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SEMESTER - I

ECONOMICS

BLOCK 2

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CONTENTS

		Page No:
UNIT 11 :	**Industry and Development** Growth of Indian Industry during the Planning Period; Industrial Policies in India; Problems of Industrial Development in India; Role of Industries in Developing Countries	**179-190**
UNIT 12 :	**Infrastructure and Development** Meaning and Features of Infrastructure; Role and Importance of Infrastructure; Public-Private Partnership: Meaning of Public-Private Partnership in Infrastructure Projects, Advantages of PPPs, Why PPPs have become Attractive to the Governments?, Limitations of PPPs, Models of PPP; Role of Public-Private Partnership in Infrastructure: PPPs in India: Recent Scenario, Government Initiatives to Encourage PPP	**191-207**
UNIT 13 :	**Planning in Development** Rationale for Planning: Market Failure, Resource Mobilisation and Allocation, Psychological Factors, Foreign Aid; Plan Models: Elements of Planning Models, Types of Planning Models; Aggregative and Inter-Sectoral Model: Cost Benefit Analysis, Social Profit, Calculation of Social Profitability, Setting Objectives, Computation of Shadow Prices and Social Discounting Rates, Decision Criteria of Choosing Projects, Planning Models and Plan Consistency; Project Evaluation; Failure of Planning; Planning in a Market Oriented Economy	**208-223**
UNIT 14 :	**Social Sector and Economic Development** Education and Health in Economic Development: Education and Economic Development: Some Empirical Findings, Schultz's Analysis of Expenditure on Education and Income, Consumption Benefits of Education, External Benefits of Education, Education, Inequality and Poverty, Linkage between Health and Economic Development; Morbidity vs Mortality; Assessment of Health Status in Terms of Disability-Adjusted-Life-Years (DALYs); Analysis of Disease Burden; Epidemiological Transition Theory of Development	**224-249**
UNIT 15 :	**Environment and Development** Environment and Economic Development: The Basic Issues; Concept of Sustainability and Environmental Accounting; Growth vs Environment; Impact of Economic Development on Environment; Gender, Environment and Poverty: The GEP-Index of Vulnerability	**250-266**

BLOCK INTRODUCTION

This is the second block of the course on Economics of Development. In the previous block, we have studied the first 10 units of the course. This block contains the remaining five units of the course, i.e., from unit 11 to 15. Unit 11 is on industry and development. Here, growth of Indian industry during the planning period has been discussed. Further, industrial policies in India, problems of industrial development in India as well as the role played by the industries in the developing countries have also been discussed. Unit 12 has been entitled *Infrastructure and Development*. Here, we have discussed meaning, features, role and importance of infrastructure. Apart from these, the concepts of public-private partnership as well as its role in infrastructure development has been discussed with special reference to India. Unit 13 deliberates on planning in development. Here, the rationale for planning, the concepts of market failure, resource mobilisation and allocation, cost-benefit analysis, social profit, calculation of social profitability as well as the decision criteria of choosing projects, different planning models and the role of planning in a market oriented economy have been discussed. Unit 14 has been entitled *Social Sector and Economic Development*. In this unit, we have discussed the role of education and health in economic development. Some of the important concepts discussed in the unit includes: Schultz's analysis of expenditure on education and income, consumption benefits of education, external benefits of education, linkage between health and economic development as well as morbidity and mortality. Further, the concepts of DALYs, analysis of disease burden and the epidemiological transition theory of development have also been discussed. The last unit of the course, i.e., the fifteenth unit of the course deliberates upon environment and development. Here, the linkage between environment and economic development has been discussed. Apart from that, the concepts of sustainability and environmental accounting, growth vs environment, impact of economic development on environment as well as the relationship between gender, environment and poverty have been discussed with a reference to the GEP-index of vulnerability.

Thus, all the 15 units of the course shall provide you a foundation for the understanding the important theories, issues and debates in the field of Economics of Development.

While going through a unit, you will notice some along-side boxes, which have been included to help you know some of the difficult, unseen terms. Some "ACTIVITY' (s) have been included to help you apply your own thoughts. Again, we have included some relevant concepts in "LET US KNOW" along with the text. And, at the end of each section, you will get "CHECK YOUR PROGRESS" questions. These have been designed to self-check your progress of study. It will be better if you solve the problems put in these boxes immediately after you go through the sections of the units and then match your answers with "ANSWERS TO CHECK YOUR PROGRESS" given at the end of each unit.

UNIT 11: INDUSTRY AND DEVELOPMENT

UNIT STRUCTURE

11.1 Learning Objectives

11.2 Introduction

11.3 Growth of Indian Industry during the Planning Period

11.4 Industrial Policies in India

11.5 Problems of Industrial Development in India

11.6 Role of Industries in Developing Countries

11.7 Let Us Sum Up

11.8 Further Reading

11.9 Answers to Check Your Progress

11.10 Model Questions

11.1 LEARNING OBJECTIVES

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

- discuss the growth of Indian industries during the plan period
- discuss the different programmes and initiatives for industrial development under the Plans
- study about industrialisation in India in the light of new economic policy regime
- describe the role of Industries in developing countries.

11.2 INTRODUCTION

The industrially advanced countries are usually referred to as developed countries whereas agricultural countries are considered developing/underdeveloped countries. Though this is a myth, this distinction is usually found to be true and there industrially developed countries are seen to grow faster. Industries provide a market for both producer and consumer goods from other sectors of the economy. In case of producer goods, industries buy raw materials from the primary sector and services from the tertiary sector; at the same time, industrial workers buy consumer

goods from the other sectors. Thus, by providing a market to these sectors, industries facilitates development of a country.j

Under British rule, India became stagnant in terms of industrial development. However, after independence, Five Year Plans were formulated which started giving priority to the industrial sector.

11.3 GROWTH OF INDIAN INDUSTRY DURING THE PLAN PERIOD

India was industrially well advanced compared to western countries before the advent of the British rulers. But during their tenure, there were no effort to develop large scale industries and thus India became a colony supplying raw materials to the manufacturing industries of the British. India's first Prime Minister, Pandit Jawaharlal Nehru, considered industrialisation as the key to poverty alleviation. He realised that industrialisation would not only lead to self sufficiency but also enable him to regain political sovereignty and the economy would benefit from external economies accruing from technical progress.

The Planning Commission set up in 1950 has been formulating Five Year Plans for India's development taking an overall view of the needs and resources of the country. The **First Five Year Plan (1951-1956)** did not put much emphasis on industrialisation. However the **Second Five Year Plan (1956-1961)** aimed at achieving rapid industrialisation of the country and focussed on the growth of basic and heavy industries. Based on the Mahalanobis Model, the Second Five Year Plan started the task of establishing basic and capital goods industries on a large scale. Three steel plants of one million tonnes capacity were set up in the public sector at Bhilai, Rourkela and Durgapur in addition to modernisation programmes undertaken for private sector industries. The **Third Five Year Plan (1961-1966)** carried forward the process by giving emphasis on expansion and diversification of capacity of the heavy industries. In the Third Plan, 20.1 percent of total expenditure was for industry. The Indian economy was in a bad shape at the end of the Third Plan and instead of the Fourth Plan, three Annual Plans were initiated. Not much development took place during

the **Fourth (1969-1974)** and **Fifth Plans (1974-1978)**. The Fourth Plan was launched during the Indira Gandhi government. The economy was passing through a period of drought, devaluation and inflationary recession along with population explosion, increased unemployment and poverty. During this time, the Indo-Pakistani War of 1971 and Bangladesh Liberation War took place. And the funds earmarked for this Plan for industrial development had to be used for war effort. The Oil Crisis of 1973 led to high rise in the price of oil and fertiliser prices leading to very high inflation. The main stress during the Fifth Plan was rapid growth of steel plants, export-oriented articles and goods of mass consumption. The steel plants at Salem, Vijaynagar and Vishakhapatnam were proposed to create additional capacity. The Steel Authority of India (SAIL) was constituted during this period. During the Fifth Plan, against the targeted growth rate of 8.1 per cent in the industrial sector, the annual growth rate was only 5.3 per cent. The main factors responsible for this slow growth of industrial production were- lack of capacity in industries, shortage of power, transport and fuel, unremunerative administered prices and poor management. The **Sixth Five Year Plan (1980-1985)** was undertaken the time of Prime Minister Rajiv Gandhi. He emphasised on industrial development, especially on the information technology sector. Science and technology made significant advance during this period. One of the major hindrances in the way of development during this Plan was the boom in Indian population. However, after several successful programmes and investments on improvement of health care, infant mortality reduced and life expectancy increased. The objective of the **Seventh Plan (1985-1990)** was to achieve growth with social justice and to improve productivity. This Plan provided an investment of Rs 22,406 crore, i.e., 12.5 per cent of the total Plan outlay, in the industrial sector. To promote industrial production, emphasis was put on easing infrastructural constraints, liberalisation of industrial licensing policy and other regulations and provisions for rapid development of industries. The Plan achieved a growth rate of 8.5 per cent against the target growth of 8.7 per cent. The factors which helped in better industrial growth include better infrastructure, changes in licensing policies and

procedures, import of technology and capital goods, better utilisation of installed capacities, etc. Due to political turmoil at the centre, fiscal imbalances and also due to global economic changes, the **Eighth Five Year Plan (1992-1997)** could not take off in 1990. Instead 1990-1991 and 1991-1992 were treated as separate annual plans. The Eleventh Plan was launched immediately after the initiation of structural adjustment policies and macro; hence the main thrust of this Plan was to improve efficiency in production and a review of public sector enterprises to improve efficiency. From the Eighth Plan, the private sector started playing an increasingly important role. After the initial setback of the industrial sector in 1992-93, from 1993-1994 to 1996-1997, the industrial production increased at the rate of 8.6 per cent per annum. The target for industrial growth in the **Ninth Plan (1997-2002)** was 8.2 per cent per annum. The main focus of the Plan was on building adequate infrastructural facilities. Further, to increase foreign direct investment, the Plan proposed to increase the number of industries in which automatic approval was granted. Steps were taken to increase the number of industries in backward areas. The Plan also took steps for industrial development of North Eastern Region. The Public Sector Enterprises (PSEs) were divided into three categories-

i. Profit makin PSEs,
ii. PSEs making only marginal profits and losses, and
iii. PSEs incurring substantial losses.

The first category would receive increased financial and managerial autonomy; the second category was to be given limited budgetary support to enable them to stand on their own feet; and hard steps would be taken in case of the third category. In respect of small-scale industries, the Ninth Plan advocated dereservation. The Plan proposed a number of steps to solve the problem of credit shortage of these industries. However, the performance during the first two years, i.e., during 1997-1998 and 1998-1999 fell short of the projected average growth. Very little progress was made in respect of several areas of industrial reforms including disinvestment of PSEs, closure of nonviable PSEs, etc.The **Tenth Five Year Plan (2002-2007)** proposed a growth rate of 10 per cent for the

industrial sector. The Plan put emphasis on modernisation and upgradation of technology and on balanced regional development. For balanced industrial development, special industrial policy packages were announced for Uttaranchal, Himachal Pradesh, Jammu & Kashmir and North East States. Other steps taken during this Plan include creating investor-friendly climate, evaluation of Growth Centre Scheme, quarterly per-formance review, experience sharing between states, identification of frontier technologies nano tech-nology, information and communication technolo-gies, formulation of National Export Insurance Ac-count for Project Exports and testing facilities in Auto Sector. However, the economy rate of only 5.9 per cent during the Plan period. At the time of the Eleventh **Five Year Plan (2007-2012)**, the economy was in a relatively better position because of the progress achieved in many sectors of the economy, mostly because of the emergence of a strong middle class and new entrepreneurs, reforms in different spheres, and Private-Public Participation (PPP) projects. Emphasis was on agriculture, improvement on health and education and increasing role of the private sector. India had an average annual economic growth rate of 8 percent during the Eleventh Plan compared to the targeted 9 per cent. And the growth rate of industrial sector stood at 7.2 per cent against the target growth rate of 10-11 per cent. The main objective of the **Twelfth Five Year Plan (2012-2017)** is on 'inclusive growth' which means a simultaneous development of agriculture, education, health, industry, social welfare.



CHECK YOUR PROGRESS

Q 1: When was the First Five Year Plan implemented in India? (Answer in around 20 words)

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Q 2: On which model was the Second Plan based? (Answer in around 20 words)

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Q 3: What were the problems facing India during the implementation of the Fourth Plan? (Answer in around 50 words)

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LET US KNOW



As per Industry Resolution, 1956, 17 industries were reserved for public sector. But the New Industrial policy 1991 reduced the number of such industries to 8 including arms and ammunitions, atomic energies, mineral oils, coal and ignite and rail transport. At present only 3 industries are reserved exclusively for public sector in India. They are - atomic energy, minerals specified in the schedule to the atomic energy (control of production and use order) 1953, and rail transport.

11.4 INDUSTRIAL POLICIES IN INDIA

At the time of independence, India had an extremely underdeveloped and unbalanced industrial structure. There were a few industries like cotton textiles, jute and sugar but no basic, heavy and capital goods industries. After independence, the Government of India undertook several steps for rapid development of capital goods industries. The major objectives of industrial policies undertaken were-

- Rapid industrial development of the country,
- A balanced industrial structure,
- Prevention of concentration of economic power,
- Balanced regional growth of the country.

The Industrial Policy of 1948, which was the first industrial policy statement of the Government of India, was changed in 1956 to a public sector dominated industrial development policy which continued till 1991 with some minor modifications and amendments in 1977 and 1980. It

was only in 1991, various changes were made in the industrial policy of 1956. The New Industrial Policy of 1991 is the foundation of industrial development at present.

The pre 1991 industrial policies created the climate for rapid industrial growth in the country. At the time of independence, the consumer goods industry constituted half of industrial production whereas in 1991, it fell to about 20 per cent. Whereas capital goods industries went up to 24 per cent in 1991 of total industrial production from 4 per cent at the time of independence. Over the years, the Government built up infrastructure required by the industrial sector and made investments for power, communication, roads, etc. however, the industrial licensing practised led to inefficiency and corruption. Although the Government announced a number of liberalisation measures in 1970 and 1980, it was only in the industrial policy of 1991 that dramatic liberalisation efforts were made.

The Industrial Policy of 1991 emphasised on substantial economic growth and integration with the global economy. This Policy reduced the industrial licensing requirements, removed restrictions on investment and expansion, and facilitated easy access to foreign technology and foreign direct investment.

11.5 PROBLEMS OF INDUSTRIAL DEVELOPMENT IN INDIA

Despite more than six decades of the formulation and implementation of Indian planning, changes in industrial policies, industrial development cannot be said to be satisfactory in India. There are a number of factors causing problems to the industrial development in the country, some of which are mentioned below:

- **Poor infrastructure:** One of the major constraints of industrial development in India is poor quality and high cost infrastructure particularly power and transport network. Infrastructural constraints not only adversely affect industrial growth but also reduce the competitiveness among the industries.

- **Under utilisation of capacity:** There are vast differences in the estimated capacity and actual capacity in the Indian industries. These gap varies from 20-30 to 60-70 percent. Therefore, there exists under utilisation of the capacity of the industries. This leads to underutilisation.
- **Poor performance of public sector:** During the Plan period there has been substantial efforts to develop the industrial sector, which were mostly concentrated on public sector industries. But the performance of public sector enterprises were not good as they are not governed by only profit motives; rather they are liable to fulfil certain socio economic objectives which may even incur losses.
- **Growth of regional imbalance:** Industrial development in India has occured in a few states while large number of states continues to lag behind.
- **Sickness caused by Administrative and Bureaucratic Complexities:** Before liberalisation, there were more interferences and restrictions for the industries. Even after liberalisation, numbers of industries are sick due to bad and inefficient management.



CHECK YOUR PROGRESS

Q 4: What are the main objectives of Industrial Policies in India? (Answer in around 30 words)

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Q 5: State two striking features of the Industrial policy of 1991. (Answer in around 30 words)

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11.6 ROLE OF INDUSTRIES IN DEVELOPING COUNTRIES

Industrialisation plays a very important role in economic development of a country. In fact establishment of industries is a pre

requisite for economic development as the history of advanced countries reveal. Share of industrial sector should increase compared to agriculture during the development process. Policy framework in favour of industrialisation results in benefitting the industrial sector; these benefits are likely to trickle down to the other sectors which leads to increase in employment, output and income.

Even agriculture dominated economies, need industrial development for proper and adequate supply of fertilisers, farm machinery and other inputs to increase the efficiency. Use of modern techniques and sophisticated equipments can increase the productivity of agriculture, leading to an increase in the per capita output of the farm sector.

Industrialisation is necessary to provide employment to the underemployed, disguised unemployed and seasonal unemployed who are engaged in the agriculture without making any addition to the per capita production. Thus industries can work as an alternative avenue for those disguised and seasonal unemployed commonly seen in the LDCs.

Industrialisation works as the bridge between the rural stagnant economies and the urban dynamic economy. It also creates multi skilled nature of works and division of labour based on skill and training.

In developing countries, there is a frequent fluctuation in the prices of primary goods due to their nature of demand and durability. This issue can be addressed by industrialisation, which creates demand for the primary perishable goods and convert them into manufacturing goods which are mostly non perishable.

Industries also play an important role in supplementing export of the developing countries. The less developed countries (LDCs) need a sizable export to maintain a proper balance of trade. Unless industrial development, they cannot increase their export volume.

Thus, industries are important in the developing countries for utilisation of natural resources, balanced sectoral development, and increase in job opportunities and also as a supplementary industry to the agriculture sector.

It is seen that industries are very important to develop in the developing countries for rapid economic development. It is not to be considered as the substitute to the agricultural sector; rather, both the sectors are complimentary to each other. Industrialisation is the key to bring diversification to the economy of the LDCs. However, there should be regional balance in industrial development for equal development of the country and also emphasis has to be put on the capacity utilisation so that all the categories of industries grow in a equitable manner.

Rapid and indiscriminate industrial growth has some negative impact which may affect development adversely. Some hazardous industries or even ill maintained normal industries create pollution reducing productivity of the other factors including land.

Thus, while undertaking policies for industrialisation of a country, proper care should be taken so that it does not lead to regional imbalance or adversely affects the sustainable development goals.



11.7 LET US SUM UP

- Many development thinkers identify industrially advanced countries as developed and agriculture dominated countries are underdeveloped.
- Being a developing country, India has been emphasising on industrial development right from the independence.
- During planning regime there were some initiatives right from the First Plan which started in 1951
- In line with the liberalisation measures, the Government announced the New Industrial policy 1991, which emphasised on the important role of private sector industries. Except the fields where there is security question is not important, private sector was encouraged. Public sector is expected to concentrate only on basic and core sectors.
- Different phases can be identified throughout the plan period in terms of industrial growth and pattern in India.
- The Industrial Policy 1948, which was the first in independent India, was replaced by Industrial Policy Resolution, 1956, which brought major changes in the industrial structure of the country.

- The prime objective of the New Industrial Policy, 1991 was to "unshackle the Indian industrial economy from the cobwebs of unnecessary bureaucratic controls".
- There are number of factors causing problems to the industrial development in the country such as poor infrastructure, under utilisation of capacity, poor performance of public sector enterprises, regional imbalances, etc.

11.8 FURTHER READING

1) Dhar, P.K. (2013). *Indian Economy-Its Growing Dimensions.* Ludhiana: Kalyani Publishers.
2) Jhingan, M.L. *The Economics of Development & Planning.* New Delhi: Konark Publishers Pvt. Ltd.
3) Puri, V.K. & Mishra S.K. *(*2016). *Economics of Development and Planning.* New Delhi: Himalaya Publishing House.
4) Puri, V.K. & Mishra S.K. (2016). *Indian Economy - Its Development Experience.* New Delhi: Himalaya Publishing House.
5) Raj, F., Mukherjee, M., Ghose, A. & Nag, R.N. (2011). *Contemporary Development Economics.* Kolkata: New Central Book Agency (P) Ltd.

11.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The First Five Year Plan was implemented in India in 1951 and continued till 1956.

Ans to Q No 2: The Second Plan was based on the Mahalonobis Growth Model which emphasised on rapid industrialisation of India.

Ans to Q No 3: The Fourth Plan was launched during the Indira Gandhi government. The economy was passing through a period of drought, devaluation and inflationary recession along with population explosion, increased unemployment and poverty. During this time, the Indo-Pakistani War of 1971 and Bangladesh Liberation War took place. And the funds earmarked for this Plan for industrial development had to be used for war effort. The Oil Crisis of 1973 led to high rise in the price of oil and fertiliser prices leading to very high inflation.

Ans to Q No 4: The major objectives of industrial policies in India are:

1. Rapid industrial development of the country,
2. A balanced industrial structure,
3. Prevention of concentration of economic power,
4. Balanced regional growth of the country.

Ans to Q No 5: The Industrial Policy of 1991 emphasised on substantial economic growth and integration with the global economy. This Policy reduced the industrial licensing requirements, removed restrictions on investment and expansion, and facilitated easy access to foreign technology and foreign direct investment.



11.10 MODEL QUESTIONS

Short Questions (Answer each question in around 150 words).

Q 1: State the constraints for the industrial development in India.

Q 2: How industry can be complementary to the agriculture sector? Discuss in brief.

Long Questions. (Answer each question in around 300-500 words)

Q 1: Describe the industrial growth during the plan in India

Q 2: How did the pattern of Indian industrial structure change throughout the plan period in India?

Q 3: Since which plan New Industrial Policy was announced? Justify the reason for recent short fall of target to achieve for industrial growth.

Q 4: Explain the role of industries in developing countries?

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UNIT 12: INFRASTRUCTURE AND DEVELOPMENT

UNIT STRUCTURE

12.1 Learning Objectives

12.2 Introduction

12.3 Meaning and Features of Infrastructure

12.4 Role and Importance of Infrastructure

12.5 Public-Private Partnership

- 12.5.1 Meaning of Public-Private Partnership in Infrastructure Projects
- 12.5.2 Advantages of PPPs
- 12.5.3 Why PPPs have become Attractive to the Governments?
- 12.5.4 Limitations of PPPs
- 12.5.5 Models of PPP

12.6 Role of Public-Private Partnership in Infrastructure

- 12.6.1 PPPs in India: Recent Scenario
- 12.6.2 Government Initiatives to Encourage PPP

12.7 Let Us Sum Up

12.8 Further Reading

12.9 Answers to Check Your Progress

12.10 Model Questions

12.1 LEARNING OBJECTIVES

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

- outline the role and importance of infrastructure
- put forward the meaning of public-private partnership and discuss its features
- evaluate the role of public-private partnership in the development of infrastructure.

12.2 INTRODUCTION

Infrastructure is considered the back bone of Economic

Development of a country. Infrastructure playsan important role in economic growth of a country. Infrastructure refers to the facilities, activities and services which support the operation and development of all sectors of the economy. The prosperity of a country depends directly upon the level of infrastructure in the country. However, development and maintenance of infrastructure is not an easy task. A lot of investment and expertise are needed. In the recent times, the private sector has been engaged in the development and maintenance of infrastructural facilities. Broadly termed as 'Public-private partnership' or 'PPP', these arrangements have played a major role in the development and maintenance of infrastructural facilities in countries all over the world. In this unit, we shall discuss the importance of infrastructure in the economy. Finally, the role of PPP in the process of infrastructure development will also be examined. seen to grow faster. Industries provide a market for both producer and consumer goods from other sectors of the economy. In case of producer goods, industries buy raw materials from the primary sector and services

12.3 MEANING AND FEATURES OF INFRASTRUCTURE

Infrastructure provides supporting services in the main areas of industrial and agricultural production, domestic and foreign trade and commerce. These services include roads, railways, ports, air ports, dams, power stations, oil and gas and pipelinesand so on.

So, Infrastructure is an umbrella term for several activities. Because Infrastructure services include all types of public works like railways, roads, major irrigation works and public utilities like power, Telecommunication health-etc.

Infrastructure contributes the process of growth and development of a country in the following heads:

- Infrastructures such as power, water, transport, communication etc. are used as inputs for production in the directly productive sector.
- Infrastructures raises productivity.

- The availability of infrastructural facilities encourages investments. Generally, level of investment of a Country or a region remains low due to the under development of infrastructure.

We cannot think modern living withoutthe infrastructure facilities like transportation, communications, education and health. The Infrastructures of education and health can produce literate and healthy population.

Important Features of Infrastructure: Some of the distinctive features of infrastructure are:

- The building of infrastructural facilities require large and lumpy investment and they contribute to output, after a long time that is their gestation period is quite long.
- Due to large overhead capital and lumpy investment, the significant economies of scale are found in most of them. Due to the significant economies of scale found in many infrastructure services, they have the characteristics of natural money.
- Infrastructure facilities create externalities.For example, building of rural roads will benefit agriculture as the farmers are able to sell their products in towns where they can get remunerative prices. Besides, they can get some inputs such as fertilisers, pesticides and other industrial products at relatively cheaper prices as their transport costs decline due to improved transportation. Power plants generate both positive and negative externalities. The construction of power plants produces electricity which is used for industrial helps production and commercial use and thereby helps in acceleration of economic growth. A power plant also produces negative externalities in the form of emission of pollutants, especially CO2.

The above features of infrastructure suggest that competitive market system will not be able to achieve a socially optimal level of infrastructural services in most of the cases. Besides, in many of infrastructural facilities, there are significant economies of scale and therefore they have the features natural monopoly. In other words, we find market failure to achieve their socially optimal level.

Therefore, these infrastructural facilities are either built or run by the government and public sector enterprises or if private sector is permitted to make investment in them and run them, they need to be regulated by the government, so that they should not exploit the consumers.

12.4 ROLE AND IMPORTANCE OF INFRASTRUCTURE

Infrastructure plays an important role in the social and economic development of a country. It is often said that concrete, steel and fiber-optic cable are the essential building blocks of the economy. Infrastructure enables trade, powers businesses, connects workers to their jobs, creates opportunities for struggling communities and protects the nation from an increasingly unpredictable natural environment. From private investment in telecommunication systems, broadband networks, freight railroads, energy projects and pipelines, to publicly spending on transportation, water, buildings and parks, infrastructure is the backbone of a healthy economy.

Not only that. Important national goals also depend on it. The economy needs reliable infrastructure to connect supply chains and efficiently move goods and services across borders. Infrastructure connects households across metropolitan areas to higher quality opportunities for employment, healthcare and education. Clean energy and public transit can reduce greenhouse gases. This same economic logic applies to broadband networks, water systems and energy production and distribution.

The expansion in infrastructure facilities such as irrigation, rural electrification, roads and road transport will promote agricultural growth and setting up of agro-processing industries. These general infrastructure facilities will help farmers and owners of processing industries to get their requirements of raw materials, fertilizers and other inputs at cheap rate and also help them to bring their products to the markets which are located in big towns and cities.

As has been stated by Thirlwall and Lopez:

"For poor farmers improved infrastructure will reduce their input

cost and increase agricultural production and reduce traders' monopoly by improving their access to markets. Nearly two-thirds of African farmers are cut off from national and world markets, because of poor infrastructure and market access. Better transport means greater access to public resources including schools, hospitals and other health facilities". [Source: Thilwall& Lopez. (2017). Economic Development: Theory and Evidence. p. 194.]

The role and importance of Infrastructure can be summarily presentedasfollows:

- **Facilitates functioning of the economy:** The functioning of an economy depends largely on infrastructural facilities. Agriculture industry and service sector are heavily dependent on infrastructural facilities for their growth. So infrastructure is essential for smooth functioning of an economy.
- **Enhancement of economic development:** Development of infrastructure and economic development grow hand in hand. Agriculture sector depends, to a considerable extent, on the adequate expansion and development of irrigation facilities. Industrial progress depends on the development of power and electricity generation, transport and communication etc.
- **Increases productivity:** Infrastructure development directly affects the productivity level of a nation. Better education and health improves the efficiency and productivity of working community. Infrastructure contributes to economic development of country both by increasing the productivity of the factors of production and improving the quality of life of its people.
- **Provides employment:** Infrastructure helps in generating employment. Many people get employment in infrastructural projects like construction and maintenance of roads, railways, electricity plants etc. Moreover large number of people is able to find employment in industry and trade.
- Development of agriculture, industry and all other sectors of the economy: The development of modern agriculture depends mainly on

infrastructural facilities (rood ways, railways and shipping) for speedy and large scale transport of agriculture inputs like seeds, pesticides, fertilizers etc. There also need insurance and banking facilities, so that agriculture activities can operate on a large scale.

Similarly, development of industry and all other sectors of the economy also largely depends on infrastructural facilities. This is the reason, why India had laid greater emphasis on the establishment of heavy industries at the public sector in the initial period of economic planning.

- **Upgradequality of life:** A developed infrastructure leads to better quality of life. Economic infrastructure ensures better living standard and social infrastructure ensures better quality of life.

12.5 PUBLIC-PRIVATE PARTNERSHIP

12.5.1 Meaning of Public-Private Partnership in Infrastructure Projects

Governments in most developing countries face the challenge to meet the growing demand for new and better infrastructure services. As available funding from the traditional sources and capacity in the public sector to implement many projects at one time remain limited, governments have found that partnership with the private sector is an attractive alternative to increase and improve the supply of infrastructure services.

The partners in a PPP, usually through a legally binding contract or some other mechanism, agree to share responsibilities related to implementation and/or operation and management of an infrastructure project. This collaboration or partnership is built on the expertise of each partner that meets clearly defined public needs through the appropriate allocation of:

- Resources
- Risks

- Responsibilities, and
- Rewards

It is important to emphasise here that a PPP is not a solution option to an infrastructure service problem but it is a viable project implementation mechanism for a preferred solution option.

12.5.2 Advantages of PPPs

Governments worldwide have increasingly turned to the private sector to provide infrastructure services in energy and power, communication, transport and water sectors that were once delivered by the public sector. There are several reasons for the growing collaboration with the private sector in developing and providing infrastructure services, which include:

- Increased efficiency in project delivery, and operation and management;
- Availability of additional resources to meet the growing needs of investment in the sector; and
- Access to advanced technology (both hardware and software).

Properly executed planning and development of a project also allows better screening of options, and helps in deciding appropriate project structure and choice of technology considering cost over the whole life cycle of the project.



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Important characteristics of PPP projects

- Promise of better project structure and design.
- Allows better screening of projects. A bad project is a bad project no matter whether it is implemented by the public or the private sector.
- Better choice of technology based on life-cycle costing.
- Better service delivery, especially if performance based payment is considered.
- Better chances of completion on time and within the budget.

12.5.3 Why PPPs have become Attractive to the Governments?

PPPs have become attractive to governments as an off-budget mechanism for infrastructure development as:

- They can enhance the supply of much-needed infrastructure services.
- They may not require any immediate cash spending.
- They provide relief from the burden of the costs of design and construction.
- They allow transfer of many project risks to the private sector.
- They promise better project design, choice of technology, construction, operation and service delivery.

12.5.4 Limitations of PPPs

There are many important economic, social, political, legal, and administrative aspects, which need to be carefully assessed before approvals of PPPs are considered by the government. PPPs have various limitations which should also be taken into account while they are being considered. The major limitations include:

- Not all projects are feasible (for various reasons: political, legal, commercial viability, etc.).
- The private sector may not take interest in a project due to perceived high risks or may lack technical, financial or managerial capacity to implement the project.
- A PPP project may be more costly unless additional costs (due to higher transaction and financing costs) can be off-set through efficiency gains.
- Change in operation and management control of an infrastructure asset through a PPP may not be sufficient to improve its economic performance unless other necessary conditions are met. These conditions may include appropriate sector and market reform, and change in operational and

management practices of infrastructure operation.

- Often, the success of PPPs depends on regulatory efficiency.

12.5.5 Models of PPP

A wide variety of PPP models has emerged. These models vary mainly by:

- Ownership of capital assets;
- Responsibility for investment;
- Assumption of risks; and
- Duration of contract.

The PPP models can be classified into five broad categories in order of generally (but not always) increased involvement and assumption of risks by the private sector. The five broad categories are:

- Supply and management contracts
- Turnkey contracts
- Affermage/Lease
- Concessions
- Private Finance Initiative (PFI) and Private ownership.

It is to be noted that each of these five categories has many variants. A categorization of the PPP/PSP models together with their main characteristics is shown in table 12.1 While the spectrum of models shown in the table are possible as individual options, combinations are also possible such as, a lease or (partial) privatisation contract for existing facilities which incorporates provisions for expansion through Build-Operate-Transfer. In fact, many PPP projects of recent times are of combination type.

Table 12.1: Classification of PPP Models

Broad category	Main variants	Ownership of capital assets	Responsibility of investment	Assumption of risk	Duration of contract (years)
Supply and management contract	Outsourcing	Public	Public	Public	1-3
	Maintenance management	Public	Public/Private	Private/Public	3-5
	Operational management	Public	Public	Public	3-5
Turnkey		Public	Public	Private/Public	1-3
Affermage/Lease	Affermage	Public	Public	Private/Public	5-20
	Lease*	Public	Public	Private/Public	5-20
Concessions	Franchise	Public/Private	Private/Public	Private/Public	3-10
	BOT**	Public/Public	Private/Public	Private/Public	15-30
Private ownership of assets and PFI type	BOO/DBFO	Private	Private	Private	Indefinite
	PFI***	Private/Public	Private	Private/Public	10-20
	Divestiture	Private	Private	Private	Indefinite

Source: United Nations ESCAP (2011). A Guidebook on Public-Private Partnership in Infrastructure. Retrieved from: https://www.unescap.org/sites/default/files/ppp_guidebook.pdf

Notes:

*Build-Lease-Transfer (BLT) is a variant.

**Build-Operate-Transfer (BOT) has many other variants such as Build-Transfer-Operate (BTO), Build-Own-Operate-Transfer (BOOT) and Build-Rehabilitate-Operate-Transfer (BROT).

*** The Private Finance Initiative (PFI) model has many other names. In some cases, asset ownership may be transferred to, or retained by the public sector.



CHECK YOUR PROGRESS

Q 1: What is meant by the term infrastructure?

.....

.....

Q 2: Mention one advantage of infrastructure.

.....

.....

12.6 ROLE OF PUBLIC-PRIVATE PARTNERSHIP IN INFRASTRUCTURE

PPP projects are very important for the development of a nation and it has a number of advantages in terms of leveraging public capital to attract private capital and undertake a larger number of Infrastructure projects, introducing private sector expertise and cost reducing technologies as well as brings in efficiencies in operation and maintenance. Hence more than their fiscal implications, PPPs are essential tools to fulfill the basic obligations of Governments to provide better Infrastructure service by increasing the accountability of the private sector as a service provider.

In the recent times, PPPs have become the preferred mode for construction and operation of infrastructure services such as highways, airports, ports etc. They offer significant advantages in attracting private capital in construction of public infrastructures as well as in improving efficiencies in the provision of services to users.

In many developed and developing countries, contractual savings in the form of pension and provident funds are being tapped for Infrastructure financing, since these saving are long term in nature and could act as a source of funds for debt instruments with long term maturities. The Government will have to introduce appropriate reforms in public provident funds, pension funds and insurance companies so that the private sector can have access to these funds for Infrastructure development.

12.6.1 PPPs in India: Recent Scenario

The Government of India has announced various measures to attract foreign investment in Infrastructure. For instance, the Government has allowed automatic approval for foreign equity participation upto 74 percent in key Infrastructure industries such as electricity generation and transmission, non-conventional energy generation and distribution and construction activities in the area

of roads, bridges, railways, ports and harbours.

In recent years, the Government has undertaken many sector-specific reform measure. For instance, telecom projects are to be treated as infrastructure and are to receive all the fiscal concession available for Infrastructure projects - like tax holiday and concessional project import duty. The Government of India has promulgated an ordinance to facilities private investments in the transmission of electricity, as distinct from generation and distribution of electricity. The Government has also announced guidelines for private investment in highway development through the Build-Operate -Transfer (BOT) route - these would provide more financial concessions and also facilitate the preparation of detailed feasibility reports, clearance for the right of way of land, relocation of utility services, resettlement and relocation of the affected establishment, environmental clearance and equity participation in the highway sector. Similar guidelines have been given for private participation in ports.

The PPP India database indicates that, as of now, 758 PPP projects costing 3833 billion rupees has been awarded/underway status. Karnataka, Andhra Pradesh and Madhya Pradesh are the leading states in terms of number and value of PPP projects. At the central level, the National Highway Authority of India (NHAI) is the leading user of the PPP model.

12.6.2 Government Initiatives to Encourage PPP

- Setting up of the Public Private Partnership Appraisal Committee (PPPAC) responsible for the appraisal of PPP projects in the Central Sector.
- The Government has created a Viability Gap Funding Scheme for PPP projects. It provides financial support in the form of grants to make infrastructure projects commercially viable.
- The Government has set up India Infrastructure Finance

Company Limited (IIFCL) with the mandate to provide long-term debt for financing infrastructure projects.

- Ø The scheme for 'India Infrastructure Project Development Fund' (IIPDF) has been launched to finance the cost incurred towards development of PPP projects. The IIPDF supports up to 75 % of the project development expenses.
- Ø Web based tool kits are available to improve decision-making for infrastructure PPPs in India.
- Ø An infrastructure projects database was developed to provide key information on the status of infrastructure projects. (www.infrastructureindia.gov.in)
- Ø The Public Private Partnership (PPP) Cell is responsible for matters concerning policy, schemes, programmes and capacity building.
- Ø Government has also set up a Committee on Revisiting and Revitalising the PPP Model of Infrastructure under Dr. Vijay Kelkar. The committee has submitted its recommendations.

Challenges & Issues in PPP in India and Kelkar Committee: The major findings and recommendations of the Kelkar Committee are:

- Ø Regulatory Environment: There is no independent PPP regulator in India currently. This has led to private players loosing bargaining power due to changes in environment over time leading to Obsolescing Bargain. Further a significant number of PPP projects have been stalled by legal disputes relating to financial issues.
- Ø According to the Economic Survey 2014-2015, the stalled projects added up to 8.8 trillion rupees or 7% of India's Gross Domestic Product (GDP). This saddled banks with huge amount of bad loans.
- Ø Lack of Information: The PPP program lacks a comprehensive database consisting feasibility reports, agreements etc regarding the projects/studies to be awarded under PPP. In

this context the committee has spoken against unsolicited Proposals ("Swiss Challenge") as they bring information asymmetries and result in lack of transparency and fair and equal treatment of potential bidders.

- Ø Lack of institutional Capacity: The limited institutional capacity to undertake large and complex projects at various levels hinders the PPP project. Structured capacity building programmes for different stakeholders need to be evolved.
- Ø The Kelkar Committee recommends "3PI" which can, in addition to functioning as a centre of excellence in PPPs, enable research, review, and support sophisticated models of contracting and dispute redressal.
- Ø The committee also recommended building a host of other institutions such as Infrastructure PPP Project Review Committee (IPRC), Infrastructure PPP Adjudication Tribunal (IPAT) and a national PPP policy.
- Ø Financing Availability: Private sector is dependent upon commercial banks to raise debt for the PPP projects. However, with commercial banks reaching the sectoral exposure limits, and large Indian Infrastructure companies being highly leveraged, funding the PPP projects is getting difficult.

The committee recommended that the government encourage banks and financial institutions to issue zero coupon bonds or deep discount bonds for sourcing long-term capital at a low cost for PPP projects.

- Ø Allocation of Risk: Inefficient and inequitable allocation of risk in PPPs can be a major factor in PPP failures. A rational allocation of risks can be undertaken in sector and project-specific contexts.



12.7 LET US SUM UP

- Infrastructure provides supporting services in the main areas of

industrial and agricultural production, domestic and foreign trade and commerce. These services include roads, railways, ports, air ports, dams, power stations, oil and gas and pipelines and so on.

- The building of infrastructural facilities require large and lumpy investment and they contribute to output, after a long time that is their gestation period is quite long.
- Due to large overhead capital and lumpy investment, the significant economies of scale are found in most of them. Due to the significant economies of scale found in many infrastructure services, they have the characteristics of natural money.
- Infrastructure facilities create externalities.
- Infrastructure plays an important role in the social and economic development of a country. It is often said that concrete, steel and fiber-optic cable are the essential building blocks of the economy. Infrastructure enables trade, powers businesses, connects workers to their jobs, creates opportunities for struggling communities and protects the nation from an increasingly unpredictable natural environment.
- Governments in most developing countries face the challenge to meet the growing demand for new and better infrastructure services. As available funding from the traditional sources and capacity in the public sector to implement many projects at one time remain limited, governments have found that partnership with the private sector is an attractive alternative to increase and improve the supply of infrastructure services.
- There are several reasons for the growing collaboration with the private sector in developing and providing infrastructure services, which include:
  - Increased efficiency in project delivery, and operation and management;
  - Availability of additional resources to meet the growing needs of investment in the sector; and

- Ø Access to advanced technology (both hardware and software).
- Ø A wide variety of PPP models has emerged. These models vary mainly by:
- Ø Ownership of capital assets;
- Ø Responsibility for investment;
- Ø Assumption of risks; and
- Ø Duration of contract.

- In the recent times, PPPs have become the preferred mode for construction and operation of infrastructure services such as highways, airports, ports etc. They offer significant advantages in attracting private capital in construction of public infrastructures as well as in improving efficiencies in the provision of services to users.
- The Government of India has announced various measures to attract foreign investment in Infrastructure.



12.8 FURTHER READING

1) Agrawal, A. N. (2011). *Indian Economy Problems and Development and Planning.* New Delhi: New Age International (P) Limited.
2) Datt, G. & Mahajan, A. (2014). *Datt and Sundharam's Indian Economy.* New Delhi: S. Chand & Company Pvt.Ltd.
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6) NCERT. *Indian Economic Development.* New Delhi.



12.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Infrastructure refers to all such activities, services and facilities, which are needed to provide different kinds of services in an economy.

Ans to Q No 2: Infrastructure increases the productivity of the factors of production.

12.10 MODEL QUESTIONS

Short Questions (Answer each question in around 150 words).

Q 1: Discuss the features of infrastructure.

Q 2: Briefly explain the role and importance of infrastructure.

Q 3: Discuss the various advantages and limitations of PPPs.

Q 4: Why PPP s Have Become Attractive to the Governments? Discuss.

Long Questions. (Answer each question in around 300-500 words)

Q 1: Discuss the different models of PPPs.

Q 2: Discuss the recent Scenario of PPPs in India.

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UNIT 13: PLANNING IN DEVELOPMENT

UNIT STRUCTURE

13.1 Learning Objectives

13.2 Introduction

13.3 Rationale for Planning

- 13.3.1 Market Failure
- 13.3.2 Resource Mobilisation and Allocation
- 13.3.3 Psychological Factors
- 13.3.4 Foreign Aid

13.4 Plan Models

- 13.4.1 Elements of Planning Models
- 13.4.2 Types of Planning Models

13.5 Aggregative and Inter-Sectoral Model

- 13.5.1 Cost Benefit Analysis
- 13.5.2 Social Profit
- 13.5.3 Calculation of Social Profitability
- 15.5.4 Setting Objectives
- 13.5.5 Computation of Shadow Prices and Social Discounting Rates
- 13.5.6 Decision Criteria of Choosing Projects
- 13.5.7 Planning Models and Plan Consistency

13.6 Project Evaluation

13.7 Failure of Planning

13.8 Planning in a Market Oriented Economy

13.9 Let Us Sum Up

13.10 Further Reading

13.11 Answers to Check Your Progress

13.12 Model Questions

13.1 LEARNING OBJECTIVES

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

- explain the meaning of planning as an instrument of resource allocation

- state the need for planning in the development process
- explain the structure of plan models and their usefulness in planning for economic development
- describe the role of project evaluation and planning in a market oriented economy
- explainwhy planning fails
- describe planning in the context of a market economy

13.2 INTRODUCTION

Planning can be described as a deliberate and conscious attempt by the government to formulate decisions on how the factors of production will be allocated among their various uses. It seeks to achieve a predetermined set of development objectives with the growth of nation's principal economic variables. Most development plans have been formulated and carried out within the framework of the mixed economies. These economies are characterised by the existence of both private and public ownership. The proportionate division of ownership controlling varies from country to country. However, achieving a balance between private mechanism and public policy has always been challenged since time immemorial. In India, the 65 year old planning commission has been dismantled by the government and a new institution called National Institution for Transforming India (NITI)Aayoghas been established in 2015 under the philosophy of cooperative federalism.

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Cooperative Federalism: Under cooperative federalism, the relationship between centre and states is vertical. The concept gained significance especially after 1990s.Cooperative federalism is the division of power between center and its various constituents, like provinces, states, cantons and so on. Cooperative federalism is a concept or subset of federalism where national, state and local governments interact cooperatively and collectively to solve common problems.The present government of India has stressed on the need to leverage

13.3 RATIONALE FOR PLANNING

The acceptance of development planning as a development tool is rested on a number of factors which can be outlined as below:

13.3.1 Market Failure

Both the commodity and factor markets in developing countries often characterised by imperfection in their operation. It leads to existence of distorted prices that cannot reflect the real cost of the societal goods, services and resources. In such a situation, government can play an important role in integrating markets and modifying prices. However, market may fail in three general forms:

a) The market cannot function properly or no market exists.
b) The social costs and benefits may differ from private costs and benefits.
c) The existence of market power influences prices by restricting quantity which is also a market failure

Therefore, policy changes under such circumstances become the need of the hour. But, policy changes always cannot fix market failure because there may be governmental failure as well. However, market failure argument is perhaps the mostly quoted reason for governmental role in planning.

13.3.2 Resource Mobilisation and Allocation

Developing countries are mostly characterised by lack of adequate skilled labour and capital. Thus, wise use of these resources is very vital for any development programme so that no factors are used in unproductive ventures. All the resources must be used in accordance with its potentiality and productivity for achieving a holistic development. Economic planning is assumed to help by recognizing, choosing and coordinating investment projects so as to channel these scarce factors into the most productive outlets.

13.3.3 Psychological Factors

It is assumed that a detailed statement of national objectives with specific planning have a psychological impact on the diverse group of population. By mobilizing support and thinking beyond class, caste, race, religion and colour with the plea to all citizens to work together can build faith and authenticity on the widespread material and social progress.

13.3.4 Foreign Aid

The formulation of development plans has been a necessary condition for the receipt of bilateral and multilateral foreign aid as it can build confidence among investors. Governments are better equipped to solicit foreign assistance and persuade donors that their money will be used in a well conceived and internally consistent plan of action.

13.4 PLAN MODELS

When development models are used to solve certain planning problems, they are referred to as planning models. Such models are set out to locate the quantitative relationships among the critical variables in the process of economic growth.

13.4.1 Elements of Planning Models

The important elements of planning models are shown below:

- **Objectives of Economic Policy:** Every planning must lay down certain goals of economic policy to be pursued under the plan. The following objectives of a plan usually tried to achieve during its course of action:
  - A targeted increase in per capita income
  - A targeted increase in employment
  - A relatively stable price level

- To maintain equilibrium in the balance of payments
- Reduction of inequalities in income distribution
- For achieving balanced regional development
- Diversification of the economy through structural change

Ø **Instruments:** Instruments are the policy measures that need to be taken up to achieve the specified objectives of the plan. These are taken as independent variables since their magnitudes are determined exogenously by the planners. Raising the saving-income ratio and the investment-income ratio, population policy, import substitution and export promotion, achieving a regional balance in development, etc., could be some of the independent variables under this category.

Ø **The functional relationship:** The dependent and instrument variables are functionally related to each other in the form of structural or behavioural equations of the model. These functional relationships are expressed in the form of coefficients. These coefficients show the response of the dependent variables when a change in the independent variables is specified.

13.4.2 Types of Planning Models

The Planning models can be broadly classified into two categories namely aggregative growth models and sectoral models. However, sectoral models can further be classified as single sector, complete main sector and comprehensive inter-sector models.

Ø **Aggregative or Macroeconomic models:** It is associated with macroeconomic estimates of required changes in principal economic variables like national output, savings, investments, capital stocks, exports, imports and so on. In such case, it may not be necessary to go into sectoral details. One of the best examples of aggregative model is the famous Harrod-Domar model which was developed as a growth model to

specify the requirements of steady growth at full employment in a developed market economy. Aggregate growth models can provide a rough approximation of the general direction of an economy. They rarely constitute the operational development of a plan.

- **Sectoral models:** Sectoral models can be classified into two categories: i) Single sector models, ii) Complete main sector models
  - **Single sector models:** In these models a single sector is separately treated as a massive project. Such separate projects are individually appraised for requirements of capital, skilled labour, foreign exchange, etc. By aggregating the requirements of individual sectors, the total resource requirements are arrived at. If the aggregate resource requirements turn out to be more than the available resources, some of the projects may be excluded from the plan.
  - **Complete Main-sector Models:** These are a more developed form of sectoral models. These are based on differentiation of main sectors of the economy, specification of their individual growth rates and taking an explicit note of their inter-dependence.
- **Comprehensive Inter-industry Models:** It is a formal model dividing the economy into sectors and tracing the flow of inter-industry purchases and sales. All industries are viewed both as producers of outputs and users of inputs. For example, the agricultural sector is both a producer of output (e.g. wheat) and a user of inputs, say, manufacturing sector (e.g. machinery, fertilizer).

The inter-industry models make use of two important techniques of economic analysis, viz. (i) input-output technique is used for purpose of setting consistent sectoral targets and ii) linear programming technique is



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NITI Aayog: NDA government at the Centre abolished the six decade old Planning Commission on December, 2014 and a new institution- namely National Institution for Transforming India (NITI Aayog) came into existence on January, 2015. Basically, the NITI Aayog is a think tank which provides expert input to the government on various aspects of the growth and development. It neither allots the funds nor approves any scheme of the government as was the practice of erstwhile Planning Commission. NITI Aayog drafted the 'Three Year Action Plan' which will be followed by a 'Seven Year Strategy' and 'Fifteen Year Vision'.

13.5 PROJECT EVALUATION

Project appraisal is the quantitative analysis of the relative desirability (profitability) of investing a given sum of public or private funds in alternative projects. It is a microeconomic technique employed to allocate the limited public investment funds to ensure efficient planning of individual projects within each sector.

13.5.1 Cost-Benefit Analysis

Project appraisal rests on the theory and practice social cost benefit analysis. The need for social cost benefit analysis arises because the normal yardstick of commercial profitability of private investments may not be an appropriate guide for public investment decisions. To decide on the worth of projects involving public expenditure, it is necessary to consider the advantages and disadvantages to society as a whole.In many projects, actual market prices often diverge from their true value and most of the private investors don not take into account the external effects of their decisions. Under such circumstances, it may affect the social welfare. Therefore, social cost benefit analysis can reduce the divergence between social cost and social benefit.

13.5.2 Social Profit

Social profit in any period can be defined as the difference between social benefits and social costs. It is measured directly where the real costs of inputs and real value of outputs are determined while it is measured indirectly which take into account the employment effects, distributional effects etc.

13.5.3 Calculation of Social Profitability

There are three steps by which social profitability can be measured:

- Ø At the first step, objective functions are to be specified and maximized. Here, different benefits like per capita consumption, income distribution are calculated tried to identify the tradeoffs among them.
- Ø To arrive at calculations of net social benefit, some of the social measures are needed. Such social measures are called accounting prices or shadow prices which reflect the true opportunity cost of resources. Greater the divergence between shadow and market prices (prices established by demand and supply in markets), the greater the need for social cost benefit analysis.
- Ø In the third step, some decision criterion is needed to reduce the stream of projected social benefit and cost flows to an index. The value of such index is used to select or reject a project or to rank them.

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Shadow Prices: While analysing investment decisions by firms, the set of correct prices by which it needs to evaluate is usually the 'shadow price'. The shadow price of a good is the net impact on social welfare of a unit increase in the supply of the good by the public sector. This idea was developed by Ravi Kanbur. The welfare changes are evaluated by using a 'social welfare function' which is a mathematical expression of inter-temporal and inter-personal distribution of consumption.

15.5.4 Setting Objectives

There is difficulty in attaching numerical values to some qualitative aspects like self reliance, political stability, quality of life etc. In such a situation, the planners measure the social worth in terms of the degree to which it contributes to the net flow of future goods and services in an economy. In recent times, income distribution has gained attention. If preferences are to be given to raising the consumption standards of low income groups, the social worth of a project is calculated as weighted sum of distribution of its benefits where additional consumption by low income groups may receive high weightage in social welfare objective function.

13.5.5 Computation of Shadow Prices and Social Discounting Rates

In developing countries, market prices of outputs and inputs do not give a true reflection of social benefits and costs. The important reasons for such cases are summarized below:

- **Inflation and currency valuation:** Many developing countries are plagued with inflation. Controlled prices may not reflect the the real opportunity cost of the society. Moreover, sometimes, domestic currencies are overvalued with inflation. It results I underestimation of the import and export prices. Public investment based on this price will therefore tend to be biased.
- **Wage rates, capital costs and unemployment:** Factor price distortions of many developing countries results in modern sector wage rates exceeding the social opportunity cost of labour and interest rates understating the social opportunity cost of capital. This leads to widespread unemployment and underemployment
- **Tariffs, quotas and, subsidies and import substitution:** The existence o f high tariffs, quotas and overvalued exchange rates discriminates against the agricultural export sector and favours

the import substituting manufacturing sector. It also encourages rent seeking (efforts by individuals and businesses to captive the economic rent arising from price distortions and physical controls) on the part of competing exporters and importers.

- **Savings deficiency:** Given the substantial pressure for providing higher consumption level to the poor, the rate of domestic savings is suboptimal in developing countries. Under such circumstances, government should use a discount rate that is lower than the market rate of interest in order to promote projects that have a longer payoff period.
- **The Social Rate of Discount:** The Social Rate of Discount (o social time preference) is the rate used to calculate the net present value of a time stream of project benefits and costs where the Net Present Value (NPV) is calculated as:

$$NPV = \sum_t \frac{B_t - C_t}{(1+r)^t}$$

Where B_t is the expected benefit of the project at time t, C_t is the expected cost and r is the government's social rate of discount. This rate may differ from market rate of interest depending on the subjective evaluation placed on future net benefits. The higher the future benefit the lower the social rate of discount.

13.5.6 Decision Criteria of Choosing Projects

After computing relevant shadow prices, allocating time stream, selecting social discount rate, planners are in position to choose from a set of alternative investment projects which are the most desirable. They therefore need to adopt a decision criterion. Normally, economists advocate for using the NPV rule. However, there is an alternative approach called Internal Rate of Return (IRR). The IRR computes a discount rate at which discounted benefits equal discounted costs. The IRR is the method that does not

depend on the assumption of discount rate and determines a value in terms of a percentage. In other words, the discounted present value of costs minus present value of benefits is equal to zero. To compute IRR, we equate initial investment with discounted (r) future benefits and then find r, that is, termed as IRR. Suppose we have invested initially Rs. 10,000 in year 0, and from year 1 to year 4 we are expecting the benefit of Rs.5, 000 each year. This can be expressed mathematically as:

$$10000 = 5000\left(\frac{1}{1+R}\right)^1 + 5000\left(\frac{1}{1+R}\right)^2 + 5000\left(\frac{1}{1+R}\right)^3 + 5000\left(\frac{1}{1+R}\right)^4$$

In most developing countries, due to capital constraints, projects are ranked by descending the net present value. This is done by their benefit cost ratios, which are arrived at by dividing NPV by the constraint on capital cost, K- that is, an NPV/K ratio is calculated for each project. The set of projects with the largest NPV/K ratio is chosen first.

13.5.7 Planning Models and Plan Consistency

The Process of formulating a comprehensive, detailed development plan is obviously a more complicated process than that described by the stages mentioned above. It involves a constant dialogue and feedback mechanism between national leaders and planners, statisticians, researchers and ministry officials.

13.7 FAILURE OF PLANNING

The results of development planning have ben generally disappointing as there exists widespread rejection. There are two set of factors responsible for it. One is dealing with the gap between the theoretical economic benefits and the practical results and the other is associated with fundamental defects of planning process.

- **Theory versus Practice:** Market failures, divergences between private and social valuations, resource mobilization are some of the principal arguments for planning. But, they are often weakly supported by planning experience. Government policies often tend to increase rather than reduce the divergences between private and social valuations. For example, economic signals and incentives in many developing countries have served to exaggerate the privte valuations of th returns to education to a point where private demand for more years of schooling greatly exceeds the social payoffs. Thus, the gap between the public rhetoric and economic reality has been greater in many developing countries.
- **Deficiencies in Plans and their implementation:** Plans are often overambitious. They try to accomplish too many objectives without consideration that some of the objectives are competing or even conflicting. They are often extravagant in design but vague on specific policies for achieving stated objectives.
- **Insufficient and Unreliable Data:** The economic value of a development plan depends on the quality and reliability of the statistical data on which it is based. When data are weak, unreliable as in many poor countries, the accuracy and internal consistency of economy wide quantitative plans are greatly diminished.
- **External and internal disturbances:** Most developing countries have open economies that are dependent on international trade, aid and private foreign investment. Under such circumstances, it becomes difficult fo them to engage in short term forecasting. The oil price increase of the 1970s caused a havoc in most development plans.
- **Institutional Weaknesses:** It includes the separation of the planning agency from the decision making machinery of government, the dialogue and internal communication about goals and strategies that may be inappropriate to local conditions. In addition, there has been much concern about incompetent and unqualified civil servants, cumbersome bureaucratic procedures, departmental rivalries that is pervasive in many governments.

- **Lack of Political Will:** Poor performance of planning is also attributed to a lack of commitment and political will on the part of many developing country leaders and high level decision makers. Political will entails much more than high minded purposes and noble rhetoric. It requires an unusual ability and a great deal of political courage to challenge powerful elites and vested interest groups and to persuade them that development is in the long run interests of all citizens.

13.8 PLANNING IN A MARKET ORIENTED ECONOMY

As a result of discontent with the planning and the perceived failure of government intervention, many economists and finance ministers of developing countries advocated increased use of the market mechanism as a key instrument for promoting greater efficiency and more economic growth. Markets accomplish many positive things. A well functioning market system depends on atleast on the following legal and economic practices:

- Property rights must be clearly established and demarcated
- Commercial laws and an independent judiciary to enforce them
- Freedom to establish businesses in all sectors except those with significant externalities
- A Stable currency and banking system including a reliable and efficient system for making transfers
- Public supervision or operation of natural monopolies as occurs in industries where technological efficiency requires that a firm be large enough to supply a substantial fraction of the national market.
- Provision of adequate information in every market about the characteristics of the products.
- Protection of consumer's preferences from influences of producers.
- Public management of externalities (both harmful and beneficial)
- Encouragement of innovation, issuance and enforcement of patents and copyrights.
- Security from violence etc.

It is clear that market reforms involve much more than merely

eliminating price distortions, privatizing public enterprises and declaring markets free. The setback to market reforms in many transition economies is in no small measure attributable to the absence of some institutional preconditions and market practices.



CHECK YOUR PROGRESS

Q 1: What is meant by planning models? State their elements.

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Q 2: Distinguish between different types of planning models. Which type of planning model should be chosen and why?

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Q 3: State the reasons behind the planning in a market oriented economy.

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Q 4: Outline the important reasons of failure in Planning.

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Q 5: What is meant by Net Present Value?

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Q 6: Mention the new mechanism for planning in India after 2015.

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13.9 LET US SUM UP

- Planning is defined as the making of major economic decisions by a designate authority on the basis of a comprehensive survey of the system as a whole.
- Planning is needed to achieve an optimum utilisation of available resources for maximisation of social welfare.

- The nature and scope of planning differs as between different economic systems.
- A planning system may totally dispense with the market mechanism, whereas another system may operate only through the market.
- The different variants of planning have their own relative advantages and disadvantages.
- The intellectual support to planning is provided by the plan models. Different types of planning models may be constructed, depending upon the objectives and the availability of resources.



13.10 FURTHER READING

1) Datt, G. & Mahajan, A. (2014). *Datt and Sundharam's Indian Economy.* New Delhi: S. Chand & Company Pvt.Ltd.
2) Garg, S. (2011). *Indian Economic Development.* New Delhi: Dhanpat Rai Publication.
3) Jain, T.R. & Ohri, V.K. (2011). *Statistics for Economiecs and Indian Economic Development.* New Delhi: Global Publications Pvt. Ltd.
4) Todaro, M. P. (1971). *Development Planning: Models and Methods.* London: Oxford University Press.



13.11 ANSWERS TO CHECK PROGRESS

Ans to Q No 1: Please refer to section 13.4.

Ans to Q No 2: See the sub section 13.4.2

Ans to Q No 3: See the sub section 13.8

Ans to Q No 4: See the section 13.8

Ans to Q No 5: See the sub section 13.5.5

Ans to Q No 6: National Institution for Transforming India (NITI) Aayog



13.12 MODEL QUESTIONS

Short Questions (Answer each question in around 150 words).

Q 1: Write a short note on computation of shadow prices and social discounting rates.

Q 2: Why planning fails? Discuss in brief.

Long Questions. (Answer each question in around 300-500 words)

Q 1: Discuss the rationale for planning.

Q 2: Discuss the concept of market failure.

Q 3: Discuss the elements of planning models and the different types of planning models.

Q 4: Discuss the relevance of planning in a market oriented economy.

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UNIT 14: SOCIAL SECTOR AND ECONOMIC DEVELOPMENT

UNIT STRUCTURE

14.1 Learning Objectives

14.2 Introduction

14.3 Education and Health in Economic Development

14.3.1 Education and Economic Development: Some Empirical Findings

14.3.2 Schultz's Analysis of Expenditure on Education and Income

14.3.3 Consumption Benefits of Education

14.3.4 External Benefits of Education

14.3.5 Education, Inequality and Poverty

14.3.6 Linkage between Health and Economic Development

14.4 Morbidity vs Mortality

14.5 Assessment of Health Status in Terms of Disability-Adjusted-Life-Years (DALYs)

14.6 Analysis of Disease Burden

14.7 Epidemiological Transition Theory of Development

14.8 Let Us Sum Up

14.9 Further Reading

14.10 Answers to Check Your Progress

14.11 Model Questions

14.1 LEARNING OBJECTIVES

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

- desciribe the linkages between education and health in the process of economic development
- distinguish between mortality and morbidity
- discuss the concepts of health status assessment in Terms of Disability-Adjusted-Life-Years (DALY)
- discuss recent disease burden
- explain the epidemiological transition theory of development.

14.2 INTRODUCTION

In the earlier units, we have already seen that education and health indicators occupy a major emphasis in measuring the level of development in a country. For example, in the discussion of Human Development Index or the UN Millennium Development Goals or the UN Sustainable Goals, the importance attached to the educational and health indicators can clearly be seen. In this unit, we shall basically discuss the interlinkages between education and economic development as well as health and economic development. Certain important concepts like the disability-adjusted-life-years (DALY), disease burden and the epidemiological transition theory of development have also been discussed.

14.3 EDUCATION AND HEALTH IN ECONOMIC DEVELOPMENT

In this section, we shall review the role played by education and health in the process of economic development. Though we shall not undertake detailed study of a particular model, we shall review some of the important empirical findings on the linkage between education and health with the process of economic development. Let us first consider a few empirical findings on the role of education in economic development.

14.3.1 Education and Economic Development: Some Empirical Findings

- **Rober Solow's Findings:** Several empirical studies made in developed countries, especially the U.S.A. regarding the sources of growth or, in other words, contributions made by various factors such as physical capital, man-hours, (i.e., physical labour), education etc. have shown that education or the development of human capital is a significant source of economic growth.

For example, Professor Solow was one of the pioneer economists to measure the contribution of human capital to

economic growth. He found that in the United States, between 1909 and 1949, 57.5 per cent of the growth in output per man hour could be attributed to the residual factor which represents the effect of the technological change and of the improvement in the quality of labour mainly as a consequence of education.

He estimated this residual factor determining the increase in the total output on account of the measurable inputs of capital and labour (man-hours). He then subtracted this figure from the total output to get the con-tribution of residual factor which represented the effect of education and technological change, the physically immeasurable factors.

- **Professor Denison's Findings:** Denison, another American economist made further refinement in Solow's analysis. He tried to separate and measure the contributions of various elements of 'residual factor'.

Denison found that over the period 1929-82 in the USA during which total national output grew at the rate of 2.9 per cent per annum, increase in labour input accounted for 32 per cent, the remaining 68 per cent was due to the increase in productivity per worker.

Denison then measured the contributions of education of per worker, capital formation, technological change and economies of scale. Denison found that 28 per cent points of contribution to growth in output due to growth in labour-productivity was due to technological change, 19 per cent points due to capital formation and 14 per cent points due to education per workers, and 9 per cent points due to economies of scale. It is thus clear that education and techno-logical progress together made 42 per cent (14 + 28) contribution to growth in national product.

- **Gary S Backer's Rate of Return Approach:** The contribution of education to economic growth has also been measured through the rate of return approach. In this approach rate of return is calculated from expenditure made by individuals on

education and the measurement of the flow of an individual's future earnings expected to result from education.

The present value of these is then calculated by using appropriate discount rate. This method has been used by Gary S. Backer who measured in-come differential arising from the cost or expenditure incurred on acquiring a college education in the United States. His estimates show that the rates of return on education in the U.S.A. for urban white population were 12.5 per cent in 1940 and 10 per cent in 1950.

- **Renshaw's Findings:** Renshaw also adopted Backer's approach. He used Schultz's earlier estimates of total earning foregone and expenditure (cost) incurred in acquiring high-school, college and university education in the U.S.A. He estimated that the average return on education ranged between 5 and 10 per cent for the period 1900 to 1950 in the U.S.A.

It is worth noting that estimates of rate of return on investment in education are based upon private rates of returns to individuals receiving education. However, by assuming that differences in earnings in a market economy reflect differences in productivity, the rate of return on investment in education is taken to be the effect of education on the output of the country.

14.3.2 Schultz's Analysis of Expenditure on Education and Income

Another approach to measure the contribution of education is based upon the analysis of the relationship between expenditure on education and income. Using this approach, T. P. Schultz studied the relationship between expenditure on education and consumer's income and also the relationship between expenditure on education and physical capital formation for the United States during the period 1900 to 1956. He found that when measured in constant dollars, "the resources allocated to education rose about

three and a half times (a) relative to consumer income in dollars, (b) relative to the gross formation of physical capital in dollars".This implies that the "income elasticity" of the demand for education was about 3.5 over the period or, in other words, education considered as an investment could be regarded as 3.5 times more attractive than investment in physical capital. It may, however, be noted that these estimates of Schultz only indirectly reflect the contribution of education to economic growth.

In our above analysis we have explained that education is regarded as investment and like in-vestment in physical capital, it raises productivity of the labour and thus contributes to growth of national income. The increased earnings or higher wages made by more educated workers have been considered as benefits not only to the private individuals, but also to the society as a whole. This is because higher earnings presumably reflect higher productivity, increased output in real as well as monetary terms.

14.3.3 Consumption Benefits of Education

We have explained above the investment benefits of education and therefore its effects on productivity and national output. But investment benefits are not the only benefits flowing from education. Education also yields consumption benefits for the individual as he may "enjoy" more education derive increased satisfaction from his present and future personal life.

In economic theory, to measure the marginal value of a product or service to a consumer we consider how much he has paid for it. An individual would not have purchased a product or service if it were not worth its price to him. Besides, an individual would have bought more units of a product if he thought that the marginal utility he was getting was more than the price he was paying.

However, an objective measure of consumption benefits

of education may be difficult and has yet to be found out, but it should not lead any one to ignore the consumption benefits of education and its policy relevance. It may also be noted that, according to the new view, economic development is not merely concerned with the growth of output but also with the increase in consumption and well-being of the society. Therefore, consumption benefits of education may also be regarded as developmental benefits.

14.3.4 External Benefits of Education

We have explained above the investment benefits and consumption benefits flowing from more education both for the individual and for society. The analysis of benefits has been based on the assumption that private interests of individuals are consistent with the social good.

First, education makes people better neighbours and citizens and makes social and political life more healthy and meaningful. Secondly, the most important external benefit of more education is its effect on technological change in the economy. More education, especially higher education stimulates research and thereby raises productivity which undoubtedly benefits the society.

After estimating the contribution of labour (including educated labour) and physical capital to economic growth Denison found an average residual of 0.59 percentage point. He attributed this to the increase in knowledge which is the direct result of research and indirectly of higher education. "If the entire residual indeed stemmed ultimately from education, as some human capital enthusiasts have implied, this would mean that education, directly or indirectly, contributed over 40 per cent of total output growth and 80 per cent of increased productivity from 1929 to 57." If Denison's residual is regarded as mainly due to research

stimulated by additional education then this is indeed a major external benefit of education.

14.3.5 Education, Inequality and Poverty

An evaluation of the role of education in economic development must not be confined to judging its impact on growth in output but should also include its impact on structure and pattern of economic development as well as on the distribution of income and removal of poverty.

In the 1950s and 1960s, the most important objective of development was the maximization of rate of economic growth, i.e. growth of material output and in conformity with this the economics of education also focused on estimating the contribution of education to the growth of national output. But now-a- days policy of economic development has been increasingly concerned with the distribution of income i.e., how gains of economic growth are distributed and whether poverty is being reduced.

But recent studies have revealed that education, given the present education system, has tended to increase the inequalities in income distribution rather than reducing them. The adverse effect of formal education on income distribution has been explained through establishing a positive correlation between level of education received by an individual and the level of his life-term earnings.

It has been shown that those who are able to complete their secondary and university education earn as high as 300 to 800 percentages more income in their life time than those who complete a part or whole of their primary education.

There are two important economic reasons why in the present education system, children and boys belonging to the poor families cannot complete their education up to the secondary level and in many cases even up to the primary level.

First, the private costs especially, 'the opportunity costs' of primary education for the children belonging to the poor families are higher than for students belonging to the rich families. Children of the poor families are needed to do work on their family farms or in other family occupations, that is, cost of studying in school is family work sacrificed. Second, benefits of education to the poor students are also lower as compared to those to the rich students.This is because it is difficult for the poor students to be selected for the jobs because of poor contacts and influences as compared to rich students, even though they may possess the same level of education.

It follows from above that as a result of higher private costs and lower expected benefits from education of the poor students, the poor family's rate of return from investment in education of a child is much lower. As a result of this, the children of poor families are likely to 'drop out' during the course of primary education.

The fact that children and boys of poor family are unable to complete their secondary education coupled with the fact that there are large income or wage differentials between different persons of different levels of education explain that education in underdeveloped economies tends to increase income inequalities and perpetuates poverty rather than helps to reduce them.

14.3.6 Linkage between Health and Economic Development

It is generally argued that a healthy person is more productive and is likely to be more efficient. In theoretical economics literature, the role of health in economic development is analysed via two channels: the direct labour productivity effect and the indirect incentive effect. The labour productivity hypothesis asserts that individuals who are healthier have higher returns to labour input. This is well tested in the empirical literature with mixed

conclusions. The incentive effect is borne of the theoretical literature, and individuals who are healthier and have a greater life expectancy will have the incentive to invest in education as the time horizon over which returns can be earned is extended.

It is also argued that a healthy child is likely to be more efficient in his/her education than a child suffering from ill health. On the other way round, a better educated person is likely to be more informed about the healthy practices and hence, is likely to have better health.

There are many such arguments validating theoretical understanding as well as empirical research. However, without going into those theoretical or empirical findings in detail, we shall consider here the key findings of the World Health Organisation' Report of the Commission on Macroeconomics and Health (2001) which was chaired by Professor Jeffrey D. Sachs. These key findings will provide us a brief interlinkage between health and economic development. The key findings include:

- Health is a priority goal in its own right, as well as a central input into economic development and poverty reduction. The importance of investing in health has been greatly underestimated, not only by analysts but also by developing-country governments and the international donor community. Increased investments in health as outlined in this Report would translate into hundreds of billions of dollars per year of increased income in the low-income countries. There are large social benefits to ensuring high levels of health coverage of the poor, including spillovers to wealthier members of the society.
- A few health conditions are responsible for a high proportion of the health deficit: HIV/AIDS, malaria, TB, childhood infectious diseases (many of which are preventable by vaccination), maternal and perinatal conditions, tobacco-related illnesses, and micronutrient deficiencies. Effective interventions exist to prevent and treat these conditions. Around 8 million deaths

per year from these conditions could be averted by the end of the decade in a well-focused program.

- Ø The HIV/AIDS pandemic is a distinct and unparalleled catastrophe in its human dimension and its implications for economic development. It therefore requires special consideration. Tried and tested interventions within the health sector are available to address most of the causes of the health deficit, including HIV/AIDS.
- Ø Investments in reproductive health, including family planning and access to contraceptives, are crucial accompaniments of investments in disease control. The combination of disease control and reproductive health is likely to translate into reduced fertility, greater investments in the health and education of each child, and reduced population growth.
- Ø The level of health spending in the low-income countries is insufficient to address the health challenges they face. We estimate that minimum financing needs to be around $30 to $40 per person per year to cover essential interventions, including those needed to fight the AIDS pandemic, with much of that sum requiring budgetary rather than private-sector financing. Actual health spending is considerably lower. The leastdeveloped countries average approximately $13 per person per year in total health expenditures, of which budgetary outlays are just $7. The other low-income countries average approximately $24 per capita per year, of which budgetary outlays are $13.
- Ø Poor countries can increase the domestic resources that they mobilize for the health sector and use those resources more efficiently. Even with more efficient allocation and greater resource mobilization, the levels of funding necessary to cover essential services are far beyond the financial means of many low-income countries, as well as a few middle-income countries with high prevalence of HIV/AIDS.

- Donor finance will be needed to close the financing gap, in conjunction with best efforts by the recipient countries themselves. We estimate that a worldwide scaling up of health investments for the low-income countries to provide the essential interventions of $30 to 40 per person will require approximately $27 billion per year in donor grants by 2007, compared with around $6 billion per year that is currently provided. This funding should be additional to other donor financing, since increased aid is also needed in other related areas such as education, water, and sanitation.
- Increased health coverage of the poor would require greater financial investments in specific health sector interventions, as well as a properly structured health delivery system that can reach the poor. The highest priority is to create a service delivery system at the local ("close-to-client") level, complemented by nationwide programs for some major diseases. Successful implementation of such a program requires political and administrative commitment, strengthening of country technical and administrative expertise, substantial strengthening of public management systems, and creation of systems of community accountability. It also requires new approaches to donor/recipient relations.
- An effective assault on diseases of the poor will also require substantial investments in global public goods, including increased collection and analysis of epidemiological data, surveillance of infectious diseases, and research and development into diseases that are concentrated in poor countries (often, though not exclusively, tropical diseases).
- Coordinated actions by the pharmaceutical industry, governments of low-income countries, donors, and international agencies are needed to ensure that the world's low-income countries have reliable access to essential medicines.

(Source: Executive Summary of the Report of the

Commission on Macroeconomics and Health (2001). WHO.
Retrieved from: apps.who.int/iris/bitstream/handle/10665/42463/a74868.pdf?sequence=1&isAllowed=y

14.4 MORBIDITY VS MORTALITY

Morbidity: The word morbid refers to sickness and disease. In simple terms, morbidity can be applied to an individual (e.g., someone with cancer) or to a population in the form of a morbidity rate (e.g., the incidence of malaria or Japanese encephalitis).

Morbidity refers to the incidence (or morbidity rate) of a medical condition which is the contrast between those who are dying and those who are sick. Thus, it refers to a medical condition and the state of being stricken by a disease. Morbidity rate is taken according to the type of disease, age, gender, and area.This is because, some diseases are highly contagious, while others are not. Similarly, some diseases are more likely to affect one demographic than another. The study of morbidity rates the health care professional and the scientists to calculate risks and make recommendations for personal and public health matters accordingly.

Morbidity is measured by ICU scoring systems such as APACHE II, SAPS II, and SOFA, just to name a few. Due to high level of technicalities involved in these measures, we shall avoid detail discussion on them. However, if you are interested, you can study them yourselves from a large number of web resources.

Another term used with morbidity is the comorbidity. Comorbidity, refers to two or more illnesses affecting an individual at the same time. For example, gout is often comorbid with diabetes. Similarly, heart disease is also closely related to prolonged diabetes. Pregnancy is also closely related to gestational diabetes. There are many such comorbid instances. Though looks simple at the outset, such comorbidity studies are of very complex nature in the medical and health sciences.

Mortality: The term 'mortality is defined as the condition of being mortal or dead. It indicates the fact that everyone is susceptible to death

or will eventually die. It also refers to the ratio of deaths in a population and measures instances of death. It is used in association with a calamity or outbreak of a disease or epidemic in a certain population. It is expressed in terms of number of deaths per thousand people or in some cases per lac population (e.g., maternal mortality ratio).

Similar to morbidity, the term mortality also varies tremendously by geographic location, wealth, incidence of illness (morbidity), age, etc. Mortality is measured through different indicators, viz., the maternal mortality rate (number of deaths of mothers due to child bearing), infant mortality rate (number of deaths of children under one year of age), or age-specific mortality rate (total number of deaths of a particular age group). Using all of these different mortality rates paints a more accurate picture about global health and well-being.

Some of the differences between the two concepts have been summarised in the following Table.

Table 14.1: Distinction between Mortality and Morbidity

	Mortality	Morbidity
Definition	Refers to the number of people who died within a population.	Refers to the state of being diseased or unhealthy within a population.
Demographic reference	Refers to the incidence of death or the number of deaths in a population.	Refers to an incidence of ill health in a population.
Database / Reports	• National vital registration systems - A major source in developed countries • Sample registration systems (e.g., in China and India) • Household surveys - to estimate infant and child mortality • Special longitudinal investigations (e.g., maternal mortality studies)	• Notifiable diseases – Clinic/hospital admissions • Laboratory specimens • Sentinel surveillance • Administrative data systems – e.g., insurance records • Other data sources – e.g., accident and injury reports For example, World Health Statistics (compiled by WHO) also provides morbidity data.

Units of measurement	Mortality rates are generally expressed as the number of deaths per 1000 individuals per year. In certain cases, it is expressed as the number of deaths per 100,000 cases per year (For example, Maternal mortality ratio).	Morbidity scores or predicted morbidity are assigned to ill patients with the help of systems such as the APACHE II, SAPS II and III, Glasgow Coma scale, PIM2, and SOFA.
Types of data	The mortality rate can be distinguished into crude death rate; perinatal mortality rate; the maternal mortality rate; infant mortality rate; child mortality rate; standardized mortality rate; and age-specific mortality rate.	Data is collected according to the disease type, gender age, area.

https://www.diffen.com/difference/Morbidity_vs_Mortality



CHECK YOUR PROGRESS

Q 1: Define morbidity. (Answer in about 40 words).

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Q 2: Why the children of poor families are likely to drop out of their education? (Answer in about 50 words)

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14.5 ASSESSMENT OF HEALTH STATUS IN TERMS OF DISABILITY-ADJUSTED-LIFE-YEARS (DALYs)

Disability-Adjusted Life Year (DALY) is a technique of quantifying the burden of disease from mortality and morbidity data. Theoretically, one DALY can be thought of as one lost year of "healthy" life. According to World Health Organisation, the sum of these DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap

between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.

How are DALYs measured? According to WHO, DALYs for a disease or health condition are calculated as the sum of two components, viz., the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences. Symbolically, it can be shows as:

DALY = YLL + YLD.

Now, the YLL basically correspond to the number of deaths multiplied by the standard life expectancy at the age at which death occurs.

Similarly, 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).

LET US KNOW



Calculation of YLL: For a given cause and with reference to age and sex, YLL is calculated as (other social preferences excluded) :

YLL = N x L,

Where, N = number of deaths

L = standard life expectancy at age of death in years

Calculation of YLD:YLD (in this case also other social preferences excluded) is calculated based on the following formula:

YLD = I x DW x L

Where, I = number of incident cases, DW = disability weight and L = average duration of the case until remission or death (years).

Prevalence YLD: The GBD 2010 study published by IHME (Institute of Health Metrics and Evaluation) in December 2012 used an updated life expectancy standard for the calculation of YLL and based the YLD calculation on prevalence rather than incidence. Thus, the study proposed the following method:

YLD = P x DW

Where, P = number of prevalent cases, DW = disability weight and Social value weights (age-weighting and discounting).

14.6 ANALYSIS OF DISEASE BURDEN

Analysis of disease burden is important to assess the overall progress made in health and other social aspects. A long-term analysis of disease burden data can actually portray the level of development a country has made both nationally and internationally. The Global Burden of Disease (GBD) conducted by WHO is a major source to analyse the progress the world in general, and the countries in particular have been able to record over a period of time.

The GBD, 2017 study conducted by IHME is an important source towards this direction. Some of the important facts from the study have been presented as follows:

There was rapid progress in life expectancy from 1950 to 2017: Males, up from 48 years in 1950 to 71 years in 2017, while females, up from 53 years in 1950 to 76 years in 2017.

Among age groups, the under-5 age group experienced huge reductions in mortality between 1950 and 2017, while adults have made much less progress, particularly adult males.

While females tend to live longer than males, the gap in life expectancy between them varies substantially by level of socioeconomic development.

There have been dramatic declines in under-5 mortality, but there were still 5.4 million deaths among children under 5 worldwide in 2017.

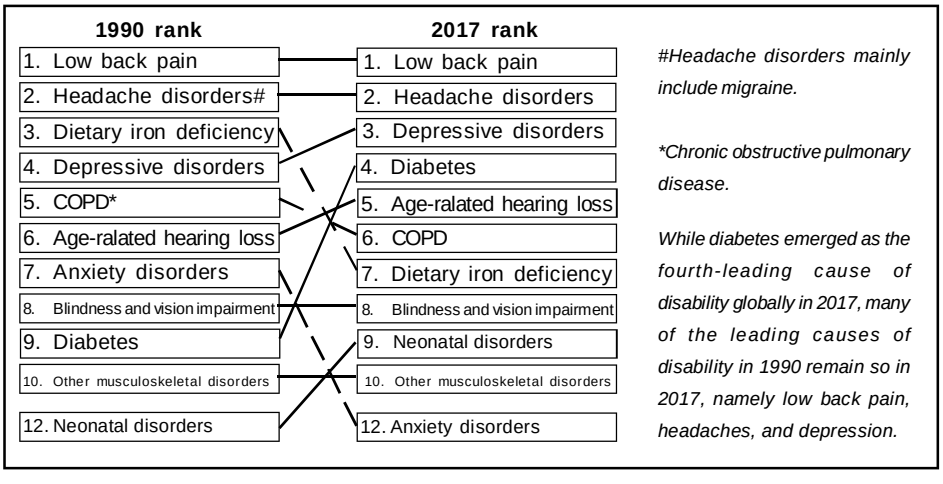
Between 1990 and 2017, early death from enteric infections, respiratory infections and tuberculosis, and maternal and neonatal disorders dropped, with the greatest declines in the least developed countries.

Progress in reducing mortality from some common diseases has stalled or reversed, primarily for non-communicable diseases such as cardiovascular diseases and cancers.

An unintended consequence of greater access to health care globally is increases in mortality from diseases and disorders linked to antibiotic resistance.

The changing pattern of disease in during 1990-2017 has been shown with the help of the Figure 14.1.

Figure 14.1: Leading causes of early death: 1990 vs 2017



Source: GBD, 2017.

- Again, important trends in early death and disability, (1990-2017) also include:
  - 41% decrease in communicable diseases and neonatal disorders.
  - 40% increase in non-communicable diseases
  - Large disparities persist in health and disease burden by sex and level of development.
- As of 2017, the leading global risk factors causing early death and disability for all ages combined were high blood pressure and smoking.

14.7 EPIDEMIOLOGICAL TRANSITION THEORY OF DEVELOPMENT

Abdel R. Omran first put forward the theory of epidemiologic transition in 1967. Conceptually, the theory of epidemiologic transition focuses on the complex change in patterns of health and disease and on the interactions between these patterns and their demographic, economic and sociologic determinants and consequences. An epidemiologic transition has paralleled the demographic and technologic transitions in the now developed countries of the world and is still underway in less-developed societies.

The epidemiological transition theory of development as discussed by Omran is based on five propositions. These propositions have been summarised in Table 14.1.

Table 14.1: Omran's Five Propositions of the Epidemiological Transition Theory

Sl.	Statements of the Proposition	Remarks (Basic matter of discussion):
Proposition 1	Mortality is a fundamental factor in population dynamics.	Mortality and Population Dynamics
Proposition 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.	Shifts in Mortality and Disease Patterns
Proposition 3	During the epidemiologic transition the most profound changes in health and disease patterns obtain among children and young women.	Relative Risks of Mortality by Age and Sex
Proposition 4	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.	Interacting Transition Variables
Proposition 5	Peculiar variations in the pattern, the pace, the determinants and the consequences of population change differentiate three basic models of the epidemiologic transition: the classical or western model, the accelerated model and the contemporary or delayed model.	Basic Models of the EpidemiologicTransition.

Note: For a detail study of the theory, learners are suggested to refer to the original article of the author (Abdel R. Omran): The Epidemiologic Transition: A Theory of the Epidemiology of Population Change (2005). The Milbank Quarterly.83(4). pp. 731-57. [Reprinted from The Milbank Memorial Fund Quarterly, Vol. 49, No. 4, Pt. 1, 1971 (pp. 509-38)].

Further, Omran stated that while a developing country moves towards becoming a developed one, it passes through three stages of epidemiological transition. Later, in 1998, Ronald Barrett, Christopher W. Kuzawa, Thomas McDade, George J. Armelagos in an article entitled Emerging and Re-emerging Infectious Diseases: The Third Epidemiologic Transition, published in Annual Review of Anthropology (Vol. 27:247-271, October, 1998; https://doi.org/10.1146/annurev.anthro.27.1.247) proposed

two additional phases. Thus, these five stages of epidemiological transition have been summarily presented in Table 14.2.

Table 14.2: Five Stages of Epidemiological Transition

Sl.	Statements of the Proposition	Salient Features of the Phase
Stage 1	The Age of Pestilence and Famine	❙ Mortality is high and fluctuating, precluding sustained population growth, with low and variable life expectancy vacillating between 20 and 40 years. ❙ It is characterized by an increase in infectious diseases, malnutrition and famine, common during the Neolithic age. ❙ Before the first transition, the hominid ancestors were hunter-gatherers and foragers, a lifestyle partly enabled by a small and dispersed population, however unreliable and seasonal food sources put communities at risk for periods of malnutrition.
Stage 2	The Age of Receding Pandemics	❙ Mortality progressively declines, with the rate of decline accelerating as epidemic peaks decrease in frequency. ❙ Average life expectancy increases steadily from about 30 to 50 years. ❙ Population growth is sustained and begins to be exponential.
Stage 3	The Age of Degenerative and Man-Made Diseases	❙ Mortality continues to decline and eventually approaches stability at a relatively low level. ❙ Mortality is increasingly related to degenerative diseases, cardiovascular disease (CVD), cancer, violence, accidents, and substance abuse, some of these due primarily to human behavior patterns. ❙ The average life expectancy at birth rises gradually until it exceeds 50 years. ❙ It is during this stage that fertility becomes the crucial factor in population growth.
Stage 4	The Age of Declining CVD Mortality, Aging and Emerging Diseases	❙ Technological advances in medicine stabilize mortality and the birth rate levels off. ❙ Emerging diseases become increasingly lethal due to antibiotic resistance, new pathogens like Ebola or Zika, and mutations that allow old pathogens to overcome human immunity.
Stage 5	The Age of Aspired Quality of Life with Persistent Inequalities	❙ The birth rate declines as lifespan is extended, leading to an age-balanced population. ❙ Socioeconomic, ethnic, and gender inequalities continue to manifest differences in mortality and fertility.

Significance of the Phases of the Theory of Epidemiological Transition: In general, in human history, Omran's first phase occurs when human population sustains cyclic, low-growth, and mostly linear, up-and-down patterns associated with wars, famine, epidemic outbreaks, as well as small golden ages, and localized periods of "prosperity". In early pre-agricultural history, infant mortality rates were high and average life

expectancy low. In today's context, life expectancy in developing countries remains relatively low, as in many Sub-Saharan African nations where it typically doesn't exceed 60 years of age.

The second phasein Omran's model involves improved nutrition as a result of stable food production along with advances in medicine and the development of health care systems. It was observed that mortality in Western Europe and North America was halved during the 19th century due to closed sewage systems and clean water provided by public utilities, with a particular benefit for children of both sexes and to females in the adolescent and reproductive age periods, probably because the susceptibility of these groups to infectious and deficiency diseases is relatively high.This happened because an overall reduction in malnutrition enabled populations to better resist infectious disease. Certain breakthrough in the practice of modern medicines during this period included the initiation of vaccination during the early nineteenth century, and the discovery of penicillin in the mid 20th century, which led respectively to a widespread and dramatic decline in death rates from previously serious diseases such as smallpox and sepsis. However, during this phase, a decline in mortality without a corresponding decline in fertility ultimately resulted in a population pyramid assuming the shape of a bullet or a barrel, as young and middle-age groups comprise equivalent percentages of the population.

The third phase in Omran's model occurs when human birth rates drastically decline from highly positive replacement rates to stable replacement numbers. In several European nations replacement rates have even become negative. This transition generally represents the net effect of individual choices on family size and the ability to implement those choices. Omran put forward three possible factors tending to encourage reduced fertility rates:

- Bio-physiologic factors, associated with reduced infant mortality and the expectation of longer life in parents;
- Socioeconomic factors, associated with childhood survival and the economic challenges of large family size; and

- Psychological or emotional factors, where society as a whole changes its rationale and opinion on family size and parental energies are redirected to qualitative aspects of child-raising.

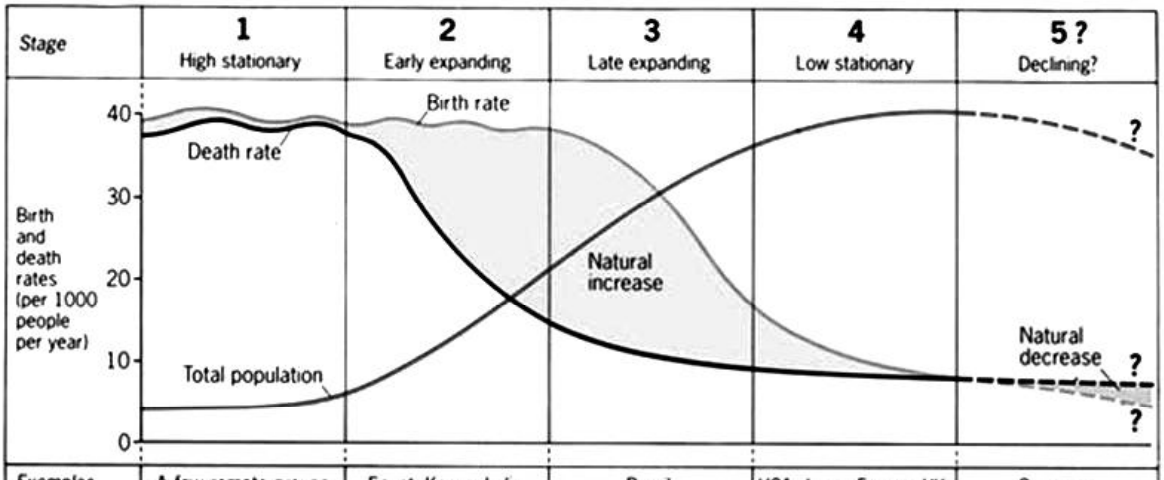
Socio-Economic Impact of the Epidemiological Transition: The important socio-economic impacts of the theory of epidemiological transition are as follows:

- Impact on fertility: As a developing country moves towards the higher stages of development, better health and greater longevity enjoyed by females of reproductive age tend to enhance fertility. However, the reduced risks to infants and young children that occurs in the later stages of the transition tends to have the opposite effect: prolonged breastfeeding associated with reduced mortality among infants and toddlers, together with parental recognition of improved childhood survival, tend to lengthen birth intervals and depress overall reproductive rates.
- **Economic impact:**The transition may also be associated with demographic movements to urban areas, and a shift from agriculture and labour-based production output to technological and service-sector-based economies. This shift in demographic and disease profiles is currently under way in most developing nations, however every country is unique and transition speed is based on numerous geographical and socio-political factors. Whether the transition is due to socioeconomic improvements (as in developed countries) or by modern public health programs (as has been the case in many developing countries), the lowering of mortality and of infectious disease tends to increase economic productivity through better functioning of adult members of the labour force and through an increase in the proportion of children who survive and mature into productive members of society.

Graphical Representation: The epidemiologic transition theory of development along with the rate of growth in population in certain countries has been graphically represented with the help of Figure 14.1.

From Figure 14.1, it has been seen that countries like India (including Egypt and Kenya) are passing through the Stage 2 (early expanding). The impact of health services can also be seen in the different stages of transition.

Figure 14.1: Graphical Representation of the Epidemiologic Transition Theory



Examples	A few remote groups	Egypt, Kenya, India	Brazil	USA, Japan France, UK	Germany
Birth rate	High	High	Falling	Low	Very low
Death rate	High	Falls rapidly	Falls more slowly	Low	Low
Natural increase	Stable or slow increase	Very rapid increase	Increase slows down	Stable or slow increase	Slow decrease
Reasons for changes in birth rate	Many children needed for farming. Many children die at an early age. Religious/social encouragement. No family planning.		Improved medical care and diet. Fewer children needed.	Family planning. Good health. Improving status of women. Later marriages.	
Reasons for changes in death rate	Disease, famine. Poor medical knowledge so many children die.	Improvements in medical care, water supply and sanitation. Fewer children die.		Good health care. Reliable food supply.	

Source: https://www.murrieta.k12.ca.us/cms/lib5/CA01000508/Centricity/Domain/1814/Epidemiologic%20Transition%20Model.pdf

Thus, from the above discussion, we can see that the epidemiological transition occurs as a country undergoes the process of transitioning from developing nation to developed nation status. The developments of modern healthcare and medicine, such as antibiotics, drastically reduce infant mortality rates and extend average life expectancy which, coupled with subsequent declines in fertility rates, reflects a transition to chronic and degenerative diseases as more important causes of death.

Further, the theory of epidemiological transition uses patterns of health and disease as well as their forms of demographic, economical and sociological determinants and outcomes.



CHECK YOUR PROGRESS

Q 3: How does DALY reflect upon the level of development in a country? (Answer in about 50 words)

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Q 4: What does the second phase of Omran's model of epidemiological transition indicate? (Answer in about 50 words)

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14.8 LET US SUM UP

- Several empirical studies made in developed countries, especially the U.S.A. regarding the sources of growth or, in other words, contributions made by various factors such as physical capital, man-hours, (i.e., physical labour), education etc. have shown that education or the development of human capital is a significant source of economic growth
- The contribution of education to economic growth has also been measured through the rate of return approach. In this approach rate of return is calculated from expenditure made by individuals on education and the measurement of the flow of an individual's future earnings expected to result from education.

- Another approach to measure the contribution of education is based upon the analysis of the relationship between expenditure on education and income.
- Recent studies have revealed that education, given the present education system, has tended to increase the inequalities in income distribution rather than reducing them. The adverse effect of formal education on income distribution has been explained through establishing a positive correlation between level of education received by an individual and the level of his life-term earnings.
- It is generally argued that a healthy person is more productive and is likely to be more efficient. In theoretical economics literature, the role of health in economic development is analysed via two channels: the direct labour productivity effect and the indirect incentive effect. The labour productivity hypothesis asserts that individuals who are healthier have higher returns to labour input. This is well tested in the empirical literature with mixed conclusions. The incentive effect is borne of the theoretical literature, and individuals who are healthier and have a greater life expectancy will have the incentive to invest in education as the time horizon over which returns can be earned is extended.
- The word morbid refers to sickness and disease while the term 'mortality is defined as the condition of being mortal or dead.
- Disability-Adjusted Life Year (DALY) is a technique of quantifying the burden of disease from mortality and morbidity data. Theoretically, one DALY can be thought of as one lost year of "healthy" life.
- According to World Health Organisation, the sum of these DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.
- Analysis of disease burden is important to assess the overall progress made in health and other social aspects. A long-term analysis of disease burden data can actually portray the level of development a country has made both nationally and internationally.

- Abdel R. Omran first put forward the theory of epidemiologic transition in 1967. Conceptually, the theory of epidemiologic transition focuses on the complex change in patterns of health and disease and on the interactions between these patterns and their demographic, economic and sociologic determinants and consequences.
- An epidemiologic transition has paralleled the demographic and technologic transitions in the now developed countries of the world and is still underway in less-developed societies.

14.9 FURTHER READING

1) Thirlwall, A. P. (2006). Growth and Development (With special reference to Developing Economies). London: Palgrave Macmillan.
2) Todaro, M. P. (1971). *Development Planning: Models and Methods.* London: Oxford University Press.

14.10 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The word morbid refers to sickness and disease. In simple terms, morbidity can be applied to an individual (e.g., someone with cancer) or to a population in the form of a morbidity rate (e.g., the incidence of malaria or Japanese encephalitis).

Ans to Q No 2: As a result of higher private costs and lower expected benefits from education of the poor students, the poor family's rate of return from investment in education of a child is much lower. As a result of this, the children of poor families are likely to 'drop out' during the course of primary education.

Ans to Q No 3: According to World Health Organisation, the sum of DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.

Ans to Q No 4: The second phase in Omran's model involves improved nutrition as a result of stable food production along with advances in

medicine and the development of health care systems. Particularly, studies on Western Europe and North America revealed that such improvements were recorded because an overall reduction in malnutrition enabled populations to better resist infectious disease.

14.11 MODEL QUESTIONS

Short Questions (Answer each question in around 150 words).

Q 1: Discuss briefly Schultz's Analysis of Expenditure on Education and Income.

Q 2: Discuss the consumption benefits of education.

Q 3: Discuss the external benefits of education.

Q 4: Distinguish between mortality and morbidity.

Q 5: Briefly explain the concept of Disability-Adjusted-Life-Years (DALY) and its importance.

Long Questions. (Answer each question in around 300-500 words)

Q 1: Discuss the relationship between education, health and economic development.

Q 2: Describe the linkages between health and economic development.

Q 3: Assessment of Health Status in Terms of

Q 4: Discuss the epidemiological transition theory of development

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UNIT 15: ENVIRONMENT AND DEVELOPMENT

UNIT STRUCTURE

15.1 Learning Objectives

15.2 Introduction

15.3 Environment and Economic Development: The Basic Issues

15.4 Concept of Sustainability and Environmental Accounting

15.5 Growth vs Environment

15.6 Impact of Economic Development on Environment

15.7 Gender, Environment and Poverty

15.7.1 The GEP-Index of Vulnerability

15.8 Let Us Sum Up

15.9 Further Reading

15.10 Model Questions

15.1 LEARNING OBJECTIVES

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

- describe how environment is related to economic development
- discuss the meaning of sustainable development and environmental accounting
- outline the impact of various developmental activities on environment
- discuss the concepts of gender, environment and poverty
- discuss the concepts of GEP-Index of Vulnerability.

15.2 INTRODUCTION

In recent years there is growing concern about the environment linking with the economic development. Due to various issues relating to ecology and overall environment caused by development programmes, focuses have been laid how the minimum degradation of environment is ensured to keep the development tasks to be continued. For rapid growth in production, urbanization and availability of other modern facilities, natural resources are explored regardless of whether the resources we are

extracting are renewable or non-renewable, or regardless whether they are causing loss of bio diversity or ecological balance or they are creating pollution in the air and water. It is argued that environmental degradation are also imposing high costs on developing countries through health related expenses and reduced productivity of other resources. Severe environmental degradation due to population pressures on marginal land has led to falling farm productivity.

Thus development economists agree that environmental issues remain an integral part of development related policy initiatives. That is why, now a days, cost of environmental degradation is imperative to incorporate in the calculation national income accounting of the countries. However, the monetary measures of loss of environmental quality is not as simple as other factor costs since most of the costs are losses of natural resources which are public goods and thereby there is question of externalities, free rider's problems. The problems in defining property rights and at the same time, most of the cases they are transboundary in nature make the issue complex. Thus development today is the question of sustainable development which aims to meet the needs of present generation without sacrificing the needs of the future generation. Sustainable development, hence needs to preserve the natural resources, especially the non renewable or which cannot be regenerated in a meaningful time period.



LET US KNOW

When activities of one country creates problem or degrades the environment of other countries, it is called the transboundary problem of environment. For example, when the industries of state of the Uttar Pradesh of India pollutes Ganga river which flows to Bangladesh and they have to face polluted river causing death of fish, causes disease, it is called transboundary or transnational problem of environmental degradation. This has led the environmental issues to global level.

15.3 ENVIRONMENT AND ECONOMIC DEVELOPMENT: THE BASIC ISSUES

In this section of the chapter, a discussion has been carried out regarding the relationship between environment and economic development. It is generally found that for the speedy development process, the quality of environment has been degraded. It requires that development and environment should be studied together.The process of economic development creates rapid industrialisation and urbanisation. But unplanned industrialization and urbanisation causes deforestation and pollution. Similarly, rapid population growth and increasing economic activities in the developing countries has resulted severe environmental damage. Unless there is appropriate measure at various level to control such issues relating to environment due to developmental activities, development we achieve will not at the cost of environmental degradation. It is very difficult to describe the relationship between these two variables from a specific aspect. But the relationship is much more complicated and various other indicators have to be taken in to consideration. In this context, the economist M.P. Todaro has mentioned eight such basic issues relating to environment and economic development viz.

- Concept of Sustainable Development and Environmental accounting
- Population, Resource and Environment
- Poverty and Environment
- Growth versus Environment
- Rural development and Environment
- Urban Development
- The Global Environment and Economy
- Nature and pace of Green House gas induced climate change

Concept of sustainable development and Environmental accounting are newly coined topic in development studies. Growing population has been leading to extensive use and creating shortage of land, water, fuel woods, and other natural resources. Moreover, high density of population due to urbanization accompanied by rapid population growth

has also contributed to environmental degradation. Rapid population growth is again caused by poverty and unemployment in the LDCs, which is also a cause of illiteracy and unaware population.

Though economic development improves the quality of life and thereby reduces fertility rate, population control take time and due to increased economic activities and industrialisation, environment continues to degrade. Preservation of environment is less preferred to increased production. Urbanisation, industrialisation and generation of power and energy cause desertification, deforestation and extensive extraction of minerals and other non renewable resources. There is increased pollution, but since the pollution abatement techniques are expensive, most of the developing countries industries seemed to go with pollution even paying taxes.

15.4 CONCEPT OF SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL ACCOUNTING

As mentioned in the previous section, enhancement and maintenance of living conditions present as well as future generations is the basic guiding principle of sustainable development of an economy. The term sustainability reflects the need for balance between economic development and preservation of environment. It refers to meeting the need of present generation without compromising the needs of the future generations. There are number of definitions of sustainable development among which widely accepted definition provided by the World Commission on Environment and Development (WCED) in the Report "Our Common Future" published on its Brundtland Summit in 1987. According to this Report of WECD, "Sustainable development is development that meets the needs of the present without compromising the ability of the future generations to meet their own needs." Thus, it is a process of economic activities which leaves the environmental quality intact with the policy directives.

A development path is sustainable if and only if the stock of over all capital assets remains constant or rises over time. The natural resource

base of a country and quality of air, water and land has to be maintained over generations. Therefore policy directives are to be made to take into consideration on the issue of sustainability. While measuring the national income of a country, costs of degradation of environment isimperative to incorporate. This is done through environmental accounting or sustainable accounting. For example, loss of valuable environmental resourcesshould be factored into estimates economic growth and human welfare. If an environmental resource is depleted in one area, a resource of equal or greater value should be regenerated or created elsewhere.

Many development analysts and environmentalists have tried to set modalities for such environmental accounting. David Pearce and Jeremy Warford provided a good example of Environmental accounting as,

$NNI^* = GNI - D_m - D_n$ where,

NNI* is the sustainable Net National Income

GNI is the Gross National Income

D_m is depreciation of manufactured capital assets such as machines, factories, roads, etc. and

D_n is the depreciation of environmental capital such as forests, soil quality, etc.



LET US KNOW

The main objective of environmental and economic accounting is to expand existing systems of national economic accounting to integrate environment and social dimensions in the accounting framework. Currently a satellite system of accounts to measure the depletion of natural resources has been developed which is called Green GNP.

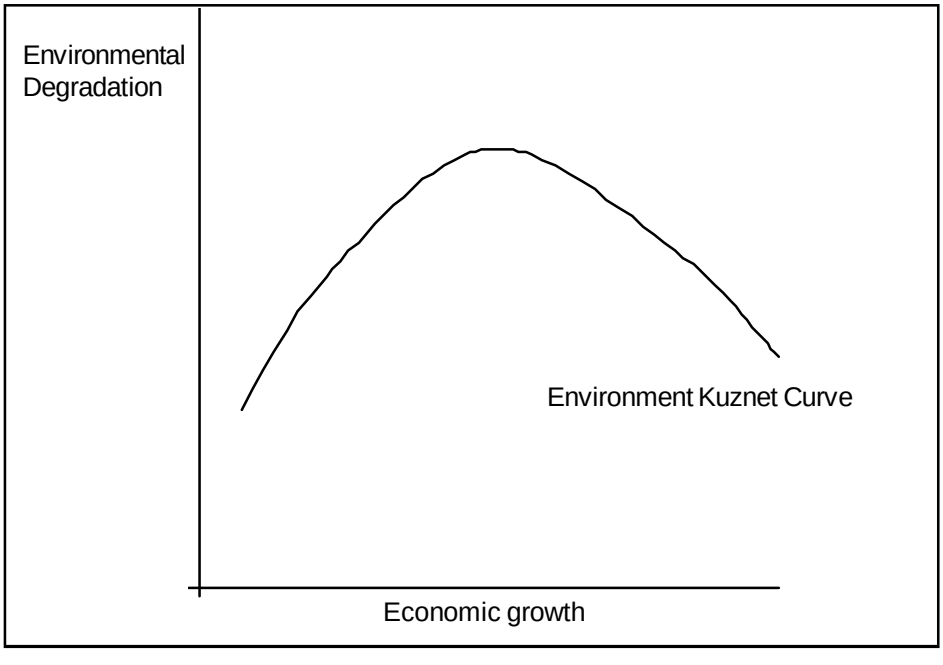
15.5 GROWTH VS ENVIRONMENT

We have seen that economic growth and environment are closely related. Economic growth of an economy can be defined as increase in

the national income of a country over a period of time.Rushing for rapid economic growth may leadto degradation of environment. Then, should we conclude that, there is negative relation between the two? This is also not true. Environmental quality is also related to the poverty, illiteracy and growth of population. Overcoming from poverty, illiteracy or control of population is possible through development and growth. It is generally observed that in developed countries, there is awareness for protecting environment and also environment friendly technology is affordable.

It is necessary to establish a relationship between economic growth and environment. Simon Smith Kuznet is considered to be pioneer in establishing the relationship between the two variables. He was an American economist and statistician who received 1971 Nobel Prize in economics for his empirically founded interpretation of economic growth which has led to deepened insight into the relation between growth and environment.According to him, at the early stage of growth, there is more degradation of environment along with increased economic activities. However, in long term, and after a certain stage of growth, this tendency falls due to increased measures for protection of environment. Thus Kuznet derived an inverted U shaped curve for environment-growth trade

Figure 15. 1: Environmental Kuznet Curve



off which is similar to his income and inequality curve. Thus, according to Kuznet, at the initial stage, environmental degradation rises and then falls at a higher level of development. This is shown in figure 1 where environmental degradation is shown on the vertical axis and economic growth on the horizontal axis.

As shown in figure 1, in the initial stages of economic growth, economic growth leads to environmental degradation. But once it achieves a certain level, further increase in economic growth helps in reducing the level of environmental degradation.

15.6 IMPACT OF ECONOMIC DEVELOPMENT ON ENVIRONMENT

In the previous section of the chapter, we have established the relationship between growth and environment mainly with the help of environmental Kuznets curve. In this section of the chapter, we have carried out an analysis regarding the specific impact of economic development on environment. We can summarise the following impacts of developmental activities on environment

- **Pollution:** Water pollution and air pollution are the most serious damage of environment quality all over the world. According to World Bank Report about 88 percent of diarrheal diseases globally are attributed to water, sanitation and hygiene. Moreover due to excessive emissions from industries and vehicles, air also has become polluted causing to various health related as well as productivity concerns.
- **Solid and Hazardous Wastes:** Inadequate collection and unmanaged disposal of wastes creates problems to human health and productivity. As noted by World Bank Report 1992, uncollected refuse dumped in public areas or into waterways contribute to the spread of disease.
- **Soil degradation:** A study sponsored by United Nations Environmental Programme (UNEP) revealed that almost 11 percent of earth's vegetated surface underwent moderate or worse soil degradation over the period 1945 - 1990 because of human activity. Soil erosion, water

logging and salinisation are the forms of soil degradation.

- **Deforestation:** Forests are essential for not only proper biodiversity; it has also value to environment for keeping weather normal. But continuous destruction of forests is going on for the need of growing human population, urbanization and industrial needs. Man has cleared forests areas for dwelling, extending agriculture, obtaining firewood, timber and construction materials. Due to increased deforestation man and wildlife conflict has been increased.
- **Loss of biodiversity:** Urbanization and deforestation causing huge loss of biodiversity which is necessary to keep balance in the ecosystem. Number of species has already omitted and some have become fighting for survival. Some has been finding difficult to shelter, some have become endangered because of changed especially warmed climate.
- **Greenhouse effect and Global warming:** Due to over emission of Green house gases, issue of global warming has come serious at present day world. Global average CO2 concentration has increased significantly due to burning of carbon based fossil fuels, deforestation and changed use of land. These amplified the natural green house gas (GHG) effect and because of that global warming have increased beyond the natural level by 20C.
- **Depletion of Ozone Layer:** Ozone layer protects earth from ultra violet ray from the sun. Ozone depletion is mainly caused by CFCs which are evidently increasingly used by certain industries. Ozone depletion causes serious threat to life support system of earth.



LET US KNOW

Some important conferences and summits on environment and climate change are:

1. UN Conference on the Human Environment (1972) commonly known as the Stockholm conference held at Stockholm
2. UN Conference on Environment and development commonly

known as Earth Summit (1992) held at Rio de Jenerio, Brazil

3. Climate change Convention or Koyoto Protocol (1997), held at Koyoto Japan
4. Bali Summit (2007) held at Bali, Indonesia
5. Copenhagen Conference (2009), Denmark
6. Doha Climate change summit (2012) held at Doha, Qatar
7. Lima climate change Conference (2014) held at Lima, Peru
8. United Nations Climate Change Conference (2016), Paris

15.7 GENDER, ENVIRONMENT AND POVERTY

In this section of the chapter, gender and poverty aspects of environment are discussed.These two aspects are very crucial for overall economic development of a country. In other words, the effects of environmental degradation can be observed on gender perspective also. Similarly, the vulnerability due to environmental degradation may differ from class of the people. Therefore, in addition to the gender perspective impacts of loss of environmental quality, it is also studied who suffer the most - the poverty ridden people or richer section of the society. There are distinct regional differences in the extent of environmental vulnerability, incidence of poverty, and women's status.

Meaning of Poverty may be different to different people. Though it is sometimes conceptualized interms of income, i.e. people living below a certain predeterminedincome level defined as poor, poverty may be defined in terms of assets instead of income. In thiscase, poverty may refer to lack of sufficient income generating assets needed to be ableto provide an adequate level of basic necessities (UNDP 1999: 26). Assets may includenatural capital (the ownership of land), human capital (work skills), social capital(human relations), physical capital (tools of the trade), and financial capital (cashsavings). For the absolute poor, individual ownership of these assets may be beyondtheir reaches. On the other hand, collectively the poor may own a substantial amount of the various forms of the asset categories mentioned above, and pro-poor publicpolicies

may focus on how to better allocate and manage these assets so that the economiccircumstances of the poor will be improved. In addition,this asset-based definition of poverty is particularly helpful in examining poverty-environmental interactions. Another key fact that needs to be recognized in relating poverty and the environmentis that poor people are not a homogenous group.

15.7.1 The GEP-Index of Vulnerability

Gender Environment Poverty Index measures the interlinkage among the three aspects viz. Gender, environmental quality and incidence of poverty of a particular area of country. This is basically a composite vulnerability Index measured with three vulnerability indices viz. Gender vulnerability, environmental vulnerability and poverty vulnerability.

The gender vulnerabilityindices have been computed by using three of the indicators discussed in the previous section: sex ratio, rural female literacy rate, and rural total fertility rate. On literacy, female literacy rates is used rather than the gender gap in literacy, since what is important is not just women's literacy level relative to men's, but also the overall level of literacy prevailing in the region. This both reflects and affects social attitudes and gender biases on other counts. In any case, the female literacy rate and the gender gap in literacy rate are highly negatively correlated.

Environmental vulnerabilityis measured by the level of normal rainfall and the per cent area under forests. The lower the normal rainfall levels in a state and the lower its forest cover, the greater would be its environmental vulnerability.

Poverty vulnerabilityis measured by the proportion of people below the poverty line. The higher the proportion of poor, or conversely the lower the proportion of non-poor in a state, the greater its poverty vulnerability.

For composite index of above three indices, A formula similar to that used in UNDP's Human Development Reportto compute

the human development index has been used to arrive at the vulnerability indices which is a geometric mean of the three dimensional indices. GEP was constructed first separately for 1971 and 1991, and then in terms of changes over time. Essentially this constitutes an attempt to gender and green the human development index for different regions.

Thus the composite index of vulnerability is calculated by averaging the three dimensional indices which is very similar to the HDI dimensional index as,

$$Z_{ij} = \frac{\text{Max Xij} - \text{Actual Xij}}{\text{Max Xij} - \text{Min Xij}}$$

The average of the individual indices gives us the GEP indices, expressed algebraically as follows:

$$\text{GEP} = 1/n \sum Z_{ij}$$

Where n is the number of indicators used.



15.8 LET US SUM UP

- For rapid growth in production, urbanization and availability of other modern facilities, natural resources are explored regardless of whether the resources we are extracting are renewable or non-renewable. Thus there is interrelation between economic development and environment.
- The essence of sustainable development is that needs to preserve the natural resources, especially the non-renewable or which cannot be regenerated in a meaningful time period.
- Growing population has been leading to extensive use and creating shortage of land, water, fuel woods, and other natural resources. Moreover, high density of population due to urbanization accompanied by rapid population growth has also contributed to environmental degradation. Rapid population growth is again caused by poverty and unemployment in the LDCs, which is also a cause of illiteracy and unaware population.
- According to this Report of WECD, "Sustainable development is

development that meets the needs of the present without compromising the ability of the future generations to meet their own needs

- While measuring the national income of a country, costs of degradation of environment is imperative to incorporate which is called environmental accounting or sustainable accounting. For example, loss of valuable environmental resources should be factored into estimates economic growth and human welfare.
- Simon Kuznet developed a relationship between growth and development. According to him, at the early stage of growth, there is more degradation of environment along with increased economic activities. However, in long term, and after a certain stage of growth, this tendency falls due to increased measures for protection of environment. Thus Kuznet derived an inverted U shaped curve for environment-growth trade off which is similar to his income and inequality curve. That is, at the initial stage, environmental degradation rises and then falls at a higher level of development.
- The effects of environmental degradation can be observed on gender perspective also. Similarly, the vulnerability due to environmental degradation may be differ from class of the people
- Gender Environment Poverty Index measures the interlinkage among the three aspects viz. Gender, environmental quality and incidence of poverty of a particular area of country. This is basically a composite vulnerability Index measured with three vulnerability indices viz. Gender vulnerability, environmental vulnerability and poverty vulnerability.
- It is public good if benefits everyone and remain available for others benefit. Some directly environment supplied things such as clean water, defence service provided by state, public institutions, etc, are common example of public goods. On the contrary, the products those decrease the well being of others simultaneously are called public bads. For example polluted air, water and soil are such public bads.

15.9 FURTHER READING

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15.10 MODEL QUESTIONS

Short Questions (Answer each question in around 150 words).

Q 1: Discuss the concept of Environment Kuznet curve.

Q 2: Discuss environmental issues as global phenomenon.

Q 3: Write a short note on GEP Index.

Long Questions. (Answer each question in around 300-500 words)

Q 1: Discuss the various environmental issues caused by economic development.

Q 2: What is sustainable development? How is it related to environment?

Q 3: Mention the major environmental degradations associated with development.

Q 4: What is environment accounting? Why it should be incorporated to the national income accounting?

Q 5: Explain the relationship between gender, environment and poverty?



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Name of the Paper: **Course Code:**

Centre for Internal Quality Assurance (CIQA)
Krishna Kanta Handiqui State Open University
City Office, Housefed Complex, Guwahati- 06

Learner's Feedback on Course

Dear Learner,

Regarding the course as mentioned above, we would like to know your opinions and comments so as to improve the quality of self learning materials in future. Please respond to the following statements by ticking the number you feel most reflect your opinion. After completion of the additional comments, please detach the page and send/mail the same to us at the address given below.

The Director, Centre for Internal Quality Assurance, KKHandiqui State Open University
Housefed Complex, Dispur, Guwahati- 781006
(E-mail id: ciqa@kkhsou.in)

1. Approximately how many hours did you spend for studying the units in the course? | | | |
2. Please give your opinions (by √ mark) to the following items based on your reading of the block:

Sl. No.	Statements	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I.	The SLMs of the course fulfil the learning objectives set out in the beginning of each unit					
II.	The units of the SLM could satisfy my academic needs and expectations					
III.	The Unit writers have excellent knowledge about the course contents					
IV.	Language and contents of the units were presented at a level which I could readily understand					
V.	Ample opportunity for participation in the activities provided in the units					
VI.	Used enough Illustrations (Diagrams, tables etc.) for conceptual clarity					
VII.	Quality of content is engaging, relevant, and up-to-date					
VIII.	The self check questions are very helpful					
IX.	The Possible/model questions and the answers to check my progress have benefited me a lot					

Additional Comments: *(Please feel free to provide your open comments)*

1. Which aspects of the SLM, according to you, worked well?

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2. What sort of changes/improvements do you feel KKHSOU could implement to improve the overall quality of the SLM?

Thank you for taking the time to complete this form.

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