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# UNIT 18 DETERMINANTS OF HEALTH STATUS

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## Structure

- 18.0 Objectives
- 18.1 Introduction
- 18.2 Economic Development and Health
- 18.3 Nutrition and Health
- 18.4 Poverty and Malnutrition
  - 18.4.1 Infectious and Chronic Diseases
  - 18.4.2 Environment and Health: Impact of Air and Water Pollution
  - 18.4.3 Indicators of Disability Burden: QALYs/DALYs
- 18.5 The Social Determinants of Health
- 18.6 Let Us Sum Up
- 18.7 Key Words
- 18.8 References
- 18.9 Answers/Hints to Check Your Progress Exercises

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## 18.0 OBJECTIVES

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After going through this unit, you will be able to:

- discuss the importance of nutrition in determining the health status of a community;
- discuss the impact of poverty and malnutrition on the health status of population;
- appreciate the need to adopt policies for combating infectious diseases for achieving better health status in an economy;
- delineate the consequences of air and water pollution on environment and health;
- know about the measurement of disability burden as quantitative expressions;
- discuss the interrelationship between wealth, inequality and health; and
- identify the important social determinants of health.

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## 18.1 INTRODUCTION

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The linkage between economic development and health was discussed in the previous unit. The present unit deals with an identification of the factors which determine the health status of a community. What are the conditions which are most conducive to good health? On the other hand, what are the conditions that are most likely to lead to or perpetuate ill health? These two questions are at the centre of the different issues discussed in this unit. Many factors combined together affect the health of individuals and communities. At a basic or fundamental level, the health status of people in a region or location are determined by their circumstances and environment. This would, in turn, depend upon factors like: (i) the socio-economic conditions of the people in the area; (ii) physical environment in terms of their living conditions; and (iii) individual characteristics and behaviours (which depend on genetical or inborn factors/traits). At a more specific level, these determinants (i.e. factors which contribute to making people healthy or its opposite) influence the health status in terms of the following.

**Income and Social Status:** Higher income and social status lead to better health. Employed persons, having more control over their working conditions, are healthier

than unemployed persons. Income levels also determine the food intake and the nutritional levels therein. In case of inequality in income, different sections of the community do not enjoy similar health standards. Although those with higher incomes can afford better health services, the expansion of public health services and the rising incomes of the poor would increase the availability of health services to the poor also.

**Education/Gender:** Low education levels are linked with poor health, more stress and lower self-confidence. Men and women suffer from different types of diseases, specific to their biological and other factors, at different ages.

**Social Support Networks:** Greater support from families, friends and communities is linked to better health. Culture (i.e. customs, traditions and beliefs) of the family and community influence the health status of the individuals in ways specific to each.

**Physical Environment:** Safe water and clean air, healthy workplace, safe houses, communication and roads all contribute to good health. The choice of the location of one's living and work place is determined by the socio-economic and educational background of the individual. There is thus inter-dependency among these broad factors also.

**Genetics:** Hereditary factors inherited genetically play an important role in determining the quality of life vis-à-vis the health status and the likelihood of developing certain diseases. Personal behaviour and coping skills (which depends on factors like balanced diet, keeping oneself clean and active, keeping oneself away from habits like smoking/drinking, etc.) are important determinants of the health status of individuals.

It follows from the above that while the context of people's lives are largely responsible for their health status, individuals would have little direct control over the factors influencing them. The governments and institutions play an important contributory role in promoting the health of the people and the society. At a macro level, factors like the level of economic development, opportunities for earning income and wealth, policies pursued for alleviating poverty and promotion of social sector institutions, etc., contribute to determining the health status of a community. The present unit focuses on discussing some of these related aspects which determine the health status of the people in a country.

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## 18.2 ECONOMIC DEVELOPMENT AND HEALTH

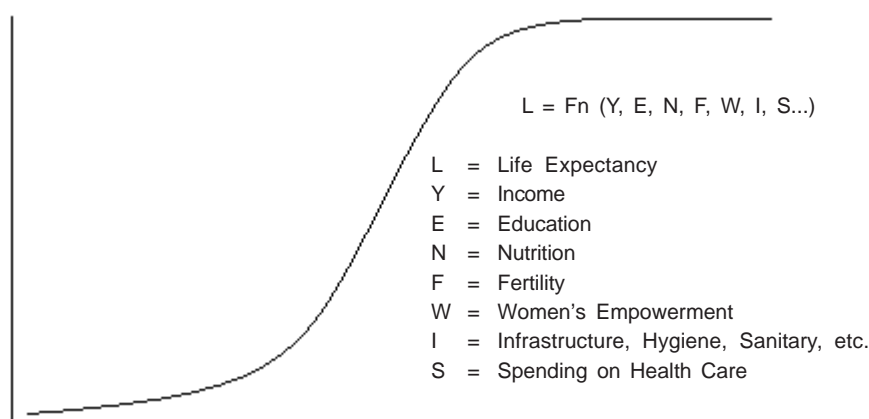
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The contribution of good health to improved growth and development prospects (or its opposite i.e. the contribution of poor health to reduced economic growth and development) is widely recognised. It is postulated in terms of: (i) nutrition links to labour productivity and growth; (ii) linkage between fertility and population dynamics to growth; and (iii) child and youth health links to growth. This is however not a one-way relationship as increase in wealth (via economic development and the resultant investment in health services) is considered good for health. In a study of cross-country regressions by Lant Pritchett and Lawrence Summers (1996), the authors demonstrate a strong causative effect between increased income and reduced infant mortality. Based on their analysis, they point out that if the developing world's growth rate had been 1.5 percentage points higher in the 1980s, half a million infant deaths could have been averted.

The history of modern economic growth since the early 19<sup>th</sup> century demonstrates that with growth, life expectancy has improved and infant mortality has declined. These indicators have improved due to an increased understanding of the causes of ill health, such as poor sanitation, as well as due to development of technologies

(e.g. vaccines and antibiotics). Many diseases are not fatal, but disabling. The economic burden of such illnesses for the affected includes loss of income, and out-of-pocket expenditure on health. The economic burden for the country includes low productivity and the direct costs of treatment. During the second half of 20<sup>th</sup> century, the diffusion of technology and knowledge to low-income countries contributed to increasing the access to improved sanitary conditions and new medicines. This was possible due to increase in wealth without which the improved services could not have been afforded. Substantial improvements in health can occur even at low income levels. As a result of complex synergies among income levels and expenditure on education, better housing, clean water, sanitation systems, infrastructure, health services, etc., people all over the world live almost 25 years longer today than they did at similar income levels in 1900. However, it is equally important to note that the relationship between health and wealth is not linear.

With the attainment of a critical threshold, health gains will result even at low income levels (Fig. 18.1). At such a point, even small increases in economic growth would result in high improvement in health outcomes. The importance of a synergy between the inter-sectoral programmes are underscored as they often improve the effectiveness of specific health programmes especially at low income levels. For example, investment in roads allow pregnant mothers to get to delivery services on time and vaccines to arrive at health centres without having the cold chain broken. Basic education is demonstrated to enable mothers to make the right choices when faced with health complications.



**Fig. 18.1: Impact of Wealth on Health (GDP/Capita)**

Improved health can also promote economic growth through a demographic link. Though not directly obvious, shifts in demographic structure of a population can result by way of more children surviving to adulthood with a consequent increase in the proportion of economically active to dependent people. This 'demographic dividend' is contended to have the potential to be a key driver of economic growth provided the broader policy environment allows these workers to find productive employment. With such synergic achievement of intra-sectoral linkages, the changing age-structure of the population is expected to result in rapid increases in the per-capita income of the population. In East Asia, for example, between 1965 to 1990 the working age population grew several times faster than the dependent population. Several studies (e.g. Bloom and Williamson, 1998) have attributed this shift to the declining infant mortality brought about by the introduction of new health technologies such as antibiotics and anti-malarial drugs as well as general improvements in sanitation and clean water. The authors contend that these health improvements were responsible for as much as one-third of the region's post-war economic growth.

Just as good health facilitates economic growth, poor health can severely constrain it. This is particularly true of the poor countries which typically have the greatest disease burdens. Most obviously, poor health can reduce economic development by

reducing the quantity and the quality of labour available to an economy. This in turn reduces the number of hours worked impacting adversely on the national income generated. With such unhealthy trends continuing over a longer period, the rate of growth of an economy will be severely affected. Such weak growth trends, by extension, squeeze the amount of resources available with the government and individuals to invest on other essentials of progress viz. education, health, living conditions, etc. This would further exacerbate the vicious circle of poor health and poverty.

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### 18.3 NUTRITION AND HEALTH

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The effects of the socio-economic and environmental factors in which one is constrained to live will manifest in terms of the nutritional and health status of individuals. The nutritional requirements of the body are derived from the food that is consumed. It is these nutrients which allow the body to function efficiently. Broad nutrients contained in food are: carbohydrates, fat, protein, vitamins and minerals. The energy derived from these nutrients are measured in terms of calories. Depending on the physical and mental work load of the individuals living in different economic settings (e.g. rural and urban areas, those engaged in physical works as compared to intellectual work involving reading and writing, etc.) the amount of energy required by an individual is defined. In India, for instance, the poverty level nutritional requirement of a person living in rural areas was defined as 2400 calories while that in an urban area as 2100 calories. This limit was determined more than three decades ago (early 1970s) when poverty measurement studies were focusing on a standard measure of assessment. Mechanisation in agriculture was also at its infancy at that time. With progressive adoption of technology and the resultant reduction in the extent of physical labour put in, the energy requirement is redefined. Usually, this is lowered as factors like mental peace derived from better income and reduced drudgery in work contribute to improvement in health.

In addition to the broad nutrients, there are micro-nutrients like iron, iodine, etc. which are important for the balanced health of the individuals. Their deficiency will result in specific diseases like anaemia, goitre, etc. The ultimate determinant of the required nutritional status, in proper combinations of all the nutrients, is decided at the cellular level. This is determined by two broad sets of factors viz. (i) the diet, which is the food consumed providing the body with the nutrients specific to the type of food, and (ii) the ability of the body to absorb, assimilate and utilise the nutrients of the diet. The latter depends on the activity level and environmental factors, including the ability to ward off the effects of infections and the ability to cope with stress situations. With balanced diet, by which is meant a combination of food items which supplies all the required nutrients, the physical and the mental status of the person is expected to remain in an ideal state. In such a state of health, it will be easier to cope with the complexities of health. The level of immunity enjoyed by an individual is a function of both inherent and acquired/developed factors of life. The level of immunity is an important factor of the health status of an individual. While the lack of food and improper nutritional contents results in conditions of malnutrition (and diseases of poverty), higher income associated with sedentary life styles cause diseases specific to energy-dense food consumption (e.g. obesity, diabetes, hypertension, cardio-vascular diseases, etc.). It is therefore necessary to maintain active and healthy habits in the life style of an individual. Knowledge of the interrelationships between nutrition and health tendencies is important for the allocation of resources in matters of public health policies.

It is important to recognise that there is considerable variation in the food intake among individuals of different sections within a country. Due to wide income inequalities and poverty, many people in developing countries are under-nourished. While some population groups face shortages of staple foods (e.g. cereals) that are necessary for meeting their energy needs, the quality of diet remains poor for the majority of the population. Falling environmental standards makes it difficult even

for the better off sections of the society to ensure the desired nutritional contents in the food they consume. High amount of fertilisers used, polluting the river waters with poisonous and highly toxic chemical wastes, air pollutants, etc. are making the air and food we consume deficient in their qualitative contents. They are becoming sources of many respiratory and gastro enteric diseases. While industrialisation and modernisation leads to increase in incomes and better standards of life, they are also accompanied by trends having adverse effects on health. The achievement of a favourable trade-off between the gains and the losses of such growth-induced changes is an important policy challenge of the modern times.

### **Barker's In Utero Hypothesis**

The developmental origins of adult disease, often called as the 'Barker hypothesis', states that adverse influences early in development, particularly during the intrauterine life, can result in permanent changes in the physiology and metabolism of adults. Such changes could result in increased disease risk in adulthood. This hypothesis originally evolved from observations made in some regions of England which had the highest rates of infant mortality in the early twentieth century. Follow-up of adults from the region decades later revealed that a number of them suffered from highest rates of mortality from coronary heart diseases. As the most commonly registered cause of infant death at the start of the twentieth century was low birth weight, these observations led to the hypothesis that low birth weight babies who survived infancy and childhood might be at increased risk of coronary heart disease later in life. These results have since been replicated in other studies from many different countries, some of them specifically focused on women.

In the 1980s, the 'foetal origins of adult disease' hypothesis got a new impetus when a link between the low birth weight and the incidence of cardiovascular disease was noted in many middle-aged men and women of U.K. Following this, there has been an emerging body of evidence from physiological, clinical and epidemiological studies. They support the 'Barker Hypothesis' that what happens during foetal development may be as important as the genetic makeup in determining the health of the infant. This evidence has led to the understanding that malnutrition in utero carries a far reaching impact on the future health of the newborn.

The Barker hypothesis outlines a mechanism by which the undernourished foetus adapts to its environment by undergoing changes in the body's structure, metabolism, hormonal sensitivity and physiology. While it thereby ensures the continued survival and growth of the foetus, there is also a compromise in the process. The disturbance in the nutrient balance results in intrauterine growth retardation (IUGR). In developing countries, the major determinants of IUGR are identified as: (i) inadequate nutritional status of the mother before conception; (ii) short stature of mothers indicating under-nutrition and infection during childhood; and (iii) low gestational weight of the foetus/child primarily due to inadequate diet of the mother particularly during the pregnancy period. The causes of IUGR are also attributed to: (i) deep rooted causes related to status of women in society; (ii) access to quality health care; (iii) sanitation; (iv) household food security; (v) education; and (vi) poverty. The foetal origin of disease theory has thus major implications on how nutritional interventions targeting towards specifically identified women should be approached. Investment in intervention to improve foetal growth and development not only will decrease the prevalence of IUGR, but will also prevent negative health outcomes throughout the life cycle. However, the intergenerational and intra-generational effects of longstanding poverty and nutritional deprivation on maternal and foetal health cannot be addressed by narrowly focussing on single nutritional interventions during a few months in pregnancy. It needs a strategy that comprehensively addresses targeting at different points in the life cycle.

**Check Your Progress 1**

- 1) Mention the five broad factors determining the health status of the people citing an example to show the inter-dependency among them.  
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- 2) What is meant by ‘demographic dividend’? Explain in 50 words.  
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- 3) What are the five macro/basic nutrients contained in food? Name two common micro-nutrients and the disease caused by their deficiency.  
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- 4) State the crux of the ‘Barker In Utero Hypothesis’. In what way is the concept behind this hypothesis important for achieving better health status of a community?  
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**18.4 POVERTY AND MALNUTRITION**

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Poverty and malnutrition are closely related. As noted before, many elementary aspects of being poor like hunger, inadequate health care, unhygienic living conditions, and the stress and strain of precarious living tend to reflect on a person’s nutritional status. In consequence, being poor almost always means being deprived of full nutritional capabilities i.e., the capabilities to avoid premature mortality, to live a life free of avoidable morbidity, and to have the energy for work and leisure. The study of poverty is thus very much a study of people’s state of under-nutrition.

Malnutrition refers to the two sides of nutritional imbalance viz. under-nutrition and over-nutrition. While the former usually characterises poverty, the latter refers to intake of energy dense food items (or overeating) which the body, in terms of its physical and mental activities performed, cannot metabolise completely. This leads to unburnt carbohydrates getting accumulated in the body as fats. Although a certain amount of fat, which serves as reserve energy is needed for the body, its excess tends to disturb the balance in the body system causing diseases specific to its accumulation (e.g. hypertension, diabetes, etc.). In the context of poverty, however, only aspects of under -nutrition are discussed. Under-nutrition is widely prevalent among the socially and economically deprived sections of the population around the world. It is associated with a cluster of related, often coexistent factors. These factors together constitute the ‘poverty syndrome’. The major attributes of this syndrome are: (i) income levels that are inadequate to meet the basic needs of food, clothing and shelter; (ii) diets that are often quantitatively and qualitatively deficient; (iii) poor environment, poor access to safe water, and poor sanitation;

(iv) poor access to health care; and (v) large family size and high levels of illiteracy, especially female illiteracy. Among the most undernourished population groups, these factors often coexist, though their relative severity and extent may vary in different locations. In the evaluation of under-nutrition, and in its progression and perpetuation, these factors often act synergistically (Gopalan, 1992).

The assessment of the magnitude of poverty has been discussed in the other units of the programme (Unit 4 of MEC 005). Here, we shall confine to discussing the assessment of under-nutrition only. Also, as under-nutrition is related to poverty, we shall consider under-nutrition as synonymous with 'malnutrition of the poor'. As said before, the magnitude of under-nutrition is generally assessed by comparing the food energy intake of persons with established norms. However, the widely accepted norms based on the intake of calories are not without debate. These norms require to be periodically reset in view of the changes in the life styles. It is also argued that the food energy intake is a poor measure of the nutritional status. This is because, health in its composite form, depends not only on the intake of certain amount of calories but also on the required nutrients. Further, it also depends on the non-nutrient attributes of the body which are outside the food and nutrition domain. It is noteworthy that some states in India with low food energy intake (e.g. Kerala, Tamil Nadu) have lower incidence of malnutrition compared to some states (e.g. Rajasthan and U.P.) which have higher per capita calorie intake but also higher burden of malnutrition. Further, in spite of a decline/stagnation in food energy intake across all classes in the 1990s in India, malnutrition has declined during this period. Studies have revealed that conditions of malnutrition depend on the conversion efficiency of food into energy which, in turn, depends on factors like access to safe drinking/potable water and the standards of environmental and personal hygiene habits. In view of this, it is hypothesised that severe malnutrition is attributable to inadequate diet while moderate to mild malnutrition could be due to environmental factors (Seckler, 1982). Increase in food intake would therefore reduce malnutrition only when other variables are controlled.

The implications of poverty and malnutrition for policy planning are significant. The effect of malnutrition on productivity carries serious implications for economic growth. Research has demonstrated a link between protein-energy malnutrition, iron-iodine deficiency, and lost productivity in adults. Children born to malnourished mothers or who are malnourished during childhood can suffer cognitive losses that are associated with lower productivity in adulthood. Malnourished children also place additional burdens on health and education systems. They need greater health care and more intensive teaching at school. Concerted efforts by planning are therefore needed to break the vicious circle of mother-child-mother malnutrition among the poor. Reduction of child mortality would depend on delivery of effective and sustainable interventions for children and mothers. Direct nutritional intervention is the short term answer for combating severe malnutrition. Broad-based, growth-supplementing and employment oriented food-for-work programmes are the principal instruments commonly adopted to reduce moderate malnutrition. Improvement of incomes of the poor and supply of environmental and health services are the long term solutions to the problem of malnutrition in general.

#### **18.4.1 Infectious and Chronic Diseases**

The most prevalent diseases of poverty, many of which are also infectious by nature, are malaria, tuberculosis, respiratory infections, water borne diseases and HIV/AIDS. In addition to having a large share of global disease burden in terms of these major infectious diseases, the low income countries are also characterised by the burden of chronic diseases like cerebro and cardio vascular disease, depression, diabetes, many physical disabilities due to low nutrient food intake, etc. The economic impact of HIV/AIDS is particularly worrisome due to its high global mortality (more than 80 per cent) occurring among the working age youths with the low income

countries of Africa and Asia bearing the burnt of this disease. The disease's impact on the labour force is heightened by its political significance. This is attributed to the massive diversion of resources away from fighting other diseases of poverty which exacerbates its economic consequences. This is also true of diseases prevalent among children like acute lower respiratory infections and diarrhoeal diseases. Referring to the impact of the high disease burden suffered in countries like those of sub-Saharan Africa, Jeffrey Sachs (2004), has argued for 'big push' in public investments in health. However, there are others who suggest that the impact of public spending on health in low income countries is very small. The burden from diseases in countries suffering most due to their high prevalence is thus compounded by the problem of the needed funds to overcome its economic consequences. There is then an additional aspect of inefficiency in public health deliveries. Major reasons cited for this in the low income countries are: (i) Public health bureaucracies are generally woefully inefficient and corrupt, especially in low income countries. As a result, the proportion of investment ending up actually reaching the beneficiaries is often very low. (ii) Social programmes that are nominally targeted at the low-income groups are frequently captured by the articulate and the influential rich.

#### **18.4.2 Environment and Health: Impact of Air and Water Pollution**

Environment includes a host of factors of which air and water are the two major components. Air pollution is caused by both natural and man-made sources. Major man-made sources of ambient air pollution include industries, automobiles, and thermal power generation. In indoor environment, tobacco smoke and combustion of solid fuels for cooking and heating are the most significant sources of air pollution. In addition, construction material, carpeting, and home cleaning agents like insecticides can also be significant sources of chemical and biological indoor pollutants.

Air pollution has both acute and chronic effects on human health. Health effects range from minor irritation of eyes and upper respiratory system to chronic respiratory diseases (e.g. lung cancer, heart disease). The respiratory ailments attributed to air pollution have been shown to cause acute respiratory infections in children and chronic bronchitis in adults. It has also been shown to worsen the condition of people with pre-existing heart or lung disease. Among asthmatics, air pollution has been shown to aggravate the frequency and severity of attacks. Both short-term and long-term exposures have been linked to premature mortality and reduced life expectancy.

Health impact of air pollution depends on the pollutant type, its concentration in the air, length of exposure, other pollutants in the air, and the susceptibility of the individual. Different people are affected by air pollution in different ways. Poor people, undernourished people, very young and very old, and people with pre-existing respiratory diseases are more at risk. In cities, poor people tend to live and work in most heavily polluted areas. In rural areas, poor are more likely to cook with dirtier fuels. In some countries, air quality standards tend to be more lax around industrial areas in cities where many poor live. Malnutrition, inadequate access to health services, etc. aggravate the susceptibility of poor to adverse health consequences of air pollution.

Air pollutants can also indirectly affect human health through acid rain. This is caused by polluted water with chemical substances evaporating to the atmosphere. This phenomenon, which is happening all over the world, is contributing to changes in the global climatic conditions. Such conditions are resulting in what has popularly come to be known as 'global warming' with the resultant variations causing the sea level to rise. Consequent to global initiatives in response to the health concerns of increasing air pollution, many countries have adopted tighter emission standards. This has helped in the levels of certain types of air pollutants to decline in many



developed countries. However, even at much reduced levels, air pollution continues to threaten public health in these countries. In developing countries, on the other hand, the ambient air pollution is a major health threat particularly in urban areas. Several factors contribute to the worsening air pollution which include rapid growth in urban population, increasing industrialisation, and rising demand for energy and motor vehicles. Other factors which add to the problem include: poor environmental regulation, less efficient production technologies, congested roads, and age and poor maintenance of vehicles.

The problem of air pollution in the rural areas of developing countries relates to indoor exposures due to the use of unprocessed solid fuels (biomass and coal) for cooking. These fuels are typically burned indoors in simple household cooking stoves, such as a pit, three pieces of brick, or a U-shaped construction made from mud. The fuels are thus burnt inefficiently with the resulting pollutants not vented out properly. High volumes of a number of health-damaging airborne pollutants are generated indoors, resulting in high exposures, especially to women who do the cooking and young children who stay indoors with their mothers. The individual peak and mean exposures experienced in such settings are often much greater than the safe levels recommended by international bodies (like the World Health Organisation: WHO). According to the 2002 World Health Report, indoor air pollution from combustion of solid fuels for cooking and heating is one of the eight most important risk factors in global burden of disease. In poor developing countries, indoor smoke from solid fuels ranks fourth (behind only under-nutrition, unsafe sex, and unsafe water/sanitation/hygiene) accounting for an estimated 3.7 per cent of the disease burden. Urban air pollution additionally accounts for 1.4 per cent of premature deaths and 0.8 per cent of the global disease burden. The estimates are based only on the impact of air pollution on mortality. They do not account for morbidity impact or specific disease centred health outcomes which are also associated with indoor smoke.

### **Health Impacts of Water Pollution**

It is well known that clean water is absolutely essential for healthy living. Although adequate supply of fresh and clean drinking water is a basic need, millions of people world-wide are deprived of this. Freshwater sources all over the world are threatened not only by over exploitation and poor management but also by ecological degradation. The main reasons for fresh water pollution can be attributed to discharge of untreated waste, dumping of industrial effluents, and run-off from agricultural fields due to the unscientific usage of pesticides and manures. Industrial growth, urbanisation and the increasing use of synthetic organic substances have serious and adverse impacts on freshwater bodies. Polluted water like chemicals in drinking water cause problems of health. Prevention of water-borne diseases therefore require taking measures both at the public and the household level.

Untreated or inadequately treated municipal sewage is a major source of water pollution particularly in developing countries. Sewage carry microbial pathogens which are the basic source of many diseases. Domestic waste water and industrial effluents contain phosphorus and nitrogen which increase the level of nutrients in water bodies. They cause eutrophication in the lakes and rivers resulting in ecological imbalance by destroying the aquatic bodies. The nitrates mainly come from the fertilizers used in agriculture. Excessive use of fertilizers cause nitrate contamination of ground water. Also, a large number of chemicals (lead, fluoride, chlorine, arsenic, etc.) either exist naturally in the land or are added due to human activity. They dissolve in the water thereby contaminating it. Diseases that are caused by the presence of such chemicals include: diarrhoea, skin irritation, reproduction disorders, nervous system damage, vascular diseases, etc.

Many diseases like cholera, hepatitis, amoebic dysentery, poliomyelitis, etc., are caused by water contamination. They are infectious spreading primarily through the

use of contaminated water. Though these diseases are spread through agents like flies, water is also one of the chief mediums for the causing of these diseases. They are therefore commonly termed as water-borne diseases. Due to their potential to spread widely, these diseases assume epidemic proportions and are basically attributed to improper management of water resources. Contamination of drinking water by microbial pathogens, chemical compounds or radiological agents has the potential to affect the health of millions of people. Good agricultural and industrial practices, proper management of water resources, regular checking of water pipes for leaks and cracks, boiling/filtering of water at home, etc., can contribute to maintaining a cleaner and healthier environment minimising the effects of ill health in the society.

### **18.4.3 Indicators of Disability Burden: QALYs/DALYs**

With the growing demand for health services, the question of allocating limited resources between alternative public programmes of differing objectives is of much concern to economic planners. An objective way of making such decisions is to rely on the economic efficiency of programmes. For this, quantitative indicators bringing out an assessment of disease burdens and the benefits realised due to medical interventions are needed. The quality adjusted life years (QALYs) and the disability adjusted life years (DALYs) are two such measures which have become popular recently.

Quality of life is a commonly used concept but has no universally accepted definition. It can be interpreted as the degree to which persons perceive themselves able to function physically, emotionally, and socially. In a general sense, it is the state of well being which makes life worth living. In a quantitative sense, it is an estimate of remaining years of life free of impairment, disability, or handicap. Quality of life has been measured in a number of different ways, ranging from more complex, multidimensional scales such as the SF-36 (8 subscales) to very simple, one-item instruments such as the Excellent/Very Good/Good/Fair/Poor (EVGGFP) measure. The latter measure, seemingly simple, has been found to carry high reliability and validity. Quality of life can be measured at a single point in time or over a period of time using measures like QALYs/DALYs.

#### **Quality Adjusted Life Years (QALYs)**

QALYs is a measure of the benefit of a medical intervention. It is based on the number of years of life that would be added by the intervention. Each year in perfect health is assigned the value of 1.0 down to a value of 0 for death. If the extra years would not be lived in full health, for example if the patient would lose a limb, or be blind or be confined to a wheelchair, then the extra life-years are given a value between 0 and 1 to account for this. QALYs are controversial as the measurement is used to calculate the allocation of healthcare resources based upon a ratio of cost per QALY. As a result, some people will not receive treatment as it is calculated that the benefits to their quality of life do not justify expenditures involved.

#### **Disability Adjusted Life Years (DALYs)**

DALYs is a measure for the overall 'burden of disease'. Originally developed by the World Health Organization (WHO), it is being increasingly used in the literature on public health. It is designed to quantify the impact of premature death and disability on a population by combining them into a single measure. Traditionally, health liabilities were expressed using one measure: expected or average number of 'years of life lost' (YLL). This measure does not take the impact of disability into account, which can be expressed as years lived with disability (YLD). DALYs are calculated by taking the sum of these two components: i.e., years of life lost plus years lost to disability or  $DALY = YLL + YLD$ .

The basic method of computing the DALYs is as follows. Suppose N is the number of deaths in a certain population and L is the standard life expectancy at age of death in years, then  $YLL = N * L$  (where the symbol \* stands for multiplication). Because YLL measures the incident on the stream of lost years of life due to deaths, an incidence perspective is also taken for the calculation of YLD. To estimate YLD for a particular cause in a particular time period, the number of incident cases in that period is multiplied by the average duration of the disease and a weight factor that reflects the severity of the disease on a scale from 0 (perfect health) to 1 (dead). If 'I' is the number of incident cases, DW the disability weight and L the average duration of the case until remission or death (in years), then  $YLD = I * DW * L$ .

Looking at the burden of disease in terms of DALYs can reveal surprising things about a population's health. For example, a 1990 WHO report indicated that 5 of the 10 leading causes of disability were psychiatric conditions. Psychiatric and neurologic conditions account for 28 per cent of all years lived with disability. Thus, psychiatric disorders, while generally not seen as a major epidemiological problem, are revealed by consideration of disability years to have a huge impact on populations.

Both the methods, QALY and DALY, are critiqued for their drawbacks. It is pointed out that studies using QALY as an indicator of health measures the benefits from a health programme in terms of the increment in health status over the period for which the intervention was effective. Thus, the QALY methodology inherently assumes that the entire change in the health status of an individual, before and after the implementation of the programme, can be attributed solely to the programme in question. However, non medical factors like income and education also contribute to the effect (i.e. impact on health) of a programme. Decisions regarding the inter-sectoral allocation of resources, which make the resources available to one sector at the cost of the other, are important from the policy angle. On the one hand, there is a possibility of improvement in the health status of individuals owing to increase in public expenditure on health programmes. On the other hand, such a policy choice will have an adverse effect on health owing to reduction in the allocation of funds for education, sanitation, etc. The measures, QALY and DALY, by disregarding the influence of such factors do not help in analysing the effectiveness of such a policy choice.

**Check Your Progress 2**

- 1) Give two reasons to indicate why food energy intake is a poor measure of nutritional status.

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- 2) What are the commonly recommended policy prescriptions to deal with the problem of malnutrition in an economy?

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- 3) What are the major reasons cited for the inefficient delivery of public health services in poor countries?

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- 4) What are the two indicators for measuring the quality of life and/or the disability burden? Which of the two is superior to the other and why?

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## 18.5 THE SOCIAL DETERMINANTS OF HEALTH

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In the last section, we have explored the relationship between poverty and ill-health. There are, however, several other factors, referred to as ‘social determinants’ which also have significant impact on the health status of the people. The four social determinants on which a WHO report (*The Solid Facts, WHO, 2003*) dwells are: unemployment, social exclusion, transportation and food.

**Unemployment:** That unemployment gives rise to social insecurity and psychological stress is well recognised. Fears and uncertainties are known to cause anxiety related illnesses. As such, whatever be the path of development and governance chosen, the central objective should be the maximisation of employment opportunities in the economy. The views of proponents as well as the opponents of market reform policies relating to the issue of unemployment in the light of its effects on health therefore merit discussion.

Short term unemployment becomes inevitable when the state dominated industries or economies are liberalised and restructured. The proponents of increased government’s role for mitigating the ill-health effects of unemployment suggest that one way of increasing the employment opportunities is to adopt measures by the state for smoothening out the highs and lows of the business cycle. The opponents of increased government role however argue against this approach and cite experiments world over that have revealed that such an approach would have a stifling effect on economic output, employment prospects and human health.

**Social Exclusion:** Given that absolute poverty is a major determinant of ill-health, the resultant social exclusion is ‘psychologically damaging, materially costly and harmful to health’ (WHO, *ibid*). The suggested path to cope with this is minimum wage legislation and labour market policies to reduce social stratification. Minimum wages set at a realistic level do little harm during times of prosperity. However, when the economy is slowing down, employers first of all shed marginal workers (e.g. unskilled workers, those with disabilities, etc.). Austerity measures taken may also be by way of reduced holidays, rest breaks, pensions and other work place benefits. This will have the effect of adding to the work related stress. The suggestion made to deal with situations of social exclusion includes expansive welfare provision. However, there is evidence that such provisions created unemployment and poverty (in U.K.) contributing to breakdown of family structures (Bartholomew, 2004). Social exclusion can instead be addressed by introducing public policies that empower the poor and the marginalised. For instance, state financed educational vouchers give the poor the choice of attending any school forcing providers of education to compete to attract the students and their vouchers.

**Transport:** Rising worldwide incomes have led to a massive use of automobiles and in particular cars. Cars are seen as a threat to health because of their links to obesity, air pollution and traffic accidents. Some health experts call for a wide range of government interventions designed to limit the use of cars, encourage alternative forms of transport (ranging from building cycle lanes to turning current roads into green spaces). Alternative methods like allowing cars with even numbered plates to ply on certain days and odd numbered plates on others, auctioning the

permission of buying cars to the highest bidder, etc. are followed in some countries. The argument comes down to restricting the use of cars. However, it could also be argued that motor vehicles are an important tool of economic growth enabling goods and labour to be transported quickly and cheaply. They also enable isolated communities to participate in national or regional economy. They are thus valuable as a tool of social cohesion allowing families to stay in contact even while staying hundreds of miles away. The economic and social consequences of motor transport cannot therefore be ignored.

An yet another suggestion made to minimise the threat to health by motorised vehicles is that planning regulations be tightened to stop the growth of low density suburbs and out of town supermarkets. The argument once again is that they increase the dependency on cars. Once again, such arguments are critiqued on the ground that they affect poor indirectly. For instance, restrictions on suburban development will constrain the housing supply, leading to rise in both general price level and the rental prices. Also, restricting the ability of retailers to operate from out-of-town locations where land is cheaper will stimulate price inflation in city centres. The higher rents will be passed on to consumers via price rises. Again, these will hit the poor the hardest. A range of alternatives are available to reduce the health consequences of air pollution. For instance, encouraging free trade in motor vehicles by eliminating import tariffs will incentivise local industries to produce better cleaner fuels. Traffic and congestion on roads increase when roads are used as a 'free good'. The harmful effects of air pollution can be curbed by better roads allowed to be used against 'road pricing'. In cities where road pricing schemes have been implemented (as an alternative to road tax), this has led to more rational use of limited road space.

**Food:** The twin paradox of food i.e., research showing excessive intake can lead to a variety of diseases whilst at the same time food poverty being a pressing issue in many regions has rendered 'food' to become a political issue. It is held that because food is bought and sold by private actors, government agencies must intervene to help regulate supply and demand thereby removing the distortions that have set in food market. Others, however, argue that it is the unhealthy intervention of the governments by way of 'tariffs, quotas, and other trade restrictions' that have created distortions in the food market. An important instrument used by the governments is the granting of subsidies. Subsidies in wealthier countries reduces the cost of food in the global markets. In other words, besides subsidies being an antithesis of a functioning market, such subsidies have harmed unsubsidised farmers in Asia, Latin America and Africa who cannot compete with the price distortions effected by such massive subsidies.

### Check Your Progress 3

- 1) Mention the four factors considered as 'social determinants' having an impact on the health status of the population. Mention also one proven factor/measure which can result in macro economic stability in the economy with its resultant health benefits.

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- 2) Mention how transport is regarded as detrimental to health of the people. Indicate how the same can be argued to promote better social cohesion and health (limit your answer to 50 words)

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## 18.6 LET US SUM UP

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Economic development positively promotes the health status of the population. The relationship between economic growth and health is non-linear. The shape of the curve indicates that beyond a stage, economic growth does not yield additional benefits to health particularly in terms of its broad indicators like life expectancy. But nutritional contents in the food consumed and health services which can be accessed would influence the health status of population progressively. Poverty and malnutrition are strong determinants of ill health. For attaining better health status of the population, it is important to focus on the female population, particularly on those who are on the fringes of social strata. The approach is aimed at ensuring the development of the foetus while it is still 'In Utero'. Failing this, poverty and malnutrition can stifle economic growth and also impose critical burden of diseases. The economic consequences of such a situation can be enormous in terms of health and educational expenditures. QALYs and DALYs are two indicators which have been developed to serve as quantitative indicators of disease burden. There is an indication that with growth and prosperity, both income inequalities and health inequalities will increase. This relationship holds good for both the rich and the poor countries alike. Although this trend gives rise to the view that achieving income equalities is equally essential, the exact relationships and the processes that cause them are far more complex to arrive at a clear conclusion.

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## 18.7 KEY WORDS

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<b>DALY</b>	:	DALY is a measure of overall burden of disease. It is a health gap measure that extends the concept of potential years of life lost to include equivalent years of 'healthy' life lost. DALY thus combines in one measure the time lived with disability and the time lost due to premature mortality.
<b>Externality</b>	:	A case in which a consumer (producer) affects the utility (costs) of another consumer (producer) through actions which lie outside the price system. Any cost external to the activity that created it is called an externality. Positive externality refers to benefits received by individuals not involved in the transaction creating the benefits. Negative externality is the cost borne by individuals not involved in the transaction creating the costs.
<b>Health/Health Status</b>	:	Measures of the physical and emotional well-being of an individual or a defined population. Mortality and morbidity rates are often used to measure health status.
<b>Mortality Rate</b>	:	The death rate for a particular population.
<b>Morbidity Rate</b>	:	The rate of incidence of disease in a particular population.
<b>QALY</b>	:	QALY is a measure of the benefit of a medical intervention.

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## 18.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

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### Check Your Progress 1

- 1) Income and social status, education/gender, social support networks, physical environment and genetics/hereditary factors.
- 2) The concept of 'demographic dividend' is related to shifts in demographic structure of a population which results by way of children surviving to adulthood as a consequence of better health services becoming available. This also results in increased proportion of economically active to dependent people.
- 3) The five broad nutrients are: carbohydrates, fat, protein, vitamins and minerals. Iron and iodine are two micro nutrients the deficiency of which causes the diseases of anaemia and goitre respectively.
- 4) The Barker's hypothesis states that adverse influences early in the intrauterine life can result in permanent changes which could result in increased disease risk in adulthood. The concept behind the hypothesis stresses the need to focus on medical and nutritional supplementary interventions of women who are malnourished. Such a focused approach facilitates the process of attaining better health status of both the undernourished mother and the child thereby contributing to the health of the community/population.

### Check Your Progress 2

- 1) One, health in its composite form, depends not only on the intake of nutrients but also on the non-nutrient attributes of the body. Two, other factors like safe drinking water, environment, etc. also contribute to the nutritional status i.e. the ultimate nutrition level absorbed by the body. Thus, intake measured in terms of calories alone is an insufficient measure of malnutrition.
- 2) Direct nutritional intervention for targeted women is the short term answer for addressing severe malnutrition. Broad-based, growth-augmenting and

employment-oriented food-for-work programmes is an answer to address moderate malnutrition.

- 3) See 18.4.1 (last para) and answer.
- 4) QALY and DALY are the measures for assessing the disability burden. Of the two DALY can be considered superior to QALY because of the following two reasons: (i) QALY measures only the benefit of a medical intervention: it is thus limited in its scope; (ii) DALY accounts for two factors viz. the years of life lost and years lived with disability.

**Check Your Progress 3**

- 1) Unemployment, social exclusion, transportation and food.
- 2) See 1<sup>st</sup> para of the sub-section on ‘transport’ (in section 18.6) and answer.