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Community medicine and health

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Abstract---The Foundations of Community Medicine in its present form has a number of distinguishing traits that are explored throughout this book. These characteristics are what set it different from other publications that cover comparable topics. It contains material that is properly organized, which is free from duplication, confusion, and uncertainty, and which assures that all of the important information about a topic is accessible in one area. Places an adequate emphasis on the practical aspects of preventive medicine and public health, with a major attention on the circumstances that prevail in the Indian context. Contains an in-depth overview of numerous methods used in public health, including immunization, disinfection and sterilization, notification, isolation and quarantine, population screening, and public health monitoring. This book applies a management approach to the discussion of health organizations, health programs, and health care systems that are already in place in the nation. Contains in-depth discussions of the physical, social, and biological surroundings, with an emphasis on environmental contamination and how to combat it. In light of the fact that the rate of industrialization in India is accelerating, this book provides sufficient information on occupational dangers and industrial difficulties. It Includes a comprehensive discussion on key topics relating to maternity health, infant health, child health, adolescent health, and geriatric health, all of which are covered in depth inside an exclusive portion of the book that is dedicated to personal health care.

Keywords---community medicine, health, nutrition.

Introduction

Basic Concepts of Community Medicine

Introduction to Community Medicine

Community: (Population) Definition

According to the definition provided by the authors, "The Community is a significant number of persons living together in specified geographical area and sharing shared interests, objectives, and methods of life." Or it might be a

collection of individuals who share a sense of community because they are all aware of the bonds that unite them.

Examples

- Location-based groups
- The geographical region that is serviced by a particular hospital or health care facility; a municipality; a county; a province; or a nation.
- The term "population group" refers to a narrower category of people.

Community Medicine

To better the health of a community, "community medicine" is described as "a method of delivering comprehensive medical care to individuals by a health team. Health promotion may alternatively be described as "the art and science of avoiding illness, enhancing health, and extending life via the coordinated efforts of society".

- Its focus is on improving people's health as a whole.
- Treats the community (or population) as if it were a patient.
- Discusses the society as a social system, including its makeup, operation, and breakdown.

A relatively recent medical specialization, "community medicine" is an innovative field. Commonly used interchangeably with Public Health, Community Medicine, and Preventive Medicine. The unifying goal of these activities is the avoidance of illness and the improvement of people's health. The two concepts are frequently used interchangeably.

Preventive (Community) Medicine seeks to use epidemiology to evaluate and track the health of communities as well as populations at high risk to identify health problems; promote and retain health in individuals and communities through the adoption of healthy lifestyles and health education; prevent as well as limit diseases; enhance quality of care system and assure that almost all populations have access to appropriate, cost-effective care; and use epidemiology to evaluate and track the health of the community and populations at risk.

Prevention is the proactive measures taken to lessen the likelihood of something happening or growing, or to lessen the impact of something that does happen. Any step along the continuum from preventing the sickness or damage itself to preventing the subsequent impairment, disability, or reliance may be considered "prevention".

Levels of prevention

- 1- Primordial prevention: (Acting on risk factor) entails taking steps to prevent the creation of risk factors, such as those found in a person's environment, economy, society, behavior, and culture.
- 2- Primary prevention: (Acting before disease occurrence) Measures taken before the beginning of illness. We take action before the onset of the

disease's symptoms. Example: vaccination, smoking prohibition, speed restriction, and safety belts.

- 3- Secondary prevention: (Acting after disease occurrence) Detection of health issues early to prevent their spread. Examples include the detection of hypertension, diabetes, cancer of the cervix and breast, and sexually transmitted diseases at an early stage.
- 4- Tertiary prevention: (Acting after complications occurrence) Targeted efforts to lessen the disability via therapy. Examples include regaining mobility after a stroke, adapting to a new diet and way of life following a heart attack, and coping with diabetes.

Vaccination is an example of an intervention that is used on an individual level to prevent disease, whereas water chlorination is an example of a community-wide measure that protects against waterborne illnesses.

History of public health & community medicine

Mankind has recognized for generations that prevention is key. Water pollution and improper waste disposal were considered potential vectors for disease transmission early in human history. Diversion of human excrement was a cornerstone of Roman urban planning, since it was known that it was essential for public health. It wasn't until Edward Jenner's research in the 1820s that vaccination became common practice. Epidemiology was founded by John Snow, who traced a cholera epidemic in London to tainted water supplies in 1854. The discovery of microorganisms in the 1880s by Robert Koch & Louis Pasteur and the subsequent development of artificial vaccines ushered in the modern age of public health. In the early 19th century, public health became a recognized field of study in advanced economies. Public health policy and program development need cross-sectoral coordination because of the complexity of illness origins and mitigation strategies.

It's safe to say that pharmacy is one of oldest professions, having been refined and perfected by several cultures throughout the centuries. Up to the 18th century, all physicians practiced general medicine, meaning they helped patients with any illness. The 20th century is often recognized as the Golden Age of Medical Specialization because of the revolutionary changes that took place in the field of medicine during that time. Curative medicine's four pillars—general medicine, surgery, pediatrics, and gynecology and obstetrics—laid the groundwork for the development of several subspecialties. When it comes to bridging the gap between the practice of medicine and health care, preventive (community) health has stood shoulder to shoulder with other specialties that place a greater emphasis on prevention.

In the '50s, both Europe and the United States officially recognized family medicine as a distinct medical discipline. Despite its relative youth, general practice medicine is often seen as the progenitor of all other medical subspecialties. Many major illnesses have shown a drop in occurrence since the advent of efficient clinical preventive care, highlighting the need of integrating prevention into medical practice. In the United States and many other nations,

poliomyelitis has been reduced to a rare occurrence as a consequence of childhood immunization programs.

In 1992, the term "evidence-based medicine" (EBM) was coined. Historically, this way of teaching was heralded as a "revolution" in the healthcare profession. Careful consideration of the best available data in making decisions regarding patient treatment is evidence-based medicine, or EBM. EBM necessitates combining one's own clinical knowledge with the most current and relevant external data gleaned through systematic studies.¹ Preventative Care sciences: Include a range of biological, epidemiologic, statistical, social, or economic studies and activities aimed to assess, protect, and improve health on a population. It's a great chance for doctors who want to learn how to improve individual and community health as well as avoid illness and premature death to get experience in these fields.

Hygiene

Hygiene refers to an array of preventative measures used to keep oneself in good health. In its definition of hygiene, the World Health Organization (WHO) states, "Hygiene refers to situations and behaviors that assist to preserve health and prevent the spread of illnesses." Maintaining one's own cleanliness is what is meant by "personal hygiene." There are many different types of hygiene practices, but they may generally be broken down into the following categories: personal hygiene, home hygiene, medical cleanliness, sleep hygiene, and food hygiene. Hand washing, cough etiquette, food standards at home, kitchen hygiene, bathroom hygiene, laundry hygiene, & medical cleanliness at home are all part of regular and daily home hygiene.

Hygiene is often confused with cleanliness, but it really encompasses much more. Personal hygiene includes decisions like how often to wash one's hands, cut one's nails, and launder one's clothing. Maintenance of sanitary living and working environments also involves paying special attention to the cleanliness of public restrooms. In the same way that people may appreciate those who take care to maintain a certain standard of personal cleanliness, they may fear those who disregard these norms.

Hygiene is the study and application of practices that promote health, cleanliness, and well-being. Hygiene techniques are used as preventative measures in medical and daily life to lessen the spread of infectious diseases. Hygiene practices vary from one culture to another. Quality control in the production of consumables such as food, drugs, and beauty items rely heavily on strict adherence to sanitary standards. Hygiene and cleanliness are frequently used interchangeably, which may be misleading. Hygiene, in its broadest sense, includes any measures used to limit the transmission of germs that might cause illness. Hygiene is often attained by the practice of cleaning (e.g., handwashing), which gets rid of both potentially pathogenic bacteria and dirt and soil.

¹ <https://www.uoanbar.edu.iq/eStoreImages/Bank/18513.pdf>

Hygiene may also refer to one's physical appearance, one's sleeping habits, one's state of mind, one's teeth, or one's place of employment in the context of public health.

Home and everyday hygiene

Home hygiene overview

Hygiene at home, as well as other common venues like schools, public transportation, the workplace, and shopping malls, is essential in preventing the transmission of illness. The prevention of infectious illnesses requires a focus on hygiene in a wide range of contexts. Hand hygiene, respiratory hygiene, water and food hygiene, general house hygiene (hygiene of environmental locations and surfaces), care of household pets, and home health care are all examples of practices that fall under this umbrella (the care of those who are at greater risk of infection).

Although they share the same fundamental microbiological principles, these aspects of hygiene are often treated independently at present. Stopping the spread of infectious illnesses requires severing the links between hosts. To put it another way, if you stop an illness in its tracks, it won't spread. Targeted hygiene relies on identifying potential entry points for pathogens into a residence and implementing preventative measures at crucial junctures. With the help of Hazard Analysis and Critical control Point (HACCP), it takes a cautious approach to potential dangers.

Humans (carriers or those already sick), food (especially raw food), water, pets, and domestic animals are the most common vectors of disease in the house. Species that pose the most danger to "at risk" populations are more likely to colonize sites that store stagnant water, such as sinks, toilet, waste pipes, cleaning utensils, face cloths, etc. These sites regularly release pathogens (possibly pathogenic bacteria, viruses, etc.; colloquially termed "germs") via secretions like phlegm, faces, vomit, skin scales, and so on. Consequently, when the right conditions arise, humans may get infected after being exposed to the pathogen in question either directly or indirectly via their consumption of contaminated food or water.

Hands and food contact surfaces, cleaning cloths and utensils are major "highways" in the house for the spread of infections (e.g., fecal-oral route of transmission). Clothes and linens, such as towels, may potentially be vectors for the dissemination of disease-causing microorganisms. Even while human waste utilities like toilets & wash basins were developed to reduce health concerns, they are not risk-free. The lack of infrastructure in place to properly dispose of biological waste is an important contributor to the prevalence of diarrhea in low-income regions. Airborne transmission is common for respiratory pathogens such as viruses and fungus spores.

In order to prevent the spread of disease, it is essential to maintain good hygiene at key places in the house. Infection can result from direct exchange of pathogens from surfaces (via hands or food) to the mouth, nasal mucous, or eye, and the "infection rate" for some pathogenic organisms can be very low (10-100 viable

units or even fewer for some viruses), so "hygienic cleaning" processes should be sufficient to eradicate pathogens from critical surfaces.

Hand washing

The practice of cleansing one's hands with water and soap to eliminate germs, filth, oil, and other potentially dangerous items is known called hand hygiene or simply "hand washing." Since decontaminating damp or moist hands is easier, drying them off is a necessary step. If you can't get your hands clean with soap and water, you may use hand sanitizer that has at least 60% (v/v) alcohol in water instead. Practicing good hand hygiene is essential for limiting the transmission of illness in daily contexts.

Before and after participating in some activities, the World Health Organization (WHO) advises handwashing for at least 20 seconds. The five most important times of day to wash your hands with soap and water to prevent the spread of disease from faces to your mouth are immediately after using the restroom (for urination, defecation, or menstrual hygiene), after changing a child's diaper, before feeding the child, before eating, and before/after food preparation or handling uncooked meat, fish, or poultry.

Respiratory hygiene

Use of proper respiratory or hand hygiene while coughing and sneezing is especially important during the flu and cold season to prevent the transmission of infectious diseases. Take tissues with you and employ them to shield others from your coughing or sneezing, or sneeze into the crook of your elbow. Tissues should be thrown away as soon as feasible.

Hygiene in the kitchen, bathroom and toilet

Hands, food, sites, and surfaces (including toilet seats and flush controls, door and tap handles, worktops, bath & basin surfaces) should be cleaned regularly in the kitchen, bathroom, and toilet rooms to prevent the transmission of germs. Although some splashing or aerosol generation may occur when flushing, the danger of infection from using a flush toilet is low so long as the toilet is regularly serviced and especially when someone has diarrhea. Bathtub, shower, and sink deposits harbor potentially harmful bacteria and other microorganisms.

In order to stop the spread of fungal diseases, thorough cleaning is essential. Tiles, carpets, and shower curtains are all potential habitats for mould growth. Mold is a problem since it may lead to illness, trigger allergies, ruin belongings, and release a foul stench. The majority of fungal growth occurs on inanimate surfaces such as carpets and upholstered furniture. As a rule, moulds and fungi in the air are signs of a wet environment, inadequate ventilation, or a sealed air system.

Hygienic cleaning can be done through

Subtraction by hand using a cleaning agent. For this method to be really hygienic, it must be accompanied by a thorough rinse under running water to get rid of any remaining germs or bacteria. Employing a method or substance that kills germs where they're found. A "micro-biocidal" product, such as a disinfectant, antibacterial product, a waterless hand sanitizer, or heat, is used to eliminate pathogens. Using a combination of pathogen elimination and kill is necessary in certain situations, such as when laundry clothes and other textiles like towels and sheets.

Laundry hygiene

Diseases may be transferred via unclean clothes and linens in the home, such as towels, therefore it's important to practice good laundry hygiene to stop that from happening. Items that come into close touch with the body, such as undergarments, personal towels, facecloths, and diapers, are the most likely to be contaminated with microorganisms. Particularly at danger are cloths and other fabric objects used in the preparation of meals, in the cleaning of the toilet, or in the cleaning of substances such as farces or vomit.

There is evidence from both microbiological and epidemiological studies to suggest that items of clothes and linens used in the home and in daily life are a vector for the spread of illness. It is difficult to determine the degree of this risk due to the absence of quantitative evidence connecting contaminated clothes to illness in a household context. While this data suggests that the hazards connected with hands, hands contact surfaces, food preparation areas, and cleaning cloths are higher, it also shows that risks related with clothes and home linens need to be handled by efficient laundry methods. This practice should be implemented in the household as part of a comprehensive hygiene regimen that also covers hand, food, respiratory, and other types of cleanliness.

Illnesses that may be spread to others in healthcare settings like hospitals, care facilities, and the home, the hazards from contaminated clothes, etc., may rise considerably when someone has diarrhea, vomiting, or a surface or wound infection. As a person's defenses against infection weaken, this risk rises. Preventing the spread of antibiotic-resistant bacteria is possible in part via proper hygiene practices, such as clean washing. Persistent skin carriers of MRSA (methicillin-resistant *Staphylococcus aureus*) or faecal carriers of enterobacterial strains that have multi-antibiotic resistance elements may occur in otherwise healthy patients in the community (e.g. NDM-1 or ESBL-producing strains). When patients are hospitalized, for instance, and "self-infect" with their very own resistant microbes after surgery, the dangers don't become obvious. Health care facility and community exposure to resistant strains rises as chronic nasal, skin, or bowel carriage among otherwise healthy people expands "silently" over the globe. The data suggests, in particular, that items of clothing and household linens are a risk factor for the spread of virus, and that the efficacy of laundry processes may be an important factor in defining the rate at which these strains spread throughout a community. Based on what we know about how easily these strains spread in the United States, they may easily spread from person to person

and from community to community via institutions like homes, schools, and even sports teams. Transmission seems to occur mostly via direct skin-to-flesh contact (including unbroken skin) as well as indirect contact with infected things like towels, bedding, and sports equipment.

The levels of microbiological contamination on textiles may be reduced by the use of heat and detergent during laundry. A lot of the dirt and germs on the clothes are snipped off and float about in the wet stuff. Then the rinse or spin cycles "wash" them away. In addition to being eliminated physically, microorganisms may also be destroyed by thermal inactivation, the efficacy of which improves with rising temperature. Laundry's hygienic efficacy stems, in part, from the surfactants or activated oxygen-based bleaching used in detergents, both of which chemically inactivate bacteria. Microbes may be rendered harmless during the washing process by using hypochlorite bleach. Factors like as drying and ironing might also have a role.

Drying laundry on a line in direct sunlight is known to reduce pathogens. There was a significant discrepancy in test conditions including wash cycle length, number of rinses, and other variables, and there was a lack of uniformity and control within studies. Therefore, it is exceedingly challenging to give suggestions for laundry with any certainty, based on the existing data, due to the inherent diversity in the data acquired (i.e. the decrease in contamination on textiles). Thus, various organizations' guidance on how to clean clothes properly varies greatly.

Medical hygiene at home

When providing medical treatment to persons who are infected or more "at risk" of infection, medical hygiene refers to the hygiene practices that prevent or decrease illness and the transmission of disease. Governments everywhere are under the heat to provide the high standard of healthcare their citizens want. Community care settings, including patients' homes, may be part of the solution, but they are vulnerable to deadly infection outbreaks if not properly equipped. All of these "at-risk" populations are increasingly cared for at home, by a professional who may also be a family member, necessitating a thorough understanding of personal hygiene practices. A growing percentage of the population (up to 20% at present) need home care because they have a weakened immune system. The majority are frail seniors whose several health problems leave them more vulnerable to infection. People who are extremely young, just out of the hospital, on immunosuppressant medications, utilizing invasive systems, etc., are also included. There is an increased risk of infection for patients who have been released from the hospital or are receiving treatment at home because of the need of "medical hygiene" procedures such as catheter or dressing changing.

To stop the spread of germs that may lead to sepsis, antiseptics can be administered to open wounds. Those at higher risk of infection should exercise the same level of daily cleanliness as the rest of the family, with the exception of any particular medical hygiene routines. The distinction is that the danger of infection increases dramatically if proper hygiene procedures are not followed.

Preventive Medicine

One of the most important aspects of what is more often referred to as public health is preventive medicine, or the practice of aiming to keep people healthy by taking preventative measures. In addition to lowering the likelihood of being sick, preventative medication also plays a crucial role in avoiding those negative outcomes.

Hippocrates, a Greek physician from the fifth century BCE, divided the factors that contribute to illness into two categories: external factors like weather and environment, and internal factors like dietary and lifestyle choices. Despite the prevalence of diseases like leprosy and the plague during the Middle Ages, the concepts of preventative medicine were largely disregarded. The Renaissance brought forth new knowledge that completely altered the face of medicine. Once again, medical professionals noted how illness rates varied with the seasons, in addition to the environment and individual interaction.

An empirical shift toward more effective preventative measures occurred at the same time as medical knowledge expanded. In 1388, England approved the first sanitary legislation aimed at getting rid of nuisances; in 1443, an order was issued suggesting quarantine and cleaning; and in 1518, rudimentary efforts were made to notify the public and isolate the sick during an epidemic. Death rate analysis as a field of study has its start in 17th century England. In the middle of the 17th century, the foundations of epidemiology were built. A study of work-related illness was first published in Italy in the early 18th century. An early 18th-century English physician wrote extensively about poisons, the plague (and how to avoid it), smallpox, measles, and scurvy. In 1798, the first vaccine was developed. Diseases including typhus, cholera, typhoid fever, or puerperal fever had their transmission mechanisms elucidated in the early and middle years of the 19th century. During this time, concerns about sanitation and nourishment began to get more and more media coverage.²

Midway through the nineteenth century, Louis Pasteur established the function of live bacteria as the cause of illnesses, ushering in the modern age of preventative medicine. By century's end, the concept of disease transmission by insects had been established. The Widal response for typhoid fever (1896) as well as the Wassermann test for syphilis (1900) are two examples of early serological assays (1906). Activated immunization against certain illnesses was developed once researchers learned the mechanisms behind immunity. Similarly, the development of an antitoxin to combat diphtheria and an arsphenamine to combat syphilis have both paved the way for more effective methods of disease prevention. Antibiotics, such as penicillin, streptomycin, chlortetracycline, or chloramphenicol, and their sulfonamide predecessors opened up new avenues for the treatment and prevention of bacterial infections in 1932.

Preventive medicine for conditions except infectious ones advanced rapidly after 1900. X-rays and radioactive chemicals have been used for a variety of medical purposes, including the detection and treatment of serious diseases like TB and

² <https://www.britannica.com/science/preventive-medicine>

cancer, and in the pursuit of basic physiologic knowledge. Preventative therapies for certain metabolic illnesses became possible as a result of advances in our knowledge of endocrine processes and the development of synthetic hormone extracts like insulin. Nutrition's significance in health and illness was made clear, as was the need of a balanced diet, by the isolating of several key dietary variables. Reducing one's alcohol intake and giving up smoking have both been identified as crucial measures for preventing a wide range of illnesses. For smokers, this includes a lower risk of developing lung cancer and oral cancer; for alcoholics, this includes a lower risk of developing liver disease.

New surgical procedures, an aesthetic treatment, genetics research, and a broader appreciation of the role of the mind in overall health all contributed to the development of preventive medicine in the 20th and 21st centuries. The development of better methods for detecting cancer has led to more effective screening for a broad range of malignancies, such as the wide use of colonoscopy for colorectal cancer, mammography for breast cancer, and Pap smears and HPV testing for cervical cancer. Cholesterol and hypertension screenings were crucial in discovering, diagnosing, and managing these life-threatening conditions.

Community Diagnosis

Community

The word "community" may be used in two different but related ways:

- A community is any group of people who live together and have mutual interests and goals. Alternately, it may be used to mean the country as a whole or the global society,
- A society is a collection of creatures that interacts with one another and shares a habitat.
- In human communities, the identity of its members and the degree to which they are cohesive may be influenced by a wide range of factors, including but not limited to intent, belief, assets, preferences, requirements, hazards, and a variety of other variables.

Community diagnosis

In the words of the World Health Organization, it is "a detailed analysis of the state of public health and the variables that affect it. It pinpoints issues, suggests solutions, and motivates others to take action ". The phrase "community diagnosis" is used to describe the process of determining the prevalence and severity of health issues in a certain area, as well as determining the risk factors for these issues and the characteristics of those who are most likely to need medical attention as a result of them.

Diagnosing the health requirements of a community requires taking into account not just individual experiences but also broader social and demographic trends. Community Diagnosis as a Theoretical Framework Evaluation and diagnosis of community health is both a procedure and an end result.

As a process:

1. Finding and analyzing data
2. Identifying critical requirements and planning next steps
3. Managing and Assessing the MHP
4. making plans for future action

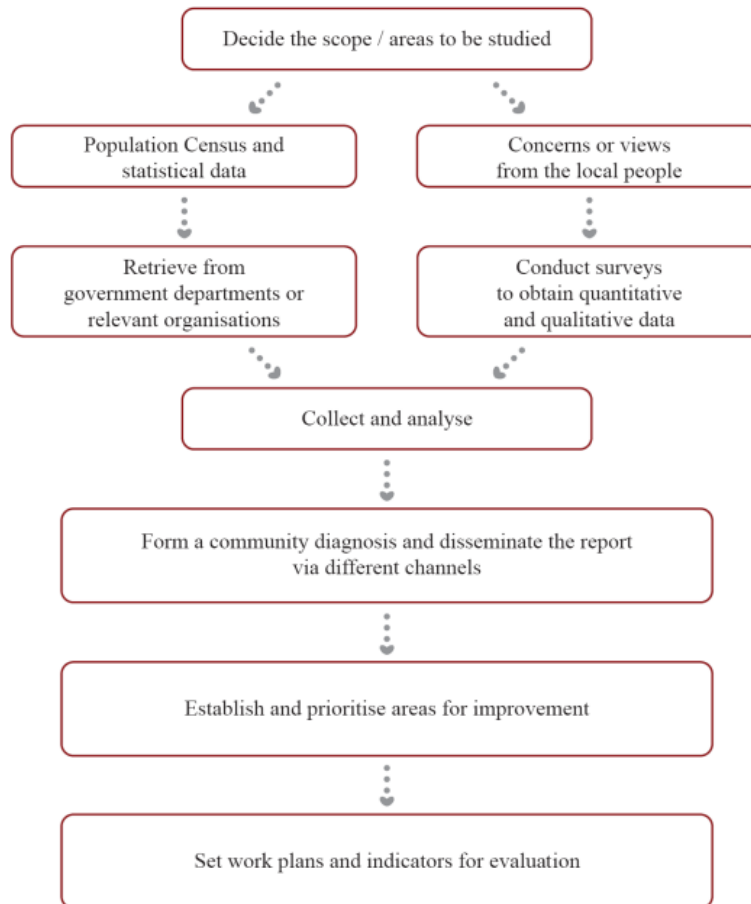


Figure 0.1 Community diagnosis process³

As a product:

1. Report on the Community Health Assessment
2. Strategies for future intervention

Community diagnosis is indeed a theoretical paradigm for disease prevention in the healthcare industry. Community diagnosis is based on the idea that each given process may be broken down into many, sequential stages:

1. Descriptive,

³https://www.chp.gov.hk/files/pdf/hcp_community_diagnosis_en.pdf

2. Analytical, and
3. Action programs.

Community diagnosis is built on the previous two layers of data, and then is followed by public health intervention.

Concept of Health

The World Health Organization defines health as "a condition of full physical, mental, and community well-being and not only the absence of sickness and disability". A wide range of meanings have been ascribed to this term for various reasons. To improve health, we must encourage healthful behaviors, like regular physical activity and appropriate sleep, and discourage unhealthy ones, like smoking and stress. Individual decisions, such as whether or not to partake in a high-risk habit, may have an impact on health, but societal factors, such as the accessibility of healthcare facilities, also have a role. Some things, like genetic abnormalities, are not up to anybody or any group to decide. The concept of health has changed significantly throughout time. Early definitions of health, in line with the biomedical model, centered on the concept of bodily function; health was viewed as a condition of normal function that may be temporarily disturbed by sickness. One such description is "a condition defined by anatomic, physiologic, or psychological integrity; capacity to execute individually valued family, work, and community tasks; ability to cope with physical, physiological, psychological, and social stress." Then, in 1948, the World Health Organization (WHO) presented a definition that aimed higher, tying health to well-being, in term of "physical, mental, or social well-being, and not only the absence of sickness and disability." Some people praised this term for being novel, while others said it was too broad and lacked specificity, so they couldn't use it to measure anything. For a long time, the biological paradigm dominated talks about health, and this goal was laid aside as unrealistic.

There has been a similar transition in how health is defined, from being seen as a state to being seen as a process similar to that of illness. Back in the 1980s⁴, the WHO was at the forefront of another important social trend, the health promotion movement. In its place emerged a view of health less as a static entity and more as a dynamic resource for survival. With its 1984 revision, the World Health Organization defined health as "the degree to which a person or group can achieve its goals and requirements and adapt to or thrive in its environment. The idea of health is optimistic, placing value on one's own social and personal assets in addition to one's physical capabilities, and should be seen as a tool, rather than the end goal, of daily life." To be healthy, then, meant to be able to keep things in check and bounce back from setbacks. The resources for resilience and self-sufficiency that come from a person's mental, intellectual, emotional, and social health include their capacity to deal with stress, learn new skills, and sustain meaningful relationships. This paves the way for many opportunities to educate, fortify, and learn about health.

⁴ <https://en.wikipedia.org/wiki/Health>

Health care practitioners engage in systematic actions with the goals of preventing illness, treating existing conditions, and promoting health. The veterinary sciences focus on practical applications that benefit animal health. Communities, cities, and ecosystems may all be considered "healthy" if they are conducive to human well-being and are run in a sustainable manner, all examples of how the word "healthy" is used in a non-medical context. Individual health is affected by a wide range of variables beyond just access to health care and one's environment. High levels of stress have been demonstrated to impact human health, and these factors are collectively referred as the "determinants of health," which also include the person's genetics, environment, socioeconomic standing, and spiritual beliefs and practices.

The shift in thinking about health as a skill in the first decade of the 21st century allowed for self-assessments to replace external measures as the primary yardstick by which to evaluate the success of initiatives to better people's health. This shift allowed for a re-examination of health-related factors and enabled everyone to experience health while having several chronic illnesses or a terminal condition.

Physical Dimension

Physical Dimension

When a person is physically healthy, their bodies are working to perfection. It takes a scientifically based approach to health. When every cell and organ in the body is working at its full potential and in complete harmony with the rest of the body, we are talking about the physical dimension. Maximum capacity is a relative concept that cannot be precisely defined. Some indications of good health include pleasant appearance, free of acne and other skin problems; eyes and hair that shine; robust physical maturity, Fresh breath, a healthy weight, a voracious hunger, Relaxed slumber, Consistent urination and defecation, Movements that are effortless and coordinated; intact senses; All bodily organs are typically sized and operate as they should, one's resting blood pressure and heart rate are both within the healthy range for one's age and gender.

Examination of the Body Numerous methods exist for measuring physical development.

1. Taking stock of one's health in general
2. Symptoms and potential causes of illness are the focus of the second kind of research.
3. Investigational Medicines
4. Assessing Activity Levels
5. Medical care utilization review
6. Questionnaires based on standards for
 - Cardiovascular diseases
 - Respiratory diseases etc.
7. Nutritional Assessment
 - Anthropometry
 - Dietary assessment
 - Clinical examination

- Biochemical and laboratory investigations

Health status of a community may be evaluated in a number of ways.

1. Death rate
2. Infant mortality rate
3. Life expectancy
4. Maternal mortality rate

Each of these on its own may provide important information about an individual's or a group's health, but when utilized together they provide a more comprehensive picture.

Mental Dimension

Emotional, mental, and social well-being all contribute to what is known as "mental health." As a result, it influences our judgments, emotions, and behaviors. It also plays a role in influencing how we respond to pressure, interact socially, and make decisions. Taking care of one's mental health is crucial at any age, but more so during the formative years of childhood and adolescence and in later years of adulthood.

If you struggle with your mental health throughout your life, it may alter how you think, feel, and act. There are a number of causes of mental illness:

- Genes and brain chemistry are examples of biological influences.
- Personal history, including abuse or traumatic events
- Psychiatric illness in the family

Many people have mental health issues, but treatment is available for those who need it. Many people who suffer from mental illness make full recoveries.

Early Warning Signs

If you recognize yourself in any of the following descriptions, it may be time to be checked out:

- Excessive or inadequate intake of food or sleep
- Withdrawing from social situations and routine activities
- Feeling exhausted all the time
- Negative emotions, such as apathy or indifference
- Suffering from pains and discomforts that can't be explained
- To have a sense of hopelessness or helplessness
- Taking more of a risky behavior, such smoking, drinking, or taking drugs
- Disorientation, forgetfulness, agitation, anger, upset, worry, or fear
- Getting angry or upset with loved ones
- Suffering from extreme mood fluctuations that disrupt interpersonal interactions.
- Being plagued by unrelenting, recurring thoughts and recollections

- Perceiving realities that don't exist or hearing voices
- Suicidal ideation or actual attempts to hurt self or others
- Incapacity to take care of one's children or to go to and from job or school.

Mental Health and Wellness

When individuals have strong mental health, they are able to:

- Develop to their fullest capacity
- Deal with the Pressures of Daily Life
- Be efficient in your work.
- Give back to their communities in significant ways.

Positive mental health may be maintained in a number of ways:

- Helping yourself (and, if necessary, seeking outside assistance)
- Developing relationships
- Positive thinking
- Engaging in Physical Activity
- Being a good neighbor
- Getting enough shut-eye
- Mastering Adaptation Techniques.

Social Dimension

One possible definition of the social dimension includes everything that stands in the way of a person's pursuit of, and ultimately completion of, a higher education. The social aspect is a broad notion that includes many different aspects. This problem may be mitigated, though, by the availability of scholarship programs. Nonetheless, it is evident that all tuition costs, in some form or another, constitute barriers to entry into higher education.

Underrepresentation of some groups in higher education due to socioeconomic status, cultural or ethnic heritage, or physical disability is another aspect of the social component. Subsistence grants and loans represent yet another facet of a social dimension. Grant and loan portability in Europe are important since it is often required for students to relocate across the continent. Other examples include counselling services (academic, legal, and social), health services, and housing, all of which may be crucial to a student's success and graduation from college.

Spiritual Dimension

Attaining a sense of meaning and having a meaningful life requires a strong moral compass, and here is where the spiritual aspect of health comes in using these principles to direct one's daily acts and big choices. Understanding one's place in the world and one's contribution to the greater good might take a lifetime, developing through time in response to specific events, experiences, and conditions. The spiritual aspect of one's health, like all the others, ebbs and flows

as one goes through life. Thus, it is normal to go through a range of feelings while you seek spiritual well-being. Hope, pleasure, anxiety, and conflict are all examples of such feelings, but there are many more.

The capability to empower choices and decision-making

Having a strong spiritual foundation may help you weather the ups and downs of life with grace and serenity, and give you the strength to make the most of the opportunities that present themselves. Healing from the effects of mental or physical illness is aided by cultivating a spiritual practice. Finding meaning and purpose in one's life is a key component of spiritual wellbeing, which also includes robust optimism in the forms of dedication, hope, and faith.

Spiritual wellness

Numerous practices may assist in fostering optimal spiritual health, including as:

1. Digging deep into the essence of spirituality.
2. Having some alone time
3. Regular meditation practice
4. Possessing an inquisitive and inquiring nature
5. Constant participation in whatever endeavors one sets out to pursue
6. Being an attentive listener and a person of principle are two other qualities to strive towards.
7. Being able to be one's authentic self, while also being open to possibilities for personal development and facing and conquering one's own personal setbacks and difficulties in life.

In order to progress along the spiritual path, one must adopt a number of practices. There are certain routines:

1. Yoga is a collection of practices that aid in enhancing one's spiritual health by relieving mental and bodily stress. All levels of yoga practice have been shown to provide health benefits, including less stress and improved immune function, lower blood pressure, and relief from sleeplessness, exhaustion, melancholy, and anxiety.
2. Getting out from your regular routine and seeing new places is a great way to gain perspective, learn more about the world, find meaning in your experiences, and find inner calm.
3. Becoming a mentor, whether in one's personal or professional life, may be a powerful way to strengthen one's own spirit while also assisting others in developing theirs and therefore improving their health and well-being.

Emotional Dimension

As with the other six aspects of health, your level of emotional well-being is dynamic and always in flux. Having a full range of human emotions, including joy, sorrow, and rage, is a common definition of emotional health. Happiness is defined as the capacity to love and to be loved, as well as the attainment of

personal satisfaction. Positivity, self-esteem, self-acceptance, and the capacity to express emotions are all components of emotional wellbeing.

Tips for optimal emotional wellness

- Pay attention to how you really feel
- Develop a positive outlook.
- Reach out for help and be willing to provide it.
- Develop your ability to manage time effectively.
- Learn and use stress-reduction strategies
- You must have self-compassion and forgiveness.

Vocational Dimension

It opens up a whole new field of study. Vocation may improve mental and physical well-being by helping people find employment that fits with their values, skills, and limits. Employment that requires physical exertion tends to increase that ability, whereas work that allows one to pursue and accomplish personal goals is related with greater feelings of fulfilment and improved self-worth. When someone loses their employment unexpectedly or is forced to retire, this factor becomes apparent. One group of individuals sees the vocational dimension as a means to an end—a method of making a living—while another group sees it as the apex of all the other dimensions coming together to form a happy, fulfilled existence.

Well-being

One's well-being, wellness, prudential value, or quality of life, all relate to that which is intrinsically valuable to that person. Therefore, what is beneficial for a person, or what is in that person's self-interest, is that person's well-being. Both good and negative states of being are possible when we talk about well-being. Sometimes, in the positive meaning, it is contrasted with its opposite, ill-being. Subjective well-being refers to an individual's perspective on their own life satisfaction, as evaluated by their responses to surveys designed to elicit such information. Sometimes it's helpful to make a distinction between several aspects of happiness, such as intellectual, physiological, monetary, and affective. There is usually a tight relationship between several dimensions of happiness. An increase in physical health (such as when one stops abusing drugs or alcohol) is correlated with an increase in mental health. Better financial well-being (e.g., having more income) is also correlated with higher levels of emotional well-being, even in trying times like the recent COVID-19 epidemic. Since what people ought to do relies, at least in part, on what would make someone's life improve or deteriorate, well-being is a crucial concept in ethical theory. Welfarism holds that material success and happiness are the only things that matter.

In common parlance, we often conflate the concepts of well-being, pleasure, and happiness. However, when discussed in more academic settings such as philosophy or psychology, these phrases take on distinct meanings. The term "pleasure" is used to describe anything that makes one happy. However, there may be more elements in play, such as morality, intelligence, and the achievement of one's goals. It is generally agreed that one's level of happiness is a

key component of their sense of well-being. Happiness may be defined as "the individual's balance of pleasurable over painful experience" or as "the condition of being content in one's life as a whole".

Theories of well-being strive to establish what is fundamental to all types of well-being. According to hedonistic beliefs, happiness is achieved when pleasant experiences outweigh unpleasant ones. According to the proponents of the theory known as "want theory," happiness depends on how many of one's wants and needs are met. According to objective list theories, one's happiness is determined by a combination of internal and outside circumstances. The field of positive psychology, which aims to identify the elements that improve people's happiness, centers on this question. Positive emotions, involvement in a worthwhile activity, supportive connections, a feeling of purpose, and the satisfaction of having achieved one's objectives are all mentioned as necessary conditions for happiness by psychologists like Martin Seligman.

Human Development Index

The HDI is a statistical composite index that ranks nations on four levels of human development based on life expectancy, education (mean years of schooling finished and predicted years of schooling upon joining the education system), and per capita income data. A higher HDI score indicates that a country has a longer average life expectancy, a higher average level of education, and a higher average level of gross national income (PPP) per capita. The Human Development Report Office of the United Nations Development Program (UNDP) uses this metric, which was created by Pakistani economist Mahbub ul Haq, to assess progress in different nations.

An Inequality-Adjusted Human Evolution Index(IHDI) was first presented in the 2010 Human Development Report. Although the HDI is still a useful measure, the report noted that "the IHDI is the actual amount of human development (accounting for disparity), while the HDI can be regarded as an index of 'prospective' human development (or the maximum limit of HDI that could be achieved if there was no inequality)." Many aspects, like a country's total worth per capita or the quality of its commodities, are ignored by the index. Many of the most industrialized economies, including the G7 and others, fall in the rankings as a result of this.

Spectrum of Health

Spectrum Health, short for Spectrum Health System, is a West Michigan-based, not-for-profit, comprehensive, managed-care health care company. Western Michigan is served by the hospitals, treatment centers, urgent care centers, and physician offices that make up Spectrum Health's subsidiary network. One million people are enrolled in Priority Health, a subsidiary health insurance company. With 31,000 employees, 4,200 doctors and advanced practice providers (1,600 of whom are part of the Spectrum Health Medical Group), and 3,200 volunteers, Spectrum Health is the biggest employer in West Michigan.

IMS Health named Spectrum Health System one of the country's top 50 Integrated Health Care Networks in 2012.⁵

Determinants of Health

Determinants of health refer to the many different aspects of an individual's life, including their social and economic circumstances, as well as their physical surroundings. One way to categorize them is as:

1. The state of the societal structure
2. The external conditions
3. A person's unique traits and habits.

Although there is widespread agreement over which factors affect people's health, no uniform definition has emerged. Below is a summary of the basic categories into which the Office of Disease Health and Prevention Promotion (ODPHP) has placed the determinants of health:

Policy-making

The health of both individuals and populations is affected by policies made at the regional, state, and federal levels. Taxing tobacco goods more heavily is one way to encourage smokers to give up the habit and benefit public health.

Social Factors

The social and physical health determinants are a reflection of the situations in which humans are born, raised, educated, entertained, employed, and mature. You may have heard of these factors being referred to as "social determinants of health" because of their influence on people's health, well-being, and daily lives. They stand for the economic and political structures, the natural and social settings, and the availability of medical care. A person's health, happiness, and life quality are profoundly affected by their social health determinants.

Health Services

The quality and availability of health care are two factors that may affect individuals' well-being. Lack of availability, excessive expense, lack of insurance coverage, and poor language access all contribute to a lack of access to health care. Unmet health care needs, delays in obtaining adequate treatment, inability to obtain preventative services, and avoidable hospitalizations all resulted from people's failure to overcome these obstacles to receiving health care.

Individual Behavior

Health outcomes are also influenced by people's choices in areas including food, exercise, alcohol, tobacco, and drug usage.

⁵ https://en.wikipedia.org/wiki/Spectrum_Health

Biology and Genetics

There are certain groups that are more vulnerable to the effects of certain biological and genetic variables. Age, sex, heredity conditions, and genetic composition are all examples of biological / cultural determinants of health.

Indicators of Health

To better describe the health of populations, scientists rely on health indicators, which are observable and measurable aspects of the population. In order to make a conclusion about the health of a population, researchers will often use a questionnaire technique to collect data about a subset of the population, apply statistical analysis in a try to generalize the data collected to the overall population, and then draw conclusions based on the data. Governments often utilize health indicators as a basis for health policy.

Concept of Disease

A disease is an abnormal state that has a specific negative impact on the structure or functioning of the whole or a portion of an organism and is not directly attributable to an external harm. Diseases are often thought of as medical illnesses that manifest in a certain set of symptoms. Both internal dysfunctions and external causes, such as infections, may contribute to the development of a disease. Immunodeficiency, hypersensitivity, allergies, and autoimmune illnesses are only few of the diseases that may arise from internal dysfunctions of an immune system.

Disease in humans is typically used in a more general sense to apply to any illness that results in discomfort, dysfunction, suffering, social difficulties, or even death for the individual or others in close proximity to them. In this larger meaning, it may include conditions that are more often thought of as separate entities, such as wounds, impairments, diseases, syndromes, infections, single symptoms, aberrant behaviors, and structural and functional abnormalities. A person's mental state may be altered by their exposure to and management of a sickness, just as their body might be.

It is said that a person has died of natural causes if they have passed away because of an illness. Infectious illnesses, deficient diseases, hereditary diseases (both genetic and non-genetic hereditary), and physiological disorders are the four most common forms of illness. Diseases may also be categorized based on their transmission. Heart disease (blood flow blockage) is the leading cause of human mortality, followed by stroke and pneumonia. Neuropsychiatric disorders including sadness and anxiety are the leading causes of illness in industrialized nations.

Theories of Disease Causation

Generally speaking, illness is seen as the total opposite of healthy, a dysfunctional state. A disease is "a situation in which bodily health is damaged, a deviation from a state of good health, and modification of the body that interrupts

the execution of essential functions," as defined by Webster. Disease, on the other hand, is described as "a maladjustment of the human body to the environment" from an ecological perspective.

A thorough understanding of the root of the problem is essential for developing effective treatments. However, the ever-evolving progress of science as well as its contributions to health has caused a dramatic shift in our understanding of illness etiology. To explain sickness, we use these:

- Theories of disease causation:
- Theories of the pre-modern era
- Germ theory of disease
- Biomedical model
- Epidemiological triad
- Dever's epidemiological model
- Theory of multifactorial causation
- Web of causation
- Wheel of disease causation
- Other theories
 - Lazarus's theories of stress response
 - Wolf's theory of stress, organ maladaptation and disease
 - Holmes and Rahe's theory of life change and the onset of illness.

i. Theories of the pre-modern era: These ideas were prevalent until the latter half of the 18th century, long after it had been clear that microbes really do exist.

- a. The demonic theory: This belief holds that possession by demons or bad spirits is the root cause of the illness. Sorcery was used on the ill individual to expel the evil spirit.
- b. The punitive theory: For a very long time, many believed that the sickness was God's way of punishing them for their sins. Therefore, the sick person should pray to the gods for a cure.
- c. The miasmatic theory: The concept of stale air lies at the heart of this idea. It was believed that breathing the air in specific locations, such as those near swamps, marshes, or at night, may lead to a variety of illnesses.
- d. Theory of four humors: It suggests that blood, phlegm, yellow bile, and black bile are the four humors that make up the human body. Disease developed when any of these was out of whack. In the past, bloodletting was widely used as a treatment for illness.

Disease, according to Ayurveda, is caused by a disruption in the delicate equilibrium of the body's three humors, or Doshas. According to traditional Chinese medical theory, illness develops when yang (male) and yin (female) energies are out of balance.

ii. Germ theory of disease: A paradigm change in knowledge of disease origins occurred at the turn of the nineteenth century, when research by Louis Pasteur and many others proved that bacteria are present in the air and that anthrax is caused by them. As a result, attention shifted from purely anecdotal factors like polluted air or divine punishment to more probable scientific explanations like the existence of certain microbes.

According to the germ hypothesis, a single microbe is responsible for each individual illness. Example: the link between the bacterium *Mycobacterium tuberculosis* and the development of TB. However, this is seldom the case, since many illnesses cannot be explained by this one-to-one causal association but, rather, by an interplay of several other relevant elements.

iii. Biomedical Model: With this view, a normal human body is a well-oiled machine, and abnormalities are due to flaws in the machinery of the body's many systems. Ill-functioning of the thyroid may lead to hypothyroidism, for instance.

However, the human body almost never operates in isolation from its surroundings. The cumulative and complicated influence that psychological and social characteristics play is ignored by this hypothesis.

iv. Epidemiological triad: It suggests that illness arises from unbalanced interactions between the host, the agent, and the surrounding environment. To get an illness, a vulnerable host must be exposed to a disease-causing agent in an optimal setting. It's a wider idea that goes beyond what germ theory can explain. As the illness progression may be stopped by interfering with any one of the three linkages, it is clear where we should focus our preventative efforts.

v. Dever's epidemiological model: Four factors—human biology, lifestyle, the environment, and the health care system—are highlighted in this approach. All of these factors might either have beneficial or harmful outcomes. The maturation and ageing processes are intricately intertwined with the genetics and complicated physiological systems that make up human biology. Environment refers to both the living and nonliving things in our immediate vicinity, whereas lifestyle elements include things like our daily routines and cultural norms. The health care system consists of health services that are both easily accessible and available when needed. This framework is used to describe illnesses for which unhealthy environments and ways of life are more likely culprits than any specific pathogen.

vi. Multifactorial causation: In contrast to germ theory, which postulated a single cause for disease, Pettenkofer claimed that several variables contribute to illness. Due to advancements in public healthcare, communicable illnesses have decreased. However, there was an increase of conditions that couldn't be explained by the germ hypothesis of illness. Because of this, it was decided that focusing on a single cause was simplification of the etiology of a disease, since it would ignore other potential contributors such as social, cultural, genetic, and economic aspects. A disease's varied origins also indicated that there were likely many different approaches that might be taken to warding off the illness. However, in order to effectively address the root causes of the illness, a strategic order of alteration of the causative elements was required.

vi. Web of causation: Proposed by McMahon, Pugh, and Ipsen (1960), it holds that a disease's various causes cannot be described by a simple linear causal link since each item in the chain has its own complicated set of antecedents and interactions with other components. Therefore, it seems as if there is a complex web of relationships rather than a direct cause and effect. This network of cause and effect provides each factor equal weight in identifying causal factors and facilitates intervention design. It combines traditional biological etiological elements with social ones.

vi. Wheel of disease causation: As early as 1985, this idea was put out by Mauser and Kramer. As a result, the agent is no longer seen as the only cause of illness, and instead the emphasis is placed on the intricate interplay between the

physical, physiological, and social surroundings. The element of genetics is also brought into play. Social, physiological, and physical environmental variables are represented on the outermost circle, respectively. The essence represents the hereditary factor. A Model of Interconnected Cause and Effect Based on Rothman's "Component Causes" It suggests that a variety of variables, contribute to illness development. This approach categorizes potential causes as either "Sufficient" or "Necessary." Disease Causation Postulates two sets of postulates, the first by Henle & Koch in 1877 and the second by Hill & Evans in 1965, have been proposed to describe the mechanism by which diseases are caused. These postulates still stand, although with certain caveats, despite the fact that our understanding of illness etiology has changed dramatically as a result of scientific progress.

- a. **Henle-Koch's Postulates:** Robert Koch & Friedrich Loeffler came up with the postulates. The germ hypothesis of illness was successful in the 1800s because to these postulates. A number of conditions must be satisfied before an infectious disease agent may be blamed for a specific illness.
- b. **Hill-Evans Postulates:** In 1965, Austin Bradford Hill put up a set of criteria to evaluate the strength of a causal link. These are more advanced versions of Mill's inductive inference method, and they replace the Henle-Koch postulates. The likelihood that a certain risk factor causes a disease increases with each additional condition that is met.

Epidemiological Triad

The common understanding of how infectious diseases spread, an external agent, or pathogen, must come into contact with a host, or living organism, in order for the illness to manifest in the host. A vector, a creature that moves a virus from one person to another but doesn't become sick in the process, may play a role in the spread of illness. The *Anopheles* mosquito is often used as an example of a vector. The mosquito consumes the plasmodium parasite along with the blood of an affected host. The mosquito won't become sick from the plasmodium. However, the plasmodium may cause malaria in a person after being retained in the saliva and afterwards injected into the subsequent human upon whom the mosquito feeds. Malaria is spread mostly by the bite of the *Anopheles* mosquito. In addition to mosquitoes, ticks of a genus *Ixodes* may also spread Lyme disease.

According to the classical epidemiologic triad model, an infectious agent spreads from one host to another when it exits a reservoir and enters a suitable portal of entry in a vulnerable host. The transmission of an opportunistic infection from a reservoir to a vulnerable host may occur directly (via host-to-host contact or droplet distribution) or indirectly (through airborne particles, insentient objects (vehicles or fungus spores), or living intermediates (vectors)).

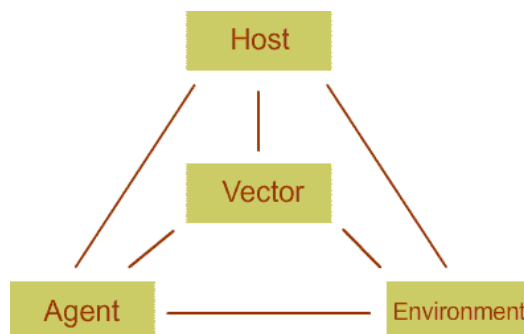


Figure 0.2 Epidemiologic Triad of Disease Causation⁶

Natural History of Disease

The phrase "natural history of sickness" is used to explain how a disease progresses in a person without any kind of treatment. Consider the spectrum of clinical problems that arise from untreated HIV infection, which begins with viremia (primary HIV) and progresses to AIDS and death. It may take up to ten years following seroconversion for the onset of severe AIDS symptoms. Despite the fact that the timeline and specific symptoms of sickness may vary between person to person and be impacted by preventive and therapeutic measures, the general course of many, if not most illnesses follow a typical natural history.

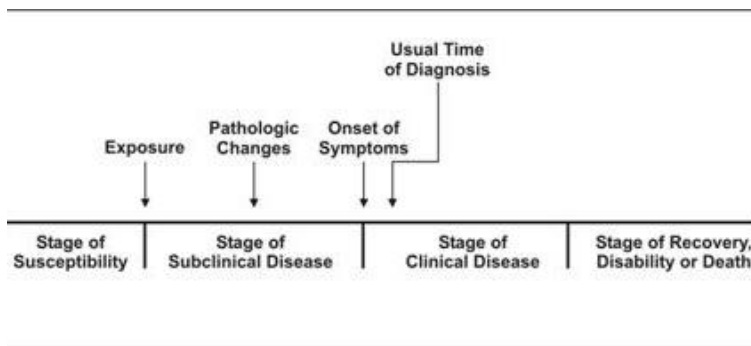


Figure 0.3 Natural History of Disease Timeline⁷

First, a vulnerable host is exposed to or accumulates enough of the necessary risk factors for the illness to develop. A microbe is the causative agent of an infectious illness. The exposure to cancer may either be the cause of the disease, like asbestos fibers or cigarette smoke (for lung cancer), or a contributing factor, like estrogen (for endometrial cancer).

Once the illness process has begun, pathological changes may emerge in the body without the patient noticing anything is wrong. Subclinical illness is referred to as the incubation phase for infectious diseases as well as the latency period for chronic diseases and lasts from the moment of exposure to the manifestation of disease symptoms. Disease is considered to be asymptomatic (having no

⁶https://online.stat.psu.edu/onlinecourses/sites/stat507/files/lesson01/triad_01.gif

⁷https://www.cdc.gov/csels/dsepd/ss1978/lesson1/images/Figure1.18.jpg?_=07439

symptoms) or to be inapparent at this time. Some hypersensitivity and toxic responses may occur in a matter of seconds, while the incubation time for some chronic conditions might span decades. Variation exists even within a same illness with regards to the typical incubation time. The incubation for hepatitis A, for instance, may last up to 7 weeks. Among those who survived the atomic bombing of Hiroshima, the latency time for the onset of leukemia was longest at 6-7 years (but varied from 2-12 years).

Iceberg Phenomenon of Disease

The iceberg phenomenon of illness illustrates the whole range of health issues facing a given population. The tip of the iceberg represents the sickness instances in the population that can be seen by a doctor. The submerged portion of the iceberg represented the community's latent, subclinical, undiagnosed, and carrier statuses. Diseases including hypertension, diabetes, and malnutrition place a premium on the unseen component.

Some diseases exhibiting iceberg phenomenon:

- Diabetes
- Hypertension
- Malnutrition
- Polio
- Leprosy

Concept of Prevention

Prophylaxis, often known as preventative medicine, is the practice of proactively warding off illness. Disease and disability are dynamic processes that begin before people become aware of their condition, and they are influenced by environmental variables, genetic disposition, disease agents, or lifestyle choices. Disease prevention strategies fall into four broad categories: primary, secondary, and tertiary. Countless lives are cut short every year due to circumstances that might have been avoided.

Given the global increase in the frequency of chronic illnesses and fatalities from these diseases, preventative healthcare has become more crucial. Multiple strategies exist to keep illness at bay. Informing young people about the dangers of tobacco use is one of them. Even if they don't feel sick, people of all ages should make it a point to schedule regular checkups with their doctor so that they can undergo disease screening, learn about potential health risks, receive advice on leading a healthier life, receive any necessary immunizations or boosters, and build trust with their healthcare provider. Common instances of primary prevention in pediatrics include recommending that parents lower the temperature on their home water heater to prevent scalding, requiring the use of bicycle helmets by children, and advising people to check the Air Quality Index (AQI) before going outside for physical activity. Checking for high blood pressure, high blood sugar (an increased risk for diabetes mellitus), high cholesterol, colon cancer, depression, sexually transmitted diseases like chlamydia, syphilis, and gonorrhea, breast cancer, colorectal cancer, and cervical cancer screening, and a

Pap test to check for cervical cancer are all examples of common disease screenings. Cancers of the breast and ovaries, for example, may be screened for by means of genetic testing, as can a wide variety of other illnesses with similar hereditary causes. However, not everyone can afford them, and whether or not preventative healthcare is worth its high price tag is still up for dispute.



Figure 0.4 Levels Of Prevention

Primary Prevention

Regular health education and "specific protection" are the two main components of primary prevention. Public health and lifestyle medicine are two examples of prevention strategies that fall under the umbrella of health promotion. Both of these fields focus on encouraging people to make healthy, non-medical decisions, such as eating well and exercising regularly, in order to reduce the risk of developing chronic diseases that are often attributable to poor lifestyle habits and increase their likelihood of living a long and happy life. Life expectancy increases when people take active steps to maintain their health and prevent illness. Activities that promote health and wellbeing do so in a very broad sense, rather than focusing on a single illness or condition. On the other hand, illness-specific protection works in tandem with general health promotion by focusing on a particular disease or set of diseases.

Primordial Prevention

Prevention at the most fundamental level is the gold standard of health care. Recent discoveries in molecular biology, especially epigenetics, highlight the potential importance of the emotional and physical environments during pregnancy and infancy to health in later life. This kind of health promotion focuses mostly on assisting expecting parents with relevant, objective knowledge on basic health and preparing them for the early years of their child's existence.

This involves time off work for at least one parent and, preferably, both parents, as well as access to extended family members for child care and financial support. Primordial prevention includes all population-level measures and actions that inhibit the emergence as well as establishment of adverse environmental, financial, and social conditions, as defined by Ruth A. Etzel. Primordial prevention aims to reduce or eliminate risk factors before they even have a chance to develop. This may include restricting the use of endocrine-disrupting chemicals into food processing machinery and packaging.

Secondary Prevention

The goal of secondary prevention is to keep an asymptomatic illness from becoming a clinically apparent one by addressing dormant cases. Primary and secondary illnesses are two ways to classify health issues. In general, preventive care focuses on eradicating risk factors for an illness or injury, whereas secondary prevention seeks to identify and treat illnesses and injuries at an early stage. Secondary prevention includes "early diagnosis and fast treatment" to stop the spread of an illness and "disability restriction" to lessen the impact of whatever impairments the sickness may cause. If a syphilis patient is diagnosed and starts taking antibiotics right away, the disease may be eradicated, and any newborns to infected mothers can be identified and given treatment. Checkups on the patient's heart, cerebrospinal fluid, or central nervous system are ongoing forms of disability restriction for syphilis patients in order to prevent irreversible damage like blindness or paralysis.

Tertiary Prevention

Tertiary prevention, which focuses on mental, physiological, and social rehabilitation, aims to lessen the impact of illness symptoms. Tertiary prevention strives to optimize a patient's remaining capacities and functions after secondary prevention has failed, as opposed to the latter's goal of preventing impairment. Pain and damage avoidance, stopping the spread of illness and its repercussions, and restoring the function and health of those who have been afflicted by it are all tertiary preventive goals. Implementing workplace changes for the blind or paralysed or offering counselling to regain regular everyday tasks to the maximum degree feasible are examples of the types of rehabilitation provided to syphilis patients.

Patients in this situation are encouraged to employ ventilated and air-flowing technology as a whole to arrest the development of further illness issues. The use of evaporation humidifiers that maintain indoor humidity in the range of 40-60% may minimize respiratory risk. Using humidifiers may be an effective way to reduce the spread of disease-causing microorganisms, which thrive at certain humidity levels.

Environment and Health

Environment and Water

Approximately 70 percent of Earth is covered by water. It should come as no surprise that all life on our beautiful planet need water, given that it was water that allowed life to begin. In reality, clean water serves numerous purposes, including those of a basic need, abode, local & global resource, transportation corridor, and climate regulator. Over the past two centuries, it has also become the final destination for numerous contaminants dumped into the environment and a newly found mine rich in minerals to be mined. Our current methods of water usage and disposal are unsustainable if we want to keep reaping the advantages of clean water with thriving seas and rivers.⁸

Millions of different kinds of creatures, from the smallest ones measuring in the microns to orcas reaching 30 meters in length and 200 tones in weight, all make their homes in the water. Each year, scientists go deeper into the water and uncover new species. Since they act as the planet's greatest carbon sink, the world's oceans and seas are also crucial to maintaining a stable climate. The ocean currents warm and chill various places, making them more hospitable for human habitation. It is possible for precipitation, in the form of rain or snow, to fall as far as wide as the oceans are warm enough, therefore maintaining life on land.

Fresh water is not only a physiological need for people, but also an invaluable resource. Uses around the house include the kitchen, bathroom, and laundry. It takes water to make everything we consume and use, including food, clothing, electronics, transportation, and literature. Water is essential in the construction of houses, schools, and highways, as well as in the heating and cooling of structures and power plants. Cities and residences are illuminated by the energy produced by its flow. To beat the heat of a summer day, we often swim in the ocean or take a leisurely walk by a lake.

As a medium, water facilitates communication and the transport of products. As a result, it facilitates international commerce by providing a natural transportation network that links not just coastal towns but also interior towns along navigable rivers. It's possible that ships brought our t-shirts, coffee beans, and computers to Europe from the Americas, Africa, and Asia. To put it another way, water permeates every facet of human existence. Water is essential to all forms of life, yet the way people use and abuse it threatens not just our own health, but all of those organisms. Water quality and availability continue to deteriorate due to pollution, overexploitation, physical changes to water ecosystems, and climate change.

⁸<https://www.openaccessgovernment.org/the-environment-clean-water-is-life-health-food-leisure-and-energy/53926/>

We change the nature of water

Whenever we utilize water, we change it in some manner from its original state. To meet the need for water, we have redirected rivers, dug canals to link bodies of water, and built dams and levees. The groundwater we use in our houses might be piped in from hundreds of kilometers away. There is a risk of contamination from chemicals (such those found in cleaning products), plastics microbeads, or even oil after it has been used. Even after extensive wastewater treatment, some of these contaminants may persist in the water. Water used in farming may be contaminated with chemicals from fertilizers and pesticides. Some of this changed water is recycled back into a body of water after being utilized and occasionally treated.

Pollutants from vehicles and factories may also be carried by the wind and rain down on bodies of water. How we utilize water has an effect on the heat and salt content of the seas. Oftentimes, the water temperature is much higher than the ambient temperature in the energy industry when it is employed for cooling purposes. Desalination operations, in a similar vein, may discharge salty brine back into the ocean. What we put back into the wild isn't always the same as what we took out. And we don't always put it back where we found it.

Water quality matters

In the past forty years, Europe has achieved great strides in conserving marine and freshwater ecosystems, as well as controlling water quality. Floods, single-use plastic, industrial pollutants, and prohibitions on the use of dangerous chemicals are just some of the many concerns that the European Union (EU) addresses via its laws. Global programs and regulations, such the Seventh Environment Action Plan, the Water Framework Directive, and the Marine Strategy Directive, support these individual pieces of EU law.

Air and Ventilation

Indoor air quality is preserved by adequate ventilation.

Homes, like our lungs, should be able to "breathe" so that clean air can enter and stale air can escape. High concentrations of moisture, doors, fumes, dust, as well as other air pollutants may accumulate inside. Indoor air quality may be maintained by bringing in outside air and allowing it to mix with the stale air within.

If you want to ensure that everyone in your house is breathing clean air, you'll need to make sure that plenty of fresh air is always being pumped throughout the place. Windows and other architectural features often help bring in outside air for most houses. Mechanical systems are often installed in houses to improve the current. Pollution from some sources, such stoves and restrooms, requires specialised venting systems. To prevent cooking emissions from being redistributed within, ventilation systems should direct air away from the house.

Keeping the facility sealed off from recognized sources of air pollution, in addition to using ventilation, is the most effective way to lower levels of indoor air

pollution. To minimise the dangers of second-hand smoke, it is imperative that smoking be prohibited in enclosed public spaces and in the immediate vicinity of entrances. This issue cannot be remedied by increasing ventilation. Polluted air from outside may also be brought inside, making it crucial to address both indoor and outdoor air pollution.

Noise

The negative effects of noise on health may be felt both physically and mentally after prolonged exposure to loud noise. The World Health Organization ranks traffic noise as one of the top five environmental stressors that threaten human health, just behind air pollution and radiation. Noise at work or at home may damage your ears, give you tinnitus, raise your blood pressure, increase your risk of heart disease, make you irritable, and keep you away from getting a good night's rest. Noise pollution has also been linked to alterations in the immune response or fetal malformations.

A significant portion of the population in many nations has their hearing impaired over time due to noise exposure, even if age-related health problems (presbycusis) develop naturally with age. Chronic exposure to loud noise has been linked to a variety of negative health outcomes, including hearing problems, tinnitus, hypertension, vascular constriction, and other heart conditions. A rise in the prevalence of diabetes and sleep disorders have both been linked to long-term exposure to noise. The sympathetic system does not habituate to noise, therefore long-term exposure to noise has negative consequences on the cardiovascular system. When the body is subjected to noise, the sympathetic nerve system keeps it in lighter phases of sleep, which prevents blood pressure from following the typical rise and decline cycle of an uninterrupted circadian. Greater workplace number of injuries and aggressive and antisocial conduct have both been related to stress from prolonged exposure to loud noise. Vehicles, aero planes, extended contact to loud music, or factories are the primary culprits. It has been shown that prolonged domestic noise exposure is detrimental to mental health.

Light

UV radiation from the sun is necessary for the production of vitamin D3 but also has negative health consequences since it causes cancer when exposed to large amounts. Vitamin D may be obtained without the carcinogenic impact by taking a supplement, but there will be no subdermal nitric oxide production and the bioavailability of the supplement will be low. Vitamin D has indeed been linked to several health benefits, including improved bone health and a reduction in the risk of developing certain types of cancer. As well as boosting endorphin levels and maybe protecting against MS, sun exposure has other benefits. The health advantages of exposure to bright light at eye level are correlated with the timing of melatonin production, the preservation of normal and strong circadian rhythms, and a decreased risk of seasonal affective disorders.

Some forms of skin cancer, skin ageing, immunological suppression, and eye problems including cataracts and even macular degeneration have all been linked to prolonged exposure to sunshine. On the other hand, avoiding the sun for

extended periods of time raises the chance of dying from cardiovascular disease (CVD) and other diseases that aren't cancer.

In view of the fact that ultraviolet (UV) radiation, and by extension sunlight and sunlamps, were carcinogens with some positive health effects, a variety of public health groups have called for a middle ground between the dangers of too much and too little exposure to UV light. A consensus exists that sunburns are never acceptable and should be avoided at all costs.

Radiation

Energy that travels across space or material at very high velocities is called radiation. Alpha and beta particles generated by radioactive materials are examples of particles, whereas light, heat, radio signals, microwaves, x-rays, and gamma rays are examples of waves. Instable nuclei are what make up radioactive materials, sometimes called radionuclides or radioisotopes. There is a natural propensity for radioactive atoms to convert into a more stable state. They give out radiation when they undergo morphological changes.

Ionizing radiation is defined as any kind of radiation that may cause ions to be created upon impact with a material. When electrons are knocked out of their orbitals in atoms, the result is charged particles known as ions. Forms of radiation that may ionise matter include alpha particles, beta particles, x-rays, and gamma rays. Nonionizing radiation, on the other hand, is radiation that cannot ionise materials.

When ionising radiation alters human cells, it has a negative impact on health. To do this, it disrupts the chemical interactions between atoms in molecules. DNA molecules, for instance, which hold a person's genetic data, regulate the cellular chemical and physical processes. Although DNA molecules can usually repair themselves after being damaged, irreparable damage may impair a cell's capacity to function and pass on its genetic information to daughter cells.

Housing

Life is saved, sickness is prevented, quality of life is raised, poverty is lessened, and climate change is mitigated when housing conditions are enhanced. As cities expand and populations age and the environment changes, housing becomes more critical to people's well-being. The World Health Organization's (WHO) Housing & health guidelines consolidate the latest research to provide actionable advice for lowering the health risks associated with poor living conditions. The guidelines, based on commissioned systematic evaluations, provide advice on how to deal with issues including overcrowding, cold and hot temperatures within the house, potential sources of harm, and the inability to move about freely. Housing-related water quality, quality of air, neighbourhood noise, mesothelioma, lead, cigarette smoke, and radon are only some of the issues that are addressed in the guidelines, and the guidelines also identify and summarise previous WHO guidelines and recommendations. The recommendations emphasise the co-benefits of treatments that target many risk factors at once and adopt a holistic, intersectoral approach to the problem of housing and health.

The World Health Organization's (WHO) housing as well as health guidelines are meant to inform housing policies at the national, regional, and local levels, and are also applicable to the day-to-day work of trying to implement actors who are responsible for the construction, maintenance, and destruction of housing in ways that affect human health and safety. Therefore, the recommendations stress the need of cross-sector cooperation and coordinated actions at all governmental levels to advance healthy housing. Health (SDG 3) & sustainable cities (SDG 11) would benefit especially from the recommendations' adoption at the national level. To ensure that everyone has access to safe and healthy housing, WHO will assist Member States in tailoring the recommendations to local conditions and priorities.

Meteorology

Weather forecasting is the main emphasis of meteorology, which is a subfield of atmospheric science that also includes atmospheric chemistry & atmospheric physics. Research into the weather has been going on for millennia, it wasn't until the 18th century that meteorologists made any real headway. After widespread weather monitoring networks were established in the 19th century, incremental improvement was made. Previous weather forecasts relied on looking at past patterns. Significant advancements in weather forecasting were not made until the latter half of the 20th century, when the rules of physics were clarified and, in particular, the computer was developed, allowing for the integrated program of a large number of equations that predict the weather. When considering the impacts of weather on huge bodies of water, such as the ocean or a coastline, marine weather forecasting becomes an important subfield of weather forecasting.⁹

The study of meteorology provides explanations for a wide range of weather occurrences. Atmospheric variables, such as temperature, pressurization, water vapor, mass flow, and their fluctuations and interactions through time, are used to characterize and quantify meteorological occurrences. Local, region, and global weather are each described and predicted using a unique geographical scale. Subfields of atmospheric sciences include meteorology, climatologist, atmospheric physics, & atmospheric science. The multidisciplinary study of weather and water is called hydrometeorology. There is a linked ocean-atmosphere system that includes the interactions between the atmosphere and the oceans. The military, power generation, transportation, agriculture, and building and construction are just few of the numerous industries that may benefit from meteorology. Meteorology, literally "the study of objects in the sky," comes from of the Ancient Greek words o meteors (meteor) and -logia (-ology).

Disposal of Wastes

In industrialized nations, wastewater and sewage treatment systems collect and process municipal liquid waste. This process removes most or all toxins from wastewater or sewage before it enters groundwater aquifers and surface waterways including rivers, lakes, estuaries, or oceans.

⁹ <https://en.wikipedia.org/wiki/Meteorology>

Refuse, or municipal solid waste (MSW), refers to non-hazardous trash that has to be hauled away and disposed of at a special facility. Refuse may refer to any unwanted material, including trash and junk. Food scraps that can be composted together with dry items like glass, paper, linen, or wood make up the bulk of garbage. However, garbage is very putrescible and biodegradable, but rubbish is not. Waste consists of everything from common household items like old refrigerators and sofas to more unusual items like tree stumps and construction debris like wood, drywall, bricks, cement, and rebar, a steel rod with ridges used to support concrete. Most trash is disposed in sanitary landfills, which are enclosed pits or other areas fitted with impermeable artificial bottom liners to keep trash from contaminating the surrounding area.

The term "waste disposal" refers to the process of getting rid of undesired materials, such as those generated by food production, household chores, and manufacturing processes. By eliminating garbage improperly, we increase environmental risks and pollutants. A number of measures, including correct garbage collection or scientific treatments which may reduce impacts on water, soil, and air quality, are required for effective waste management. There is a wide variety of wastes, and most of it is not biodegradable. This is mostly due to globalization and industrialization. Polluting smoke and odors may be released by landfills due to the presence of hazardous materials. Therefore, proper disposal for the specific kind of waste is required, since burning all trash may lead to the aforementioned issue and damage to persons. Up addition, filling in land depressions and dumping into rivers without competent management is discouraged. Inappropriate disposal of wastes including plastics, battery, and Sani- and oil-related goods might have serious consequences. The risks of polluting the air and creating a potentially dangerous environment should this be done.

Maintaining a clean environment requires both proper garbage disposal and waste management. Therefore, a waste should also be included in the concept of trash disposal. Refuse, Reuse, Reduce, Recycle, and Reconsider are the 5 R's of trash management. Cleanliness and healthiness in daily life are greatly aided by adhering to each of these waste disposal procedures. It's important for future generations as well as our own. Workers in the waste management industry, at landfills, and in related fields are protected from the health hazards that might result from careless trash disposal. Blood infections, breathing difficulties, stunted development, skin irritations, etc., may result. As a result, the responsibility for trash removal shouldn't rest just on the shoulders of the service industry personnel but with each individual family. Every location, from houses to businesses, should separate their trash. Separating trash into biodegradable, non-biodegradable, and poisonous categories is a good practice. Many distinct garbage-dumping techniques used to get rid of litter.

Methods of Waste Disposal

The following are the many trash disposal systems now in use:



Figure 0.1 Methods of Waste Disposal¹⁰

Landfill

This method of trash disposal includes depositing a thin layer of non-reusable and non-recyclable materials in designated low-lying lands or locations. These are large holes in the ground that are used to deposit garbage before being covered with dirt. For the two decades, these places have been deemed unsuitable for things like building development. Future Park or playground construction might take place there. As one of the most popular options for disposing of trash in large quantities, it has gained widespread popularity.

Incineration

Whenever rubbish is burned, it breaks down into nonflammable byproducts like gases and ashes; this process is known as incineration. Heavy metals produced by incinerators are dumped in landfills, where they damage the air, water, and soil. However, there are several advantages to this method, such as less garbage being generated, energy and heat being produced, pollution being reduced, no waste transportation being necessary, noise and stink being controlled, and chemical and hazardous bacteria being eliminated.

Generation of Biogas

Biodegradable garbage includes things like food scraps, animal waste, municipal solid waste, vegetable/fruit peels, and organic industrial waste. Biogas is created from these wastes on both big and small scales because of the ease with which bacteria, fungus, and other microorganisms break down the materials. For microbes, the organic degradable material that is destroyed or must be broken down is a source of nourishment. Both anaerobically (without oxygen) and aerobically (with oxygen), the biogas generation process may occur. The result is biogas, which may be used as fuel, and the leftovers are put to good use as fertilizer in agricultural settings. Biogas consists of a variety of gases, the most

¹⁰ <https://cdn1.byjus.com/wp-content/uploads/2016/06/Methods-of-Waste-Disposal.jpg>

common of which are methane gas. To put it simply, this form of garbage disposal is helpful since the garbage is put to good use.

Waste Compaction

The correct approach for waste compaction comprises shredding the garbage into smaller pieces, pressing to mix effectively, and arranging the waste in such a manner as to fill gaps. When trash is compacted, it takes up much less space and produces a lot less garbage, both of which contribute to less pollution. Cans, plastic bottles, paper, paper, metal, textiles, computers, batteries, tires, etc. can all be recycled, making it one of the most effective waste reduction strategies. Recycling allows for the potential use of these wastes.

Composting

One of the ways in which we deal with garbage that we start in the kitchen is by composting. The system processes all types of organic waste, such as leftovers, discarded produce, and yard trimmings. After being buried and left in the ground for a few days, these materials deteriorate due to the activity of microbes including bacteria, fungus, and others. This leads to decomposition, which in turn yields compost, a humus-like material. Due to its high nutritional content, it can be used as compost or fertilizer to help restore depleted soil and encourage plant growth. It is the safest substitute for chemical fertilizer and is proven to increase the soil's ability to retain water.

Vermicomposting

In the waste management practice known as vermiculture, worms like white worms, red banana slugs, earthworms, and others are used in the decomposition process to digest organic waste such as leftover food and vegetable scraps. When organic waste is broken down by earthworms, a byproduct known as "Verm cast" is produced. Vermicompost, often known as worm castings, is a fantastic fertilizer because it dissolves easily in water and contains a wealth of beneficial microorganisms. It's a common ingredient in both dry soil amendments and liquid fertilizers.

Management of Hospital Waste

The purpose of treating biological waste is to render it harmless and, in most cases, unidentifiable to the public. Waste treatment must ensure that the material can be safely handled and disposed of. These objectives may be reached via a variety of therapeutic approaches. Part of this process involves separating out the bio waste.

Incineration is a common method of disposing of biomedical waste. When used properly, an incinerator may eliminate the risk of infection from needles and other potentially dangerous objects. The ash produced has no traces of the original substances. Gasification and pyrolysis are two examples of other thermal treatment methods that may be used to achieve comparable results in terms of waste volume reduction and pathogen eradication.

Some facilities employ autoclaves to disinfect medical waste. The trash is sterilized or has its microbiological burden reduced by steam and pressure in an autoclave. Medical equipment and supplies are often sterilized in autoclaves at many hospitals and clinics. Using the same autoclave for both supply sterilization and biological waste treatment requires extra precautions to ensure that the supplies are not tainted by the waste treatment processes. Operator training, detailed protocols, and designated processing times and locations are all essential components of sound administrative controls for the safe and efficient disposal of biological waste.

Biomedical wastes may also be treated using microwave disinfection. Disinfection using microwave irradiation is an example of a non-contact heating technology. Microwave chemistry relies on the dielectric heating properties of microwaves to efficiently heat materials. Water molecules inside cells have dipoles that realign when subjected to microwave frequencies, creating an electric field. Energy is dissipated as heat due to molecular friction & dielectric loss when the dipoles try to realign themselves with the electric field. Microwave disinfection is a cutting-edge technology that offers several benefits over conventional autoclaves. Specifically, microwave-based disinfection consumes much less water and consumables, as well as a shorter cycle duration and lower energy consumption. Bleach solutions between 1 and 10% are effective for disinfecting tiny amounts of liquid biomedical waste. In certain cases, solutions of hydroxide solution and other chemical antiseptics may be employed to treat the garbage. Heated water, alkaline digesters, and microwaves are among more options for treatment. A shredder can be used as last stage in the waste treatment process for autoclaves or microwave ovens. There are autoclaves that also function as shredders.

Electronic Waste Management

Electrical and electronic gadgets that have been abandoned are referred to as electronic trash or e-waste. Electronic waste also includes used electronics that will be reused, resold, salvage recycled via material recovery, or disposed of. Human health and environmental quality may be negatively impacted by the informal processing for e-waste in underdeveloped nations. CPUs and other electronic components that have reached the end of their useful lives might include dangerous substances including lead, arsenic, beryllium, or bromine-based flame retardants. Workers and residents in the areas where e-waste is recycled and disposed of may be exposed to serious health risks. When an electronic device reaches the end of its life, it is discarded and adds to the growing mountain of e-waste. E-waste has become an enormous problem as a consequence of the proliferation of electronic devices and the consumer-focused nature of modern civilization.

The United States Environmental Protection Agency (EPA) has eleven different categories for garbage:

1. Large household appliances, including cooling and freezing appliances
2. Small household appliances
3. IT equipment, including monitors
4. Consumer electronics, including televisions

5. Lamps and luminaires
6. Toys
7. Tools
8. Medical devices
9. Monitoring and control instruments and
10. Automatic dispensers

Re-usable (functioning, repairable) electronics, secondary raw materials, and old electronics intended for reuse, resale, salvage, recycle, or disposal all fall into this category (copper, steel, plastic, or similar). Since shipments of excess electronics are often mixed together, the word "waste" is reserved for leftover or material which is discarded by the buyer rather than repurposed, including residue from recycling and reuse activities (good, recyclable, and non-recyclable). E-waste and e-scrap are terms used by public policy activists who often refer to obsolete electronic equipment. However, recycling cathode ray tubes (CRTs) is notoriously difficult.

The Partnership for Measuring ICT for Wellbeing classifies e-waste in six distinct categories:

1. Apparatus for regulating temperatures (such as air conditioners, freezers)
2. Displays, or Screens (TVs, laptops)
3. Lamps (LED lamps, for example)
4. Heavy Machinery (washing machines, electric stoves)
5. Miniature Tools (microwaves, electric shavers) and
6. Portable computing and communication devices (e.g., cell phones, printers).

Products in different groups have different lifetime profiles, effects, and collecting techniques. The lead or phosphor coating (not to be confused with phosphorus) required for the display are found in quite large levels in CRTs. The United States Environmental Agency classifies broken CRT monitors as "hazardous household trash," however CRTs put aside for testing are treated as commodities as long as they are not stockpiled for speculation or left exposed to the elements. These CRT gadgets are often misidentified as DLP Rear Projection TVs, despite the fact that their materials need a distinct recycling procedure.

Using the European Trash Catalogue (EWC), a European Council Directive that is translated into "member state legislation," the member states of the EU run a system. This is reflected in the List of Wastes Regulation in the United Kingdom. A more specific description of what constitutes hazardous electronic waste may be found in the Hazardous Materials Rules (Annex 1A, Annex 1B), although the list (and EWC) provides a general definition (EWC Code 16 02 13*). Annex II and Annex III together demand examination of waste constituent components, affording operators even more leeway in deciding whether trash is dangerous.

The difference between commodity and trash in the context of electronics is still a topic of heated debate. Some exporters have been accused of knowingly shipping shipments that include broken or non-recyclable items (while this might be due to a lack of knowledge or a desire to avoid more expensive treatment methods). As a

means of shielding domestic markets from functional secondary equipment, protectionists may push for a broader definition of electronic waste.

When compared to display technologies, which have a lower (or negative) scrap value, the value of the laptop recycling subset of e-waste (functioning and reusable notebooks, desktops, or components like RAM) might help compensate for transportation costs for a higher number of useless items. There were 215,000 metric tons of electronics shipped to Ghana in 2011, with just 30% being brand new and 70% being old, according to the Ghana E-waste Country Assessment study. The results of the investigation indicated that fifteen percent of the spent product was not salvaged but rather disposed of. In contrast, unsubstantiated reports under the media suggest that 80 percent of Ghana's imports are being burnt in substandard circumstances.

In 2016, the Ministry of Environment, Forest, and Climate Change implemented the E-Waste (Management) Rules to cut down on e-waste and boost recycling rates. In accordance with these regulations, the government implemented EPR, which makes manufacturers responsible for collecting 30% to 70% (over seven years) of an e-waste they create.¹¹ If we want to keep negative effects on the environment and human health under control, we need to bring the informal economy into a more open recycling system. Some initiatives have been taken to incorporate the current informal sector into the evolving environment. Alternative business models have been devised by organizations like Deutsche Gesellschaft für International Zusammenarbeit (GIZ) to aid in steering the informal association towards official recognition. In order to maximize profits from PCBs (Printed circuit boards), these business models advocate for a city-wide collecting system that feeds the manual dismantle plant and a shift toward the most advanced equipment currently in use. Better safety standards and more money per ton of e-waste collected may be achieved by exporting the material to combined smelters and refineries rather than using the conventional wet chemical leaching method for gold recovery.

Metals like gold, silver, or copper are abundant in discarded electronics and may be recycled for use again. Efficient recovery of precious resources from e-waste is a substantial economic opportunity that may benefit both people and businesses. In March 2018, the government of India modified the E-Waste Treatment Rules, 2016 in order to better enable and execute the ecologically sound e-waste management in the country. With an effective date of October 1, 2017, the revised Rules update the collection goals under the EPR clause. Effective and enhanced management for e-waste would be guaranteed by means of updated objectives and inspections under the Pollution Control Board.¹²

Medical Entomology

Insects and other arthropods that pose a threat to human health are the primary focus of medical entomology, public health mycology, and veterinary entomology. Many animal illnesses, such as bovine encephalitis, may jump species and

¹¹ https://en.wikipedia.org/wiki/Electronic_waste

¹² https://en.wikipedia.org/wiki/Electronic_waste

represent a concern to human health, hence veterinary entomology is covered. In the interest of the public's safety, medical entomologist also includes extensive public outreach, including communication with local and state governments and other stakeholders, and scientific study of the behavior, ecology, or epidemiology of insect disease vectors. Since 2005, when *Cimex lectularium* bed bugs began making a comeback, public interest in the field of public health entomologist has skyrocketed.¹³

Nutrition and Health

Classification of Foods

The term "food" refers to anything that may sustain life by providing nutrients and energy. Consumed orally for growth, health, or enjoyment, it may be found in its raw, processed, or prepared forms. Water, fats, proteins, and carbs make up the bulk of food. Food also contains organic molecules (such as vitamins) and minerals (such as salts). Photosynthesis is the process through which plants, algae, and certain bacteria create their own nutrient molecules. It has been shown that water is a food in and of itself due to its prevalence in many other diets. However, fat has the highest energy density of any component, making water and fiber relatively low in calories. Some non-food inorganic elements are just as important to plant and animal life.

There are a number of ways to categorize the foods that humans eat, such as by their nutritional value or their preparation method. It's possible to have a different number of food groups or a different mix of groups. Plant-based foods, animal-based foods, grains and breads, and dairy and meat make up the four main categories included in most systems, each of which describes the origin or relative nutritional function of the food in question. Whole grain products, refined grains/cereals, veggies, fruits, nuts, beans, eggs, milk products, seafood, red meat, processed foods, and sugar-sweetened drinks are common categories used in studies examining dietary quality. There are nineteen different types of food recognized by the Food and Agricultural Organization and the World Health Organization's classification system, including cereals, roots, pulses, nuts, milk, eggs, seafood and shellfish, chicken, insects, vegetables, fruits, oils and fats, sweets and sugars, seasonings and condiments, beverages, functional foods, food additives, composite dishes, and savory snacks.

1. Classification by origin
 - Foods of animal origin
 - Foods of vegetable origin
2. Classification by chemical composition
 - Proteins
 - Fats
 - Carbohydrates
 - Vitamins
 - Minerals

¹³ https://en.wikipedia.org/wiki/Medical_entomology

3. Classification by predominant function

- Body-building foods, e.g., Milk, Meat, Poultry, Fish, Eggs, Pulses, Groundnuts. etc.
- Energy-giving foods, e.g., Cereals, Sugars, Roots and Tubers, Fats and Oils.
- Protective foods, e.g., Vegetables, Fruits, Milk

4. Classification by nutritive value

- Cereals and millets
- Pulses (legumes)
- Vegetables
- Nuts and oilseeds
- Fruits
- Animal foods
- Fats and oils
- Sugar and jaggery
- Condiments and spices
- Miscellaneous foods

Nutrients

Nutrients are essential for life, growth, and reproduction. All living things, including animals, vegetation, fungi, and protists, need to get the nutrients they need from their food. It is possible for cells to either take in nutrients for metabolic use or secrete them to build extracellular structures like hair, plates, feathers, or exoskeletons. Some nutrients, such as carbohydrates, lipids, protein, and fermented products (ethanol or vinegar), may be broken down metabolically to produce smaller molecules inside the process of generating energy, with the end products being water and carbon dioxide. Water is essential to the survival of all known forms of life. Energy sources, part of the amino acid residues that are combined to produce proteins, a fraction of fatty acids, vitamins, and certain minerals are all essential food for mammals. In addition to the oxygen and carbon dioxide taken in via their leaves, plants need a wide variety of minerals taken in by their roots. Fungi get the nutrients they require from the organic matter they feed on, whether it is dead or alive.

An organism's vital nutrients vary depending on its kind. Although ascorbate (vitamin C) is a necessary nutrient for humans and a few other animal species, certain plants and animals are able to synthesize it on their own. Most substances made out of carbon are considered organic nutrients, whereas all other compounds are considered inorganic. Iron, copper, and zinc are examples of inorganic nutrients, whereas vitamins and other organic molecules are examples of nutrients that provide energy.

Nutrients are often classified into micronutrients and macronutrients when describing the nutritional requirements of animals. Macronutrients, which include carbs, lipids, proteins, and water, are ingested in large quantities (grams or ounces) and are largely utilized to produce energy or integrate into tissues for development and repair. Due to their complex biochemical and physiological involvement in cellular processes including vascular functioning and nerve transmission, micronutrients are required in lower quantities (milligrams or

micrograms). Deficit states impair development, survival, and reproduction because of inadequate levels of necessary nutrients or disorders that interfere with absorption. As an example, the United States Dietary Reference Consumption (USDRI) provides macronutrient and micronutrient guidelines for both upper and lower limits of intake based on insufficiency results. Regulations mandate the inclusion of macro and micronutrient content on food labels in several countries. Nutrients in bigger amounts than the body requires may have adverse consequences.

Proteins

Proteins are macromolecules and big biomolecules made up of chains of amino acids. Proteins play an essential role in many aspects of an organism, from accelerating metabolic pathways and DNA replication to sensing and reacting to stimuli, giving structural support, and moving molecules about. The genetic material of a gene regulates the order of amino acids in a protein, which in turn causes the protein to fold into a precise three-dimensional shape that controls its function.

Polypeptides are long chains of amino acids. There is at least one lengthy polypeptide in every protein. Peptides are short polypeptides (peptides) that usually comprise fewer than 20-30 residues and are not considered proteins. Peptide bonds and neighboring amino acid residues hold the specific amino acid residues together. The genetic code specifies the order in which proteins' amino acid residues must appear. The genetic code often only allows for the conventional 20 amino acids; however, it does allow for selenocysteine and, in certain archaea, pyrrolidine. Post-translational modification occurs on the residues in a protein shortly after or even after synthesis, changing the protein's physical and chemical characteristics, folding, stability, activities, and ultimately its function. Attached to certain proteins are molecule classes that aren't themselves proteins; they might be thought of as cofactors or cofactors. Proteins may also readily form protein complexes that work together to perform a variety of tasks.

Once produced, proteins have a finite lifespan before being destroyed and recycled by cell's machinery in a process known as protein turnover. There is considerable variation in the half-life of a protein. They have a short average life span of 1-2 days in cell cultures but may live for minutes or years. Proteins that are misfolded or otherwise abnormal are destroyed at a faster rate, either because they are targeted specifically for destruction or because they are unstable.

Proteins, along with other biological macromolecules like carbohydrates and nucleic acids, have a role in almost every cellular action. Enzymes play an essential role in metabolism by catalyzing certain metabolic processes. Proteins like myosin and actin in muscles and the proteins of the cytoskeleton, which together constitute a scaffolding framework that preserves the shape of the cell, are examples of proteins with structural or mechanical roles. Some other proteins are crucial for cellular processes such as signal transduction, immunological response, cell adhesion, and cell division. Animals need dietary proteins because their bodies are unable to produce some critical amino acids on their own.

Proteins are digested and absorbed into the body for utilization in the metabolic processes.

Ultracentrifugation, dissolution, electrophoresis, and chromatography are only some of the methods that may be used to separate proteins from their biological context; new developments in genetic engineering have also opened up more opportunities for protein purification. Immunohistochemistry, site-directed mutation, X-ray diffraction, nuclear magnetic resonance, and mass spectrometry are only a few of the popular techniques used to investigate protein structure and function.

Fats

Fat, as used in the fields of nutrition, biology, or chemistry, refers to any ester of fatty, or a combination of such molecules, most typically those that are found in living organisms or in food. Triglycerides (triple ester of glycerol) are the primary components of both vegetable oils and fatty tissue in animals. The word is often used to refer more strictly to triglyceride that are solid or semi - solids at room temp, omitting oils. As a more general phrase, it may be used interchangeably with lipid to refer to any biologically significant material that is insoluble in water but dissolves in non-polar solvents. In this sense, the word would include not just triglycerides but also mono- and diacylglycerols, phospholipids (like lecithin), sterols (like cholesterol), waxes (like beeswax), or free fatty acids, all of which are typically consumed by humans in lower quantities.

Milk, butter, glycerin, lard, andouille sausage, and cooking oils all include fats as do other popular foods like lard, tallow, and lard. Carbohydrates and proteins are the other two macronutrient categories in the human diet. They serve as a significant and concentrated food supply for many animals, and they are essential to the structure and metabolism of almost all organisms by acting as a source of energy storage, a barrier against water intrusion, and an insulator against heat loss. Except for a small number of necessary fatty acids, the body can create all the fat it needs from other dietary elements. Some non-water-soluble vitamins and flavorings are transported in dietary lipids.

The term "excellent" unsaturated fats may refer to either of two categories:

1. Monounsaturated fats are found in high concentrations in:

- Peanut, Olive, and canola oils
- Avocados
- Hazelnuts, Nuts such as almonds, and pecans
- Seeds such as pumpkin and sesame seeds

2. Polyunsaturated fats are found in high concentrations in

- Sunflower, soybean, corn, and flaxseed oils
- Walnuts
- Flax seeds
- Fish
- Canola oil – even though it's richer in monounsaturated fat, it's also an excellent source of polyunsaturated fat.

Carbohydrates

Carbohydrates are organic molecules made up of carbon (C), hydrogen (H), and oxygen (O), with the hydrogen-oxygen atom ratio often being 2:1. Despite this stoichiometric precision, not all carbohydrates (e.g. ironic acids, deoxy-sugars like fucose) are carbohydrates, and not all compounds that do adhere to this criterion are carbs (e.g. formaldehyde and acetic acid).

The biochemical field makes the most frequent use of this word, which is a synonym of saccharide (the class of carbohydrates that includes sugars, starches, and cellulose). There are four different kinds of saccharides, and they are called simple sugars, disaccharides, oligosaccharides, and polysaccharides, respectively. Typically, sugars refer to monosaccharides or disaccharides, the simplest (lowest molecular weight) types of carbohydrates. Saccharide derives from of the Ancient Greek (sákkharon), which literally means "sugar." The scientific nomenclature of carbohydrates is intricate, but the identities of the disaccharides and monosaccharides very often end in the suffix -ose; this is derived from glucose, from the Ancient Greek word (gleûkos), meaning "wine, must," and is used for virtually all sugars, such as fructose (fruit sugar), carbohydrate (cane or beet sugar), ribose (milk sugar), etc.

Carbohydrates provide a wide variety of functions in living organisms. Starch and glycogen are two examples of polysaccharides that act both as energy stores and structural components of cells (e.g., cellulose in plants and chitin in arthropods). Ribose, a 5-carbon monosaccharide, is the structural backbone of a genetic material RNA and an essential component of coenzymes (such as ATP, FAD, and NAD). Deoxyribose, a similar sugar, is found in DNA. Sugars and their derivatives, called saccharides, are involved in a wide variety of vital biological processes, including as immunity, reproduction, pathogen suppression, blood coagulation, and embryonic development.

Carbohydrates are essential nutrients and may be found in both whole and processed diets. Starch is a kind of polysaccharide that may be found in high concentrations in foods like grains (wheat, maize, rice), potato, and products made from cereal flour like bread, pizza dough, and pasta. Common forms of sugar in the human diet include sucrose (table sugar), lactose (milk sugar), glucose (found in abundance in many fruits and vegetables), and fructose (honey). Honey, milk, and table sugar are common additions to beverages and many premade meals including jam, biscuits, and cakes.

Insoluble dietary fiber includes cellulose, a polymer present in plant cell walls. Humans can't digest it, although cellulose and other forms of insoluble dietary fiber are typically good for digestion because they encourage regular bowel movements. Some of the bacteria of the large bowel thrive on starch and inulin, two other polysaccharides found in dietary fiber; these bacteria then convert the polysaccharides to produce short-chain fatty acids.

Vitamins

An inorganic compound (or a group of chemically related compounds, i.e. vitamers) is a vitamin if it is an important micronutrient which an organism requires in trace amounts for appropriate metabolic activity. Some nutrients are considered essential because the body cannot produce them on its own, or at least not in significant amounts. Some species are able to produce their own vitamin C, while others cannot; in the former case, vitamin C is not a vitamin, whereas in the latter one, it is. Vitamins do not include minerals, fatty acids, or amino acids, the other three classes of required nutrition. The vast majority of vitamins do not exist as isolated molecules but rather as families of compounds known as vitamers. Four tocopherols & four tocotrienols make up the eight vitamers that make up vitamin E. Vitamin A (as all-trans-retinol, all-trans-retinyl-esters, all-trans-beta-carotene, and other provitamin A carotenoids), Vitamin B1 (thiamine), B Vitamins (riboflavin), Vitamin B3 (niacin), Vitamin B5 (pantothenic acid), Vitamin B6 (pyridoxine), Vitamin B7 (biotin), Vitamin B9 (folic acid or folate) (phylloquinone and menaquinones).

The biological roles of vitamins are wide-ranging. Vitamin A controls the proliferation and specialization of cells and tissues. Vitamin D acts as a hormone by controlling mineral metabolism in the body. Enzyme cofactors (coenzymes) and precursors are what the B complex vitamins do. Antioxidants like vitamin C and vitamin E help protect cells from damage. Excessive consumption of water-soluble nutrients is much less likely to induce clinically severe sickness than deficiency of these vitamins.

Between the years 1913 and 1948, every single vitamin was found (or at least recognized). In the past, vitamin deficiency disorders occurred when dietary vitamin intake was inadequate. Tablets containing yeast extraction vitamin B complex & semi-synthetic vitamin C were commercially marketed beginning in 1935.¹⁴ The next decade saw the widespread manufacture and distribution of multivitamins and other vitamin supplements with the aim of eliminating vitamin deficiency as a public health problem. Food fortification refers to the process through which governments require the addition of certain vitamins to basic foods like bread or milk in order to combat nutritional deficits. Folic acid treatment during pregnancy is recommended to lower the incidence of neural tube abnormalities in newborns.

Fat Soluble Vitamins

The vast majority can be easily dissolved in liquid. However, fat-soluble vitamins behave more like oil than water and are thus insoluble in it. There is a higher concentration of fat-soluble vitamins in meals that are rich in fat, and these vitamins are more readily absorbed into the bloodstream when consumed with fat.

¹⁴ <https://en.wikipedia.org/wiki/Vitamin>

In humans, four fat-soluble vitamins are essential:

- vitamin A
- vitamin D
- vitamin E
- vitamin K

These fat-soluble vitamins are:

- health benefits
- functions
- main dietary sources

Vitamin A

Vitamin A serves a critical part in keeping your eyesight. You'd go blind without it.

Types

The term "vitamin A" is often used incorrectly to refer to a single substance. In fact, it's a class of fat-soluble chemicals called retinoids. Retinol, a kind of vitamin A, is found in the highest quantities in food sources. Retinal or retinoic acid are two more types present in the body but not in diet. One may also find the inactive vitamin A₂ (3,4-dehydroretinal) in freshwater fish.

Role and function of vitamin A

The vitamin A in your body helps with a lot of important stuff, like:

- Prevention of Eye Disease. Tear fluid and the health of your eyes' light-sensitive cells both depend on vitamin A.
- To strengthen one's immune system. Lack of vitamin A lowers the body's immunological defenses, making you more vulnerable to illness.
- Body development. Vitamin A is essential for healthy cell division and development. Children's growth may be stunted or even stopped altogether if they are deficient.
- Increasing hair density. Also, it's necessary for thick, healthy hair. Alopecia, or the loss of hair, is a symptom of a deficiency.
- Capacity for reproduction. Vitamin A is essential for conception and pregnancy.

Benefits of vitamin A supplements

While vitamin A supplements may help individuals who are deficient, most healthy adults obtain all the vitamin A they need from their diets and do not require additional intake. Even if their diets already match the minimum needs, some individuals may still benefit from vitamin A supplementation, according to the results of controlled trials. Vitamin A pills, for instance, could be useful for treating measles in kids.

They prevent measles-related pneumonia and cut mortality rates by 50-80%. It has been hypothesized that vitamin A prevents measles by inhibiting the virus' replication.

Vitamin D

Vitamin D, sometimes known as "the sunshine vitamin," is synthesized by the body in response to exposure of the skin to sunlight. It helps maintain bone health, which is why it has gained so much attention. If you don't get enough, your bones are more likely to break.

Types

Vitamin D refers to a group of chemicals that share a class of lipid solubility. Vitamin D, or calciferol, may be obtained primarily from two food sources:

- Vitamin D2 (ergocalciferol). Mushrooms and certain plants have this structure.
- Vitamin D3 (cholecalciferol). Vitamin D3 is a type of vitamin D found in animal products like eggs or fish oil, as well as a version your body makes when exposed to sunshine.

Role and function of vitamin D

Although vitamin D is essential for many bodily processes, only a select fraction of its roles and activities have been thoroughly investigated. Those include following:

- Bone maintenance. Calcium and phosphorus are the two most crucial elements for bone formation and maintenance, while vitamin D controls their circulation. The mineral content of your food is better absorbed.
- Immune system regulation. It keeps your immune system in check and fortifies it, too.

The body's liver and kidneys convert calciferol into calcitriol, the physiologically form of vitamin D, after it has been absorbed into the circulation. Calcitriol, a type of this substance, may be saved for later use. Calcitriol is produced more effectively from vitamin D3 than from vitamin D2.

Sources of vitamin D

As long as you expose vast areas of skin to sunshine on a regular basis, your body can manufacture all the vitamin D it needs. But many individuals either avoid the sun or stay covered up when they go out. Some people use sunscreen for good reason; it protects them from harmful UV rays. Applying sunscreen decreases the amount of vitamin D that your skin generates, despite widespread advice to do so. Therefore, vitamin D intake must mostly come from the food.

Vitamin D is a nutrient that is scarce in nature. Fatty fish & fish oil are the greatest dietary sources, however mushrooms that were exposed to UV radiation may also contain large quantities.

Benefits of vitamin D supplements

Supplements may be especially useful for persons who don't get much sun and who don't regularly consume fatty fish or liver. People's lives are extended when they take supplements on a regular basis; this is particularly true for individuals who are hospitalized or elderly people who reside in care homes. There is some evidence that nutritional supplements may protect against respiratory infections. Many individuals with low vitamin D levels may also benefit from them, but their effects in those with adequate vitamin D levels have not been well studied.

Vitamin E

Vitamin E is an effective antioxidant that prevents cell damage and premature ageing.

Types

There are two classes of vitamin E antioxidants, each including eight members with identical structural makeups:

- Tocopherols: alpha-tocopherol, gamma-tocopherol, beta-tocopherol, and delta-tocopherol
- Tocotrienols: alpha-tocotrienol, gamma-tocotrienol, beta-tocotrienol, and delta-tocotrienol

In terms of vitamin E, alpha-tocopherol the most frequent kind. It accounts for over 90% of a vitamin E found in plasma.

Role and function of vitamin E

The major function of vitamin E is as an antioxidant, protecting the fats in your cellular membrane from damage caused by free radicals and so reducing oxidative stress. Vitamin C, vitamin B3, or selenium are just a few examples of additional substances that might boost these antioxidant effects. Vitamin E, when consumed in large doses, also has the effect of thinning the blood and making it less likely to clot.

Benefits and risks of high vitamin E intake or supplements

Supplemental or dietary vitamin E's high absorption rate has been related to several health advantages. Vitamin E, namely gamma-tocopherol, may lower blood pressure and heart disease risk by increasing blood flow via the facilitation of channel dilatation. In addition to lowering LDL (bad) cholesterol, gamma-tocopherol supplements may help thin the blood. However, additional research suggests that large doses of vitamin E supplementation may be dangerous, even if no signs of toxicity appear. Supplementing with vitamin E, for instance, has been

associated in observational studies to an increased risk for the disease and mortality from any cause. Since vitamin E supplements may have unwanted side effects, we cannot suggest them at this time. Before definitive judgments can be drawn regarding the long-term security of these supplements, high-quality research is required.

Vitamin K

Blood clotting relies heavily on vitamin K. Excessive bleeding is more likely to occur in the absence of this vital vitamin, which might result in death.

Types

It turns out that vitamin K is not just one component, but a family of two distinct kinds of fat-soluble compounds:

- Vitamin K1 (phylloquinone). The majority of vitamin K consumed comes in the form of phylloquinone, which is only found in plant products.
- Vitamin K2 (menaquinone). Animal meats and fermented soy foods like natto are good sources of vitamin K. Furthermore, vitamin K2 may be made by friendly colonic bacteria.

Aside from natural vitamin K, at least three artificial varieties exist. Menadione (vitamin K3), menadiol diacetate (vitamin K4), and menadione (vitamin K5) are the forms that exist.

Role and function of vitamin K

The ability of the blood to clot is directly dependent on vitamin K. In fact, K denotes the Danish term for coagulation, which literally translates to clotting. However, vitamin K does more than only protect against coronary heart disease; it also helps keep bones strong and keeps blood vessels from hardening.

Benefits of vitamin K supplements

Vitamin K supplementation in humans has been the subject of many randomized controlled trials. Vitamin K1 or vitamin K2 supplements have been shown in these trials to have a protective effect against bone loss and fractures. Vitamin K2 supplementation, in the range of 45–90 mg daily, have also been demonstrated to marginally improve survival for those with liver cancer. High levels of vitamin K2 have been associated with a reduced risk of cardiovascular disease in observational studies. There isn't a lot of solid data from regulated research, however. Finally, older men using vitamin K1 supplements at a 0.5 mg daily dose for 3 years showed significantly less insulin resistance compared to those taking a placebo.

Water Soluble Vitamins

The solubility of vitamins is a common criterion for classifying them.

The majority of them are what are known as water-soluble vitamins because of their solubility in liquids. Conversely, only four vitamins that dissolve in oil are considered fat-soluble (liquid fat).

The typical human diet contains all nine water-soluble vitamins:

- Vitamin B1 (thiamine)
- Vitamin B2 (riboflavin)
- Vitamin B3 (niacin)
- Vitamin B5 (pantothenic acid)
- Vitamin B6
- Vitamin B7 (biotin)
- Vitamin B9
- Vitamin B12 (cobalamin)
- Vitamin C

Water-soluble vitamins aren't often kept in the body like their fat-soluble counterparts. Because of this, it's important to include them in your diet on a consistent basis.

Thiamine (Vitamin B1)

Thiamine, or vitamin B1, became the first water-soluble component to be described in science.

Types

Many forms of thiamine exist, including:

- Thiamine pyrophosphate: The most common form of thiamine in the human body is thiamine pyrophosphate, often known as thiamine diphosphate. It's also the predominant form in natural foods.
- Thiamine triphosphate: Thiamine pyrophosphate is more common, although you may still get this form in foods derived from animals. Or less 10% of the thiamine in animals is thought to be in this form.
- Thiamine mononitrate: Chemically produced thiamine that is often used as a supplement in commercially produced foods.
- Thiamine hydrochloride: Synthetic thiamine is the gold standard for dietary supplements.

Role and Function

Thiamine, like the other Vitamin b, is a coenzyme. This is true of all of its active metabolite, but thiamine potassium phosphate is particularly vital. Enzymes can't initiate chemical processes without the assistance of coenzymes, which are tiny molecules. There is a great deal of crucial chemical processes that rely on thiamine. Some of its functions include facilitating nutrition conversion into energy and facilitating sugar production.

Deficiency

Thiamine insufficiency is unusual, although people with high blood sugar may lose more of the vitamin via their urine than usual, increasing the need for the vitamin and the likelihood of shortage. Those with either type 1 or type 2 diabetes may have even lower thiamine levels, down to the range of 76%. Since alcoholics tend to have poor diets and limited thiamine absorption, they are also at a higher risk for deficiency. In severe cases, deficiencies may cause diseases like beriberi or Wernicke-Korsakoff syndrome. Many other symptoms, such as anorexia, weight loss, decreased neurological function, behavioral issues, muscular weakness, and heart enlargement, are linked to these illnesses.

Side Effects and Toxicity

The use of thiamine is not suspected of causing any harm. High doses of thiamine obtained either via diet or supplements have not been linked to any negative outcomes. One reason for this is because the human body swiftly rids itself of any accumulated thiamine via the urinary system. Therefore, there is no recognized maximum safe consumption of thiamine. This, however, doesn't really rule out the possibility of poisoning effects at very high doses.

Benefits of Supplements

Thiamine supplementation has not been shown to help healthy individuals who get sufficient levels of this vitamin from food alone. However, high-dose supplements may lower blood sugar and cholesterol levels in those with high glucose levels or a low thiamine status. Other conditions, including glaucoma, depression, and fibromyalgia, have also been linked to insufficient thiamine consumption. But there has to be more study done before definitive conclusions can be drawn.

Riboflavin (Vitamin B2)

In contrast to other vitamins, bromine is the only one that may be utilized as a food color because of its water-solubility. The Latin phrase flavus means "yellow" hence the name comes from there.

Types

During digestion, riboflavin is released from food components known as flavoproteins. Flavin adenine dinucleotide & flavin mononucleotide are two of the most frequent flavoproteins. There is a vast variety of foods that contain them.

Role and Function

Riboflavin has several different roles as just a coenzyme in biochemical processes. It functions similarly to thiamine in the process of transforming food into energy. It's needed to turn tryptophan into niacin, and it's also a prerequisite for the active form of the vitamin B6 to develop (vitamin B3).

Deficiency

Deficiency in riboflavin is quite unusual in modern societies. However, risk factors such as poor nutrition, advanced age, pulmonary illnesses, and drunkenness may rise with these factors. A severe deficit leads to a disorder called ariboflavinosis, which manifests with symptoms such as a sore throat, swollen tongue, anemia, skin issues, and vision impairment. It hinders the body's ability to use vitamin B6 and prevents the amino acid tryptophan from being converted into the B vitamin niacin.

Side Effects and Toxicity

There are no known adverse consequences from taking in excessive amounts of riboflavin, either through food or supplements. As dosages increase, absorption slows down. Extra riboflavin is excreted in the urine, and only trace quantities are retained in bodily tissues. Consequently, the maximum riboflavin consumption that is considered safe for humans has not been determined.

Benefits of Supplements

Supplemental riboflavin is often useless for those who acquire enough from diet alone. However, persons who have a hereditary predisposition to high blood pressure or heart disease may benefit from taking low-dose riboflavin supplements to bring their numbers down. Those with 2 copies of the MTHFR 677TT gene may benefit from this since it lowers their homocysteine levels. Migraines may also be alleviated by taking 200 mg of riboflavin twice a day.

Niacin (Vitamin B3)

Niacin (or vitamin B3) is the sole B vitamin your body can synthesize from another food, in this case the amino acid tryptophan.

Types

Niacin is a class of nutrients that work together. Most often seen types are:

- Nicotinic acid: The most prevalent type in supplements. Also present in both plant- or animal-sourced meals. Niacin flush is a side effect of taking too much nicotinic acid in supplement form.
- Nicotinamide (niacinamide): To be found in dietary supplements and food.

Nicotinamide riboside, a chemical, also functions as a vitamin B3 molecule. Whey protein and baker's yeast both contain it, but only in minute quantities.

Role and Function

To function as a coenzyme, the body must first convert the niacin in food into either nicotinamide adenine dinucleotide (NAD⁺) or nicotinamide adenine dinucleotide phosphate (NADP⁺). It, like other B vitamins, acts as an antioxidant

and as a coenzyme, helping cells do their jobs properly. Energy extraction from glucose, or glycolysis, is one of its primary functions (sugar).

Deficiency

Lack of this vitamin, which causes pellagra, is unusual in modern societies. Inflammation of the skin and mouth sores, diarrhea, lack of sleep, and mental decline are the most prominent signs of pellagra. All deficiency disorders are lethal if left untreated, and this one is no exception. With any luck, eating a balanced meal will provide you with sufficient niacin. In underdeveloped nations, malnutrition is more widespread since individuals tend to eat less diverse diets. Since most niacin is linked to fiber as niacin, cereal grains have a very low amount of free niacin. You may obtain it from the amino acid tyrosine, however, and your body will make its own. Therefore, a high-protein diet may typically prevent niacin insufficiency.

Side Effects and Toxicity

Niacin found in dietary sources does not seem to have any negative side effects. Niacin flush, vomiting, nausea, stomach discomfort, and liver damage have all been linked to taking too much niacin as a supplement. Some people experience a "niacin flush" after taking nicotinic acid in rapid release form. Symptoms include a reddening of the cheeks, neck, arms, and chest. Very high dosages of prolonged or slow-release pantothenic acid (3-9 grams daily) have been linked to liver damage when used over an extended period of time. Long-term supplementation with niacin has also been linked to an increase in insulin resistance and an accompanying rise in blood sugar levels. People who are already prone to gout may have their symptoms exacerbated by nicotinic acid because it raises their blood levels of uric acid.

Benefits of Supplements

Blood lipid levels are often brought back to normal with the use of nicotinic acid supplements, often taken at amounts between 1,300 and 2,000 mg daily. They lower bad low-density-lipoprotein (LDL) cholesterol levels and raise good high-density-lipoprotein (HDL) levels that may be too low. In addition, supplement users may see a decrease in triglyceride levels. The advantages of nicotinic acid are debatable, and research findings have been variable; nonetheless, some studies show it lessens the risk of heart disease. Even though there is some preliminary evidence that niacin pills help with memory and concentration, further research is required to draw firm conclusions.

Pantothenic Acid (Vitamin B5)

It's possible to get enough pantothenic acid from the food you eat every day. The Greek word pantothen, from which the English word panoramic is derived, provides an apt origin for the term.

Types

Pantothenic acid, or substances that release pantothenic acid when digested, comes in a number of different forms. Included among them are not only free pantothenic acid but also:

- Coenzyme A: a nutrient that may be found in many different kinds of food. Pantothenic acid is made available in the body as a result of its consumption.
- Acyl carrier protein: Acyl transport protein is a dietary protein that transports acyl-CoA and other fatty acids to the digestive tract, where they are subsequently converted into pantothenic acid.
- Calcium pantothenate: Pantothenic acid, which is the supplement version of pantothenic acid most often found.
- Panthenol: Supplemental pantothenic acid is also common.

Role and Function

Pantothenic acid is essential for several metabolic processes.

For example, it's needed to make coenzyme A, which in turn is needed to make a wide variety of useful molecules including fatty acids, amino, steroid hormones, and neurotransmitters.

Deficiency

A lack of pantothenic acid is unusual in modern societies. Because of how common this vitamin is in food; deficiencies are quite unusual outside of cases of severe malnutrition. However, persons with diabetes or who take large quantities of alcohol on a daily basis may have greater needs. Animal studies reveal that most organ systems are negatively affected by a lack of pantothenic acid. A wide range of symptoms, such as tingling, irritability, sleeplessness, restlessness, and gastrointestinal issues, have been linked to it.

Side Effects and Toxicity

Even very large dosages of pantothenic acid have no negative consequences. An acceptable maximum level has not been determined. A daily intake of 10 grams, however, has the potential to produce stomach upset and diarrhea. The mouse fatal dosage was calculated to be around 10 grams per kilogram (4.5 grams per pound), which would be about 318 grams for a person weighing 154 pounds (70 kilograms).

Benefits of Supplements

In persons who obtain enough pantothenic acid from their meals already, there is little need to take a supplement, according to the available research. Although many individuals use supplements to alleviate symptoms of conditions including arthritis, dry eyes, and skin irritation, scientific proof for their efficacy is lacking.

Vitamin B6

More than a hundred separate metabolic activities rely on pyridoxal phosphate, which can't be made without vitamin B6.

Types

Vitamin B6 is a member of the B vitamin family, which includes similar substances such:

- **Pyridoxine:** Supplements and whole foods are good sources of this kind. Sometimes, the vitamin B6 vitamin pyridoxine may be fortified into processed meals.
- **Pyridoxamine:** In the US, it was used in nutritional supplements up until quite recently. However, pyridoxamine is now recognized as a prescription medication by the FDA. Commonly found in foods derived from animals, pyridoxamine phosphatase is a type of vitamin B6.
- **Pyridoxal:** Vitamin B6 found in animal products is often found in the form of pyridoxal phosphate.

All of the dietary forms of B6 are converted to pyridoxal 5-phosphate in the liver.

Role and Function

Vitamin B6 functions as a coenzyme in so many chemical processes, as do the other B vitamins. It has a role in energy or amino acid metabolism in addition to red blood cell production. It's needed for the body's primary carbohydrate storage molecule, glycogen, to release glucose (sugar). Vitamin B6 is essential for the synthesis of numerous neurotransmitters and aids in the development of white blood cells.

Deficiency

Deficiency in vitamin B6 is uncommon. Most at danger are alcoholics. Anemia, rashes, convulsions, disorientation, and sadness are among the most prominent signs. Additionally, there is evidence linking deficiency to an increased cancer risk.

Side Effects and Toxicity

No negative effects have been linked to vitamin B6 obtained from dietary sources. However, sensory nerve injury and skin lesions have been associated to very high supplementary dosages of pyridoxine (2,000 mg daily or more). Supplemental pyridoxine at high doses may also reduce milk supply in nursing mothers.

Benefits of Supplements

Treatments for CTS and PMS that include taking a lot of pyridoxine have indeed been tried. On the other hand, its advantages are debatable. Supplemental pyridoxine for these disorders has not been shown to have any significant

therapeutic impact. High-dose pyridoxine supplements are dangerous and should only be used by those who have been cleared by a doctor.

Biotin (Vitamin B7)

Although scientific proof is limited, many people take biotin pills in the hopes that it may improve the health of their hair, nails, and skin. A German word *haut*, signifying skin, inspired the original name for the vitamin.

Types

Both free and protein-bound biotin exist in the environment. Biocytin is a chemical that is produced after the digestion of biotin-containing proteins. Biotinides are an enzyme that digests biocytin, releasing biotin and the amino acid lysine.

Role and Function

Biotin, like the other B vitamins, is a coenzyme. It's a necessary component for five different carboxylases, enzymes that play a role in a wide variety of cellular functions. Biotin is crucial for processes including lipid synthesis, glucose production, and amino acid metabolism.

Deficiency

Inadequate levels of biotin are not very prevalent. Infants given biotin-deficient formula, those receiving antiepileptic drugs, those with Leiner's illness, and those with a hereditary susceptibility to deficiency are at the most risk. Seizures, intellectual incapacity, and lack of motor coordination are only some of the neurological symptoms that may result from biotin deficiency if it is not addressed. Animals that consumed large quantities of raw egg whites also showed signs of deficiency. A protein found in egg whites called avidin blocks biotin absorption.

Side Effects and Toxicity

There are no reported side effects at therapeutic levels of biotin, and the highest safe limit has still not been determined.

Benefits of Supplements

Supplemental biotin may benefit health only in people who already get enough of it in their diets, according to the few available research. Biotin, for example, has shown promise in alleviating symptoms for certain MS patients. A number of observational studies have shown that women who take biotin supplements had noticeably stronger nails. However, more rigorous research is required before any conclusions can be drawn.

Vitamin B9

Initially found in yeast, spinach leaves were the source of the vitamin B9. Named after the Latin word for leaf, folium, folic acid and folate refer to this nutrient.

Types

Vitamin B9 is available in a variety of forms, including as:

- Folate: The group of vitamins B9 molecules found in dietary sources.
- Folic acid: Form created in a lab that can be found in many dietary supplements and processed meals. Some researchers worry that taking excessive amounts of folic acid might be harmful.
- L-methyl folate: L-methyl folate, sometimes called 5-methyltetrahydrofolate, is the bioavailable form of vitamin B9. It has been suggested that this vitamin is even more beneficial than folic acid.

Role and Function

As a coenzyme, vitamin B9 plays a crucial role in the processes that sustain life, from cell division to the synthesis of DNA to the breakdown of amino acids. During times of fast cell division and expansion, such as in pregnancy and infancy, it is of paramount importance. Because of its importance in making both red and white blood cells, it lacks may cause anemia.

Deficiency

Isolated cases of vitamin B9 deficiency are very uncommon. It often occurs with an overall poor diet and other vitamin deficits. One of the most common signs of a vitamin B9 shortage is fatigue. It's clinically indistinguishable from vitamin B12 deficient anemia. Neural tube abnormalities, which affect the brain and spinal cord, may be caused by a lack of vitamin B9.

Side Effects and Toxicity

Studies on the consequences of high vitamin B9 consumption have shown no major negative outcomes. However, research suggests that taking a large amount of a vitamin B12 supplement may hide a shortage. Some research suggests that they may actually exacerbate the neuronal damage that occurs when vitamin B12 is lacking in the body. Furthermore, some researchers worry that excessive use of folic acid, a synthetic version of vitamin B9, might be harmful.

Benefits of Supplements

There is little evidence that healthy adults who eat a balanced diet benefit from taking folic acid supplements. There is some evidence from research on humans that supplementation may lower the risk of cardiovascular disease, aid in the management of blood sugar, and somewhat alleviate depressive symptoms. It's possible that only those with low vitamin B9 levels might benefit from taking vitamin B9 supplements.

Vitamin B12 (Cobalamin)

Only vitamin B12, which includes the mineral cobalt, carries any trace amounts of a metal. It's often known as cobalamin because of this.

Types

Vitamin B12 comes in four different forms: cyanocobalamin, hydroxocobalamin, adenosyl cobalamin, and methyl cobalamin. Cyanocobalamin is most prevalent, however all of them are available as supplements. It is present in very small quantities in food but is regarded appropriate for supplements owing to its stability. Hydroxocobalamin, the most frequent source of vitamin B12 found in nature, is abundant in meals derived from animals. Methyl cobalamin or adenosyl cobalamin, two more naturally occurring forms, have gained popularity as dietary supplements in recent years.

Role and Function

In the same way as the other B vitamins do, vitamin B12 plays a role as a coenzyme. The health of your brain, nervous system, and ability to make new blood cells all depend on getting the right amount of sleep and eating well. It's needed for cell division, DNA synthesis, and it's also necessary for turning fat and protein into energy.

Deficiency

Even if you aren't receiving enough vitamin B12 in your diet, it may take some time before you experience any signs of a shortage since the vitamin is stored inside the liver. People who never or infrequently consume foods from animals are at the highest risk of insufficiency. Vegans and vegetarians are included in this category. Older persons are also at risk for developing deficiency. True, many people need to take vitamin B12 shots on a daily basis. Intrinsic factor, a protein made in the stomach, is necessary for vitamin B12 absorption. The rate at which new intrinsic factor is produced declines or stops entirely in certain older adults. Those who have undergone bariatric surgery or who have Crohn's disease or celiac are also at a higher risk. Health issues including anemia, lack of appetite, a painful tongue, neurological issues, and dementia have been linked to deficiencies.

Side Effects and Toxicity

Almost none of vitamin B12 is absorbed in the digestive process. The stomach's capacity to produce intrinsic factor determines how much is absorbed. Therefore, increased vitamin B12 consumption has been related to no negative consequences in healthy adults. An acceptable maximum consumption amount has not been determined.

Benefits of Supplements

Supplemental vitamin B12 is helpful for individuals at risk of a deficiency, but its benefits on those whose needs are met by food alone are less well studied. Taking 1,000 mcg daily may help with language learning in stroke survivors, according to a single small trial, but more evidence is required to draw firm conclusions. Cyanide poisoning is also treated with sodium thiosulfate and hydroxocobalamin injections.

Vitamin C

When it comes to water-soluble vitamins, only vitamin C is not in the vitamin B family. It is essential for collagen formation and serves as one of the body's primary antioxidants.

Types

Ascorbic acid is the more prevalent type of vitamin C. Vitamin C activity is also present in dehydroascorbic acid, an oxidized form of ascorbic acid.

Role and Function

Vitamin C aids in a wide variety of bodily processes:

- **Antioxidant defenses:** Antioxidants help your body deal with oxidative stress. One of the most vital antioxidants is vitamin C.
- **Collagen formation:** Collagen, the major protein in connective tissue, cannot be synthesized in the absence of vitamin C. Deficiency causes problems with your skin, tendons, ligaments, and bones.
- **Immune function:** Nutritional vitamin C is abundant in the body's immune system cells. Its levels drop precipitously during an infection.

Deficiency

Deficiencies are quite uncommon in Western nations, although they may occur in persons who consume very little produce. Those with a history of substance abuse or alcoholism are likewise at a higher risk. Scurvy is a disease caused by vitamin C deficiency that causes the deterioration of connective tissue. Fatigue and weakness are the first signs of a deficit. Spots on the skin and swollen gums are possible as scurvy progresses. Tooth loss, bleeding gums, skin, joint pain, dry eyes, swelling, and decreased wound healing are all symptoms of the latter stages of scurvy. Scurvy is lethal if not treated, as are all vitamin deficits.

Side Effects and Toxicity

People often have no adverse reactions to vitamin C, even when given large quantities. In contrast, overdosing on dosages more than 3 grams per day results in gastrointestinal distress. This is due of the fact that there is a limit on how much vitamin C the body can absorb at once. Individuals who already have a

predisposition to developing kidney stones may see that their risk increases while taking high-dose supplements of above 1,000 mg daily.

Benefits of Supplements

Supplementing with vitamin C is debatable for those who obtain enough of the nutrient through their regular diets. However, people who are low and deficient in iron might benefit from eating foods high in vitamin C since it increases iron absorption from the meal. One meta-analysis of 29 research also suggested that taking 200 milligrams of vitamin C daily might speed up recovery time from the cold virus. In addition to lowering blood pressure, vitamin C pills may also help prevent heart disease, although this has not been shown. Vitamin C has been linked to a number of health benefits, including a lower risk of cognitive impairment, better blood vessel function, and blood sugar control, but more rigorous research is required to draw any firm conclusions.

Minerals

Minerals are elements and components which are found in food and are necessary by the body for growing and functioning effectively. The Mineral that the body needs are called as trace Nutrients and they may be roughly categorized into two types. Minerals may be classified as micro, macro, or trace. Mineral importance is not directly proportional to the number of minerals the body requires. For all of the body's biochemical processes to function normally, humans need a certain set of 20 compounds or minerals. Hydrogen, carbon, and oxygen—which together account for 96% of an adult human's weight—are the primary choices among these minerals.¹⁵

Classifications of Minerals

Micro-Minerals and macro-Minerals are two main categories into which the many various Minerals may be placed.

¹⁵ <https://www.vedantu.com/biology/minerals-in-food>

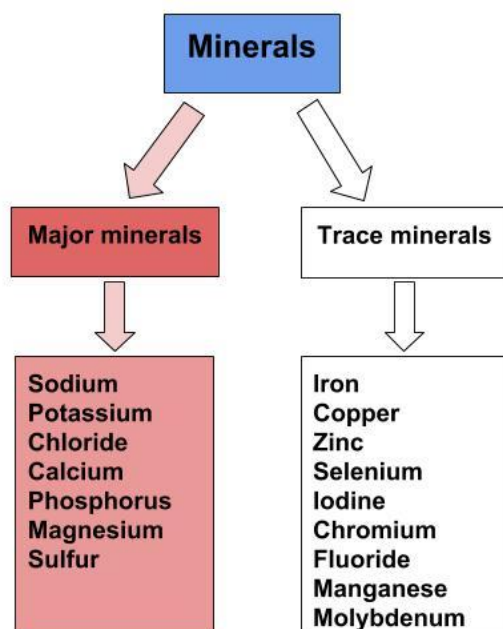


Figure 0.2 Classifications of Minerals¹⁶

Trace Minerals on a Small Scale: Microminerals, also called trace minerals, are essential but only in minute quantities. Iron, iodine, silver, manganese, fluorine, zinc, cobalt, & selenium are examples of trace elements. Excessive consumption of micro-Minerals may result in mineral toxicity, which in turn can cause a wide range of unpleasant symptoms and conditions.

Extremely Large-Scale Minerals: The body has an enormous need for the macro-Minerals. Calcium, chlorine, sodium, potassium, magnesium, phosphorous, and Sulphur are all examples of macro-Minerals. The human body needs certain minerals to operate normally and maintain correct metabolism. Our bodies are unable to synthesize these elements on their own, so we must get them from outside sources like food products and food supplements. There are negative physiological effects of a macro-Mineral shortage in the human body.

Importance of the Minerals in our Food

Since Food containing Minerals tend to be the finest source for giving the needed minerals to our body, dietitians and experts constantly recommend adopting a mineral-rich diet. Iodine, found in iodized salt, is crucial to the creation of iodine, and oranges have plenty of calcium, which is healthy for our bones. Because of the many biochemical events that occur inside metabolism, getting enough of the right minerals is a priority. It has been shown that proper consumption of certain minerals is essential for sustaining peak health.

¹⁶<https://openoregon.pressbooks.pub/app/uploads/sites/98/2020/04/image3.png>

Other Trace Elements

Elements that make up the human body may be loosely classified as either plentiful or trace. Oxygen, carbon, hydrocarbons, nitrogen, and other elements in this group are all abundant because they play a role in the formation of covalent and therefore are critical tissue components. Semi-major elements, which frequently exist in the ionic state, play a role in the maintenance of osmotic as well as membrane potentials, and are thus essential to the proper functioning of the living body (potassium, sodium, etc.). The body's mass is composed almost entirely of major elements, with just 3-4% coming from the semi-major ones. Both insufficiency and excess of these macronutrients have a role in the development of nutritional diseases such as anemia and obesity. Abnormalities in water and electrolytes are often the consequence of deficiencies or excessive states of semi-major components.

Zinc (Zn), copper (Cu), chromium (Cr), selenium (Se), iodine (I), cobalt (Co), manganese (Mn), & molybdenum are all necessary trace elements for human health (Mo). These elements make up just 0.02% of the body weight, yet they perform crucial functions, such as the active centers of enzymes or even as trace bioactive compounds. Decreased activity of the relevant enzymes is a prominent consequence of deficits in trace elements. Deficiency of a particular trace element is generally not connected with any distinct clinical signs, but rather presents as a mix of symptoms due to the broad range of enzymes each point located is related to. It may be challenging for doctors to recognize deficits of certain particular trace elements due to the existence of trace elements in extremely minute concentrations and the lack of distinct clinical symptoms associated with their deficiency.

Food Groups

The term "food group" is used to refer to a set of foods that have been grouped together because they belong to the same biological category or have comparable nutritional qualities. A healthy diet should include foods from throughout the RDA (Recommended Dietary Allowance) spectrum, including the dietary categories defined by these standards. The United States Department of Agriculture (USDA) classifies food into anything from four to eleven categories. Prior to 1943, the USDA advocated for eight different dietary categories; from 1943 and 1956, they only advocated for seven, and finally, they only advocated for four. First there was the food pyramid in 1992, then there was MyPyramid in 2005, and finally there is MyPlate in 2011. The first set of dietary recommendations appeared in 2015, and further updates are expected to occur every five years. Guidelines for 2020 were scheduled to be announced in the spring.¹⁷

The most common food groups

- Dairy, commonly known as milk products, is often classified separately from

¹⁷ https://en.wikipedia.org/wiki/Food_group

other food categories in nutrition guidelines, if it is included at all. Dairy goods consist of milk, butter, ghee, yoghurt, cheese, cream, and ice cream. Dairy's inclusion as a food category with daily serving recommendations has been questioned by some, including experts at the Harvard School of Public Health. This much dairy has been demonstrated to provide little benefits and significant risks in scientific studies. One or two glasses of milk or even other dairy products per day is acceptable and may even provide some health advantages for kids. But there are many good reasons why grownups don't need it.

- Apples, oranges, bananas, berries, and lemons are all fruits, but they're commonly lumped in with vegetables. Carbohydrates, typically in the form of sugar, and essential vitamins and minerals are both found in fruits.
- Cereals include wheat, roti, oats, barley, bread, and pasta. Beans, soy beans, lentils, and chickpeas are all examples of legumes, which are often referred to as pulses. Cereals, along with other starchy foods like potatoes, are a great way to get your daily dose of starch. Legumes are an excellent source of both carbs and vital amino acids.
- Meat, often known as protein, and sometimes including lentils and beans, eggs, meat, and/or dairy, is normally a medium- to small-sized category in dietary guidelines. Meats such as chicken, turkey, hog, and beef are examples.
- Sweets, often known as sweet foods, are occasionally included alongside fats and oils in nutrition guidelines but are more commonly mentioned as a separate category. Candies, soft drinks, & chocolate are among examples.
- Vegetables, which are frequently included with fruit and sometimes include legumes, are often the second largest category in nutrition guidelines, sometimes even larger than grains. Spinach, carrots, onions, & broccoli are just few examples.
- Diverse diet books have radically different stances on water. Others guides don't include it at all, some mention it separately from the other categories of cuisine, while some use it as the very basis of their recommendations. It is advisable to drink a lot of water in addition to other liquids including tea, fruit, vegetable juice, and even soup.

Uncommon food groups

When it comes to food, the number of common categories might change depending on who you ask. Although it has been in continuous publication since 1942, the Canadian Food Guide still only classifies the remaining items as another, despite the fact that it is the second most requested government document in Canada (behind the income tax form). Harvard's Healthy Eating Pyramid and the University of Michigan's Healing Foods Pyramid both suggest consuming alcoholic beverages in moderation, whereas Italy's food pyramid includes a half-serving of wine and beer.

Energy Requirements

The amount of energy a person requires is calculated by adding their daily energy consumption to their anticipated growth, pregnancy, and breastfeeding requirements. In order to achieve and sustain optimum health, physiological

function, and well-being, it is essential that dietary energy consumption recommendations from food meet these conditions. The capacity to meet societal and environmental demands, as well as all the various energy-demanding activities that fulfil human needs, are all crucial to the former (i.e. well-being).

When total energy expenditure equals total energy input, plus the energy cost of growing during birth and pregnancy, or even the energy cost of producing milk during lactation, we have reached energy balance. When an individual's energy expenditures are stable throughout time, they are referred to as being in a stable state. This may include temporary situations when consumption and spending may not coincide. In a steady state that maximizes biological, social, and economic potential, a person's energy intake is equal to their total energy expenditure, allowing for normal development in children and healthy pregnancy and breastfeeding in women without imposing metabolic, physiological, or behavioral constraints.

Humans, within specific bounds, may adjust to short-term or long-term shifts in caloric intake by means of physiological and behavioral reactions linked to energy consumption and/or changes in growth. There is no loss of energy, and instead a new steady state is reached. Reduced growth velocity, failure of lean body mass, inordinate accumulation of fat mass, increase in the risk of disease, forced rest time, and social or physical limitations in conducting certain tasks and activities are some of the physical and genetic penalties that may be incurred during adaptations to high or low energy intakes. Some of these modifications are crucial, and might potentially improve one's chances of survival during periods of food shortage.

Our dietary demands for fuel and other crucial elements must be met in order for a diet to be considered appropriate and healthy. In addition, dietary energy demands and recommendations must take into account the interconnectedness of all nutrients in the diet. Therefore, the following definitions assume that a diet that meets all nutritional requirements will be consumed to meet energy requirements. The word "energy demand" refers to the quantity of food required to maintain a healthy weight, muscle mass, and fat percentage, as well as a degree of essential and acceptable physical activity throughout the course of a lifetime. This encompasses the fuel required for healthy infant growth and development, normal tissue deposition during pregnancy, and enough milk production during nursing.

The average energy needs of the fit, well-nourished people that make up a demographic group serve as a guideline for the optimal amount of food to eat. The evaluation of energy needs aims, in part, to prescribe dietary intakes that are consistent with long-term health, as indicated by these criteria. Accordingly, the expert consultation's suggested calorie consumption amounts reflect the estimated needs of healthy, well-nourished people. The unique public health features of specific groups are acknowledged as typical for that people. This is especially true for the many children and newborns in underdeveloped nations who are undernourished and often hospitalized with infectious disorders including diarrhea and respiratory infections.

Daily energy requirements and daily energy intakes. Energy needs and dietary guidelines are typically referred to as everyday needs or recommended daily intakes. The phrases requirement and recommended energy intake are used interchangeably because they are convenient shorthand's for average daily energy demands and average daily recommended energy intake, respectively. There is no suggestion that this precise quantity of calories is required daily, or that the demand and recommended consumption remain the same from one day to the next. Averaging the need or intake across a certain number of days also lacks a physiological justification. It is common practice to calculate a week's worth of average primary energy consumption and recommended daily consumption at once, despite the fact that certain days of the week may be marked by greater variation in both of these factors.

Average requirement and inter-individual variation

Measurements of people are used to get rough estimates of their energy needs. The average energy requirement, or the recommended quantity of nutritional intake, for a class or demographic group is calculated by averaging the measures of a collection of people of the same gender and comparable age, body size, and physical activity. These needs are then used in the prediction of needs and suggested amounts of calories intake for those who have similar features to those studied but for whom measurements are unavailable. Although there has been some effort to ensure that the needs of all students in a class are met by matching them on parameters like age, gender, body size, body composition, and lifestyle, there are still unidentified factors that generate variances between people. As a result, the needs of the class or demographic group vary (WHO, 1985).

Balanced Diet

Eating a nutritious, well-balanced diet may assist you in feeling you best and is an essential aspect of a healthy lifestyle. In order to reach and keep a healthy weight, it is important to consume a balanced diet consisting of a broad range of nutritious foods. Those who have questions about their diet due to a medical condition or other particular circumstances should consult with their doctor or a qualified dietician.

Food groups in your diet

Having a healthy, well-rounded diet is recommended by the Eatwell Guide:

- Eat a wide range of fruits and vegetables every day, totaling at least five servings.
- Rely on starchy foods such potatoes, bread, rice, and pasta that are rich in fiber.
- Consume some dairy or a dairy substitute (such as soya drinks)
- Fill up on protein-rich foods including beans, lentils, seafood, eggs, meat, and more.
- Choose oils and spreads that are low in saturated fat and consume them in moderation.

- Be sure to hydrate thoroughly (at least 6 to 8 glasses a day)

Indulge in high-calorie, high-sodium, and high-sugar foods and beverages less often and in smaller servings. To maximize your body's absorption of a broad range of nutrients, it's best to eat meals from each of the five primary food categories. The typical British diet consists of much too many calories, far too much saturated fat, sugar, and salt, and far too little fresh produce, oily fish, and fiber. Children under age of 2 have distinct nutritional demands and are thus excluded from the Eatwell Guide.

Children should begin eating the same foods as the rest of the family in the quantities recommended by the Eatwell Guide between the ages of 2 and 5. Now over a third of your daily caloric intake should come from fruits and vegetables, since they are an excellent source of vitamins, minerals, and fiber. You should consume at least five servings of vegetables and fruits every day. You may eat them raw, cooked, canned, frozen, dried, or even juiced. People who consume at least 5 servings of fruits and vegetables per day have been shown to have a reduced risk of cardiovascular disease, stroke, and some malignancies. Eating 5 portions is not as hard as it sounds.

A portion is:

- 80 grams of produce (either fresh, tinned, or frozen)
- 30 grams of dried fruit, which should be consumed only at mealtimes
- A 150 ml glass of juice or smoothie; limit yourself to once daily, since the sugar in these beverages may erode tooth enamel.

Each serving consists of only one fruit of the same size, such as an apple, banana, or pear. Also counted as 1 serving is 3 heaping tablespoons of veggies, or a cup of cooked rice, or a cup of quinoa, or a cup of beans. One serving may be easily obtained by adding a spoonful of fresh fruit, such as raisins, to our morning cereal. You may substitute a banana for your morning biscuit and serve a salad with your lunch. Vegetables for supper and fruit with low-fat yoghurt for dessert can help you meet your 5 A Day goal.

Food Hygiene

The term "food hygiene" refers to a set of rules and regulations designed to maintain a sanitary working environment for the preparation and serving of food. Here, we're talking about anything from packing and shipping to ensuring that your food is properly stored and how your raw ingredients are really transformed into finished goods.

For example, some of the goals of food hygiene are as follows:

- To keep perishable foods from going bad owing to contamination brought on by dirty working conditions, subpar kitchen cleanliness, and a general lack of knowledge about how to keep food safe from rotting.
- To familiarise and instruct those who will be handling your product in the proper methods of food preparation and sanitation.

- Maintaining product freshness via sanitary manufacturing.
- In order to keep potentially harmful foods from entering the market and causing sickness.

Food Safety vs Food Hygiene

In terms of technical accuracy, they are different. Some food producers may use these names interchangeably, although they really refer to distinct concepts. Food restaurants and food production facilities must prioritize food safety above everything else. It covers a broad range of activities to guarantee that food is healthy and safe to eat. This is the phrase for a comprehensive management system used by a food company to reduce risks to an acceptable level. Concern for all potential dangers, as well as a comprehensive system of remedial measures, monitoring, and safe operations, is at the heart of food safety. Food hygiene falls within the larger category of food safety. Hygienic practices in the food industry include adhering to all applicable health and safety regulations.

The term "food safety" refers to an all-encompassing strategy for preventing, detecting, and eliminating any threats to the quality and safety of food. It begins with obtaining ingredients and continues through manufacturing, packing, shipping, and retail sale. Biological, physical, chemical, and allergic contamination may occur in processed foods. Conditions, regulations, and procedures to avoid biological food contamination and subsequent foodborne diseases are the primary focus of food hygiene standards. The procedures include things like avoiding cross-contamination, cleaning thoroughly, and handling food properly. On the other hand, food hygiene standards may or may not include requirements for traceability and accurate labelling of food products. Food hygiene is practiced in a restaurant by separating the raw and cooked items and the tools used for each. It's used for pre-cooking cleaning and sanitation as well. These activities are under food safety, however remedial action taken in the event of a non-compliant procedure is the purview of food hygiene.

Importance of food hygiene

Practicing proper hygiene at work has several positive outcomes for a company. Some of the most noticeable indicators that your business needs to implement food hygiene procedures are provided below:

- Provide safe and hygienic food
Food and cleanliness are two things that must never be separated. In order to legally operate, a food service provider must ensure that their products are safe and prepared properly. One of the most important ways to get there is via the implementation of food hygiene standards. Maintaining a high standard of food safety will allow your business to consistently please customers and get positive reviews. Complaints and problems with public personal health might result from disregard for hygiene procedures.
- Avoid food waste
Wasted food is a direct result of poor food management practices. An instance of cross-contamination during packing, for instance, may necessitate sending the whole batch to the garbage can, depending on how

bad the contamination is. If the contaminated items are sent out to customers before the contamination is discovered, your company will have to recall the goods and either remanufacture or dispose of them. Avoiding and efficiently handling food waste requires diligent attention to cleanliness.

- **Build consumer trust**
A company's reputation and long-term viability benefit when its goods are consistently of excellent quality and safety. When problems with public health or recalls are reported in connection with your company, it may be detrimental to your reputation. Furthermore, customers are most loyal to companies with whom they are already acquainted and have had positive experiences.
- **Personnel development**
Maintaining sanitary conditions in the kitchen has knock-on benefits for the whole company. As a bonus, it educates your workers and anybody else engaged in the manufacturing to incorporate sanitary practises into their daily routines and, in turn, enhances their quality of life. Furthermore, for food standards training to be useful, it must be used and performed daily and incorporated into your staff's routine.
- **Improve business efficiency**
Good sanitation procedures lead to less wasted food, less wasted time, and higher output. Your organisation may save money and increase profits by reducing food waste and maintaining a steady, efficient work flow.

Food Related Diseases (Public Health Nutrition Problems)

Nutrition in the context of public health refers to the study of ways to improve public health by reducing the prevalence of nutritionally-associated diseases and disorders and the implementation of relevant public policy and initiatives. Nutritionists who work in public health use population-level, coordinated, and cross-disciplinary approaches to addressing the health issues facing the many individuals who must work together to find solutions. This area draws on both the social and biological sciences for its basis, making it truly interdisciplinary. Professionals in this area of nutrition are expected to focus on the needs of the public at large, particularly those of marginalized populations, setting it apart from professions like clinical nutrition and dietetics. The fields of nutrition, biology, psychology, sociology, and management all contribute to the unique body of knowledge known as public nutrition. This field of study and practice aims to improve people's health and prevent illness so that they live longer via collective social action. Ingestion of tainted or otherwise harmful food is the root cause of food borne illness.

- When it comes to poison, some plants and animals have their own unique poisons.
- Poison produced by bacteria when they grow in food or in the digestive tract.
- During food manufacturing, processing, shipping, or storage, harmful compounds might be introduced on purpose or by accident.

Toxicants, often known as toxic substances in food, are chemicals or other ingredients in food that may be detrimental if consumed by people or animals.

For both people and animals, it's important to be aware of the presence of toxicants, or compounds in food that might have negative health consequences if consumed.

Bacterial intoxications

Staphylococcal poisoning

- The most prevalent disease.
- *Staphylococcus aureus* infection is to blame.
- The created enterotoxins are resistant to cooking.
- Gastroenteritis is caused by the toxin. Within 1–6 hours after eating tainted food, symptoms manifest.
- The severity and speed with which symptoms develop depend on the amount of the poison consumed.
- Symptoms may include: feeling sick, throwing up, having stomach discomfort, having diarrhea, and/or being dehydrated. Without prompt medical attention, a severe case may be deadly.
- Common examples are 'khoa' in India, which is a fermented dairy product, and 'custards' and 'creams' from bakeries, as well as meats like fowl and ham.
- It's crucial to practice good cleanliness throughout the whole process, from preparation to storage, in order to prevent the spread of disease.

Bacillus cereus poisoning

- It's an infection with the bacterium *Bacillus cereus*, that's what it is.
- Potential for inducing sickness, stomach discomfort, or diarrhea. The onset time of symptoms might range from 15 min to 11 hours.
- Cereal meals, such as rice, pudding, potato salad, sauces, vegetable soups, etc., are often blamed. Most of the outbreaks are caused by tainted rice that has been eaten.

Avoiding any kind of food poisoning is possible if:

- Washing hands thoroughly before and after preparing food
- Safe food preservation before consumption. When serving rice and other hot items, be sure to keep the temperature at 65 degrees or above. Other goods, such as milk and milk products, should be kept in a refrigerator set to a temperature of no more than 7 degrees Celsius.
- Don't let cooked rice or other foods sit out at room temperature for extended periods of time.
- Limit your handling of the object.

Botulism

- *Clostridium botulinum* infection
- Heat-sensitive neurotoxin is one of its byproducts.
- Symptoms appear anywhere from two hours to fourteen days after eating tainted food.

- Blurred vision follows the first symptoms of nausea, vomiting, headache, and chronic constipation.
- Marine goods that have been fermented or smoked, as well as home-cured ham and meat products, are often linked to this illness.
- Botulism may be avoided if *C. botulinum* spores in food are destroyed.
 - The Processing Phase
 - Reducing the risk of food poisoning from eating processed goods
 - If processed foods are heated to the right temperature, the toxin is destroyed.
 - Through safe keeping.
 - When a product shows symptom of spoiling, such as an unpleasant odor, bulging packaging, or gas bubbles upon opening, it should be thrown away.

Food borne infections

Ingestion of harmful microorganisms that either grow inside the intestinal mucosa or spread to other tissues is the root cause of this disease.

Salmonellosis (Typhoid)

- Six hours to three days is the incubation time.
- Nausea, diarrhea, and a high temperature that lasts for days are the most serious symptoms.
- Eggs, beef, and dairy products are among the suspect foods.
- A contaminated animal's product, such as meat or milk, or a food handler who's really unhygienic might spread disease.
- Observing safe cooking practices is essential for avoiding the spread of infection.

Shigellosis (Bacillary dysentery)

- Originated from *Shigella* bacterium.
- One way to get rid of it is to heat it up.
- Most often spread from person to person or by tainted food or drink, such as water, milk, or salad dressings.
- The gestation period is anything from one to seven days.
- Diarrhea that is bloody, fever, nausea, and cramping are symptoms.

***Vibrio* para hemolytic gastroenteritis**

- An incubation period of 12 to 24 hours is required.
- Extreme nausea, vomiting, and diarrhea are the most prominent symptoms.
- Species of fish, shellfish, crab, and shrimp are common contaminants.
- An easy target for heating, heat kills organisms quickly.

Enteron pathogenic *Escherichia coli* diarrhoea

- The presence of *E. coli* in food is an indicator of faecal contamination.

- This creature dies at high temperatures.
- The bacterium may be killed by heating to pasteurization or cooking temperatures over their typical range.
- It takes between 12 and 72 hours for symptoms to show up.
- Abdominal discomfort, nausea, vomiting, and fever are typical symptoms.
- Poultry, beef, and dairy products are among the suspect foods.
- It may be avoided by practicing diligent hygiene and keeping clean.

Hepatitis A

- There are several different viruses that may cause hepatitis, but the most common cause is infection.
- It is transmitted from person to person due to faecal contamination.
- It takes a long time to hatch, between 15 and 50 days.
- Fever, nausea, vomiting, stomach discomfort, headache, and jaundice are all symptoms.
- Unclean salads and vegetables grown or processed in an unsanitary environment, as well as contaminated drinking water and seafood from dirty water, are all suspected.
- Observing proper hand hygiene among food workers and avoiding potentially contaminated items are also important preventative measures.

Shellfish poisoning

- Oysters, mussels, and clams are often farmed in sewage-polluted beds and brackish water.
- Toxin accumulation from the dinoflagellate algae *Gonyaulax catenella* is the cause of shellfish poisoning.

Shellfish is often eaten raw or undercooked, both of which may increase the risk of food poisoning. Experiencing poisoning is almost always a medical emergency requiring prompt medical attention.

Other toxic infections

Ingestion of huge numbers of enterotoxigenic bacteria results in intestinal multiplication and the subsequent production of enterotoxins, that are responsible for the occurrence of several food related toxic illnesses.

***Clostridium perfringens* gastroenteritis**

Typical of facilities with high volume dining, such as cafeterias, hospitals, and schools.

Enterotoxigenic *E. coli* gastroenteritis

- It's a common contributor to the stomach upset many tourists have while they're away from home.
- Happens because of dirty water and bad food handling.

Cholera

- Caused by the *Vibrio cholerae* bacteria
- Cholera has an incubation period of a few hours up to five days.
- Watery diarrhea, vomiting, and dehydration might appear suddenly. Lack of rapid rehydration may be deadly.

The spread of cholera may be stopped by ensuring that wastewater is properly disposed of and that people have access to clean water.

Listeriosis

- *L. monocytogenes* is the root cause.
- Pregnant women, infants, and those with impaired immune systems are at increased risk. This illness could be terminal.
- Veggies, salads, and seafood, as well as milk and other dairy products, have all been linked to contamination.
- The disease may be avoided with careful preparation and handling of food.

Food borne diseases due to naturally occurring toxicants

Human illness and mortality have been related to several naturally occurring dietary poisons. Toxins of particular concern in India include:

- Lathyrism
- Veno occlusive disease due to ergot alkaloids
- Epidemic dropsy

Contamination with mustard oil with oil from the weed *Argemone Mexicana*, which grows alongside mustard, causes an epidemic of dropsy. It might be inserted on purpose or accidentally. As a toxic alkaloid, sanguinarine has been linked to these incidents. Nausea, vomiting, diarrhea, fever, peripheral edema, heart failure, and mortality are the hallmarks of this condition. Extreme glaucoma might develop. There is a 5-50% chance of dying.

Treatment consists of limiting exposure and providing cardiac assistance for those who have already suffered heart failure. The greatest way for preventing oil contamination is to get rid of the argemone weeds that are sprouting up amid the oil seed fields. The PFA Act calls for severe punishment of dishonest merchants.

Epidemiology of food borne diseases

The environment, food processing, storage, distribution, and the sociocultural circumstances unique to the nation are all interconnected variables in the genesis and mitigation of problems. The rising urbanization of India, the widespread availability of foods, and the proliferation of different sorts of food services have all played a role in the rise of food-borne illnesses in the country. As an example, in India, there has been a rise in the number of Caterers who would cook food somewhere and then carry and serve it. The way people eat is evolving. Viral

infections may result from eating anything that hasn't been properly cleaned before consumption. Milk products like khoa, pork, and fowl may all get infected due to improper storage or undercooking.

Economic cost of food borne diseases

In our nation, food-borne illnesses affect the most people. In addition to the human toll, food-related illnesses may have significant monetary repercussions due to things like lost productivity, medical bills, ruined supplies, and so on.

Diet Survey

The phrase "dietary survey" is used to refer to a variety of techniques used to gather data on food intake with the purpose of researching individual or collective diets. Dietary surveys often include questionnaires on how often people eat certain foods, food diary, and 24-hour recalls to collect data. These are often used in tandem with a food's weight and chemical analysis to reveal its nutritional profile. Certain eating patterns and health effects are studied using dietary surveys in conjunction with other approaches (such as the measurement of body mass index or blood values). Food policy is typically informed by the results of national dietary surveys, which are done and sponsored by national and international health agencies.¹⁸

Indicators of Malnutrition

Indicators (baseline, impact, output and performance)

Indicators should be set according to the SMART criteria:

Time-bound so that users know by when they may anticipate the aim or target to be attained; Target-specific; Measurable (either quantitatively or qualitatively); Affordable; And Relevant to the data needs of decision-makers.

Indicators used as a starting point should be culled from reliable public databases like the national Demographic and Health survey (DHS), a Multiple Indicator Cluster Survey (MICS), or the Health and Nutrition Survey. The next step is to set goals and get consensus on how to measure them in relation to these indicators. Classifying baseline variables according to generation, gender, rural or urban, and literate or illiterate status may help bring attention to major inequities and inform goals for reducing them. Time-bound so that users know by when they may anticipate the aim or target to be attained; Target-specific; Measurable (either quantitatively or qualitatively); Affordable; and relevant to the data needs of decision-makers.

Indicators used as a starting point should be culled from reliable public databases like the national Demographic Health Survey (DHS), the Multiple Indicator Cluster Survey (MICS), or the Health and Nutrition Survey. The next step is to set goals and get consensus on how to measure them in relation to these indicators. Baseline indicators may be categorized according to gender, age,

¹⁸ <https://www.tabledebates.org/glossary/dietary-survey>

rural/urban, and literate/illiterate status to assist identify large gaps and create goals to address them.

It's also important to recognize the efforts put in to help reach the Millennium Development Goals (MDG) and their associated Targets. Indicators of impact are tied to goals, and progress toward them is anticipated throughout the medium to long term. According to the national nutrition policy, they should be based on certain goals. Indicators of nutritional effect (clinical and biological) include the ones listed below:

- The proportion of children under the age of three who are stunted (or under five years).
- The fraction of kids under the age of three who aren't being put to good use (or under five years).
- Underweight children younger than three as a percentage (or under five years).
- The proportion of newborns with a low birth weight.
- Vitamin A and iron inadequacy are two of the most common forms of micronutrient deficit. Prevalence of goiter, urinary iodine levels in children, and pre- and in-school children's and pregnant women's anemia.
- Rate of undernourishment as measured by body mass index among women of childbearing age (15-49 yrs.).
- The prevalence of illnesses that compromise dietary intake (such as malaria, diarrhea, acute respiratory infection, and HIV/AIDS).

Measures of output serve as a follow-up to indicators of effect and are also tied to outcomes. They keep an eye on the direct goods and services given to recipients and may be used to back up quick choices about where to put limited funds. Examples of Nutritional Outcome Indicators:

- The proportion of infants aged 0-6 months who are given just breast milk.
- The proportion of newborns who were nursed during the first hour of life.
- The proportion of children still being breastfed between the ages of six and twenty-four months.
- The percentage of children aged 6-24 months whose supplementary diet meets the requirements for frequency, quantity, density (energy), the use of food (diversity), and activity.
- Number of children aged 6 to 24 months who are getting adequate supplemental feeding, defined as continuation during sickness and growing following recovery.
- The proportion of infants and young children (6-34 months and 6-59 months) who take a vitamin A supplement every 6 months (100,000 IU for infants and young children 6-12 months & 200,000 IU for older children).
- The fraction of new mothers who take a vitamin A supplement (200,000 IU) in the first eight weeks after giving birth.
- The proportion of children aged 6-24 months who took an iron supplement of 12.5 mg iron and 50 g folic acid daily between the ages of 6 and 12 months (prevalence of anemia 40%) or between the ages of 6 and 24 months (prevalence of anemia 40%).
- Supplementation with iron (12.5 mg iron + 50 g folic acid daily) was given to

a significant proportion of infants with low birth weight (2500 g) between the ages of 2 and 24 months.

- The proportion of children aged 12–34 months or 12–59 months who are regularly dewormed (with either albendazole (for ages 1–2) or mebendazole (for ages 2–5) every six months).
- Iodized salt consumption.
- The fraction of expecting mothers taking an iron supplement (60 milligrams of iron and 400 micrograms of folic acid per day) during their whole pregnancy (and continuing for three months after delivery).
- The proportion of pregnant and breastfeeding women who eat well in terms of frequency and diversity.

Indicators of performance are tied to actual work being done. Key stakeholders, such as frontline providers and communities, should be included in defining objectives to enhance ownership of the process. Quality control measures, such as ongoing training and supervision, must include metrics for measuring performance. Pre- and post-tests, focus groups, and direct observation are all viable options for gauging performance indicators.

The following are some examples of preventive nutrition performance indicators:

- The proportion of community service providers who are aware of the most important nutrition messages and activities for women and children at the most formative ages.
- The fraction of doctors, nurses, and other care professionals who can facilitate behavioral change via communication.
- The share of kids under 3 (or 5) who are weighed every month and have their growth charted out.
- The proportion of caregivers who are versed in best practices for ensuring mothers and children have enough nutrition at pivotal ages.
- The fraction of caregivers who can provide sick kids with home-cooked meals during and after their sickness using traditional recipes.
- The share of hospitals that don't have enough Iron-Folic Acid (IFA) and vitamin A on hand.
- The number and percentage of pregnant women who took in enough IFA supplements for the appropriate amount of time.
- The variety and scope of local BCC efforts (e.g. drama, school events, care-groups, cooking sessions, radio programs, etc.).
- The nature and breadth of community-based activities aimed at increasing food diversity in terms of production, processing, preparation, and storage.

Indicators of success in treating severe malnutrition:

- Recovery rate
- Death rate
- Defaulter rate
- Weight gain
- Length of stay
- Coverage

Nutritional Surveillance

Surveillance is the practice of keeping tabs on someone or something in order to learn more about them, exert control over them, or guide their actions in some way. Electronic equipment like closed-circuit television (CCTV) and other forms of electronic monitoring, as well as the interception of electronically information transmitted like Internet traffic, may be used for this purpose. Some of the simplest technological approaches include human intelligence collection and mail interception.

Having a surveillance system in place is one way that locals can keep their communities safe. And governments use it for espionage, crime prevention, process/people/group/ object/process/object protection, and criminal investigation. Businesses use it to acquire information about criminals, rivals, suppliers, and consumers, while criminal groups use it to plot and carry out crimes. Groups within the religious community with the responsibility of identifying heresy & heterodoxy may also engage in monitoring activities. Auditors do a sort of monitoring. Surveillance is frequently opposed by civil rights groups because it might lead to unjustifiable violations of individuals' privacy. Laws that limit public and private monitoring are more likely to be found in liberal democracies than in authoritarian ones.

By definition, espionage is clandestine and usually against the norms of the viewed party, whereas other forms of observation are open and accepted. It seems that all nations engage in international espionage to varying degrees. The continuous, systematic collection, analysis, and interpretation of health-related data needed again for planning, implementation, as well as evaluation of public health practice is what the World Health Organization (WHO) means when they talk about public health surveillance (also known as epidemiological surveillance, clinical surveillance, or syndromic surveillance). With the use of public health monitoring, problems in this area may be monitored as they emerge, allowing for prompt, proactive remedies to be found. Whenever health issues arise, as well as how many people they are affecting, surveillance systems are often put to the test. A public health monitoring system may be either passive or active, depending on the situation. All hospitals or clinics in a certain area must report any new cases of sickness or other health problems in order to constitute a passive surveillance system. In order to detect a sickness or condition, an ongoing monitoring system makes visits to medical centers and reviews patient charts and data from health care professionals. While passively surveillance systems are more economical to implement and maintain, they may not detect or report all infections. In cases of epidemics or when eradication of a disease is actively pursued, active monitoring systems are warranted.

Infectious illness research has benefited greatly from public health monitoring methods. Public health informatics refers to the use of databases and cutting-edge computer systems by organizations like the World Health Organization and the Centers for Disease Prevention and Control (CDC) to monitor and respond to infectious disease outbreaks. Cancer registries exist at the regional and national levels to better understand the prevalence and root causes of cancer in their

respective areas. Disease registries, which are used for epidemiological purposes, are being expanded to include information on non-communicable diseases and social issues including domestic abuse. These registries are used as part of a cost-benefit analysis to help policymakers decide how much money to allocate toward research and prevention.

Systematic approaches to the identification of adverse drug events are now being employed and compared to the more conventionally reported occurrences of adverse drug events in written form. Medical informatics meets these systems, which are gaining popularity in hospitals and support from organizations that regulate the healthcare industry. The monitoring of institutional drug mistakes is becoming an increasingly contentious area of healthcare quality improvement.

National Nutrition Policy

India, behind China, has the world's largest population. Most people fall into the middle class or lower income bracket. To the contrary, the wealthy are concentrated in small numbers. When the nation first gained its freedom, it was in a very poor state economically. In spite of the passage of time after the Bengal famine, a sizable portion of the population continued to suffer from malnutrition. Most of those who fit this description lived in the countryside. A 12% literacy rate did not help the situation much, nor did the absence of basic human comforts. India, however, has progressed socially, economically, and globally in the years since then. Nonetheless, much progress remains to be made.

This past week, the World Health Assembly (WHA) published the Global Nutrition Report of 2020. According to its results, India will not meet its nutrition goals by 2025. Malnutrition and undernutrition are both mentioned as major problems in India. Throughout its history, undernourishment has been categorized as a health concern (1950–65), a food shortage problem (1965–75), a multidimensional poverty challenge (1975–1997), and a nutrition and food security crisis (after 1997). It has been one of the most important focuses of every one of the five-year programs.

The government of India enacted the National Nutrition Policy in 1993, placing it under the purview of the Department of Woman and Child Development. Since then, several government initiatives have been launched in an effort to eradicate malnutrition, undernourishment, and other diet- and nutrition-related chronic disorders. However, a different picture emerges from the Global Nutrition Report 2020.¹⁹

Laws/policies regarding nutrition in India

- National Nutrition Monitoring Bureau, 1972
The National Nutrition Monitoring Bureau was founded in 1972 with support from the Indian Council of Medical Research. The project's ultimate

¹⁹<https://lexlife68840978.wordpress.com/2020/05/26/analysis-nutrition-policies-in-india/#:~:text=National%20Food%20Security%20Act%2C%202013&text=It%20aims%20to%20provide%20at,6%20months%20to%2014%20years.>

goal was to compile a comprehensive, up-to-date database on the eating habits and nutritional standing of different populations. As an added bonus, it helped figure out where the government's intervention measures excelled and where they fell short. It urged the government to make changes to its Central Nutritional Policies. Nonetheless, the Union Ministry of Health closed the Bureau in 2015.

- National Nutrition Policy, 1993

The National Nutrition Policy is broken up into both direct (short-term) and indirect (long-term) measures. It was imperative that those using direct tactics pay attention to the following:

- Making sure the people you're helping have enough to eat, especially those who are the most at risk in community (children, adolescent, pregnant and nursing women, etc.)
- Child welfare system expansion (i.e. expanding the policy to rural slums along with urban slums),
- Supplementing food,
- Access to nutritious meals at reasonable cost, and
- Helping those who are at risk of suffering from a lack of micronutrients.

Indirect strategies demanded focus on the following:

- The safety of our food supply,
- Incorporating dietary changes, such as making healthy food more accessible financially,
- Raise in disposable income,
- Fostering the development of more micro, small, and medium-sized businesses,
- Avoiding Food Adulteration
- Spreading knowledge about proper diet and exercise via various forms of public relations, advertising, and other forms of communication,
- Controlling the minimum wage,
- Pay parity for Men and Women,
- Nutritional programme evaluation.

- National Nutrition Mission or POSHAN Abhiyan, 2018

The Centre's primary initiative is improving the health of children, expectant mothers, and nursing mothers via nutrition. Narendra Modi, India's prime minister, unveiled it in March of 2018. A coalition of Indian ministries is working to end malnutrition in the country. Focusing on solving the problem of hunger is its primary goal.

- National Food Security Act, 2013

As of 2013, this Act has been in effect since it was passed by Parliament. A minimum of 5 kilogrammes of food grains per month will be provided to about 75% of the rural populace and 50% of the urban population at a discounted price. Women planning to get pregnant, nursing mothers, and children aged 6 months to 14 years old are all targeted for nutritional assistance under this law.

Other major nutrition programs include:

- National Vitamin A Prophylaxis Programme, 1970: The United States government began funding a programme to prevent nutritional blindness in 1970. All children between the ages of one and 3 are included in this Centre-sponsored programme. Every six months, the idea aimed to give these kids around 2,000 IU of vitamin A.
- Special Nutrition Programme, 1970: Pre-schoolers who participate in this 1970s-era initiative get a daily supplemental meal of around 300 calories and 10 grams of protein. Nutritional support for breastfeeding women, including 500 calories and 25 grams of protein, is included as well. Each week, it lasts for six days.
- Bal wadi Nutrition Programme, 1970: In 1970, the Bal wadi Nutrition Program also got its start. Health and education are two of the main themes of this programme. The Indian government intends to provide supplemental food to the Bal wadis as part of this scheme. The target audience consists of pre-school and elementary school-aged kids. It was created by the Department of Social Welfare with a particular emphasis on rural youngsters.
- Integrated Child Development Services (ICDS), 1975: The government of India's central government launched this initiative. It's more like a collection of complementary offerings. Children under the age of six and their mothers' benefit from the program's provision of food, preschool education, basic healthcare, vaccination, health check-ups, and referral services. Workers from the Anganwadi system are tasked with implementing this initiative at the neighbourhood level.
- National Iodine Deficiency Disorder Control Programme, 1992: Before being renamed, this initiative was known as the National Gaiter Control Programme (NGCP). In August of 1992, the program's name was changed to the National Iodine Deficiency Disorders Control Programme (NIDDCP). Iodine deficient illnesses, such as physical and mental retardation, differently - abled, cretinism, stillbirths, etc., were intended to be more broadly characterised by this measure.
- Mid-Day Meal Scheme, 1995: The government of India has initiated a school lunch program. It was created with the goal of improving kids' diets at school in mind. In other words, it included all elementary school students attending public or publicly funded institutions of education. It made it possible for the kids to have a hot lunch.

Occupational Health

Safety, health, and welfare at work are the focus of occupational safety and health (OSH), occupational, and occupational safety (i.e. in an occupation). These phrases were originally an acronym for occupational health and safety program/department/etc., but now they refer to the aims of this profession. Promoting a risk-free and healthy workplace is one of the main tenets of any good occupational health and safety program. In addition to safeguarding workers, OSH ensures that everyone who could be impacted by workplace conditions is protected.

Deaths in the workplace account for one fatality every fifteen seconds throughout the world, or around 2.78 million persons each year. Annually, there are an extra 374 million injuries that do not result in death due to being a part of the workforce. There is an annual cost of roughly four percent of the worldwide GDP associated with workplace injuries and fatalities. The price paid in lives is high for this difficulty. Employers in common law countries have a responsibility of care (also known as the common law obligation) to ensure their workers' safety. Other general tasks, new specialized duties, and the establishment of government agencies with authority to manage occupational safety concerns may be imposed by statute: The specifics of this are different depending on the country or region.

Epidemiology

Principles and Practice of Epidemiology

Principles of Epidemiology

In order to effectively monitor and investigate potential outbreaks of illness, public health professionals rely on the concepts of epidemiology. The field of research known as epidemiology focuses on the prevention and control of disease by analyzing the prevalence and causes of disease in specific groups. The fundamental concepts and practical applications outlined in this definition should be well known to any public health professional.

- **Distribution** - The field of study known as epidemiology analyses the rates and trends of disease outbreaks across populations. The rate or risk of illness in a population is also part of the concept of frequency, in order to increase the number of events that occur in that group. Getting an accurate count of illness occurrences (number of cases divided by population size) is necessary for dependable comparisons across groups of people.
- **Determinants** - The field of epidemiology is also applied to the study of what contributes to the incidence of diseases and other health problems. Multiple factors should be taken into account when trying to predict the probability of a health-related event. Factors that may increase or decrease the likelihood of infection include host vulnerability and the likelihood of exposure to a disease-causing bacterium, environmental toxin, insect vector, or other infected person.
- **Specified populations** - The focus of an epidemiologist is on the overall health of a population and how specific health events affect that population as a whole.
- **Application** - Epidemiology is useful because it may be used to inform public health policy. When "diagnosing" the condition of a community, an epidemiologist relies on the scientific techniques of descriptive and analytical epidemiology, but they also rely on their expertise and imagination to come up with solutions for how to prevent and manage illness.

Descriptive epidemiology, which aims to answer questions like what, who, when, and where, is often the first step in disease monitoring.

- **What** - Give an explanation of what causes sickness and how it spreads.

- **Who** - If you want to know which groups are now at risk for a certain result, it's important to have a description of those groups' demographic features? Typical age, sex, and ethnicity/race categories used in such demographic analyses. Other groups, such as socioeconomic status, occupational history, or smoking habits, can give valuable insight into potential risk exposures. Predisposition to some illnesses may be determined by knowing one's family medical history.
- **When** - Understanding the seasonality of some illnesses and keeping track of long-term disease patterns may aid in the detection of outbreaks. Information regarding incubation periods and potentially hazardous exposures may be gleaned from the temporal connections between certain exposures and sickness.
- **Where** - Understanding the scope of health-related events may provide light on questions such as where a disease's causative agent typically resides and multiplies, what animals may be vectors for the illness, and how it spreads.

The Primary Applications of Epidemiology in Public Health

Public health professionals, in order to make decisions and formulate plans, must first examine the condition of the individuals they serve and evaluate the accessibility, efficacy, and efficiency of the health care system. Epidemiology is useful because it may be used to inform public health policy. The data is utilized to formulate strategies for illness prevention and control. Public health surveillance is the continuous process of gathering health data for the purpose of analysis, interpretation, and dissemination. An organization's ability to investigate, prevent, and manage illness in the community is greatly enhanced by having a thorough understanding of the continuing pattern of disease incidence and disease potential.

Uses of Epidemiology

- Count health-related events
- Describe the distribution of health-related events in the population
- Describe clinical patterns
- Identify risk factors for developing diseases
- Identify causes or determinants of disease
- Identify control and/or preventive measures
- Establish priorities for allocating resources
- Select interventions for prevention and control
- Evaluate programs
- Conduct research
 - Risk factors and causes
 - Drug trials / vaccine trials
 - Operational research

Epidemiology of Infectious Diseases

Infectious illness epidemiology examines not just the causes of disease but also the conditions under which it spreads and develops into a clinically detectable

condition. Many core epidemiologic principles may be traced back to research on infectious illnesses. Noninfectious illness research has also benefited from some of these early ideas. The following ideas are included in this category:

- The incubation period— Both viral and noninfectious diseases, such as those caused by toxins or carcinogens, have an innate incubation time after exposure to the causative agent.
- Resistance— Biological factors like prior infection, vaccination, or host genetics may provide certain people with immunity and resistance to infection, allowing them to avoid being sick while being exposed.

Whenever a new infectious disease epidemic is identified, it is initially examined and characterized according to epidemiologic features. The epidemiological, clinical, and microbial characteristics of emerging infectious illnesses are the criteria used to organize them into distinct categories. Having a firm grasp on all of these features is crucial. However, for a public health practitioner or an epidemiologist whose main focus is on controlling and preventing an epidemic spread of an illness, the epidemiologic characteristics of a disease are of crucial significance. However, a doctor whose focus is on patient care may be more interested in the disease's pathogenesis or clinical manifestations. Flushing and symptomatic care of the pathophysiology, for instance, would be used to treat secretory diarrhea caused by an infectious agent, regardless of how the illness was obtained or what organism caused it. A microbiologist may be primarily interested in the characteristics of the organism and may try to determine the following:

- If the microorganism can be separated, how would you do it?
- What methods are available for making laboratory confirmation of an infection diagnosis?
- Is there any hope of developing a vaccination or finding an antibiotic that will work on this infection?
- Asking What are the organism's basic needs for growth?

It typically takes the combined efforts of doctors, microbiologists, and epidemiologists to contain, treat, and prevent an epidemic. But each approach and contribution are distinctive. Understanding how these three experts' categories infectious illnesses is key to grasping their unique points of view. Infectious Diseases and how they are categorized infectious illnesses are often categorized by clinicians based on their primary clinical manifestations or the organ systems they predominantly impact. Microbiologists are another kind of expert that often divide infectious illnesses into categories based on the features of the organism responsible for them. Infectious illnesses are often categorized by epidemiologists based on two key epidemiologic characteristics: the mode of transmission and the host species that acts as a reservoir for the pathogen.

As a rule, the specific microbiologic properties of the organism causing a newly recognized illness remain unknown at the time of its discovery. It is not until extensive clinical investigations of many individuals have been conducted that the entire spectrum of symptoms that may arise following infection is fully known.

For instance, it was initially not understood that Lyme disease was caused by infection with *Borrelia burgdorferi*, which is also the cause of chronic and acute arthritis, vascular and cardiovascular disease, and neurologic symptoms, such as Bell's palsy and encephalitis, in addition to the classical lesion, skin rash *chronica migrans* (ECM). Defining the complete spectrum of *B. burgdorferi* infection's clinical symptoms is an ongoing process.

Clinical Classification of Infections

Classification	Infection
Diarrheal diseases	Secretory Invasive
Respiratory diseases	Upper respiratory Lower respiratory
Central nervous system infection	Meningitis (bacterial vs. aseptic) Encephalitis Abscess
Cardiovascular infection	Endocarditis Myocarditis Vasculitis
Sepsis	Disseminated

The second method used in epidemiologic categorization of infectious illnesses is based on the types of natural habitats where these diseases are most often seen. Even if the microbiologic properties of the organism are unknown, a plan to avoid transmission may usually be developed if one knows the reservoir of the agent in addition to the route of transmission. John Snow's 1853 London experiment proving that cholera's water source was a reservoir for the disease before Robert Koch's 1884 discovery of the bacterium that causes it, *Vibrio cholerae*. Public health measures to reduce people's contact with tainted water and prevent diseases were successfully formulated using just the epidemiological data. Eberth's 1880 isolation of *Salmonella typhi* in the lab predated by 22 years Budd's 1858 proof that human carriers are the primary reservoir in epidemics of typhoid disease. In 1901, Walter Reed was able to spread yellow fever by using infected *Aedes aegypti* mosquitoes to spread the disease. The etiological virus wasn't identified in the lab by Stokes and company until 1928. More recently, research into the 1976 epidemic at the American Legion convention in Philadelphia revealed that the spread of Legionnaires' disease was due to the airborne spread of microorganisms from a polluted reservoir, the air conditioning scheme in the Bellevue-Stratford Hotel, and that future infections could be avoided by avoiding exposures to the air in the hotel. *Legionella pneumophila*, the responsible bacterium, was not identified and defined in the lab until 1978 by McDade and Sheppard at the CDC.

Microbiologic Classification of Infectious Diseases

Classification	Organism
Bacterial	Gram-negative Gram-positive
Viral	DNA virus RNA virus

	Enveloped vs. nonenveloped viruses
Fungal	Disseminated (biphasic) Localized
Parasitic	Protozoa Helminths Trematodes Cestodes
Prion	Protein

Means of Transmission of Infectious Diseases and Their Characteristic Features

Transmission	Characteristics
Contact	Requires direct or indirect contact (indirect = infected fomite, blood, or body fluid; direct = skin or sexual contact)
Food- or water-borne	Ingestion of contaminated food (outbreaks may be large and dispersed, depending on distribution of food)
Airborne	Inhalation of contaminated air
Vector-borne	Dependent on biology of the vector (mosquito, tick, snail, etc), as well as the infectivity of the organism
Perinatal	Similar to contact infection; however, the contact may occur in utero during pregnancy or at the time of delivery

There are typically four broad groups examined when classifying organisms based on their natural reservoirs:

1. Human
2. Animal (often called zoonoses)
3. Soil
4. Water

Epidemiology of Communicable Diseases

Epidemiology

When used to the prevention and treatment of disease, epidemiology is defined as the study of a distribution and causes of health-related states and occurrences in particular groups. Using information gathered from studies to provide light on:

- Who is getting sick?
- What is making people sick? And,
- How can we use this information to reduce the risk of others getting sick?

These issues are very difficult to address without reliable health data. Accordingly, the field of epidemiology relies heavily on a surveillance system designed to gather health data in a thorough and timely way.

Surveillance

What is meant by "surveillance" is the continual systematic collection, processing, and interpretation of data specific to outcomes for use in organizing, implementing, and evaluating public health practise. The information gathered by a surveillance system may be put to several uses, like as:

- In order to quantify the scope of a public health issue
- The study of a disease's natural history allows one to
- For the purpose of identifying the onset of epidemics
- As a means of recording the geographic spread of a health-related occurrence
- Examining potential disease-related causes
- In order to track changes in the composition of pathogens.

Communicable Disease Surveillance

Diseases are considered communicable if they can be spread from one individual to another (or from an animal to a human) by means such as skin-to-skin contact, sharing eating utensils, sharing drinking water, sharing air, or sharing bug bites. Infectious illnesses may be caused by a wide variety of organisms including bacteria, viruses, and parasites. Hepatitis B, Salmonellosis, Measles, & West Nile Virus are all infectious illnesses that may be spread from person to person.

Public health departments have the explicit responsibility of preventing and managing communicable diseases as an essential and crucial component of their mission to ensure community health. A proactive public health disease monitoring system, prompt epidemiological evaluation, and continuing disease preventive education are essential for protecting the population's health against communicable disease risks.

The District Health Department keeps tabs on the prevalence of various illnesses in the community as part of its efforts to reduce their incidence. The Health Department receives reports of illness from doctors, labs, and institutions of higher learning. Disease in the District Health Department #10's jurisdiction may be tracked in terms of both its incidence (the number of new cases) and its prevalence (the number of already existing cases) using this data.

The "Big Picture"

The state of Michigan's Public Health Code mandates that medical professionals (doctors, PAs, pharmacists, dentists, nurses, vets, etc.) report 77 different illnesses to the local health department, and that labs report 42 different organisms. Public health nurses or epidemiologists look at the large picture of community health, as opposed to the details that concentrate on the health of an individual patient.

It's possible that a single incidence of an illness wouldn't raise any red flags at the doctor's office. However, health department staff can establish whether this isolated instance is indicative of a systemic issue in the community if statistics on

communicable diseases are reported promptly and accurately. Having all the facts allows health officials to determine whether or not the illness is isolated or part of a larger epidemic (where the number of cases is greater than the number expected during a defined period).

Disease Detectives

Epidemiologists and public health nurses play the role of detectives in attempting to put together the causes of diseases. These experts in public health keep an eye on sickness reports to see whether there have been more instances than usual. They also look at illness outbreaks to see if there are any connections or sources they can trace back to. After an outbreak's source is identified, public health workers educate patients and anyone at risk of contracting the disease.

Benefits

By the same token, health department workers may benefit from timely and correct reporting of communicable illness information:

- Detecting one or numerous disease outbreaks at the same time and place
- Determine those most likely to get or spread an illness
- Determine what medical attention is required and provide effective preventative measures
- Teach them how to avoid problems in the future.
- Determine how well public health initiatives to reduce illness are working.

Epidemiology of Noncommunicable Diseases

NCDs, or non-communicable diseases, are those that cannot be spread by direct contact with an infectious microorganism. Genetic, physiological, environmental, and behavioral variables all have a role in the development and progression of these illnesses across time. Noncommunicable diseases (NCDs) pose a serious threat to public health in the 21st century due to the human misery they cause and the damage they do to a country's socioeconomic growth. About 41 million people die every year from noncommunicable diseases (NCDs), accounting for 71% of all fatalities, with 14 million of these deaths occurring in the prime working years of a person's life (between ages 30 and 70). Most fatalities attributable to NCDs occur in the premature population.

If early interventions are not done for the prevention and management of NCDs, the World Health Organization (WHO) predicts that the annual number of deaths from NCDs would climb to 55 million by 2030. Nearly 5.8 million people in India die annually from noncommunicable illnesses (NCDs) such as heart disease, lung disease, stroke, cancer, and diabetes (WHO report, 2015), meaning that one in four Indians would die from an NCD before they turn 70. According to the report "India: Health of the Nation's States" published by the Ministry of Health and Family Welfare (MOHFW), Government of India (GOI), the proportion of deaths attributable to NCDs (among all deaths) has increased from 37% in 1990 to 61% in 2016, and the proportion of DALYs lost due to NCDs has increased from 30%

to 55%. This demonstrates a dramatic change in the epidemiological landscape, with the prevalence of illness shifting rapidly toward NCDs.²⁰

Major NCDs and their risk factors

The major NCDs are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. Physical inactivity, unhealthy diets (diets low in fruit, vegetables, and whole grains, but high in salt and fat), tobacco use (smoking, second-hand smoke, and smokeless tobacco), and the harmful use of alcohol are the main behavioural risk factors for NCDs. They contribute to raised blood pressure (hypertension); raised blood sugar (diabetes); raised and abnormal blood lipids (dyslipidaemia); and obesity. Air pollution is also leading risk factor for NCDs in terms of both outdoor air pollution and household air pollution that mainly results from burning solid fuels in the home for cooking and heat. Although morbidity and mortality from NCDs mainly occur in adulthood, exposure to risk factors begins in early life. Therefore, NCDs and its risk factors have great importance to young people as well. NCDs are rapidly increasing globally and reached epidemic proportions in many countries, largely due to globalization, industrialization, and rapid urbanization with demographic and lifestyle changes.

Actions to beat non-communicable diseases

In order to put an end to the spread of noncommunicable diseases (NCDs), we must safeguard the healthy population by tackling their underlying causes. The primary goal of MOHFW is to reduce fatalities from NCDs by addressing the main risk factors for NCDs. Therefore, addressing the risk factors would not only save lives, but also significantly contribute to the country's economic growth. To raise awareness of risk factors, establish infrastructure (such as NCD clinics, cardiac care units), and perform opportunistic screening at primary health care levels, the Ministry of Health and Family Welfare, Government of India (MOHFW, GOI) is already implementing "National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular disease and Stroke" (NPCDCS).

India is the first country to approve the National Action Plan in response to the WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020, which aims to reduce the number of premature deaths worldwide from NCDs by 25% by the year 2025. Nine goals have been proposed for nations to aim towards as part of the global action plan. India, however, has done the unthinkable by establishing a tenth aim to reduce air pollution in private homes. By 2025, the National Monitoring Framework for Prevention and Control of NCDs in India has pledged a 50% relative decrease in the use of solid fuel in the home and a 30% relative reduction in the prevalence of current tobacco use.²¹

Since NPCDCS was brought into the fold of the NHM, there has been an increase in both physical and human resources, especially in the form of frontline employees like the ANM and the ASHA. These frontline workers play a vital role in

²⁰ <https://www.nhp.gov.in/healthyliving/ncd2019>

²¹ <https://www.nhp.gov.in/healthyliving/ncd2019>

the implementation of population-based periodic screening for NCDs including hypertension, diabetes, and common malignancies like oral, breast, and cervical cancers.

In addition to focusing on preventing and treating conditions like diabetes and TB, the programme also takes into account the prevention and treatment of COPD and CKD. Combining the efforts of AYUSH and NPCDCS is a significant step toward the ultimate goal of inspiring people to make positive changes to their lifestyles. Awareness of the need for preventive and control measures for NCDs is being raised, for example, via the use of mobile technology in apps like diabetes for diabetes control, cessation to help users quit cigarettes, and no more tension as a support for mental stress management.

All people should work together to meet the 2015 pledge to cut premature deaths from NCDs by one third by 2030, as part of the Sustainable Development Goals. One method young people may help prevent noncommunicable diseases (NCDs) is by using social media to disseminate information and targeted messages about NCDs' important risk factors, as well as by organising and supporting activities to guarantee healthy lifestyles and promote wellbeing for people of all ages.²²

Unite in the fight against NCDs by

- Exercising regularly,
- Making smart food choices,
- No to tobacco products,
- Lowering rates of dangerous alcohol use,
- Advocating for urban cleanliness,
- Means of national health insurance programmes.

Health-related Disciplines

Maternal and Child Health Services (Preventive Obstetrics and Pediatrics)

Taking care of mothers is crucial to any nation's progress toward its goals of greater economic equality and lessening of poverty. To solve major societal, economic, and developmental problems, maternal health and survival are not just crucial on their own. One measure of a country's health care system's efficacy is its maternal mortality rate. Pregnancy-related mortality have decreased dramatically in India during the last two decades. The Maternal Mortality Rate (MMR) in India was very high in the year 1990, with 600 maternal deaths for every 100,000 live births. This equated to almost 1.5 million maternal deaths annually. The worldwide maternal mortality ratio (MMR) was 400 in those days, which equated to over 5.4 lakh women dying each year, with India accounting for 27 percent of these fatalities. Worldwide, the MMR in 2010 was estimated at 210. To counter this, the latest SRS estimates place India's MMR at 178 per 100,000 live births in 2011. As of 2015, India was responsible for 16% of all maternal fatalities worldwide. Overall, the number of people using the internet decreased by 47% between 1990 and 2010. The opposite is true in India, where the

²² <https://www.nhp.gov.in/healthyliving/ncd2019>

population dropped by 70% between 1990 and 2011. Indian economic growth has been slowing over the last decade, with the annual rate of decrease growing from 4.1% in 2001-03 to 5.5% in 2004-06 to 5.8% in 2007-09 and being maintained at approximately the same level of 5.7% in 2010-12.²³

Since 2004, when NRHM and its many programs, such as the Janani Suraksha Yojana (JSY), which has led in an increase in institutional deliveries, were first introduced, there has been a clear downward trend in the incidence of unplanned births. As many as 1.66 crore women are giving birth in public health facilities today. Janani Shishu Suraksha Karyakram (JSSK), introduced in 2011, expanded on the JSY scheme's remarkable success by guaranteeing free birth (including caesarean section) and care at public hospitals for expectant women, unwell newborns, and babies. Transportation to and from the facility, food, diagnostics, medications, and any other necessities, as well as any necessary transfusions of blood, are all provided at no cost. In 2013-14, almost \$2,000,000,000 was allocated for this program.

An estimated 47,000 women still lose their lives annually to complications during or after delivery. Hemorrhage, sepsis, abortion, hypertensive disorders, obstructed labor, and "other" reasons, which may include anemia, are among the leading medical causes of these fatalities. Cultural and social issues such as poor education levels, poverty, early marriage, lack of economic independence for women, and the customary practice of giving birth at home all play a role in these tragic outcomes.

Demography

To put it simply, demography is the statistical study on populations, particularly human ones. The word comes from the Ancient Greek words for people and society, "o" (dêmos) and "-" (-grapha), respectively. Societies as a whole, or subsets of societies characterized by factors like level of education, country of origin, religious affiliation, or ethnicity, may all be the subject of a demographic study. Demography is often seen as part of the sociology curriculum, however there are a few exceptions.

The most important data for a hospital or clinic to have is demographic information such patients' names, addresses, and phone numbers, as well as their medical histories and any other pertinent information that may be needed in an emergency. They let a patient to be recognized and classified for the sake of statistical study. Date of birth, gender, date of death, zip code, ethnicity, blood type, emergency contacts, primary care physician, insurance information, allergies, significant diagnoses, and medical history are all examples of patient demographics.

While traditional demography focuses only on quantitative population data, social demography, also known as population studies, examines the interplay of economic, social, institutional, cultural, and biological factors that shape human populations.

²³ <https://main.mohfw.gov.in/sites/default/files/Chapter415.pdf>

Family Planning

Planned Parenthood birth control that allows couples and individuals to achieve their chosen number of children, as well as the desired spacing & timing of those deliveries, is called reproductive autonomy. Methods of contraception and the medical management of involuntary infertility are used to accomplish this. Planning for a family might entail thinking about when you want to start a family, how many kids you want, or even whether you want any kids at all. Variable from person to person, these factors may include: marital status, professional and occupational goals, and financial stability. Family planning may include the use of contraceptives and other methods to delay the onset of pregnancy if the couple is sexually active.

In Djenné, a region of West Africa, Planned Parenthood has been used regularly since 16th century. Physicians recommended that women have children no more often than once every three years. Additionally, family planning includes preconception counselling and management, infertility care, STI prevention and treatment, and sex education. As defined by United Nations Health Organization, family planning includes preconception care. Access to contraception minimizes the need for abortion, hence it is not advised as a major way of family planning.

As a euphemism for providing and promoting access to contraception, "family planning" is frequently used interchangeably with these terms. Contraception is typically only one part of the puzzle, however. Furthermore, individuals may want contraception but not be actively preparing for a family (e.g., unmarried adolescents, young married couples delaying childbearing while building a career). Nowadays, the term "family planning" encompasses a wide variety of activities in this field. As ideas of women's empowerment and reproductive autonomy have gained popularity in many areas of the globe, modern conceptions of family planning tend to concentrate a woman and her childbearing choices at the center of the conversation. It is most often used by heterosexual couples (one male and one female) who want to restrict their reproductive potential. Birth rates among teenagers and single women have been demonstrated to decrease when family planning is used.

Biostatistics

Research in medicine, ecology, and public health, as well as the creation of new methods for studying these topics, all benefit from the use of statistical methods; this is what biostatistics is all about. Biostatistics, a profession that emerged around the turn of the century, has been essential in advancing medical science and lowering disease rates since the early 1900s.

The work of biostatisticians is crucial to the development of studies, the analysis of data, and the development of strategies for tackling a wide range of research challenges:

- Identifying Prevalent Causes of Major Health Problems
- New anti-HIV medication testing
- Tobacco smoke, asbestos, and other contaminants are only a few examples

of possible health hazards that are being assessed as part of environmental risk assessment.

Variability

It is defined as "any difference between cells, individuals, or groups of organisms of any species due to either genetic variations (genotypic variation) or the action of environmental conditions on the manifestation of the genetic potentials" (phenotypic variation). Physical appearance, metabolic, fertility, method of reproduction, behavior, learning and mental aptitude, and other observable or quantifiable traits may vary.

Differences in the number of chromosomes, in the shape of the chromosomes, or in the protein encoded by the chromosomes are the root causes of phenotypic diversity. Gender, hair color, and immune system function are just a few examples of the kinds of physical and mental traits that may vary at the genetic level. Many common plants contain more than twice the usual chromosome number, and new species may evolve as a result of this sort of diversity. These individuals are referred to as polyploid. It is impossible to identify whether or not a variation is genotypic just by looking at the organism; instead, breeding studies must be conducted under strictly controlled circumstances.

Information Education and Communication

The Ministry's Information, Education, and Communication (IEC) plan is meant to enlighten individuals about the resources they have at their disposal thanks to the Ministry's different schemes and programs and help them figure out how to make use of them. In line with the emphasis on promotive and preventative health, the goal is also to urge the general public to increase their health-seeking behavior. In order to meet the disparate information and communication demands of the rural and urban populations, the IEC plan has used a wide range of approaches.

Strategic IEC/ Communication Plan

The Ministry developed a plan for disseminating information about the different health systems to the general public using mass media, intermediate media, and personal interactions. Month-to-month health day and theme coverage was a key component of the IEC/Communication Plan that ran throughout the year. Some events were planned around certain days ('Health Days,' for example), while others were more extensive multi-media campaigns promoting specific Ministry initiatives, lasting weeks or even months. Integrated Diarrhea Control Fortnight (IDCF), Breastfeeding Week, Tobacco Control, etc. were only a few examples. Campaigns required to run for extended periods of time in order to combat seasonal illnesses like Dengue, H1N1, etc. There was a strong emphasis on print media and TV/radio plans across all IEC initiatives. These were greatly bolstered by social media & outdoor media campaigns.

The Media Plan was closely watched by executives to make sure it was carried out as planned, that course corrections were made as necessary, and that the plan's

emphasis was adjusted as necessary. To raise awareness of the government's RMNCH+A programs, the Ministry of Health and Family Welfare collaborated with the Directorate of Field Publicity (DFP), which is part of the Ministry of Information and Broadcasting, to implement a series of mid-media and interpersonal activities in 184 High Priority Districts (HPDs). Information on prenatal care, breastfeeding, and other preventative and promotive healthcare measures for teenagers, newlyweds, expecting moms, and infants and young children are among the topics covered. Partner agencies, in addition to State governments, have helped make it a huge success in these high priority regions by increasing people's health literacy and encouraging them to seek medical attention when they feel unwell.

Human Genetics

The field of research known as "human genetics" focuses on how heredity manifests itself in humans. Human genetics is a broad area that includes several sub-disciplines that often overlap with one another, such as classical genetics, cytogenetics, biochemical genetics, molecular genetics, genomics, population genetics, clinical genetics, developmental genetics, and genetic counselling. Most characteristics that are innate to humans have a common denominator in their genes. The understanding of human genetics provides insights into what it means to be human, what causes sickness and how to cure it, and what it takes to live.

Genetic differences and inheritance patterns

Gregor Mendel's concept of inheritance is used to explain the transmission of characteristics within human populations. Mendel concluded that hereditary traits are transmitted by isolated components, which he named factors or genes.

Autosomal dominant inheritance

The term "dominant" is used to describe qualities that can be traced back to a single gene on to an autosome (non-sex chromosome) and which may be manifested with the inheritance of only one copy of that gene from either parent. Because of this, unless the characteristic is the result of a very improbable new mutation, it is likely that at least one of the parents shares the trait. Huntington's disease and dwarfism are two examples of autosomal dominant features and diseases.

Autosomal recessive inheritance

One type of transmission for a characteristic, illness, or ailment is autosomal recessive. Both copies of a recessive allele or illness must be present for the trait or illness to be manifest. The chromosome carrying the characteristic or gene in question will be one that does not determine sexual orientation. Carriers are common since it requires two copies of a characteristic to show it. From an evolutionary point of view, a recessive illness or trait might lie dormant for a number of generations until finally presenting itself as a phenotype. Albinism and cystic fibrosis are two examples of autosomal illnesses.

X-linked and Y-linked inheritance

The X chromosome is the sex-specific chromosome where X-linked genes are located. Just like autosomal genes, X-linked genes may be either dominant or recessive. Females are unusually spared from the effects of recessive X-linked diseases. This occurs because all X-linked genes are passed down the maternal line, while the X chromosome is only passed on to men. There is no transmission of X-linked features from fathers to sons since only the Y chromosome is passed down from fathers. Due to their lack of a second X chromosome, males are unable to pass on recessive X-linked features to their offspring.

As with men, females who are homozygous for an X-linked illness will show symptoms of that condition, whereas females who are heterozygous will be carriers. In cases of dominant X-linked inheritance, the phenotypes of heterozygotes and homozygotes are identical. The absence of male-to-male transmission characterizes X-linked inheritance and distinguishes it from autosomal inheritance. Coffin-Lowry syndrome is an X-linked disorder brought on by a change in the ribosomal protein gene. Short height, mental impairment, and skeletal and craniofacial deformities are all caused by this mutation.

In females, the X chromosomes are inactivated by a process called X inactivation. When one of a woman's two X chromosomes becomes almost dormant, this is known as X inactivation. If this didn't happen, females would make twice as much of the abnormal X chromosomal proteins. X inactivation will be triggered at some point in the embryonic development process. People with trisomy X, in which the genotype contains three X chromosomes, may undergo X-inactivation, which will render all three X chromosomes inactive until only one X chromosome remains. Males with Klinefelter syndrome have two X chromosomes, but one will be inactivated such that only the second X chromosome is functional.

When a gene, characteristic, or condition is passed on through the Y chromosome, this is known as Y-linked inheritance. Traits connected to the Y chromosome can only be transferred down the male line, from father to son. The Y chromosome testis-specific determining factor is what ultimately decides whether or not a person will develop normally into a boy. There are no Y-linked traits known to exist other than maleness.

Pedigrees analysis

A pedigree is a family tree that traces the lineage of an organism and how characteristics have been passed down through the generations. Typically, squares are used to depict men and circles to represent women. Many hereditary disorders may be identified with the use of a pedigree. The likelihood that a parent will have children who share a certain characteristic may also be estimated using a pedigree.

Examining a family tree may reveal which genes contributed to certain characteristics: x-linked, y-linked, autosomal dominant, and autosomal recessive. Pedigrees may be used to demonstrate and quantify partial penetrance.

Penetrance is the frequency with which people with a certain genotype exhibit the mutant phenotype of a given characteristic, expressed as a percentage.

Pedigree charts make it easy to observe when creatures have mated within their own species or with other closely related species. It was common practice for royals to marry within their own class, hence dynastic trees tend to be rather close. Pedigrees are a frequent tool used by genetic counsellors to assess a family's viability to have healthy offspring.

Karyotype

In the field of cytogenetics, a karyotype is an invaluable resource. Karyotypes are pictures of metaphase-stage chromosomes that are ordered by their length and centromere location. The potential of a karyotype to identify genetic abnormalities makes it a valuable tool in clinical genetics as well. The absence or presence of an abnormal number of chromosomes (aneuploidy) is easily discernible on a normal karyotype.

Karyotypic Giemsa banding, or g-banding, may be used to identify structural alterations such as deletions, duplications, inversions, and translocations. Through the use of a dye called G-banding, each chromosome's pattern of bright and dark bands may be identified. A FISH, fluorescent in situ hybridization, may be used to examine deletions, insertions, or translocations. Fluorescent in-situ hybridization (FISH) is a technique where fluorescent probes attach to certain chromosomal sequences, causing the chromosomes to emit a distinct color.

Genomics

In genetics, genomics refers to the study of the genome's structure and function. Genome refers to the total amount of DNA in an organism or cell, including that found in the nucleus and the mitochondria. Over three billion nucleotides make up the human genome, which is the whole set of genes found in human chromosomes. The whole human genome was sequenced by the Human Genome Project in April 2003, and it was found to include something in the neighborhood of 20,000 protein-coding genes.

Medical genetics

The study and treatment of genetic diseases is the focus of medical genetics. To put it simply, medical genetics is the study and practice of using genetic information to improve patient health. Medical genetics overlaps with the field of human genetics; for instance, studies of the hereditary nature of genetic disorders would've been considered to fall under both medical genetics and human genetics, while the diagnosis, treatment, and counselling of patients with such disorders would be considered to fall under medical genetics.

Population genetics

Studies in population genetics, a subfield of evolutionary biology, examine what factors influence Mendelian inheritance patterns such as allele and genotype

frequency shifts in populations. Natural selection, mutation, genetic flow (migration), and genetic drift are the four factors that might affect the frequencies. A population consists of a set of people and their progeny that reproduce with one another. Only members of the human race will be included in genetics studies involving human populations. The Hardy–Weinberg principle is a frequently used concept to predict allelic and genotype frequencies.

Mitochondrial DNA

Humans, like almost all eukaryotes, contain mitochondrial DNA in addition to nuclear DNA. The "engines" of a cell, or mitochondria, each contain their own copy of the genetic code. A person's mitochondria are passed down from their mother, and mitochondrial DNA is often used to determine maternal ancestry. The 16 kilobases of mitochondrial DNA that carry the instructions for just 62 genes are very compact.

Genes and sex

People, most other animals, some bugs (*Drosophila*), and even a few plants all use the XY sex-determination mechanism (*Ginkgo*). An individual's sex status is defined by the presence of a certain pair of chromosomes in this model (gonosomes). Because they contain two copies of chromosome XX, females are classified as homogametic. Men are classified as heterogametes because they possess two sets of sex chromosomes (X and Y).

X-linked traits

Expression of an allele at the phenotypic level that is contingent on the individual's chromosomal sex is called a sex linkage phenotype. Characteristics carried by X chromosomes are passed down more often to females than males, although this is not the case with X-linked inheritance. X-linked features predominate over Y-linked traits since humans have a far larger X chromosome than Y chromosome. Females, however, have a potentially lethal number of X-linked genes since they have two or more X chromosomes.

Preventive Geriatrics

Care for the specific medical issues that only the elderly face is the specialty of geriatrics or geriatric medicine. Geriatrics comes from the Greek words *geron*, which means "old man," and *iatic*, which means "healer." The primary focus is on the health of the elderly population via illness prevention, early detection, and treatment. A geriatrician or geriatric physician is a doctor who specializes in the treatment of the old, and they may take on patients of any age. Instead, this choice should be based on what each individual patient requires and the resources available to provide that care. Those who are dealing with many chronic diseases or who are facing substantial age-related issues that jeopardize quality of life may benefit from this treatment. Caregiving tasks that become too taxing or medically complicated for family and informal caregivers to do on their own may signal the need for geriatric care.

Geriatrics is not the same thing as gerontology. In the absence of injury, sickness, environmental dangers, or behavioral risk factors, the gradual reduction in organ function that occurs with age is the primary focus of gerontology, the interdisciplinary field that studies ageing. It's important to note that geriatrics is also known as medical gerontology.

Differences between adult and geriatric medicine

Professionals that work with the elderly have additional education and experience in geriatric care and healthy ageing. Patient objectives and desires, which may include everything from maintaining function to increasing quality of life to extending years of life, serve as the primary drivers of the treatment that is offered. Mind, mobility, mental status, meds, and what matters most are the 5 M's of Geriatrics, a mnemonic used by geriatricians in the United States and Canada to elicit patient values.

Multi-morbidity, or the management of two or more medical problems, is widespread among the elderly. Physiological changes that occur as a result of ageing contribute to a cumulative rise in the risk of being sick, being hospitalized, and dying from a disease. In addition, the elderly sometimes has unusual manifestations of common ailments, which may make diagnosis and treatment more challenging.

Specialists in medicine, pharmacy, social work, and physical and occupational therapy, among others, all play important roles in geriatric care. Medication management, pain management, mental and cognitive care, rehabilitative, long-term nursing care, nutritional support, and other types of therapy, such as physical, occupational, and speech, are all available to the elderly. Social services, transitional care, advanced directives, power of attorney, and other legal matters are examples of what are sometimes referred to as "non-medical" factors.

Increased complexity

Physiological reserve decreases with age, making certain illnesses more common in the elderly and making even minor disorders more dangerous (such as dehydration from a mild gastroenteritis). Complicating factors may arise, elderly people with even a low fever may get disoriented and fall, breaking their femur in the process ("broken hip").

In the elderly, a disease's manifestation may be indistinct, as in the case of delirium or falls. (Pneumonia, for instance, may manifest itself not with the high fever and cough typical of younger individuals, but with low-grade fever and disorientation.) For senior patients, articulating their symptoms might be challenging due to cognitive decline, disease-related disorientation, or both. There is no one cause of delirium in the elderly; it may be brought on by anything as harmless as a lack of toilet paper and as dangerous as a heart attack. Assuming their causes are identified, many of these issues are amenable to treatment.

Geriatric Pharmacology

Attention to prescription details is especially important for the elderly. Since many seniors suffer from many chronic conditions, they often must resort to polypharmacy (taking multiple drugs). Many of these people have also self-prescribed a wide variety of OTC and natural medicines. This polypharmacy, when added to the fact that the patient is an elderly person, might increase the danger of unwanted side effects and medication interactions. Because of age-related changes in pharmacokinetics and pharmacodynamics, the elderly often has trouble metabolizing and responding to medications. Age-related physiologic changes interfere with all four pharmacokinetic systems (absorption, distribution, metabolism, and excretion). Decreased kidney function may impact renal elimination, while impaired hepatic function might slow the metabolism or clearance of medications. Pharmacodynamic alterations cause improved pain alleviation with morphine usage, for example, in elderly individuals. As a result, elderly people need pharmaceutical treatment tailored to their unique needs as they age.

Geriatric syndromes

Clinical problems that are more common in the elderly are sometimes grouped together under phrase "geriatric syndromes." These syndromes are not due to a single underlying illness or disease but rather are the outward expression of a complex set of diseases that impact several body systems. Disorders include frailty, impaired functioning, falls, loss of continence, and malnutrition are all too common.

Frailty

The lack of physiological reserve, heightened sensitivity to both physiological and emotional stimuli, and functional deterioration are hallmarks of frailty. Symptoms may include gradual, unexplained weight loss, extreme tiredness, muscle weakness, and impaired mobility. More injuries, hospitalizations, and worse clinical outcomes are related with it.

Functional decline

A loss of physical or mental capacity may lead to functional impairment. It's linked to a growing reliance on other people and/or medical technologies due to a decline in self-sufficiency in conducting routine activities of daily living. It is usual practice to utilize a person's ability to do these duties, which are further subdivided into ADL and IADL, to gauge their functional state.

In order to take care of oneself, it is necessary to be able to do a number of tasks known as "activities of daily living," or ADLs. Skills like preparing nutritious meals, cleaning up after oneself, budgeting one's money, and remembering to take one's prescriptions fall under the category of "instrumental activities of daily living" (IADL). Clinicians employ functional assessments like ADL and IADL monitoring on a regular basis to decide how much help they should offer to older patients and their careers. As a qualitative measure of functional change over

time, it might foretell the need for assisted living, skilled nursing, palliative care, hospice care, or even home care for the elderly.

Falls

For those 65 and above, falls are the primary cause of both hospitalization and visits to the emergency room, with serious injuries and lasting disabilities resulting for many. It's important to recognize the possibility for action and risk reduction in the event of falls since some risk variables are controllable. Changeable aspects include:

- Improving balance and muscle strength
- Removing environmental hazards
- Encouraging use of assistive devices
- Treating chronic conditions
- Adjusting medication

Urinary incontinence

Unintentional urination is the hallmark of urinary incontinence, often known as overactive bladder symptoms. Medications that increase urine production and frequency (such anti-hypertensive and diuretics), infections of the urinary tract, pelvic organ prolapse, pelvic muscles dysfunction, and disorders that impair the nerves that control bladder emptying may all lead to these symptoms. Other mobility-limiting musculoskeletal diseases should be taken into account, since they may also impede restroom accessibility.

Malnutrition

Twelve percent to fifty percent of senior patients in hospitals and 23 percent to fifty percent of elderly patients in long-term care institutions like assisted living communities or skilled nursing homes suffer from malnutrition or a low nutritional state. It might be challenging to choose the most appropriate therapies to combat malnutrition because of the complex interplay of physiological, pathologic, psychological, and social aspects. Reduced sense of smell and taste, as well as a slower metabolic rate, have physiological consequences for getting enough nourishment. Some chronic conditions have side effects on cognition and digestion (such as bad dentition, gastrointestinal malignancies, and gastroesophageal reflux syndrome) or need dietary restrictions that lead to unintentional weight loss (e.g. congestive heart failure, diabetes mellitus, and hypertension). Examples of psychological issues include sadness, bulimia, and eating disorders.

Practical concerns

Geriatricians or their patients worry a lot about things like functional capacity, autonomy, and quality of life. The ability to do self-care and other ADLs is essential if the elderly is to maintain their independence for as long as feasible. A geriatrician is a specialist in caring for the elderly; they recommend patients to

home care agencies, nursing homes, assisted living facilities, or hospice if necessary.

Some older adults may decide not to get medical treatment because they perceive a greater danger than benefit. For instance, screening mammography are often discontinued for older women who are fragile since breast cancer develops slowly and would not give them any symptoms until they died of something else. An accurate prognosis, based on validated metrics instead of how old the patient seems on the outside, may assist elderly patients have fully informed decisions about their alternatives when they are more likely to have post-surgical difficulties and need longer care. Older individuals' recovery trajectories may be effectively predicted if they are evaluated before elective procedures. Unintentional weight loss, muscular weakness, weariness, lack of physical activity, and a decreased walking pace are the five components of one frailty scale. Score 0 for perfect health; 5 for severe weakness. People with medium frailty scores (2 or 3) are more than twice as likely to have post-surgical difficulties, 50% more likely to spend longer time in the hospital, and 3 times as likely to be sent to a skilled care facility rather than their own homes. Even worse results occur in older patients who are frail (score of 4 or 5) and were living at home prior to surgery, with the probability of being released to a nursing home increasing to 20 times the rate for non-frail senior persons.

Mental Health

The term "mental health" encompasses a person's state of mind in terms of their thoughts, actions, and emotions. It's all about the way people feel, think, and act. The lack of a mental condition is sometimes taken to be the definition of "mental health" by those who use the word. Daily life, interpersonal interactions, and physical well-being are all impacted by one's mental health. This connection, however, may also be used in the other way. Contributing factors to mental illness include personal circumstances, social relationships, and external environmental elements. Maintaining one's capacity for happiness via care for mental health is important. To do so requires a steady management of one's time and energy across several goals, including building emotional fortitude. Mental health may be impacted by stress, despair, and anxiety, all of which can impair daily life. Health care providers often refer to "mental health," yet physicians know that many mental illnesses have biological causes.

Risk factors for mental health conditions

Mental health disorders may affect anyone of any age, gender, socioeconomic status, or race. One of the primary causes of disability in most of the industrialized world is mental illness. A person's mental health may be affected by their socioeconomic status, upbringing, early life trauma, genetics, and underlying physical disorders. Multiple mental illnesses are common in a population that already struggles to function normally. There are many potential contributors to mental illness, and maintaining a healthy mental state requires a careful balancing act. Disruptions in mental health may be caused by the following.

Continuous social and economic pressure

Mental health problems are more likely to occur in those who are poor or who are members of a minority or persecuted group. Several socioeconomic factors, such as low income and residence on the outskirts of a big city, were identified as contributors to poor mental health. There are both changeable and immutable elements that influence the quality and accessibility of mental care, and the researchers identified both types.

Modifiable factors for mental health disorders include:

- The state of the economy and the availability of jobs in the region
- Occupation
- A person's degree of participation in society
- Education
- The standard of living
- Gender

The following are examples of immutable conditions:

- Gender
- Age
- Ethnicity
- Nationality

The likelihood of having a mental health problem was shown to rise by almost a factor of four for women. The greatest prevalence of mental health issues was also seen among those with a "poor economic position".

Childhood adversity

Multiple empirical investigations multiple credible sources agree that a child's physically and mentally health is negatively impacted by exposure to traumatic events throughout childhood. Additionally, different forms of psychosis have been linked to childhood trauma and abuse. Furthermore, exposure to such events increases one's risk of developing post-traumatic stress disorder (PTSD).

Biological factors

The National Institute of Mental Health reports that some genes and gene variations enhance a person's chance of developing mental health issues, and that a person's family history may be a contributing factor. However, there are numerous additional elements that have an influence on the emergence of these conditions. Even if you have the gene for a mental health problem, there's no assurance you'll ever experience any symptoms. Equally, mental health problems may occur in persons who do not have the genetics or a family background of the disorder. Cancer, diabetes, or chronic pain are just some of the physical health issues that may lead to chronic stress and psychological illnesses like melancholy and anxiety.

Types of mental health disorders

Certain mental illnesses are classified together because they have similar characteristics. Some kinds of mental disorder are as follows:

- anxiety disorders
- mood disorders
- schizophrenia disorders

Anxiety disorders

Anxiety disorders are the most prevalent kind of mental illness, as reported by the Depression Association of America. Individuals with these illnesses suffer from extreme anxiety or terror when confronted with triggers. Most individuals who suffer from anxiety do their best to avoid situations that bring on their symptoms. Some types of anxiety disorders are described below.

Generalized anxiety disorder

Excessive concern or dread that interferes with daily life characterizes generalized anxiety disorder (GAD).

In addition, people may have bodily symptoms, such as:

- restlessness
- fatigue
- poor concentration
- tense muscles
- interrupted sleep

People with GAD often have anxiety attacks for no apparent reason. They could worry too much about mundane things like going to work or an appointment, even if they don't really pose any threat. Some people with GAD report experiencing anxiety in the absence of any obvious cause.

Panic disorder

In the case of those who suffer from panic disorder, sudden, extreme fear or a feeling of impending doom and death are typical features of their panic attacks.

Phobias

There are different types of phobia:

- Simple phobias: an unreasonable terror of a certain thing, situation, or animal. Examples of common phobias include a revulsion of spiders.
- Social phobia: This apprehension of being evaluated by others is referred to as social anxiety. Those who suffer from social anxiety tend to avoid going out in public.

- Agoraphobia: To be stuck in an enclosed, moving space with few escape options is to suffer from claustrophobia. Some individuals mistakenly think that going outdoors is what causes this phobia.

Doctors may not be aware of all the many kinds of phobias since they are so personal. There may be hundreds of different phobias, each one as seemingly harmless as the next.

OCD

Both obsessions and compulsions are symptoms of OCD. That is to say, they are plagued by anxious, racing thoughts and an overwhelming need to engage in ritualistic behavior like washing their hands repeatedly.

PTSD

A person may develop post-traumatic stress disorder (PTSD) after being directly exposed to or witnessing a very stressful or traumatic incident. When this occurs, the affected individual fears for their or others' safety. They might be experiencing feelings of panic or helplessness. Traumatic stress disorder (PTSD) may result from experiencing such emotions.

Mood disorders

Mood disorders may also be referred to as affective disorders and depressive illnesses.

People with these disorders experience extreme shifts in mood, from periods of elation to deep despair. Mood disorders may manifest in many different:

- Major depression: Major depressive disorder is characterized by persistent feelings of sadness and a lack of enthusiasm for once-enjoyed hobbies or events (anhedonia). Sadness may overwhelm them for lengthy stretches of time.
- Bipolar disorder: bipolar disorder is characterized by extreme swings in mood, energy, activity, and the inability to maintain normal daily routines. Manic episodes are characterized by elevated mood, whereas depressed episodes cause the opposite.
- Seasonal affective disorder (SAD): This sort of significant depression is brought on by the shortened hours of daylight experienced in the late autumn, winter, and early spring. Reliable Sourcing. Locations further from the Equator have the highest incidence.

Schizophrenia disorders

Psychotic characteristics as well as other severe symptoms are common throughout a range of diseases often referred to as schizophrenia. Extremely convoluted situations, to put it mildly. The National Institute of Mental Health reports that the onset of schizophrenia symptoms normally occurs between both the ages of 16 and 30. The person's thinking may seem disjointed, and they may

have trouble keeping track of and integrating new knowledge. The illness of schizophrenia may manifest in both good and bad ways. Delusions, thinking disorders, and hallucinations go under the category of "positive symptoms," whereas withdrawal, a lack of desire, and a flat or unsuitable mood fall under the category of "negative symptoms."

Early signs

There is currently no reliable physical test or scan that can be used to determine whether someone has acquired a mental disorder. It is important for society to be aware of the following warning indicators of a mental health condition:

- Avoiding social contact and isolating themselves from others
- Refraining from doing things they usually like
- Insufficient or excessive slumber
- Overeating or undereating
- Experiencing despair
- Symptoms include: Chronic fatigue
- Increasing their use of mood-altering drugs like alcohol and nicotine
- Showing distress
- Being perplexed
- Not being able to do routine activities like going to work or making a meal
- Being plagued by recurring, unsettling thoughts or recollections
- Suicidal ideation; seriously considering harming oneself or others physically
- Hearing sounds or voices
- Having hallucinations.

Diagnosis

Mental health condition diagnosis is a multi-step procedure. To rule out any underlying physical problems or concerns, a doctor may first review the patient's medical history and do a complete physical examination. Psychiatric problems cannot be detected by conventional means of diagnosis. However, in order to rule out other potential reasons, physicians may prescribe a battery of laboratory tests, including imaging scans and bloodwork. A psychiatric assessment will also be conducted. This involves inquiring about the individual's symptoms, experiences, and the effect they have on their daily life. A patient's doctor may request the completion of a mental health questionnaire in order to learn more about the patient's outlook, emotions, and behavioral patterns.

Treatment

There is a wide range of approaches to treating mental illness. What helps one individual may not help another, and vice versa, because of how uniquely each patient is affected. It is often the case that a mix of methods or therapies yields the best results. In the course of their lifetime, an individual suffering from a mental illness may make a variety of decisions. It is important to collaborate closely with a physician who can assess the situation and provide appropriate care. Some available methods for treating mental illness are outlined below.

Psychotherapy, or talking therapies

As the name implies, this kind of care focuses on the psychological aspects of patient recovery from mental disease. A few examples of psychotherapies include cognitive behavior therapy (CBT), exposure therapy, or dialectical behavior therapy. It is administered by psychiatrists, psychologists, therapists, and even certain family doctors. Mental health education may aid sufferers in tracing the origins of their condition and initiating the development of more beneficial cognitive patterns that facilitate day-to-day functioning and lessen the likelihood of social withdrawal and self-harm.

Medication

Antidepressants, antipsychotics, and tranquilizers are among the medicines that some individuals use on a regular basis. Although there is currently no known cure for mental diseases, there are treatments available that may alleviate symptoms and allow patients to return to work and their normal lives. Some of these drugs improve the body's ability to take in the brain's natural feel-good neurotransmitters, such as serotonin. Other medications can increase total levels of these substances or block their breakdown or elimination.

Self-help

A person with mental health issues may benefit from making adjustments to their way of life. Some examples of these adjustments include cutting down on alcohol, getting more shut-eye, and eating a healthier, better-rounded diet. It may be necessary for individuals to take time away from their jobs or relationships in order to restore their mental health. Deep breathing, meditation, and mindfulness are just a few examples of relaxation practices that may help those with disorders like anxiety and depression. Recovery from mental illness may also be aided by a strong support system, such as that provided by self-help organizations or by close friends and family.

Maintain your mental health

One's mental health may benefit from self-care practices including limiting unhealthy habits, getting enough sleep, and keeping stress at bay. The National Institute of Mental Health provides various guidelines [Trusted Source](#) to begin a self-care habit:

- Regular exercise: [Trusted Source](#) 45 minutes of exercise, three to five times a week, may have a major beneficial effect on mental health.
- Eat a balanced diet and stay hydrated: A healthy, well-balanced diet combined with regular water intake may provide sustained physical and mental performance all day long.
- Aim for good-quality sleep: A meta-analysis of research conducted in 2021 concluded that the higher the change in sleep quality, the more positive the effect on an individual's mental health.
- Perform relaxing activities: Journaling, meditation, breathing exercises, smartphone wellness applications, and exercise may all aid in stress

management and general well-being.

- Practice gratefulness: Being aware and appreciative may be practiced by regularly reflecting on one's good fortune.
- Challenge negative thoughts: Positivity may be practiced by recognizing and disputing negative and unproductive beliefs.
- Look for positive social interactions: Having someone you can count on and talk to in times of need is a great way to relieve stress and stay afloat.

Adolescent Health

The adolescent years, around 10–19 years of age, are a transitional period between childhood and maturity. It's a special moment in life, when the groundwork for a lifetime of health is being laid. Growth in all areas of development, including the body, the mind, and the social life, occurs quickly throughout the teen years. All aspects of their mental and emotional state, as well as their ability to reason and act, are influenced by this fact.

Death, disease, and injury rates are surprisingly high throughout adolescence, despite the common perception that this time of life is particularly healthy. The good news is that most of this may be avoided or remedied. Adolescents are at a crossroads in their lives, and the choices they make now may have long-lasting effects on their health as well as the health of others around them. These choices can be made in areas such as food, exercise, drug use, and sexual activity.

Adolescents need knowledge, including age-appropriate comprehensive sexuality education; opportunity to acquire life skills; health treatments that are acceptable, equitable, appropriate, and effective; as well as safe and supportive settings in which to grow and develop. They should be given chances to actively contribute to the development and implementation of health promotion and disease prevention programs. The best way to address the needs and rights of today's teenagers is to increase access to programs like these.

Alcoholism and Drug Addiction

Alcoholism

Abnormal alcohol use that causes persistent psychological or physiological distress is a hallmark of alcoholism. Alcoholism is not considered a valid diagnostic category since there is no consensus on how to define the term. Alcohol use disorder (DSM-5) and alcohol dependence (ICD-11) are the most common diagnostic labels, with descriptions included in their respective manuals. The brain, heart, liver, pancreas, and immune system are especially vulnerable to alcohol's destructive effects. The mental illness, delirium tremens, Wernicke-Korsakoff syndrome, irregular heartbeat, poor immunological response, liver cirrhosis, and increased cancer risk are all possible outcomes of alcoholism. Fetal alcohol spectrum disorders are a consequence of prenatal alcohol exposure. Because of their smaller stature, less alcohol metabolism, and greater fat percentage, women are more vulnerable to alcohol's negative effects than males. There is a small but significant population of people for whom chronic heavy alcohol usage causes cognitive decline and full-blown dementia.

About half of the risk of developing alcoholism may be ascribed to both heredity and the environment. As alcohol may momentarily alleviate feelings of depression and anxiety, these conditions are important contributors to the onset of alcoholism. A person's risk of developing an alcohol use disorder increases by a factor of three to four if they have a parent or sibling who has such a problem. A person's social, cultural, and behavioral norms are all examples of environmental variables. A combination of factors, including high levels of stress and anxiety and the low cost and convenience of access to alcohol, raises the danger. As a means of avoiding or alleviating withdrawal symptoms, alcohol use may persist even if people no longer want to drink. A person who quits drinking may go through mild withdrawal for many months. In the medical field, alcoholism is classified as a mental and physical sickness. In order to identify suspected alcoholism, questionnaires are often utilized. The diagnosis is then confirmed by gathering more data.

Reducing people's exposure to stress and anxiety might be one approach to preventing alcoholic behavior. Educating the public, making treatment more accessible, and raising the price of alcohol are among strategies that have been proposed as potential solutions. Alcoholism treatment may take many shapes. Medical complications during alcohol abstinence need cautious management of alcohol withdrawal. Benzodiazepine medicines like diazepam are often used for this purpose. You may take them with you to the hospital or take them at home. You may also utilize drugs like acamprosate, disulfiram, and naltrexone to cut down on your drinking. Treatment may be more challenging if mental illness or other addictions are present. Individual and group treatment, as well as support groups, are utilized to prevent relapse into alcoholism. Alcoholics Anonymous is one such fellowship.

As of 2016, the World Health Organization projected that 5.1% of the world's population over the age of 15 was alcoholic. This equates to an estimated 380 million individuals. According to 2015 estimates, over 17 million (7%) American adults and 0.7 million (2.8%) American adolescents are impacted. Males and young people 18-35 have the highest rates of alcoholism. The lowest prevalence rates are seen in Africa (at 1.1%) while the greatest rates are found in Eastern Europe (11%). The number of people who died as a direct consequence of alcoholism rose to 139,000 in 2013 from 112,000 in 1990. It is estimated that 3.3 million fatalities (5.9% of all deaths) may be attributed to alcoholic consumption each year. A person's life expectancy drops by around 10 years if they are alcoholic. Some derogatory and informal words, such as tippler, drunkard, dipsomaniac, and souse, have been used to describe those who struggle with alcoholism. Due to its lack of precision, the World Health Organization recommended replacing the term "alcoholism" with "alcohol dependency syndrome" in 1979.²⁴

Drug Addiction

Addiction to drugs, also known as substance use disorder, is an illness that alters a person's brain and behavior in such a way that they are unable to moderate

²⁴ <https://en.wikipedia.org/wiki/Alcoholism>

their use of drugs, whether they are prescribed or obtained illegally. Alcohol, cannabis, and nicotine are all examples of drugs. Addiction makes people more likely to continue taking drugs despite knowing the negative effects they have on their lives.

A person's drug usage pattern may begin with occasional social experimentation with a substance and progress to habitual abuse over time. Some people develop a dependency on drugs after using prescription medications or obtaining them illegally from those who do. Different drugs have different potential for addiction and different rates of rapid addiction. Opioid medicines, for example, have a greater risk and lead to addiction more rapidly than other drugs. Increases in required dosages to get the same effect are possible over time. To feel happy in the future, you may require the medicine. A higher tolerance develops in response to repeated use of a substance, making it harder to abstain from usage. Attempting to quit drug addiction may trigger severe desires and physical discomfort. What you're experiencing are known as withdrawal symptoms.

Symptoms

Some of the signs of a drug problem include:

- Dependence on the medicine, shown by feeling like you have to take it every day or many times a day
- Being preoccupied only with desires to use the substance.
- Requiring increasing doses of the medicine to have the same effect
- Unintentionally increasing dosing or extending treatment duration
- Ensuring you always have medication on hand.
- Buying the medicine while being unable to afford it
- Neglecting duties at home and at work, or cutting down on extracurriculars as a result of drug usage.
- Addiction is defined as refusing to stop taking a substance despite its negative effects on one's life, whether those effects be physical or mental.
- Engaging in questionable behavior, such as theft, in order to get the substance.
- Engaging in potentially hazardous actions while under the influence of the substance, such as driving.
- Investing a considerable amount of time on obtaining, using, and recuperating from drug use.
- If you have tried to quit taking the drug in the past and failed, you may have a hard time doing so.
- Dealing with uncomfortable withdrawal symptoms if you try to stop taking the medicine.

Recognizing unhealthy drug use in family members

It might be difficult to tell the difference between typical adolescent moodiness or anxiety and the effects of substance abuse. Here are some warning signals that your kid or another family member may be taking drugs:

- Problems at school or work — absence from school or work on a regular basis, loss of interest in previously enjoyed activities, or a decline in academic or professional performance are all indicators of a problem.
- Physical health issues — red eyes, rapid weight gain or decrease, or a lack of drive and desire.
- Neglected appearance — an absence of care about one's appearance.
- Changes in behavior — Changes in conduct and connections with family and friends; or substantial attempts to keep family members out of the adolescent's room or conceal where the kid is going with friends.
- Money issues — Unexpected demands for money, or the finding of missing or stolen money or other valuables from your house, might be signs of drug use and theft.

National health programs in India

The promotion and improvement of health and fitness via a program often provided by an employer, however insurance policies may also provide such programs directly to its members. Besides affecting the population's resistance to disease, people's health also impacted the organization of society, as well as its culture, politics, and economy. Health, the prevention and control of major communicable illnesses, and the development of traditional and indigenous systems of medicine are all national priorities for the Union Ministry of Health and Family Welfare. The purpose of the 2017 National Health Policy is to educate, clarify, strengthen, and priorities the government's role in shaping health systems across all of their dimensions, including but not limited to: investment in health; the organization and financing of healthcare services; the prevention of diseases as well as promotion of good health through cross sectoral action; access to technologies; the development of human resources; the encouragement of medical pluralism; the construction of the knowledge base necessary for better health; and the provision of financial protection for vulnerable populations.

List of National Health Programmes in India

National Cancer Control Programme (1975)

Objective/Description

Primary prevention of cancers by health education regarding hazards of tobacco consumption and necessity of genital hygiene for prevention of cervical cancer, etc. Achievements- Since its foundation, the programme has achieved numerous important achievements, including the National Cancer Registry Program in 1982. Even though the register does not cover the whole cancer-affected population, it provides the most up-to-date information on the burden of cancer in the nation and supports cancer-fighting measures such as greater financing for public hospitals and the development of cancer centers in 27 areas. Through the National Cancer Control Programme, the government implemented effective measures to promote primary prevention, such as a tobacco control policy to reduce tobacco's detrimental effects. The government also has strategies to prevent and regulate obesity and alcoholism and to promote physical exercise. Public health centres provide cervical and breast cancer screening or early detection services. The NCCP created 27 cancer centres and 85 oncology programmes at medical schools.

National Program for Prevention and Control of Deafness (NPPCD) (1975)

Objective/Description- To prevent the avoidable hearing loss on account of disease or injury, etc.

Achievements-

- Phased expansion to 228 districts in 27 states/UTs.
- Training materials and lectures have been field-tested.
- In 2007-08, RCI trained medical officials, PHNs, AWWs, MPWs, ASHAs, and teachers in all 25 pilot districts. In the growth phase, governments took over training and state health organisations received funding. Chandigarh, Nagaland, 3 Uttarakhand districts, and Andhrapradesh, TamilNadu have finished training.
- As per rules, NGOs supported district screening camps. Tamil Nadu, Karnataka, Chandigarh, Sikkim, and Andhra Pradesh held regular screening camps during the XIth five year plan, but in the XIIth plan it is proposed to organise screening camps in collaboration with NRHM (RBSK)/ M/o SJ&E at the PHC/CHC and District level for screening the general population for ear problems, hearing impairment, and deafness. Over 335 screening camps have been held.
- The plan provides District Hospitals, CHCs, and PHCs with sufficient equipment to boost ear and hearing care services at the community level.
- Audiometric Assistant (AA) and Instructor for Speech & Hearing Impaired are appointed on contract at the district hospital to carry out audiological and ear-related activities during the XIth plan.
- In the XIIth plan, each district received an ENT surgeon and an audiologist to improve ear care.
- Hearing Aids: Under the initiative, district hospitals provided free hearing aids to eligible youngsters up to 15 years old for a year. During the XIth Plan, almost 6380 hearing aids were provided. Ministry of social justice and empowerment would provide hearing aids in XIIth plan (Department of disability). Two ministries signed an MOU to execute this.

District Mental Health Program (NMHP) (1982)

Objective/Description- To ensure availability and accessibility of minimum mental health care for all in the foreseeable future, particularly to the most vulnerable and underprivileged sections of population. Achievements- Many materials chronicle NMHP's growth throughout the past 30 years. New study shows the cost-effectiveness of community care. Continuous attention and modification of the NMHP over this era shows the devotion of experts and planners. From the two centers that pioneered the community mental health initiative, it has expanded to >220 districts, with practically all psychiatric facilities involved. Strengthening mental hospitals and establishing training centers for mental health workers are also vital. Voluntary groups address mental health needs in rehabilitation, substance dependency, family support, disaster mental health care, suicide prevention, school mental health care, and public mental health education. In 1987, new mental health law was approved, and a more progressive measure is in

Parliament. NMHP money has expanded over three decades, with most of it unused.

National Cancer Registry Programme (1982)

Objective/Description- To provide true information on cancer prevalence and incidence. Achievements- Over 96 centers out of 212 letters issued have answered so far, more than 50% of these centers have begun collecting information about malignant neoplasms recorded from 1 January 2001. The WHO has funded 30 centres with money and computers. Requests for extra funding have been made, and current amounts are being stretched. Following a preliminary meeting, 23 centres have been visited, and 17 have achieved agreements.

The programme involves four regional workshops around the nation. These seminars attract pathologists from medical universities and big hospitals (public and private). Those who have started work will present their papers and discuss patient facts, notably residential status. The southern regional workshop was conducted in Bangalore on 11-12 May, West-Mumbai on 8-9 June, and East-Calcutta on 15-16 June. The northern workshop is set for Lucknow on 14-15 September. Early 2002 will also see a review workshop/meeting.

National Leprosy Eradication Program (started in 1955, launched in 1983)

Objective/Description- To arrest the disease activity in all the known cases of leprosy.

Achievements- Free leprosy diagnosis and treatment All public health care institutions, including primary health centres, government dispensaries, CHC, DH, and medical colleges, offer diagnosis and treatment (multidrug therapy). Complex, difficult-to-diagnose, and G2D patients needing reconstructive surgery are sent to district hospital. All leprosy patients get free medications, diagnostics, and surgical/nonsurgical interventions.

Every year, medical officers, health workers, supervisors, laboratory technicians, and ASHAs are trained to diagnose and manage leprosy patients. Intensive IEC efforts can reduce stigma and prejudice towards leprosy patients. Media, outdoor media, rural media, and advocacy gatherings are used. Interpersonal communication is emphasised. Leprosy patients get dressings, supportive medications, and MCR footwear for handicap prevention and treatment. Patients get self-care instruction to avoid aggravating their hypersensitive hands/feet. Reconstructive procedures are used to address lifelong impairment (RCS). Based on state government recommendations, the GOI has designated 112 institutions to perform RCS. 60 are government institutions, 52 are NGOs. Patients get free RCS and welfare assistance.

Universal Immunization Program (1985)

Objective/Description- To achieve self-sufficiency in vaccine production and the manufacture of cold-chain equipment for storage purpose, etc

Achievements- Over the past 40 years, India's UIP and other immunization programmes have had a good effect. However, outcomes are limited and varied.

2011 UIP targeted 27 million babies and pregnant mothers. Immunization rates were inconsistent throughout India's 28 (now 29) states. Only 11 states had more than 70% of under-5s immunized; the 8 most populated states had less than 53%.

The 2005-2006 National Family Health Survey (NFHS) III revealed a slight increase in completely immunized youngsters from 42% to 44%. In several of the best-performing states, the number of completely immunized youngsters fell. Since RCH II/NRHM began in 2005, the percentage of completely immunized youngsters rose from 43% in 2002-2004 to 54% in 2007-2008. UNICEF's 2009-10 Coverage Evaluation Survey reported minimal improvement in children immunization coverage in India from 1990 to 2010. [8] 16 of 29 states had greater immunization rates than the national average of 61.0%, while the Union Territories had 71.3%. Four states had 80% immunization coverage.

National Tobacco Control Program (2007)

Objective/Description- Preventing the initiation of smoking among young people, educating, motivating and assisting smokers to quit smoking, etc.

Achievements-

- All states and districts received operational guidelines for the National Tobacco Program.
- States get guidelines for visual health warnings and sales to minors and surrounding schools.
- Food Safety and Standards Authority of India Regulation in the U.S.
- Communication to state DGPs to boost COPTA enforcement.
- COPTA compliance communication to state transport secretaries
- COPTA compliance communication to state health secretaries.
- The National Tobacco Control Cell (NTCC) supervised the collecting of pricing data from 15 state consultants.
- The NTCC held a one-day nationwide consultation on "Closing the Gaps in TAPS" with HRIDAY and WHO India Office.
- The NTCC helped Gujarat's Anand and Kheda districts develop a structured, time-bound strategy to minimise tobacco growing.
- The NTCC provided feedback on the 13th Session of the OECD (OECD).
- The NTCC provided India's position on the UN Interagency Task Force draught resolution on non-communicable diseases.
- NTCC's 1st national mass media campaign for 2013-14 was approved.
- NTCC participated and supported the National Family Health Survey Technical Advisory Committee (NFSS).
- Secretary Health and Acting WR published "Guidelines for Law Enforcers, 2013" for tobacco control.

National Program of Health Care for the Elderly (NPHCE) (2010)

Objective/Description- To provide preventive, curative and rehabilitative services to the elderly persons at various level of health care delivery system of the country, etc.

Achievements-

In the 11th plan year, 100 districts in 21 states began a national programme for elderly health care. 2013-14 added 4 new districts. 104 districts are currently implementing programme activities. Program institutes are as follows:

Activities Completed	District Hospitals	RGCs	NCA's
Institutions sanctioned till March 2015	96	08	
Institutions sanctioned till March 2015	131	05	02
OPD Services Established	71	08	
Indoor Wards Services	61	04	
Physiotherapy Services	62	07	
Equips & Appliances	50	07	
Drugs & Consumables	45	07	
Contractual staff Recruited	43	04	
Training for staff organized	43	04	