

# Unit-I

## NATURAL / MANMADE DISASTERS RESULTING IN EMERGENCY SITUATIONS

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### Introduction

Many extreme hazardous occurrences have resulted in disasters in India in recent decades due to the country's massive population, diverse geography, and extreme weather patterns. The country is frequently hit by a variety of natural disasters which includes floods, droughts, cyclones, earthquakes, and landslides. Human-caused disasters like fires, epidemics, stampedes, chemical leaks, etc., occur frequently and further increase people's vulnerability to already high risks posed by such extreme natural phenomena. This Unit's goal is to help you comprehend the language and frameworks of catastrophe management and their interconnectedness. You should be able to understand the following after reading this Unit:

- 1-Various types of disasters.
- 2-Factors that give rise to emergency in these disastrous conditions.
- 3-Illustrate disasters with the help of case studies from the Indian subcontinent.

### Disaster

The French word "Deseastre," which literally translates to "evil star," is the source of the English word "disaster." The term "disaster" does not have a single, agreed-upon definition. "An event, concentrated in time and space, in which a community undergoes such severe danger and incurs such losses to its members and physical apparatuses that the social structure is disrupted and the fulfilment of all or some of the essential functions of society are prevented," as defined by the United Nations Disaster Relief Organization UNDR0 (1984). Disaster is defined by the Modern Dictionary of Natural Disasters as:

- 1) A state of extreme anxiety, suffering, bodily damage, and economic upheaval brought on by a natural disaster or armed war.
- 2) The occurrence of extensive devastation, injury, or loss of life or property, beyond the community's ability to recover from, causing serious disruption to the afflicted society.
- 3) An unsafe situation that has such a negative impact on a community that it disrupts vital social structures and processes.

4) The end result of a widespread ecological breakdown in human interactions with the natural world; an extreme and unexpected occurrence (or gradual, as in drought) of such magnitude that the affected community requires extraordinary efforts to cope with it, often with the help of or international aid.

## Classification of Disasters

In August 1999, at the Prime Minister's direction, the Indian Ministry of Agriculture formed a High-Power Committee (HPC) led by Shri J.C. Pant and consisting of representatives from several Indian government departments, states, non-governmental organisations (NGOs), and subject matter experts. It was India's first attempt at developing a comprehensive and holistic strategy for dealing with disasters of all kinds. According to the HPC's research (2001 HPC Report), disasters can be broken down into the following categories:

### 1) Water and Climate related disasters:

Floods and Drainage Management, Cyclones, Tornadoes and Hurricanes, Hailstorm, Cloud Burst, Heat Wave and Cold Wave, Snow Avalanches, Droughts, Sea Erosion and Thunder and Lightning.

### 2) Geologically related disasters:

Landslides and Mudflows, Earthquakes, Dam Failures/ Dam Bursts, Mine Fires.

### 3) Chemical, Industrial and Nuclear related disasters:

Chemical, Industrial and Nuclear Disasters.

### 4) Accident-related disasters:

Forest and Urban Fires, Mine Flooding, Oil Spill, Major Building Collapse, Serial Bomb Blasts, Festival related disasters, Electrical Fires, Air, Road and Rail Accidents, Boat Capsizing and Village Fire.

### 5) Biologically related disasters:

Biological Disasters and, Pest Attacks, Cattle Epidemics, Food Poisoning.

## Tsunamis

Tsunamis are a succession of waves caused by a disturbance in the ocean, most commonly an earthquake. The word "tsunami" comes from Japanese, where the kanji for "harbour" (tsu) and "waves" (nami) are written separately. Misnomers include "tidal waves" while referring to tsunamis. Tsunamis can be raised by several different things, but earthquakes are the most common. Large waves can also be caused by a variety of other conditions, such as landslides, volcanic eruptions, explosions, and so on. A tsunami is caused when a substantial volume of water is displaced, such as when the sea floor moves after an earthquake or when new mass is introduced. The water mass is displaced, and waves occur as it seeks to return to its original position. Tsunamis can only be generated by earthquakes that strike underneath or very close to the ocean and are sufficiently large to cause movement in the sea floor. Tsunamis can occur anywhere there is an ocean, but the countries along the Pacific coast are particularly at risk because of the frequent big earthquakes in the region's so-called "ring of fire."

As the waves propagate away from the source of the disturbance, they do so in all directions. From five minutes to ninety minutes is possible between wave crests, and the open ocean's average wave speed is a mind-boggling 450 mph. There have been instances of waves measuring over 100 feet in height. Tsunamis are extremely difficult to detect for most ships out in the open ocean. The waves look regular, but their pace drops dramatically as they near the coast. As the ocean's depth decreases,

the water is compressed, making the wave rise higher until it crashes into land, where it frequently causes extensive damage and even fatalities.

## Earthquakes

Earthquakes occur when rocks deep within the Earth crack and shift, causing the crust above them to shake violently. One of the most perilous and devastating of all natural disasters is the earthquake. Predictions on its precise time and place of occurrence, as well as its severity, are notoriously difficult to make. Although there are many earthquakes annually, only a small fraction of them is either located in populous regions or are strong enough to damage the built environment. India's Sixty per cent landmass is endangered to earthquakes of varied magnitudes. The Andaman and Nicobar Islands, as well as the Himalayas and the regions immediately adjacent to them, are particularly at risk. Earthquakes have happened in India for a very long time. Several major earthquakes with Richter magnitudes greater than 8.0 have occurred here.

## Landslides

The northern, north-eastern, and southern regions of India all feature extensive hilly landscapes. Most Indian Mountain ranges are young relative to Earth's age, making their rock structure particularly vulnerable. In the country's hilly regions, landslides constitute a major threat to the environment, human life, towns, and infrastructure, especially when united with other native events like rainfall, earthquakes, etc. The term "landslide" refers to the process through which native rock, soil, artificial fill, or a combination of these moves downward and outward under the influence of gravity. At least 15% of India's landmass is impacted by landslides, a phrase that encompasses a huge diversity of procedure and phenomena under the force of gravity, such as rock falls, mud, or debris flows, etc. During the monsoon season, landslides pose a threat to a total of twenty-three of Indian states and union territories.

## Drought (Famine)

When the amount of water or moisture available drops drastically below what would be considered typical or expected for a certain time period, this is known as a drought. This issue arises when either rainfall is insufficient or irrigation infrastructure is lacking. Most nations must deal with droughts. Approximately sixty-eight per-cent of India's total sown area is vulnerable to famine. Droughts are more common in the west and south, although they have less of an effect in the north and the centre. States like Bihar, Gujarat, Haryana, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal, Jharkhand, and Chhattisgarh continue to experience drought-like conditions. There are three main types of droughts, and they are as follows:

- A meteorological drought is defined as a period (measured in days, months, seasons, or years) during which precipitation falls below a predetermined threshold (lengthy average for a specified time). It is the mildest kind and it happens when there is a sudden, unforeseen drop in precipitation.
- A hydrological drought is characterised by a sustained period of below-average water availability (stream flow, lake level, ground water, subsurface aquifers). It happens when surface reservoirs and lakes are depleted, as well as when natural stream flow or groundwater levels drop significantly.
- A drought in the agricultural sector happens when soil moisture levels drop below the threshold at which normal crop growth and yields are possible. Droughts in agriculture occur when there is a prolonged difference between the amount of moisture in the soil and the amount of water the crop requires to survive through evaporation and transpiration.

## Desertification

It is a secondary risk to drought which could be brought on by natural causes, man activity, or animal pressure. Before humans existed, native long-term climatic shifts impacting rainfall and surface water patterns caused the world's vast deserts to expand and contract. However, since the advent of humanity, desert expansion has undergone substantial changes, and it has become a major concern for many governments and nongovernmental organisations worldwide who are concerned with environmental health and development.

Anthropogenic desertification results primarily from inefficient land management. Pressure from a growing community and animal on an already-scarce peripheral coastline hastens the procedure. A few of the influenced regions are exacerbated because migrants from fewer dry regions are migrating there to avoid desertification. Desertification is not a process with clear boundaries or patterns that can be easily traced. Deserts can expand and progress in unpredictable ways, and they can pop up far from their source regions. Desertification is often only widely recognised after major damage has already been done to a region. The procedures necessary to halt or reverse desertification are not fully understood, and it is also unclear whether the worldwide-change forms correlated with erosion are everlasting.

Although droughts contribute to desertification, they do not always cause the phenomenon. When rains arrive, well-managed fields do not need much help to bounce back following a dry spell.

## Flows of debris

These dangers, also known as mudflows or mudslides, are usually smaller than landslides yet can cause significantly additional damage when they occur. Large quantities of water, such as those produced by persistent rain, flash flooding, or quick snowmelt, are necessary for the initiation of debris flows. Debris with a high liquid content can travel farther and faster from their point of origin because of the lubrication supplied by the liquid.

## Avalanches

Avalanches, also known as snow slides, are mass move of debris that can include snowflakes, iceberg, sphere, stone, and anything else they pick up along the way as they go down the affected slopes. When the force of gravity acting on the snow surpasses the snow's ability to hold its shape, avalanches result. An avalanche needs these four things to happen:

- A soaring incline
- A blanket of snow
- A thin layer of snow covering the ground
- A set-off

Heavy, cyclical precipitation (snow, rain, defrosting) or an expansion in atmospheric force are common precipitation and pressure triggers (like as skiers, livestock, or eruptions). Avalanches typically begin on slopes between 30 and 45 degrees. Slopes with an incline of less than 20 degrees almost never experience a failure, while snow seldom reaches a critical accumulation rate on slopes more than 60 degrees. Over a million avalanches happen every year, according to estimates. They tend to retrace the same routes annually, leaving scars in their wake. As a result, vulnerable areas can be pinpointed with great precision by trained professionals. Avalanches typically follow well-defined pathways, but extreme weather can lead them to branch off in unexpected directions, making it difficult to predict where danger could lie.

## Monsoons

These winds change direction at regular times every year and can be found in every region of the globe. When they move across warmer ocean waters on their way to cooler landmasses, they often bring with them substantial rainfall. When air is heated and rises, it can absorb vapour from the top of the sea, as seen when wind blows over warm water. Over the cooler landmass, the water vapour condenses, and the resulting downpours can linger for weeks or months.

The Indian subcontinent has a profound and personal connection to the monsoons because of its reliance on the yearly cycle of winds to provide respite from the hot, dry months of winter. Agriculture and many other aspects of daily life would cease to function without the monsoons. There are two separate monsoon seasons in this area, with the dry season occurring between September and March and the rainy season being between June and September. India receives anywhere from half to ninety percent of its annual rainfall during the wet summer monsoon. Excessive flooding caused by the monsoons can kill people, force them from their homes, and ruin crops and infrastructure.

Both monsoon failure and excessive monsoon rainfall can have knock-on effects that lead to disaster. Famine can strike in less developed countries if the monsoons do not come through for several years in a row. If an emergency plan has not been prepared and implemented before crops suffer or collapse, there may be food shortages.

## Tornadoes

Fast-spinning columns of air (vortices) spreading downward from a cumulonimbus cloud are sometimes referred to as funnel clouds (clouds that cause rainfall). Every year, thousands of tornadoes are produced in different parts of the world, yet most of them never make it to the ground. The United States suffers the most damage from atmospheric dangers every year, with an average of 1,000 incidents.

Although the presence of these variables in no way assures the formation of a tornado, tornadoes are created when warm, moist air collides with cold, dry air. Tornadoes can inflict widespread destruction due to the high winds they produce. Secondary risks, such as debris missiles and huge hail, account for most tornado-related fatalities.

## Ice Storm (Polar Vortex)

This type of precipitation occurs when freezing rain builds to a thickness of more than a quarter of an inch on exposed surfaces. These storms can cover hundreds of square miles, and the weight of the piled ice makes them extremely devastating. Tree branches snap, electricity lines crash to the ground, and roofs cave in due to the weight of the accumulated ice during an ice storm. When the roads are icy, vehicles frequently crash. Economically, power outages can have repercussions due to the disruption of commerce and the destruction of agricultural output caused by the resulting extreme cold.

## Hailstorms

Clear ice and dense snowfall as balls or lumps during these weather conditions. Hailstorms can form in any climate, even the tropics, because cold ground temperatures are not required. It is not fully understood how hailstones originate and grow, yet it is thought that ice crystals form within a cloud and are at that time enclosed in layer upon layer of frozen water while suspended in powerful updrafts until the cloud's holding volume is extended. Hail can be round or irregular in shape, and its diameter can range from a few millimetres to an inch or more during a storm. Rarely, large hailstones up to 5 inches in diameter have been produced.

Hailstorms mostly cause economic losses due to physical harm done to crops. Animals also face danger owing to storm-related injuries and deaths. Hail rarely kills people, but it can hurt them. When big hailstones gather rapidly, they cause extensive damage to property (buildings and autos) and frequently cause roof collapses. Hailstorms have been blamed for damaging aircraft as well.

## Cyclones

Cyclones are a particularly devastating type of storm, especially for coastal areas. Cyclones are a serious threat throughout India. The area around the Indian Ocean is one of the six most cyclone-prone places on Earth. Typically, cyclones hit this area in the months of May and June, then again in October and November. Cyclones provide a lot of risks and are a major cause of economic, social, and environmental devastation because of the following:

- Gale-force winds and heavy rains can uproot a huge number of saplings and cause severe damage to both architecture and non-architecture buildings, including homes, hospitals, food storage facilities, highways, bridges, culverts, crops, and more.
- Extreme rainfall can cause problems with drainage and sewers, ruin crops, and wash out roads and railroads.
- Storm surges, often known as tidal waves, are the most dangerous aspect of cyclones. Coastal storm surges not only cause flooding and property damage, but also erode beaches and embankments, kill vegetation, and deplete soil fertility.

Heavy rainfall generates floods and storm surges that overburden shallow reclining coastal areas, while powerful winds inflict damage to structures and loss of life and livestock.

## Floods

Since the beginning of recorded history, river floods have been one of the most common and deadly natural disasters to strike the country. Recent years have seen a dramatic increase in the severity of flood damage due to rising populations, faster rates of development, and associated economic pressures. The floods in this country are largely due to the unusual characteristics of its rainfall. Eighty percent of the year's rain falls during the brief monsoon season (around three to four months). This causes a tremendous amount of water to rush into the rivers, which in turn causes severe flooding.

A flood occurs when water levels increase to the point where they threaten to overtop typically dry areas. When a river's flow rate exceeds its carrying capacity, this happens. Many factors contribute to floods, including but not limited to:

- Forest clearance
- Silting of riverbeds
- Construction of new drainage systems
- Blockage caused by development efforts

## Nuclear Disasters

The possibility of a nuclear or radiological calamity occurring is of extreme worry. Radiation or radioactive materials (such as isotopes of Cesium, Cobalt, Iridium, Iodine, Strontium, Uranium, Plutonium, etc.) are released into the environment in a concentrated burst, causing widespread damage. It is defined as a catastrophe brought on by the abnormal release of radioactive material or radiation, such as would be the case in the detonation of a nuclear bomb or the normal functioning of nuclear power plants (Simone, 2006). Reasons behind this disaster:

- The deliberate use of nuclear weapons in war is a real possibility now that multiple countries have the know-how to create such weapons, which are far deadlier than the atomic bomb dropped over half a century ago thanks to technical advancements. Only twice have nuclear weapons been deployed in open conflict; both times were dropped by the United States on Japan during World War II (1939-1945). Hiroshima was nearly destroyed by an atomic bomb on August 6, 1945, and three days later, Nagasaki was hit.
- Nuclear weapons are extremely carefully crafted to only detonate when intentionally armed and discharged; yet, accidents are possible. However, there is always the chance that an explosion will occur by accident; this could happen in the areas where weapons are assembled and stored, during the loading and transportation process on the ground, or while the weapon is in the delivery vehicle, such as an aeroplane or a missile.

- There is also the risk of accidental exposure to harmful radiation from the various nuclear power plants. Accidents at nuclear power plants provide a risk of radiation exposure due to the release of radioactive material into the environment; the amount released, the direction and speed of the wind, and the weather all have a role in determining the area that would be affected.
- Attacks by terrorists, sometimes known as "dirty bombs," typically involve the deployment of a "Radiological Dispersion Device" (ROD), a makeshift weapon that disperses radioactive material via conventional explosives and subsequent debris. Other methods include an airstrike, a bombardment with heavy weapons, or an act of sabotage against a nuclear power station or facility utilising or processing radioactive material (India Disaster Knowledge Network Portal, 2008, <http://192.168.0.118/idknew/>).

### Fire in the Woods (Forest Fire)

The term "wildfire" was first used to describe a similar material called Greek fire, which was utilised as a naval weapon in mediaeval Europe. There are several threats to forests, but fire is the most common. The biodiversity, ecology, and environment of a region are all put in jeopardy by their presence, and it is not just the forest wealth that's at risk. Without any moisture for months during the summer, dead leaves and twigs litter the forest floor and can easily catch fire. Recent summers have seen widespread forest fires in the Himalayas, especially in the Garhwal Himalayas in Uttaranchal State, resulting in a devastating loss of vegetation. Heat created in the litter and other biomes in the summer due to human negligence can spark both natural and controlled forest fires (human neglect). In certain cases, residents deliberately start forest fires for their own gain.

### Types of Forest Fire

Forest fires come in a wide variety of forms, each with its own unique characteristics in terms of nature, size, rate of spread, behaviour, and so on (for a comprehensive breakdown, see the following section from the Manual on Natural Disaster Management in India, NDM Division, IIPA, Government of India, 2005):

- Underground fires are classified as low-intensity fires that consume organic matter below ground and surface trash on forest floors. The mineral soil in the Himalayas' densest forests is typically covered by a layer of organic matter several inches thick. Such materials are fuel for the fire, which then spreads within. Completely underground fires can burn for several metres before being discovered, although they expand slowly and can be difficult to put out once they get going. They might continue to char the landscape for weeks or months. Muck fires and ground fires are also names for these blazes, depending on the region.
- Most forest fires, known as surface fires, burn along the forest floor, consuming dead leaves, and branches. In general, it helps the forest recover and thrive. The forest floor, understory, and canopy are all at risk if the fire is allowed to continue to expand. Surface fires, such as those caused by grass, dead and downed limbs, forest needle and leaf litter, or debris from harvesting or land clearance, spread through flame combustion through fuels at or near the surface. So, "a fire that burns surface litter, other loose material of the forest floor, and small vegetation" is the definition of a surface fire. Among all species of trees, this is the most prevalent cause of forest fires. Depending on the availability of fuel, a wildfire can range from being a small, slow-moving blaze in areas with little grass and pine needle litter to a large, fast-moving blaze in areas with slash, flammable understory bushes, or other abundant fuel. If a surface fire gets out of control, it could threaten the tops of trees and other tall vegetation.
- To a layperson, it would be difficult to tell an underground fire from a ground fire. Fires that have been smouldering underground for a while eventually emerge as ground fires. This fire consumes the herbaceous vegetation on the forest floor along with the layer of organic debris

in various stages of decay, including the roots and other material on or beneath the surface. They can do more damage and kill all plants than surface flames. These blazes occur in the organic soils of swamps and bogs, in the duff layers beneath forest stands, in the Arctic tundra or taiga, and in other similar environments. Most surface fires start ground fires, which burn slowly and steadily below the surface. As a result, the organic material beneath the surface litter of the forest floor is consumed by a Ground fire, and putting out such flames is a tough and time-consuming task.

- Crown fires are the most dangerous because they start at the tops of trees, spread quickly due to the wind, and are difficult to contain. These flames are almost always started by sparks from the surface. Therefore, a Crown Fire is a fire that spreads from tree to tree or shrub to shrub, separately from the surface fire. Crown fires can outpace their supporting surface fires in thick conifer stands on steep slopes or on level terrain with a strong breeze. In terms of forest fires, this is the most impressive type. Since it is out of reach of ground forces until it falls to the ground again, it poses a serious threat to firefighters who are trying to prevent them from being caught and burned.
- Extreme fire across a wide region is known as a firestorm and is the most rapidly spreading type of forest fire. The fire spreads as hot air rises and winds blow fuel onto the flames. When given more oxygen, a fire will whirl wildly, like a tornado. Smaller fires start around the fiery twister as flames shoot out of its foundation and embers pour from its peak. Inside of these storms, temperatures can rise to well over 2,000 degrees Fahrenheit.

## Stampede

A stampede occurs when a large group of individuals act on an instinct and suddenly begin running in the same direction. Large stampedes are destructive because they are thought to emerge from biological responses in the brains and endocrine systems of the crowd. Human stampede is a metaphor for a rapid rush of a large throng of people, which frequently results in numerous injuries and deaths due to suffocation and trampling. The term "mob" or "crowd" is used in the context of a stampede to describe a large group of individuals who have gathered and become extremely agitated and divided.

The most defining characteristics of this phenomenon are the uniformity of its members' thoughts and acts and the irrationality and haste with which they behave. Anxiety and terror are the two main emotional triggers for any stampede. They are the physical representation of our vital "flight or fight" survival mechanism. Anxiety, fear, and alarm serve the same purpose as physical pain in warning us of impending danger. A little trigger created by panic, like feeling lonely and helpless in a crowd, or imprisoned in an auditorium, stairway, etc., can result in a very dreadful feeling that has an immediate influence on body functions, and therefore, a stampede. Anxiety can be a contributing factor in such behaviour, in which individuals act irrationally in response to the reactions of others rather than their own rational deliberation. Numerous societal and cultural settings are ripe for stampede incidents. Each of these predicaments has unique root causes and degrees of severity. The following examples of potential settings for stampedes should give you a good understanding of the range of possibilities:

- Distribution of Food
- Rites of Passage
- Extreme weather events
- Voltage drops
- Celebrations of Faith
- Arson at religious and other occasions
- Unrest at Major Sports Events
- The weather
- Haven from bombs
- Performative Activities



- Pedestrian movers and escalators

## Epidemics

The number of people infected with a disease at a certain time (point prevalence) or over a specified amount of time (period prevalence). Sporadic sickness occurs when there are isolated incidents of illness in different locations. The Greek preposition "epi," meaning "upon," and the noun "people," meaning "epidemic," together form the root of the English word. Therefore, an infectious illness epidemic is the sudden and widespread spread of a disease that is either proven or strongly suspected to have an infectious cause. In order to spread rapidly, an epidemic needs three things: a susceptible human population, a disease agent, and a means of widespread transmission (e.g., contaminated water supply, poor sanitation, and vector population). This concept encompasses not just the "fast" epidemics of communicable diseases like measles, polio, and cholera, but also the "slow" epidemics of non-communicable disorders like diabetes, heart disease, and depression that are becoming increasingly common in the modern world. The typical cold is more prevalent in the northern hemisphere. In some regions of India, cholera and malaria are persistent problems. In many places in the United States, infectious diseases are leading causes of death and disability.

## Accident Disaster

- Aircraft Crashes

Mid-air collisions, forced landings, crashes caused by mechanical difficulties, and crashes caused by poor visibility in hilly areas make up most flight mishaps. Air mishaps can happen everywhere, but people living within a 30- to 40-kilometer radius of airports are at the greatest risk. Accidents are more likely to happen during take-off or landing near busy airports, as flight paths tend to get crowded there. Forests, hills, mountains, the open sea, etc. are all sites where aviation mishaps might happen because of their isolation. Human error on the part of pilots and air traffic controllers and mechanical failure of on-board landing instruments both contribute to the occurrence of air mishaps. Terrorist acts are a remote possibility, as well.

- Boat Accidents

The rising number of boats used for inland and ocean fishing raises the risk of accidents involving capsizes. It has been determined that natural disasters like cyclones and floods played a role in this tragedy, but that human reasons like overcrowding, shoddy boat equipment, lack of preventative maintenance, and basic mistakes in judgement played an even larger role. Most boating accidents happen in the spring and summer when floods are common and when weather is stormy and visibility is low. In the hours before an event begins, when there is a hurry to get there early, and after it ends, when there is a rush to go home before nightfall, boats are at a greater risk of being damaged or destroyed. Accidents involving boats, especially those involving collisions, have also been linked to low visibility conditions. During festivals, it is common for a significant number of boats to congregate, making it difficult to navigate. Authorities may not always be able to keep a tight rein on river traffic due to a lack of resources (such as security personnel or docking facilities).

- Oil Spills

The ocean is now relied upon for a wide variety of resources, including food, water, minerals, oil, natural gas, and renewable energy. Rapid industrialization and population growth in recent decades have resulted in a mountain of trash that must be hauled away from the land. As a result, the marine environment has become increasingly polluted due to the increasing frequency with which it has been utilised as a garbage dump. Urbanization, deforestation, an increase in ship numbers and vessel sizes, a rise in the demand for oil, oily wastes from ships, tankers, and offshore installations, chemicals and dangerous goods, the dumping of nuclear waste, and the leakage of undersea pipelines are just some of the many factors that contribute

to marine pollution in our coastal waters. Areas near oil refineries, oil processing plants, waterways used by oil tankers, and offshore oil platforms are all at risk of contamination from oil spills.

- **Accidents on the Indian Railways**

The Indian railways are the largest railway network in Asia and the first largest railway network in the world to be managed centrally. The country's primary passenger and freight transportation system is the railways. In developing countries like India, where improvements to infrastructure are prioritised in order to increase national wealth, the railway is the life line of the nation. The railways must deal with cyclones, floods, fires, bomb blasts, accidents, etc., involving trains as part of their daily operations. Although a train derailment can happen anywhere along the rails, double-line sections have been found to be especially hazardous.

- **Road Accidents**

National and state highways are especially at risk for fatal collisions due to the high speeds that typically accompany such incidents. Road cars falling into pits is another common cause of accidents on highways in mountainous terrain and ghat regions. As more and more cars try to squeeze onto the same amount of road, traffic accidents have become a more serious and widespread concern. Accidents on the roads are a direct outcome of the resulting traffic congestion. It has been noticed that traffic accident fatalities and injuries are significantly higher in underdeveloped countries than in industrialised ones. While the number of people killed in car accidents has decreased in wealthy nations, the opposite trend can be seen in rising economies. The issue of road safety has been studied from a wide variety of perspectives. There are several important factors, but the first four are the machine factor, the human factor, the engineering factor, and the environment factor, respectively.

## Terrorism

To intimidate or exact ransom by the unlawful use of force or violence against innocent people or their property is terrorism. Terrorists frequently resort to threats in order to: Convince the public that the government can do little to stop terrorism, Gain instant exposure for their organisations. Terrorist acts encompass a wide range of behaviours, including but not limited to the following: threats, assassinations, kidnappings, hijackings, bomb threats, bombings, cyber-attacks (online attacks), and the use of CBRN (chemical, biological, nuclear, and radioactive) weapons (Robert, 2003). "An act with the intent to kill or seriously injure civilians or non-combatants in order to intimidate a population or compel a government or an international organisation to conduct or abstain from doing any act" is a definition of terrorism. (UN Terrorism Expert Group).

### Terrorism is:

- Something of a convoluted nature
- Trained in the art of political murder
- Adverse forms of psychological conflict
- It is not the people you think it's for.
- To have an effect, rather than kill, is the objective.

## Biological Disasters

When microorganisms or toxins are intentionally disseminated in food or water or via insect vector or by aerosol to affect human population, food crops, and livestock, we call this a "biological disaster." Biological disasters can be created by natural epidemic outbreaks or by human action. Toxic or deadly organisms or their by-products can be classified as biological agents because of their effects on humans, animals, and vegetation. Biological weapons are commonly referred to as "poor man's bombs" due to their low production cost, lack of need for complex delivery methods, and high lethality (Roberts, 1993) Biological agents can be effectively delivered using relatively simple technologies, such as crop-dusting planes or little perfume atomizers. Spraying them into the air,

infecting animals that then infect humans, and contaminating food and water are all viable methods of spreading biological agents.

- The release of biological agents into the air as aerosols creates a fine mist that can travel for kilometres. Humans and animals exposed to the agent via the air may get pandemic diseases.
- Animals Fleas, mice, flies, mosquitoes, and livestock are all vectors for disease.
- Contamination of food and water supplies; certain poisonous organisms and toxins may still be present. Boiling water and cooking food effectively destroys most harmful bacteria and parasites. Water boiled for one-minute kills most bacteria and viruses, although there are exceptions.
- Some infectious diseases can also be passed from person to person. The Lassa virus, like smallpox and the plague before it, originated in humans.

## Chemical Disasters

Damage to people, property, and the environment can result from chemical, mechanical, civil, electrical, or other process failures within an industrial plant that are the result of accident, negligence, or incompetence. Emission, fire, or explosion of one or more hazardous chemicals during industrial activity (handling), storage, or transportation, or as a result of natural events, can have severe effects inside or outside the installation, potentially resulting in loss of life, property, and adverse environmental effects. Chlorine, Ammonia, Liquified petroleum gas, and other potentially Lethal compounds were involved in these mishaps. Major chemical mishaps in India after the Bhopal Gas Disaster of 1984 include:

- In Andhra Pradesh, an oil well caught fire (2003).
- Hindustan Petroleum Corporation Limited (HPCL) Refinery, Vishakhapatnam, Explodes, Producing a Large Cloud of Vapor (1997).
- In Nagothane, Maharashtra, an explosion occurred at the Gas Cracker Complex of the Indian Petrochemicals Corporation Limited (IPCL) (1990). (Source: National Disaster Management Guidelines)

## Effect and Cause

Many different things can end up in the same way. Heavy rain could cause a dam to burst, leading to a disastrous flood, either because the reservoir fills too quickly or because it triggers a mudslide. The dam could be broken due to earthquakes, bad construction, an unintentional explosion, a terrorist strike, or even a military conflict. If the dam is not operated and maintained properly, it could collapse suddenly and cause a flood. It is possible that the outcomes and impacts of an event will change depending on where it takes place. In comparison to a similarly strong earthquake in a well-prepared society, the destruction caused by an earthquake in a developing country with poor building standards, sub-standard construction, and few emergency services will be far larger. Circumstances linked together.

## Consequence of Disasters

As an alternative to classifying disasters according to their origin, we might examine their effects, such as:

- the number of fatalities;
- the number of persons who had to relocate;
- the cost of repairs;
- the overall economic impact.

It is not easy to compare two calamities. The number of casualties, property damage, and disruption caused by an earthquake in one area will be easier to assess than those caused by a famine that spreads slowly over time and may have no obvious beginning or end. A heat wave can be the direct cause of mortality for the elderly and children, who may already be in poor health. While flooding can result in many immediate fatalities due to drowning, it can also cause numerous secondary fatalities due to contaminated water sources and destroyed crops.

- **Consequences for the Economy**

The pre-disaster infrastructure standard is used to calculate the cost of repair and reconstruction. While a natural disaster in an industrialised country could cost millions to repair, in a low-income country it might only cost tens of thousands.

However, the economic impact may be disproportionately greater in poor countries. An impoverished neighbourhood may suffer disproportionately from even a seemingly insignificant event. If a rich country has a calamity, it may be more equipped to deal with it and recover more quickly than a poor one would be. Destruction on a vast scale and/or numerous casualties are hallmarks of catastrophes, although "little monetary losses can lead to considerable pain and misery or, conversely, large losses can be very sustainable." (Alexander, 2002).

- **A Rising Population**

The rise in the world's population is undoubtedly a contributing factor to the expansion in the number of victims. However, this is not just about doing simple math. As the world's resources become ever scarcer, individuals will be forced to alter their lifestyles and take on greater dangers just to stay alive.

People are having more children and living longer. This is creating a larger pool of people who are particularly vulnerable in times of crisis, such as the elderly and children.

- **Competition and migration**

Local population estimates are also susceptible to variation when people move around. If all the good and bad land is taken, people will have to leave and compete with the people already living there for housing and employment opportunities. They risk becoming exposed to new diseases as a result of this. Although there are benefits to the dissemination of new ideas when people move, some of these innovations like new methods of construction or farming may not be as well suited to the new setting. On the other hand, some people may be unable to relocate because they have invested too heavily in property or buildings to sell them.

- **Urbanization**

More urbanisation can be attributed to several factors, including rising populations and economies, increased competition for farmland, and a belief that more possibilities can be found in urban centres. Due to the high population density, more lives will be lost in the event of a calamity. This encompasses both natural and technological disasters, as workers will likely want to dwell close to their places of employment to cut down on transportation costs. Because of the rise in global trade over the past century and other factors like tourism, oil exploration, and fishing, many of these rapidly growing cities may be found along the shore.

Cities like Shanghai, Manila, and Karachi that were constructed on or near the water's edge are at risk from climate change and natural disasters. These communities are growing quickly, but lax regulation has not kept up with the pace, leading to shoddy land use planning and shoddy construction. Although the flat alluvial soils are ideal for construction, they do not offer protection from flooding. The effects of natural disasters like earthquakes and cyclones are amplified when many people are gathered in one area. Fewer individuals will be harmed if a disaster occurs in a rural location with a low population density. Diseases, fires, and social instability all spread more quickly in densely populated regions, such as slums and squatter settlements. In cities, residents are totally dependent on others to provide for their basic needs. People in urban regions are less likely to have access to natural sources in the event of a supply chain breakdown, leaving them without necessities.

- **Loss of forest and degradation of farmland**

Many of today's urban areas were formerly covered in forest. Tree cutting not only reduces slope stability, which can lead to floods and droughts, but it also increases erosion and the deposition of soil and silt further downhill. The removal of mangrove forests along numerous coastlines results in the loss of rich natural resources and habitat, as well as the loss of protection from the sea. Farmers are increasingly being pushed to operate in environmentally or physically hazardous "marginal" locations. Pastoralists and agriculturalists sometimes find themselves at odds over who gets to use the best grazing pasture. Farmers face more peril when they concentrate on a small number of income crops or a single crop, when they must rely on costly imported fertilisers and pesticides, and when they lack ready access to markets due to a lack of reliable transportation. In addition, farmers may prioritise short-term gains from the land over maintaining its long-term fertility.

- **Economics**

While economics plays a role in many of them, economics also play a role when it comes to contributing to disasters. The global trading system encourages monocultures of cash crops. Drought in economic terms occurs when the value of a crop declines for reasons unrelated to climate change, such as when prices fluctuate and reduce the income from the product. When governments are under pressure to reduce spending, economic policies can also restrict funds for health and infrastructure. The Great Depression of the 1930s was just one example of how fluctuations in the financial markets may lead to economic disasters with far-reaching negative consequences for people's lives and the natural world.

- **Global Warming**

Most observers generally agree that global warming is occurring. Windstorms, floods, extreme temperatures, and droughts are becoming more frequent and severe, as are the resulting landslides, avalanches, fires, and crop diseases. A quick spring thaw of the Himalayan glaciers is predicted to cause significant flooding in places like Bangladesh, followed by drought when the base flow of snowmelt water is not sustained throughout the summer. Farming will become more challenging as levels of uncertainty rise and the weather becomes less predictable. Cities on the coast, delta regions, and island nations are all at danger due to rising sea levels. As more people are displaced from their homes because of climate change, more people will become environmental refugees.

- **Fringe territory**

Land scarcity is an issue in both urban and rural locations. Many individuals are forced to live or farm on dangerously steep slopes because of this problem. While lowlands that are prone to flooding or that lie in the shadow of a volcano may be uninhabited at the present time, they are likely to remain so for very good long-term reasons. Drought-prone areas are often farmed despite being unsuitable for long-term food production. The crowded population of Bangladesh forces people to live in vulnerable coastal locations, but the banks of silt deposited by the periodic river floods offer fertile and unclaimed land. Physical investments in decent housing and basic infrastructure are limited because of the peripheral nature of these communities in social, economic, and environmental dimensions. Coastal locations in other countries have been populated for various reasons, including fishing, tourism, and retirement. This leaves them vulnerable to hurricane and typhoon-induced storm surges and tsunamis, as the desired sea vistas are not shielded from the elements.

## Case Studies from Indian Sub-Continent:

- **Bhopal Gas Leak**

The gas leak incident at the Union Carbide Chemical Plant in Bhopal, Madhya Pradesh on the terrible night of 2-3 December 1984 was the worst imaginable industrial tragedy. Union Carbide Chemical Plant released almost 40 tonnes of Methyl Iso-cyanate (MIC) and other

deadly chemicals, including hydrogen cyanide, killing 8000 people instantly. The lethal after effects of the gas leak, to which thousands of people were exposed, persist to this day. Twenty-five or more studies have found that more than 530,000 people have been adversely impacted, resulting in injuries across multiple body systems. 15 years after the disaster, the death toll has passed 20,000, and it continues to rise at a rate of 10–15 each month. The Indian government's commitment to increasing agricultural output through mechanised farming practises, dam construction, and chemical and fertiliser manufacturing led to the 1969 establishment of the Union Carbide Chemical (UCC) Plant. The gas leak has had the worst possible impact on the health of those exposed, and it has done so across a wide geographic area. The carbide gas leak impacted 36 of the city's wards. The victims' immune systems, lungs, brains, kidneys, and reproductive systems were all severely compromised by the deadly gas- absorption into the bloodstream. Carbide gas leaked in 1992, and ten years later, those who were exposed to it still have problems with their periods, get abortions, and develop neurological and mental diseases. There has been a threefold increase in the prevalence of respiratory issues, early-onset cataracts, and stillbirths. When pregnant mothers were affected by the gas leak, their babies were born with delays in motor and language development.

- **Surat Plague**

Six hundred thousand people left Surat, India's "diamond city," because of the violence. These individuals likely carried the plague's spores to other parts of the country and the world, sparking widespread fear. Surat's plague was predictable if the city's rubbish dumps and other unclean problems were cleaned up in a timely manner. It took a human cost to encourage inhabitants and the government to act for cleaning up the city, but people had been living peacefully in the filth until they were given cause for concern by the dying rats.

- **Uphaar Cinema Fire**

In 1997, a fire broke out in a packed Uphaar big cinema theatre in Green Park Extension, South Delhi, killing 59 people and injuring over 100. Asphyxiation was the cause of death for most victims. The rest could not get it out of the four-story theatre before being crushed in the panicked stampede. While the movie was being shown to over a thousand people, a transformer in the basement exploded. The automobile parking lot on the ground floor was a complete disaster after a transformer burst and spewed hot oil. Vehicles exploding gas tanks added fuel to the fire, which quickly filled the theatre with smoke. The installation of a transformer indoors breached fire safety regulations. A rescue effort was undertaken by numerous store owners and bystanders. Some people called the authorities from their cell phones. Angry witnesses reported waiting 45 minutes for the first fire truck to arrive after initially calling for help. "We were stopped in the tight roadways and heavy traffic in the region," the fire officer stated. Gas mask-clad officers and firefighters flooded the scene. Unconscious people were hauled down from upper floors by firefighters using three 100-foot hydraulic snorkels. It took over two hours to completely evacuate the theatre, with police gypsies and ambulances transporting the patients to the neighbouring hospitals amid heartbreaking scenes of comatose youngsters being taken out.

- **The Chernobyl Accident**

The worst nuclear disaster in history happened in the Soviet Union's Chernobyl on April 26th, 1986. (Now Ukraine). It was during this time of routine maintenance shut down that plant personnel checked the efficacy of the plant's electrical back-up system. The Testing Team and the Operation and Safety Team never coordinated or communicated with one another. Reactor design flaws also contributed to the disaster's severity. The reactor almost blew up in a cataclysmic explosion after a sudden and uncontrollable power spike was induced. The emission of around 120 million curies of radioactivity and approximately 6-7 tonnes of debris contaminated an area greater than 210,000 square kilometres throughout Ukraine, Belarus, and the Russian Federation. When the radiation level was roughly 1 rad/hr, 40,000 people were evacuated in just over 2 hours and 45 minutes. There are more than 1 Ci/km<sup>2</sup> on the 1.19.514.5 million square kilometres that are home to 7 million people. The tragedy affected

800,000 people; between mid-August 1986 and the end of the year, 116,000 people had to be evacuated; another 52,000 in Ukraine, 106,000 in Belarus, and 47,500 in the Russian Federation had to be relocated. Over exposure and first-degree burns sent 237 people to the hospital. There were 134 people identified with Acute Radiation Syndrome (ARS), 56 with radiation burn injuries, and 2 with further skin injuries. Deaths from over exposure accounted for 28, deaths from explosions for 2, and a potential coronary thrombosis death for 1. Five people succumbed to ARS between 1987 and 1990, and nine did so between 1992 and 1996. Overexposure to radiation affected about 17 million people, including 2.5 million children under the age of losses.

## Summary

Natural disasters wreak the most havoc on developing nations. Recent studies have shown that natural disasters pose a serious challenge to long-term sustainable growth. Geography contributes to the gap in influence between wealthy and poor nations. Studies have revealed that the poor, the young, the old, women, the disabled, and those on the fringes of society due to their caste, ethnicity, or race are the hardest hit during natural catastrophes. Natural and man-made disasters both pose significant obstacles to efforts to alleviate poverty and promote long-term sustainability. Natural and man-made disasters have reached a point where the whole force of scientific and technological advancements must be applied to the reduction of human tragedy and economic burden.

## Check your Progress:

- Explain what you mean when you say "disaster."
- Sort out the various catastrophes that can occur.
- Describe the varied results that calamity can have.
- Provide examples of disasters that have occurred in India.
- Utilize the help of Mother Nature?
- Give an example of a technical disaster you are familiar with.
- Make some quick notes on:
  - ✓ Tsunamis
  - ✓ Earthquakes
  - ✓ Landslides
  - ✓ Desertification
  - ✓ Avalanches\ Cyclones
- Describe and categorise drought.
- What exactly is a flood, and what are some of the causes of floods?
- Write about both natural disasters caused by weather and geology.
- Describe what you understand about chemical, industrial, and nuclear disasters.
- Give a quick summary of:
  - ✓ Stampede
  - ✓ Dangers of nuclear war
  - ✓ Disastrous forest fires
  - ✓ Epidemics
  - ✓ Terrorism
  - ✓ Disease pandemics

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Medical NBC information from the Surgeon General; [www.nbc-med.org](http://www.nbc-med.org)

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## Unit III

# COMMUNICABLE DISEASES: SURVEILLANCE AND TREATMENT

### Content:

- Communicable and non-communicable diseases.
- Common health issues in different age-groups.
- Method and programme for control of different diseases.
- Importance of Immunization programme.
- Role of sanitation.
- Epidemiological surveillance.

### Introduction:

WHO defines health as a comprehensive condition of physical, mental, and social well-being and not just as the absence of sickness or disability. Mortality and morbidity are caused by diseases. Diseases are segregated into two groups: communicable diseases and non-communicable diseases. The Indian government has started several programmes to prevent, treat, and manage various diseases. You will learn about disease management and prevention in this section. Following completion of this section, you are capable to:

- Describe the most prevalent communicable and non-communicable diseases.
- Describe common illnesses in each age range.
- comprehend the typical causes and treatment of these illnesses
- Enumerate significant national health programmes.
- Recognize the significance of immunization.
- The common diseases that can be prevented by vaccination.
- Characterize the country's vaccination programme.
- Explain the significance of sanitation.
- Outline the surveillance for infectious diseases.

## Common Communicable and Non-Communicable Diseases

A disease can be described as an odd state that affects an organism's body and is thought to be a medical condition because it is accompanied by a set of characteristics. The disease can be broadly categorized into two groups- communicable diseases and non-communicable diseases.

### 1. Communicable Diseases

The term "communicable diseases" reflects to morbidity that can transfer from one's contact to another and are brought on by disease-causing parasites or microorganisms. Although there are many deviations in symptoms and signs, each disease possesses its own distinctive set of characteristics. These microbes might be categorized as viruses, bacteria, or fungi. These can spread from one's contact to another by contaminated food, water, air, bites from insects, bio- fluids such as blood and secretions, etc. A communicable sickness, according to Anderson, is one that may be spread from one human to another or from lower to higher animals. According to Brain, infectious diseases that can spread from one person to another or from an animal to a person are known as communicable

diseases. Olaoye divided communicable diseases into four groups: those that are spread through water, the air, insects, and other diseases that are spread through human contact and other means. For instance, fungus-related disorders, such as skin infections, are communicable diseases; Infections caused by bacteria include diarrhea, sore throat, infections in ear, infections in eyes, boils, etc.; virus infections include sore throat and jaundice; and parasites include round worm, thread worm, malaria, and other infestations of worm.

## 2. Non-Communicable Diseases

Non-communicable diseases, which include those brought on by nutritional deficiencies, lifestyle problems, behavioral issues, stress, inactivity, and work stress, cannot be passed from one sick person to another. The list below includes some significant causes of non-communicable diseases.

i) **Nutrient inadequacies in the diet:** These are the main types of deficiencies that cause non-communicable diseases.

a) Vitamin inadequacies, like as vitamin A inadequacy, may impair vision in dim light; vitamin B complex inadequacies can cause mouth ulcers, anaemia, or weakness; vitamin C inadequacies may cause bleeding gums and skin conditions; and vitamin D inadequacies may cause rickets or abnormal bone development in children.

b) A diet lacking enough proteins can prevent young children from gaining enough weight and height.

c) Children and pregnant women who do not consume enough iron in their diets may develop iron inadequacy symptoms including anaemia.

d) Bone abnormalities can result from a diet that is inadequate in calcium.

ii) **Excessive nutrient intake:** Eating too many fats can cause heart disease and obesity; eating too many carbohydrates can cause diabetes; and chewing tobacco can cause mouth and tongue cancer.

iii) **Additional:** Other causes of non-communicable disease, in addition to dietary shortages and excessive intake, are included below:

a) Lack of exercise, a sedentary lifestyle, and smoking can cause high blood pressure, heart disease, pulmonary cancer, and oral cancer.

b) Numerous mental issues might also be brought on by excessive stress.

c) Chewing tobacco use can cause mouth and tongue cancer.

The United Nations claimed that non-communicable diseases were accountable for 60% of global fatalities in 2004. In terms of non-communicable diseases, most regions are severely affected by cardiovascular disease, cancer, and respiratory disorders. Since many non-communicable diseases are chronic, the health system must take a comprehensive and well-planned approach to their management. In India, the prevalence of the following non-communicable diseases is rising:

- Cardiovascular disease and cancer
- Psychological illnesses
- Breathing allergies
- Foodborne illness
- Psychiatric condition
- Alcohol dependence groups at risk for contracting certain communicable diseases

## Vulnerable Groups in Society

Children and women make up the most vulnerable groups in society. They are especially vulnerable to disease that causes illness and malnutrition. Education and supplemental nutrition play a critical role in the fight against malnutrition. As a result, several nutritional programmes have been launched

as both short- and long-term solutions to combat malnutrition. Food Supplementation Programmes/Nutrient Deficiency Control Programmes are programmes that address nutritional issues right away by supplying food or nutrient supplements. The term "nutrition education programmes" refers to initiatives that inform the public on how to both prevent and treat dietary issues.

## 1) Diseases Common in Children

Malnutrition causes children to be underweight and overgrown for their age; vitamin A and D deficiencies cause rickets and night blindness, respectively; diarrhoea; respiratory diseases; eye, ear, and skin infections; infestations of worm; whooping cough; measles; and poliomyelitis. Children's frequent communicable diseases can be mainly divided into four groups: conjunctivitis, hand, foot, and mouth diseases, respiratory illnesses including the common cold and cough, and skin and gastrointestinal illnesses like diarrhoea.

India has an extremely high infant mortality rate (IMR, or deaths among children in their first year), which is 64 per 1000 live births in 2000. This figure will be significantly higher in rural areas. Mortality in the neonatal era (0-28 days), especially in the first week of life, accounts for about 50 to 60 percent of this. The causes of this mortality are many. There are practically no facilities for newborn care from primary to tertiary levels, frequent childbirths, inadequate treatment for moms who are at risk, poor infrastructure facilities, and inadequate care for newborns upon delivery. Low mother height and weight, maternal malnutrition and anaemia, many pregnancies, chronic maternal disorders, as well as pregnancy difficulties are only a few of the variables that contribute to low-birth-weight newborns, whether they are born prematurely or with intrauterine development retardation. Low birth weight is a significant underlying cause of newborn or infant mortality, especially when it is specifically linked to premature birth. Young children may die from tetanus if pregnant women are not given the tetanus toxin vaccine. These illnesses can be avoided through: adequate nutrition, iron-folic acid and vitamin A supplementation, immunization with the DPT, BCG, OPV vaccines, early-stage diagnosis and treatment of infections in respiratory tract and diarrhoea, good cleanliness and disinfection, safe water and proper discarding of waste and feces, and health training of mothers regarding proper nutrition and hygiene.

The greatest approaches to shield children hostile to communicable diseases are to keep them healthy and maintain their resistance.

To get benefited of immunization and vaccination against such diseases and to eliminate any known risk factors for disease exposure, keep the child away from anyone who has a communicable disease.

## 2) Common Diseases in Adolescents

There are several interconnected factors that require our attention regarding adolescents' health:

1.7 million teenagers between the ages of 10 and 19 are thought to die each year, primarily as a result of accidents, brutality, issues related to pregnancy, or diseases that can be either prevented or treated. Numerous others experience chronic disease, which reduces their prospects of finding personal fulfilment.

To lessen the load of disease in later phase of life because childhood and adolescent malnutrition perhaps result in lifetime health issues and because neglecting the medical needs of young pregnant women can harm both the mothers' and the newborns' health. At this age, sexual preferences and decisions on danger and protection are developed. Adolescence has some of the greatest rates of sexually transmitted illness infection. Simply because of the HIV/AIDS pandemic, it is necessary to reevaluate how adolescent health requirements are met by health care. Smoking starts in youth and is

closely linked to several ailments of late middle age, including heart disease, lung cancer and bronchitis.

It is important to infuse in your health today and tomorrow since the good and bad habits you form today could last a lifetime. Teenagers of today will be tomorrow's parents, educators, and civic leaders. They will pass on what they learn to their own offspring. Adolescence is a time of curiosity, when kids are open to learning about their bodies and themselves and start to participate actively in decision-making.

The Convention on the Rights of the Child (CRC) states in Article 24 that children have a right to "the highest possible quality of health and to facilities for the treatment of disease and rehabilitation of health" in order to uphold their human rights. The CRC guarantees young people the right to preventative health-care and demands for special safety for those with impairments or those who live in very challenging circumstances. Governments are required by the CRC to provide services for appropriate health care as well as to ensure that young people can express themselves and that their opinions are taken into consideration in accordance with their maturity and age.

One last thing to think about is how to protect human capital. In some countries, two out of every three teenagers are employed, and many women under the age of 20 are already moms. The cost is primarily a human one, but there is also a cost to society if they are no longer able to perform these responsibilities due to accident, disease, or psychological harm. The population's levels of health and education have a significant impact on both economic progress and personal fulfilment.

## Essential Adolescent Health Services

The following should make up the foundational package for enhancing adolescent development and health.

- Give vaccinations, monitor growth and development.
- Recognize and evaluate issues and problematic behavior, and manage them wherever possible or refer young people if you cannot handle the conditions.
- Provide guidance on developmental changes, self-care, and methods for getting support.
- There are programmes for young children, but not ones for older siblings. Before becoming pregnant, adolescent girls need to be protected from rubella. Additionally, there are vaccines available for tetanus, hepatitis, and meningitis.
- The Most Important Clinical Services
  - a. Common medical facilities for diseases like malaria, tuberculosis, endemic conditions, accidents, injuries, and dental care.
  - b. Pregnancy care, STI treatment, contraception, and post-abortion management are all included under reproductive health.
  - c. HIV counselling and testing, which should be optional and private.
  - d. Controlling sexual violence.
  - e. Services for mental health, such as those addressing drug, alcohol, and cigarette use.
  - f. Information and guidance on adolescent growth, including sexual development, eating habits, hygiene, and substance use.

### 3) Diseases Common in Women

India now has a maternal mortality ratio (number of deaths among women during pregnancy and after delivery) of 407 per 100,000 live births (1998), which is relatively high when compared to wealthy nations and certain developing nations. In rural areas and urban slums, maternal care (during pregnancy, delivery, and lactation) is grossly inadequate. Approximately 80% of births in rural areas take place outside of hospitals, with untrained birth attendants attending to the mothers and newborns. Sepsis (infections), toxæmia, haemorrhage (bleeding), starvation, fits and high blood pressure and

illegal abortion are a few of the major causes of maternal mortality (deaths). These women typically have malnutrition as a result of insufficient food intake, anaemia caused by iron and vitamin B complex deficiency, and other conditions.

## Prevention Techniques

The following is a description of some of the preventive steps needed to improve the health status:

- The revelation that induced abortions conducted by unqualified individuals in unclean settings considerably increased maternal mortality and morbidity led to the liberalization of abortion restrictions and the passing of the Medical Termination of Pregnancy (MTP) Act in 1971. Wherever necessary, in both rural communities and urban slums, facilities for MTP services by fully educated and skillful doctors are to be given.
- To gradually enhance antenatal registration and care for pregnant women, systematic measures must be done.
- Additionally, it must be gradually established that practically all deliveries are carried out by skilled healthcare professionals, such as female midwives or the dais, in aseptic circumstances.
- Twice to thrice doses of tetanus toxin, as well as iron and folic acid as nutritional supplements, should be given to expectant and nursing mothers.
- Mothers should get education on breastfeeding, growth monitoring, appropriate weaning techniques, immunization of the child, as well as on personal hygiene, a healthy diet, and family planning, during postnatal checkups.

## 4) Diseases Common in Old Age

Approximately 7.2% of the population in India is above the age of 60. The following categories might be used to group health issues in old age.

- Health issues brought on by the ageing process: these include changes in the body that cause conditions like cataracts, glaucoma, hearing loss due to nerve degeneration, osteoporosis (softening of the bones), breathing difficulties, changes in mental prospect, and a decline in the sensory faculty.
- Age-related issues: Certain diseases, such as those that affect the heart and blood vessels and are more prevalent after the age of 40, as well as cancer, are also more prevalent as people become older. Accidents caused by bone softening, diabetes, joint illnesses making it difficult to walk, respiratory diseases like asthma, infections making it difficult to pass urine, urinary tract infections, etc. are also a problem.
- Mental alterations lead to poor memory, rigidity of outlook, resistance to change, and emotional disorders brought on by social maladjustment, among other psychological issues.

## Controlling Common Diseases

Promoting health, protecting health, restoring health when it has been compromised, and minimizing suffering and incapacity brought on by diseases are the objectives of medical treatment. The following actions can achieve these objectives.

- Adopting healthy lifestyles that include eating a balanced diet, getting enough exercise, and abstaining from drugs, alcohol, and smoking; receiving regular immunizations; using certain nutrients; protecting oneself from accidents and workplace dangers; and avoiding allergies.
- Elimination of environmental dangers such as air, water, or land pollution; Improvement of living conditions, including the use of sanitary facilities, pest control, hygiene, and sanitation practices;
- Regular health examinations for early disease detection, seeking medical guidance at the first sign or symptom of a disease, and proper rehabilitation in the event of disease-related impairment are all recommended.

# I.NHP: National Health Program for Communicable Disease Control

Several national health initiatives were initiated.

## 1) Program for National Tuberculosis Control (NTBCP)

Nearly 14 million Indians have TB, and 2.2 million new cases are reported each year. Annually, TB causes close to 5 lakh fatalities in our nation. In order to address the issue of defaulters, the NTBCP was launched in 1962 and amended in 1992 with the addition of Directly Observed Treatment with Short Term Chemotherapy (DOTS). The cure of at least 85% of all new cases of TB and the detection of at least 70% of all anticipated TB cases are two crucial goals. Strategies

- Early symptom identification (3 weeks cough, fever, weight loss)
- Examinations of sputum (at least 3 samples on the spot early morning)
- Medicines administered on alternate days for a month during the intensive phase in front of healthy people.
- The patient takes the first dose of the continuation phase in the presence of health professionals before taking subsequent doses at home.

## 2) National Program for Control of Vector Borne Diseases and National Anti Malaria Program

Every year, there are around 2 million cases of malaria in India. In 1953, the campaign to combat malaria got under way. This program's goal is to lower malaria prevalence and fatality rates.

Strategies

- Involving neighbourhood volunteers
- Medication-infused bed nets
- Tutoring for health professionals
- Inter-sectoral cooperation to stop water collection
- Management of epidemics

## 3) Program for National AIDS Control

There are between 3-5 million HIV-positive individuals in India. And all states are experiencing a rising trend. In 1987, the government's campaign to combat AIDS was launched. This program's goals are to (a) prevent viral infection, (b) reduce illness and mortality, and (c) reduce socioeconomic impact.

Strategies

- Social mobilization and IEC.
- Promotion of condoms.
- Blood protection (professional donors should be banned, HIV testing, licensing of blood banks, training).
- Monitoring through the labs at medical schools.
- Prevention and treatment of STDs (STD).
- Clinical supervision (training of staff and providing of medicines).
- Case management and co-operation provided by NGOs.

## 4) Other Nationwide Programs For Health



The Indian Government has initiated a project to check the spread of diseases and to improve people's health standards in addition to the specialized programmes announced to check the spread of communicable and non-communicable diseases.

### i) Mission for National Rural Health (2005-2012)

In order to pursue an universal perspective by associating health to factors of good health such as education and employment, it is important to acknowledge the significance of health in the process of economic and social development as well as increasing the quality of life. The Indian Government started the National Rural Health Mission in 2005, focusing on the areas of nutrition, disinfection, cleanliness, and safe drinking water.

The main goal of this mission is to increase peoples' access to and availability of high-quality healthcare, with a focus on rural residents, the underprivileged, women, and children.

### Objectives

- Place a woman who advocates for health in every village i.e., ASHA.
- A village health plan created by a local team led by the Panchayat's Health & Sanitation Committee.
- Using Indian Public Health Standards, strengthen rural hospitals to provide good curative care and hold them accountable to the community (IPHS).
- Vertical health and family welfare programmes and funding are integrated for the best use of resources and foundation.
- Improving the provision of primary healthcare.
- Integrate AYUSH into the system of public health.
- Using a District Plan for Health, integrate health issues with factors that affect health, such as nutrition, safe drinking water, and sanitation and hygiene.
- Decentralization of initiatives for district-level health management
- Address the discrepancies between states and districts.
- Set time-bound objectives and update the audience on their progress.
- Increase access to primary healthcare for persons living in rural areas, particularly for low-income women and children. Strategies
  - Provide Panchayati Raj Institutions (PRIs) with training and resources to help them better own, control, and oversee public health services.
  - Encourage female health activists to increase household access to better healthcare (ASHA).
  - Village Health Committee of the Panchayat's Health Plan for each village.
  - Increasing the number of Multi-Purpose Workers and strengthening the sub-center through an untied money to support local planning and action (MPWs).
  - Improving current Primary Health Centers (PHCs) and Community Health Centers (CHCs), as well as providing 30–50 CHC beds for every lakh of the population. the creation and implementation of an integrated district health plan that addresses nutrition, sanitation, and hygiene, as well as drinking water.
  - At the national, state, block, and district levels, integrating vertical programmes in health and family welfare.
  - Technical assistance for public health management provided to national, state, and district health missions.
  - Increasing capabilities for data collection, evaluation, and analysis for planning, monitoring, and supervision based on information.
  - The creation of open policies for the advancement of health-related human resources.

- Building up all levels of capacity for preventative healthcare.

## II. RCH Program: Reproductive and Child Health

To provide integrated reproductive and pediatric health care, this initiative was introduced in India on October 15th, 1997. This program's goals are to provide for all perceived contraceptive needs and to lower baby and mother morbidity and death in order to reduce fertility to the targeted level.

### Strategies

- Community involvement in service planning and priority setting
- A customer-centered approach to service delivery
- Improved training and upgraded facilities
- A focus on high-quality care
- Lack of incentives and targets for using contraception
- Gender-responsive services
- A multi-sectoral approach to service implementation and monitoring.
- RCH Program components.

This program's broad areas are broken down into the five categories listed below.

- a) Maternal health includes assistance for mothers during pregnancy, labour, and delivery, as well as postpartum care, including safe abortion procedures if needed.
- b) Services for children in the field of child health include newborn care, immunization, vitamin A prophylaxis, oral rehydration therapy (ORT) for diarrhoea, management of acute respiratory infections (ARI), anaemia control, etc.
- c) Services for eligible couples that promote the use of contraceptive techniques and, when necessary, infertility services in order to prevent and manage unwanted pregnancies.
- d) Reproductive tract infections (RTIs) should be prevented and managed via services for early detection, research, and treatment.
- e) Adolescent Health: Services for adolescents' health, including guidance on parenting and sexual and reproductive health.

### iii) Program for Integrated Child Development Services (ICDS)

The world's largest nationwide scheme for mother and child development is called Integrated Child Development Services (ICDS). In 1970, the Planning Commission established inter-ministerial study teams and a National Policy for Children. In 1974, the Government of India followed the recommendations provided by these committees, and the Ministry of Social Welfare created the ICDS plan. Children below the age of six years, expectants and nursing mothers, and women between the age range of 15 and 44 are the beneficiaries.

### Objectives:

Below is a list of the five goals of these plans.

- To improve the dietary and physical health of children aged 0 to 6 years.
- To establish the ground for the child's optimal psychological, physical, and social development.
- To decrease the incidence of death, morbidity, hunger, and dropout rates.

- To coordinate strategy and implementation effectively covering ministries to forward child development.
- To upgrade the mother's capacity to take care of the child's nutritional and health requirements through good nutrition and health education.

#### iv) Combination of Services

To have a greater impact on mothers and children, all ICDS services are delivered through the anganwadicentre (AWC), a village-based facility, in an integrated manner. An anganwadi worker (AWW) and an assistant operate each AWC. Each AWC serves 700 tribal members and roughly 1,000 residents of rural and urban regions. Under the programmes, the services listed below are offered.

a) **Complementary nutrition** - This refers to extra feeding, vitamin A deficiency prevention, and nutritional anaemia management. To identify low-income households, underprivileged children under the age of six, pregnant and nursing mothers, and adolescent females, all families in the anganwadi region are surveyed. For 300 days a year, they use the option of supplemental nutrition supplementation. The feeding is only meant to augment and not take the place of family meals. The food is often a hot meal prepared at the anganwadi that includes a mixture of pulses, cereals, oil, veggies, and sugar. The type of food varies from state to state. Some states offer prepared meals with the same essential elements. The choice of food items can be adjusted to meet regional demands. The state covers the cost of supplemental feeding within the plan budget, which is allocated for the barest necessities.

b) **Immunization** - Children are given the poliomyelitis, diphtheria, pertussis, tetanus, tuberculosis, and measles vaccines, as well as tetanus vaccinations for pregnant mothers and infants. Infants and expecting women are immunized in accordance with the national immunization schedule by PHC and its infrastructure. The AWW helps the health professionals reach the target population with immunization campaigns. She assists in setting up the scheduled immunization session. She keeps track of ICDS beneficiaries' immunization records and does follow-up to guarantee complete coverage.

c) **Health Check-Ups** - This includes providing medical attention to young children, pregnant women, and nursing moms after delivery. Regular health examinations, weight monitoring, immunizations, management of malnutrition, treatment of diarrhoea, deformity, and delivery of medications are just a few of the health services that AWWs and PHC staff offer to children. The lady health visitor (LHV) and auxiliary nurse midwife (ANM) at the anganwadi regularly inspect youngsters, adolescent girls, pregnant women, and nursing moms. They also diagnose minor illnesses and hand out inexpensive medications.

d) **Referral Services:** Through ICDS, unwell or malnourished children which seek medical attention are sent to appropriate care during health examinations and growth monitoring. In order to identify disabilities in young children, the AWW has also been tailored. She keeps a separate register of all such cases and refers the medical officer to it.

v) **Growth Monitoring and Promotion-** Two crucial ICDS initiatives are nutrition surveillance and growth monitoring. Both are crucial for determining how well health and nutrition-related programmes have worked. Children under the age of three are weighed once every month, while those aged three to six are weighed every three months. All children under the age of six are given the opportunity to have their growth monitored at scheduled immunisation appointments or on days when moms pick up younger children's rations. Growth is tracked in order to monitor the animals'

nutritional health as well as spot growth stalls. Children who have been determined to be severely malnourished receive specialised, therapeutic extra food or just a double diet, as well as referrals to medical care.

vi) **Nutrition and Health Education** - The function of the anganwadi worker includes providing nutrition, health, and education (NHED). This programme aims to increase the capacity of women, particularly those between the ages of 15 and 44, so they can take care of their own health and nutritional requirements as well as those of their children and families. This component is anticipated to provide coverage to all women in this age range. Basic health and nutrition messaging about child care, baby feeding techniques, using medical services, family planning, and environmental sanitation are included in the NHED components. Sessions, home visits, and demonstrations are used to teach NHED.

vii) **Early Childhood Care and Pre-school Education (ECCE)**: The ECCE component of the ICDS is regarded as the program's skeleton. Up to the age of six, ECCE focuses on the child's whole development. Through maternal intervention, it promotes early stimulation of children under three.

viii) **Adolescent Girls Scheme**: Using the ICDS infrastructure, a unique intervention for adolescent girls has been developed for the first time in India. This intervention aims to satisfy the requirements of school dropout females between the ages of 11 and 18 in terms of self-development, nutrition and health education, leisure, literacy, and skill building.

## Immunization

An organism's response to antigen is increased during immunization, which enhances the organism's capacity to fend off or survive illness. Any substance that triggers the development of antibodies is an antigen, whether it be a poison or an enzyme.

### The significance of immunization

Children's malnutrition is exacerbated by infection since it stunts growth. Therefore, it becomes crucial to keep kids from getting sick so they can develop normally. Immunization is a key tactic in the fight against public nutrition issues and one of the most economical ways to avoid illnesses.

Immunization boosts the body's capacity to fight off various hazardous diseases, providing protection against them. Therefore, vaccination prevents from lifelong mental and physical impairment and dying due to terrible diseases.

### Common Illnesses Preventable by Vaccine

Vaccine Preventable Diseases are illnesses that vaccination can help to prevent. Tetanus, Poliomyelitis, Diphtheria, Pertussis, Measles, and Child Tuberculosis are the most prevalent diseases that vaccinations can prevent. Starting with tetanus

1) **Tetanus**: The bacillus *Clostridium tetani* produces a toxin that causes tetanus. Typically, the bacteria is discovered in animal faeces. The disease is more prevalent in people between the ages of 5 and 40 since they are more likely to sustain injuries of all types and have a higher risk of contracting tetanus. Tetanus in newborns is quite common in India and other tropical nations because of poor hygiene measures after delivery, especially for cutting the umbilical cord by unskilled traditional midwives (dais). Women, especially those between the ages of 15 and 45 who are fertile, are more susceptible, especially following abortions and deliveries made in spartan conditions in rural and tribal communities.

Next, let's discuss poliomyelitis.

2) **Poliomyelitis**: Poliomyelitis is an acute contagious illness brought on by a virus. Although it primarily affects the digestive tract, it also affects the central nervous system, frequently resulting in

paralysis. It primarily affects children and young adults. The age range between 6 months and 3 years is the most vulnerable.

Now let's move on to diphtheria.

3) **Diphtheria:** Caused by the bacteria *Corynebacterium Diphtheriae*, diphtheria is an illness of the throat, nose, or larynx. Infants and young children are most frequently affected, but adults can also contract the illness. A thin membrane develops in the throat in the most prevalent form of the illness. Heart and nerve system issues may result from the illness.

Let's talk about pertussis now.

4) **Pertussis:** The microorganism *Bordetella pertussis* or the pertussia bacillus is what causes pertussis, also known as whooping cough. A severe and very contagious respiratory ailment, whooping cough. It primarily affects babies and young children. Children who are undernourished experience a severe form of the illness, which can be fatal.

Let's discuss measles now.

5) **Measles:** The most dangerous of the main paediatric illnesses, measles is an acute contagious viral disease. Typically, it results in a 1–2 week-long rash, high fever, cough, runny nose, and watery eyes. As a result of complications from pneumonia, diarrhoea, and starvation, it is to blame for numerous child deaths.

Let's learn more about tuberculosis last.

6) **Tuberculosis:** Tuberculosis *Mycobacterium tuberculosis* is the causative agent of the chronic illness tuberculosis. It results in weight loss, fever, and coughing. Droplets from infected people's sputum are particularly effective in spreading it during coughing. Even while it can happen at any age, it is more common among low-income guys over the age of 45. In many places of the world, it is a significant factor in death and disability.

You can see from the description of the common ailments that they can be highly deadly. Therefore, all infants and children receive vaccinations against these terrifying diseases. Pregnant women receive the tetanus immunization. Let's learn more about the vaccine schedule that has been adopted in our nation.

## National Vaccination Program

You must be aware of the immunization trips your friends' and relatives' kids make to the doctor or health clinic. They are required to adhere to a specific immunization schedule. What does an immunization schedule mean, then. An immunization schedule is the schedule that details how many doses of each vaccination should be administered. We must be aware that vaccinations must be administered to people (infants, kids, and women) at the proper time and dose. To provide the beneficiaries with the best protection available, the entire course must be completed.

You would understand that each nation has its unique vaccination schedule based on the illnesses and disorders that are common there. In India, we adhere to the immunization schedule shown in Table 3.1, which calls for giving pregnant women two doses of tetanus toxoid (TT), three doses of oral polio vaccine (OPV), a triple dose of diphtheria, pertussis, and tetanus (DPT), and one dose each of BCG and measles.

Examine LIP Table 3.1, paying close attention to the age, dose, and vaccination indicated. You will also see a few booster dosages included at particular ages in Table.

## Add-on dosage

An additional dose known as a booster dose is given to confirm the effectiveness of the initial dose. Children receive booster doses of immunizations to achieve complete immunity. Around the ages of 16 to 24 months, booster doses of OPV and DPT are administered, while a booster dose of DT is given between the ages of 5 and 6. Additionally, two TT doses are administered at ages 10 and 16. Along with vaccines for infectious diseases, oral prophylactic doses are also administered to ward off specific nutrient deficient disorders. For instance, oral vitamin A prophylaxis is administered at 9 months together with the measles vaccine. Children are then given a six-monthly dose of vitamin A until they are three years old. The "National Prophylaxis Programme" administers vitamin A injections to prevent blindness caused by vitamin A deficiency.

Table No 3.1 Schedule For National Immunization

To Whom	When	Vaccine	Number of doses
Women	Pregnancy	TT	2 (one in early pregnancy and other one month later)
Infants	At birth	BCG	1
		OPV	"0" does
	6 weeks	DPT	1
		OPV	1 <sup>st</sup>
		BCG (if not given at birth)	1
	10 weeks	DPT	2 <sup>nd</sup>
		OPV	2 <sup>nd</sup>
	14 weeks	DPT	3 <sup>rd</sup>
		OPV	3 <sup>rd</sup>
	9 month	Measles	1
		Vitamin A prophylaxis*	1"
	9-18 month	Measles, Mumps, Rubella (MMR)	1
	16-24 month	DPT	booster
		OPV	1 <sup>st</sup> booster
Children	5-6 years 10 years & 16 years	DT	2 <sup>nd</sup> booster
		TT	2

\*Given 6 monthly till 3 years of age (total 5 does)

## Hygiene And Sanitation

This section is divided into two parts. In the first part, we discuss the importance of providing clean water and proper sanitation to people so that they are protected from water-borne infections and maintain good health. In the second part, we discuss the importance of providing clean water and proper sanitation to people so that they are prevented from these infections and maintain good health.

### The Value of Clean Water, the Causes of Water Contamination, and the Dangers of Contamination

Water is a macronutrient made up of two elements, hydrogen, and oxygen, and is found in foods such as vegetables, fruits, and cereals. It is crucial for life; in fact, one can go weeks without food but not without water. If the food we eat is grown on contaminated soil (chemical effluents, or containing

significant amounts of human excreta), then the roots of the food-plants or crops will suck up this cadmium. In terms of the water we consume, the source is typically neither clean nor secure in urban settings. Sewerage mains frequently contaminate mains and tubes, which are big tubes carrying water from the source. The most significant cause in the spread of gastrointestinal disorders is water contaminated with feces (diarrhoea, dysentery or even cholera). These days, tube-wells are a regular sight. They are also to blame for the spread of digestive disorders. Again, shallow tube wells are quickly contaminated by sewage. Let's now discuss how to raise the amount and quality of the water supply in our nation.

## Quantity of Water

It has been prophesied that by the middle of the century (2050), there would be a water war. India is lucky to have the Himalayas as a reliable source of water. We also have a long coastline where, with the help of future technology, seawater might likewise be converted to drinkable water, much like in Israel. The amount needed for drinking, cooking, and washing, however, only accounts for roughly 10 to 15 percent of the total amount of water available. Irrigation uses the vast majority of the water. Once more, genetic engineering or biotechnology can produce seed strains that need a lot less water. Another method of water conservation is drip irrigation.

## Quality of Water

In 2000, India established the Rajiv Gandhi Water Commission to provide citizens with better drinking water and sanitation services. Urban Water Boards, which regulate water distribution, could carry out the following actions:

- All water and sewer mains should be replaced.
- Control and dictate how deep tube wells should be drilled. They should be tailored to the community, colonies, and habitations,
- Install water purifying facilities close to the source of the water that will be supplied.
- Water samples should be tested continuously both at the source (river tanks) and the final delivery points, such as public taps or tube-well taps. Take the appropriate and urgent action.
- Charge the High-Income Groups a minor water management cost that is applied to all residents of slums (HIGs).
- Control the massive influx of rural people moving into cities. Create "migrant shelters" on the outskirts of urban areas and supply clean water (quantity and quality).
- Establish washing stations at our "mandi" markets and make it a rule that only clean, cleaned produce will be sold.
- Wherever possible, promote rainwater collection, starting with public institutions like government offices.
- Give women living in colonies with Lower Middle Income (LIG) homes microfinance so they may take care of their own water needs.
- During the rainy season, keep an eye on the water and sanitation situation.
- Make village Panchayats in charge of rainwater collection, tap and bore-well upkeep, and making sure there is adequate water (both quantity and quality) available.
- Promote food-for-water management programmes that can provide employment for village children.
- Water and sanitation go hand in hand, particularly in rural India where the idea of cleanliness is hardly even a concept.
- Ensure that the necessities of water and sanitation are included in all rural housing loans.
- Rural populations have contaminated their water supplies for as long as anybody can remember. Create an effective Information, Education, and Communication (IEC) system, starting with the Panchayat and ending at the local school.
- While it is raining, keep an eye on the water and sanitation situation.

Thus, the Indian government is making several efforts to raise the standard and quantity of water supply. Let's study more about cleanliness and some methods for enhancing it in Indian cities.

## Urban and Rural Sanitation and Sanitation Improvement Techniques

Sanitation must be considered as a whole, including cleanliness of the environment, community, family, and one's own body. For the migratory community, the utterly destitute, and the low-income group (LIG) in India, sanitation conditions are appalling. The issue won't get better unless the communities that need it the most push for and maintain hygienic latrines. Let's go over some methods for enhancing urban sanitation:

- The slums ought to speak up and ask for better sanitary services.
- The media should take an active role in influencing public opinion and decision-makers to support better sanitation services.
- Women should be trained in the building and upkeep of low-cost latrines because they are the most affected, especially stay-at-home women.
- As previously noted, the migrant population should be kept outside city bounds while yet receiving the bare minimum in terms of water and sanitation.
- It is critically necessary to conduct research, develop technology, and create specific low-cost latrines to accommodate various geo-hydrological circumstances.

Let us move on to some Indian success tales now.

- All our major cities and towns now have Sulabh Sanitary Latrines as a standard feature. The idea of "pay and use" has endured.
- In Ahmedabad, SEWA provides microcredit for housing that must include a specific amount for water and sanitation to women working in the urban informal sector (cart pullers, street vendors, and construction workers).
- Ahmedabad Parivartan: 300,000 families were housed in over 1000 slums (informal settlements) and almost 1500 chawls (tenements), which had limited or no access to essential urban amenities. In order to address this expanding issue, the Ahmedabad Municipal Corporation started Parivartan (meaning change), an ongoing programme that provides these Ahmedabad chawls and slums with inexpensive and sustainable basic infrastructure services, including water and sanitation. The Strategies to Combat project formed a fruitful relationship between the commercial sector, regional NGOs, and the target communities.
- Over 10 lakh people living in 1000 villages in the UP hills and Bundelkhand now have better access to rural water supplies and sanitary facilities thanks to the World Bank-funded SWAJAL project in Uttar Pradesh. The expense of operation and maintenance is voluntarily covered by the community.
- The government of India's Rajiv Gandhi National Drinking Water Mission has launched a national pilot programme in 58 districts. This would make it easier for India's rural poor to access better drinking water and sanitary facilities. NGOs, the private sector, and the Water Mission have partnered in several districts.

So far, our programmes targeted at enhancing India's sanitation services have been successful. Before the sanitary conditions in India significantly improve, these need to be implemented on a larger scale.

## Epidemiological Monitoring

An essential epidemiological activity in the realm of public health is surveillance. There are two ways to use this term:

- In a larger sense, surveillance has been compared to the routine health information system that provides an overview of the state of the patient's overall health.
- In a more restricted sense, it refers to a specialized information system about an illness or other health-related occurrence.

## Surveillance



"Surveillance is the collection of facts for action," would be the simplest definition. However, it is specified as: The methodical gathering and application of epidemiological data for planning, application, and evaluation of disease prevention (World Health Assembly, 1968). The continuous and methodical gathering, examination, and interpretation of health data in the describing and keeping track of a health occurrence. Planning is aided by this data. Putting in place and assessing public health programmes and interventions. Surveillance Data are used to assess the "need" for public health intervention as well as to decide "Efficacy" of programmes (CDC, 1988).

Thus, the following would be a list of the essential elements of epidemiological surveillance:

- 1) It is an organized, consistent, ongoing, and ongoing activity.
- 2) It entails gathering, compiling, analyzing, interpreting, and promptly disseminating information.
- 3) Different forms of action should be taken using the knowledge. Therefore, a straightforward definition of surveillance is "ongoing scrutiny, typically utilizing means
- 4) Instead of being perfectly accurate, they are distinguished by their applicability, consistency, and speed.
- 5) The primary goal is to identify shifts in disease distribution or trends in order to start investigational or preventative action.
- 6) The sensible design and evaluation of any disease requires surveillance, which is a crucial precondition of controlling a programme.
- 7) Prevention is the main goal of surveillance. The surveillance has the following goals:
  - Estimating the size of the issue.
  - Tracking the execution of health programmes.
  - Knowing the problem's local epidemiology.
  - Evaluating shifts in disease distribution or trend.
  - Identifying the vulnerable populations.
  - Allowing for the prediction of illness incidence patterns.
  - Evaluating the effects of the programme intervention for disease control.
  - The accuracy, thoroughness, and frequency of the reporting have a significant impact on how well a surveillance system works.

## Strategies for Surveillance

Since no single method of surveillance can be utilized with equal dependability for all diseases or events, many methods are chosen for the collecting of data for surveillance.

### 1) Passive surveillance

It is the routine reporting of cases of diseases that patients bring to clinics or hospitals for care.

### 2) Involved Surveillance

This specific search is carried out to identify cases in the neighbourhood, typically by door-to-door inquiries for diseases like malaria.

### 3) Sentinel Surveillance

It is a reporting system based on chosen institutions or people that provide regular, comprehensive reports on one or more diseases happening ideally in a designated attachment and provides extra data on cases. Sentinel surveillance institution selection criteria:

- Large number of target illness patients present.
- Ability to diagnose with reasonable accuracy.
- Good recording and reporting equipment is available.
- Easy access for the populace (especially rural).
- Not too expensive or specialist a treatment centre to bar some persons.
- Staff readiness to provide reports.
- Existence of a control programme in the area that is moderately developed to permit.
- Increasing response to reports.

## Case/Epidemic Investigation

Examination of diseases' epidemiology during outbreaks, even if they are sporadic can offer thorough epidemiological information on the condition in terms of frequency. Investigating an epidemic also aids in identifying the causes of it. The occurrence of the epidemic, which can aid in preventing and controlling it.

## Investigation of Cases and Events

Thorough investigation of certain instances or cases, such as each maternal death investigation after each instance of newborn tetanus, baby mortality, or acute flaccid paralysis, etc. The goal is to pinpoint the events and circumstances that contributed to the occurrence of the questioned incident so that the proper course of action can be taken. The phrase for such an examination of deaths is verbal autopsy.

## Special studies and surveys

When routinely repeated at set intervals, sample surveys for particular diseases might give more precise community-based epidemiological data on the illness in relation to the extent and causal variables in any non-epidemic situation.

## System for Vital Records

Births, deaths, and other events are reported here by public and private health care providers. A census is a count of people that asks about diseases, health practices, and other things.

## System for Epidemiological Surveillance

These are the processes for creating an epidemiological monitoring system below:

- Choose the disease condition that will be the subject of your surveillance.
- Indicate the specific goal of the surveillance.
- Use inclusion criteria in addition to the conventional case definition.
- Select the data that must be gathered.
- Decide on a surveillance strategy.
- Create methods, instruments, and formats for data gathering.
- List of reporting units to be prepared.
- Obtain information on the condition or disease as it is believed, likely, or diagnosed.
- Regular confirmed cases from the reporting units are sent, along with the line listing as needed.
- Suspect: A diagnosis given based on past events by paramedics or community members, such as rice-water stools in cholera cases.
- Diagnosed as probable or presumed based on the usual history and clinical examination by medical officers, such as the observation of shooting stars under dark field microscopy in cases of cholera.
- Confirmed: A medical officer's clinical diagnosis and/or a positive lab finding.
- Gather and deliver laboratory samples if a diagnosis is required.
- Gather information for the reporting person.
- Decide who and how often to report to, as well as the reporting channel.
- Keep track of report receipts to ensure accuracy, completeness, and timeliness.

- Analyze the data to find out the frequency and distribution pattern's magnitude and changes.
- Interpret data and take appropriate action.

## Limitations of Monitoring

- The limits of surveillance include the following:
- A labor-intensive undertaking.
- Analyses and tabulations take time.
- Only a few essential indications are present 0 Years of data collecting are required to find trends.
- Impact is difficult to determine if there is no control group or a small population.
- Data from surveillance are frequently reported in part.

NCHA (NUTRITION CENTRED HEALTH ASSESSMENT) The Nutrition Centred Health Assessment (NCHA) uses children under the age of five (i.e., between the ages of 12 months and 5) as the "point of contact" to identify and evaluate a wide range of health issues. The technique is employed for early evaluations of health and nutritional status, long-term surveillance of illness, undernourishment, and mortality, as well as long-term monitoring of food supplies, logistics, water, and food quality.

NCHA was initially created as a tool for analyzing the plight of refugees and other displaced people; later, it was modified for use in the context of victims of famine and drought. Most recently, it has started to be employed in situations when individuals are confined to camps or concentrations and have their daily needs met entirely or largely by aid organizations. The system functions effectively in both urban and rural settings, or in almost any climate. Because children's health and nutritional condition inherently reflect what is happening to the entire community, NCHA uses children (1 to 5 years of age) as the focus point for assessment. Because they require more food and good nutrition than other demographic groups, pregnant and breastfeeding women, as well as children under the age of five, are referred to as "vulnerable populations." Additionally, this vulnerable group is the first to be impacted by disease and death for a number of social and physiological reasons.

The planners can identify signs of numerous issues based on health and dietary data for this population. For instance, if a large number of underweight children are found, there may be other issues as well, including a lack of food or disease. The relevant components can be identified by cross-referencing food supplies, medical data, and water supplies. NCHA turns into a tool for monitoring the programme once corrective measures, such supplemental feeding for mothers and young children, are put in place. The amount of children who have diarrhoea can be used to indicate water supply issues or cleanliness issues if, even after several weeks of feeding, the children don't seem to be getting better. If water is not discovered to be an issue, then infections that exhibit diarrheal symptoms would be assumed.

Using NCHA techniques, an experienced surveillance team might be able to identify:

- Lack of food due to logistical issues.
- Problems with food distribution, such as uneven delivery to some areas or groups.
- Issues with intra-family food distribution (working men providing or consuming food).
- Issues with diet (in terms of nutritional content of relief foods).
- Diseases.
- Lack of water.
- Pollution of water
- Personal hygiene issues, as well as psychological issues among susceptible groups.

## Summary

Diseases can be categorized into two groups: communicable diseases and non-communicable diseases. A disease agent, such as parasites or microorganisms, causes communicable diseases, which are those that can transfer from one's contact to another. Non-communicable diseases are conditions that cannot be passed from one diseased person to another. They are brought on by nutritional deficiencies, lifestyle problems, behavioural issues, stress, inactivity, occupational stress, etc.

Malnutrition causes children to be underweight and overgrown for their age; vitamin A and D deficiencies cause rickets and night blindness, respectively; diarrhoea; respiratory diseases; ear, eye, and skin infections; worm infestations; measles; whooping cough; and poliomyelitis.

Teenagers frequently experience illnesses, problems connected to pregnancy, violence, and other issues that can either be prevented or treated. Simply because of the HIV/AIDS pandemic, it is necessary to reevaluate how adolescent health requirements are met by health care. Smoking starts in youth and is closely linked to several ailments of late middle age, including lung cancer, bronchitis, and heart disease. Anemia caused by a lack of iron and vitamin B complex, as well as undernutrition from insufficient food intake, are common disorders in women. Sepsis, infections, haemorrhage, toxemia, and malnutrition are a few of the major causes of maternal mortality.

Age-related illnesses include cataracts (a whitened lens in the eye), glaucoma (increased eye pressure leading to visual problems), deafness (from nerve degeneration), osteoporosis (softening of the bones), breathing problems, changes in attitude, and a reduction in sensory perception. Due to bone softening, diabetes, diseases of the joints making it difficult to walk, diseases of the respiratory system like asthma, infections, and difficulty passing urine, urinary tract infections, etc., degenerative diseases of the blood vessels and heart, cancer, and other illnesses are also common in old age. Additionally, mental alterations lead to memory loss, an inflexible outlook, a resistance to change, and emotional illnesses brought on by social maladjustment. The objectives of medicine are to promote, preserve, and restore health when it has been compromised as well as to lessen pain and incapacity brought on by diseases.

Immunization is a crucial technique for preventing illnesses in children. All kids should receive vaccinations against the six most prevalent diseases that can be prevented by vaccines. In our nation, we have extensive national initiatives that offer children extra food in addition to other assistance. Additionally, we have research-based initiatives that have given kids extra nourishment. To make these research action programmes better, we must incorporate what we can learn from them into our own national programmes. India has a fantastic potential to alleviate malnutrition thanks to genetically modified crops. Among India, particularly in the urban population, significant efforts are needed to increase the accessibility of drinking water and sanitation facilities. Successful projects in the field of public nutrition have shown how these services might be enhanced.

Sanitation must be considered as a whole, including cleanliness of the environment, community, family, and one's own body. For the migratory community, the utterly destitute, and the low-income group (LIG) in India, sanitation conditions are appalling. So far, our programmes targeted at enhancing India's sanitation services have been successful. Before the sanitary conditions in India significantly improve, these need to be implemented on a larger scale.

NCHA was initially created as a tool for analyzing the plight of refugees and other displaced people; later, it was modified for use in the context of victims of famine and drought. Most recently, it has started to be employed in situations when individuals are confined to camps or concentrations and have their daily needs met entirely or largely by aid organizations. The system functions effectively in both urban and rural settings, or in almost any climate.

## Suggested Resources and Readings:

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Sahni, Pardeep and Madhavi Malalgoda Ariyabandu (Eds.), 2003, Disaster Risk Reduction in South Asia, Prentice-Hall of India, New Delhi.

WHO (2000), Health Systems: Improving Performance, World Health Report, Geneva

Website:

[Dmc.engr.wisc.edu/courses/aimscope/AA02-05 .html.s](http://Dmc.engr.wisc.edu/courses/aimscope/AA02-05.html)

Check your progress:

- What do you mean when you say "disease"?
- Classify diseases?
- What exactly are communicable diseases?
- Please list a few prevalent communicable diseases.
- Mention a few ailments that affect teenagers frequently.
- What illnesses affect elderly people most frequently?
- What are a few of the communicable disease control programmes' aims?
- What is the programme for reproductive and child health?
- What do you mean by ICDS?
- What is an immunization?
- Record the child's immunization schedule from birth to age six.
- Describe the significance of sanitation for a healthy existence.
- Why epidemiological surveillance is important.

## UNIT- IV

### ASSESSMENT OF NUTRITIONAL STATUS IN EMERGENCY AFFECTED POPULATION

To determine whether children, mothers, and other adults in your population hub are experiencing nutritional deficiencies, we can conduct a nutritional assessment using several different tools and techniques. Assessing a community's nutritional status is a major first step in developing a public health strategy. It can address malnutritional consequences. The "at risk" groups or populations and their causes can be identified through nutritional status assessments.

Different methods are applied for assessing the nutritional status of a person or group and related health issues, it is necessary to collect data in a systematic and organised manner, as nutritional status strongly indicates the functional and survival processes. This procedure differs from nutritional screening, which may be performed by any doctor or nurse and leads to a dietitian's nutritional assessment of the patient. As we have seen, determining a person's nutritional status involves a complex web of interconnected elements and characteristics. It is all relative, and it depends mostly on how much and what kind of food you eat and how healthy you are. Consequently, a poor diet might result in either extreme obesity or severe malnutrition.

#### Nutritional Assessment Methods

Multiple methods exist for determining a person's nutritional status. Some of the techniques include the following:

##### I) Indirect Evaluation

Vital Statistics and other indirect measures are used to calculate an individual's nutritional status in the Indirect assessment approach. Included in this group are:

- 1) Rates of death among the most at-risk segments of the population, such as new-born and their mother; and
- 2) The prevalence regarding diseases such as diarrhoea and pneumonia to determine whether the population is receiving sufficient nutrition.

##### II) Direct Evaluation

Direct evaluation involves taking readings of specific indicators from representative samples of the community in order to provide an accurate picture of their overall nutritional health. In other words, we can assess a subset of the population by conducting direct measurements like weight or conducting a clinical examination to assess or estimate haemoglobin levels. With the use of a nutrition survey, we may collect representative samples from the population. Later in this chapter, you will learn regarding various approaches of direct nutritional assessment.

Our exploration of health assessment techniques will begin with an in-depth look into indirect assessment, including an examination of some concrete health statistics data utilised under this framework to gauge the nutritional condition of a group. Let us get into some indirect evaluation.

## I) Indirect Assessment of Nutritional Status

As we have seen, health statistics like mortality and morbidity rates, as well as birth outcomes (infant, maternal, and perinatal), can provide an indirect measure of nutritional status. Let us get clear on what we mean when we talk about death and disease rates. A population's death rate is the mortality that occurred during a certain time period and is typically stated as deaths per thousand people, whereas a population's morbidity rate is the number of individuals who became diseased throughout that time frame divided by the entire population. In such instances, it is common practise to make use of information gathered in conjunction with other national surveys. Fundamentally, malnutrition affects numerous mortality and morbidity rates. The health status of the most endangered population segment of community, especially children, is affected by the prevalence of disease.

Obtaining reliable statistics on these rates is notoriously difficult, and this must be considered. Such information should be gathered only by competent organisations. Sample registration scheme in India collects data on a regular basis, using defined processes, with the help of qualified investigators, and using samples large enough to be statistically significant. They have yearly reports that could serve as evidence. For accurate morbidity statistics, prospective surveys with a large enough sample size, utilising consistent terminology and protocols, are necessary. Data for morbidity surveys are collected longitudinally by weekly or biweekly visits to randomly selected families.

In a morbidity survey, the time between appointments is referred to as the "reference period." This period should never be more than two weeks. The longer the time period, the more likely the people providing the information are to have forgotten specifics. Diseases including diarrhoea, pneumonia, and measles are often seen in malnourished populations. Malnutrition may be a result of an increase in the prevalence of certain diseases. In addition, the immunity in child (capacity to combat foreign bodies) may have been compromised by acute undernutrition, making them more susceptible to certain of these morbidities.

Age-specific mortality rates, mortality rates attributable to certain causes, and morbidity rates attributable to similar causes are some of the particular indirect indicators used to examine nutritional health of society. Environmental elements that have an impact on a community's diet are often studied as well. Let us take a closer look at each of these leading indications. The indices of mortality will be our starting point.

### 1) Age Specific Mortality Rates

A mortality rate that only applies to a certain age range is called an age-specific mortality rate. The deaths in that age group make up the numerator, while the total population of that age makes up the denominator. The rate of death in each age group is a crucial measure of health. Children under the age of four continue to have a high death rate in regions where protein energy deficiency is common. Even though the infant mortality rate (IMR) is used as a measure of a country's health, it is now understood that the death rate for children lying in age range 1 to 4 years is significantly greater in poor nations than in affluent ones due to widespread protein energy malnutrition.

The fact that the IMR has dropped dramatically since independence is more proof of this (from about 160 to 60 per 1000 live births). The combination of dietary insufficiency and high death rates throughout this age group is the primary cause of the high death rate among children lying in age range of 1 to 4 years. Where can we go now to find out how often people of different ages are dying?

This information can be gathered by searching through vital records such as birth and death certificates. This kind of data is also available from the decennial censuses that are conducted in India. Expertise on conducting special surveys with sufficient statistical power and a random selection of respondents is readily available. Though informative, such surveys take a lot of time and effort and may not offer anything to more straightforward approaches to evaluation. Now, let us check out the second metric. In other words, death rates broken down by reason.

## 2) Cause Specific Mortality Rates

A population's cause-specific mortality rate measures the frequency with which deaths occur due to a single cause. The numerator represents the total number of deaths that can be pinned down to a single factor. Midpoint size of at-risk population serves as denominator. Indirectly determining the nutritional health of communities would benefit greatly from data on cause-specific mortality. In India, however, such information is spotty at best and frequently inaccurate. Information of this sort is available from medical facilities. Records of deaths attributable to clinically detectable malnutrition, if they exist, could be useful for making an indirect assessment of the nutritional condition of societies. Cases of critical protein calorie malnutrition and keratomalacia seen in hospitals are frequently utilised as an index of the nutritional health of communities. The mortality indexes were analysed. Let us have a peek at the disease mortality rate now.

## 3) Mortality Rate Based on Cause and Nutritional Significance

Indirect measures of nutritional health at the population level include data on the occurrence of nutritional related morbidities such as diarrhoea, acute respiratory infections, and measles. Most children who present to hospitals with severe types of clinical malnutrition have a pre-existing medical condition that contributes to their malnutrition. Malnutrition epidemics often followed diseases like measles and diarrhoea in the past. Malnutrition is not just caused by hunger, but also by other disorders. Intestinal worms, malaria, and tuberculosis are only a few examples.

These factors might also affect how widespread hunger is in a certain area. Malnutrition in the current context may be significantly influenced by the prevalence of AIDS. As a result, during the site visits, medical facilities could provide data on these illnesses. Therefore, the rates of morbidity that are related to nutrition but can be broken down by aetiology are a useful proxy for overall nutritional health. Let us look at a few ecological indicators that may shed light on local populations' dietary health.

## 4) The Role of the Environment

It is widely accepted that human hunger is an ecological problem, caused by a complex interplay of multiple causes in a community's biological, physical components and ethnic settings. Community-level nutritional status can be evaluated with data on food intake, particularly weaning patterns, trust and traditional practises, educational services, medical and health services, and socioeconomic factors. We can get this data by going to the locations themselves. Let us dig into the details of a few of these variables to see how they might impact our ability to combat hunger.

## 5) Feeding Options: Breastfeeding and Other Complementary Feeding Methods

The largest dominant elements that perhaps upgrade the health condition of societies are breastfeeding practises, such as exclusive breast feeding for the infants from birth to six months of age, giving of colostrum to new-born child, and introduce complementary meals to infants older than six months. When it comes to feeding babies in India, colostrum is sometimes thrown away because of cultural taboos (it is impure milk), and complementary foods are not given until after the child has turned one. That is to say, the baby is not getting enough to eat from an early age on.

## 6) Habits in Food Intake



Similarly, qualitative data on dietary habits may point to a problem with malnutrition in the area. Food consumption patterns of different food-groups such as milk, pulses, cereals, and green leafy vegetables especially in youngsters, might provide insight into the nutritional status of a society. Restricting food intake due to illness, such as diarrhoea, or avoiding meals altogether during pregnancy are also signs of poor nutrition in the community.

## 7) Economic and Social Contexts

Nutritional status reflects one's socioeconomic standing. Malnutrition is more severe in economically disadvantaged communities, such as those belonging to scheduled castes and tribes, residents of urban slums, etc. Low levels of education, especially among women, contribute to widespread illiteracy and harmful cultural beliefs about food and eating. Even if these communities spent all their money on food, it does not ensure to fulfil the nutritive demands. Sex differentiation, especially on the community level, may increase the likelihood that women will go hungry.

## 8) Institutions and Procedures in Health Care

Most people in rural areas do not get the care they need until it's too late, and the health care facilities there aren't up to par. Most of the time, time away from work is required in order to get to a health care institution. In addition, the services are inadequate because health officials are not held to high standards of responsibility. Evaluation of community sanitation and hygiene practises may also provide some insight on the dietary health of those living there. Quick visits and qualitative data collection can yield the necessary knowledge on these aspects.

As we have seen, a person's nutritional status can be affected by a wide range of variables, including eating behaviours, food consumption patterns, socioeconomic circumstances, and health care practises. Keep in mind that they are all round indirect measures. Therefore, we realised that we might gather information on ecological elements and use health statistics data to make an indirect assessment of the community's nutritional state. The next step is research into direct methods of gauging the health of a population's diet.

## II) Direct Assessment of Nutritional Health

The conventional approach:

1. Anthropometric Method
2. Biochemical Approach
3. Clinical Methodology
4. Dietary Intake Method

To evaluate a region's nutritional health, we use a nutrition survey to collect data using indicators on representative samples of the population. Clinical assessment and anthropometry represent the bulk essential constituent in routine nutrition surveys since they are easy to conduct in community settings and do not necessitate complex instruments like biochemical estimates. Let us first examine the development of nutritional deficiency, which will inform our choice of assessment strategies for measuring and identifying changes in the nutritional status of the community.

### Nutritional Deficiency Disease Progression

It is well accepted that low food intakes over extended periods of time are the primary cause of nutritional deficiencies. When a person's nutrition is inadequate, it causes physical changes in their muscles and liver, followed by biochemical alterations. Evaluating blood and plasma or serum can identify biochemical alterations, while examining affected tissues can evaluate structural changes. Since no outward anatomical alterations have yet been observed, it has been determined that the

dietary deficits are still in the subclinical stage. Biochemical evaluation or anthropometric measurements can detect these preclinical shifts. Clinical examination allows for the diagnosis of anatomical abnormalities in particular organs, such as inflammation in the body or alterations in the eyeball.

## 1) Anthropometric Method

Human (Greek;anthropos) and measurement (Greek: ;metry) are the roots of the word anthropometry. This is indicative of morphological alterations brought on by starvation. A person's morphological development can be tracked by taking anthropometric measures. Bone, fat, and water in the muscles all play a role in what is called the anatomical body design. You cannot fully understand a person's circumstance by analysing only one variable. Alterations in size and shape can be tracked by a variety of anthropometric measurements.

### Children's Nutritional Status

There are many causes of juvenile malnutrition, including not getting enough to eat, contracting an illness while young, and receiving inadequate medical care. Every year, millions of lives are lost because of these causes of poor health. There is evidence to suggest that it also influences growth-related alterations as well as long-term mortality and morbidity. The first few years of life are crucial since that is when the mind and body are still forming and the body is most vulnerable to numerous ailments and illnesses. The root causes of the widespread malnutrition among Indian youngsters remain unclear. Overpopulation, poor living conditions, discrimination based on gender, inadequate training, and limited access to healthcare are all significant issues. Malnutrition is a major contributor to the high poverty rate in India. Children who suffer from malnutrition have their growth and development stunted due to a lack of essential nutrients including minerals and vitamins. Various anthropometric measurements, including those of the head, upper arm, length/height, weight, and chest, can be used to evaluate development.

Anthropometry is an essential tool for monitoring children's health since it allows for the epidemiological assessment of a population's nutritional condition. Health care facilities, feeding programmes, nutritional surveys, and doctors' offices all use anthropometric charts to look for signs of growth or nutritional disorders in their patients.

#### i) Length/height

Everyone knows that both hereditary and environmental variables play a role in determining an individual's final height. It is true that genes dictate a person's maximal height, but it's the environment that ultimately determines how much of that height is used. The most significant environmental contributors are a healthy diet and a lack of illness. Only chronic malnutrition can shorten the stature of a child or youngsters.

Young children who are unable to stand upright can have their length (crown-heel distance) measured with a pedometer. A stadiometer or a portable anthropometer can be used to measure the height of older children or adults.

#### ii) Weight

The measurement of body mass index (BMI) is the simplest, most routinely applied, and most direct anthropometric indicator of nutritional status. It is important to note that different age groups employ different scales.

A weighted sling or spring scale, often known as the 'salter scale,' can be used to determine the ages of children under the age of two to within 0.1 kg. Beam balances are widely used, and measurements in both older children (over the age of two) and adults are made to the nearest 0.1Kg. Periodically, using known weights, you should calibrate the scales to ensure accuracy. It is best to measure a

person's weight when they're wearing as little as possible. The zero error of the scale should be checked before each weight is taken, and the scale should be readjusted as needed.

### iii) Measurement of the Upper Arm's Middle (MUAC)

A good indicator of lean body mass is the circumference of the upper arms taken at the midpoint. This component is useful for screening and estimating the risk of death in children because it affects the growth of muscles. MUAC is a straightforward, non-invasive method for measuring a large population's nutritional status at the community level in preparation for a broad-based intervention effort.

The mid-upper-arm circumference (MUAC) is the measurement taken halfway between the tops of a person's shoulders (the acromion of the scapula) and their elbows (the olecranon of the forearm).

### iv) Measurements of the Head and Chest Area

The distance around the head as measured from the front of the head (at the supra orbital ridge) to the major area at the back of the head (at the occipital prominence). To the nearest millimetre, a stretchy and flexible tape may measure the diameter of the head. We may all agree that brain size corresponds to head size. In infants, brain size expands at an astounding rate. Therefore, measuring the child's head circumference is a valuable method for detecting a long-term dietary issue in infants and toddlers.

Chest size, on the other hand, expands even more rapidly than head size in a well-nourished child's second and third years. These days, a child's chest size is often larger than their head size by a margin of roughly one year. However, at the age of 2.5 to 3 years, the head circumference is still greater than the chest circumference in a protein energy deficient child because of inadequate growth of the chest. Chest circumference is taken at mid inspiration, starting at the nipple.

## Children's Nutritional Status Measures

This evaluation of nutritional status relies heavily on nutritional indicators. There are three main ways to measure malnutrition.

- Stunting (low height for age),
- Underweight (low weight for age)
- Wasting (low weight for height)

The purpose of this study is to assess the subjects' diets. When two measurements are added together, or when one measurement is added to an individual's age, we have an index. In order to evaluate your child's development, you need to be familiar with the many indices available.

### a) Weight-for-Age

Children's growth can be evaluated using a standard index like weight for age. To be termed underweight, a kid must weigh less than the reference child of the same age.

$$\text{Weight-for-age} = \frac{\text{weight of the child}}{\text{weight of reference child of the same age}} \times 100$$

### b) Height-for-Age

Low height for age (stunting), often known as chronic (long term) malnutrition in children, is measured using the height-for-age index.

Stunting is a form of stunted growth and development that can occur in children as a result of inadequate nutrition, and it is characterised by a child's being much shorter than average for his or her age.

$$\text{Height-for-age} = \frac{\text{height of the child}}{\text{height of reference child of same age}} \times 100$$

Children that are stunted are reported to be less productive intellectually and physically. Stunting in children is an indicator of socioeconomic disadvantage and can be used to identify those who have suffered from chronic malnutrition, which has a linear effect on their height and weight.

### c) Weight-for-Height

A child's body mass index is an index statistic used to evaluate severe acute malnutrition, also known as wasting. There is no age bias in the weight-to-height ratio.

The term "wasting" refers to a child whose weight is significantly lower than average for his or her height.

Calculating an individual's ideal body mass based on their height requires the following formula:

$$\text{Weight-for-height} = \frac{\text{child's weight}}{\text{weight of reference child of same age}} \times 100$$

Children who are severely underweight have a higher chance of contracting diseases and dying as a result.

### v) Body mass index

Body mass index (BMI) is calculated by dividing the child's weight in kilogrammes by the square of their height in metres. By taking precise measurements of the child's weight and height, you may calculate the child's BMI and thereby assess the child's development.

Table 4.1 shows the percentile cutoff values used to categorise people's nutritional health.

Nutritional status based on BMI	BMI values Cut-off
Underweight	< 5 <sup>th</sup> Percentile
Healthy weight	≥ 5 <sup>th</sup> Percentile to < 85 <sup>th</sup> Percentile
Overweight	≥ 85 <sup>th</sup> Percentile to < 95 <sup>th</sup> Percentile
Obese	≥ 95 <sup>th</sup> Percentile

Origin: It was reported by the CDC in 2000.

Recording anthropometric measures and then comparing them to predetermined cut-off values of anthropometric indicators is the first step in determining the health condition of residents.

### Indicator

An indicator is an index with predetermined threshold values that can be used to assess a child's risk of being underweight or malnourished. Consider the above-mentioned body mass index (BMI) and height-to-weight ratio. Anthropometric indicators can be used to determine nutritional status, but they can also

- For the purpose of assessing the outcomes of a nutritional intervention plan.

- To admit or initiate youngsters into the programme.
- To let kids out of the programme.
- In order to organise efficient nutrition programmes.
- Useful for policymakers and public health initiatives generally.

The nutritional status of children is often assessed using three indicators:

- Stunting (ST)
- Underweight (UW)
- Wasting (WS)

When the z-scores for weight for age, height for age, and weight for height are fewer than -2 standard deviations (SD), the children are classified as underweight, stunted, and wasted. World Health Organization's typical international guidelines are shown in the table below (WHO, 2006):

Table 4.2 presents anthropometric indicators and thresholds for determining the degree of malnutrition in children.

Indicator	Meaning	Cut-Off-Point	What it indicates
Underweight	Low weight-for-age (WAZ)	<- 2SD	Moderate UW
		<-3SD	Severe UW
Stunting	Low height-for-age (HAZ)	< 2SD	Moderate Malnutrition (MAM)
		<-3SD	Severe Chronic Malnutrition (SAM)
Wasting	Low weight for height (WHZ)	<-2SD	Moderate acute malnutrition
		<-SD	Severe acute malnutrition

Origin:WHO,2006.

Diagnosis of underweight, stunting, and thinning is frequently made by correlating the patient's weight, height, and mid-arm circumference to the community norms for the patient's age group. The severity, duration, and correlative contributions of calorie or protein shortage can be used to categorise Protein Energy Malnutrition (PEM). Anthropometric measurements are useful for evaluating kids (Srilakshmi, 2010).

Table 4.3 Measurements of Normal and PEM Children's Anthropometrics

Measurement Rao index wt. in $\text{kg}/(\text{ht. in cm})^2 \times 100$ Skinfold thickness	Normal >0.15 >10mm	PEM <0.15 <6mm
Bangle test- 4.0 cm in diameter	Does not pass	Passes above the elbow

Mid-arm circumference	16cm	13.5 cm-Mild 12.5 cm-Moderate <12.5cm- Severe
Kanawati index MUAC/Head Circumference	>0.32	0.28-0.32 – Mild 0.25 – 0.28 – Moderate <0.25- Severe
Chest Circumference/ Head Circumference	>1.0	<1.0
Ponderal index*wt/ht <sup>3</sup>	>2.5	2.0-2.5- Borderline <2.0-Severe

Origin: Mukherji et al.,2009.

## Adults' Nutritional Status

Anthropometric measurements, such as weight and height, midupper arm circumference, waist circumference, hip circumference, and other skinfold measurements, can be used to evaluate an adult's dietary status and body composition (fat patterns).

The fat mass and the fat-free mass are two components that must be considered when determining a person's overall body composition. As a result, these two groups can be evaluated with their own unique set of anthropometric metrics.

### Adult nutritional status indicators

#### i) Measurements of fat mass

The Body Mass Index (BMI) is a useful device for gauging your overall level of fat in body. BMI is calculated by dividing a person's weight in kilogrammes by the square of their height in metres. Body mass index (BMI) is a gauge of fatty tissue. The following table displays the BMI cut off values (WHO, 1995) used to evaluate adult nutritional status.

Table 4.4: Reference ranges for body mass index (BMI) in adults for determining nutritional status

BMI(Kg/m <sup>2</sup> )	Nutritional status
>40.0	Very obese
30.0-40.0	Obese
25.0-29.9	Overweight
18.5-24.9	Normal
17.0-18.49	Mild Chronic Energy Deficiency
16.0-16.9	Moderate Chronic Energy Deficiency
<16.0	Severe Chronic Energy Deficiency

Origin: The World Health Organization 1995

There is a correlation between a low BMI and low physical activity levels and output in adults. These adults will be at higher risk of infection due to their compromised immune systems. Reducing body mass index increases the risk of morbidity and mortality. Both lower and higher body mass indexes

are linked with an elevated risk level of death and illness. The link between obesity and health problems is, thus, well recognised. There is mounting evidence linking obesity to an elevated risk for development of diseases like type 2 diabetes and cardiovascular disease.

### ii) Central obesity, or Belly Fat:

When taking a waist circumference measurement, the patient should stand tall and erect with their stomach muscles relaxed, their arms at their sides, and their feet together. The measurement should be taken at the level of the umbilicus and rounded to the nearest half centimetre. Normal expiration's end is the best time to take these readily.

Table 4.5: The WC threshold at which an individual becomes at risk

Male	Status	Female
<102 cm	Normal	<88 cm
≥102 cm	Risk	≥ 88 cm

Origin: WHO,2008.

The at-risk person is overweight and must lose weight to lower their risk for development of Type 2 diabetes and cardiovascular morbidity-related problems, which can reduce their life expectancy.

### iii) Waist-Hip Circumference

The hip circumference is the largest circumference around the hips and buttocks, and it can be measured to the nearest half centimetre. The WC and HC should be measured using a tape that is both adaptable and resilient.

As an indicator of central or abdominal obesity, the Waist-Hip Ratio (WHR) can be calculated. The WHR index is calculated by dividing the WC in centimetres by the HC in centimetres. WHR cut off values are listed in Table 4.6.

Table 4.6: Cut-off Values of WHR

Male	Status	Female
<0.90	Normal	<0.85
≥0.90	Risk	≥ 0.85

Origin: WHO,2008.

A WHR evaluates a person's potential danger. Central obesity, or the accumulation of fat in the middle of the body, is linked with an increased risk of diabetes and cardiovascular morbidity, therefore it is important to keep an eye on your values.

### iv) Skinfold Measurement

#### a) Regional Fat Mass

The fat layer can be measured with a skinfold calliper by selecting the skinfold between the thumb and forefinger. Regional adiposity is calculated from skinfold thickness measurements taken at different anatomical sites. The bicep skinfold, the triceps skinfold, the subscapular skinfold, the

abdominal skinfold, the suprailiac skinfold, the midcalf skinfold, etc. are all examples of common skinfolds.

## b) Measuring fat-free mass

The mid-upper-arm circumference is a reliable indicator of fat-free mass (MUAC). MUAC is a quick, painless, and effective way to screen many patients in a community setting. We are familiar with the methods used to quantify MUAC. The nutritional status of pregnant women can only be evaluated by MUAC. Below you will find the MUAC's limiting settings.

Table 4.7: Minimum Unit Acceptable Cutoffs of MUAC

Category	Range (cm.)	
	Male	Female
Normal	≥23	≥22
Undernourished	<23	<22

Origin: Based on work by Tang et al., 2017.

## 2. Biochemical Method

Biochemical alterations or biochemical approaches can detect any type of deficient disease before it manifests clinically. Diseases in their pre-clinical stages can often be diagnosed with the use of biochemical tests performed on readily available body fluids like blood and urine. Biochemical testing validates the result or the deficiency condition if the symptoms are vague during clinical diagnosis.

The measurement of haemoglobin is an extremely valuable indication of overall nutritional health and a crucial biochemical test. This method assesses protein and trace element intake in addition to detecting anaemia. Stool tests can reveal the existence of ova and/or intestinal parasites in a person. Albumin and sugar levels in the urine need to be checked. Biochemical assays, like vitamin D, serum retinol, and serum iron, assess the nutrient density of a person's bodily fluids. It can also detect metabolite levels in urine that are outside of normal range (e.g.; urinary creatine, urinary iodine).

### Benefits of the Biochemical Method for Nutritional Evaluation

When it comes to catching metabolic and nutritional shifts early, before they become severe or until clinical symptoms arise, the biochemical approach is invaluable. This technique is intrusive, yet it yields excellent results.

Moreover, there are constraints such as:

- It is a tedious process
- It is a hefty sum.
- Large-scale implementation is not possible.
- Biochemical analysis calls for knowledgeable staff and dedicated lab space.

## 3) Clinical Method

Clinical procedures are the quickest and easiest ways to assess nutrition in a population. When providing community health services, you will encounter many people who are suffering from nutritional inadequacies. Nutritional status can also be evaluated by looking for clinical signs and symptoms of malnutrition. The likelihood of a correct diagnosis is considerably improved if two or more of the clinical symptoms are present.



Due to increased energy demands, decreased energy intake, and elevated nutritional losses, an individual's susceptibility to malnutrition may be exacerbated by an illness. These states are highly vulnerable of contracting certain morbidities, such as,

- Stroke/heart failure
- Cancer
- Digestive disorders (GI)
- Surgery, injuries, and severe burns
- Disturbances of the mind, such depression

A person's nutritional status can be negatively affected by even a small number of symptoms if they cause them to cut back on their supplement consumption or increase their nutrient losses.

- Lethargy
- Dysphagia
- Abdominal distress
- Constipation and diarrhoea

Getting a strong nutritional history is a crucial part of any nutritional study. The patient must undergo a thorough general clinical examination, including a thorough inspection of the hair, mouth, gums, nails, skin, eyes, tongue, thyroid, etc. As a result, malnutrition and vitamin and micronutrient deficiencies can be diagnosed based on the presenting symptoms.

## Training and Standardization

Clinical examinations should be performed in well-lit areas by only trained personnel. All the researchers should go through extensive training to ensure that they all get the same diagnosis after examining the same person twice. Only the existence or absence of a symptom should be noted. It is imperative that clinicians refrain from assigning numerical values to clinical signs (such as + or ++ etc.). In order to miss nothing, we must actively search for the existence of all the symptoms of common nutritional deficiency. In order to guarantee that no deficiency sign is overlooked, a schedule/proforma should be drafted that includes all the clinical indicators. All clinical signs and symptoms should be listed in the provided proforma.

Instructions for documenting the presence of, and symptoms related to, nutritional deficiencies:

I) Malnutrition and related conditions

II) Nutritional Disorders: Their Clinical Presentation

Nutritional deficiencies and excesses manifest themselves in the form of changes in the body known as clinical symptoms. This section will provide a quick review of the symptoms associated with the following nutritional disorders:

- 1) Energy-protein malnourishment
- 2) A lack of vitamin C
- 3) Hypovitaminosis A
- 4) Rickets
- 5) Anaemia
- 6) Deficiency in essential fatty acids
- 7) Goitre

8) Deficiency in the B-complex vitamins

9) Fluorosis

## 1) Energy-Protein Deficiency

You are aware that kwashiorkor, marasmus, and marasmic-kwashiorkor are the clinical presentations of protein energy malnutrition (PEM). Now, we will take a look at the symptoms shared by all three types of PEM. This may seem like a lot of review, but it's essential that we review their clinical symptoms once more.

### i) Kwashiorkor

Pre-schoolers and elementary schoolers are disproportionately affected. Oedema is the most critical indicator that should prevent a kwashiorkor diagnosis (swelling of the body). Lower extremities show the most evidence of oedema (legs and feet). By pressing the investigator's thumb on the skin for a few seconds directly above the ankle or feet, oedema can be confirmed. As soon as the thumb is removed, the depression is gone forever. No such impression would be made on a healthy infant with no oedema.

Kids with kwashiorkor lack motivation, are easily frustrated, and never seem interested in anything going on around them. Alterations to their hair and skin can serve as warning flags. Some illnesses and nutritional inadequacies have been linked to kwashiorkor.

### ii) Marasmus

Extreme muscular and subcutaneous fat loss indicate marasmus. The child's skin is sagging and he or she appears to be made entirely of bone. The kid looks like an old man and is so frail that he can hardly cry. It's possible that the person's weight is as low as half the median for their age. There will be a noticeable lack of hair. Diarrhoea and other illnesses could be linked to the kid.

### iii) Marasmic kwashiorkor

A child may have marasmic kwashiorkor if they exhibit symptoms of both marasmus and kwashiorkor. Marasmic kwashiorkor refers to marasmus complicated with oedema. As a result, the kid will be underweight and swollen. Now let us talk about the symptoms of vitamin A insufficiency in the clinical manifestations.

## 2) Hypovitaminosis A

Visual impairments have been linked to vitamin A deficiency (ocular signs). Night blindness, conjunctival xerosis, and bitot's spots are examples of less serious ocular disorders (sometimes called xerophthalmia) that can affect the white of the eye (cornea). These conditions include the vision-robbing corneal xerosis, ulcer, and keratomalacia. Let us look through these symptoms again.

### a. Night blindness

Children as young as preschool age might show symptoms of vitamin A insufficiency, the earliest of which is night blindness. The youngster is impaired in low-light conditions. A concerned mother will notice when her child has trouble seeing the toy or food on the table.

### b. Xerosis of the Conjunctiva

The dry, thick, and wrinkled conjunctiva characteristic with conjunctival xerosis. Instead of being smooth and shiny, it seems rough. Exposing the conjunctiva to air, with the eyelids drawn back for 10-15 seconds, accentuates the dryness.

### c. Bitot's Spot

Spots like these can be found on the outer edge of the cornea and have a dirty white, foamy, and elevated appearance on the conjunctiva. Initially, a bitot spot can become visible as a single dot or a cluster of smaller dots, but it will likely grow into a huge triangular patch, its base pointing toward the cornea, over time. When the kids use 'Kajal,' the areas on Bitot will be permanently discoloured black. The Bitot might have spots in one or both eyes.

#### d. Corneal Xerosis

The cornea, normally glossy and smooth, becomes dry and rough as a symptom of severe Vitamin 'A' insufficiency. Due to the child's avoidance of bright light, the situation may go unnoticed throughout the clinical examination if not properly examined.

#### e. Corneal Erosion/Ulcer

Without immediate treatment, corneal xerosis can cause a corneal ulcer. The ulcer may start out superficial, but if it progresses too far, it can cause perforation and the contents of the eyeball to prolapse.

#### f. Keratomalacia

In this disorder, the cornea rapidly deteriorates and liquefies, causing the iris to prolapse and ultimately in irreversible blindness. Since vitamin A-related corneal involvement (ulcer/keratomalacia) is pain-free and the conjunctiva will be muddy white, it can be distinguished from other infective disorders of the eye. The eye will be red and inflamed due to infection.

#### g. Corneal Ulcer

After a corneal ulcer heals, it leaves a white scar, the size of which might vary depending on how big the ulcer was. Normal vision is disrupted when the scar is large or located in a central spot. Now let us talk about how anaemia manifests itself physically.

### 3) Anaemia

An anaemic child is less active than a healthy one. If the disease is severe, the infant will be pale, short of breath, and have swelling of the face, body, and limbs. A person's inner eyelids, buccal mucosa (the roof of their mouth), and nail beds are the ideal places to look for signs of anaemia. Their skin is pale. Adults, and particularly pregnant and breastfeeding mothers, might experience similar symptoms if they have anaemia. In advanced stages, finger and toe nails become extremely weak and curl upwards, taking on the appearance of a spoon. The medical term for this issue is koilonychia. The most accurate method of diagnosing anaemia is through the measurement of haemoglobin in the blood.

### 4) Goitre

The swelling of the thyroid gland in the front side of the neck is called goitre and is caused by an iodine deficit. The thyroid gland is not detectable by touch or sight in healthy people. Size increases due to iodine insufficiency. Goitre is defined as an enlarged thyroid gland that is larger than the tip of the thumb. Deafness, mutism, and cretinism (physical and mental retardation) are further symptoms of iodine deficient illnesses (deaf and dumb).

### 5) Deficiency in the B-complex vitamins

Under this heading, we shall discuss the two most typical deficits in the vitamin B complex: riboflavin and niacin. Let us start with a quick recap of riboflavin insufficiency.

## a. Deficiency in Riboflavin

Dyssebacea, atrophic papillae, angular stomatitis, and a crimson or magenta tongue are all symptoms of riboflavin insufficiency. Here is a rundown of their clinical manifestations:

- **Angular Stomatitis**  
Deficiency in this vitamin causes Angular Stomatitis, which manifests as ulcers and fissures in the mouth's corners. Cracks in the corners of the mouth might be tiny or quite profound. They could spread beyond the mouth and even the skin. Even with your mouth slightly ajar, you can spot mild lesions.
- **Glossitis**  
In the case of glossitis, the tongue turns a vivid crimson or magenta and may or may not develop fissures. Pain is a common symptom of the illness. In severe cases of B complex deficiency, the tongue may become entirely hairless.
- **Cheilosis**  
If you have cheilosis, your lips will get red, crack, and possibly even ulcerate. Let's check out niacin insufficiency right now.

## b. Deficiency of Niacin (Pellagra)

Niacin deficiency causes photo dermatitis (skin changes) in the body-parts which are exposed to sun, including the face, neck, waist, hands, and feet. Acute cases are characterised by red, somewhat swollen, and cracked skin that is itchy and painful. In severe cases, the skin thickens, gets dry, and turns dark. Niacin insufficiency also manifests as a tongue that is red and rough, with fissures and atrophic papillae.

## 6) Lack of vitamin C

Floating, bloody gums. Symptoms include puffy, bleeding gums that are easily irritated. Painful swelling of the epiphyses of bones and a rash called petechial haemorrhages may also occur.

## 7) Persistent Rickets

Symptoms include pain-free epiphyseal expansion of developing ends of the long bones, beading of ribs, a persistently open anterior fontanelle (after 18 months of age), craniotabes (parietal or occipital bones of the skull become soft, and dent on pressure, which spring back to normal shape when pressure is released) (in children 1 year), and muscular hypotonia (weakness). Knock-knees (knees touching each other) and bow legs are signs of healed rickets, as is the prominence of the frontal and parietal bones of the head (frontal/parietal bossing) (legs becoming curved)

## 8) Deficiency in Essential Fatty Acids

Phrynoderma is a skin lesion characterised by hyperkeratosis. Hair follicle openings are surrounded by projections that take the shape of cones. When the hand is run over the affected area, a sharp pain is felt, making it easy to spot. The backs of elbows, the insides of knees, and the sides are common places to find it. They often have a dry surrounding skin and can be somewhat pigmented.

## 9) Fluorosis

Dental fluorosis refers to the discoloration of teeth that can occur in the early stages of fluorosis. Teeth in a healthy mouth are a pearly white colour. The teeth of a person with fluorosis are chalky white (opaque) and mottled (with yellowish streaks) and have brownish spots. Enamel pitting or chipping can be observed occasionally, most often in the upper incisors. Many adolescents and young adults in regions with high rates of endemic fluorosis may suffer skeletal abnormalities, especially in the spine.

The many symptoms of the nutritional deficiency disorder we have addressed before are encapsulated in Table for your convenience. Symptoms and causes of nutritional deficiencies are listed in Table 4.8.

Table 4.8:Symptoms and causes of nutritional deficiencies

Nutritional Deficiency Disorders	Sign and Symptoms
Kwashiorkor	<p>Oedema</p> <p>Underweight (&lt;80% of normal weight-for-age)</p> <p>Apathy and irritability</p> <p>Moon Face</p> <p>Hair Skin changes</p>
Marasmus	<p>Extreme muscle wasting- “skin and bones”</p> <p>Loose and hanging skin fold</p> <p>Old man’s or monkey face</p>
Marasmic kwashiorkor	<p>Extreme muscle wasting- “skin and bones”</p> <p>Loose and Hanging skin fold</p> <p>Old man’s or monkey face</p> <p>Absolute weakness</p> <p>Oedema</p>
Vitamin A deficiency	<p>Changes in the eye such as</p> <p>Conjunctival xerosis: dryness of the transparent membrane that covers the cornea and lines inside of the eyelid</p> <p>Xerophthalmia (including keratomalacia)</p> <p>Bitot’s spot: dry foamy, triangular spots appearing on the temporal side of the eye.</p> <p>Night blindness: inability to see in dim light</p>
Iron deficiency anaemia	<p>Paleness of conjunctiva</p> <p>Paleness of tongue</p> <p>Paleness of mucosa of soft palate</p> <p>Low haemoglobin</p> <p>Swelling of feet in severe anaemia</p> <p>Spoon shaped nails</p>
Iodine deficiency disorder	<p>Thyroid enlargement: gland visible and enlarged</p> <p>Abortions, Congenital abnormalities</p> <p>Cretinism</p>
Riboflavin deficiency	<p>Angular stomatitis- lesions on both angles of the mouth</p> <p>Glossitis:- Tongue bright red or magenta</p> <p>Cheilosis:- Lips become red and develop cracks</p>
Niacin Deficiency	<p>Dermatitis- Symmetrical skin lesions evident only</p> <p>On areas exposed to sunlight</p>

Vitamin C deficiency	Spongy bleeding gums
Rickets	Changes in skeletal system- such as beading of ribs, pigeon chest: protruding breast bone, knock knees or bow legs
Essential fatty acid Deficiency	Lesions in the skin-generally seen on back of elbows, around knees and sides
Fluorosis	Mottled teeth with chalky white and brownish areas with or without erosion of enamel

As we have already established, there are a variety of clinical indications that can be used to diagnose a person's nutritional status. The biochemical assessment will be discussed as the next direct approach of nutritional evaluation. First, though, let us review what we've covered thus far.

When compared to the other two approaches, the Clinical way of nutritional assessment stands out as very useful because it is:

- Quick and simple to implement
- Costs little to nothing
- A painless technique

The clinical approach to evaluating nutritional status also has its drawbacks. The most significant drawback is that it cannot identify early stages of disease.

#### 4) Dietary Intake Method

The healthcondition of a person or a whole society can be accurately determined by measuring dietary consumption. To ensure proper growth, maintenance, repair, vital processes, and general health, it is important to eat a diet that is both adequate and balanced. Many negative impacts on development and health can be traced back to a lack of proper nutrition. The 24-hour recall method measures the food consumed by an individual or a group over the course of a day. The Recommended Dietary Allowances (RDAs) are the minimum daily consumption amounts of nutrients that, according to NIN guidelines (National Institute of Nutrition, ICMR), are necessary to fulfil the nutritional requirements of all healthy individuals in every stage of life and sexcategory.

### Community Nutrition StatusAssessment Methods

Means and medians (averages) of weight and height measurements are compared to values acquired on age-appropriate norms at the community level. These can be compared to normative data plotted on a growth chart. Distance maps show how a community is spreading out over time.

Effective catastrophe management necessitates a thorough evaluation of the damage. It is impossible to develop, implement, and assess disaster management plans and strategies without first gaining a thorough understanding of the disaster's cause, scope, and impact. There have been numerous innovations in catastrophe data collection over the years. Numerous cutting-edge tools and methods, including sample surveys.

#### Sample Survey (Research Subsample)

In order to evaluate the disaster's impact and determine what kind of help is needed, a representative sample survey is conducted. Surveying a statistically-sound subset of a population allows for reliable extrapolation to the full population of interest. Although this type of evaluation can never be entirely accurate, it may nonetheless serve as a useful guide when planning for rehabilitation.

By taking a representative sample, we can learn about every issue and/or condition affecting the whole population. While not definitive, it may serve as a useful snapshot of the populace's

requirements. Questionnaires can be used in sample surveys to gather some of the necessary information, such as morbidity and mortality rates, and statistical analysis can be used to evaluate the collected data. Both governmental and non-governmental organisations make use of these surveys.

A sample survey can save time and money by providing useful insights into a population or situation without requiring a comprehensive poll of all respondents. However, when conducting a sample survey, it is important to pay attention to developing a survey questionnaire suitable for the intended population, selecting sites that are statistically representative of the affected area, selecting the appropriate time period in which to conduct the survey, and structuring the questionnaires to obtain accurate information. To obtain data that is representative of the community, it is also crucial to decide how the individuals or families will be selected. The sample survey can be carried out in a variety of ways. Those things are:

- Simple Random Sampling,
- Systematic Sampling,
- Cluster Sampling; and
- Stratified Sampling.

## Nutrition Surveillance

Monitoring a population's diet in order to enhance its nutritional condition is called "nutrition surveillance." To monitor a population's nutritional status and take timely, effective measures to improve it, nutrition surveillance is an ongoing, systematic activity.

You are probably well aware that "repeated measures of the nutritional status, at regular intervals of population or a specific group of individuals over a period" best describes nutrition monitoring, which is a common component of nutrition surveillance.

Nutrition surveillance, then, includes both scrutiny and action to improve health and nutrition in a population. "Surveillance," on the other hand, is concerned with data on the current status/activities at local levels for initiating action in response to events occurring during specific programme implementation in the population.

The term "Triple A Cycle" will likely come up frequently as we learn more about nutrition monitoring, so let us take a moment to define it: Assessment; Analysis; Action; Nutrition Surveillance.

Assessing an individual's nutritional status is the first step in the cycle, followed by determining what factors led to their nutritional decline. These factors could include, but are not limited to, delayed complementary feeding, inadequate dietary intake, frequent attacks of morbidity, and failure to access government-provided services.

## The Reasons for Conducting Nutritional Studies

The primary purpose of nutrition monitoring is to identify vulnerable populations, such as children and pregnant women, at an early stage so that appropriate interventions and activities can be taken to combat undernourishment.

- First, it needs to single out those most at risk and the most common nutrition-related issues.
- Nutritional surveillance systems (NSS) should not operate in a vacuum; rather, the data they collect should be used to launch effective intervention programmes that reduce the risk of nutritional problems.
- Third, it should supply data on community nutrition and health to aid in the development of multi-tiered plans of action.

- It should help with the administration and assessment of health and nutrition programmes, for example.
- Fifth, the nutrition monitoring system must be able to alert authorities about imminent food shortages.

## Usefulness of Nutritional Monitoring

Among the many possible applications of a nutrition surveillance system are:

- 1) One of NSS's primary benefits is its ability to aid in the early detection of malnutrition, allowing for the swift and immediate implementation of corrective actions to bring that condition under control.
- 2) Second, the NSS details the current state of nutrition, where issues with diet and health are most prevalent (by pinpointing specific locations), what factors contribute to the rise or fall in incidence or prevalence, what steps have been taken, and what results have been seen.
- 3) Third, nutritional stress seasons can be determined with the NSS.
- 4) The NSS can also be used to evaluate the efficacy of current intervention programmes and to identify causal factors.
- 5) It can assist the administration in setting priorities, in adjusting policies and programmes on occasion.
- 6) The NSS can assist build a database on nutrition and related indexes to enable constant evaluation of the amount to which national nutritional goals are being achieved, and it can give statistics on nutritional trends over time.

Now that we understand why and how NSS is implemented, we can investigate what kind of infrastructure is required to make NSS a permanent fixture.

## Infrastructure for Nutrition Surveillance System to Track People's Diets

The identification of suitable infrastructure is a crucial part of launching a national NSS. Rather than starting from scratch, it would be preferable to leverage an already established system, such as India's Integrated Child Development Services (ICDS), which is one of the hugest nationwide children developmental programmes.

- It is already in use in most of the country's society development blocks, and according to the National Nutrition Policy (NNP), it will be rolled out to all rural and half of urban regions.
- Second, it has a built-in management information system at every level, from the local to the national, and the requisite infrastructure and skilled staff.
- All the nutrition goals established by the NNP are addressed by the ICDS activities, including growth monitoring, an important prerequisite for determining the nutritional status of children.
- Fourth, ICDS includes a Monthly Progress Reporting (MPR) system that may prove useful to NSS.

## Method for Reporting Monthly Progress

Monthly progress reports (MPRs) are currently used by Anganwadi Workers (AWWs) to keep track of how well the ICDS scheme is being implemented at the anganwadi centre (village) level. These reports are then consolidated by supervisors and child development project officers (CDPOs), and they contain mostly quantitative data on the extent to which various ICDS components are being implemented (Process variables).

The Department of Health, which has substantial infrastructure in the rural areas, can also be considered as the delivery mechanism for nutrition surveillance, and, the two departments should work together on nutrition surveillance.

Now that we know how to leverage already-in-place resources to launch NSS, let us take a look at the fundamental factors that will make or break a nutrition surveillance initiative.



## Nutritional Surveillance: Critical Success Factors

While the ICDS and Health Department do gather data on many health and nutrition indicators, we highlight a few that are very important for a well-executed nutrition surveillance programme.

- Registration and participation of various recipients in food-assistance and preschool programmes,
- Trends in children's nutritional status,
- Slowing child development,
- Oedema (kwashiorkor), wasting (marasmus), Bitot spots, night blindness, and a palpable goitre are only few of the nutritional deficiency symptoms that are all too common.
- Protection provided by national programmes, including:
  - a) Children and pregnant women should be immunised,
  - b) Providing kids with vitamin A,
  - c) Children, expectant mothers, and nursing mothers should all have access to IFA tablets.
- Low birth weight is common.
- Death rates according to age and physiology, and
- Childhood mortality rates and the prevalence of common childhood illnesses.

Thus, the variables may supply crucial data on nutritional status and population coverage for nutrition and health intervention programmes.

You undoubtedly already know that, like many other programmes, NSS might benefit from the use of computers to improve efficiency in service delivery.

## Surveillance and Monitoring through Computerization

Manually compiling and consolidating the data from various AWCs/Sectors/Projects on a continuous basis is time consuming and prone to errors; therefore, a simple, user-friendly, computer software can be developed to enable the concerned personnel at each project level to submit the reports on a regular basis, assess their completeness and correctness, and review the reports for further action.

When the services of NICNET are employed, the surveillance reports can be shared with all the developmental agencies and the office of the District Collector for the purposes of decision making, and the district authorities can use the information to prepare an action plan for nutrition and to target and review the district's developmental programmes.

A feedback mechanism will stimulate the ICDS functionaries at different levels and assist the commencement of necessary action without any time delay, and the software programme will aid with both performance appraisal and corrective administrative procedures.

Also, keep in mind that training modules may be required to ensure uniformity in the filling out and interpretation of the MPRs and other health-related information collected by different workers. New hires could receive this training during their induction period, while those already employed should receive it as soon as possible.

The National Nutrition Policy of the Government of India and the National Plan of Action on Nutrition both called for the creation of a National Nutrition Surveillance System, and the Tenth Five Year Plan advocated for a coordinated effort to keep tabs on nutrition using the tools at hand.

## SUMMARY

The nutritional status of a society is a useful assessing device for identifying "at risk" residents and identifying reasons come up with, and when developing a public health strategy to combat malnutrition. This is because nutritional status of a person can be the consequence of several correlated variables, most significantly their food intake and the nutritional density of that intake.

We have also discussed that majorly there are two methods which are applied for assessment of nutritional status i.e., Indirect method of assessment and Direct method of assessment. Indirect method of assessment includes: rates of death among the most at-risk segments of the population, such as new-born and their mother; and the prevalence regarding diseases such as diarrhoea and pneumonia to determine whether the population is receiving sufficient nutrition.

We can assess a subset of the population by conducting direct measurements like: anthropometric method, biochemical method, clinical method, and dietary intake method. Weight or conducting a clinical examination to assess or estimate haemoglobin levels. With the use of a nutrition survey, we may collect representative samples from the population. Above methods are employed to assess nutritional status of an individual or community and useful for policy makers for planning new developmental programmes and their implementation for upliftment of overall health status of the community.

This unit provided an in-depth examination of the various anthropometric tools and formulas, deficiency disorder diseases, programmes and organisations in India that collect systematic data on nutrition, health, and demographic profile. Some of the most prominent of these are the National Nutrition Monitoring Bureau, the National Sample Survey Organization, and the National Family Health Survey.

## Glossary

**Anthropometry:** It refers to the study of human morphology, including body size, shape, and composition, and the factors that influence these characteristics.

**Prospective survey:** Is a survey conducted before the occurrence of the disease or event being studied.

**Stunting:** Refers to a general lack of height and length.

**Triceps:** The triceps are a muscle in the upper part of the arm.

**Wasting:** Physical wasting manifests as extreme thinness or emaciation.

## Check your progress

- What are the various nutritional evaluation procedures?
- Direct and indirect nutritional assessment are two distinct approaches of assessment, explain them.
- What is Body mass index (BMI)?
- Indirect nutritional evaluation employs several health statistics; name three of these statistics.
- Please enumerate three ecological parameters that are employed in nutritional evaluation.
- Please describe the direct approaches that have been developed to evaluate nutritional status.
- Explain four applications of anthropometry.
- In nutritional anthropometry, what kinds of measurements are typically taken?
- Exactly what does "Nutrition Surveillance" entail?
- Name two major infrastructure/systems in India that transport system for NSS.
- The success of a nutrition surveillance programme depends on which indications, highlight them.
- Please describe the three primary functions of a nutritional analysis.

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## **Structure Unit 5**

5.1 Introduction

5.2 Objectives

5.3 Assessment of food needs in emergency situation

5.4 Food Distribution Strategy

5.5 Identifying and reaching the vulnerable groups targeting food aid

5.6 Mass and Supplementary Feeding

### **5.1 INTRODUCTION**

Before we understand about the assessment of food needs in emergency situation we have to first understand the stages of food and nutrition emergency and its causes. Anywhere in the world emergency situation can arise where malnutrition can be the most serious public health problem.

A food emergency can exist due to the following causes –

- 1- Any natural disaster like draught, flooding, storms or insect infestation such as locusts.
- 2- It can arise due to armed conflict, war or political upheaval.
- 3- It can arise due to disruption or collapse of the food distribution network which can arise due to an environmental, political or economic crises.
- 4- It can be due to spreading of HIV Aids.
- 5- Extreme poverty of marginalized population like the elderly people and urban slums populations who have poor access to water, sanitation, health care and livelihoods.

These problems can cause the following effects in the community –

- 1- A draught can cause overtaxing and drying up of water supplies resulting in the loss of crops, livestock and the lack of drinking water and water for washing and bathing.
- 2- Crop failure, the depletion of food stocks and grazing for livestock causing temporary migration of families to areas with more pasture for remaining livestock or to cities for alternative source of income.
- 3- A condition of famine can occur in populations whose food consumption is reduced to the extent that the population becomes acutely malnourished and there is a rise in mortality.
- 4- When food emergencies are caused by arm conflict and not natural disasters the civilian population are cut off from food markets. These conflicts can create famine by leading to the following –
  - Interference in the market and buying capacity of the people.
  - Destruction of food stocks and harvests.
  - Displacement of farmers from the land.
  - Creation of food shortages because of which low income households cannot afford food.
  - Disruption of the agricultural cycle.

Because of these problems a stage of food emergency and food insecurity can arise. A **food emergency** can be of the following two types –

- A nutrition emergency arises when there is the risk of or an actual rise in mortality due to acute malnutrition.
- A complex emergency is an internal crises in the state where the capacity to sustain livelihood and life is threatened by political factors or high level of violence.

## 5.2 OBJECTIVES

The objectives of the unit will be as follows –

- 1- To understand the causes and types of food emergency situations.
- 2- To understand the steps of assessment of Food needs in emergency situation
- 3- To know how to develop food distribution strategies.
- 4- To understand how to identify and reach the vulnerable groups of the vulnerable society
- 5- To understand about mass and supplementary feeding.

### 5.3 ASSESSMENT OF FOOD NEEDS IN EMERGENCY SITUATIONS

In any critical food insecurity and food emergency the food need has to be assessed and for that monitoring and evaluation of the whole situation has to be done. It is done in the following two stages

–

1- **Field Assessment** – the field assessment is done to assess the nutrition needs of the population. This is done in the following steps –

- **Early warning and nutritional surveillance** – this consist of simple predictable indicators to alert the authorities about interruptions in food supply and food access.

The early warning indicators can be the following –

- Reduce rainfall
- Loss of livestock
- Deficit food production
- Food shortages
- Infestations of food crops
- Significantly increased grain prices
- Market demand for food
- Epidemics
- Population displacement and indicators of household food insecurity i.e. reduced diet diversity (number and frequency of consumption of different foods)
- Increasing percentage of household expenditures on food
- Loss of employment
- Temporary work
- Loans from family and friends
- Early sale of crops and migration to look for work or food insecurity.

After identification of these bench marks government gets prepared for the food emergency.

Nutrition situation	Recommended actions
Acute malnutrition rate >15% or 10-14% with aggravating factors*	Emergency food aid: general food ration Blanket supplementary feeding Therapeutic feeding of severely malnourished individuals
Acute malnutrition rate 10-14% or 5-9% with aggravating factors*	No general rations Targeted supplementary feeding Therapeutic feeding of severely malnourished
Acute malnutrition rate <10% with no aggravating factors	No emergency food and nutrition intervention

2- **Local Assessment** – in any emergency situation the food and nutrition assessment is done for the following purposes –

To determine –

- whether food and nutrition problem exists
- The magnitude of the emergency
- Severity of malnutrition
- Geographic extent
- Size of the effected population

- To provide recommendations for a course of action to reduce or prevent a food and nutrition emergency.
- To communicate this information to the concerned decision makers and government authorities both local and national.
- To assess local capacity and the capacity of other organization such as Non Governmental Organizations (NGOs).

**Crop and Food Supply Assessment Missions (CFSAMs)** are mounted for disaster assessment purposes in response to a government request for emergency food assistance or when one is anticipated. They are also undertaken when there is a need for an independent and critical assessment of local information on food supply and demand and the food security and nutrition, status of vulnerable groups. This includes situations where such information may be weak, incomplete or subject to political influence. Their reports are often key background documents for assessment of nutritional status of the vulnerable groups.

CFSAMs are designed to verify and assess the threat of imminent food problems resulting from a disaster, using the most recent and accurate information available and to assess the need for international food assistance to respond to this threat. Their main objectives are to

- a) analyze the food supply and demand situation in the forthcoming marketing year at national level. The aim of this analysis is to estimate national food deficits and the assistance required to meet them
- b) to evaluate the food situation at the sub-national level.

### **Overall Approach**

The estimate of the food supply and demand situation in the forthcoming marketing year is based on National Food Balance Sheets (NFBSs), summarizing:

- domestic food production;
- opening and closing stocks;
- domestic utilization;
- external commercial trade;
- imported food assistance requirements; and
- scope for triangular transactions and donor-financed local procurement.

Assessing the food situation at the sub-national level and issues related to the affected populations involves:

- gaining an understanding of the impact of the emergency on local food systems, and of "coping" behavior and the status of local institutional resources;
- identifying the affected population and especially the most vulnerable;
- assessing the food security situation of these various groups as a result of the disaster;
- estimating target populations for emergency food assistance;
- calculating ration rates;
- determining programme duration;
- assessing logistical aspects; and
- determining distribution mechanisms.

In recognizing a disaster affecting food or agriculture and the possibility of an impending emergency, FAO rapidly follows up by an impact and needs assessment exercise. Types of assessment conducted by FAO are:

1. The impact of the disaster on national food supply, demand, the food security and nutritional situation of affected groups, and of needs for international food assistance to alleviate the problem.
2. The impact of the disaster on agricultural production capacity. This includes impact on livestock in the affected area, the needs for agricultural relief to enable production to resume quickly, and the need for longer term rehabilitation and reconstruction measures.
3. The impact of an outbreak of animal disease or plant pest in the affected and at risk areas or countries and the deciding of strategies for the rapid containment, control and/or elimination to prevent such an outbreak from evolving into a major epidemic.

These assessments are quickly disseminated to the international community to enable timely and effective donor responses, and are used as a basis for FAO's own relief efforts.



## 5.4 FOOD DISTRIBUTION STRATEGY

One of the first priorities in a food emergency is to arrange adequate food for the community and its proper distribution. Government and relief agencies should always organize buffer stocks and should have some emergency food, so that food aid can be rapidly distributed if there is food emergency. Food commodities are imported only when there is a country deficit and there is no possibility of supplying available surpluses in the disaster affected areas. The estimated average energy requirement of 2100 kcal per person per day is used to estimate the amount of food needed for the general food ration.

In food emergencies the distribution of the food has to be adequate to reach most of the effected people.

An adequate food storage does not guarantee that food will be equally distributed to all the needy household.

### THE REQUISITE OF AN EFFECTIVE FOOD DISTRIBUTION SYSTEM

- 1- **Fair** – rations should be fairly distributed based on needs and household size
- 2- **Transparent** – the effected population should have information about the rations, the timing when it will be distributed and the place where it will be distributed.
- 3- **Accountable to beneficiaries** – distribution should take into account the social, ethenic and political divisions within the target population.
- 4- **Answerable to donors** – report of food distributed and number of beneficiaries must be provided on a regular basis to the donors.
- 5- **Gender sensitive** – In all the affected areas women should be a part of the food committees and they should be allowed to collect food.

In situation when the government is stable the distribution can be done by the authorities itself. when there are conflicts it might not be appropriate for government structures or local leaders to distribute the food. In such situations NGOs can distribute the food they should have the following qualities –

- 1- The organization should have food distribution experience
- 2- Should be able to work in the affected geographic area.
- 3- It should be able to mobilize staff quickly.
- 4- Maintain neutrality

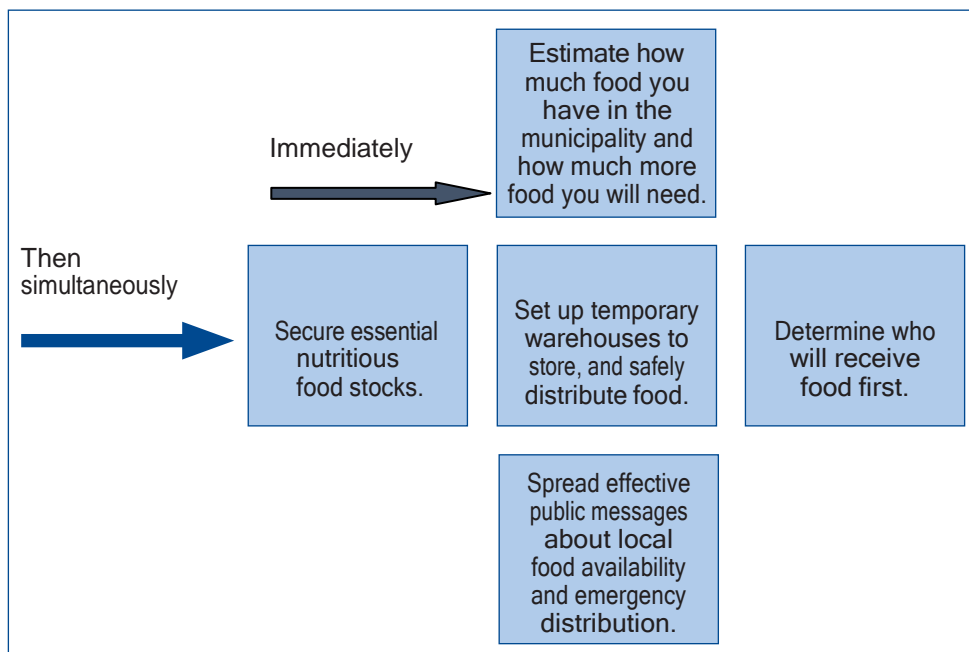
#### The steps of food distribution

- 1- Registration of the target population should be done and kept up to date.
- 2- Registration of the vulnerable households such as households affected by HIV/Aids and female headed households or politically marginal groups should be given special attention.
- 3- Food aid can be distributed directly to households, Ration cards with family size and address can be issued for this purpose.
- 4- Food aid can be distributed in bulk to groups in which households are informed in their entitlements and in which distribution is done within the group itself.
- 5- Rations can be distributed weekly, by weekly or monthly depending upon security and dispersion of the target population.
- 6- Rations must not be too heavy to carry over long distances.

## WHAT DO WE DO IF THE PANDEMICVIRUS HAS ARRIVED AND THERE ISNO TIME TO PREPARE?

When people realize that a pandemic is on the horizon and are unwilling to distribute emergency rations, local leadership teams and aid departments should immediately take the following critical steps: Instructions for each step are provided in the following sections.

- Evaluate potential food needs. Estimate how much food is available in your community and how much more food is needed to protect your population from potential food shortages. Sections 1 and 2 describe how to do this.
- Work with private sector providers and community-based humanitarian organizations to ensure stockpiles of essential nutrients for later distribution. Section 2 describes how to do this.
- Work with various public and private organizations to set up and operate temporary warehouses to receive, store, and distribute food while ensuring social distancing. Section 3 describes how to do this.
- Work with members of the local leadership team to identify those most at risk of food insecurity and ensure that those who receive food rations first are those most in need. Sections 4 and Tools 8, Categorizing food insecurity risk locations, and 9, Identifying locations with the highest food insecurity risk are helpful.
- Distribution of emergency food once a pandemic begins is necessary as it limits people's ability to obtain food in sufficient quantities to meet their daily needs. Section 5 provides guidance for determining appropriate times for food distribution. Section 6 provides guidance on safe distribution methods that can be used during a pandemic.
- Work with the city's public relations team to ensure effective public messaging regarding local food availability and emergency distribution during the pandemic. Section 7 of this tool and Tools 12-14 on crisis and emergency risk communication provide guidance on this.



## STEP 1: ASSESSING THE POTENTIAL NEED FOR FOOD

Determining how to procure and safely distribute emergency food requires first assessing a community's potential food needs and current capacity to meet food shortages lasting up to 12 weeks. To accomplish this, the community leadership team should focus on her two key aspects of contingency planning.

- Risk Level: How likely is it that your area will run out of food during a severe pandemic?
- Responsiveness: In the event of a pandemic, how can communities respond quickly and effectively?

The following table shows some important considerations when answering these two important questions.

A. Level of Risk	B. Capacity to Respond
<p>Where does your food come from and how reliable are these sources?</p> <p>How does the food arrive at the wholesale markets or local distributors, and how likely is it that these routes can be disrupted? Where are the wholesaledistributors located?</p> <p>What is the size of the population of the municipality, and how is it distributed geographically?</p> <p>Where do households normally obtain their food supplies?</p> <p>For food that is produced, when is it available to households? When is it not available?</p> <p>For food that is purchased, how does the food get from the wholesale distributors to the retail stores?</p>	<p>Who in the municipality has prior experience in managing emergency food or similar mass distribution programs? Are they available to help?</p> <p>What kinds and quantities of food are produced and available locally? How much is on hand now?</p> <p>What space can be made available for storage and distribution of emergency food supplies?</p> <p>How can transportation be made available to transport food rations from central warehouses to local distribution points? And from these, if necessary, for home delivery? Are there sufficient numbers and types of transportation (e.g. vehicles and drivers, horses, carts, etc.)?</p> <p>What financial and human resources does the municipality have that would be needed to purchase, store, distribute, and manage emergency food supplies?</p>

Being prepared in advance also helps the team understand how the grocery market works and how households are connected to it. This provides further insight into the level of food insecurity risk that exists in the community. Contact central ministries or their representatives

Non-governmental organizations and international aid agencies check to see if an up-to-date market assessment has been conducted in the area. If so, ask them to share their results.

## STEP 2: SECURING NUTRITIOUS FOOD STOCKS FOR EMERGENCY DISTRIBUTION

### WHAT TYPE OF FOOD ITEMS SHOULD WE ACQUIRE?

Collect foods that have a long shelf life and are highly nutritious. The following table gives examples of non-perishable foods. What items are most needed depends on what food people can afford. For example, if a community has many mango and banana trees on both communal and private lands, and poultry is kept in nearly every household, people will get some of their nutrition needs from protein, fruit, and vegetable groups.

Grains	Protein	Fruits and Vegetables	Shelf-Stable Milk	Miscellaneous Foods
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Rice	Dried beans and peas	Tubers	Dry milk	Cooking oil/fat source
Maize	Dried meats	Canned vegetables	Canned evaporated milk	Salt and other condiments
Wheat	Canned fish and meats	Canned fruit		Sugar
Flour		Canned/bottled 100 percent fruit juice		
Pasta				
Cereal				
Instant baby rice cereal				

## HOW MUCH FOOD WILL WE NEED?

Population size and existing levels of food security and vulnerability will determine how much food we need each week to support our population and how much food we need to stockpile to survive a 6-12 week wave.

First, determine how many calories of food energy a person needs to feed the entire community for a week. Because some households can meet their full food needs while others can only partially meet their food needs, it is unlikely that the agencies will be able to provide all food to the entire population of the community needs. If the city management team had enough time to promote home preparedness and identify those at risk of food insecurity, the number of people in need of assistance in the community and the number of people who are inadequately or partially fed can be decided. Knowing these numbers is important otherwise we can take the entire population as a starting point.

The initial plan uses an average minimum daily energy requirement of 2,100 calories per person per day. This is based on light physical activity typically performed by people living in temperate climates.

It is also very important to ensure that the food stored for emergency distribution provides sufficient nutritional energy. We have to make sure that people get enough protein and fat in their diet. Emergency food must meet the following requirements:

- Protein: 10-12 percent of the energy in the diet should be in the form of protein (that is, 52-63 g of protein per day).
- Fats/Oils: At least 17 percent of the energy in the diet should be in the form of fat (i.e. 40 g fat per day).
- Micronutrients: Essential micronutrients should also be included, especially vitamin A (found in vitamin A-rich oils, flour, and sugar) and iodine (found in iodized salt).

The table on the following page shows the complete rations one person can take in one day.

Let's use these numbers to estimate the amount of food needed to feed a city population of 10,000 for one week.

### EXAMPLE OF AMOUNT OF FOOD NEEDED TO FEED A POPULATION OF 10,000 FOR ONE WEEK

Food Items	Average amount needed per day for one person	Amount needed per person per week (per day amount x 7)	Amount needed to feed a population of 10,000 for one week (per person per week amt. x 10,000) ÷ 1000 = kg
Maize, rice, wheat	400g	2800g	28,000kg
Legumes	60g	420g	4,200kg
Vitamin A fortified oil	25g	175g	1750kg
Fortified blended foods, such as soya products	50g	350g	3500kg

Sugar	15g	105g	1050kg
Salt	15g	105g	1050kg

The figures in these examples demonstrate the importance of determining the amount and location of local food supplies. Knowing what is available can help communities determine what additional food items they need to purchase.

## WHERE CAN WE OBTAIN FOOD FOR EMERGENCY DISTRIBUTION?

Emergency food can be purchased by donation or direct purchase. If the pandemic virus has already reached the community. We need to take a closer look at what food supplies are available from local or relatively nearby sources and how they can be managed to help the community as a whole.

The following emergency measures can be taken -

1. The best method of purchase and transportation should be decided.
2. Energy- and nutrient-rich staples should be stocked as soon as possible, preferably before prices soar and transport collapses.
3. Negotiation with local vendors to purchase available groceries for emergency use.
4. If possible surplus agriculture can be done.
5. If we are building an emergency food stockpile in the pre-pandemic period and there are food processing in your area, buy and store food in bulk when it is abundant can be very helpful. (when prices are lowest). This makes it more cost effective.

Potential sources for emergency food stock items	Why they might donate food items or sell them at a reduced cost	Considerations
<ul style="list-style-type: none"> <li>• Local food producers</li> <li>• Packers</li> <li>• Distributors</li> <li>• Wholesalers</li> <li>• Retail markets</li> </ul>	<ul style="list-style-type: none"> <li>• Overproduction</li> <li>• Inventory control</li> <li>• Packaging errors</li> <li>• Changes in product formulas</li> <li>• Items are approaching a sell-by date</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that once items reach their expiration date they are not included in the emergency food stock.</li> <li>• Prepackaged items with an extended shelf life are the most durable.</li> <li>• Fresh fruit and vegetables may be acquired <i>during</i> a pandemic, but they must be handled carefully and distributed within a few days.</li> </ul>

Representatives should inquire about the availability and location of national emergency food supplies and planned donations from national and international food aid organizations. United Nations agencies such as the World Food Program and international non-governmental organizations (NGOs) have regular food programs in many countries. Regular food programs are likely to shift to emergency food distribution. However, even if these agencies are in the area, there is no guarantee that one will get help from them as they are likely to be overwhelmed with so many requests for help.

## STEP 3: STORING EMERGENCY FOOD STOCKS

Two types of food storage areas are used for emergency food storage: Such as warehouses and temporary distribution centers.

## **WHAT IS A WAREHOUSE?**

The camp is where all donated and purchased emergency food items are stored until distribution time. In camps, food rations are usually pre-packaged in quantities sufficient for one week's supply for each household and delivered to temporary decentralized distribution centers throughout the region in the event of a pandemic virus outbreak.

Depending on the size of the community, the community leadership team will establish and operate one or more camps.

## **STEP 4: DETERMINING WHO SHOULD GET FOOD FIRST**

If food is scarce, priority should be given to who gets food first. For this we have to Identify People Most at Risk of Food Insecurity or identifies who in the community is most affected by poverty and hunger, and who is likely to be suffering the most from the impact of the pandemic. A step-by-step assessment has to be done to identify people most at risk.

Risk levels fall into three categories:

- Highest,
- Medium
- Lowest.

The ranking is based on the likelihood of households experiencing hunger and loss of income during the pandemic.

## **STEP 5: DETERMINING WHEN IT IS TIME TO DISTRIBUTE EMERGENCY FOOD RATIONS**

To make the most efficient use of food stockpiles, it is important to know when to distribute emergency rations. If food rations are distributed too early, communities may run out of food before the pandemic wave is over. If food rations are distributed too late, people may starve or migrate to other areas in search of food. Community leadership teams should begin distributing food when the pandemic begins to affect households' ability to obtain enough nutritious food to meet their daily energy needs.

A pandemic can affect people's food availability in three main ways -

- By causing sickness and death. Illness can prevent people from harvesting their own or homegrown food, or from visiting local markets, grocery stores, and community kitchens.
- By interfering with the normal food supply. Disease and trade restrictions outside the community may prevent food shipments from reaching local markets.
- By creating unemployment. Traffic disruptions can make it difficult for people to get to work. Business entry, supply and distribution can force employers to lay off local workers and

reduce or eliminate household income.

The community leadership team should (1) should remain constantly alert and (2) keep an eye on the following list of key indicators which causes the need to respond in a timely manner. The key indicators are as follows –

<p>Indicator # 1 Less food is available in local markets or from local production.</p>	<p>Actions to be taken:</p> <ul style="list-style-type: none"> <li>• Begin to distribute food rations following the guidelines in <i>Section 6</i>.</li> </ul>
<p>Possible problems that may occur as a result:</p> <ul style="list-style-type: none"> <li>• Normal sources of food may not be available in the near future.</li> <li>• Prices of available food may rise drastically, making staple food items unaffordable to those on limited incomes.</li> <li>• Without alternative sources of food, people may resort to theft or mass migration.</li> <li>• Vulnerable groups may be at risk of malnutrition and even starvation.</li> </ul>	
<p>Indicator #2 Economic systems are disrupted.</p>	<p>Actions to be taken:</p> <ul style="list-style-type: none"> <li>• If food is still available in markets and inflation has not caused drastic increases in the price of food items, consider barter shops, fair price shops that sell basic items at controlled or subsidized prices, and methods of linking people to existing regional or national cash transfer programs.</li> <li>• If food is not available in markets, or prices have risen dramatically, begin to distribute food rations following the guidelines in <i>Section 6</i>.</li> </ul>
<p>Possible problems that may occur as a result:</p> <ul style="list-style-type: none"> <li>• Many workers may lack enough income to buy food for their households.</li> <li>• Without alternative sources of cash, people may resort to theft or mass migration.</li> </ul>	
<p>Indicator # 3 Each week more people are sick or dying from the influenza.</p>	<p>Actions to be taken:</p> <ul style="list-style-type: none"> <li>• Begin to deliver food and water to homes of affected families. Refer to <i>Section 6</i>.</li> <li>• Connect with health leaders to determine needs for home-based feeding.</li> <li>• Provide food transfers to hospitals and medical centers.</li> </ul>
<p>Possible problems that may occur as a result:</p> <ul style="list-style-type: none"> <li>• Continued transmission of the virus</li> <li>• Dehydration if water is not available</li> <li>• Loss of large sections of the workforce</li> <li>• Loss of main household income earner may result in destitution and poverty.</li> </ul>	

# STEP 6: DISTRIBUTING EMERGENCY FOOD RATIONS

The majority of food distribution to individuals and households is through distribution centers. Some may not be able to receive food, such as the disabled, the elderly, and households where everyone is seriously ill and unable to leave their homes. Volunteers will need to be recruited to deliver food directly to these homes.

A central warehouse supplies a number of decentralized distribution points with prepackaged food rations, usually enough for each household for her week. The amount varies depending on the number of people in each household.

## HOW MUCH FOOD SHOULD BE GIVEN TO EACH HOUSEHOLD?

Calculate the average food ration per person for each food available. See the table below for sample rations. Using average rations reduces the amount of work involved in calculating household rations based on each household member's different nutritional needs. The average minimum ration should provide 2,100 calories per person per day. Average amounts tend to be the same within families.

Sample Daily Ration	
Ingredients	Nutritional Value
400g of maize, rice/bulgur 60g of legumes 25g of oil (vit. A fortified) 50g of fortified blended foods (corn-soya blend) 15g of sugar 15g of iodized salt	Energy 2,100 calories Protein 58g Fat 43g

Some households have only enough food to meet their needs from household items. These partial feedings should be designed to meet minimal energy requirements. They are often low in grain, but once we know how the pandemic is impacting the food supply of our communities, we need to decide what they are. The rations need to supplement food that households have difficulty accessing.

## WHAT TYPE OF DISTRIBUTION METHOD SHOULD BE USED?

In some areas, transportation disruptions may leave the communities short of cash to buy food and groceries, even though the virus has not yet reached your community. The methods used to get food to people depend on whether the virus has spread to epidemic scale in the community. In any case, the logistics center must be secured.



Social Distancing Is Not in Place	Social Distancing Is in Place
<ul style="list-style-type: none"> <li>• Dispense rations on one or two designated days of the week through community centers, NGO pantries, neighborhood markets, school or church facilities, or other service groups.</li> <li>• Prepared meals can be provided through shelters for homeless and abused persons, community soup kitchens, hospitals, and senior centers.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish small-scale decentralized drop-off points in neighborhoods and require that representatives of each household retrieve their rations on a schedule that avoids waiting in line.</li> <li>• Attendants should practice all non-pharmaceutical interventions as described in Tool 5, <i>Non-Pharmaceutical Interventions (NPIs): Actions to Limit the Spread of the Pandemic in Your Municipality</i>.</li> <li>• Enlist volunteers to deliver rations directly to individual households, especially for people who are unable to pick up rations.</li> </ul>

# STEP 7: ADDITIONAL EMERGENCY FOOD RESPONSIBILITIES MANAGEMENT

## BUILDING AWARENESS AND COMMUNICATION WITH THE PUBLIC

It is important to foster open, two-way communication with the public. Transparency is essential to building trust, support and compliance in food distribution programs. Specific methods of informing the public about emergency food include awareness campaigns, nutrition education, emergency preparedness materials and events, emergency messages, radio and television announcements and interviews, telephone hotlines, and social distancing measures. public neighborhoods if not. A meeting to explain the program. Crisis and emergency risk communication tools 12-14 in this toolkit can provide further guidance in this area.

## MONITORING AND REPORTING

Officials acting on behalf of the public must gain trust and confidence through transparency. Even if it is not possible to organize a formal monitoring and evaluation plan, the municipal leadership team and those implementing the food distribution program need to keep track of the process to ensure that the activities are happening according to plan in order to:

- Make adjustments and changes needed to ensure compliance with the plan,
- Ensure that all those in need are receiving assistance,
- Check if the assistance is being used as expected, and
- Verify that people are not forced to resort to migration in search of food or employment or forced to use negative coping strategies such as selling assets or land to get money to purchase food.

Everyone involved in implementing the food distribution program will need to pay close attention to these issues, maintain communication with the people receiving the food rations, and report their findings to the team. This information can help you understand who has suffered the most from the pandemic's impact and who has managed fairly well.

## 5.5 IDENTIFYING AND REACHING THE VULNERABLE GROUPS TARGETING FOOD AID

The planning for an emergency food and nutrition response begins with identification of vulnerable groups.

The vulnerable groups of the community are pregnant women, children under the age of five, aged people, people who are severely ill and also those families who are either female headed or 1 or more person from the family is suffering from HIV / Aids.

For identification of the vulnerable groups a nutrition survey has to be done, which is main part of nutrition surveillance. The purpose of nutrition survey findings is to:

- Identify emergency affected populations and confirm the occurrence of a food and nutrition emergency. If it precedes a local field assessment, it can signal a food and nutrition emergency. If it follows a local field assessment, it can confirm a food and nutrition emergency;
- Estimate the number of malnourished individuals, the kind of malnutrition and target the most vulnerable populations for intervention. It is essential to standardize nutrition survey methods so that findings can be compared to findings of surveys in other areas and over time (see Tables 9-6 and 9-7);
- Monitor the adequacy of food and nutrition emergency interventions and improvement in the nutritional status of the affected population. The first survey in an area can be used as a baseline.

The **survey report** should present the acute malnutrition rate, the severe acute malnutrition rate and the prevalence of kwashiorkor in order to discuss the real situation about household food security, public health, child feeding practices and humanitarian assistance based on the information collected during the local field assessment. The findings should be communicated as soon as possible to both local and national authorities.

**Weight and height** are used to assess malnutrition in both individuals and populations. Acute malnutrition rates in children six to fifty-nine months of age are used as an **indicator of nutritional status** of the target population. Survey data should be collected from a representative, cross-sectional population sample of households with children six to fifty-nine months of age. If a child's age is unknown, the cut-off for inclusion in the survey is a height of 110 cm. Training and supervision is needed to ensure accurate and reliable measurements. The weights and heights or lengths of all children in the target age group in the households sampled are measured.

### Standard height/length and weight measurements of children under five

Measurement	Procedure
Length	For children less than 85 cm or two years of age, length is measured. The measuring board is placed on the ground with the child lying in the middle. An assistant holds the child's head and positions it to touch the headboard. The measurer places his hands on the child's legs and gently stretches the child, keeping one hand on the child's feet. The foot plate must be perpendicular to the board when the measurement is read. Length

	is measured to the nearest 0.1 cm.
Height	For children greater than 85 cm or two years of age, height is measured. The measuring board is placed upright on level ground. The child stands upright against the measuring board. The child's head, shoulders, buttocks, knees and heels should touch the backboard while the measurer places the headboard firmly on the child's head. The child's line of sight should be straight ahead. Height is measured to the nearest 0.1 cm.
Weight	A 25-kg hanging Salter scale is generally used. Weighing pants are suspended from the lower hook and the scale is adjusted to zero. The child's clothes should be removed and the child placed in the weighing pants and then hung freely from the hook. When the child is still, the weight is recorded to the nearest 100 g with the scale at eye level. If the child is moving, the weight can be estimated at the midpoint of the range of oscillations.

Weight-for-height, as an indicator of acute malnutrition or wasting in children from six months to five years of age, is compared to international reference standards and expressed as a z score.

**Weight-for-height Z score** is the weight of the child compared to the median and standard deviation of the reference weight for the child's height. Weight-for-height z scores can be calculated by hand.

Z scores are used to present survey data while **percentage of the reference standard** is used for assessing individual children for admission and discharge from therapeutic or supplementary feeding.

For the assessment of a population's nutritional status in an emergency situation, other anthropometric indicators such as height-for-age z score (an indicator of stunting or chronic malnutrition) and weight-for-age z score, which is an indicator of underweight that conflates stunting and wasting, are neither needed nor recommended. For both of these standard indicators, accurate determination of the child's age is required, which can be difficult to determine because birth registration is not universal in some populations.

New WHO standards for length/height-for-age, weight-for-age and weight-for-length/height are now in use and replace the earlier WHO/National Centre for Health Statistics reference standards used since the 1970s. The new standards are based on the growth of healthy children living in Brazil, Ghana, India, Norway, Oman and the United States under conditions likely to favor their full genetic growth potential, including exclusive breastfeeding.

In addition to measurement of weight and height, cases of kwashiorkor and vitamin A or iron deficiency on the basis of clinical observations observed in the sample population should be noted.

Other age and gender groups at nutritional risk e.g. **breastfeeding women or the elderly** can also be included in the survey if there is reason to believe that these groups are at high risk and if specific interventions for instance, supplementary feeding is planned for these groups. **Body Mass Index (BMI)** is used for measuring acute malnutrition in adults. An adult BMI less than sixteen indicates

severe wasting.

**Low birth weight** which is a birthweight under 2.5 kg can indicate maternal underweight before and during pregnancy as well as an increased risk of infant mortality. Accurate and objective data on birth weight is difficult to obtain when a significant proportion of births takes place in the home. Low-birth-weight data from maternity records also tend to give a biased estimation of low-birth-weight prevalence. If birth weight data is collected, its prevalence should be estimated for live births during the preceding twelve months. Low birth weight can be estimated by asking a new mother whether her last newborn was big, average or thin.

**Mid-Upper-Arm Circumference (MUAC)**, which measures fat and muscle in the mid-upper arm, is sometimes used for rapid assessments and screening for therapeutic feeding of individuals. MUAC of the left arm should be measured. For children, a cut-off value of <12.5 cm should be used for children under five to indicate acute malnutrition and referral for further evaluation. For pregnant and breastfeeding mothers, the cut-off value is 22 cm. Measurement of Mid-Upper-Arm Circumference is prone to measurement error and inaccurate assessment of nutritional status and therefore it is not recommended for nutrition surveys.



Standard **sampling methods** are described in Table 9-7. A cluster sample of 900 children is generally used (thirty clusters and thirty children per cluster). Sample clusters are selected by proportional-to-population sampling and a random sample of thirty households is selected in each sample cluster.

### Standard survey sampling methods

Sampling method	Description
Cluster sampling	Clusters of the population such as communities or neighborhoods are selected and sample households and children within the cluster are selected for the survey.
Population proportional to size sampling	Clusters and population sizes are listed with cumulative population sizes in a third column. The total cumulative population size is divided by 30 to get n. A number between 1 and n is randomly selected and the cluster with the cumulative population closest to this number is selected. Add n to the random number and select the second cluster closest to but not exceeding the sum of n and the random number. Continue in this manner until 30 clusters have been selected.
Random sampling	A random starting point is selected in each cluster and every household with children under five is visited, moving in a randomly selected direction.

## **Targeting aid and determining eligibility**

Eligibility criteria, i.e. the characteristics of those individuals or households to be targeted with food, arise from the objectives. Clearly, if an objective is to meet the needs of a group of individuals or households which are thought to require a certain quantity and quality of food, then the eligibility criteria must specify the characteristics of these individuals or households. Criteria need to be both sensitive (to ensure that those eligible are not excluded) and specific (to ensure that those not eligible are excluded).

There are two aspects to determining eligibility.

The first is the defining of the eligibility criteria and the second is applying them in practice. The eligibility criteria adopted must ensure a practical way of identifying individuals or households at the point where they receive food. If, for example, the eligibility criteria set for eligible households are that the household must have less than a particular amount of land or livestock, there must be some method of checking that the household does, in fact, have this characteristic. A targeting system can be no more accurate than its ability to identify the beneficiaries. Eligibility criteria must therefore be clear. Eligibility criteria fall into two broad categories:

Criteria applied to individuals. The need to target individuals in emergencies usually arises because inadequate support has been given to households, e.g. because of early warning failure, shortage of relief food, or because they have been excluded in some way from support to the general population. Individuals are targeted either because they are currently malnourished, e.g. children less than 80% of the median weight for height, or because it is thought that they have special needs and are unlikely to be able to meet their food needs, e.g. the sick, particular ethnic groups, pregnant or lactating women, the elderly, the disabled, or orphans.

Criteria applied to households or groups of households. The intention is usually to make up for some measured or assumed deficit in the household's ability to acquire food. The criteria applied are usually socio-economic, e.g. households with less than a certain amount of land or livestock, or households that are displaced. The criteria are usually proxy indicators which are associated with the target group. Criteria may be defined by outsiders or by the community themselves. However, a common understanding of the definition of the household must be reached between the recipient population and the external agency. A recent evaluation of community managed targeting in Malawi showed that households tend to reside in clusters which are economically interdependent. In this situation, targeting by household resulted in considerable redistribution. In pastoralist communities, households may be routinely split up as different members pursue distinct, but complementary, economic activities. No eligibility criteria. Households and individuals can also be targeted indirectly through self-targeting systems. Each of these categories is discussed in detail below.

### **Targeting individuals**

Eligibility criteria applied to individuals vary in the ease and accuracy with which they can be applied. For the most part, criteria applied to individuals are set by outsiders to the community (also called administrative targeting).

### **Targeting individuals according to nutritional status**

Anthropometric status provides an objective basis for selecting individuals to receive food, but may exclude other individuals in need, as previously described. Anthropometric and other

criteria for admission to supplemental or therapeutic nutrition are largely standardized and widely accepted (WHO, 2000). In extreme crisis situations or when resources are insufficient to deal with the number of malnutrition cases, standards can be adjusted. B. Weight requirements at discharge can be reduced to allow more children to participate in the program and/or entry criteria can be lowered to include care for only the most malnourished children.

Clinical nutrition criteria can also be used, for example, persons with nutritional edema, demonstrably malnutrition, or frank vitamin deficiencies can be admitted to a nutrition center (Collins et al., 2000). However, such standards are difficult to standardize and can be difficult to apply when inexperienced staff manage approvals.

### **Targeting individuals according to health status**

Targeting individuals with food according to their disease status is virtually impossible unless a) there is an existing, accurate means of identifying the recipients (such as a TB clinic or hospital), very broad definitions are used, which could result in high levels of inclusion error.

### **Targeting pregnant and breastfeeding women**

Pregnant and lactating women are relatively easy to identify. This group is often targeted with food - usually through dry supplementary feeding because it is easy to do and can be used to provide a mechanism for referral for antenatal care, micronutrient supplementation or immunization. The actual vulnerability of pregnant and lactating women in terms of food shortage will depend on whether the general ration is adequate. In a situation where the general ration is adequate, but it is believed that women are not receiving sufficient food because of biases in intra-household allocation, there would also be a logical basis for targeting this group with food.

### **Targeting the disabled and elderly**

The elderly may be nutritionally vulnerable. Reduced physical or mental function may make it difficult for them to access food, particularly in situations of displacement where social support networks or access to traditional foods is disrupted. The nutritional vulnerability of older people should not be assumed in every context, but older people may be nutritionally vulnerable in a situation where the majority of the population are older people (if, for example, the remainder of the population has fled or migrated). The definition of the elderly in a general population may be difficult<sup>3</sup>. Equally, trying to define disability is a complex and controversial matter. Acceptable terminology changes over time and from one culture to another.

### **Targeting school children and people attending or resident in institutions**

School enrolment varies enormously from country to country but, in parts of some countries, can be as low as 10%. Generally, children who are enrolled in school are likely to be from higher and more powerful socio-economic groups, better nourished, and are more likely to be boys. Therefore, they are, in general, less likely to be vulnerable to food and nutrition crises than children out of school. The reverse can be true in pastoral situations, where children from richer households are away with the livestock and children of poorer households remain in towns and villages. One of the primary motives for school feeding in emergencies is to prevent children from dropping out of school. Additionally, it has been used to provide a household ration for orphans in schools, e.g. recently in southern Africa. In general, targeting school children is not a primary means of targeting food according to need in emergencies. There are occasional exceptions, where school children are targeted because they are found to have the greatest need for food aid.

Institutions may be targeted to reach specific groups who are thought to be vulnerable, e.g. hospital patients or orphanages. These groups may face special problems in a crisis, as inmates' relatives may find it difficult to provide support, and Government support for institutions may collapse.

## **Targeting households**

Eligibility criteria for households are usually 'socio-economic' and based on either:

- An estimate, based on a formal assessment, that specific types of household in the population cannot meet their survival or livelihood needs e.g. poor, female headed, HIV affected households, or
- An assumption that this is so. The assumption is usually based on an observed high prevalence of malnutrition, and is used to justify a general ration, or to target rations, to particular households. A common targeting system is to assume that households with a malnourished child registered in a feeding centre are food insecure and to provide them with a ration.

## **Targeting households according to socio-economic status**

In setting eligibility criteria for general food distribution to households, a distinction is sometimes made between administrative targeting, where the eligibility criteria are set by Government, donors or external organizations, and community managed targeting where the community plays an active role in defining the criteria for eligibility. In practice, this distinction is far from clear and communities are rarely left to entirely define who should receive the distributed food and how much they should receive. Strictures are placed on the community's decision making power, e.g. only 60% of households can receive food, or the types of household which should be included is predefined).

Economic assessments may lead to criteria that can be difficult to apply directly, i.e. it may be difficult to identify those households who are economically eligible to receive food. For example, during an assessment, a 'poor' population group might be defined as one which has less than a certain amount of land or livestock, criteria which it may be difficult or impossible to verify during a distribution. To use these criteria for the inclusion of an individual household in distribution, an outside agency would require a survey of all households. This may be practical on a small scale or with a densely settled population, (e.g. by using community workers who can visit each house in a camp) but is usually impractical. A situation where an existing administrative system, e.g. an ID registration system, provides the necessary information for accurate beneficiary identification is rare, although it is occasionally found, e.g. the systems used to determine ration beneficiaries in the 'oil-for-food' programme in parts of Iraq. In most cases involving a large, dispersed population, there is usually no practical alternative to the involvement of the community or its administration (e.g. village chief) in the identification of the beneficiaries, as they are the only people with easy access to the necessary information. This is typically done via the existing socio-political structures, e.g. by requiring village representatives to produce lists of eligible households, usually according to criteria set by Government, donors or agencies. The criteria used may arise from an assessment, e.g. households with less than a certain amount of land. Sensitive and specific criteria may be difficult to develop, as there may be

multiple characteristics that define the eligible group.

In community managed systems, the community is used to identify beneficiaries – thus, those who are identifying the most needy are those who have the greatest knowledge about socio-economic factors in the targeted communities. Community managed systems are usually distinguished from ‘administrative’ systems by the more active participation of the recipient population, rather than only its representatives, with the aim of reaching mutually agreed and acceptable eligibility criteria. Thus, eligibility criteria tend to be more subjective, complex and locally specific. In addition, it may be easier for communities to make judgments of relative need, whereby it is possible to identify the poorest 30% of the community, rather than setting the criteria and then seeing what proportion of the population meet them. This may make food aid planning easier.

The extent to which there is a conflict between donor and recipient views varies enormously from place to place, and the problem should not be overstated. Nevertheless, food will be diverted (from the donor perspective) to ineligible people, and the reverse. The extent to which the two views can be accommodated will often depend on making a reasonable ‘deal’ with the recipients, such as supplying a larger quantity of food than is indicated by a strictly assessed need.

In large food distribution systems, the levels of supervision may be low and the scope for inclusion and exclusion errors may be large. In any large system, communities (and, it should be said, sometimes government administrations) have considerable power to subvert donor imposed systems. This can lead, at best, to redistribution of the food (and therefore large inclusion errors) and, at worst, to a refusal by the community to participate in the programme. In practice, attempts to target precisely a beneficiary group, using imposed externally defined criteria, invites conflict with the community who may have a different concept of need and entitlement.

### **Targeting households according to illness**

The high prevalence of HIV/AIDS has brought the targeting of HIV affected households into prominence. HIV/AIDS can create additional risk of food insecurity and through the course of the crisis in southern Africa, attention has been given to how food insecure households, with the additional burden of HIV/AIDS, can be effectively targeted.

First, it should be noted that the impact of HIV/AIDS on household food security is still poorly understood, certainly highly variable (i.e. HIV/AIDS affects both poor and wealthy households) and depends on a range of factors, such as which household members are affected, the household livelihood strategy and the demographic profile of the household. It is, probably, a fair generalization to say, that in most settings, the effect of HIV/AIDS (through the loss of productive household members, increased costs, e.g. from increased numbers of dependent children) is to increase the level of poverty, but that much poverty will arise from other, unrelated causes. Thus, the most food insecure households may or may not be HIV/AIDS affected. Therefore, attempts to target HIV/AIDS affected households alone are unlikely to be appropriate, as they will exclude other food insecure households.

Further, in most contexts, it is difficult to develop criteria which identify HIV/AIDS affected households accurately. Many people will not know their HIV status and even if they did, open discussion may increase the stigmatization they face. Proxy indicators of HIV/AIDS may go some way to identifying these households, but run the risk of supporting households which are not food insecure, and of excluding households which require food security support.

Where the objective of targeting is to address food insecurity, it may be better to adopt established criteria, e.g. to target the poorest households and, where administrative systems allow this, to



adjust this to meet the special needs of particular households, e.g. to provide a better quality of diet to households with chronically ill members. In southern Africa in 2002-3, the approach taken was to increase the size of the general ration, on the assumption that the increased provision would reach those affected. In addition, recommendations were made to increase the quality of food provided and where possible, provide milled, rather than whole, grain (to avoid the need for HIV/AIDS affected individuals from having to pound grain). In addition to improving the quality of rations, distribution of rations need to take into account that people living with HIV/AIDS may be less mobile and less able to carry food long distances from distribution points. They are also less likely to be able to participate in heavy labor in food for work schemes.

During an emergency, there may be scope to target HIV/AIDS affected households with food aid on a local scale. This is likely to be possible only where a long term programme for support of these households is already in place. For example, the Zimbabwe Red Cross added food aid to the package of services offered by volunteers to HIV/AIDS affected households. The other services included hygiene training for infection management, promoting key health and nutrition messages, and working to reduce stigma. The criteria used to identify these households, 'home based careclients' and their families are shown.

### **Targeting households according to the nutritional status of children: the 'family ration'**

In the absence of a clear understanding of who is food insecure, some targeting strategies have been based on the assumption that if a household has a malnourished child registered in a feeding centre, then this is an indicator of food insecurity. Households with children that are malnourished are, therefore, targeted for a general household ration. However, this assumption may not be valid where a child is malnourished primarily due to other factors, e.g. disease or inadequate care.

This targeting strategy, sometimes referred to as providing a 'family ration', has been adopted in a number of emergency contexts where support for the general population is absent or inadequate. While the provision of a family ration may target food to a proportion of needy households, the strategy in situations of overall scarcity has potential weaknesses;

- a) It may exclude households in need of food which do not have an eligible child and lead to families attempting to admit children who do not meet the eligibility criteria, causing practical problems of numbers.
- b) Some children may be kept in an undernourished condition to ensure that the family has access to a ration.
- c) Providing the ration at the point of the malnourished child's discharge is contrary to the logic of the distribution, i.e. it keeps a household in want for a potentially long period before they receive food support.

In situations of less extreme shortage, targeting households according to the nutritional status of their members may be an appropriate strategy. In Afghanistan, Concern chose anthropometric indicators to target households with a comprehensive general ration of rice, wheat, oil and beans, for all household members for five months. MUAC measurements of women and children were used to determine eligibility and therefore, many children and women who were at nutritional risk, but who were not yet meeting weight for height/BMI

criteria for acute malnutrition, were included. The targeting strategy allowed women to be targeted who were known to be socially and politically vulnerable (Kopplow, 2003).

### **Targeting households according to gender**

Targeting households headed by females, on the basis that such households are most vulnerable to food insecurity, is another strategy that has been used by agencies. However, as with all possible target groups, no assumptions should be made which are not validated by assessment about the food security of female headed households.

In Ethiopia, a recent study found that female-headed households were four times more likely to be destitute than male-headed households. If, however, female-headed households were used as a criterion for targeting of food assistance to the most needy, there would be a high inclusion error (as two-thirds of these households are not destitute) and high exclusion errors (because of the higher frequency of male headed households). In other country contexts, female headed households may not face economic disadvantage compared to male headed households.

### **Self-targeting of households and individuals**

Eligibility criteria can also be set indirectly. 'Self-targeting' approaches include:

- Market interventions which allow the individual or household to choose if they acquire food and how much they acquire. Interventions include price support for staple foods, or cash distribution to increase people's ability to purchase food.
- Commodity choice can occasionally be used to increase the chances of food reaching a particular population group
- Food for work, which is intended to exclude non-eligible people by posing a deterrent, is typically intended to 'self-select' only those people who have no more satisfactory way of obtaining food.

## 5.6 MASS FEEDING AND SUPPLEMENTARY FEEDING

Supplementary feeding is not a substitute for inadequate basal feeding and should always be considered in the context of the total ration. Complementary nutrition programs include:

- **Blanket supplementary feeding** is an urgent solution to prevent nutritional deterioration in high-risk groups such as children under five, pregnant and lactating women, families living with HIV/AIDS and the elderly. In emergencies, the World Food Programme, UNHCR and implementing agencies will work to ensure the timely delivery of adequate universal food. However, subpopulations that are already malnourished or at high risk of malnutrition may require complementary foods for a period of time. For example, flat-rate supplementary feeding should be considered in the early stages of a nutritional emergency when general food supplies are still inadequate.
- **Targeted Supplementary feeding** is recommended for acutely malnourished children aged 6 months to 5 years according to established criteria (mid-arm circumference <12.5 cm or weight between 70% and 79% of height). is intended for pregnant women in the second or third trimester of pregnancy. Women who are breastfeeding up to 6 months after giving birth. Adults who are severely malnourished (BMI < 16) based on body mass index and the elderly. Of particular concern are families living with HIV/AIDS. The aim of targeted nutrition supplementation is to prevent severe acute malnutrition in moderately malnourished persons and to limit the need for comprehensive therapeutic nutrition, especially in children. Targeted supplemental feeding is often implemented to a limited extent.
- **Supplementary feeding linked to therapeutic feeding** is intended for children who have been released from therapeutic nutrition but who are still mildly malnourished. A child is usually discharged from these supplemental feeding programs when she reaches 85% of her average weight and has maintained that weight for two consecutive weighings.

In the absence of information on the prevalence of acute malnutrition

in food emergencies, the projected figure of 15 per cent of children under 5 years of age being malnourished can be used to estimate their nutritional needs.

For example:

<b>For an emergency affected population of 30,000</b>	
Estimated number of children aged less than five years (15% to 20%)	4,500 to 6,000
Estimated number of moderately malnourished children (15%)	675 to 900

For complementary nutritional interventions for pregnant or lactating women, a proportion of 2.5 can be used to estimate the proportion of pregnant women in the total population. 2.5 inches can also be used to estimate the proportion of breastfeeding mothers in the total population.

Food commodity	Take-home daily dry ration		On-site daily wet ration	
	1	2	3	4
Blended fortified food	200	250	75-100	-
Cereal				125
Pulse				30
Oil, fortified with vitamin A	20	25	15-30	20
Sugar	15	20	10-20	
Salt, iodised				5

**Dry ration** should be provided for home preparation. Wet food (cooked food) should be limited to situations where distribution of dry food could be endangered, such as in post-disaster situations, when people have no means of cooking for themselves, or on the way home. . Dry feed with take-home supplements provides 1,000 to 1,250 kcal per person per day, while feed-in or wet feed provides 500 kcal per person.

Supplementary food preparation must be culturally appropriate to incorporate palatable and locally available foods. The World Food Program has collected recipes from around the world that use fortified mixed foods to prepare staples such as pancakes, porridge, porridge and unleavened bread.

**High energy biscuits** (referred to as BP5 and BP100) are sometimes used as dietary supplements when fortified feed mixtures and grain/legume mixtures are not available. If you give biscuits to small children, dissolve them in water. High energy biscuits are not suitable for children recovering from

severe malnutrition and should not be used for nutritional therapy. However, high-energy biscuits supplement the diet and energy intake of pregnant women in the second trimester and reduce the risk of low birth weight babies. Summarize the criteria for starting and closing supplementary feeding programmes.

### **Criteria for opening and closing emergency supplementary feeding**

	<b>When to open</b>	<b>When to close</b>
Blanket supplementary feeding	At onset of an emergency, before the food pipeline and general food ration are improved and sustained. Outbreak of scurvy, beriberi or pellagra in the target population.	When the food pipeline and general food ration distribution are adequate.  When there are no cases of scurvy, beriberi or pellagra in the target population.
Targeted supplementary feeding	To prevent deterioration in the nutritional status of vulnerable groups in the population (children under five, pregnant women, lactating women, families affected by HIV/AIDS, the elderly) and when there is a need for large-scale therapeutic feeding.	When the prevalence of global acute malnutrition is stable or declining.
Supplementary feeding linked to therapeutic feeding	When there are too many severely malnourished individuals to be treated adequately in existing health care facilities.	When the number of severely malnourished cases decreases to a number that can be adequately treated in clinics or hospitals.

## **MASS FEEDING**

### **Mass Feeding for Emergency Operations**

Finding and equipping a mass feeding site

#### **Food safety**

- Keep perishable foods at room temperature for periods of 30 minutes or less. Otherwise, maintain cold food at 41°F or below, or hot at 135°F or above.
- Do not serve time/temperature control for safety food (TCS food) such as ground meat or egg salad sandwiches, chicken or other fowl, potato salad and cream-filled desserts and pastries.
- Appropriate meal items include peanut butter and jelly sandwiches, smoked meat or cheese, and canned fruits and vegetables.
- Do not serve home-prepared meals or hot dishes. Home-prepared non-TCS foods such as baked cookies, bars, fruit pies or cakes are acceptable.

**KEEP HOT FOODS HOT AT 135°F OR ABOVE.**

**KEEP COLD FOODS COLD AT 41°F OR BELOW.**

### **Sanitizing cooking and eating utensils**

Use disposable dishes and utensils whenever possible. Do not reuse plastic or paper items. If you must use washable dishes and utensils, clean them in a standard three-compartment sink, or a sink equipped with three separate containers that can serve as an improvised three compartment sink.

### **Procedure to sanitize cooking and eating utensils**

1. Wash all items in the first sink, using a household detergent solution in clean, hot water.
2. Rinse in the second sink, in clean, hot water. Remove all detergent residues, to ensure that the final sanitizing step will be effective.
3. Sanitize your utensils in the third sink. Use a solution made with one tablespoon of bleach for each gallon of water. This will yield a chlorine concentration of 200 parts per million, which should be adequate to sanitize your dishes, even if the water you are using is contaminated. Make sure your dishwashing water is clear and free of sludge or sediment.
4. Air dry all dishes and utensils.

### **Food service workers**

All persons volunteering to work in the mass feeding center should be properly oriented before they begin work.

### **Personal hygiene**

- Food workers should wash their hands frequently, particularly after using the toilet, or after handling materials or equipment that may be contaminated.

- Keep yourself and your clothing clean. Cleanliness is essential for all people who work in the mass feeding center.
- People with vomiting, diarrhea, fever, or respiratory illnesses should not be allowed to work in a food service operation. ■ No one with cuts, burns or other skin abrasions should be allowed to handle food unless wounds are covered with waterproof dressings or gloves.

### **How to wash hands**

1. Wet hands properly
2. Apply soap
3. Rub your hands for 10 to 15 seconds
4. Rinse hands
5. Dry hands
6. Keep hands clean

The entire process must last at least 20 seconds. Gloves, wet-wipes or hand antiseptics are not substitutes for hand washing.

### **Prevent bare hand contact with food**

People in a disaster can be at greater risk for getting sick from unsafe food. One way of keeping food safe is for food workers to wear gloves while preparing food. It is important that gloves be used the right way:

- Food workers should use utensils such as tongs, scoops, deli papers, or single use gloves to keep from touching food whenever possible.
- It is important to wear gloves when touching food that will not be cooked (ready-to-eat food) such as sandwiches, carrot sticks and cookies.
- Food workers should wear single-use gloves when they are preparing foods that have to be handled a lot. This includes making sandwiches, slicing vegetables or arranging food on a platter.

It is also important to remember that both hands and gloves must always be clean.

- Always wash hands before putting on clean gloves.

- Change gloves that get ripped or torn.
- Change gloves that get dirty.
- Never wash or reuse gloves.
- Change gloves when you change jobs, such as when you move from making sandwiches to cutting raw vegetables.
- Throw gloves away after you use them.
- Wash your hands after taking gloves off.

## **Supervision**

If possible, someone who has experience with large food service operations should supervise your mass feeding operation. Possible supervisors include school or institutional food service managers, or people who have worked as cooks, employees or managers in large restaurants.

## **Drinking water**

If your water has been contaminated or if you are unsure of its safety:

- Use only boiled or bottled water.
- Use only commercially packaged ice from approved sources.

## **Garbage handling**

Dispose of garbage frequently. If the local community disposal facility is not accessible, use a remote area for temporary storage. Clean these temporary storage areas thoroughly, and transfer garbage to the regular facility when it reopens.

## **CHECK YOUR PROGRESS**

- 1- What are the various food emergency situations?
- 2- Write down various causes because of which emergency situation can arise?
- 3- Write a detailed note assessment of food needs in emergency situations?
- 4- What do you understand by food distribution strategy?
- 5- Comment on various steps of food distribution strategies?
- 6- What steps would you follow while organizing a buffer stock for food emergency situations?
- 7- How will you identify the vulnerable groups of the affected community?
- 8- Throw light on targeting food aid in emergency situations?
- 9- What steps will you follow while organizing mass feeding in emergency situation?



**10-** Write a detailed note on supplementary feeding?

