was overworked (including children), very, very poor and lived in overcrowded, unhygienic environments. The food they ate was unsatisfactory for healthy development. The situation for the masses of poor people was even worse in the cities.

Nourishment wasn't so good because they mostly ate the cereals they produced which was very monotonous compared to the hunter and gatherer diet which contained more varied foodstuff. Meat was a privilege for the wealthier people,

Mortality was mostly due to famine and pandemics and epidemics of infectious disease like the plague, typhus, cholera, leprosy etc…

Average life expectancy was as low as 20-40 years depending on the period we are talking about. (Remember, the first epidemic period lasted many centuries)

The biggest killer was the plague, which came in many waves. There was a pandemic of the plague in the 6th century, killing 25-50 percent of the population and there was the Black death, killing 30-60% of Europe from 1347 to 1350.

Medicine in Europe in the middle ages was not at all advanced, there was nothing to stop the pandemics and epidemics.
Because medicine had so little to offer, people spent much of their lives suffering from fevers, dermatological problems, infected wounds, aches and pains.
We must also remember that most people lived in extreme poverty with few of their basic needs met.

The second epidemiological period. The Age of Receding Pandemics from about 1850- to about 1945)

By the middle of the 19th century, the place of **epidemics** and **pandemics** was taken by **endemics** of infectious disease. Infectious disease was still the major cause of mortality but they were localised. In nations where the industrial revolution was happening (UK, USA, France, Germany etc..) infectious disease like tuberculosis, typhus, typhoid, smallpox, pneumonia, diarrhea or cholera started to disappear from the mid to late 19 century. Average life expectancy started to go up, more and more children survived and populations started to grow. More babies survived and people lived longer and longer.

Why did this epidemiological transition happen?

It is clear that medical science did not play a role in the 19th century decline in infectious disease in mortality because microbes, vaccines and antibiotics were discovered later. Whichever major infectious disease you look at, it started to decline before medical science had the drugs to cure it or the vaccines to prevent it. Of course from the twentieth century, medicine played a major role in controlling these conditions.

Two things were responsible for the improvement of people's health:

a- reduced contamination, better sanitation due to public health reforms

Industrialisation brought large masses of people into cities to work in factories. They lived in crowded, unhygienic places with no sanitation, clean water etc… The dirt is unimaginable by today's standards. Nothing was known about microbes, but policy makers were aware that dirty water, air and surroundings were bad for health. Public health efforts were made to clean up the environment, build sewage systems, make sure that landlords take care of plumbing in the houses and butchers sell safe meat. " it appears that the greatest proportion of the deaths of heads of families occurred from... removable causes... The expense of public drainage, of supplies of water laid on in houses, and the removal of all refuse... would be a financial gain.. as it would reduce the cast of sickness and premature death." (Chadwick, 1842) Through working for sanitation and hygienic conditions, public health reduced contamination and environmental risk of infection. Public health reforms resulted in much healthier environments.

b- **greater acquired resistance to infections due to improving living standards and better economic conditions**

If you remember the animated graph, you will recall that per capita GDP went on the rise around this time. Although many people were still poor, they were better off than before, had better food to eat etc…

Being fitter, they were more resilient to infections. Thanks to better sanitary conditions and better living standards, more children survived into adulthood.

3 **The third epidemiological period- The Age of Degenerative and Man-Made Diseases:** (from about 1950- 1980 in most western industrial countries. Some would argue that Eastern Europe is still partly in the third period.

For the first time after thousands of years, it is not infectious diseases that are the major cause of mortality in this epidemic period which is only characteristic of the developed world) but degenerative chronic disease (cancer, cardiovascular disease). Infectious diseases are no longer a significant cause of mortality in the developed world due to high standards of hygiene, better nutrition and the huge developments medical science has achieved in combating these diseases. (they are still significant in the developing world, nevertheless.) These degenerative conditions are called "man-made" by some because they are associated with lifestyle related factors (smoking. alcohol consumption, diet, stress) and not a single germ. Lifestyles and the social environment are more important than viruses in mortality. In the developed world, infectious disease is no longer a significant cause of mortality. Life expectancy is in the seventies.

Infant mortality is very low.

4. 4th epidemiological period age of delayed degenerative disease 1975 today

This is very much like the 3rd period, the only difference being that The onset of degenerative illnesses, most importantly cardiovascular disease, starts later in life, than it did in the third period, meaning that more years are spent in good health before illness/ death. Life expactancy is in the early 80ies. This is characteristic of the most advanced countries only. This is partly due to more health promoting lifestyles and higher standards of living as well as medical science.

The world is a huge place. As you saw on the graph, and can see on the world life expectancy map clicking on this link https://www.targetmap.com/viewer.aspx?reportId=46476

average life expectancies span from about 50 years to 80 years across the globe, reflecting the huge differences in living standards. We can say that the first, second, third and fourth epidemiological periods are present today across the globe.

Mortality from infectious disease still play a big role in less developed countries. Millions of children die each year from infectious diseases that are preventable by vaccination. Tuberculosis and malaria are on the rise. AIDS is the leading cause of mortality in many Sub-Saharan African countries. The benefits of scientific medicine do not reach poor countries. The living conditions in these poor countries is still very much like they were in developed countries hundreds of years ago. There is no sanitation, drinking water is polluted, people live in overcrowded unhygienic conditions, with no fresh air due to indoor and outdoor smoke pollution. Infant mortality is still very high. Masses are undernourished. Medical care is only available to the rich and the privileged in these areas.

Don't forget to look at the table on the next page.

Epidemiological periods in the present

epidemiological periods	characteristics	Average life expectancy	Region
First period: pandemics	malnutrition and infectious disease	under 50 years	Sub-Saharan Africa
second period: endemics	Better nutrition, public health efforts, more people survive to die from chronic disease	50	Southern Asia, parts of Latin America
third period: chronic illness (non-infectious)	Increased smoking and alcohol consumption, unhealthy diets. Due to public health and reasonable standard of living, infectious disease is less important than chronic	60-70	Eastern Europe, parts of Latin America, Parts of India, the Middle east
fourth period: delayed onset of	Healthier lifestyle and social conditions than in regions with the 4th period. Major causes of mortality are cancer and cardiovascular diseas	over 75 years	High income developed countries.

degenerative conditions,			