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DEPARTMENT OF BIOMEDICAL ENGINEERING

VII Semester

OBT357 BIOTECHNOLOGY IN HEALTH CARE

UNIT- I PUBLIC HEALTH

1.2 Historical aspects of Public Health

Public health has evolved over centuries, shaped by societal needs, scientific advancements, and responses to disease. Below is a concise overview of its historical aspects, focusing on key developments:

Ancient Civilizations (c. 3000 BCE - 500 CE):

- **Early Sanitation & Hygiene:**
  - **Indus Valley Civilization (Harappa, Mohenjo-Daro):** Sophisticated urban planning with advanced drainage systems, public baths, and private toilets (c. 2500 BCE) indicated an early understanding of sanitation.
  - **Egyptians:** Practiced personal hygiene, food preservation, and some level of medical care for communities, documented in papyri like the Ebers Papyrus.
  - **Hebrews (Mosaic Law):** Detailed codes of conduct related to personal and community hygiene, food preparation, waste disposal, and quarantine for infectious diseases, found in the books of Leviticus and Deuteronomy.
  - **Greeks:** Emphasized physical fitness, hygiene, and a balance between mind and body. Hippocrates (c. 460-370 BCE) emphasized the importance of environmental factors in disease causation ("airs, waters,

places").

- **Romans:** Known for their impressive public works related to health, including aqueducts for fresh water, vast sewer systems (e.g., Cloaca Maxima), public baths, and organized urban planning. They also had public medical services for soldiers.

Medieval Period (c. 500 - 1500 CE):

- **Decline and Resurgence of Disease:** With the fall of the Roman Empire, centralized public health efforts declined in Europe, leading to widespread epidemics.
- **The Black Death (14th Century):** This devastating pandemic spurred some of the first organized public health responses in Europe.
    - **Quarantine:** Cities like Venice pioneered the practice of quarantining ships and travelers to prevent disease spread (the term "quarantine" comes from "quaranta giorni" – 40 days).
    - **Isolation Hospitals:** Lazarettos were established to isolate people with infectious diseases.
    - **Cemeteries:** Efforts were made to bury the dead away from living areas.
- **Islamic World:** During Europe's Dark Ages, the Islamic world maintained and advanced medical and public health knowledge. Hospitals (bimaristans) were established, offering comprehensive care, and there was a strong emphasis on hygiene and public sanitation.

Renaissance and Early Modern Period (c. 1500 - 1800 CE):

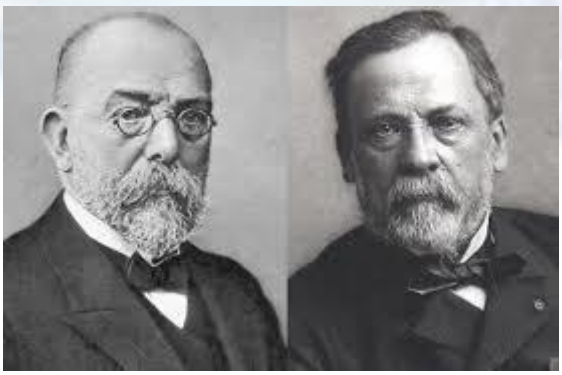
- **Rise of Statistics:** Growing interest in "political arithmetic" (early vital statistics) began to document births, deaths, and causes of mortality, laying the groundwork for epidemiology. John Graunt's "Bills of Mortality" (17th century London) are a famous example.
- **Colonialism and Disease Spread:** European expansion led to the global spread of diseases, but also increased awareness of disease patterns.
- **First Public Health Boards:** Some cities began establishing rudimentary health boards in response to recurring epidemics.

The Industrial Revolution and the "Sanitary Movement" (18th - 19th Centuries):

- **Urbanization and Poor Conditions:** Rapid industrialization led to overcrowding, unsanitary living conditions, and widespread disease (cholera, typhoid, tuberculosis) in cities.
- **Edwin Chadwick (UK):** A key figure in the Sanitary Movement. His 1842 report, "Inquiry into the Sanitary Conditions of the Labouring Population of Great Britain," highlighted the link between poor sanitation and disease, advocating for drainage, sewage, and clean water. This led to the **Public Health Act of 1848** in the UK, establishing local health boards.
- **John Snow (UK):** The "father of epidemiology." His investigation of the 1854 Broad Street cholera outbreak demonstrated that cholera was waterborne, not airborne ("miasma theory"), by meticulously mapping cases and identifying the contaminated pump.
- **Rudolf Virchow (Germany):** Emphasized the social and economic determinants of health, arguing that disease was often a result of social conditions.

Germ Theory and the Scientific Revolution in Public Health (Late 19th Century):

- **Louis Pasteur and Robert Koch:** Their work on germ theory (identifying specific microorganisms as disease causes) revolutionized public health. This led to:



Louis Pasteur and Robert Koch

  - **Immunizations:** Development of vaccines for diseases like rabies, diphtheria, tetanus.

- **Antiseptics and Sterilization:** Practices in surgery and medicine greatly reduced infections.
- **Hygiene Education:** Greater understanding of personal hygiene and food safety.

❖ **Establishment of Public Health Institutions:** Formation of national and local health departments, specialized laboratories, and public health nursing.

- ✓ National Centre for Disease Control (NCDC), Delhi -1909
- ✓ All India Institute of Hygiene and Public Health (AIIH&PH), Kolkata -1932
- ✓ Central Council of Health and Family Welfare (CCHFW) -1952
- ✓ All India Institute of Medical Sciences (AIIMS), New Delhi -1956
- ✓ Indian Council of Medical Research (ICMR) -1949
- ✓ National Institute of Health and Family Welfare (NIHFW)-1977
- ✓ National Health Systems Resource Centre (NHSRC) -2006
- ✓ National Medical Commission (NMC) -2020

20th Century: Expansion and Specialization:

❖ **Focus on Chronic Diseases:** As infectious diseases came under control, attention shifted to chronic diseases (heart disease, cancer, diabetes) and lifestyle factors.

❖ **Maternal and Child Health:** Significant improvements in maternal and infant mortality rates.



- **Nutrition:** Public health campaigns addressed malnutrition and promoted balanced diets.



United Nations Sustainable Development Goal (SDG) 2- Zero Hunger aims to end all forms of malnutrition by 2030

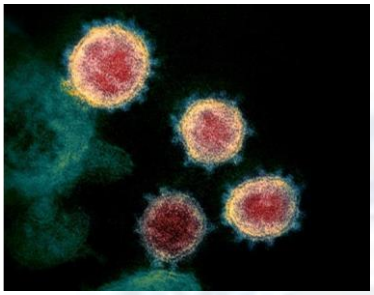
- **Occupational Health:** Focus on workplace safety and health.



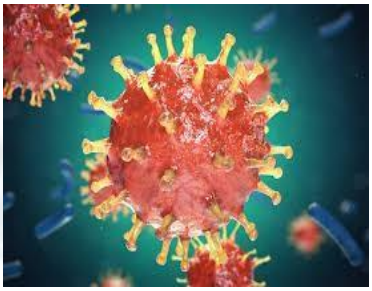
- **Global Health:** Emergence of international organizations like the World Health Organization (WHO) in 1948, addressing health issues on a global scale.
- **Public Health Acts:** Comprehensive legislation covering housing, food safety, water, air quality, etc.

21st Century: New Challenges and Approaches:

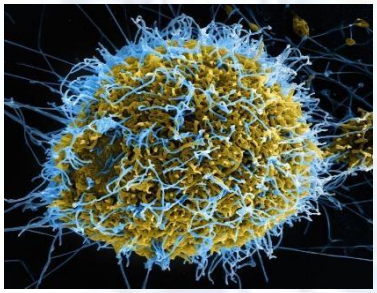
- **Emerging Infectious Diseases:** SARS, H1N1, Ebola, COVID-19 have highlighted the ongoing need for robust public health surveillance and rapid response.



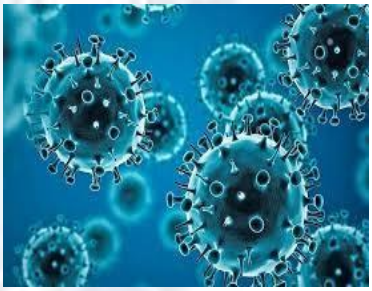
Severe acute respiratory syndrome (SARS)



H1N1, also known as swine flu



Ebola Virus



Covid 19 Virus

- **Non-Communicable Diseases (NCDs):** Continued focus on prevention and control of chronic diseases, often linked to urbanization, aging populations, and lifestyle changes.
  - Example: NCD – Cardiovascular Disease, Cancer, Chronic Respiratory Disease, Diabetes Mellitus, Chronic Kidney disease, Mental health disorders, Neurological disorders.
  - Promote Health Education and Behavior Change
  - Urban Planning for Healthy Living
  - Health Services Strengthening
  - Enforce regulations on food labelling and trans fats
  - Community Engagement
  - Example: India's National Efforts

1. NPCDCS: National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke
2. Smart Cities Health Plans
3. Eat Right India Movement
4. Fit India Movement

- **Health Equity and Social Determinants:** Increased recognition that social, economic, and environmental factors profoundly impact health outcomes, leading to efforts to address health disparities.
- **Data and Technology:** Utilization of big data, artificial intelligence, and digital tools for surveillance, intervention, and health communication.
- **Climate Change and Health:** Growing awareness of the health impacts of climate change and the need for public health adaptation strategies.

In essence, the history of public health is a dynamic progression from rudimentary survival instincts and localized responses to highly organized, science-driven, and globally coordinated efforts to improve the health and well-being of populations.