Communicable Disease

Communicable diseases are diseases that can be spread from one person to another and cause a large number of people to get sick. They are caused by germs like bacteria, viruses, fungi, parasites or toxins. Communicable diseases, also known as infectious diseases or transmissible diseases, are illnesses that result from the infection, presence and growth of pathogenic (capable of causing disease) biologic agents in an individual human or other animal host. Infections may range in severity from asymptomatic (without symptoms) to severe and fatal. The term infection does not have the same meaning as infectious disease because some infections do not cause illness in a host.

A communicable disease is an illness caused by a specific infectious agent or its toxic products. It arises through transmission of that agent or its products from an infected person, animal, or inanimate reservoir to a susceptible host, either directly or indirectly (through an intermediate plant or animal host, vector, or the inanimate environment). Control of disease is the reduction of disease incidence, prevalence, morbidity, or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction. Control is to be contrasted with elimination (reduction to zero of the incidence of a specified disease in a defined geographic area as a result of deliberate efforts; continued intervention measures are required), eradication (permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed), and extinction (the specific infectious agent no longer exists in nature or the laboratory).

Disease causing biologic agents include viruses, bacteria, fungi, protozoa, multicellular parasites, and aberrant proteins known as prions. Transmission of these biologic agents can occur in a variety of ways, including direct physical contact with an infectious person, consuming contaminated foods or beverages, contact with contaminated body fluids, contact with contaminated inanimate objects, airborne (inhalation), or being bitten by an infected insect or tick. Some disease agents can be transmitted from animals to humans, and some of these agents can be transmitted in more than one way.

Germs that may cause communicable diseases are spread in a number of ways including.

- Physical contact with an infected person, through contact with skin (Staphylococcus aureus), sexual contact (chlamydia, AIDS,gonorrhea, syphilis), fecal/oral contact (rotavirus), or respiratory droplets (influenza, mumps, TB)
- Contact with a contaminated surface or object (norovirus), food (salmonella, E. coli), blood (HIV, hepatitis B and hepatitis C), or water (cholera).
- Bites from insects or animals capable of passing the disease (West Nile virus, Lyme disease and rabies); and bites from insects or animals capable of transmitting the disease (mosquito: malaria and yellow fever; flea: plague).
- Through the air (tuberculosis and measles).
- Mother to unborn child. A pregnant woman may pass germs that cause infectious diseases to her unborn baby. Some germs can pass through the placenta. Germs in the vagina can be transmitted to the baby during birth.

Communicable Disease are :

- Tuberculosis
- Flu
- Measles
- HIV/AIDS
- Rabies
- Whooping cough
- Hepatitis A
- Hepatitis B
- Hepatitis C
- Malaria
- Hepatitis E
- Mumps
- West Nile Fever
- Ebola virus disease
- Syphilis
- Gonorrhoea

- Salmonellosis
- Cholera
- Chickenpox
- Meningococcal disease
- Rubella(german measles
- Polio
- Dengue Fever
- Meningitis
- Chalamydia
- Lyme disease
- Leprosy
- Typhoid Fever
- Tetanus
- Diphtheria
- Giardiasis
- Listeriosis
- Smallpox
- Trichinosis
- Leptospirosis
- Paratyphoid fever
- Group A streptococcal infection
- Plague
- Amoebiasis
- Shigellosis
- Shingles
- Yellow fever
- Campylobacteriosis
- Creutzfeldt-jaco disease
- Cryptosporidiosis
- Middle respiratory syndrome
- Sever acute respiratory syndrome

- Scabies
- Q fever
- Brucellosis
- Chikungunya virus infection
- Viral hemorrhagic fever

As described above, the traditional epidemiologic triad model holds that infectious diseases result from the interaction of agent, host, and environment. More specifically, transmission occurs when the agent leaves its reservoir or host through a portal of exit, is conveyed by some mode of transmission, and enters through an appropriate portal of entry to infect a susceptible host. This sequence is sometimes called the chain of infection.

Figure Chain of Infection

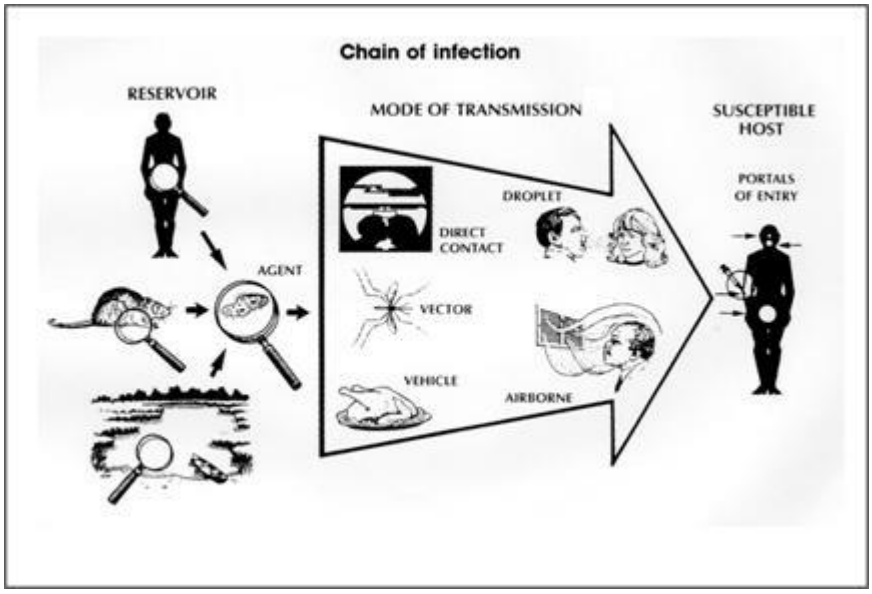


Image Description

Source: Centers for Disease Control and Prevention. Principles of epidemiology, 2nd ed. Atlanta: U.S. Department of Health and Human Services;1992.

Reservoir

The reservoir of an infectious agent is the habitat in which the agent normally lives, grows, and multiplies. Reservoirs include humans, animals, and the environment. The reservoir may or may not be the source from which an agent is transferred to a host. For example, the reservoir of Clostridium botulinum is soil, but the source of most botulism infections is improperly canned food containing C. botulinum spores.

Human reservoirs. Many common infectious diseases have human reservoirs. Diseases that are transmitted from person to person without intermediaries include the sexually transmitted diseases, measles, mumps, streptococcal infection, and many respiratory pathogens. Because humans were the only reservoir for the smallpox virus, naturally occurring smallpox was eradicated after the last human case was identified and isolated.8

Human reservoirs may or may not show the effects of illness. As noted earlier, a carrier is a person with inapparent infection who is capable of transmitting the pathogen to others. Asymptomatic or passive or healthy carriers are those who never experience symptoms despite being infected. Incubatory carriers are those who can transmit the agent during the incubation period before clinical illness begins. Convalescent carriers are those who have recovered from their illness but remain capable of transmitting to others. Chronic carriers are those who continue to harbor a pathogen such as hepatitis B virus or Salmonella Typhi, the causative agent of typhoid fever, for months or even years after their initial infection. One notorious carrier is Mary Mallon, or Typhoid Mary, who was an asymptomatic chronic carrier of Salmonella Typhi. As a cook in New York City and New Jersey in the early 1900s, she unintentionally infected dozens of people until she was placed in isolation on an island in the East River, where she died 23 years later.

Carriers commonly transmit disease because they do not realize they are infected, and consequently take no special precautions to prevent transmission. Symptomatic persons who are aware of their illness, on the other hand, may be less likely to transmit infection because they are either too sick to be out and about, take precautions to reduce transmission, or receive treatment that limits the disease.

Animal reservoirs. Humans are also subject to diseases that have animal reservoirs. Many of these diseases are transmitted from animal to animal, with humans as incidental hosts. The term zoonosisrefers to an infectious disease that is transmissible under natural conditions from vertebrate animals to humans. Long recognized zoonotic diseases include brucellosis (cows and pigs), anthrax (sheep), plague (rodents), trichinellosis/trichinosis (swine), tularemia (rabbits), and rabies (bats, raccoons, dogs, and other mammals). Zoonoses newly emergent in North America include West Nile encephalitis (birds), and monkeypox (prairie dogs). Many newly recognized infectious diseases in humans, including HIV/AIDS, Ebola infection and SARS, are thought to have emerged from animal hosts, although those hosts have not yet been identified.

Environmental reservoirs. Plants, soil, and water in the environment are also reservoirs for some infectious agents. Many fungal agents, such as those that cause histoplasmosis, live and multiply in the soil. Outbreaks of Legionnaires disease are often traced to water supplies in cooling towers and evaporative condensers, reservoirs for the causative organism Legionella pneumophila. Portal of exit is the path by which a pathogen leaves its host. The portal of exit usually corresponds to the site where the pathogen is localized. For example, influenza viruses and Mycobacterium tuberculosis exit the respiratory tract, schistosomes through urine, cholera vibrios in feces, Sarcoptes scabiei in scabies skin lesions, and enterovirus 70, a cause of hemorrhagic conjunctivitis, in conjunctival secretions. Some bloodborne agents can exit by crossing the placenta from mother to fetus (rubella, syphilis, toxoplasmosis), while others exit through cuts or needles in the skin (hepatitis B) or blood-sucking arthropods (malaria).

Modes of transmission

An infectious agent may be transmitted from its natural reservoir to a susceptible host in different ways. There are different classifications for modes of transmission. Here is one classification:

- Direct
    - Direct contact
    - Droplet spread
- Indirect
    - Airborne
    - Vehicleborne
    - Vectorborne (mechanical or biologic)

In direct transmission, an infectious agent is transferred from a reservoir to a susceptible host by direct contact or droplet spread.

Direct contact occurs through skin-to-skin contact, kissing, and sexual intercourse. Direct contact also refers to contact with soil or vegetation harboring infectious organisms. Thus, infectious mononucleosis ("kissing disease") and gonorrhea are spread from person to person by direct contact. Hookworm is spread by direct contact with contaminated soil.

Droplet spread refers to spray with relatively large, short-range aerosols produced by sneezing, coughing, or even talking. Droplet spread is classified as direct because transmission is by direct spray over a few feet, before the droplets fall to the ground. Pertussis and meningococcal infection are examples of diseases transmitted from an infectious patient to a susceptible host by droplet spread.

Indirect transmission refers to the transfer of an infectious agent from a reservoir to a host by suspended air particles, inanimate objects (vehicles), or animate intermediaries (vectors).

Airborne transmission occurs when infectious agents are carried by dust or droplet nuclei suspended in air. Airborne dust includes material that has settled on surfaces and become

resuspended by air currents as well as infectious particles blown from the soil by the wind. Droplet nuclei are dried residue of less than 5 microns in size. In contrast to droplets that fall to the ground within a few feet, droplet nuclei may remain suspended in the air for long periods of time and may be blown over great distances. Measles, for example, has occurred in children who came into a physician's office after a child with measles had left, because the measles virus remained suspended in the air.

Vehicles that may indirectly transmit an infectious agent include food, water, biologic products (blood), and fomites (inanimate objects such as handkerchiefs, bedding, or surgical scalpels). A vehicle may passively carry a pathogen — as food or water may carry hepatitis A virus. Alternatively, the vehicle may provide an environment in which the agent grows, multiplies, or produces toxin — as improperly canned foods provide an environment that supports production of botulinum toxin by Clostridium botulinum.

Vectors such as mosquitoes, fleas, and ticks may carry an infectious agent through purely mechanical means or may support growth or changes in the agent. Examples of mechanical transmission are flies carrying Shigella on their appendages and fleas carrying Yersinia pestis, the causative agent of plague, in their gut. In contrast, in biologic transmission, the causative agent of malaria or guinea worm disease undergoes maturation in an intermediate host before it can be transmitted to humans

The portal of entry refers to the manner in which a pathogen enters a susceptible host. The portal of entry must provide access to tissues in which the pathogen can multiply or a toxin can act. Often, infectious agents use the same portal to enter a new host that they used to exit the source host. For example, influenza virus exits the respiratory tract of the source host and enters the respiratory tract of the new host. In contrast, many pathogens that cause gastroenteritis follow a so-called "fecal-oral" route because they exit the source host in feces, are carried on inadequately washed hands to a vehicle such as food, water, or utensil, and enter a new host through the mouth. Other portals of entry include the skin (hookworm), mucous membranes (syphilis), and blood (hepatitis B, human immunodeficiency virus).

Figure Complex Life Cycle of Dracunculus medinensis (Guinea worm)

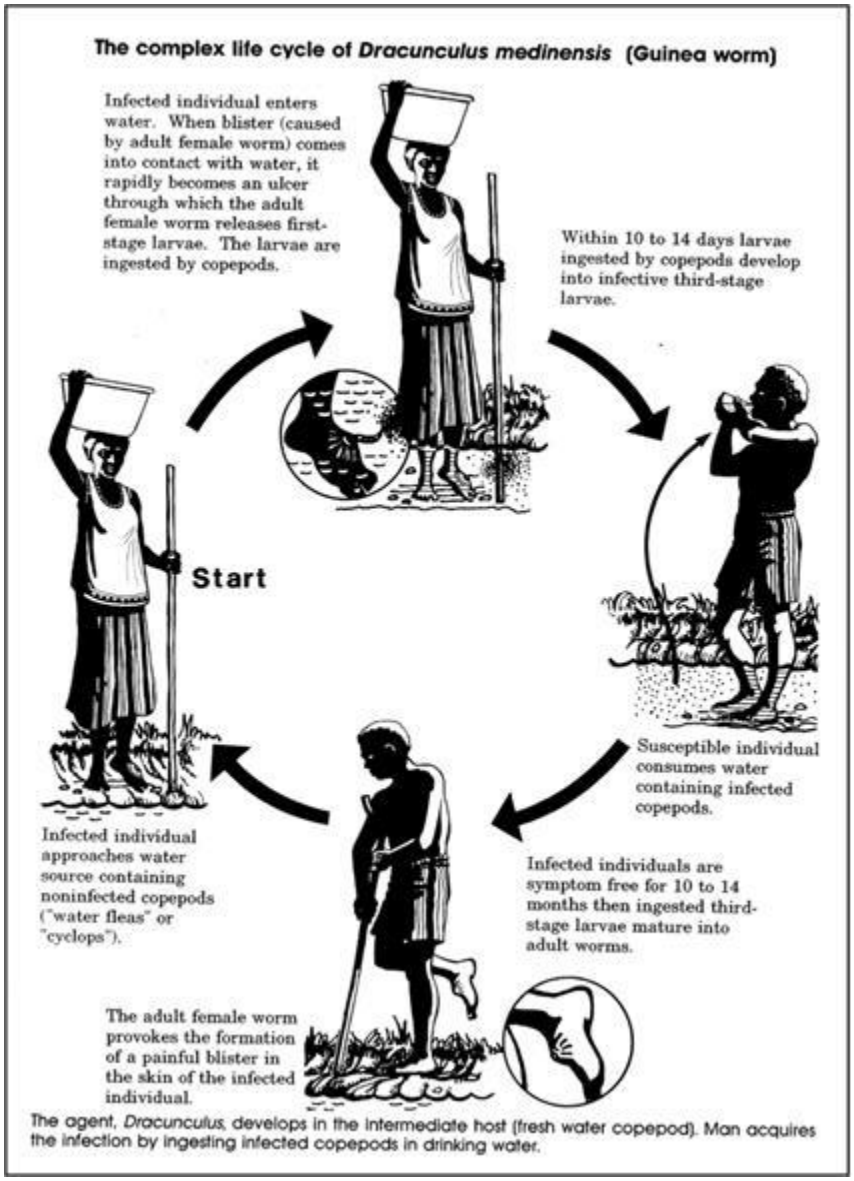


Image Description

Source: Centers for Disease Control and Prevention. Principles of epidemiology, 2nd ed. Atlanta: U.S. Department of Health and Human Services;1992.

Host

The final link in the chain of infection is a susceptible host. Susceptibility of a host depends on genetic or constitutional factors, specific immunity, and nonspecific factors that affect an individual's ability to resist infection or to limit pathogenicity. An individual's genetic makeup may either increase or decrease susceptibility. For example, persons with sickle cell trait seem to be at least partially protected from a particular type of malaria. Specific immunity refers to protective antibodies that are directed against a specific agent. Such antibodies may develop in response to infection, vaccine, or toxoid (toxin that has been deactivated but retains its capacity to stimulate production of toxin antibodies) or may be acquired by transplacental transfer from mother to fetus or by injection of antitoxin or immune globulin. Nonspecific factors that defend against infection include the skin, mucous membranes, gastric acidity, cilia in the respiratory tract, the cough reflex, and nonspecific immune response. Factors that may increase susceptibility to infection by disrupting host defenses include malnutrition, alcoholism, and disease or therapy that impairs the nonspecific immune response.

Implications for public health

Knowledge of the portals of exit and entry and modes of transmission provides a basis for determining appropriate control measures. In general, control measures are usually directed against the segment in the infection chain that is most susceptible to intervention, unless practical issues dictate otherwise.

Interventions are directed at:

- Controlling or eliminating agent at source of transmission
- Protecting portals of entry
- Increasing host's defenses

For some diseases, the most appropriate intervention may be directed at controlling or eliminating the agent at its source. A patient sick with a communicable disease may be treated with antibiotics to eliminate the infection. An asymptomatic but infected person may be treated both to clear the infection and to reduce the risk of transmission to others. In the community, soil may be decontaminated or covered to prevent escape of the agent.

Some interventions are directed at the mode of transmission. Interruption of direct transmission may be accomplished by isolation of someone with infection, or counseling persons to avoid the specific type of contact associated with transmission. Vehicleborne transmission may be interrupted by elimination or decontamination of the vehicle. To prevent fecal-oral transmission, efforts often focus on rearranging the environment to reduce the risk of contamination in the future and on changing behaviors, such as promoting handwashing. For airborne diseases, strategies may be directed at modifying ventilation or air pressure, and filtering or treating the air. To interrupt vectorborne transmission, measures may be directed toward controlling the vector population, such as spraying to reduce the mosquito population.

Some strategies that protect portals of entry are simple and effective. For example, bed nets are used to protect sleeping persons from being bitten by mosquitoes that may transmit malaria. A dentist's mask and gloves are intended to protect the dentist from a patient's blood, secretions, and droplets, as well to protect the patient from the dentist. Wearing of long pants and sleeves and use of insect repellent are recommended to reduce the risk of Lyme disease and West Nile virus infection, which are transmitted by the bite of ticks and mosquitoes, respectively.

Some interventions aim to increase a host's defenses. Vaccinations promote development of specific antibodies that protect against infection. On the other hand, prophylactic use of antimalarial drugs, recommended for visitors to malaria-endemic areas, does not prevent exposure through mosquito bites, but does prevent infection from taking root.

Finally, some interventions attempt to prevent a pathogen from encountering a susceptible host. The concept of herd immunity suggests that if a high enough proportion of individuals in a population are resistant to an agent, then those few who are susceptible will be protected by the resistant majority, since the pathogen will be unlikely to "find" those few susceptible individuals. The degree of herd immunity necessary to prevent or interrupt an outbreak varies by disease. In theory, herd immunity means that not everyone in a community needs to be resistant (immune) to prevent disease spread and occurrence of an outbreak. In practice, herd immunity has not prevented outbreaks of measles and rubella in populations with immunization levels as high as 85% to 90%. One problem is that, in highly immunized populations, the relatively few

susceptible persons are often clustered in subgroups defined by socioeconomic or cultural factors. If the pathogen is introduced into one of these subgroups, an outbreak may occur.

Prevention communicable disease :

- Make sure immunizations
- Wash hands often.
- Know how to prepare food safely.
- Practice safer sex.
- Avoid contact with wildlife (such as feeding or petting wild animals) and make sure pets stay healthy by getting them vaccinated by a vet.

- Vaccine-Preventable Diseases. Some communicable diseases can be prevented by the use of vaccines. The word vaccine comes from vaccinia, the Latin name for cowpox. The first vaccine was developed by Edward Jenner, an eighteenth-century English physician and naturalist who noticed that milkmaids who had acquired cowpox (a condition that caused lesions to appear on the udders of cows) on their hands did not seem to be affected by smallpox. He believed that infection with cowpox would protect against smallpox, a serious, often fatal epidemic disease. In 1796 he took material from a skin lesion on the hand of a milkmaid and inoculated it into the arm of a young boy. The boy was subsequently exposed to smallpox and did not become ill. Thus began the vaccine era.
- It was nearly one hundred years until the next vaccine (rabies) was developed by Louis Pasteur. In the twentieth century, a number of vaccines were developed; many more are under development as a result of the biotechnology revolution. Widespread use of vaccines in children has had a dramatic impact on the occurrence of the diseases.
- Because smallpox has been eradicated, smallpox vaccination is no longer carried out. The last case of naturally occurring smallpox in a human was in 1977, and in 1980 the World Health Assembly certified that smallpox had been eradicated from the face of the earth. Stocks of smallpox virus have been maintained (under security) in both the United States and Russia, though the debate continues whether they should be destroyed. Concerns

have arisen about the possibility that some groups or nations have retained the smallpox virus and developed.

Chemoprophylaxis. Chemoprophylaxis refers to the practice of giving anti-infective drugs to prevent occurrence of disease in individuals who are likely to be exposed to an infectious disease or who might have already been infected but have not developed disease. For example, individuals traveling to areas where malaria is common can take anti-malarial drugs before arriving, during their stay, and for a few weeks after leaving and thus protect themselves against malaria. Similarly, persons who have been exposed to syphilis can be given penicillin to prevent the possibility of their developing syphilis, and persons who have been infected with tuberculosis can be given six months of treatment to prevent the development of tuberculosis.

Antibiotics and Resistance. Antibiotics are compounds that are produced by microorganisms that kill or inhibit the growth of other microorganisms. Those that kill bacteria are called bactericidal; those that prevent multiplication (and rely on the body's defense mechanisms to deal with the limited number of living organisms) are called bacteriostatic. Some antibiotics are effective against a limited number of microorganisms, others may have more widespread effect.

Because microorganisms are continually in a state of evolution, strains may evolve that are resistant to a particular antibiotic. In addition, resistance characteristics can be transferred from some microorganisms to others (this is particularly true of organisms that inhabit the gastrointestinal tract).

Communicable diseases occur only when the causative agent comes into contact with a susceptible host in a suitable environment. Prevention and control efforts for communicable diseases may be directed to any of these three elements. Communicable diseases affect both individuals and communities, so control efforts may be directed at both. Treatment of persons with communicable diseases with antibiotics typically kills the agent and renders them noninfectious. Thus, treatment is also prevention. A simple way to prevent the occurrence of communicable diseases is to eliminate the infectious agent through, for example, cooking food, washing hands, and sterilizing surgical instruments between use. Assuring the safety of drinking water through filtration and chlorination and treating sewage appropriately are other important means of preventing the spread of communicable diseases.

For most communicable diseases there is an interval between infection and occurrence of symptoms (the incubation period) in which the infectious agent is multiplying or developing. Some persons who are infected may never develop manifestations of the disease even though they may be capable of transmitting it (in apparent infection). Some persons may carry (and transmit) the agent over prolonged periods (carriers) whether or not they develop symptoms. Treatment during the incubation period may cure the infection, thereby preventing both disease and transmission. This preventive treatment (chemoprophylaxis) is often used in persons who have been exposed to sexually transmitted diseases such as syphilis and gonorrhea. It also is effective in persons who have been infected with tuberculosis, although the preventive treatment must be given for several months.

The susceptibility of the host to a specific infectious agent can be altered through immunization (e.g., against measles) or through taking medications that can prevent establishment of infection following exposure (chemoprophylaxis). Since malnutrition and specific vitamin deficiencies (such as vitamin A) may increase susceptibility to infection, ensuring proper nutrition and administering vitamin A can be more general ways of increasing host resistance. If persons survive a communicable disease, he or she may develop immunity that will prevent the disease from recurring if re-exposed to the causative agent.

The environment may be rendered less suitable for the occurrence of disease in a variety of ways. For example, food can be kept hot or cold (rather than warm) to prevent multiplication of organisms that may be present. Individuals can use mosquito repellents or mosquito nets to prevent being bitten by infected mosquitoes. Breeding places can be drained or insecticides used to eliminate vectors of disease. Condoms can be used to prevent sexually transmitted diseases by providing a mechanical barrier to transmission. Reduction of crowding and appropriate ventilation can reduce the likelihood of droplet or airborne transmission. Respiratory protective devices can be used to prevent passage of microorganisms into the respiratory tract.

The gathering of humans in settlements (and subsequently cities) resulted in the development of periodic epidemics of communicable diseases, often with devastating impact. In the fourteenth century, for example, bubonic plague (carried by rats and transmitted to humans by fleas) swept through Europe, killing approximately one-quarter of the population of the continent. Epidemics

of "crowd" diseases such as measles and influenza resulted from person-to-person transmission, and inadequate water and sewage management led to epidemics of diseases such as cholera and typhoid. Milk-and food-borne diseases also were common. Until the end of the nineteenth century, communicable diseases were the leading cause of death throughout the world.

In the United States in 1900, tuberculosis was the leading cause of death, followed by pneumonia and diarrhea. Along with diphtheria (in tenth place), these conditions accounted for more than 30 percent of all deaths in the country. Major reductions in morbidity and mortality from communicable diseases have resulted from improvements in sanitation, housing, and nutrition as well as introduction and use of vaccines and specific therapies.

Improvements in sanitation have dramatically reduced the burden of water-and food-borne diseases. Improvements in housing have also played an important role in reducing transmission of tuberculosis, and improvements in nutrition have made persons with infectious diseases less likely to die from their infections. The introduction and use of vaccines have resulted in global eradication of smallpox, significant progress toward eradication of poliomyelitis, and a marked reduction in illness and death due to diseases such as diphtheria, whooping cough (pertussis), and measles. Specific therapies such as antibiotics and antiparasitic drugs have had a significant impact on deaths due to infectious diseases as well as having some impact on the occurrence of the diseases by shortening the period in which an infected person is infectious to others.

The most dramatic improvements have been seen in the United States and other developed nations (see Figure 1). Although significant progress has also been made in developing nations, the World Health Report 2000 reports that 14 million deaths (25 percent of all deaths in the world in 1999) resulted from infectious diseases or their complications. There is a marked disparity in the importance of infectious diseases in high-income countries compared to middle- and low-income countries. In high-income countries, infectious diseases accounted for only 6 percent of all deaths, whereas in middle-and low-income countries they accounted for 28 percent of all deaths.

Worldwide, lower respiratory infections (e.g., pneumonia) and diarrhea are the leading infectious causes of death; each of these conditions can be caused by a variety of microorganisms.

EMERGING AND RE-EMERGING INFECTIOUS DISEASES

New infectious diseases continue to be recognized and others, once thought under control, are reemerging as significant problems. To cite a few examples of "new" diseases, the following have been recognized for the first time since 1975: legionnaire's disease, ebola virus, HIV/AIDS (acquired immunodeficiency syndrome), toxic shock syndrome, Escherichia coli O157:H7 (cause of hemolytic-uremic syndrome), Lyme disease, Helicobacter pylori (major cause of peptic ulcer), hepatitis C, and hantavirus. Some of these are conditions previously known but without a known infectious cause (e.g., peptic ulcer) while others represent apparently new clinical syndromes that have not occurred or have not been recognized in the past.

Old diseases, such as tuberculosis and malaria, are reemerging in areas where they were once under control. This may be a result of the lack of continued application of known effective interventions but also may result from ecological changes. Some of the factors involved in the increase in infectious diseases, whether new or old, include population shifts and growth (and encroachment on previously unpopulated areas); changes in behavior (e.g., injection drug use, sexual practices); urbanization, poverty, and crowding; changes in ecology and climate; evolution of microbes; inadequacy of thepublic health infrastructure to deal with the problems; modern travel and trade; and the increasing numbers of persons with compromised immune systems (whether as a result of HIV/AIDS, chemotherapy for cancer, or immunosuppresive therapy for organ transplants). Many of these factors are interrelated.

In addition to these new and reemerging diseases, there may be specific interactions between diseases. This is particularly true with HIV and tuberculosis (TB), in which each infection is a very potent co-factor for worsening the other: Persons with HIV infection who become infected with TB are more likely to develop TB disease that is serious and rapidly progressive than persons without HIV infection, and persons with TB who contract HIV infection are very likely to have a rapid progression to full-blown AIDS.

In the United States, the incidence of foodborne disease has received increasing attention in the past several years. This relates in part to improved surveillance but also relates to changes in patterns of food production, distribution, and consumption. With modern transportation, it is possible to get fresh vegetables and fruits at all times of the year. This means that salad

ingredients purchased at a modern supermarket (and eaten raw) may have been grown in a developing country, where the average American traveler would not eat raw vegetables. The consolidation of producers of prepared foods makes possible large interstate outbreaks of food-borne disease such as the 1994 outbreak of Salmonella infections associated with ice cream that affected an estimated 224,000 persons nationwide. It is currently estimated that food-borne diseases cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year.

HIV/AIDS

- HIV continues to be a major global public health issue, having claimed more than 32 million lives so far. However, with increasing access to effective HIV prevention, diagnosis, treatment and care, including for opportunistic infections, HIV infection has become a manageable chronic health condition, enabling people living with HIV to lead long and healthy lives.
- There were approximately 37.9 million people living with HIV at the end of 2018.
- As a result of concerted international efforts to respond to HIV, coverage of services has been steadily increasing. In 2018, 62% of adults and 54% of children living with HIV in low- and middle-income countries were receiving lifelong antiretroviral therapy (ART).
- A great majority (82%) of pregnant and breastfeeding women living with HIV also received ART, which not only protects their health, but also ensures prevention of HIV transmission to their newborns.
- However, not everyone is able to access HIV testing, treatment and care. Notably, the 2018 Super-Fast-Track targets for reducing new paediatric HIV infections to 40 000 was not achieved. Global targets for 2020 are at risk of being missed unless rapid action is taken.
- Due to gaps in HIV services, 770 000 people died from HIV-related causes in 2018 and 1.7 million people were newly infected.
- In 2018, for the first time, individuals from key population groups and their sexual partners accounted for over half of all new HIV infections globally (an estimated 54%) in

2018. For eastern European, central Asian, Middle Eastern and north African regions, these groups accounted for around 95% of new HIV infections.

- Key populations include: men who have sex with men; people who inject drugs; people in prisons and other closed settings; sex workers and their clients; and transgender people.
- In addition, given their life circumstances, a range of other populations may be particularly vulnerable, and at increased risk of HIV infection, such as adolescent girls and young women in southern and eastern Africa and indigenous peoples in some communities.
- Increased HIV vulnerability is often associated with legal and social factors, which increases exposure to risk situations and creates barriers to accessing effective, quality and affordable HIV prevention, testing and treatment services.
- Over two thirds of all people living with HIV live in the WHO African Region (25.7 million). While HIV is prevalent among the general population in this region, an increasing number of new infections occur among key population groups.
- HIV can be diagnosed through rapid diagnostic tests that can provide same-day results. This greatly facilitates diagnosis and linkage with treatment and care.
- There is no cure for HIV infection. However, effective antiretroviral drugs (ARVs) can control the virus and help prevent onward transmission to other people.
- At the end of 2018, an estimated 79% of people living with HIV knew their status. 62% were receiving antiretroviral therapy (ART) and 53% had achieved suppression of the HIV virus with no risk of infecting others.
- In June 2019, 24.5 million people were accessing antiretroviral therapy.
- Between 2000 and 2018, new HIV infections fell by 37% and HIV-related deaths fell by 45%, with 13.6 million lives saved due to ART. This achievement was the result of great efforts by national HIV programmes supported by civil society and international development partners.

The human immunodeficiency virus (HIV) targets the immune system and weakens people's defense systems against infections and some types of cancer. As the virus destroys and impairs

the function of immune cells, infected individuals gradually become immunodeficient. Immune function is typically measured by CD4 cell count.

Immunodeficiency results in increased susceptibility to a wide range of infections, cancers and other diseases that people with healthy immune systems can fight off.

The most advanced stage of HIV infection is acquired immunodeficiency syndrome (AIDS), which can take from 2 to 15 years to develop if not treated, depending on the individual. AIDS is defined by the development of certain cancers, infections or other severe clinical manifestations.

The symptoms of HIV vary depending on the stage of infection. Though people living with HIV tend to be most infectious in the first few months after being infected, many are unaware of their status until the later stages. In the first few weeks after initial infection people may experience no symptoms or an influenza-like illness including fever, headache, rash or sore throat.

As the infection progressively weakens the immune system, they can develop other signs and symptoms, such as swollen lymph nodes, weight loss, fever, diarrhoea and cough. Without treatment, they could also develop severe illnesses such as tuberculosis (TB), cryptococcal meningitis, severe bacterial infections, and cancers such as lymphomas and Kaposi's sarcoma.

HIV can be transmitted via the exchange of a variety of body fluids from infected people, such as blood, breast milk, semen and vaginal secretions. HIV can also be transmitted from a mother to her child during pregnancy and delivery. Individuals cannot become infected through ordinary day-to-day contact such as kissing, hugging, shaking hands, or sharing personal objects, food or water.

Behaviours and conditions that put individuals at greater risk of contracting HIV include:

- having unprotected anal or vaginal sex;
- having another sexually transmitted infection (STI) such as syphilis, herpes, chlamydia, gonorrhoea and bacterial vaginosis;
- sharing contaminated needles, syringes and other injecting equipment and drug solutions when injecting drugs;

- receiving unsafe injections, blood transfusions and tissue transplantation, and medical procedures that involve unsterile cutting or piercing; and
- experiencing accidental needle stick injuries, including among health workers
- Prevention
- Individuals can reduce the risk of HIV infection by limiting exposure to risk factors. Key approaches for HIV prevention, which are often used in combination, are listed below.

- Male and female condom use
- Correct and consistent use of male and female condoms during vaginal or anal penetration can protect against the spread of STIs, including HIV. Evidence shows that male latex condoms have an 85% or greater protective effect against HIV and other STIs.

- Testing and counselling for HIV and STIs
- Testing for HIV and other STIs is strongly advised for all people exposed to any of the risk factors. This enables people to learn of their own HIV status and access necessary prevention and treatment services without delay. WHO also recommends offering testing for partners or couples. Additionally, WHO recommends assisted partner notification approaches, in which people with HIV receive support to inform their partners either on their own, or with the help of health care providers.

- Testing and counselling, linkages to tuberculosis (TB) care
- TB is the most common illness among people living with HIV. Fatal if undetected or untreated, TB is the leading cause of death among people with HIV, responsible for nearly 1 in 3 HIV-associated deaths.
- Early detection of TB and prompt linkage to TB treatment and ART can prevent these deaths. TB screening should be offered routinely at HIV care services, and routine HIV testing should be offered to all patients with presumptive and diagnosed TB. TB preventive therapy should be offered to all people living with HIV who do not have active TB. Individuals who are diagnosed with HIV and active TB should urgently start effective TB treatment (including for multidrug-resistant TB) and ART.

A scientific trial confirmed that if an HIV-positive person adheres to an effective ART, the risk of transmitting the virus to their uninfected sexual partner can be reduced by 96% in 2011. Following the results, WHO recommended that all people living with HIV should be offered ART with the aim of saving lives and significantly reducing HIV transmission. A 2019 study showed that HIV transmission risk through sex without condoms in serodiscordant men in same sex couples who were virally suppressed and on ART was effectively zero.

Pre-exposure prophylaxis (PrEP) for HIV-negative partner

Oral PrEP of HIV is the daily use of ARVs by HIV-negative people to block the acquisition of HIV. More than 10 randomized controlled studies have demonstrated the effectiveness of PrEP in reducing HIV transmission among a range of populations, including serodiscordant heterosexual couples (where one partner is infected and the other is not), men who have sex with men, transgender women, high-risk heterosexual couples, and people who inject drugs.

WHO recommends PrEP as a prevention choice for people at substantial risk of HIV infection as part of a combination of prevention approaches. WHO has also expanded these recommendations to HIV-negative women who are pregnant or breastfeeding.

Post-exposure prophylaxis for HIV (PEP)

PEP is the use of ARVs within 72 hours of exposure to HIV to prevent infection. PEP includes counselling, first aid care, HIV testing, and administration of a 28-day course of ARV drugs with follow-up care. WHO recommends PEP use for both occupational and non-occupational exposures, and for adults and children.Harm reduction for people who inject and use drugs

People who inject drugs can take precautions against becoming infected with HIV by using sterile injecting equipment (including needles and syringes) for each injection, and not sharing drug-using equipment and drug solutions. Treatment of drug dependence, in particular, opioid substitution therapy for people dependent on opioids, also helps to reduce the risk of HIV transmission and supports adherence to HIV treatment.

A comprehensive package of HIV prevention and treatment interventions for people who inject drugs includes:

- needle and syringe programmes;
- opioid substitution therapy for people dependent on opioids, and other evidence-based drug dependence treatment;
- HIV testing and counselling;
- HIV treatment and care;
- risk-reduction information and education, and provision of naloxone to prevent opioid overdose;
- access to condoms; and
- management of STIs, TB and viral hepatitis.

Elimination of mother-to-child transmission of HIV

The transmission of HIV from an HIV-positive mother to her child during pregnancy, labour, delivery or breastfeeding is called vertical or mother-to-child transmission (MTCT). In the absence of any interventions during these stages, rates of HIV transmission from mother-to-child can be between 15% and 45%. The risk of MTCT can almost be eliminated if both the mother and her baby are provided with ARV drugs as early as possible in pregnancy and during the period of breastfeeding.

Hepatitis B Virus Infection

The prevalence of chronic hepatitis B virus infection in Central American children arriving in the United States is unknown. However, recent data suggest that the general prevalence in El Salvador, Honduras, and Guatemala is low (<2%). In addition, all three countries include a birth dose of hepatitis B vaccine in their national immunization schedules. Therefore, it is reasonable to conduct targeted screening for chronic hepatitis B virus infection in at-risk individuals including:

- Known or suspected IV drug users
- Men who have sex with men
- People with tattoos
- Pregnant women
- Children of mothers with known hepatitis B virus infection
- Household contacts of infected individuals
- HIV- or hepatitis C-infected individuals
- Children who received whole blood products or blood components before immigration
- Children with a history of known or possible sexual exploitation

Children should complete the 3-dose hepatitis B vaccine series if no official documentation of prior completion is available.

Tuberculosis

- A total of 1.5 million people died from TB in 2018 (including 251 000 people with HIV). Worldwide, TB is one of the top 10 causes of death and the leading cause from a single infectious agent (above HIV/AIDS).
- In 2018, an estimated 10 million people fell ill with tuberculosis (TB) worldwide. 5.7 million men , 3.2 million women and 1.1 million children. There were cases in all countries and age groups. But TB is curable and preventable.
- In 2018, 1.1 million children fell ill with TB globally, and there were 205 000 child deaths due to TB (including among children with HIV). Child and adolescent TB is often overlooked by health providers and can be difficult to diagnose and treat.
- In 2018, the 30 high TB burden countries accounted for 87% of new TB cases. Eight countries account for two thirds of the total, with India leading the count, followed by, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa.
- Multidrug-resistant TB (MDR-TB) remains a public health crisis and a health security threat. WHO estimates that there were 484 000 new cases with resistance to rifampicin – the most effective first-line drug, of which 78% had MDR-TB.
- Globally, TB incidence is falling at about 2% per year. This needs to accelerate to a 4–5% annual decline to reach the 2020 milestones of the End TB Strategy.
- An estimated 58 million lives were saved through TB diagnosis and treatment between 2000 and 2018.
- Ending the TB epidemic by 2030 is among the health targets of the Sustainable Development Goals.

Tuberculosis (TB) is caused by bacteria (Mycobacterium tuberculosis) that most often affect the lungs. Tuberculosis is curable and preventable.

TB is spread from person to person through the air. When people with lung TB cough, sneeze or spit, they propel the TB germs into the air. A person needs to inhale only a few of these germs to become infected.

About one-quarter of the world's population has latent TB, which means people have been infected by TB bacteria but are not (yet) ill with the disease and cannot transmit the disease.

People infected with TB bacteria have a 5–15% lifetime risk of falling ill with TB. Persons with compromised immune systems, such as people living with HIV, malnutrition or diabetes, or people who use tobacco, have a higher risk of falling ill.

When a person develops active TB disease, the symptoms (such as cough, fever, night sweats, or weight loss) may be mild for many months. This can lead to delays in seeking care, and results in transmission of the bacteria to others. People with active TB can infect 5–15 other people through close contact over the course of a year. Without proper treatment, 45% of HIV-negative people with TB on average and nearly all HIV-positive people with TB will die.

Tuberculosis mostly affects adults in their most productive years. However, all age groups are at risk. Over 95% of cases and deaths are in developing countries.

People who are infected with HIV are 20 times more likely to develop active TB (see TB and HIV section below). The risk of active TB is also greater in persons suffering from other conditions that impair the immune system. People with under nutrition are 3 times more at risk. There were globally 2.3 million new TB cases in 2018 that were attributable to under nutrition.

1.1 million children (0–14 years of age) fell ill with TB, and 230 000 children (including children with HIV associated TB) died from the disease in 2018.

Alcohol abuse and tobacco smoking increase the risk of TB disease by a factor of 3.3 and 1.6, respectively. In 2018, 0.83 million new TB cases worldwide were attributable to alcohol abuse and 0.86 million were attributable to smoking.

TB occurs in every part of the world. In 2018, the largest number of new TB cases occurred in the South-East Asian region, with 44% of new cases, followed by the African region, with 24% of new cases and the Western Pacific with 18%.

In 2018, 87% of new TB cases occurred in the 30 high TB burden countries. Eight countries accounted for two thirds of the new TB cases: India, China, Indonesia, Philippines, Pakistan, Nigeria, Bangladesh and South Africa.

Common symptoms of active lung TB are cough with sputum and blood at times, chest pains, weakness, weight loss, fever and night sweats. Many countries still rely on a long-used method called sputum smear microscopy to diagnose TB. Trained laboratory technicians look at sputum samples under a microscope to see if TB bacteria are present. Microscopy detects only half the number of TB cases and cannot detect drug-resistance.

The use of the rapid test Xpert MTB/RIF® has expanded substantially since 2010, when WHO first recommended its use. The test simultaneously detects TB and resistance to rifampicin, the most important TB medicine. Diagnosis can be made within 2 hours and the test is now recommended by WHO as the initial diagnostic test in all persons with signs and symptoms of TB.

Diagnosing multidrug-resistant and extensively drug-resistant TB (see Multidrug-resistant TB section below) as well as HIV-associated TB can be complex and expensive. In 2016, 4 new diagnostic tests were recommended by WHO – a rapid molecular test to detect TB at peripheral health centres where Xpert MTB/RIF cannot be used, and 3 tests to detect resistance to first- and second-line TB medicines.

Tuberculosis is particularly difficult to diagnose in children.

TB is a treatable and curable disease. Active, drug-susceptible TB disease is treated with a standard 6-month course of 4 antimicrobial drugs that are provided with information and support to the patient by a health worker or trained volunteer. Without such support, treatment adherence is more difficult. Between 2000 and 2018, an estimated 58 million lives were saved through TB diagnosis and treatment.

People living with HIV are 20 times more likely to develop active TB disease than people without HIV.

HIV and TB form a lethal combination, each speeding the other's progress. In 2018 about 251 000 people died of HIV-associated TB. In 2018, there were an estimated 862 000 new cases of TB amongst people who were HIV-positive, 72% of whom were living in Africa.

WHO recommends a 12-component approach of collaborative TB-HIV activities, including actions for prevention and treatment of infection and disease, to reduce deaths.

Multidrug-resistant TB, Anti-TB medicines have been used for decades and strains that are resistant to one or more of the medicines have been documented in every country surveyed. Drug resistance emerges when anti-TB medicines are used inappropriately, through incorrect prescription by health care providers, poor quality drugs, and patients stopping treatment prematurely.

Multidrug-resistant tuberculosis (MDR-TB) is a form of TB caused by bacteria that do not respond to isoniazid and rifampicin, the 2 most powerful first-line anti-TB drugs. MDR-TB is treatable and curable by using second-line drugs. However, second-line treatment options are limited and require extensive chemotherapy (up to 2 years of treatment) with medicines that are expensive and toxic.

In some cases, more severe drug resistance can develop. Extensively drug-resistant TB (XDR-TB) is a more serious form of MDR-TB caused by bacteria that do not respond to the most effective second-line anti-TB drugs, often leaving patients without any further treatment options.

In 2018, MDR-TB remains a public health crisis and a health security threat. WHO estimates that there were 484 000 new cases with resistance to rifampicin – the most effective first-line drug – of which 78% had MDR-TB. The MDR-TB burden largely falls on 3 countries – India, China and the Russian Federation – which together account for half of the global cases. About 6.2% of MDR-TB cases had extensively drug-resistant TB (XDR-TB) in 2018.

Worldwide, only 56% of MDR-TB patients are currently successfully treated. In 2016, WHO approved the use of a short, standardized regimen for MDR-TB patients who do not have strains that are resistant to second-line TB medicines. This regimen takes 9–12 months and is much less expensive than the conventional treatment for MDR-TB, which can take up to 2 years. Patients

with XDR-TB or resistance to second-line anti-TB drugs cannot use this regimen, however, and need to be put on longer MDR-TB regimens to which 1 of the new drugs (bedquiline and delamanid) may be added.

In July 2018, the latest evidence on treatment of drug-resistant TB was reviewed by an independent panel of experts convened by WHO. A rapid communication on key changes to recommendations for the treatment of drug-resistant TB has been issued by WHO, to be followed by the release of updated and consolidated WHO policy guidelines later in the year.

WHO also approved in 2016 a rapid diagnostic test to quickly identify these patients. Sixty-two countries have started using shorter MDR-TB regimens. By the end of 2018, 90 countries reported having introduced bedaquiline and 57 countries reported having introduced delamanid, in an effort to improve the effectiveness of MDR-TB treatment regimens.

On 26 September 2018, the United Nations (UN) held its first- ever high-level meeting on TB, elevating discussion about the status of the TB epidemic and how to end it to the level of heads of state and government. It followed the first global ministerial conference on TB hosted by WHO and the Russian government in November 2017. The outcome was a political declaration agreed by all UN Member States, in which existing commitments to the Sustainable Development Goals (SDGs) and WHO's End TB Strategy were reaffirmed, and new ones added.

SDG Target 3.3 includes ending the TB epidemic by 2030. The End TB Strategy defines milestones (for 2020 and 2025) and targets (for 2030 and 2035) for reductions in TB cases and deaths. The targets for 2030 are a 90% reduction in the number of TB deaths and an 80% reduction in the TB incidence rate (new cases per 100 000 population per year) compared with levels in 2015. The milestones for 2020 are a 35% reduction in the number of TB deaths and a 20% reduction in the TB incidence rate. The strategy also includes a 2020 milestone that no TB patients and their households face catastrophic costs as a result of TB disease.

Ebola virus disease

Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever, is a rare but severe, often fatal illness in humans.

- The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission.
- The average EVD case fatality rate is around 50%. Case fatality rates have varied from 25% to 90% in past outbreaks.
- Community engagement is key to successfully controlling outbreaks.
- Good outbreak control relies on applying a package of interventions, namely case management, infection prevention and control practices, surveillance and contact tracing, a good laboratory service, safe and dignified burials and social mobilisation.
- Vaccines to protect against Ebola are under development and have been used to help control the spread of Ebola outbreaks in Guinea and in the Democratic Republic of the Congo (DRC).
- Early supportive care with rehydration, symptomatic treatment improves survival. There is no licensed treatment proven to neutralize the virus but a range of blood, immunological and drug therapies are under development.

The Ebola virus causes an acute, serious illness which is often fatal if untreated. EVD first appeared in 1976 in 2 simultaneous outbreaks, one in what is now Nzara, South Sudan, and the other in Yambuku, DRC. The latter occurred in a village near the Ebola River, from which the disease takes its name.

The 2014–2016 outbreak in West Africa was the largest Ebola outbreak since the virus was first discovered in 1976. The outbreak started in Guinea and then moved across land borders to Sierra Leone and Liberia. The current 2018-2019 outbreak in eastern DRC is highly complex, with insecurity adversely affecting public health response activities.

The virus family Filoviridae includes three genera: Cuevavirus, Marburgvirus, and Ebolavirus. Within the genus Ebolavirus, six species have been identified: Zaire, Bundibugyo, Sudan, Taï

Forest, Reston and Bombali. The virus causing the current outbreak in DRC and the 2014–2016 West African outbreak belongs to the Zaire ebolavirus species.

It is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as fruit bats, chimpanzees, gorillas, monkeys, forest antelope or porcupines found ill or dead or in the rainforest.

Ebola then spreads through human-to-human transmission via direct contact (through broken skin or mucous membranes) with:

- Blood or body fluids of a person who is sick with or has died from Ebola
- Objects that have been contaminated with body fluids (like blood, feces, vomit) from a person sick with Ebola or the body of a person who died from Ebola

Health-care workers have frequently been infected while treating patients with suspected or confirmed EVD. This occurs through close contact with patients when infection control precautions are not strictly practiced.

Burial ceremonies that involve direct contact with the body of the deceased can also contribute in the transmission of Ebola.

People remain infectious as long as their blood contains the virus.

The incubation period, that is, the time interval from infection with the virus to onset of symptoms, is from 2 to 21 days. A person infected with Ebola cannot spread the disease until they develop symptoms. Symptoms of EVD can be sudden and include:

- Fever
- Fatigue
- Muscle pain
- Headache
- Sore throat

This is followed by:

- Vomiting
- Diarrhoea
- Rash
- Symptoms of impaired kidney and liver function
- In some cases, both internal and external bleeding (for example, oozing from the gums, or blood in the stools).
- Laboratory findings include low white blood cell and platelet counts and elevated liver enzymes.
  - Treatment
  - Supportive care - rehydration with oral or intravenous fluids - and treatment of specific symptoms improves survival. There is as yet no proven treatment available for EVD. However, a range of potential treatments including blood products, immune therapies and drug therapies are currently being evaluated.
  - In the ongoing 2018-2019 Ebola outbreak in DRC, the first-ever multi-drug randomized control trial is being conducted to evaluate the effectiveness and safety of drugs used in the treatment of Ebola patients under an ethical framework developed in consultation with experts in the field and the DRC.
  - Vaccines
  - An experimental Ebola vaccine proved highly protective against EVD in a major trial in Guinea in 2015. The vaccine, called rVSV-ZEBOV, was studied in a trial involving 11 841 people. Among the 5837 people who received the vaccine, no Ebola cases were recorded 10 days or more after vaccination. In comparison, there were 23 cases 10 days or more after vaccination among those who did not receive the vaccine.
  - The rVSV-ZEBOV vaccine is being used in the ongoing 2018-2019 Ebola outbreak in DRC.

    Initial data indicates that the vaccine is highly effective.

Good outbreak control relies on applying a package of interventions, including case management, surveillance and contact tracing, a good laboratory service, safe burials and social mobilisation. Community engagement is key to successfully controlling outbreaks. Raising awareness of risk factors for Ebola infection and protective measures (including vaccination) that individuals can take is an effective way to reduce human transmission. Risk reduction messaging should focus on several factors:

- Reducing the risk of wildlife-to-human transmission from contact with infected fruit bats, monkeys, apes, forest antelope or porcupines and the consumption of their raw meat. Animals should be handled with gloves and other appropriate protective clothing. Animal products (blood and meat) should be thoroughly cooked before consumption.
- Reducing the risk of human-to-human transmission from direct or close contact with people with Ebola symptoms, particularly with their bodily fluids. Gloves and appropriate personal protective equipment should be worn when taking care of ill patients. Regular hand washing is required after visiting patients in hospital, as well as after taking care of patients at home.
- Outbreak containment measures, including safe and dignified burial of the dead, identifying people who may have been in contact with someone infected with Ebola and monitoring their health for 21 days, the importance of separating the healthy from the sick to prevent further spread, and the importance of good hygiene and maintaining a clean environment.
- Reducing the risk of possible sexual transmission, based on further analysis of ongoing research and consideration by the WHO Advisory Group on the Ebola Virus Disease Response, WHO recommends that male survivors of EVD practice safer sex and hygiene for 12 months from onset of symptoms or until their semen tests negative twice for Ebola virus. Contact with body fluids should be avoided and washing with soap and water is recommended. WHO does not recommend isolation of male or female convalescent patients whose blood has been tested negative for Ebola virus.

Controlling infection in health-care settings

Health-care workers should always take standard precautions when caring for patients, regardless of their presumed diagnosis. These include basic hand hygiene, respiratory hygiene, use of personal protective equipment (to block splashes or other contact with infected materials), safe injection practices and safe burial practices.

Health-care workers caring for patients with suspected or confirmed Ebola virus should apply extra infection control measures to prevent contact with the patient's blood and body fluids and contaminated surfaces or materials such as clothing and bedding. When in close contact (within 1 metre) of patients with EVD, health-care workers should wear face protection (a face shield or a medical mask and goggles), a clean, non-sterile long-sleeved gown, and gloves (sterile gloves for some procedures).

Table: Chronology of previous Ebola virus disease outbreaks

Year	Country	EVD	Cases	Deaths	Case fatality
2018-2019	Democratic Republic of the Congo	Zaire	ongoing		
2018	Democratic Republic of the Congo	Zaire	54	33	61%
2017	Democratic Republic of the Congo	Zaire	8	4	50%
2015	Italy	Zaire	1	0	0%
2014	Spain	Zaire	1	0	0%
2014	UK	Zaire	1	0	0%
2014	USA	Zaire	4	1	25%
2014	Senegal	Zaire	1	0	0%
2014	Mali	Zaire	8	6	75%
2014	Nigeria	Zaire	20	8	40%
2014-2016	Sierra Leone	Zaire	14124*	3956*	28%
2014-2016	Liberia	Zaire	10675*	4809*	45%
2014-2016	Guinea	Zaire	3811*	2543*	67%

Year	Country	EVD	Cases	Deaths	Case fatality
2014	Democratic Republic of the Congo				
2012	Democratic Republic of Congo	Bundibugyo	57	29	51%
2012	Uganda	Sudan	7	4	57%
2012	Uganda	Sudan	24	17	71%
2011	Uganda	Sudan	1	1	100%
2008	Democratic Republic of Congo	Zaire	32	14	44%
2007	Uganda	Bundibugyo	149	37	25%
2007	Democratic Republic of Congo	Zaire	264	187	71%
2005	Congo	Zaire	12	10	83%
2004	Sudan	Sudan	17	7	41%
2003 (Nov-Dec)	Congo	Zaire	35	29	83%
2003 (Jan-Apr)	Congo	Zaire	143	128	90%
2001-2002	Congo	Zaire	59	44	75%
2001-2002	Gabon	Zaire	65	53	82%
2000	Uganda	Sudan	425	224	53%
1996	South Africa (ex-Gabon)	Zaire	1	1	100%
1996 (Jul-Dec)	Gabon	Zaire	60	45	75%
1996 (Jan-Apr)	Gabon	Zaire	31	21	68%
1995	Democratic Republic of Congo	Zaire	315	254	81%
1994	Côte d'Ivoire	Taï Forest	1	0	0%
1994	Gabon	Zaire	52	31	60%
1979	Sudan	Sudan	34	22	65%
1977	Democratic Republic of Congo	Zaire	1	1	100%
1976	Sudan	Sudan	284	151	53%
1976	Democratic Republic of Congo	Zaire	318	280	88%

Dengue, chikungunya, and Zika fever

Dengue, chikungunya, and Zika viruses cause mosquito-borne infections of increasing concern in El Salvador, Guatemala, and Honduras. Dengue fever is endemic throughout much of Central and South America. However, chikungunya first arrived in this region in 2014 after appearing in the Caribbean in 2013. Currently, local chikungunya transmission is occurring in more than 45 countries and territories in the Americas, including El Salvador, Guatemala, and Honduras. Active Zika virus transmission has been reported throughout Central America, including El Salvador, Guatemala, and Honduras

Acute dengue, chikungunya, and Zika infections have similar presentations and may be clinically indistinguishable. Common symptoms include fever, headache, severe myalgia, arthralgia, joint swelling, and rash. Chikungunya is unique in that it may cause persistent joint inflammation for months, and sometimes years, even after acute symptoms have resolved. Chikungunya should be considered in those with chronic rheumatologic symptoms from areas of local transmission. Dengue is unique because reinfection with another dengue virus can cause a condition called severe dengue. Severe dengue can be fatal if not properly treated in a timely manner. With good medical management, mortality due to severe dengue can be less than 1%. Severe dengue is more likely when an individual returns to a disease-endemic area and unlikely in a newly arriving refugee. Zika may be associated with conjunctivitis and other symptoms that are generally less severe than dengue and chikungunya. Zika virus infection is frequently . Despite the relatively benign nature of acute infection, Zika has recently been associated with an increased risk of Guillain-Barré syndrome, and birth defects (e.g., microcephaly) when acquired during pregnancy CDC has posted interim screening guidelines for infants with microcephaly and possible Zika infection. Clinical presentation of these infections during the domestic screening visit is unlikely since the incubation period is generally short, with symptoms often resolving within 10 days of exposure.

Chikungunya

- Chikungunya is a viral disease transmitted to humans by infected mosquitoes. It causes fever and severe joint pain. Other symptoms include muscle pain, headache, nausea, fatigue and rash.
- Joint pain is often debilitating and can vary in duration.
- The disease shares some clinical signs with dengue and zika, and can be misdiagnosed in areas where they are common.
- There is no cure for the disease. Treatment is focused on relieving the symptoms.
- The proximity of mosquito breeding sites to human habitation is a significant risk factor for chikungunya.
- The disease mostly occurs in Africa, Asia and the Indian subcontinent. However a major outbreak in 2015 affected several countries of the Region of the Americas.

Chikungunya is a mosquito-borne viral disease first described during an outbreak in southern Tanzania in 1952. It is an RNA virus that belongs to the alphavirus genus of the family Togaviridae. The name “chikungunya” derives from a word in the Kimakonde language, meaning “to become contorted”, and describes the stooped appearance of sufferers with joint pain (arthralgia).

Chikungunya is characterized by an abrupt onset of fever frequently accompanied by joint pain. Other common signs and symptoms include muscle pain, headache, nausea, fatigue and rash. The joint pain is often very debilitating, but usually lasts for a few days or may be prolonged to weeks. Hence the virus can cause acute, subacute or chronic disease. Most patients recover fully, but in some cases joint pain may persist for several months, or even years. Occasional cases of eye, neurological and heart complications have been reported, as well as gastrointestinal complaints. Serious complications are not common, but in older people, the disease can contribute to the cause of death. Often symptoms in infected individuals are mild and the infection may go unrecognized, or be misdiagnosed in areas where dengue occurs.

Chikungunya has been identified in over 60 countries in Asia, Africa, Europe and the Americas. The virus is transmitted from human to human by the bites of infected female mosquitoes. Most

commonly, the mosquitoes involved are Aedes aegypti and Aedes albopictus, two species which can also transmit other mosquito-borne viruses, including dengue. These mosquitoes can be found biting throughout daylight hours, though there may be peaks of activity in the early morning and late afternoon. Both species are found biting outdoors, but Ae. aegypti will also readily feed indoors.

After the bite of an infected mosquito, onset of illness occurs usually between 4 and 8 days but can range from 2 to 12 days.

Dengue

Dengue is an acute infectious disease that comes in two forms: dengue and dengue hemorrhagic fever. The principal symptoms of dengue are high fever, severe headache, backache, joint pains, nausea and vomiting, eye pain, and rash. Generally, younger children have a milder illness than older children and adults.

Dengue hemorrhagic fever is a more severe form of dengue. It is characterized by a fever that lasts from 2 to 7 days, with general signs and symptoms that could occur with many other illnesses (e.g., nausea, vomiting, abdominal pain, and headache). This stage is followed by hemorrhagic manifestations, tendency to bruise easily or other types of skin hemorrhages, bleeding nose or gums, and possibly internal bleeding. The smallest blood vessels (capillaries) become excessively permeable (“leaky”), allowing the fluid component to escape from the blood vessels. This may lead to failure of the circulatory system and shock, followed by death, if circulatory failure is not corrected. Although the average case-fatality rate is about 5%, with good medical management, mortality can be less than 1%.

Dengue and dengue hemorrhagic fever are caused by any one of four closely related flaviviruses, designated DEN-1, DEN–2, DEN-3, or DEN-4.

Diagnosis of dengue infection requires laboratory confirmation, either by isolating the virus from serum within 5 days after onset of symptoms, or by detecting convalescent-phase specific antibodies obtained at least 6 days after onset of symptoms.

There is no specific medication for treatment of a dengue infection. Persons who think they have dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing aspirin. They should also rest, drink plenty of fluids, and consult a physician. Persons with dengue hemorrhagic fever can be effectively treated by fluid replacement therapy if an early clinical diagnosis is made, but hospitalization is often required.

Dengue fever and Dengue Haemorrhagic fever (DF/DHF) is a viral disease transmitted by Ae. aegypti mosquito. There are four sero-types of dengue virus, DEN-1; DEN-2; DEN-3; and DEN-4; all producing similar manifestations, which may be asymptomatic, undifferentiated fever, dengue fever (DF) and dengue haemorrhagic fever (DHF) with plasma leakage and shock(Dengue Shock Syndrome-DSS).The global population at risk is estimated to be 2.5-3.0 billion in the urban areas of the tropical and sub-tropical regions. In Bangladesh there had been Dengue outbreaks in 2000 (5,555 cases and 93 deaths);2001 (2,430 cases and 44 deaths) and 2002 (6,104 cases and 58 deaths). Cases were reported from the metropolitan cities (Dhaka, Chittagong, Khulna, Rajshahi) and as per the sero-survey findings, 3 sero-types of the virus circulating. No vaccine is available yet and there is no specific treatment. Hence DF/DHF control is primarily dependent on control of Ae. aegypti mosquito. Dengue is transmitted to people by the bite of an Aedes mosquito that is infected with a dengue virus. The mosquito becomes infected with dengue virus when it bites a person who has dengue or DHF and after about a week can transmit the virus while biting a healthy person. Monkeys may serve as a reservoir in some parts of Asia and Africa. Dengue cannot be spread directly from person to person.

Dengue is endemic in many tropical countries in Asia and Latin America, most countries in Africa, and much of the Caribbean, including Puerto Rico. Cases have occurred sporadically in Texas. Epidemics occur periodically. Globally, an estimated 50 to 100 million cases of dengue and several hundred thousand cases of dengue hemorrhagic fever occur each year, depending on epidemic activity. Between 100 and 200 suspected cases are introduced into the United States each year by travelers.

There is no vaccine for preventing dengue. The best preventive measure for residents living in areas infested with Aedes aegypti is to eliminate the places where the mosquito lays her eggs, primarily artificial containers that hold water.

Undifferentiated fever: Infants, children and some adults who have been infected with dengue virus for the first time (i.e. primary dengue infection) will develop a simple fever indistinguishable fromother viral infections. Dengue fever: It is generally an acute biphasic fever (390 C to 400 C) with headache, myalgia, arthralgias, rashes and leucopenia. Although DF is commonly benign, it may be an incapacitating disease with severe muscle and joint pain (break-bone fever), particularly in adults, and occasionally with unusual haemorrhage.

Dengue haemorrhagic fever: Dengue haemorrhagic fever is most common in children less than 15 years of age, but it also occurs in adults. DHF is characterised by the acute onset of fever and associated non-specific constitutional signs and symptoms. There is a haemorrhagic diathesis and a tendency to develop fatal shock (dengue shock syndrome). Abnormal haemostasis and plasma leakage are the main patho-physiological changes, with thrombocytopenia and haemoconcentration.

Hemorrhage: It may occur from the beginning with fever in case of Dengue Fever. But if this is found after a few days during afebrile period DHF is the possibility. DHF is a potentially dangerous condition threatening life. Hemorrhage may be of any description including prolongation of menstrual bleeding in case of female. The common sites are conjunctiva, skin, gum, nose and GI tract usually evident in the form of hematemesis, malena and hematokezia. Incubation period is 4-6 days (range 3-14 days).

For prevention:

- Avoid mosquito bites, use long sleeve shirts and protective clothing
- Sleep under mosquito nets (preferably Insecticide treated nets)
- Destroy all domestic and peri-domestic breeding sources of Ae. aegypti mosquito (artificial containers, coconut shells, canes, used tires, earthen pots, flower vase, ant-traps etc.)

- Use of mats, coils, aerosol house spray, vaporising mosquito repellents etc. may be useful
- Use of Repellent: Essential oils from plant extracts (neem oil, lemon grass, citronella oil etc.) gives protection from mosquito bites.

For travelers to areas with dengue, as well as people living in areas with dengue, the risk of being bitten by mosquitoes indoors is reduced by utilization of air conditioning or windows and doors that are screened. Proper application of mosquito repellents containing 20% to 30% DEET as the active ingredient on exposed skin and clothing decreases the risk of being bitten by mosquitoes. The risk of dengue infection for international travelers appears to be small, unless an epidemic is in progress.The emphasis for dengue prevention is on sustainable, community-based, integrated mosquito control, with limited reliance on insecticides (chemical larvicides and adulticides). Preventing epidemic disease requires a coordinated community effort to increase awareness about dengue/DHF, how to recognize it, and how to control the mosquito that transmits it. Residents are responsible for keeping their yards and patios free of sites where mosquitoes can be produced.

For Treatment

- Complete bed rest is essential and patient should take sufficient fluid drinks (fruit juice, ORS etc.). This will help correction of dehydration due to fluid loss from vomiting and high fever.
- Should consult the physician immediately for appropriate management of the illness and must be referred to the hospital if needed.
- DO NOT use ASPIRIN or NSAID-these drugs may trigger gastritis and provoke bleeding.
- DO NOT give antibiotic as these do not help

Standby Emergency Treatment

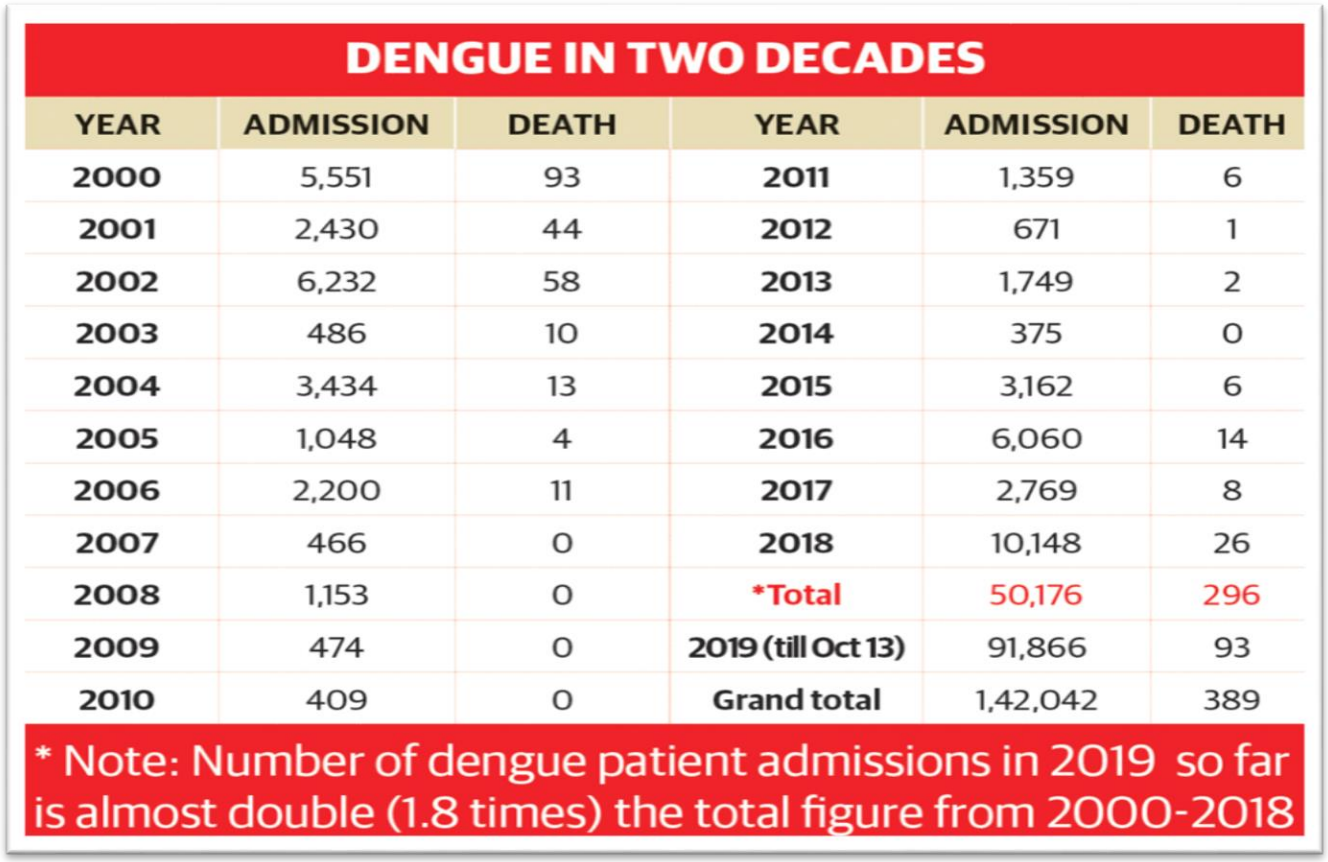
- Any patient with sudden onset of high spell of fever without any upper respiratory features or common cold symptoms is a suspect of Dengue Syndrome.
- This is more so when there is accompanying muscle and bone pain.

- Patient should be observed, fever to be lowered to the tolerable level with preferably room temperature tepid water sponging and or judicious use of paracetamol.
- Fluid balance to be maintained with ORS along with nutrition and fresh fruit juices.
- Observation should be continued for two weeks for the danger signs that are: abdominal pain, bleedings, low blood pressure, prostration, decreased urine volume, or any other unusual features.
- In any case appropriate consultation and referral to hospital may be needed

Dengue impact Bangladesh

Patients nearly doubled this year in comparison to the total from last 19 years 2019.The number of dengue patients identified across Bangladesh this year so far is nearly double of the total diagnosed with the mosquito-borne disease recorded in the past 19 years. Between 2000 and 2018 end, some 50,176 dengue patients were identified around the country, according to the Directorate General of Health Services (DGHS). Breaking all records of the past recorded since 2000, the year when dengue outbreak was documented for the first time, the DGHS has also confirmed, a total 91,866 people were hospitalized throughout country until on Sunday

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DENGUE IN TWO DECADES

YEAR	ADMISSION	DEATH	YEAR	ADMISSION	DEATH
2000	5,551	93	2011	1,359	6
2001	2,430	44	2012	671	1
2002	6,232	58	2013	1,749	2
2003	486	10	2014	375	0
2004	3,434	13	2015	3,162	6
2005	1,048	4	2016	6,060	14
2006	2,200	11	2017	2,769	8
2007	466	0	2018	10,148	26
2008	1,153	0	*Total	50,176	296
2009	474	0	2019 (till Oct 13)	91,866	93
2010	409	0	Grand total	1,42,042	389

* Note: Number of dengue patient admissions in 2019 so far is almost double (1.8 times) the total figure from 2000-2018

The confirmed number of deaths this year has already equaled with that, with some 90 more deaths yet to be confirmed. Until yesterday, after examining 151 cases, the Institute of Epidemiology Disease Control and Research (IEDCR) has confirmed that 93 dengue patients died between January 1 and October 13 this year alone. IEDCR has received reports of 242 deaths from dengue. Meanwhile, the official toll of deaths from the disease across the country currently stands over 180. Meanwhile, the recent development in tackling the crisis has given some sort of relief to the people. The number of new patients recorded countrywide every day has come down to less than or around 300 since October 8, according to DGHS control room. Yesterday, as many as 1,132 people were admitted to different hospitals around the country, and 287 of them were hospitalized between Saturday and yesterday morning. According to latest DGHS data, 38 patients were diagnosed with dengue in January, 18 in February, 17 in March, 58 in April, 193 in May, 1,884 in June, 16,253 in July, 52,636 in August, and 16,856 in September. Over the past 13 days this month, 3,913 patients were diagnosed with dengue.The official death

toll stands at 112, unofficial toll is reported to be over 191, so far. A total of 149 dengue patients have been admitted to different hospitals across Bangladesh in the last 24 hours.Till 8am on Friday, 57 new patients were admitted in Dhaka and 92 in districts outside the capital, reports UNB. Dengue, a mosquito-borne virus, spreads among humans through its carrier, the Aedes mosquito.The Health Emergency Operation Centre and Control Room at the Directorate General of Health Services (DGHS), in a press release issued on Friday, said the number of patients currently undergoing treatment in government and private hospitals in the country is 760. As many as 319 patients are currently receiving treatment in government and private hospitals in Dhaka, whereas 441 people were undergoing treatment outside Dhaka, the DGHS data said.The Institute of Epidemiology, Disease Control and Research (IEDCR) has received 251 reports of dengue-related deaths across Bangladesh. It has reviewed 179 of them and confirmed 112 deaths from January 1 till November 8,2019 However, the unofficial death toll is reported to be over 191, so far.Since January 1 till November 8, as many as 97,540 people have been affected by dengue.Among those admitted, a total of 96,529 have been released from their respective hospitals and clinics after treatment.

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