SOCIAL CONCEPT OF DISEASES AND MEDICAL ANTHROPOLOGY

Illness and death are significant events for people everywhere. No one is spared. So it should not be surprising that how people understand the causes of illness and death, how they behave, and what resources they marshal to cope with these events are extremely important parts of culture. Some argue that we will never be able to completely understand how to treat illness effectively until we understand the cultural behaviours, attitudes, values, and the larger social and political milieu in which people live. Others argue that society and culture have little to do with outcome of illness- the reason that people die needlessly is that they donot get the appropriate medical intervention.

But anthropologists particularly medical anthropologists, who are actively engaged in studying health and illness, are increasingly realizing that biological and social factors need to be considered if we are to reduce human suffering. For instance, some populations have an appalling incidence of infant deaths due to diarrhoea. The origin of this situation is mostly biological, in the sense that the deaths are caused by bacterial infection. But why are so many infants exposed to those bacteria? Usually, the main reason is social. The affected infants are likely to be poor. Because they are poor, they are likely to live with infected drinking water.

Discovering the health-related beliefs, knowledge, and practices of a cultural group- its ethnomedicine- is one of the goals of medical anthropology. How do culture's view health and illness? What are their theories about the causes of illness? Do those theories impact on how illnesses are treated? What is therapeutic process? Are there specialised medical practitioners, and how do they heal? Are there special medicines, and how they are administered?

Concept of Balance or Equilibrium

Many culture have the view that the body should be kept in equilibrium or balance. The balance may be between hot and cold, or wet and dry. The notion of balance is not limited to opposites. For example, the ancient Greek system of medicine, stemming from Hippocrates, assumed that there four humors- blood, phlegm, yellow bile, and black bile- that must be kept in balance. In Ayurveda there are 3 humors (vatta, pitta, kapha).

Chinese medicine system which dates back to 3500 years initially stressed the balance between the contrasting forces of yin and yang. The yang part is invisible to the living. The yin part exists in the underworld in the shape of house and tree. If a person has a health problem, a traveller may be sent to underworld to see what is wrong with the person's yin house or tree. Fixing the yin house or tree should restore health to the yang part of body. The yin world is also where ghosts reside; they sometimes may cause illness. In that case, people may ask for help from powerful gods who reside in yang world.

Supernatural Forces

George P Murdock in cross cultural study of 139 societies found that only 2 societies did not have the belief that gods or spirits cause illness, making such a belief nearly universal.

Illness can also be thought of as caused by the loss of one's soul, fate, retribution for violation of a taboo, or contact with a tabooed substance or object. Sorcery is believed to be a cause of illness by most societies on all continents. On Truk, an atoll in Central Pacific, serious illness are mainly believed to be work of spirits.

Among Ojibwa, the most serious of illness, are thought to be due to retribution for doing wrong to another person, animal, or spirit. To cure such an illness, you must reflect on your own conduct to see what you did wrong and must tell to doctor(confession).

The biomedical paradigm

In most societies people think that their ideas about health and illness are true until they confront another medical system. Most anthropologist use the term biomedicine to refer to the dominant medical paradigm in Western cultures today, with the bio part of the word emphasizing the biological emphasis of this medical system. As Robert Hahn points out biomedicine appears to focus on certain specific diseases. Health is not the focus, as it is thought to be absence of the disease. Diseases are considered to be purely natural, and there is little interest in culture or social system. Doctors generally donot treat the whole body but tend to specialize, with the human body partitioned into zones that belong to different specialities. Death is seen as a failure, and biomedical practitioners do everything to prolong the life regardless of the circumstances under which the patient would live his life.

EPIDEMIOLOGY

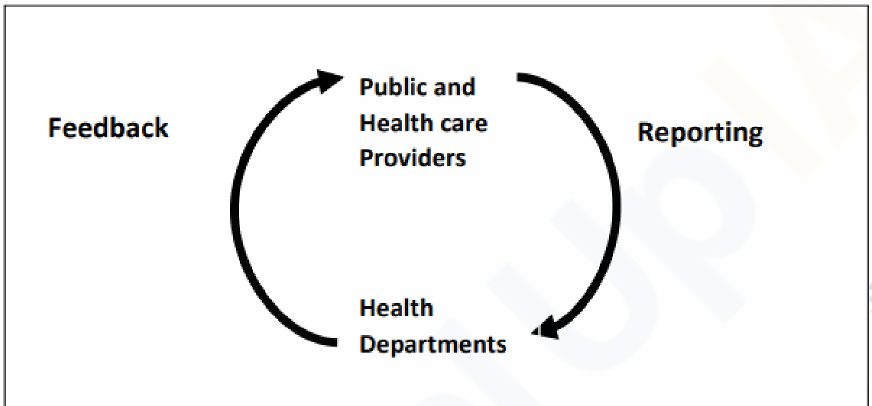
The word "epidemiology" comes from two Greek words "epi", means on or upon, demos, means people, and logos means the study of. In other words, we can say that epidemiology has its roots in the study of what befalls a population. Epidemiology is often defined as the study, distribution and determinants of disease and injuries in human population (Last 2011). Epidemiological anthropology elucidates social and cultural factors involved in a disease incidence, and emphasis on population variation in incidence and occurrence.

Many diseases are influenced by lifestyle variables which are in turn affected by social and cultural factors. The understanding of the effects of behavioural factors, thus require understanding of social and cultural forces on different condition of health and disease. Equally there is growing awareness that considerations of human behaviour and its social and cultural determinants are important for understanding the distribution and control of infectious disease.

Main tasks of epidemiology in public health in mid 1980s were identified as follows:

Public health surveillance

Public health surveillance is an ongoing, systematic collection, an analysis, interpretation and the dissemination of health data for helping public health decision makers to take action. Surveillance is quite similar to monitoring the pulse of the population or the community. The main purpose of the public health surveillance also called “information for action” (Orenstein, 1990) is to represent the current patterns of disease occurrence and potential disease so that the investigation, control, and the prevention measures can be applied effectively and efficiently.



Surveillance cycle

Searching for causes

Majority of epidemiologic research is dedicated to searching of casual factors that effects one’s risk of disease. The goal for these researches is to find a cause so that an appropriate public health action should be taken. They focus both on biological causes and socio-cultural causes disease.

Policy Development

Generally, the definition of epidemiology ends with the phrase: “…and the application of this study to control of health problems. Certainly, epidemiologists who understand the problem and the population in which the problem occurs are generally in a unique qualified position to recommend suitable interventions. As a results, the epidemiologists working in the public health sector provides input, testimonies and recommendations regularly regarding disease control strategies, reporting of disease regulations and also health-care policies.

What can anthropology contribute to the epidemiological study of health and disease?

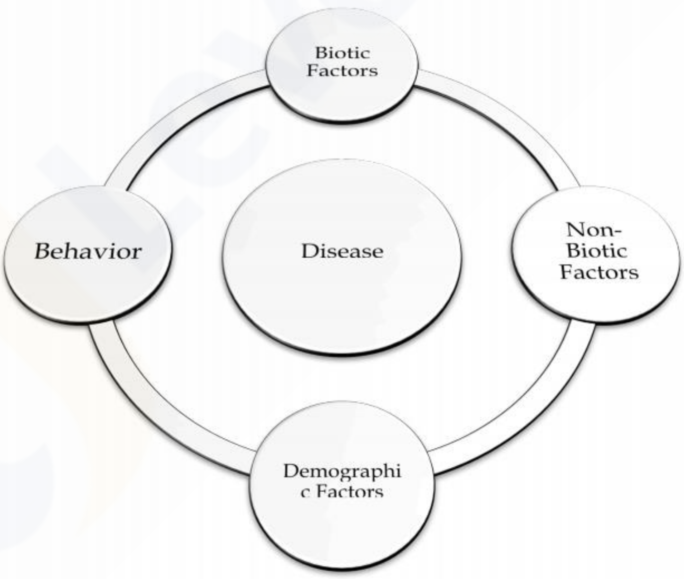
The relation between the two sciences – growing since two decades.

1. Most of chronic, non-infectious diseases are caused by a number of life-style variables which are social and cultural in nature - an understanding of social and cultural factors is imperative.
2. The spread of human diseases and their control depends to a very great extent on social and cultural factors.
3. Disease etiology now requires understanding psychological, biological, and socio-cultural characteristics of the hosts rather than exclusive concern with exposure to particular agent.
4. Anthropologists on the other hand have shown increasing interest in potential contribution anthropology can make to public health, disease occurrence etc.

These factors led to the interdisciplinary approach of EA. The interdisciplinary approach of EA revealed that many human disease or disorder is the result of many factors within a "causal web" – a web of determinants. The "web" includes.

- Exogenous Factors – Biotic and Non-biotic
- Endogenous Factors – Genetic
- Demographic Factors
- Behavior – Social, cultural, and psychological

It is the goal of EA to identify and measure the relative importance of factors within this causal web of disease.



HEALTH AND DISEASE

Health can be defined based on some measured values like temperature, pulse, breathing rates, BP, height, weight etc – which are biological criteria based on statistical concepts. It can also be defined as an ability to function effectively in complete harmony with one's environment – the ability to meet physical, emotional and mental stresses of life. Hence, health is more than physical fitness – it involves social, mental and emotional well-being.

Factors Affecting Health

Many factors combine together to affect the health of individuals and communities. Whether people are healthy or not, is determined by their circumstances and environment. To a large extent, factors such as where we live, the state of our environment, genetics, our income and education level, and our relationships with friends and family all have considerable impacts on health, whereas the more commonly considered factors such as access and use of health care services often have less of an impact.

The determinants of health include:

- the social and economic environment,
- the physical environment, and
- the person's individual characteristics like genes and behaviours.

The context of people's lives determines their health, and so blaming individuals for having poor health or crediting them for good health is inappropriate. Individuals are unlikely to be able to directly control many of the determinants of health. These determinants—or things that make people healthy or not—include the above factors, and many others:

1) Income and social status - higher income and social status are linked to better health. The greater the gap between the richest and poorest people, the greater the differences in health.

2) Education – low education levels are linked with poor health, more stress and lower self-confidence.

3) Physical environment – safe water and clean air, healthy workplaces, safe houses, communities and roads all contribute to good health. Employment and working conditions – people in employment are healthier, particularly those who have more control over their working conditions.

4) Social support networks – greater support from families, friends and communities is linked to better health. Culture - customs and traditions, and the beliefs of the family and community all affect health.

5) Genetics - inheritance plays a part in determining lifespan, healthiness and the likelihood of developing certain illnesses. Personal behaviour and coping skills – balanced eating, keeping active, smoking, drinking, and how we deal with life's stresses and challenges all affect health.

6) Health services - access and use of services that prevent and treat disease influences health

7) Gender - Men and women suffer from different types of diseases at different ages.

8) Political and Economic Influences on Health- people with more social, economic, and political power in a society are generally healthier. Ethnic differences also predict health inequities. in South Africa under apartheid, the 14% minority population, referred to as white controlled most of the income of the country and most of high-quality land. Blacks were restricted to areas to areas with shortage of houses and unemployment.

Power and economic differences between societies also have profound health consequences. Over the course of European exploration and expansion, indigenous people died in enormous numbers from induced diseases.

DISEASE

In very simple terms, it is any bio-medical deviance. Though disease and "illness" are used interchangeably, they are not the same. A person may have a disease for many years without even being aware of its presence – i.e., he is diseased but not ill. A person with the disease Diabetes is no ill as long as he takes insulin. Many cancers – go undetected till they cause symptoms.

Hence, illness is the subjective and social experience of disease. It also implies discomfort and inability to function optimally. A disease is any deviation from normal form and function. Hence, a disease is any departure from health – biological or behavioural. Diseases can be acute or chronic and infectious or non-infectious.

Disease may be acute, chronic. Acute conditions are severe and sudden in onset. This could describe anything from a broken bone to an asthma attack. A chronic condition, by contrast is a long-developing syndrome, such as osteoporosis or asthma. Note that osteoporosis, a chronic condition, may cause a broken bone, an acute condition.

Also mention social concept of diseases in answer

CLASSIFICATION OF DISEASES

Classification of diseases become extremely important in the compilation of statistics on causes of illness and causes of death. It is obviously important to know what kinds of illness and diseases are prevalent in an area and how these prevalence rates vary with time.

The most widely used classification of disease are:
1) Topographic- by bodily region or system
2) Anatomic - by organ or tissue
3) Physiological – by function or effect
4) Pathological – by nature of the disease process
5) Etiological – causal system of diseases
6) Epdemiological – deals with incidences, distribution, and control of disorders in a population.

DISEASES ARE 'NATURAL'

We tend to think of diseases as abnormalities — and for individuals suffering from them, they are. But diseases are as much a part of life as any other aspect of our biological world. Many diseases are caused by other living organisms — viruses, bacteria, and protozoa — and are carried by other species, they are really perfectly natural. Disease-causing species have adapted to the biology of their hosts, and the hosts at least attempt to adapt to the disease-causing species.

Diseases can also have wide-ranging effects on population size and structure. In fourteenth-century Europe, a drop in population was the result of plague, mostly bubonic plague, a fatal bacterial disease carried by fleas, which were in turn transported by rats. A major outbreak began in Italy in 1347 and spread rapidly across Europe over the next five years, killing 25 million people. The period came to be known as the Black Death.

Bubonic plague spread so quickly through Europe during those years because of the dense populations of its cities and the extensive trade networks that linked them. Rats that carried the fleas moved easily from place to place, and the bacteria easily moved from person to person. Culture affected a biological event — and vice versa. Many aspects of European culture were affected by the Black Death — from economy to art to religious dissent and reform movements.

We tend to think that our species, especially in modern times, has removed itself from many, if not most, such relationships. After all, those of us in developed or developing countries virtually ignore some diseases that a generation ago were serious threats. Polio has been virtually eliminated from the United States, Europe, and India. In 1980 smallpox was declared eradicated worldwide. But there are still diseases that disable and kill us, and new diseases or new strains of old diseases are even now emerging as the species that cause them continue to undergo the processes of evolution. Diseases are significant factors of natural selection.

Disease and Hominid Evolution

Evolutionary relationships among human and animal viruses suggest that some viruses have even played a role in hominid evolution (Van Blerkom 2003). As major causes of illness and death, viruses can be agents of selection within populations — for example, selecting for and maintaining general diversity in the all-important human immune system. Viruses can also be involved in selection between populations accounting for the extinction of individual populations. Perhaps early migrants out of Africa — where populations had a long time to develop immunities to certain diseases — carried pathogens to hosts who lacked immunity.

An analogous phenomenon occurred, for example, when the Spaniards conquered the Aztecs of Mexico in 1521. European diseases — smallpox, measles, and influenza — to which the Aztecs had no prior exposure and thus no immunity, probably did more to lead to their downfall than did the military actions of the Spanish soldiers. Finally, since viruses operate by commandeering host-cell machinery for their own purposes, some may also have played a more direct role in altering the human genome and thus, perhaps, in accounting for some of the evolutionary changes seen in hominid history (Van Blerkom 2003).

Remnants of ancient viruses make up about 1 percent of the human genome. Some of these viral sequences may cause pathological conditions, but others, after millions of years of evolution, may be involved in such normal processes as placental formation and foetal development. An evolutionary tree of certain related virus types mirrors the evolutionary tree of their host species. This is evidence of a long-term coevolution.

Disease and Human History

Looked at from the biocultural perspective, we may see general trends in the relationship between diseases and the human species. Anthropologist George Armelagos (1998; Armelagos et al. 1996) has outlined these trends and refers to them as three "epidemiological transitions."

For most of our species' history, we lived in small, widely dispersed, nomadic foraging groups. Our ancestors certainly experienced diseases of various sorts and would have come into contact with new diseases as they migrated to new environments. But infectious diseases may not have had serious effects on large numbers of people or many different populations, since they would have had little chance of being passed onto many other humans.

First Epidemiological Transition When some people began to settle down and produce their food through farming and animal domestication — starting about 10,000 ya — the first epidemiological transition occurred. Infectious diseases increased in impact, as larger and denser concentrations of
people provided the disease vectors with greater opportunity to be passed from host to host. Animal domestication brought people into contact with new diseases. Working the soil

exposed farmers to insects and other pathogens. Sanitation problems caused by larger, more sedentary populations would have transmitted parasitic diseases in human waste, as would the use of animal dung for fertilizer. Agriculture also led to a narrowing of food sources, as compared with the varied diets of foragers which resulted in nutritional deficiencies. The storage of food surpluses attracted new disease carriers such as insects and rats. Trade between settled communities, as we saw in the case of the Black Death in Europe, helped spread diseases over large geographic areas. Epidemics, diseases that affect a large number of populations at the same time, were essentially non-existent until the Agricultural Revolution.

Second Epidemiological Transition Beginning in the last years of the nineteenth century and continuing into the twentieth, we experienced the second epidemiological transition. With modern medical science providing immunizations and antibiotics and with better public health measures and
improved nutrition, many infectious diseases were brought under control or even, as with smallpox, eliminated. There was a shift to chronic, degenerative diseases such as cancers and cardiac, circulatory, and pulmonary diseases. Fewer people were dying from infectious diseases and more were living longer. But the results of modern lifestyles in developed countries and among the upper classes of developing countries led to a more sedentary life leading to less physical activity; more stress; environmental pollution; diets contributing to obesity, clogged arteries, and diabetes; and smoking and alcohol consumption.

Third Epidemiological Transition But on the heels of the second transition has come the third epidemiological transition, and we are in it now. New diseases are emerging, and old ones are returning. Both of these phenomena can be understood in terms of evolutionary theory. The return of old diseases is the result of the fact that microorganisms are evolving species themselves. For example, new and serious antibiotic resistant strains of tuberculosis have recently appeared. This evolution may have been encouraged by what some authorities consider our overuse of antibiotics, giving microorganisms a greater chance to evolve resistance by exposing them to a constant barrage of selective challenges. Some bacteria reproduce hourly, and so the processes of mutation and natural selection are speeded up in these species.

EMERGING DISEASES

Emerging diseases are also the results of human activity in the modern world, which brings more people into contact with more diseases, some of which were unheard of even a few decades ago. As people and their products become more mobile, and as our populations spread into previously little-inhabited areas, cutting down forests and otherwise altering ecological conditions, we contact other species that may carry diseases to which they are immune but that prove deadly to us. Between 1940 and 2004, a reported 335 infectious diseases emerged, reaching a peak in the 1980s (Jones et al. 2008). The majority of these (around 60 percent) are caused by a nonhuman animal source, and of those, almost 72 percent are from various forms of wildlife. The spike in emergence in the 1980s is possibly a result of increased susceptibility to infection from the HIV/AIDS pandemic.

HIV-1, the virus that is the most common cause of AIDS, crossed over to humans from chimpanzees in West Africa as early as 1931 (Hahn et al. 2000; Korber et al. 2000). (Another virus, HIV-2, came from the sooty mangabey monkey.) Hunting, butchering, and the consumption of undercooked contaminated meat probably accounted for the contact that initially allowed the virus to be transmitted to humans from the nonhuman primates that had evolved the ability to carry the virus with no adverse effects. Early cases were isolated, so the disease didn't spread, even though the virus easily moves from host to host through the exchange of bodily fluids during sexual activity or as the result of using unsterilized hypodermic needles. AIDS reached epidemic proportions later in the twentieth century and continues in the present as a result of social factors, including but not limited to our increased mobility. In addition, the virus itself has evolved since its transmission to humans, producing strains that are drug resistant, more virulent, and hard to detect. We have long known of another deadly virus — rabies — that is successful because it can jump from species to species (Mills 1997). Hantavirus from rodents, Ebola virus possibly from fruit bats, and campylobacter, a bacterium from chickens, are some other examples of pathogens that have recently jumped from other species to ours, with serious consequences. Threats from new strains of influenza, such as swine flu and avian flu, seem to appear almost yearly.

Then, there are the prion proteins. Prions begin as normal proteins in the nervous tissue of humans, other mammals and birds. These prions, however, sometimes rearrange themselves into abnormal configurations. In this abnormal form, the prions trigger the same rearrangement of the normally configured proteins and then build up in brain tissue, which they eventually destroy. The condition is called spongiform encephalopathy. "Mad cow" disease in cattle, Creutzfeldt-Jakob disease in humans, and kuru, a disease described among the Fore people of highland New Guinea, are some examples of this condition, as are other manifestations in sheep, goats, minks, and possibly elk and mule deer. Although the trigger for the abnormal shape of the protein may come, not surprisingly, from a genetic mutation, prions can easily be transmitted across species. Moreover, they are very hard to destroy. Mad cow disease may have spread as the result of cattle being fed meal that contained the remains of other infected domestic animals (Rhodes 1997). Because we now understand the nature and transmission of prions, the incidence of prion diseases has dropped sharply. For a time, though, there were many cases of "mad cow" in Europe (especially Britain), and Creutzfeldt-Jakob is still a threat, affecting, for example, blood donation qualifications.

So, the evolution of our species has been, and is still being, affected by diseases caused by, originating in, and carried by other species that are themselves evolving. An important area for understanding these diseases, then, is evolutionary theory, which explains important factors about their source and transmission. In fact, this approach has been given the name "Darwinian medicine" (Nesse and Williams 1998; Oliwenstein 1995), and I imagine it will become increasingly important in the future.

DIET AND DISEASE

The Paleolithic Diet

For most of human history, people lived in small groups and subsisted on wild foods that they could collect by hunting or gathering. Obviously, diets varied in different areas: Sub-Saharan Africans were not eating the same thing as Native Americans on the northwest Pacific coast. Nonetheless, S. Boyd Eaton and Melvin Konner (Eaton & Konner, 1985; Eaton et al., 1999) argue that we can reconstruct an average Paleolithic diet from a wide range of information derived from paleoanthropology, epidemiology, and nutritional studies.

Comparison of Paleolithic and Contemporary Diets

Dietary Component	Paleolithic Diet	Contemporary Diet
Energy (calories)	High caloric intake and expenditure to support active lifestyle and large body size.	More sedentary lifestyle uses fewer calories, yet caloric consumption often exceeds expenditure.
Micronutrients (vitamins, antioxidants, folic acid, iron, zinc)	High consumption (65–70% of diet) of foods rich in micronutrients, such as fruits, roots, nuts, and other noncereals.	Low consumption of foods rich in micronutrients.
Electrolytes (sodium, calcium, and potassium, needed for a variety of physiological processes)	High consumption of potassium relative to sodium (10,500 mg/day vs. 770 mg/day). High blood pressure is rare in contemporary hunter–gatherers with high potassium/sodium ratios.	Low consumption of potassium relative to sodium (3,000 mg/day vs. 4,000 mg/day). High sodium intake from processed foods is associated with high blood pressure.
Carbohydrates	Provide about 45–50% of daily calories, mostly from vegetables and fruits, which are rich in amino acids, fatty acids, and micronutrients.	Provide about 45–50% of daily calories, mostly from processed cereal grains, sugars, and sweeteners, which are low in amino acids, fatty acids, and micronutrients.
Fat	Provides about 20–25% of daily calories, mostly from lean game animals, which have less fat and saturated fat than domestic animals, leading to lower serum cholesterol levels.	Provides about 40% of calories, mostly from meat and dairy products. Some contemporary diets, such as from Japan and the Mediterranean region, are low in total or saturated fat and are associated with lower heart disease rates.
Protein	High consumption, providing about 30% of daily calorie intake, mostly from wild game that is low in fat.	Recommended daily allowance about 12% of total calories. High-protein intake has been associated with higher heart disease rates, probably because contemporary high-protein diets also tend to be high in fat.
Fiber	50–100 g/day. High-fiber diets sometimes are considered risky because of loss of micronutrients, but this would be less of a worry in a Paleolithic diet rich in micronutrients.	20 g/day.

The contemporary diet is not simply a more abundant version of the hunter–gatherer diet. It differs fundamentally in both composition and quality. Compared with contemporary diets, the hunter–gatherer diet can be characterized as being high in micronutrients, protein, fibre, and potassium and low in fat and sodium. Total caloric and carbohydrate intake is about the same in both diets, but hunter–gatherers typically were more active than contemporary peoples and thus needed more calories, and their carbohydrates came from fruits and vegetables rather than processed cereals and refined sugars.

The comparison between hunter–gatherer and contemporary diets indicates that increasing numbers of people are living in nutritional environments for which their bodies are not necessarily well adapted. With few exceptions (such as the evolution of lactose tolerance) there has not been enough time, or strong enough selection pressures, for us to develop adaptations to this new nutritional environment. Indeed, because most of the negative health aspects of contemporary diets (obesity, diabetes, cancer) become critical only later in life, it is likely that health problems associated with the mismatch between our bodies and our nutritional environment will be with us for some time.

Agriculture and Nutritional Deficiency

Agriculture allowed the establishment of large population centres, which in turn led to the development of large-scale, stratified civilizations with role specialization. Agriculture also produced an essential paradox: From a nutritional standpoint, most agricultural people led lives that were inferior to the lives of hunter–gatherers. Agricultural peoples often suffered from nutritional stress as dependence on a few crops made their large populations vulnerable to both chronic nutritional shortages and occasional famines. The “success” of agricultural peoples relative to hunter–gatherers came about not because agriculturalists lived longer or better lives but because there were more of them. With their dependence on a single staple cereal food, agricultural populations throughout the world have been plagued by diseases associated with specific nutritional deficiencies. As in the Illinois Valley, many populations of the New World were dependent on maize as a staple food crop. Dependence on maize is associated with the **development of pellagra**, a disease caused by a deficiency of the B vitamin niacin in the diet. **Pellagra causes a distinctive rash, diarrhoea, and mental disturbances, including dementia.**

In Asia, rice has been the staple food crop for at least the last 6,000 years. In China, a disease we now call beriberi was first described in 2,697 BCE. Although it was not recognized at that time, beriberi is caused by a deficiency in vitamin B1 or thiamine. Beriberi is characterized by fatigue, drowsiness, and nausea, leading to a variety of more serious complications related to problems with the nervous system (especially tingling, burning, and numbness in the extremities) and ultimately heart failure. Rice is not lacking in vitamins; however, white rice, which has been polished and milled to remove the hull, has been stripped of most of its vitamin content, including thiamine.

CONCEPT CHECK Health Costs of Agriculture

Due to population increase, crowding, and poor nutrition, human populations' health declined in many settings globally.

HEALTH INDICATOR	HUNTER-GATHERERS	AGRICULTURALISTS
Infection (periosteal reactions)	Low	High
Dental caries	Low	High
Child growth and development	Normal	Reduced
Enamel defects (hypoplasias, microdefects)	Low	High
Iron deficiency (porotic hyperostosis, cribra orbitalia)	Low	High
Adult height	Normal	Reduced

AGRICULTURE AND ABUNDANCE: THRIFTY AND NONTHRIFTY GENOTYPES

The advent of agriculture ushered in a long era of nutritional deficiency for most people. However, the recent agricultural period, as exemplified in the developed nations of the early twenty-first century, is one of nutritional excess, especially in terms of the consumption of fat and carbohydrates of little nutritional value other than calories. The amount and variety of foods available to people in contemporary societies are unparalleled in human history.

In general, according to law of Natural selection, genes or genotypes that cause genetic disorder are rare as the natural selection operates against them. But in case of certain genetic diseases the frequency is exceptionally high. This appears to contradict general law of natural selection. Such genes or genotypes are called thrifty genotypes and their corresponding behaviour or phenotype as thrifty phenotype.

In 1962, geneticist James Neel introduced the idea of a thrifty genotype, a genotype that is very efficient at storing food in the body in the form of fat, after observing that many non-Western populations that had recently adopted a Western or modern diet were much more likely than Western populations to have high rates of obesity, diabetes (especially Type 2 or non–insulin dependent diabetes), and all the health problems associated with those conditions (see also Neel, 1982).

Since then, it has been invoked frequently to explain the epidemics of obesity and non-insulin dependent diabetes (NIDDM) in populations all over the world as they have made the rapid transition to a westernised lifestyle in the twentieth century. An examination of the archaeological record indicates that human populations were exposed to nutritional stresses throughout history (both as hunter-gatherers and agriculturalists) which could have selected strongly for a "thrifty" metabolism.

Populations such as the Pima Papago Indians in the southwest United States have diabetes rates of about 50%, and elevated rates of diabetes have been observed in Pacific Island-, Asian-, and African derived populations with largely Western diets. Diabetes mellitus caused by the absence of insulin gene leading to increase blood sugar level. As explained by the geneticist Neel, the genes to produce insulin could not have been advantageous in early stage of human evolution like hunting gathering where there was no food assurances and frequent famines.

In such situation genotypes leading to diabetes were more favourable. Thus, thrifty genotypes were the ones which were favourable in the early stages of changed modern societies. At its heart is the idea that we are adapted to a lifestyle and nutritional environment far different from those we find in past populations.

Supporting evidence for Neel's thrifty genotype hypothesis is gestational diabetes where pregnant woman needs an additional food safety as the need to support another life in her body. (Gestational diabetes is high blood sugar that develops during pregnancy and usually disappears after giving birth. Gestational diabetes can cause problems for you and your baby during and after birth.)

EPIDEMIOLOGICAL TRANSITION (CAUSES AND CONSEQUENCES)

The epidemiologic transition describes changing patterns of population distributions in relation to changing patterns of mortality, fertility, life expectancy, and leading causes of death. There are two major components of the transition: (1) changes in population growth trajectories and composition, especially in the age distribution from younger to older, and (2) changes in patterns of mortality, including increasing life expectancy and reordering of the relative importance of different causes of death.

A. R. Omran is typically credited with formulating the theory of the epidemiologic transition. Omran's formulation of the theory consisted of five propositions.

1) The theory of epidemiologic transition begins with the major premise that mortality is a fundamental factor in population dynamics.

2) During the transition, a long-term shift occurs in mortality and disease patterns whereby pandemics of infection are gradually displaced by degenerative and man-made diseases as the chief form of morbidity and primary cause of death.

3) Proposition three states that "During the epidemiologic transition the most profound changes in health and disease patterns obtain among children and young women."

4) The fourth proposition holds that "The shifts in health and disease patterns that characterize the epidemiologic transition are closely associated with the demographic and socioeconomic transitions that constitute the modernization complex.

5) The final proposition outlines three basic models of the epidemiologic transition that are a function of "peculiar variations in the pattern, the pace, the determinants and the consequences of population change.

Omran posits **three typical phases of transition**. The **first transition phase**, called the **"Age of Pestilence and Famine"**, is characterized by high and fluctuating mortality rates, variable life expectancy with low average life span, and periods of population growth that are not sustained. Armelagos et al., propose that the earliest transition dates to pre-history (Neolithic period, approximately 10,000 years ago) across geographically widely separated cultures. According to their reading of the evidence, the transitions were a result of the transformation from hunter-gatherer societies to agrarian societies, with more settled life required in order to tend cultivated crops and domesticated animals. The change in patterns of livelihood and living conditions also meant changes in population size and density and daily life in closer proximity to animals. The reduction in human and animal migration created a new kind of ecological imbalance. There was an increase in infectious diseases as a result of exposure to human and animal waste and contaminated water and the reciprocal transmission of organisms between human and animal hosts. The disease patterns that emerged were determined by increasing microbial exposures, dietary deficiencies because the food supply, though perhaps more reliable in good years, was less diverse, illnesses due to inadequate food storage, increased transmission rates and endemic disease as a result of increased population density, eventual development of global trade with a concomitant increase in potential for disease spread over wide geographic regions, and increased mortality which, in keeping with the epidemiologic transition model, would lead to increased birth rate.

The **second transition phase** is characterized as the **"Age of Receding Pandemics" and** is marked by declining mortality rates that become steeper as epidemics occur less frequently, an increase in average life expectancy from about 30 years to about 50 years of age, and more sustained population growth that eventually becomes exponential. This transition occurs in the early modern period and is characterized by a shift in patterns of disease and mortality from primarily infectious diseases to what have come to be called "chronic" diseases. The theory proposes that this shift is accompanied by a shift in the population age distribution as early infectious disease deaths decline and deaths from chronic and degenerative disease increase, the latter a result not only of the receding competing risk from infectious diseases, but also of the new environmental hazards that came with industrial development and increasing urban living.

Explanations for these changes are multi-faceted and complex and include changes in the relationships in the classic matrix of agent, host, and environment; socioeconomic, political, and cultural changes; improved living conditions and standard of living, including the contributions of the sanitary movement to water and sanitary services, improved nutrition, better personal hygiene, and less overcrowding; medical and public health advances and interventions; better understanding of infectious diseases with acceptance of the germ theory and adoption of antiseptics and pasteurization; lower fertility and longer birth intervals with better infant and child survival; and increasing lifespan resulting in an older population.

The third transition phase is termed **the "Age of Degenerative and Man-Made Diseases"**. In this phase it is theorized that infectious disease pandemics are replaced as major causes of death by degenerative diseases, and infectious agents as the major contributor to morbidity and mortality are overtaken by anthropogenic causes. With declines in mortality rates, average life expectancy increases to > 50 years, fertility becomes more important to population growth, and the anthropogenic and biologic determinants of disease also change. This transition is typically associated with the late 19th and 20thcenturies in developed countries.