

Basics of Health Promotion and Education Intervention
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Lecture - 01
Brief History of Public Health

We are here today to discuss the basics of health promotion and education interventions. This is a very essential part of public health. And for those of you who are interested in public health, taking it up as your academic pursuance or as your profession later on, it is very important to understand these issues.

To understand public health, we would, of course, have to go through a brief history to see how it has evolved into the present status.

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So, the concepts which we will cover over the next few minutes, are the history of evolution and adaptation of humankind, which is basically the history of public health. Health and disease in the ancient world as it were. History of pandemics and now we are living in an age of pandemics. Documentation and statistical analysis for social and public health reforms, which forms a very important area of public health, and some landmark inventions and discoveries like microscopy, vaccination, etc.

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History of Public health

- The history of public health is the story of the search for effective means of protecting and promoting health and preventing disease in the population
- Hunter gatherers to communal habitation - adaptation to changing environmental conditions and hazards
- Epidemic and endemic infectious disease
- War and natural disasters
- Urbanization and social reforms
- Nutrition and exposure to communicable and non infectious disease
- Tools and skills for cooking, food storage, burial of the dead, and removal of waste products
- The Paleolithic Age - organized societal structures existed - people lived in bands & survived by hunting and gathering food.
- Mesolithic Age - evolution from hunter-gatherer societies into the Neolithic food-raising societies (agriculture) - domestication of animals, growing of grain and root crops, and vegetables;
- At each stage of evolution - diseases associated with the environment living patterns.
- Life expectancy in prehistoric times was 25-30 years, with men living longer than women, probably due to malnutrition and maternity-related causes.
- History of adaptation of human society to the environment - History of public health



Let us start the history of public health then. The history of public health is basically the story of the search for effective means of protecting and promoting health and preventing disease. And that is what is public health, protecting and promoting health and preventing disease. So, we all know that human beings have evolved from being hunter gatherers, gradually to communal habitations.

They lived, started living in groups, they started adapting to changing environmental conditions and hazards. They went through epidemics; they went through endemic infectious diseases. They went through wars and natural disasters. And along with all these changes, came urbanizations, came social reforms.

And we have also increasingly understood the importance of nutrition, the history of exposure of mankind, to communicable and non-infectious diseases. And humankind has also evolved in its tools and skills for cooking, food storage, burial of the dead, and removal of waste products. Some of these are, these are just some examples of what we have achieved and what has made an impact on public health.

So, we have gone through the Paleolithic age. Those of you who are familiar with the term know that this is, as far as we can see, go back, where there was organized societal structure. People started living in bands, and they survived as hunter gatherers. They hunted and gathered food. Then came the Mesolithic age, where there was evolution from hunter gatherer societies to the Neolithic age.

Food raising societies or the agricultural societies, with domestication of animals growing of grains, roots, etc., vegetables. So, each of these had its impact on the health of humankind. At each stage, there were different diseases associated with changing living patterns. And, just as an example, we can say that we can see that life spans, life expectancies have also been changing. In prehistoric times, it was only 25 to 30 years, very young in terms of what we say the present-day life expectancies.

Men lived longer always than women then. Probably due to malnutrition and maternity related causes women died earlier. So basically, what we would like you to know is that history of adaptation of human society to the environment, is the history of public health.

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Health and disease in the ancient world

- Many of the main traditions of preventing and treating diseases were based on magic or religion.
- Cultural sanctions of **WATER, SANITATION & HYGIENE**
- Cleanliness equated with godliness and hygiene associated with religious beliefs and practices. Chinese, Egyptian, Hebrew, Indian, and Incan societies provided **sanitary amenities as part of religious beliefs and provided water, sewerage, and drainage systems.**
- These measures allowed for successful urban settlement.
- Chinese practices - **digging wells for drinking water; destruction of rats and rabid animals; using sewers and latrines.** The concept of health was that of counter forces between the principles of yin (female) and yang (male), with an emphasis on a **balanced lifestyle.** Emphasis on diet, herbal medicine, hygiene, massage, and acupuncture.
- Ancient cities in **India** were planned with **building codes, street paving, and covered sewer** drains built of bricks and mortar.
- Ancient Indian way of medical practice, **Ayurveda** ("knowledge of life"). **Personal hygiene, sanitation, and water supply engineering** were emphasized in the laws of Manu.
- Among the most valued pieces of ancient Indian writings are those created by Sushruta, a surgeon, and Charaka, a physician, both prominent teachers who ran prestigious schools of medicine. According to some historians, the teachings of Sushruta and Charaka were passed along to the Romans and Greeks



Now health and disease in the ancient world, whatever we know shows that many of the main traditions of preventing and treating diseases were based on magic or religion. We did not understand it. So, we attributed it to some magical powers or something beyond our comprehension, some supernatural human being. And but what is important is that even way back, we found cultural sanctions of water sanitation and hygiene.

Cleanliness was always equated with godliness. And hygiene was associated very strongly with religious beliefs and practices. Chinese, Egyptian, Hebrew, Indian and Incan societies they all provided sanitary amenities as part of their religious beliefs

and provided water, sewerage and drainage systems. So that forms the basis of our civilizations. These measures were all essential for successful urban settlements.

Like the Chinese practices of digging wells for drinking water, destruction of rats and rabid animals, using sewers and latrines, there is evidence of that. The concept of health was that of counterforces between yin and yang. This most of us know about Chinese beliefs with an emphasis on the concept of health on a balanced lifestyle.

There was emphasis on diet, emphasis on herbal medicines, emphasis on massages, of different types, acupuncture which is still there now. Ancient cities in India also are planned according to building codes, street paving, covered sewer. So, you see sanitation was quite an in-thing even then. Ancient Indian way of medical practice Ayurveda which is again gaining a lot of popularity.

Personal hygiene, sanitation and water supply engineering were emphasized even in the laws of Manu. Among the most valued pieces of Indian writings are those created by Sushruta, a surgeon and Charaka a physician. Both of them were prominent teachers who ran very prestigious schools of medicine. And according to some historians, actually, their teachings were passed on to the Romans and Greeks.

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Health and disease in the ancient world -evidence from Documentation

- The advent of writing - documentation.
- Requirements of medical conduct were spelled out as part of the general legal code of Hammurabi in Mesopotamia (c. 1700 BCE) (regulation of physician fees, with punishment for treatment failure - legal basis for practice of medicine)
- Ancient Egyptian texts -
The Kahoun Papyrus, the most ancient scroll, includes three parts: human medicine, veterinary science, and mathematics. Intensive agriculture and irrigation practices were associated with widespread parasitic disease. The cities had stone masonry gutters for drainage, and personal hygiene was highly emphasized. The Ebers Papyrus - extensive description of Egyptian medical science, including the isolation of infected surgical patients. The first section - divine origin and the strength of magic - latter portions - treatment of medical conditions including digestive diseases, eye diseases, skin problems, fractures, painful limbs & a treatise on the heart and vessels - covering anatomy and physiology. The last portion focuses on surgery, in particular, tumors and abscesses.
- The Hebrew/Mosaic law of the five Books of Moses (c. 1000 BCE) stressed prevention of disease through regulation of personal and community hygiene, reproductive and maternal health, isolation of lepers and other "unclean conditions", and family and personal sexual conduct as part of religious practice. It laid a basis for medical and public health jurisprudence. Personal and community responsibility for health included a mandatory day of rest, limits on slavery and guarantees of the rights of slaves and workers, protection of water supplies, sanitation of communities and camps, waste disposal, and food protection, all codified in detailed religious obligations. Food regulation prevented use of diseased or unclean animals, and proscribed methods of slaughter improved the possibility of preservation of the meat. The Mosaic Law (basis for Judaism, Christianity, and Islam), codified health behaviors for the individual and for society - practical application in environment of social hygiene.



So, with the advent of writing, but all that was what we what was anecdotal, what was passed on across generations. With the advent of writing, we had documentation, we had evidence. Requirements of medical conduct was spelled out as part of the general

legal code. There is a lot of issues about medical conduct, which is raised right now. But it was there right from 1700 BC.

Ancient Egyptian texts, you know, what they wrote on was Papyrus, and we have some very, these are just examples of two very important relevant Papyrus is the Kahoun Papyrus, which is the most ancient scroll. It includes three parts. Then itself, we had human medicine, veterinary science and mathematics. And they said, intensive agriculture and irrigation practices were associated with widespread parasitic disease.

The cities had stone masonry gutters for drainage. Personal hygiene was highly emphasized. There was another Papyrus found the Ebers Papyrus, which has an extensive description of Egyptian medical science, including the isolation that is an important public health concept again, isolation of infected surgical patients. So, the first section of the Ebers papyrus deals with divine origin and strength of magic.

But the latter portion has a lot on the treatment of medical conditions, digestive diseases, eye diseases, skin problems, fractures, painful limbs, etc. So that was anatomy and physiology. And the last portion was focused on surgery. Even the Hebrew mosaic laws, The Five Books of Moses, they had a lot of emphasis on prevention, through regulation of personal and community hygiene.

And again, something which is very importantly focused nowadays, reproductive and maternal health. So, unclean condition was also very much focused on. But that was based on religious practice. This laid a basis for medical and public health jurisprudence as well, you know, laws, acts, regulations, etc.

Personnel and community responsibility for health which is again being emphasized and very important part of health promotion, that included mandatory days of rest, limits on slavery and guarantees of the rights of slaves and workers, protection of water supplies, all these were mandated, sanitation of communities and camps, waste disposal, and food production.

So, food regulation prevented use of diseased or unclean animals and prescribed methods of slaughter were there which improved the possibility of preservation of meat. So, this Mosaic Law, which was across many religions, like Judaism, Christianity, Islam, they codified health behaviors for individuals and society at large.

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Health and disease in the ancient world

Ancient Greece placed high emphasis on **healthful living habits** - personal hygiene, nutrition, physical fitness, and community sanitation. Hippocrates articulated the relationship between disease patterns and the natural environment (air, water, and places) - dominated epidemiological thinking until the nineteenth century

- In Cretan and Minoan societies, climate and environment were recognized as playing a role in disease causation. Malaria was related to swampy and lowland areas; prevention involved planning the location of settlements.
- Preservation of health was seen as a balance of forces: exercise and rest, nutrition and excretion, and recognizing the importance of age and sex variables in health needs.
- Disease was seen as having natural causation.
- City-states providing free medical services for the poor and for slaves. City officials were appointed to look after public drains and water supply, providing organized sanitary and public health services

The Romans were extremely skilled in engineering of water supply, sewerage and drainage systems, public baths and latrines, town planning, sanitation of military encampments, and medical care.

Rome had access to clean water via 10 aqueducts supplying ample water for the citizens and also built public drains. The aqueducts made available 600-900 liters per person per day of household water from mountains. Marshlands were drained to reduce endemic malaria. Public baths were built to serve the poor, and fountains were built in private homes for the wealthy. Streets were paved, and organized garbage disposal served the cities.

Occupational health - measures to reduce known risks such as lead exposure, particularly in mining. Galen, Rome's leading physician, perpetuated the fame of Hippocrates through his medical writings, basing medical assessment on the four humors (sanguine, phlegmatic, choleric, and melancholic). These ideas dominated for nearly 1500 years.

Ancient Greece also placed high emphasis on healthful living habits, personal hygiene, nutrition, physical fitness, community sanitation, etc. So, we all have heard about Hippocrates. He articulated the relationships between disease patterns and natural environment like air, water etc. And this dominated epidemiological thinking till the 19th century.

So, there are some more examples of how in Cretan and Minoan societies climate and environment were recognized as playing a role in disease causation. We all know malaria, the very name meant that it was bad air and it was related to swampy and lowland areas, and prevention included planning the location of the settlements.

So basically historically, preservation of health was seen as a balance of forces, exercise and rest, nutrition and exercise, recognizing the importance of age and sex variables gradually, and diseases were seen as having natural causations. Cities and states started providing free medical services for the poor and slaves. City officials were appointed to look after public drains and water supply etc.

This was especially seen in the Roman settlements, where they were extremely skilled in engineering the water supplies, sewerage and drainage systems. So, Rome, in fact had access to clean water via 10 aqueducts supplying ample water, and they had calculated that each person would be needing 600 to 900 liters per person per day of household water.

So, these aqueducts brought that amount of water from the mountains for household use. Marsh lands were drained to reduce endemic malaria. Public baths were built to serve the poor, and fountains were built in private homes for the wealthy. We have all seen this in the various films, novels, stories that we have read. Streets were paved, and organized garbage disposal served the cities.

So along with that, the seeds of occupational health also were sown. There were measures to reduce known risks like lead exposure, particularly in mining. Galen who was Rome's leading physician, he perpetuated the fame of Hippocrates through his writings. He based medical assessment on four humors, sanguine, phlegmatic, choleric, and melancholic basically the mind, the gut problems, the lung problems, etc.

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Health and disease in the ancient world

- Jewish rabbi-philosopher-physician Moses Maimonides, synthesized Roman, Greek, and Arabic concepts of **communicable disease isolation and sanitation**.
- Monastery hospitals - provide care to the sick and dying - gradually supplanted by municipal, voluntary, and guild hospitals. By the fifteenth century, Britain had 750 hospitals. **Medical care insurance** was provided by guilds to its members and their families. Hospitals employed doctors, and the wealthy had access to private doctors.
- **Increasing contact between the Crusaders and the Muslims through war, conquest, cohabitation, and trade introduced Arabic culture and diseases.**
- **Leprosy** became a widespread disease in Europe, particularly among the poor - severely accentuated during and following the Crusades. Isolation in leprosaria was common in Europe. In France there were 2000 leprosaria in the fourteenth century.
- In Western Europe, **cities developed with crowded and unsanitary conditions**. Rapidly growing medieval towns lacked systems of sewers or water pipes. Garbage and human waste were thrown into the streets. Houses were made of wood, mud, and dung. Rats, lice, and fleas flourished in the rushes or straw used on the clay floors of people's houses.
- **Crowding, poor nutrition and sanitation, lack of adequate water sources and drainage, unpaved streets, keeping of animals in town, and lack of organized waste disposal created conditions for widespread infectious diseases.**
- Municipalities developed protected water sites (cisterns, wells, and springs) and public fountains with municipal regulation and supervision. Piped community water supplies were developed in Dublin, Basel, and Bruges (Belgium). Novgorod in Russia used clay and wooden pipes for water supplies, and municipal bath houses were available.
- Conditions were ripe for vast epidemics of smallpox, cholera, measles, and other epidemic diseases, fanned by the debased conditions of life and warfare, and famines raging throughout Europe.



Gradually what happened was the Jewish philosophers like Moses, Maimonides, he worked on communicable disease isolation and sanitation. He brought out several of his findings. And then monastery hospitals were set up to provide care to the sick and

dying, gradually supplemented by other institutions, municipal hospitals, voluntary hospitals, guild, hospitals, etc.

By 15th century Britain had 750 hospitals. Then we had the incoming of medical care insurance. Along with that, what happened was wars were raged. So, the crusaders from Europe came across to Middle East, and the crusaders and Muslims interacted through war, conquest, cohabitation and trade. So, the diseases, the culture all were intermixed. Leprosy then became a widespread disease in Europe, particularly among the poor, severely accentuated during and following the crusades.

So,, they were leprosaria or the sanitarium setup in Europe. In France, there were 2000 leprosaria in the 14th century. In Western Europe, it is at this time, you know, population started increasing. In the cities there were crowded, unsanitary conditions. These rapidly growing towns, medieval towns lacked systems of sewers or water pipes. Garbage and human waste were thrown out into the streets.

Houses were made of wood, mud and dung. Rat, lice and fleas flourished. So crowding, poor nutrition and sanitation, lack of adequate water sources and drainage, unpaved streets, keeping of animals and lack of organized waste disposal led to widespread infectious diseases. So gradually municipalities developed protected water sites, public fountains with regulation and supervision.

Piped community water supplies were developed first in Dublin, Basel and Bruges. In Russia, they started using clay and wooden pipes for water supplies, and municipal bath houses were also available. So what happened was, despite all this, the conditions were ripe for vast epidemics of smallpox, cholera, measles and other epidemic diseases which gradually started flaring up.

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Pandemics - The Black Death

- Pneumonic and bubonic plague - *Yersinia pestis* infection transmitted by fleas on rodents - brought from the steppes of Central Asia to Europe, China, Russia with Mongol invasions, and transmitted via extensive trade routes by sea and overland.
- Plague traveled with armies and caravan traders, and later by ship as world trade expanded. Despite local efforts to prevent disease by quarantine and isolation of the sick, the disease devastated whole communities.

"Rumors of a terrible plague supposedly arising in China and spreading through Tartary (Central Asia) to India and Persia, Mesopotamia, Syria, Egypt and all of Asia Minor had reached Europe in 1346. They told of a death toll so devastating that all of India was said to be depopulated, whole territories covered by dead bodies, other areas with no one left alive. In the absence of a concept of contagion, no serious alarm was felt in Europe until the trading ships brought their black burden of pestilence into Messina while other infected ships from the Levant carried it to Genoa and Venice. By January 1348 it penetrated France via Marseille, and North Africa via Tunis. Ship-borne along coasts and navigable rivers, it spread westward from Marseille through the parts of Languedoc to Spain and northward up the Rhone to Avignon, where it arrived in March. It reached Narbonne, Montpellier, Carcassone, and Toulouse between February and May, and at the same time in Italy spread to Rome and Florence and their hinterlands. Between June and August it reached Bordeaux, Lyon, and Paris, spread to Burgundy and Normandy into southern England. From Italy during the summer it crossed the Alps into Switzerland and reached eastward to Hungary. In a given area the plague accomplished its kill within four to six months and then faded, except in the larger cities, where, rooting into the close-quartered population, it abated during the winter, only to appear in spring and rage for another six months."

Source: Tuchman BW. *A distant mirror: the calamitous fourteenth century*. New York: Alfred A. Knopf; 1978.



And then came the huge pandemics. We have all heard about the Black Death, plague, pneumonic and bubonic plague. So, the rats brought them from the steps of Central Asia to Europe, China, Russia. The Mongols actually, the lots of Mongol invasions happened and they carried these by extensive trade routes by sea and over land. So, plague traveled with the armies and caravans and later by ship as the World Trade expanded.

So, despite local efforts to prevent disease by quarantine and isolation of the sick, this disease devastated whole communities. It was much worse than what we can ever think of right now. So, there is a bit of a quote which is put up here. I will not read the entire part or you can always refer to it.

But that these rumors, just like rumors of COVID do now, rumors gave rise to a lot of stigma, discrimination, wrong practices, misconceptions, misinformation etc. But still, the Black Death spread.

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Pandemics - The Black Death

- Fear of a new and deadly disease, lack of knowledge, speculation, and rumor led to countermeasures which exacerbated the spread (as with Covid 19, SARS and pandemic H1N1 influenza)
- In Western Europe, **public and religious ceremonies and burials were promoted by religious and civil authorities, which increased contact with infected people.** The misconception that cats were the cause of plague led to their slaughter. Hygienic practices limited the spread of plague in Jewish ghettos, leading to the Jews being blamed for the plague's spread, and widespread massacres, especially in Germany and Central Europe.
- Seaport cities in the fourteenth century began to keep ships coming from places with the plague waiting in remote parts of the harbor, initially for 30 days (*treutina*), then for 40 days (*quarantina*) establishing the **public health act of quarantine.**
- Towns along major trading routes in Russia took measures to restrict movement in homes, streets, and entire towns during epidemics - banned public funerals during plague epidemics, and in the seventeenth century, Czar Boris Godunov banned trade, prohibited religious and other ceremonies, and instituted quarantine-type measures.
- The plague continued to strike, with epidemics in London in 1665, Marseille in 1720, Moscow in 1771, and Russia, India, and the Middle East through the nineteenth century. Furthermore, the plague continued into the twentieth century with epidemics in Australia (1900), China (1911), Egypt (1940), and India (1995).
- The disease is endemic in rodents in many parts of the world, however, modern sanitation, pest control, and antibiotic treatment have greatly reduced the potential for large-scale plague epidemics.
- Guilds organized to protect the economic interests of traders and skilled craftsmen. These brotherhoods provided a tradition later expressed in **sick funds, and insurance for health care** based on employment groups.



So fear of a new and deadly disease, lack of knowledge, speculation and rumor led to countermeasures, which exacerbated the spread, as with COVID-19, SARS and pandemic H1N1 which we have seen in recent years. In Western Europe, public and religious ceremonies and barriers were promoted by religious and civil authorities, which increased contact with infected people.

So that was what we were seeing in the beginning here as well. Sometimes there was misconception that cats were the cause of plague and people started killing cats all over the country. So these things kept happening. Even when plague was happening in Jewish ghettos, people said that these Jews are responsible for plague. So they killed Jews.

Seaports cities in the 14th century kept, they were the first to introduce this idea that these ships have to be kept at bay. So what we do, quarantine, now which is very commonly followed, was first introduced then. First 30 days, which was known as *treutina*, and then for 40 days, which was known as *quarantina*. So all these towns along the trade routes took measures to restrict movements in the homes in the streets and entire towns during the epidemics, banned public funerals during plague.

So now they started to take more practical and feasible methods. So, in their institute, they had institutional quarantine measures. Plague continued to strike with epidemics in London, Marseille, Moscow, Russia, India and Middle East throughout the 19th

century. However, so we still had, even as late as 1995, we had outbreaks of plague. The disease still remains as endemic.

However, modern sanitation, pest control, antibiotic treatments have reduced the magnitude and the potential for large plague epidemics. So what was good was that out of this, we have learnt a lot. And what happened was the guilds actually started first to protect the economic interest of these traders and craftsmen. What we saw was the first care or the thought that of setting up sick funds and insurance for health care started with as an aftermath of this losses due to plague.

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Renaissance - Commerce, industry, trade, merchant fleets, and voyages of discovery

As a result, vast epidemics of syphilis, typhus, smallpox, measles, and the plague continued to spread across Europe. Malaria was still widespread. Rickets, scarlet fever, and scurvy, particularly among sailors, were rampant. Pollution and crowding in industrial areas resulted in centuries-long epidemics of environmental disease, particularly among the urban working class.

A virulent form of syphilis, allegedly brought back from America by the crews of Columbus, spread rapidly throughout Europe. Control measures included examination and registration of prostitutes, closure of communal bath houses, isolation in special hospitals, reporting of disease, and expulsion of sick prostitutes or strangers.

British Poor Laws - local parish government responsible for the health and social well-being of the poor. Each citizen was responsible for cleaning his part of the street, but hygienic standards were low, animal and human waste freely accumulating.

The contagion theory of disease, described in 1546 by Fracastorus and later Paracelsus - the terms infection and disinfection - contrary to the miasma teachings of Galen.

In the mid-seventeenth century, the czarist administration established a State Pharmacy Department to control pharmaceuticals and medications, education of doctors, military medicine, quarantine, forensic medicine, and medical libraries. Government revenues from manufacturing, sale, and promotion of vodka provided for these services.



Then came Renaissance, which was a wonderful period, but it had a lot of travel, lot of trade. So there were vast epidemics of syphilis, typhus, smallpox, measles, continued to spread all over. Along with that with the trade we also understood rickets were happening, scarlet fever, scurvy, particularly among sailors, pollution and crowding in industrial areas. So, all this kept happening.

And what came out of it was that in the British areas they had poor laws, they set up poor laws, which was the local parish government became responsible for health and social wellbeing of the poor. What we are thinking of now of this universal health coverage or health as a right of the population was first conceptualized.

And each citizen was held responsible for cleaning this part of his street, but still the hygienic standards were quite low. And at that time, we had the contagion theory of

disease, which means disease is spread by some agent, a contagious agent. Before it was only the natural forces, air, water etc. So we had the terms infection, disinfection, etc., introduced.

In fact, in Russia in the mid-17th century they set up the state pharmacy department, which looked into these issues of quarantine, forensic medicine, etc.

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Documentation & statistical analysis - epidemiology utilizes demography, sociology & statistics

- Registration of births and deaths originating in Egypt, China, India, Greece, and Rome - used for tax purposes & determination of potential military manpower. Statistical & epidemiological methods emerged in the early seventeenth century - Francis Bacon & applied by John Graunt in demography.
- Churches maintained registries of births and deaths; compulsory registration with local government adopted in the UK in 1853. From 1538, parish registers of christenings and burials were published in England as weekly and annual abstracts, known as the **Bills of Mortality** which included tabulation of death by cause. In 1662, John Graunt compiled and interpreted mortality figures. He showed statistical relationships between mortality and living conditions - **first statistical analysis of mortality data, providing a foundation for use of health statistics in planning of health services**. It established the sciences of demography and vital statistics and methods of analysis, providing basic measurements for health status evaluation with mortality rates by age, sex, and location.
- In Russia, in 1722, Peter the Great began a system of registration of births of male infants for military purposes. In 1755, Mikhail Vasilyevich Lomonosov established the study of demography, carrying out surveys and studies of birth statistics, infant mortality, quality of medical care, alcoholism, and workers' health - led to improved training of doctors and midwives & epidemic control measures. In 1724, Tatishev carried out a survey by questionnaire of all regions of the Russian empire regarding epidemic disease and methods of treatment.

Then came documentation and statistical analysis, another very important landmark. Registration of births and deaths. This is actually a revolution, brought in a revolution in the thinking of public health. It originated in Egypt, China, India, Greece and Rome. It was used basically first for tax purposes. They wanted to know how many people we can tax or how many people we can recruit in the army.

So the potential military manpower. But gradually from that, there were two people Francis Bacon and John Graunt who applied it and showed us how we can use it for health purposes as well. So the churches were the ones who maintained registries of births and deaths. But gradually what happened, bills of mortality would be published by the churches in England as weekly or annual publications.

The first statistical analysis of this data was done by John Graunt. He was, he is considered as the father of health statistics. He was the one who analyzed it in terms of age, sex, location, etc. In Russia in fact, Peter the Great, he said, I would also require something like this. In 1755, another person Lomonosov, he established the


study of demography, carried out surveys, studies of birth statistics, infant mortality, etc.

These were all very new and very path breaking at that time. So all this was used for epidemic control. In fact, in the known documents in 1724, it was the Russian scientist Tatishev who carried out a survey by questionnaire of all regions of the Russian empire regarding epidemic diseases, which is also the first that we know of.

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Documentation & statistical analysis - epidemiology utilizes demography, sociology & statistics

- Daniel Bernoulli constructed life tables based on available data showing that variolation against smallpox conferred lifelong immunity and vaccination at birth increased life expectancy.
- Following the French Revolution, health statistics flourished under Pierre Charles Alexandre Louis - considered founder of modern epidemiology. Louis conducted several important observational studies, including one showing that bloodletting, then a common form of therapy, was ineffective. *The Lancet*, one of the oldest, best known, and most respected medical journals, was founded in 1823 and played an important role in promoting statistical analysis in medical sciences.
- In 1700, Bernardino Ramazzini, "father of occupational medicine", published 'Diseases of Workers', applying epidemiological principles and highlighting specific health hazards - exposure to chemicals, dust, and metals, as well as musculoskeletal injury from unnatural postures and repetitive or violent motions
- Deeper understanding of trades and their risks - identification of causative agents & methods of prevention. Observational studies of Percival Pott identified scrotal cancer as occupational hazard of chimney sweeps. In 1767, George Baker studied Devonshire colic, acquired from lead poisoning in cider production.



Bernoulli, an Italian scientist, he was the first one who constructed life tables. He loved mathematics; you know. So he used to work with these numbers. And he showed that variolation against smallpox, what they used to do then, it is not vaccination but variolation, conferred lifelong immunity. So he was the one who worked on this and found that it increased life expectancy.

Then of course we had Alexandre Louis, who was considered founder of modern epidemiology. He was the one who did a lot of observational studies, linking one thing to the other. And we had the Lancet being originating at that time. So Lancet was the best known most respected medical journal founded in 1823. They used to publish this statistical analysis, and it is an important landmark.

Along with that we have already talked about occupational health, but Ramazzini, he is considered the father of occupational medicine again, he did another observational study. He found out the different types of diseases which are occurring amongst

different workers. And he published the disease of workers laying the foundation of specific health hazards or what exposures can bring about in human beings.

Exposures to chemicals, dusts, metals, musculoskeletal disorders, etc. And this was followed up by Percival Pott, many of you might have gone through this study of Pott's scrotal cancer study. He identified it as an occupational hazard of chimney sweeps. And then again, the Devonshire colic, which George Baker studied to study cider production and lead poisoning.

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Health statistics for social and public health reform

- Recognizing the significance of accurate statistical information in health planning and disease prevention.
- Edwin Chadwick's work led to legislation establishing the Registrar-General's Office of Britain in 1836. William Farr became its director-general and placed the focus of the office on public health. Farr's analysis of mortality in Liverpool, for example, showed that barely half of its native-born lived to their sixth birthday, whereas in England, the overall median age at death was 45 years. As a result, Parliament passed the Liverpool Sanitary Act of 1846, creating a legislated sanitary code, a medical officer of health position, and a local health authority.
- In 1842 in Boston, Massachusetts, Lemuel Shattuck initiated a statewide registration of vital statistics, which later became a model in USA. His report was a **landmark in the evolution of public health administration and planning** - provided a detailed account of data collection by age, sex, race, and occupation, and uniform nomenclature for causes of diseases and death - emphasized the importance of a routine system for exchanging data and information. The London Epidemiological Society, founded in 1850 - active investigative and lobbying group for public health action. Its work on smallpox led to the passage of the Vaccination Act of 1853, establishing compulsory vaccination in the UK.
- In the later part of the nineteenth century, Florence Nightingale highlighted the value of a **hospital discharge information system**. She promoted the collection and use of statistics that could be derived from the records of patients treated in hospitals. Her work led to marked improvements in the management and design of hospitals, military medicine, and nursing as a profession.



So health statistics has been very vital for social and public health reform, for planning, for prevention, for protection, and for planning the system as well. So it was Edwin Chadwick who worked in this and led to a lot of laws in the Registrar General's Office of Britain, what sort of data should be collected? William Farr has an interesting anecdote. But of course, which you can always look up.

William Farr was an interesting person, and he always used to love looking at these numbers. And he was the one who focused the work on public health, focused these data, and related it to public health. He analyzed mortality in Liverpool and showed that barely half of its native born live up to their sixth birthday, whereas in England, the overall median age was 45 years.

So all these are observations, but they were keen observers. As a result, you know, many apps came out many regulations came out. And then you came, there was again,

some other people who work, this was in America, they started the statewide registration of vital statistics, another very important landmark in the evolution of Public Health Administration and planning, because more you have numbers, better planning you can make.

Similarly, it was Florence Nightingale also who highlighted the value of hospital discharge information. Before that, people would just be discharged without any information on their or any data. She promoted the collection and use of statistics, which could be derived from these records.

And so Chadwick, Shattuck, and Florence Nightingale are said to be the path breakers in the initiation of hospital or healthcare delivery system planning based on statistical data.

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Investigation of nutrition in public health - first clinical trial and epidemiological investigation

- Scurvy (the Black Death of the Sea) was a major health problem among sailors during long voyages. Scurvy was a major cause of sickness and death among sailors when supplies of fruit and vegetables ran out, thus significantly limiting long voyages and contributing to frequent mutinies at sea. Samuel Purchas and John Woodall recommended the use of lemons and oranges in the treatment of scurvy, but this was not widely practiced
- In 1498, Vasco da Gama lost 55 crewmen to scurvy.
- A British naval squadron of seven ships and nearly 2000 men left Plymouth to circumnavigate the globe. The squadron returned to England comprised of only one ship and 145 men, after losing the majority of the crews to scurvy.
- **James Lind** carried out his pioneering epidemiological investigation on scurvy among sailors on long voyages. His work led to the adoption of lemon or lime juice as a routine nutrition supplement for British sailors some 50 years later. Vitamins were not understood or isolated until almost 150 years later;
- Lind's scientific technique of hypothesis formulation, study design, careful observation and testing, followed documentation and publication, was exceptional and monumental.



So, this was another aspect. Nutrition at the same time was being better understood. Scurvy, you know, like the Black Death of plague was there. So scurvy was there amongst the sailors who took long voyages and that was found gradually by observations and in Vasco de Gama's crew he lost 55 crewmen to scurvy in a single journey. So, there were lots of people and lots of journeys undertaken over the sea at that time.


But James Lind carried out his pioneering investigation, which led to the adoption of lemon or lime juice as a routine nutritional supplement for British sailors. And not

only he did this, but his technique laid the foundation for hypothesis formulation, study design, careful observations and testing, followed by documentation and publication, which is what you are all doing now.

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Development of microscopy

- The first compound microscope was created by Zacharias Janson and his father, Dutch spectacle-makers 1595. They placed lenses in a tube, and noted that the object examined looked substantially enlarged. Robert Hooke in England and Jan Swammerdam in the Netherlands built compound microscopes and made important discoveries with them.
- Credit for invention of the microscope and its medical use is given to Anton van Leeuwenhoek a Dutch scientist and draper. His skill in grinding and polishing lenses provided remarkably high magnifying power. He was the first to see and describe bacteria (1674), yeast plants, the teeming life in a drop of water, and the circulation of blood corpuscles in capillaries.
- The microscope has provided one of the key technological contributions to health sciences.




Then we had the development of microscopy. These are some very innovative things as you can see. Spectacle makers started making the microscope which was refined later on by another person who was a draper, a scientist later. But then he was he is now considered the father of microbiology.

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Vaccination

- ✓ Smallpox ravaged all parts of the world and was widespread in Asia, the Middle East, and Europe during the Middle Ages. It was a designated cause of death in the Bills of Mortality in London. Epidemics of smallpox occurred throughout the seventeenth to eighteenth and into the nineteenth centuries. Primarily a disease of childhood, mortality rates were 25 to 40 percent or more and had disfiguring sequelae.
- ✓ Smallpox was a key factor in the near elimination of the Aztec and other societies in Central and South America following the Spanish invasion.
- ✓ Traditions of prevention of this disease by inoculation or transmission of the disease to healthy people to prevent them from acquiring a more virulent form during epidemics were reported in ancient China. This practice, called variolation, was first brought to England in 1721 by Lady Mary Montagu, wife of the British ambassador to Constantinople, where it was common practice.
- ✓ It was widely adopted in England in the mid-eighteenth century, when the disease affected millions of people in Europe. Catherine the Great of Russia had her son inoculated by variolation.
- ✓ Edward Jenner was the first to use vaccination with cowpox to prevent smallpox in 1796 initiating one of the most dramatically successful endeavors of public health.
- ✓ Vaccination later became compulsory in many countries, leading to the ultimate public health achievement: global eradication of smallpox in the late twentieth century.



Then came vaccination, many of you might have heard about it, how it was smallpox, which ravaged the country. And then finally, we had these different experimentations. And in England, in Russia, people tried very different things. But Edward Jenner was

the first one to cowpox vaccination. It later became compulsory. And now you know, it is a very well-known thing and the most widely practiced implementation intervention, now in public health.

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CONCLUSION

- History is collective memory, the storehouse of experience which enables understanding the past and plan for the future.
- It provides useful insights into the social and political content in which human communities existed and how they influenced public health practice
- It provides knowledge of how public health practices have evolved, their successes and failures, their highs and lows.
- It also highlights the innovative approaches introduced in public health initiatives which have made great progresses in population health status worldwide.
- It is interesting to look back at chronologies of public health history and understand the factors at work behind significant developments to learn about the many influences we need to consider and the timescale of change that we may face in delivering health improvements.

So, what we would like to say and emphasize for all of you who would study public health is that history is collective memory. It is the storehouse of experience, which not only helps us understand the past, but only after understanding the past you can plan for the future. It provides useful insights into the social and political content in which people lived, and how they influenced public health practice.

So people cannot live in isolation. It is the surrounding environment, the socio-political environment, which influences their health and wellbeing. It provides knowledge of how public health practices have evolved, their successes, failures, highs and lows so that we can use them for our interventions later. It also highlights how innovative approaches have been introduced, and have made great progress in improving population health status.

So, it is interesting to look back at chronologies of public health history and understand the factors behind these significant developments to learn about these influences, which are as important and which we have to consider in the timescale of change, which we may be facing in delivering health improvements in future and public health is all about improving health.

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I have enlisted a set of references for you, which you can readily refer to if you want to know more about it. And I do hope that all of you would like to appreciate and look back into history to move forward into the future. Thank you.