HEALTH STATUS OF INDIA'S POPULATION: A STATE - LEVEL ANALYSIS

Dissertation submitted to the Jawaharlal Nehru University in partial fulfilment of the requirements for the award of the degree of

MASTER OF PHILOSOPHY

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1999

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This is to certify that the dissertation titled

HEALTH STATUS OF INDIA'S POPULATION: A STATE - LEVEL ANALYSIS

Submitted by Aradhana Srivastava, in partial fulfillment of the requirements of the award of the degree of Master of Philosophy of the University, is to the best of my knowledge, a bonafide work and may be placed before the examiners for evaluation.

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ACKNOWLEDGEMENT

I convey my whole hearted and sincere gratitude to my supervisor Dr. Sachidanand Sinha whose concern, advice and guidance has shaped up my research. I am also grateful to Dr. Ritu Priya for her constructive advice which was very valuable.

I am deeply indebted to my family for the love and care they have always bestowed me with, especially my brother who is a pillar of support. His help was instrumental in the timely submission of this dissertation.

I would also like to thank Mr. Deepesh Mittal, Mr. Varghese and Ms. Usha Mathur for their timely assistance, as well as the librarian of the National Institute of Health and Family Welfare for extending his full support and co-operation.

Lastly, I wish to thank all my friends for their encouragement and support, especially Ranjana, Mahuya, Ashis, Rakesh, Kaushik, Sanghita and Vijay Bhaiya. A very special thanks to Sobel Da whose reassuring smile and sincere help saw me through many an anxious moment.

CONTENTS

LIST OF FIGURES

LIST OF BOXES

LIST OF TABLES

CHAPTER I

INTRODUCTION

I.1 STATEMENT OF THE PROBLEM:

Health is one of the basic prerogatives of the welfare state. The concept of welfare state envisages that the responsibility of the welfare of the population lies with the state. The state must ensure a 'good' life for all its citizens. This implies the fulfilment of basic human needs, provision of a decent standard of living, good health and education, etc.

Health in its most basic sense means the absence of illness, but it is the function of several factors such as good nutritional intake, clean living environment, maintenance of hygiene and sanitation, education level and the provision of proper health care facilities. Health is thus not only a bio-physical status but also a social status. This is the reason why WHO defines health as 'a state of complete physical, mental and social well being, and not merely the absence of disease or infirmity'. Health being a social status is relative to the social and cultural context in which it is defined. Twaddle states that '...to the extent that we must talk about normal health within the context of group and cultural definition, rather than perfect health or any other fixed definition, health becomes a social norm.'[1] Whatever the cultural context, health has been universally recognised as a social goal. But while health is regarded as desirable universally, it does not necessarily get the same priority in all contexts.

India being a welfare state, health is one of the basic social responsibilities of the government. The state is responsible for ensuring the good health of all its citizens. India is also a signatory to the Alma Ata declaration of the WHO to ensure health for all by 2000 AD. However, in spite of this commitment, health remains a neglected social sector, especially in the face of economic problems faced by the country when budgetary allocations of health and other social sectors are cut in order to divert funds to other sectors which are given higher priority in economic development.

Though India has made considerable progress since independence in reducing mortality and in controlling many of the major diseases, it still experiences high morbidity prevalence and high death rates especially in the vulnerable groups of infants, young children and females in the reproductive age group. Most of India's health problems stem from a single factor - poverty. Poverty leads to poor living conditions and undernutrition which results in frequent morbidity. This in turn leads to loss of earnings due to absenteeism from work and expenditure on treatment of illness, thus leaving the household further

[1] Twaddle, A.C. (1974), 'The Concept of Health Status' , *Social Science and Medicine*, vol. 8(1), p. 29.

impoverished. It is a vicious circle which can be broken only through conscious efforts towards poverty amelioration as well as disease eradication. The role of poverty in determining health status was realised in WHO's tenth revision of the International Classification of Diseases which classified severe poverty as a disease in itself.[2]

There are two important features which characterise health status of population in India:

a) The health status has a significant relationship with social and economic backwardness, but social factors seem to play a more prominent role in determining health status than economic and other factors in India.

b) There exist in India wide disparities in the level of health. These disparities are not only across geographical regions, but age groups, gender and social classes as well. They are basically the result of institutionalised social inequalities which translate into inequalities in health status as well.

It is important , therefore, to assess the health status of the country's population and the underlying factors which influence health perception, morbidity prevalence and the accessibility to and utilisation of health care facilities. Health status as indicated by the levels of mortality which is the extreme manifestation of poor health, morbidity or the extent of diseases in the population and nutritional intake which determines the functional ability of the individual and his/her susceptibility to ill health, is a major indicator of the quality of a country's population. This study, therefore, analyses the health status of population in India in terms of the three above mentioned aspects. Analysis of data on these aspects since independence gives a valuable insight into the trends and patterns of morbidity, its relationship with mortality and nutritional status and the factors which influence health status in India.

I.2 OBJECTIVES:

The following are the three main objectives of this paper:

1. Analysis of the mortality rates , morbidity rates and nutritional status of the population in order to arrive at a comprehensive understanding of health status of India's population on a spatio-temporal scale.
2. To analyse the patterns of a composite index of health status which combines the three variables of mortality, morbidity and nutritional status.
3. To examine the effect of the major social and economic factors in determining the health status of India's population, and to observe the degree to which they influence the health status.

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[2] Gumber, A. (1997), 'Burden of Disease and Cost of Ill Health in India.', *Margin*, vol. 29(2), p. 134.

I.3 DATABASE:

There are four major sets of data that have been used in this study. They are regarding mortality, morbidity , nutritional status and factors affecting health status.

1. Mortality data:

The mortality data was examined for the years 1961, 71, 81 and 94. The 1961 mortality estimates were taken from the 'Vital Statistics of India' report for the year 1962-63 which contained data of the Civil Registration System. However, for the years 1971-94, the Sample Registration System annual reports provided the data for the relevant years.

2. Morbidity data:

Measures of morbidity were formulated using the data on diseases pertaining to the different categories and disease groups in terms of number of cases reported and number of deaths as registered in the public health institutions which was available in the Statistical Abstract for the years 1961, 71 and 81. However, for 1993-94 the data on diseases was available only for communicable diseases and pertained only to rural areas as reported by the primary health centres. This data is published in the report 'Health Information of India' published by the Ministry of Health and Family Welfare.

3. Nutritional Status:

Nutritional status was analysed through data on calorie intake taken from the NSSO report titled ' Nutritional intake in India' published in 1996 containing data of 50^{th} round of the NSS (1993-94). Data on proportionate expenditure on food was taken from the Sarvekshana Analytical Report no. 2 of the 50^{th} round of NSS published in 1998. Data on calorie intake and food expenditure for the previous NSS rounds was also available in the above mentioned report.

4. Factors affecting health status:

Data on determinants of health status such as levels of urbanisation, poverty, female literacy, availability if health care facilities and immunisation was used in the exercise in correlation and regression analysis and was derived from different sources. Data on poverty and income was taken from the Statistical Abstract, and the 'Health Information of India' provided data on health expenditure, health personnel and health care facilities. SRS estimates on life expectancy at birth and NSS estimates on calorie intake and expenditure on food was also included in the analysis. Data on immunisation coverage was taken from the National Family Health Survey (1992-93).

I.4 METHODOLOGY:

The following methods wee used in the analysis of the health status across the states:

1. Mortality:

Mortality levels across the states were analysed for the years 1961-94 using the standard measures of crude death rate, infant mortality rate, maternal mortality rate and death rate in the age group of 0-4 years. The following are the measures of mortality which have been used in health status analysis:-

a) Crude Death Rate (CDR): It is the most simple measure of mortality indicating the number of deaths in a particular region in a year per thousand population of that region.

CDR = (D/P) x 1000 where -

D =No. of deaths in a year.

P = Estimated mid-year population for that year.

b) Infant Mortality Rate (IMR): This measures the proportion of deaths of children below one year of age to the number of live births.

IMR = (D0 / B1) x 1000 where -

D0 = No. of deaths of children under one year of age in a year.

B1 = No. of live births in that year.

The IMR is affected by not only the overall conditions of health in a region, but also several social and cultural factors which influence the survival of infants. It is therefore a sensitive indicator of the level of social development of the community.

c) Maternal Mortality Rate (MMR): Maternal mortality is the death of a woman from causes related to pregnancy and child birth. It is an important indicator of the health status of females particularly in societies with high fertility rates. MMR is high in societies with low level of social and economic development and also in regions with inadequate development of health care facilities especially for women.

MMR = (DM / BI) x 1,00,000 where -

DM = No. of female deaths due to maternity causes in a year.

BI = No. of live births in that year.

d) Death rate in the age group 0-4 years: This measure has been used as an indicator of child mortality, hence has been termed child mortality rate (CMR) in this study. The CMR has been calculated by the following method:

$CMR = (D_{0-4} / P_{0-4}) \times 1,00,000$ where -

D_{0-4} = No. of deaths in the age group 0-4 years.

P_{0-4} = Total population in the age group 0-4 years.

2. Morbidity:

Morbidity was analysed for the years 1961-94 across the states using the following four measures of morbidity:

a) Disease Prevalence Rate: The method for calculating disease prevalence rate (DPR) per lakh population for a particular year is given below.

DPR = (No. of cases of i^{th} disease in j^{th} region / total population of the region) x 1,00,000

b) Case Fatality Rate: The case fatality rate or CFR for a particular year is calculated using the following method:

CFR = (No. of deaths from disease x in region j / no. of cases reported of disease x in region j) x 100

c) Proportional Morbidity: The proportional morbidity or PMB for a particular year in a given region is calculated using the following method:

PMB = (No. of cases reported of disease x / total no. of cases reported) x 100

d) Proportional Mortality: The proportional mortality or PMT is calculated for the particular year in the given region as :

PMT= (No. of deaths reported from disease x / total no. of reported deaths from all diseases) x 100.

3. Nutritional status:

Per capita per diem calorie intake levels were analysed across the states to assess the nutritional status of the population No statistical measures were used in this section.

4. Composite Index of Health Status:

A composite index of health status was calculated using the three health status variables of morbidity, mortality and nutritional status in order to analyse the resultant state-level patterns of a combined picture of health status. The method used was Kendall's method of ranking coefficient.

$$CI = \sum Rij$$

when R= rank of jth region in terms of ith feature. In this method the three variables are ranked according to their relative position across the states, and the summation of the ranks gave the composite index of health status. The three variables used in this study were disease prevalence rate, infant mortality rate and per capita per diem calorie intake.

5. Factors affecting Health Status:

In order to analyse the factors which influence health status, the interrelationship between them and their relationship with the health status variables an exercise in correlation and regression analysis was carried out using the SPSS computer package

I.5 RESEARCH QUESTION:

Health status studies in India have so far dealt with mainly mortality statistics because of the easy availability and greater reliability of mortality data as compared to morbidity or nutritional status. In this context, this study puts forth the following research questions which it then proceeds to explore:

1) What is the spatio-temporal pattern which emerges from analysis of morbidity data available in India and how does it relate to the health status patterns as derived using the mortality data?
2) What is the spatio-temporal pattern of nutritional status in India and how does it relate to the patterns of morbidity and mortality?
3) What are the patterns emerging from analysis of a composite index of heath status which combines the morbidity, mortality and nutritional status variables and what is the feasibility of such an index in the Indian context?
4) What is the nature of relationship of different socio-economic factors which affect the health status of population and to what extent do they influence the health status of people in India?

I.6 RATIONALE:

There are certain assumptions which comprise the rationale of this study and can be summarised as follows:

1) The health status of population is the combined manifestation of the aspects of mortality, morbidity and nutritional status, and can effectively indicate health status in the Indian context also.
2) Morbidity has a profound influence on mortality and high morbidity leads to high mortality and vice versa. This trend can be reflected through statistical analysis in the Indian context also.
3) Nutritional status influences morbidity and mortality negatively in the sense that malnutrition increases the risk of morbidity and mortality and therefore lowers health status. Since the problem in India is more of widespread undernutrition than overnutrition, it is assumed that lower the level of calorie intake, higher the morbidity and mortality.
4) Socio-economic factors play a greater role influencing people's health in India, particularly social development factors, as compared to other factors affecting health status.

I.7 AREA OF STUDY:

The study is restricted to a state-level analysis for India for the years 1961, 71, 81 and 1993-94 (which is the latest year for which data was available at the time of commencement of the study). Only the 15 major states have been included in the study because the minor states have low population base and often distort the results by inflating or deflating the national averages in some cases and the averages at the regional level in some cases. Another problem with the minor states is that of data availability, since for certain variables data was not available for all the states.

The study area thus includes the four southern states of Kerala, Tamil Nadu, Andhra Pradesh and Karnataka; the western states of Maharashtra, Gujarat and Rajasthan; the central and northern states of Uttar Pradesh and Madhya Pradesh; the eastern states of Bihar (only mortality and nutritional status), Orissa, West Bengal and Assam; and the north-western states of Haryana, Punjab and Himachal Pradesh. All these states together constitute 96.5% of the country's population and hence are highly representative of the nation as whole.

The study, therefore, has been able to examine the health status patterns for the major states on a temporal scale and also the manner in which health status is influenced by different socio-economic variables.

I.8 DESIGN OF THE STUDY:

As stated earlier, the focus of the study is on the analysis of the health status of India's population as manifested through the spatio-temporal patterns and on the dominant socio-economic factors which influence health status in India.

The following is the scheme of chapters followed in this study:

Chapter II is a comprehensive survey of literature regarding the research carried out on health status. The literature review states that studies in the broader context of social well being, and quality of life studies. This includes a look into the measures of health status, quality of life and health-related quality of life as given by medical scientists, economists, geographers and other researchers. It also explores the development of medical geography, the field in which this study is placed. Lastly it surveys the work done in health status studies in India, which includes studies on quality of life as well as health services utilisation among others.

Chapter III is an inquiry into the nature of data required for health studies. It examines the type of data required, its attributes and limitations, and the sources through which the data can be obtained. It

outlines the various sources from which health and related data can be obtained in India highlighting the main features and limitations of the same.

Chapter IV forms the main body of the study. It is divided into four major parts. The first part is an analysis of the mortality variables across the states from 1961-94. The second part is the exhaustive look into the morbidity patterns across the states from 1961 to 1993-94 by disease groups as well as their constituent diseases for which data was available. The third section deals with the analysis of nutritional status of India's population across the states from 1962-63 to 1993-94 in terms of the variations in the levels of per capita calorie intake. The last section is an examination of the results ofd an exercise into the formulation of a composite index of health status. This analysis provides an insight into the feasibility of combining the three indicators of morbidity, mortality and nutritional status into a single index of health status in the Indian context.

Chapter V contains the analysis of the determinants of health status. An exercise on correlation analysis has been carried out containing a total of four health status variables and 15 determinant variables for fourteen major states for the year 1993. While the correlation analysis brings out the direction and degree to which the socio-economic determinants of health status affect the health status variables. The second part of the chapter containing a regression analysis on 10 independent variables shows the extent of the influence of these determinants on health status and the extent of variation in morbidity and mortality which can be explained by them.

The last chapter contains the summary of conclusions reached in the health status analysis. It also contains a critique of the health policy of India and an outline of the areas in health which require special focus in future in order to improve the health status population in India.

CHAPTER II

HEALTH STATUS STUDIES: A SURVEY OF LITERATURE.

II.1 INTRODUCTION:

Good health is the foundation of a good life since it ensures optimal functionality of the individual. Not only does illness cause pain and suffering, but also leads to loss of productive ability. Through the ages human beings have been continuously striving to improve their health status and lead a long and illness-free life. Such efforts led to the development of the medical sciences. The last two centuries have seen vast expansion of medical research leading to rapid development in the field of medicine, and dramatic improvements in the health status of population all over the world. There has also been expansion of research in fields related to health such as epidemiology, social medicine, health economics and medical geography. Developments in these fields have led to changes in the conception of health from mere absence of disease to the more generic concept of physical, mental and social well being. One of the major issues that emerged in the field of health research was the analysis of how healthy people actually were. This concern for measuring the health status of populations has undergone great expansion, particularly in the scenario after the second world war. This chapter traces the course of research in this field from the past to the present, highlighting the major ideological and other influences that have affected it and the resultant changes in the methodologies that emerged.

II.2 EARLY PHASE:

Measurement of health status of populations grew in importance in the post second world war era of nations emerging out of a colonial past and chalking out their paths to development. The developed countries and the UNO played an important role in this process, providing the guidelines on which these nations could proceed towards development. This was also the era of increased emphasis on quantification in social research. The concern for economic development led to collection of vast amount of data on resources and other economic attributes which could be analysed with the help of the emerging econometric techniques. During the first two development decades of the 1950s and 60s, a nation's level of development was measured using macro-economic indicators such as the per capita GDP. A growth in the national income was assumed to reflect a growth in the overall development of the nation. Global ranking of nations on the basis of economic growth was a useful tool in the hands of the industrial nations to

decide the potential recipients of aid and development loans. All countries which adhered to the ideology of the welfare state worked towards providing better social infrastructure to the people. There was also concern to observe as to how the states were faring on the welfare aspect.

II.2.1 HEALTH STATUS STUDIES IN THE EARLY PHASE:

In this period the disease model of health prevailed, which meant that health was seen as mere absence of disease. Research on health status measurement during this period was mainly based on mortality data. The reason for the extensive utilisation of mortality based data like the infant mortality rates and life expectancy at birth, was the easy availability and reliability of such data. The UNO , which was one of the major organisations supporting such research, formed a committee in 1953 on 'International Definition and Measurements of Standards and Levels of Living'[1]. The committee published a list of health indicators utilising mortality based data. This was one of the earliest attempts to identify indicators specific to health.

Two of the widely used mortality based health status indexes that developed in the USA are given below[2]:

1. **Unnecessary Death Index:** This is the ratio of unnecessary deaths to all deaths for a given disease and geographic area. The death rate for the lowest rate region is taken as the baseline and applied to the population of the other region to get a normative rate for expected number of deaths. The difference between the actual number of deaths and the normative figure gives the unnecessary deaths.
2. **Discratic Index:** Proposed by de Shelley-Hernandez [3], the index is derived by dividing the infant mortality rate per thousand for a given year for a community, with the average life expectancy of the same community.

These calculations revealed little about the actual health condition of the population under study and were in this sense crude measures, not useful for meaningful qualitative analysis. Mortality based indicators, therefore, could not be considered comprehensive in the absence of morbidity data. The main hindrance in this respect was the inconsistency and unreliability of the data available. However, it was not until the mid-60s that full development of morbidity based indices could take place.

Morbidity reporting was traditionally limited to type and incidence of diseases. A morbidity index measured the prevalence of illness in a population. Sullivan[4] categorised the characteristics of

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[1] Balinsky, W. & R. Berger (1975), 'A Review of Research on General Health Status Indexes', *Medical Care*, vol. XIII (4), p.287.
[2] Ibid., p.287.
[3] Ibid., p.288.
[4] Ibid., p.286.

morbidity into three states- clinical evidence, subjective evidence and behavioural evidence. Sullivan later popularised the concept of disability component of morbidity, defining it as 'any temporary or long term reduction in a person's activity. The disability component became important in the categorisation of illness on the basis of severity categories and in health indicator studies correlating health status with the functional status of the individual. Morbidity indexes, though more complicated and less reliable than mortality, gained importance in the assessment of health status of populations.

II.2.2 INFLUENCE OF WELFARE APPROACH:

By the 1960s, substantial research had been carried out on the indicators of economic development of countries. The research revealed that economic growth did not capture the state of social development of a country. A growth in national income did not necessarily mean a more equitable distribution of wealth. Economic indicators did not reflect the health status of a population or the educational achievement. The developing countries were faced with the problem of poverty, malnutrition, poor housing, high infant mortality rates, ill health and illiteracy. In spite of economic growth there was the problem of widening disparity between the rich and the poor, the haves and the have-nots. The industrial nations on the other hand faced the problem of rising economic and social inequalities, unemployment, crime, pollution, ghettos etc. These problems were not reflected in the economic performance of the nations. The policy makers gradually realised the futility of reliance on economic growth to indicate all aspects of development.

II.3 SOCIAL INDICATORS MOVEMENT:

Assessing the social state of a nation required a different set of indicators, and thus was born the social indicators movement. Originating in the USA, it soon spread to UK and other European nations. Smith, while giving an overview of the social indicators movement, states that a social indicator 'should ideally measure the state of and changes over time in major aspects or dimensions of social conditions that can be judged normatively as part of a comprehensive and interrelated set of such measures embedded in a social model, and their compilation and use should be related to public policy goals.'[5]

Social indicators, thus, reflected the social dimension of development. With tools such as factor analysis in their hands, statisticians and economists brought out many studies in different parts of the world, condensing a large amount of data on social indicators into indices of social development. Geographers in this period also started analysing regional differences in the level of

[5] Smith, D. M. (1973), The Geography of Social Well Being in the United States, p.54.

social development within nations using territorial social indicators. Regionalisations on the basis of levels of social development were carried out. Smith[6] has mentioned a few such studies among which is a study by Lewis in 1968, in which he delineated 'level of living' regions of the US on the basis of 'levels of living' indices constructed from 12 variables relating to population migration, education, employment status, housing, telephones, political participation, health and family stability. Thus, spatial aspects of welfare had emerged by the late 1960s.

In the beginning of the 1970s there was an expansion in literature on social problems. Welfare economics and welfare geography emerged as sub-disciplines focused entirely on the study of welfare issues. Welfare economics, according to Nath, studies the 'effects of various economic policies on the welfare of society'[7], while welfare geography studies the spatial attributes of social welfare. In the words of Smith[8], 'the welfare theme defined human geography as the study of who gets what where, and how.

Since social research was important for the purpose of developmental planning it received the patronisation of official agencies. In course of time the social indicator research became biased because of government intervention and sponsorship, when social analysis was made conciliatory to the social policy advocated by the government. Even the non-governmental evaluations became influenced by the officially sponsored studies. Social indicators became equivalent to any 'good statistics'[9] without testing the efficiency of the indicators, resulting in an over-supply of information in social reports. The great enthusiasm which existed in the 1970s for social indicators and monitoring them for better quality of life, dwindled in the 1980s. However, social research had by then been well established in the social sciences.

II.4 SOCIAL WELL-BEING AND QUALITY OF LIFE:

Two concepts that emerged under the welfare theme were social well being and quality of life. Though often used synonymously , the two were different in the sense that while social well being was a more concrete concept, dealing with aggregate welfare of social groups, quality of life was a more personalised concept dealing with individual well being or 'goodness' of life. There were **two main reasons for the growing concern towards quality of life:**

1. Welfare economics analysed those markets in which price was absent such as that of health and social services. In this discipline measures of output and outcome were required for

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[6] Ibid, p.17.
[7] Smith, D. M. (1975), Human Geography : A Welfare Approach, p.239.
[8] ibid, p.288
[9] Mukherjee, R. (1989), The Quality of Life, p.55.

economic appraisals in the field of health care and quality of life measures served this purpose.

2. Increasing costs of social services prompted the governments to act more stringently and cut down on the budgets for social sectors. Better management of the available funds necessitated measurement of cost-effectiveness of health and other social interventions. The quality of life measures helped in cost-effectiveness analysis of such interventions.

A person's well being depends upon the degree to which his/her needs and wants have been satisfied. Needs are imperative, the most basic being those relating to physical survival. Maslow[10] in 1954 categorised human needs in a hierarchy, in which higher needs emerge as the more basic ones are satisfied.

Maslow's Hierarchy of Human Needs:

Survival → Security → Belongingness and Love → Esteem → Self actualisation.

Quality of life measures were basically measures of degree of need satisfaction. Quality of life studies fast gained ground in the developed world where the emphasis was on detailed studies of individual's life satisfaction or degree of 'happiness' achieved, especially since the question of meeting basic needs was no longer as relevant as in the developing countries.

R. Mukherjee[11] outlines **two basic aspects of quality of life research:**

1. Need-based research in which the researchers took the view of experts regarding the needs of the people and investigated as to the degree to which they had been fulfilled. This approach was an elitist perception of the needs of society.
2. Want-based research which focused on the perception of the masses - what the people wanted and how they realised their wants.

However, it was the elitist perception of people's needs which influenced policy formulation, since the elite were also the ones who held power over society.

II.4.1 DREWNOWSKI'S LEVEL OF LIVING INDEX (1966):

One of the most significant early attempts at quality of life measurement was by Drewnowski in the construction of a Level of Living index undertaken at the UNRISD[12]. Drewnowski made a

[10] Smith, D. M. (1975), op cit., p.28.
[11] Mukherjee, R. (1989), op cit., p51.
[12] Smith, D. M. (1975), op cit. p. 34

distinction between the state of being and the level of living. State of being is analogous to stock of well being at a point of time while level of living is the flow of goods and services which are the source of well being. Drewnowski constructed separate indices for measuring the state of well being and the level of living of the people. In the selection of indicators Drewnowski used the Delphi technique which was widely used in social science research. It is a kind of group interview in which a group of persons identify value judgements as to what are the determinants of quality of life.

Box II.4.1 Composition of Drewnowski's Level of Living Index:

1. **Nutrition** (food intake)
   a) Calories intake
   b) Protein intake
   c) Per cent of non-starchy calories
2. **Clothing** (use of clothes)
   a) Cloth consumption
   b) Footwear consumption
   c) Quality of clothing
3. **Shelter** (occupancy of dwellings)
   a) Services of dwellings
   b) Density of occupation
   c) Independent use of dwellings
4. **Health** (health services received)
   a) Access to medical care
   b) Prevention of infection and parasitic disease
5. Proportional mortality ratio **Education** (education received)
   a) School enrolment ratio
   b) School output ratio
   c) Teacher pupil ratio
6. **Leisure** (protection from overwork)
   a) Leisure time
7. **Security** (security assured)
   a) Security of the person
   b) Security of the way of life
8. **Social environment** (social contacts and recreation)
   a) Labour relations
   b) Conditions for social and economic activity
   c) Information and communication
   d) Recreation : cultural activities
   e) Recreation : travel
   f) Recreation : sport and physical exercise
9. **Physical environment**
   a) Cleanness and quietness
   b) Public amenities in the neighbourhood
   c) Beauty of the environment

Source: Smith D.M.: Human Geography: A Welfare Approach , p.36.

According to Drewnowski, there are two sides to the level of well being, the passive and the active side. The passive characteristic is what the population receives as welfare goods and services, while the active characteristic is what the population can give in return. This makes the concept of welfare a utilitarian one rather than a purely consumption approach.

Quality of life studies were increasingly being employed to analyse social and economic problems arising from inequalities in the level of welfare of different groups within a population. Growing costs, on the other hand, were imposing a strain on the welfare budgets of governments, and therefore the government was encouraging 'relevant' research into the identification of means through which maximum satisfaction could be derived within the limited cost constraints. Thus cost-effectiveness analysis became a part of quality of life research. Quality of life research thus gradually lost its political neutrality and became a tool in the hands of the officials to evaluate resource allocations in welfare planning.

Quality of life studies were carried out by economists, geographers, psychologists and physicians as well, making the field multidisciplinary. Quality of life is an ambiguous concept since there is no consensus on the exact attributes which constitute it specially because this concept is subject to cultural relativism, i.e. different cultures have different conception of what constitutes a 'good life'. Many critics have questioned the very feasibility of quantifying a subjective concept such as 'happiness' or 'goodness' of life. There is a lot of debate about whether quality of life studies should be carried out at all, and if they are carried out, then what should be the parameters by which quality of life will be measured. Construction of global quality of life indicators was also criticised since the indicators were not comparable across countries. According to Rogerson[13] the renewed focus on quality of life studies in recent years in the west has been attributed to the rise in the individualist ethic, where the shift is from social and economic attributes of social development to the post materialist ideas of centrality of the individual.

II.4.2 PHYSICAL QUALITY OF LIFE INDEX (PQLI):

One of the pioneering efforts towards construction of a set of indices to measure the state of well being of nations was by Morris D. Morris[14]. Its major advantage was its simplicity. It was based on the assumption that the most basic requirement of individuals for well being are a larger life expectancy, reduced illness and a greater opportunity. Morris realised the need for indicators that could be universally applicable, and reflect the level of social development of the nations in a broad sense. He selected as indicators the life expectancy at age one, infant mortality rate and basic literacy rate. For each indicator the performance of a country was placed on a scale of 0 - 100, giving a common measure of performance. A composite index was then calculated by averaging them. Equal weights were assigned to the three indicators. The PQLI was a useful tool to rank the countries of the world on a scale of development. It helped identify those nations which ranked high on social development in spite of low per capita income, and vice versa. The index could also be used to measure gender disparity in social development. The PQLI proved that economic development did not necessarily translate into social development.

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[13] Rogerson, R. (1995), 'Environmental and Health Related Quality of Life', *Social Science and Medicine* vol. 41(10), p. 1374

[14] Morris D. Morris & McAlpin (1982), Measuring the Conditions of India's Poor: The Physical Quality of Life Index, New Delhi.

II.4.3 HUMAN DEVELOPMENT INDEX (HDI):

A measure which seemed highly influenced by PQLI was the HDI developed by the UNDP and used as a measure for ranking countries on the scale of human development. Human development was defined as the process of enlarging people's choices. The three essential factors for human development were a long and healthy life, acquisition of knowledge, and access to resources needed for a decent standard of living. The index therefore combined indicators of life expectancy, educational attainment and income. In this sense it differed from the PQLI since the PQLI did not include any income indicator. The three indicators in HDI were life expectancy at birth, adult literacy/educational attainment and GDP per capita at purchasing power parity. The index set a maximum and a minimum for each dimension and then showed where each country stood in relation to these scales which was expressed as a value between 0 and 1. The scores for the three indicators were then averaged in an overall index.

This was also a macro-level index created specially with the objective of enabling inter-country comparisons of human development. Though it incorporated social indicators, income remained one of the components. Thus the approach did not completely divorce itself from the emphasis on economic growth. HDI remains a useful tool in the hands of the international lending agencies like the World Bank, International Monetary Fund, Asian Development Bank etc. and the industrial nations who are also aid donors to choose recipients and monitor their performance on human development.

Human Freedom Index: Charles Humana in 1985[15] constructed this index to measure the degree of freedom people enjoyed in different societies. He examined various UN documents and from them distilled forty distinct criteria for judging the freedom available to humans. These different types of freedom were freedom of speech, freedom of movement, right to assemble etc. Critics, however, question the reliability of an index measuring a value so subjective as human freedom.

Human Poverty Index (HPI): A variant of the HDI was introduced in the 1997 Human Development Report, published by UNDP, known as Human Poverty Index. It attempted to bring together the different features of deprivation in the quality of life to arrive at an aggregate measure of poverty in a country. While accepting the fact that deprivation varied in different social and economic contexts, the HPI considered three elements as essential for human life and therefore universal in significance - knowledge, longevity and decent living standard. To measure deprivation in these elements, the following indicators were chosen in HPI.

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[15] UNDP (1991): Human Development Report, p. 75.

1. Percentage of people expected to die before age 40.
2. Percentage of adults who are illiterate.
3. Percentage of people without access to health services and to safe water, and the percentage of malnourished children less than 5 years of age.

The method of arriving at the composite index was the same as that for HDI.

Such global indicators did not serve the purpose of detailed local level analysis, nor did they capture all aspects of human development and quality of life. However, they were sufficient to act as broad measures of global trends and patterns in human development and therefore served the purpose for which they were created.

II.5 HEALTH-RELATED QUALITY OF LIFE STUDIES:

Quality of life studies which focused mainly on the social, psychological and environmental aspects of health came to constitute the health-related quality of life (hrql) measures. Health state valuations became a part of this larger body of hrql measures. Health-related quality of life has been defined as 'the value assigned to duration of life as modified by the impairments, functional status, perceptions and social opportunities that are influenced by disease, injury, treatment, or policy'.[16] The hrql studies which had emerged from the increasing interaction between the health status studies and quality of life studies, became increasingly patient-focused, studying the impact of perceived health state on the ability to live a satisfactory life. Such studies gained popularity in the developed countries through the 1980s and the 90s as well, because of the individualist ethic and the emphasis on consumer satisfaction in health services.

Hrql studies have been carried out for the following main purposes:

1. Economic appraisal of health care programmes for resource allocation decisions, which include:
   - Cost-effectiveness analysis of health interventions, in which the effects of alternative programs are measured in the same units.
   - Cost-benefit analysis, which determines the net social benefit of a health intervention, measured in monetary units.
   - Cost-utility analysis in which measures health effects in terms of quality-adjusted life years gained. This common unit of measure enables comparisons across all kinds of health programmes.
2. Evaluation of quality of health services provided by medical practitioners to patients on a personal basis.
3. Studies on the true nature of social reality, not related to any practical application.

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[16] Ebrahim S. (1995), 'Clinical and Public Health Perspectives and Applications of Health Related Quality of Life Measurement', *Social Science and Medicine*, vol. 41(10), p. 1384.

2. Evaluation of quality of health services provided by medical practitioners to patients on a personal basis.
3. Studies on the true nature of social reality, not related to any practical application.
4. Monitoring the health of the population - analysing gender differences, status of child health, old persons, etc.
5. Evaluating the effects of social policies by measuring the process of change, its efficiency, and its specific outcomes for individuals.
6. Diagnosis of the nature, severity and prognosis of disease. The measurement of hrql in terms of impairment, disability and handicap model identifies the ways in which diseases affect people and about the sort of interventions which are required to improve the disability and handicap suffered by the patients.
7. Evaluating the efficacy of treatment - hrql studies that exclusively explore the patient's quality of life after specific treatments are useful in evaluating the efficacy of the treatment offered.

There are two major ethical concerns in hrql:

- Clinical concern in which the ethical perspective is to do the best for the individual regardless of cost.
- Public health concern in which the approach is utilitarian - doing the greatest good for the greatest number.

The ethical stance determines the methods used to develop hrql measures, and thus there are two types of hrql studies - the clinically-based studies focusing on individual's hrql, and the population based hrql studies.

The health state descriptions in hrql studies are in functional terms rather than in clinical terms, i.e., the health state depends on the individual's ability to function, and includes levels of physical, emotional as well as social functioning. Hrql studies mostly have adapted the WHO's model of impairments, disabilities and handicaps. Since 1948, the WHO has been publishing a classification of impairments, diseases and handicaps for different diseases. This classification, known as the International Classification of Impairments, Diseases and Handicap (ICIDH) has been accepted almost universally as the basis of categorisation of diseases. According to the ICIDH, impairment is defined as any loss or abnormality of physical, psychological or anatomical structure and function. Disability is any restriction or lack of ability to perform an activity in a manner or within the range considered normal for a human being. Handicap is a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal for that individual (depending on age, sex, social and cultural factors). Hrql studies in the developed countries are increasingly patient-focused and subjective indicators of quality of life are gaining in importance because of the importance given to patient satisfaction rather than inferences based on statistical exercise at the population level.

Individual perception studies are mainly based on questionnaires or interviews. A substantial literature has built up over the years on hrql measures, with a range of measures being proposed by medical and social scientists, dealing with disease-specific health state valuation scales as well as generic health status indices.

The hrql measure can be traced back to 1940s in the earliest attempts at evaluation of health states. The earliest examples of hrql measure is recognised in the Karnofsky index given in 1948 to evaluate the effectiveness of treatment on the patient's quality of life without taking into account the cost factors.

The following are some examples of health status measures that have emerged over the years:

II.5.1 CORNELL MEDICAL INDEX:

This index, devised in 1948, is one of the earliest examples of questionnaire based health state valuation techniques[17]. It is a precursor to other such hrql techniques that followed. It consisted of a 4 paged questionnaire containing 195 questions relating to symptoms and functional ability, much similar to the questions generally asked in a detailed medical interview. The patients were asked to fill the questionnaire. It was first used in a survey of the New York Hospital Outpatient Department. The basic purpose of the index was to supplement the patient's case histories, by obtaining important facts about the medical history of the patient. It aided in more comprehensive diagnostic and prognostic appraisals, and saved a lot of time for the physicians.

II.5.2 SICKNESS IMPACT PROFILE (SIP):

The SIP is a behaviourally based measure of health status. It was developed in the late 1970's by M. Bergner[18] et al as a perceived health status measure broadly applicable across different types of illness and different social and cultural groups. Initial work began in 1972 with the development of procedures to collect and evaluate statements describing sickness - related behavioural dysfunction from patients, individuals caring for patients, the apparently healthy and health care professionals. The SIP was intended to provide a measure for evaluation of health treatments and as a tool for health care program planning and policy formulation. The SIP reflects the shift in emphasis in the developed countries from disease cure to minimising the impact of illness in everyday activities as Bergner states 'estimates of the actual performance of activities are needed to provide a relevant and sensitive indicator for evaluating medical care, assessing needs and determining the allocation of resources'.[19] Therefore the SIP hypothesises that an assessment of the performance of daily activities could provide a reliable measure to evaluate health outcomes, and would also be sensitive to changes in health status over time.

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[17] Broadman et al (1949), 'The Cornell Medical Index: An Adjunct to Medical Interview', *JAMA*, vol. 140, p. 530.
[18] Bergner M. et al (1981), 'The Sickness Impact Profile: development and Final Revision of a Health Status Measure', *Medical Care*, vol. 19, p. 787.
[19] Ibid, p. 788.

The SIP is a schedule which contains 136 statements about health related dysfunction in 12 areas of activity, from which the subjects select conditions corresponding to their state of health. The schedule can be either interviewer administered or self administered. The subjects can be patients as well as non-patients. Each dysfunction is rated on a 15 point item scale by a panel of judges. The SIP percentage scores are calculated for the respondents according to their health statuses as recorded in the schedule.

Table 2.1 SIP Categories and Selected Items:

DIMENSIONS	**CATEG -ORIES**	**ITEMS DESCRIBING BEHAVIOUR**	**SELECTED ITEMS**
Independent categories	SR	Sleep and Rest	I sit during much of the day. I sleep or nap during the day.
	E	Eating	Nutrition through tubes or IV fluids. I am eating specific or different food.
	W	Work	I am not working at all. I often act irritable towards my colleagues.
	HM	Home Management	I am not doing any of the repair or maintenance work around the house that I usually do. I am not doing heavy work around the house
	RP	Recreation & pastimes	I am going out for entertainment less I am not doing any of my usual physical recreation or activities
Physical	A	Ambulation	I walk shorter distances or stop to rest often. I do not walk at all.
	M	Mobility	I stay within one room. I stay away from home only for brief periods of time.
	BCM	Body care and movement	I do not bathe myself at all, but am bathed by someone else. I am very clumsy in body movements.
Psychosocial	SI	Social interaction	I am doing fewer social activities with people I isolate myself as much as I can from the family.
	AB	Alertness behaviour	I have difficulty reasoning and solving problems, making plans, taking decisions, learning new things. I sometimes behave as if I were confused or disoriented in place or time, for example, where I am, who is around, etc.
	EB	Emotional behaviour	I laugh or cry suddenly. I act irritable and impatient with myself, for example, talk badly about myself, swear at myself, blame myself for things that happen.
	C	Communication	I am having trouble writing or typing. I do not speak clearly when I am under stress.

The SIP has been one of the most widely used measures of health state evaluation because of its simplicity and applicability across different diseases and population groups.

II.5.3 HEALTHY DAYS OF LIFE LOST:

This measure was proposed by the Ghana Health Assessment Project and is important in the analysis of health assessment in the context of less developed countries. While the hrql measures in developed countries have been moving higher and higher on scales of subjectivity, the problem in developing countries remains one of eradication of major infectious diseases and reducing the absolute mortality and morbidity rates. The Ghana project[20] undertaken in the 1980's proposed a measure for the assessment of the impact on health of different health care programmes, the results of which would help in setting priorities for resource allocation in such programmes.

The analysis was a community level analysis in which 48 diseases prevalent in Ghana (based on International Classification of Diseases, WHO) were considered. The team evaluated the healthy days of life lost due to each disease for the whole population. The diseases were then ranked according to the percentage share of the diseases in the total days of healthy life lost due to illness. The following method was used to evaluate the days of healthy life lost due to a disease:

Let A_0 = average age at onset

A_d = average age at death of those who died of the disease

$E(A_0)$ = Expectation of life (in years) at age A_0

C = case fatality rate (expressed as percent)

D_{od} = percent disablement in the period from onset until death among those who die of the disease.

Q = percent of those affected by the disease who do not die but are permanently disabled.

D = percent disablement of those permanently disabled.

t = average period of temporary disablement (days) among those who are affected but neither die nor are permanently disabled, multiplied by the proportion disablement of those temporarily disabled.

The average number of days of healthy life lost to the community by each patient with the disease is given by :

Days lost due to:

$L = (C/100).[E(A_0) - (A_d-A_0)].365.25$: premature deaths.

$+(C/100).(A_d - A_0).(D_{0d}/100).365.25$: disability before death.

$+(Q/100).E(A_0).(D/100).365.25$: chronic disability.

$+[(100-C-Q)/100].t$: acute illness

Let I = annual incidence of the disease (new cases/1000 population/year)

Then number of days lost by the community which are attributable to the disease is:

R = LI / Population.

[20] Ghana Health Assessment Project Team (1981), 'A Quantitative method of Assessing the Health Impact of Different Diseases in Less Developed Countries', *International Journal of Epidemiology*, vol. 10 (1), p. 80.

To calculate the effects of health care programmes in reducing the days lost due to disease was illustrated with the help of an example of measles immunisation.

Initial healthy days of life lost due to measles = 27,600 days per thousand population.

Reduction in measles incidence after immunisation = 66.5%

Days of life saved by immunisation programme = 27,600 x .665 = 18,354 days/thousand population

Cost of immunisation = .5 Cedis / child.

No. of one year olds in total population = 40 per thousand

Cost of immunisation / thousand population / year = 40 x .5 = 20 Cedis

Benefit = 918 healthy days of life per Cedi.

The project team stressed on the necessity of concentrating resources towards eradication of widespread communicable diseases rather than funding for chronic and degenerative diseases which require high investment in technology and equipment.

The use of unweighted healthy days of life lost is indifferent to adult productivity. The Project team in a second paper published in 1987 revised its earlier measure to include time preference and productivity effects. Time preference was considered in the sense that 'a healthy day of life in the present has a greater intrinsic value to the individual than a day in the future.'[21] This time preference is explained by the fact that consumption in the present is preferred to consumption in the future and also by randomness of the event of death. It is a normative concept incorporating value judgement regarding the relative importance of present versus future events. A discount rate of 2% was therefore used and the results showed a change in the ranking of diseases, those with greater immediate loss of healthy days increasing in importance as compared to those whose effects were spread over a longer time period. Age weights were added to the index so that the age-groups with highest economic productivity were given greater weightage. The weights were added on the basis of estimates of the age-earning profile.

The paper then carries a comparative study between two health projects to contrast their cost effectiveness. The modification of the earlier index by addition of discounting and age weighting introduces value judgements into the index. The authors however feel that the absence of weights and discounting could also not eliminate subjectivity since then it would be considered that lack of importance for adult productivity is an objective of social welfare.

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[21] Barnum H. (1987), 'Evaluating Healthy Days of life Gained from Health Projects', *Social Science and Medicine*, vol. 24 (10), p. 834.

II.5.4 KAPLAN - BUSH INDEX:

Kaplan and Bush (1982)[22] gave an index of hrql based on functional status of individuals. The index placed individuals with given health states on a scale based on 3 categories - mobility, physical activity & social activity. It then classified the symptoms and health problems they had on a given day. The questionnaire method was used to assign respondents to specific functional levels. A utility value was assigned to each functional level. The utility value decided the score of the respondent on the index of well being scale. The index quantified the health output of a treatment in terms of years of life adjusted for changes in quality caused as a result of the illness and its treatment. This methodology has also been widely used because of its simplicity as a health status measure and a methodological tool for health care decision making.

II.5.5 HEALTHY YEARS EQUIVALENT (HYE):

The HYE is a measure identical to time trade-off technique of health state valuation, which constitutes a trade-off between two states of equal utilitarian value it is a general approach to valuing future health prospects and can employ different valuation methods. The HYE techniques determine the hypothetical number of years in full health that are equal to an individuals possible lifetime health profile.

The measure, as explained by Mehrez and Gafni (1989)[23] is calculated in two stages. In the first stage the remainder of respondents life in poor health is valued between 0(death) and 1(full health). In the second stage the reduced number of years in good health that are equal to the utility value assigned to the persons life is calculated.

Stage 1

$W \sim X$ in which

W = value attached to remainder of life

$\sim$ = symbol of indifference

X = value of the gamble

Stage 2

H such that $X \sim Y$

H = duration of reduced life in full health

Y = value of life of reduced duration

if $W \sim X$ and $X \sim Y$ then $W \sim Y$

The calculation of HYE was a complicated and time consuming task, and hence the HYE measures gradually lost popularity and were replaced by a similar but more simple method of quality adjusted life years. HYE is also not suited for decision making on a social level though it is more likely to reflect individual preferences than the quality adjusted life years.

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[22] Bowling A. (1995), Measuring Disease, p. 15.

[23] Buckingham K. (1993), 'A Note on HYE', *Journal of Health Economics*, vol. 11, p. 301.

II.5.6 EUROQOL METHOD:

The EUROQOL group[24] is a group of European researchers who got together in 1987 to create an hrql measure which was not disease specific and which could be used for cross national comparisons also. Data was collected through postal questionnaires. The group selected 6 dimensions of health based on examination of existing health status measures. Within these 6 dimensions are included 216 health states.

Box II.5.1 EUROQOL Descriptive Classification:

Mobility
1. No problems walking about
2. Unable to walk about without a stick, crutch or walking frame.
3. Confined to bed.

Self-care
1. No problems with self-care
2. Unable to dress self
3. Unable to feed self

Main activity
1. Able to perform main activity (e.g. work, study, housework)
2. Unable to perform main activity

Social relationships
1. Able to pursue family and leisure activities
2. Unable to pursue family and leisure activities

Pain
1. No pain or discomfort
2. Moderate pain or discomfort
3. Extreme pain or discomfort

Mood
1. Not anxious or depressed
2. Anxious or depressed

Each subject was asked to rate 16 states, which represented in two groups of 8 across successive pages of the questionnaire. Values for 16 different health states were derived using the visual analog scale, very much like a thermometer.

The field centres for conducting EUROQOL studies were York (UK), Bergen op Zoom (Netherlands) and Lund (Sweden). The correlation between the three studies was then calculated using Spearman's rank correlation coefficient. All three studies were found to be highly correlated indicating a broad agreement in the ranking of health states by the respondents. In course of time empirical work was carried out in

[24] The EUROQOL Group (1990), 'EUROQOL - A New Facility for the Measurement of Health Related Quality of Life', *Health Policy*, vol.16, p. 139.

Finland and Norway too. Spanish and Catalan versions, French, German, Italian and Danish versions were also published. The EUROQOL gained general acceptance in Europe. The health state was valued using simple rating scale technique rather than complex statistical methods. Several follow-up surveys were later carried out to test the reliability of the method and to compare it with other health state valuation techniques.

II.5.7 WHOQOL METHOD:

The WHO carried out an exercise on generating quality of life indicators on the lines of EUROQOL - the indicators should be generic and comparable across countries. The project was termed WHOQOL. Multi-centre research was carried out with field centres in 15 places from across the globe. The quality of life was defined as "individuals perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns".[25] The WHOQOL is organised into 6 broad domains of life:-

a) physical domain;
b) psychological domain;
c) level of independence;
d) social relationships;
e) environment; and
f) spirituality/religion/personal beliefs.

Within each domain were included several sub-domains making a total of 24 facets of life which were scored. To determine the domains, field investigators and consultants drafted a provisional list of domains which was further refined through focus group interviews, discussions with patients, healthy persons and health personnel. Each focus group consisted of 6-8 individuals demographically representative of the target population of the region. After a lot of revisions and reworking questions were prepared in the field centres which were later pooled to make the 'global question pool' of about 1800 questions. Further refinement reduced the number of questions to 235 which appeared on the WHOQOL pilot study. In the pilot study about 250 patients and 50 healthy persons were questioned for each of the 15 centres. Thus the total number interviewed were 4,500. The pilot study was useful in checking the validity of the WHOQOL domains and facets and to check the reliability of the measure. Further work on the measure has been proceeding with the aim to construct separate schedules for certain specific diseases and conditions, such as one for communicable diseases, for child health, etc. The WHOQOL measure is thus very similar to the EUROQOL method , but while the EUROQOL strived to achieve comparability across all European nations, WHOQOL has the even higher aim of achieving comparability across the globe.

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[25] The WHOQOL Group (1995), 'The WHO Quality of Life Assessment: Position Paper from the World Health Organisation', Social Science and Medicine, vol. 41 (10), pp. 1403-09.

II.5.8 MEASURES FOR QUALITY-ADJUSTED LIFE YEARS:

The concept of Quality-adjusted life years (QALYs) has emerged from the growing interest in measures which 'combine information on life expectancy with complementary information on the quality of that life.'[26] The basic notion is that an individual who has to live Y years in less than full health would be able to equate it with a reduced number of years in full health (X). Individuals will try to maximise the QALYs and therefore will choose options which offer more QALYs. They will be willing to trade-off a longer life in poorer health with a shorter life in full health. QALYs can be arrived at using a procedure which involves three stages[27]:

1. Measuring the patient's health status on the basis of the phase of illness and the severity of the disease.
2. The health state description is formally valued using an adequate utility valuation technique.
3. Results from Stage 1 and 2 are then combined with data on duration of illness to calculate the QALYs as an outcome measure.

Though the concept of QALYs was first introduced in 1976 by Weinstein and Stason[28], the QALYs have included in their fold a variety of valuation techniques, older than the concept itself. QALYs are measures of cost-utility analysis. Utility is intrinsic to the QALY concept, since in QALY a year of full life quality is adjusted with a utility value based on the condition of health, which reflects the hrql. G.W. Torrance has described utilities as 'cardinal value that are assigned to each health state on a scale that is established by assigning a value of 1 to being healthy and 0 to being dead. Utility can be measured on the ordinal or the cardinal scale. Ordinal scales are simply a ranking of health statuses on the basis of preference. In the cardinal scale numeric values are assigned to the health state valuations on the basis of their strength. The aggregation across subjects of health state valuations is achieved by adding up the individual utilities and calculating the arithmetic mean. The cost-effectiveness of a medical intervention is judged by calculating the cost per QALY gained. QALYs combine life expectancy with an index of disability and therefore are based on invalidated value judgements. The various QALY techniques differ basically in terms of how the utility values are derived.

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[26] Kind, P. et al (1990), 'What are QALYs ?', in S. Baldwin et al (eds.): *Quality of Life: Perspectives and Policies*, p. 57.

[27] Krabbe, P.F.M. et al (1997), 'The Comparabiltiy and Reliability of Five Health State Valuation Methods', Social Science and Medicine, vol. 45 (11), p. 1641.

[28] Bowling, A. (1995), *op cit*, p. 18.

Techniques For Deriving Utility Values:

1. Rating Scale Technique:

The rating scale technique is an ordinal measure of health status in which several health states are listed out and the respondents have to rate the different health states on a scale. The scale may be a category scale in which a specified number of categories are used, or a visual analogue scale resembling a thermometer drawn on the questionnaire for e.g. the EUROQOL measure. Rating scale techniques can be used to evaluate preferences for chronic diseases and temporary health states separately.

Rosser index technique of health state evaluation given below is an example of the rating scale method.

a) Rosser Index (RI): Introduced by Rosser and Watts in 1972, the RI is one of the most widely used QALY measures in UK[29]. The index was constructed initially for measurement of hospital output. The final classification was arrived at after group discussions with doctors as well as non medical subjects and a field trial on forty patients. The classification included 8 degrees of disability with 4 levels of subjective distress, covering all aspects of illness and provided 29 categories of health states.

A study was conducted on 2120 patients admitted to a teaching hospital over a period of one month. Subjects were asked to rank the health states on the basis of severity. The subjects were also asked to locate death amongst the disability / distress states and also evaluate it. The valuation was done on a scale ranging from 0(death) to 1(full health). Negative values were added for states worse than death. It was observed through statistical analysis of the data collected that there were significant differences in the valuation of different categories of subjects such as doctors, patients, psychic patients, nurses etc. These differences were, however, rendered insignificant when the subjects were regrouped according to age, sex and social class characteristics.

Box II.5.2 Rosser's Classification of Illness States:

DISABILTY

I.	No disability.
II.	Slight social disability
III.	Severe social disability and/or slight impairment of performance at work. Able to do all housework except very heavy tasks.
IV.	Choice of work or performance of work very severely limited. Housewives and old people are able to do light housework only, but are able to go out shopping.
V.	Unable to undertake any paid employment. Unable to continue any education. Old people confined to home except for escorted outings and short walks and unable to do shopping. Housewives able to perform only few simple tasks.
VI.	Confined to chair or to wheelchair or able to move around in the house only with support from an assistant.
VII.	Confined to bed.
VIII.	Unconscious.

DISTRESS

A.	No distress.
B.	Mild.
C.	Moderate.
D.	Severe.

[29] Kind, P. et al (1990), *op cit*, p. 58

This approach was projected as a global index which could be used to assess benefits from a wide range of health interventions and measure them on a common scale. The RI has, however, been criticised on the following three points[30]:

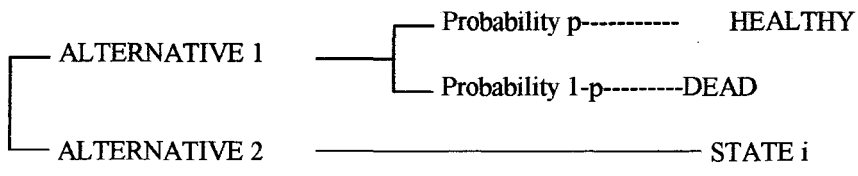
1. All diseases are treated alike in the index. No distinction between different types of illness means no consideration of the duration of illness and the degree of pain/disability. This is a major drawback because the value which the people place on different health states varies with the duration and degree of disability caused by the illness affecting them. Thus values for chronic and acute diseases would differ from that of common and temporary ailments. Lesser value will be placed on a disease with shorter duration than a long and degenerative disease.
2. The RI neglects peoples attitude to risk and uncertainty. Assuming risk neutrality has been proved to be a shortcoming since people attach greater value to high-risk illness, than those of lesser risk and greater uncertainty.
3. The 29 categories which comprised the health states to be evaluated have been criticised for being too less and inadequate to cover all aspects of illness and health. Critics fear that the index may have been rendered too insensitive because of this drawback.

Criticisms not withstanding, the RI has been one of the most popular of QALY techniques and is considered a precursor to EUROQOL and WHOQOL methods.

2. Standard Gamble Technique:

The standard gamble method is an example of a cardinal preference measure. It is based on the utility gamble theory given by Morgenstern and Neumann in 1953. The method was developed by Torrance and colleagues[31] in the Mc Master university, Canada, in the early 1970s. As represented in the figure below, it is a preference measurement method, in which the subject is given two alternatives of health status, one alternative being of continuation in a given health state(i), and the second alternative being treatment with two possible outcomes - a probability (p) of either return to full health or immediate death (1-p). The probability (p) is then varied till the subject is indifferent between the two alternatives.

Diagrammatic Representation of Standard Gamble (Chronic Health State):



[30] Loomes, G. & L. McKenzie (1989), 'The Use of QALYs in Health Care Decision Making', *Social Science and Medicine*, vol. 28(4), p.303.

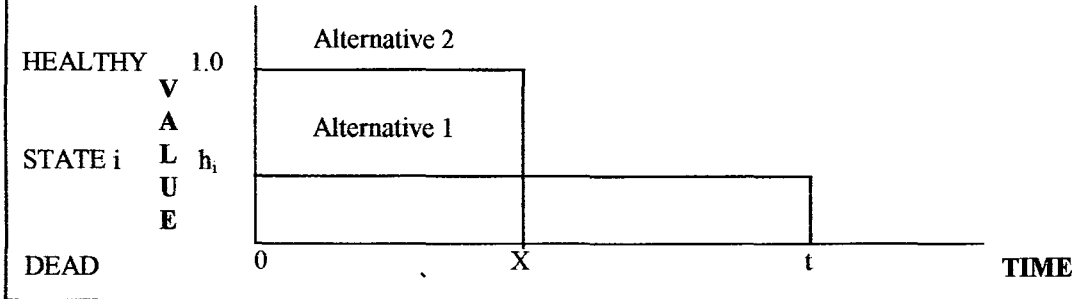
[31] Torrance, G.W. (1986), 'Measurement of Health State Utilities for Economic Appraisal', *Journal of Health Economics,* vol.5, p.20.

The standard gamble technique can be modified to apply only to chronic diseases or to measure preferences for temporary health states only. The technique has been criticised for its complexity of procedure. Critics have pointed out that not all individuals would be able to relate to probabilities, and the valuations may not be accurate. The standard gamble technique was often represented with visual aids to remove this drawback. It has been used extensively in the field of decision analysis.

3. Time Trade-Off (TTO):

This method was also developed by Torrance et al[32] in 1972. It is a simpler method than standard gamble and therefore more widely used in QALY measurement. The TTO method is based on trade-off between survival duration and health status. The subject is offered to trade-off between two alternatives, the first being a lower health status (i)of longer duration (t) followed by death, and the second being a shorter duration of full health (x<t). Time x is varied till a point of indifference is reached between the two states. The preference value for state(i) is then derived by H = x/t.

Time Trade-off for Chronic Health State Preferred to Death:



The TTO method can also be modified to consider temporary health states or conditions worse than death, such as vegetative states. It has gained popularity over the standard gamble technique essentially because of its simplicity.

4. Equivalence:

The equivalence technique, as described by Torrance, has been in use in the early 1970s. In this technique, the question put before the subject is thus 'if there are x people in adverse health situation A and y people in adverse health situation B, and if you can only help (cure) one group, which group would you choose to help?'[33]. The number of people in one of the groups can then be varied till the subject regards the two groups equivalent in terms of needing help. If the equivalence numbers are p and q for A and B respectively, then the undesirability condition of B is p/q times as great as that of A.

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[32] ibid., p.22
[33] ibid., p.25

5. Willingness-To-Pay (WTP):

In this method the subject is given a monthly budget, and then asked to imagine that if he/she were in a given impaired state of health, then what amount would the person be willing to give up to return to normal health. This measure is thus a way to give monetary values to illness states, which can be converted to percentage values or can be rated on a scale of 0 to 1.

The simplicity of QALY measures has been achieved by making certain assumptions which do not appear very sound. for instance, it is assumed that the trade-off between life length and health is at a constant proportion for whole life. This assumption may not hold good since people value different stages of life differently. Assumption of risk neutrality, as discussed earlier, has also been questioned.

Eric Nord [34] observes that there is a lack of clarity among the scientific community regarding validity of QALY measures. He gives three reasons for this:

1. The techniques occur in different versions and these give different results.
2. Insufficient recognition of the fact that the validity depends upon the use to which the values are put. The viewpoints of different categories of users are different. A technique which may be appropriate for assessing the benefits of alternative treatments may not be effective in evaluating outcomes of health interventions.
3. The QALY weights arrived at by different methods have different interpretations. For example, the utilitarian interpretation is different from the patient preference valuation through rating scale technique.

QALYs have also been criticised on the grounds that the source of QALY weights (individual perception and preference) is subjective, varying with different categories of subjects, and therefore renders the measure unreliable. John Cohen[35] adds that QALYs take into account patient's preferences and not the basic needs of the individual. This may lead to misleading conclusions since all needs may not be accommodated in a person's preference. QALY techniques require persons to evaluate health status which they may not have experienced themselves. In that case they may not be fully aware of the effects of different ailments and hence the values they attach to different health statuses may lack consistency and reliability.

The above mentioned factors have resulted in much debate about validity of QALY measures and comparability of QALYs derived from different techniques. In spite of the controversy surrounding them, QALYs are a major technique for economic appraisal of health programmes and treatments.

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[34] Nord, E. (1992), 'Methods for Quality Adjustments of Life Years', *Social Science and Medicine*, vol. 34 (5), p.564.

[35] Cohen, J. (1996), 'Preference, Needs and QALYs', *Journal of Medical Ethics*, vol.22 (5), p.271.

II.5.9 GLOBAL BURDEN OF DISEASE:

The concept of burden of disease is an effort towards estimation of the degree to which ill health imposes strain on the resources of the affected individual, whether in the form of cost of treatment , loss of productivity or loss of income due to absence from work. The increasing emphasis health planning and health expenditure is the result of the change in attitude towards health expenditure which is now seen as a productive investment towards improvement of human capital and thus contributing to economic development, rather than a consumption expenditure which was considered a necessary obligation of a welfare state.

Need For An Indicator Of Burden Of Disease:

The change in global outlook towards health necessitated an indicator for the burden of disease which would :

a) provide an objective measure of health status;
b) aid in the allocation of resources in health care, and in setting health research priorities;
c) facilitate comparative studies on health status, and
d) provide a measure which could be comparable at the global level.

In other words, the measure was required to be an effective instrument in health policy and planning by governments in order to increase the efficiency of the health systems.

Realising the need for such a comprehensive health status indicator, the World Bank (WB) and WHO carried out a joint study to develop an indicator for measuring the global burden of disease (GBD) in 1992. The study culminated in the development of Disability-Adjusted Life Year (DALY) as a health status indicator which combined the loss of healthy life years due to ill health and disability with the life years lost due to premature death. The index was developed by C. J. L. Murray and Lopez. The results of the study were published in the World Development Report of 1993 published by the World Bank.

General Concepts:

While formulating the DALY index four general concepts were considered which provided a basis for explaining the technical assumptions incorporated in the measure[36]:

1. To the extent possible, any health outcome that represents a loss of welfare should be included in an indicator of health status.
2. Only age and sex of the individual should be considered as affecting the health outcome in calculating the associated burden of disease.
3. Treating like health outcomes as like.
4. Time is the unit of measure for the burden of disease.

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[36] Murray, C.J.L. (1994), 'Quantifying the Burden of Disease: The Technical Basis for Disability-Adjusted Life Years', WHO Bulletin, vol. 72 (3), p. 429.

Only age and sex of the individual were taken as affecting the health outcome because these are the only two variables which are universally comparable. Treating like health outcomes as like ignores the differences in socio-economic status and ensures comparability of burden of disease over time and over different communities. Using time as the unit of measure has enabled the combination of losses due to death, disability and ill health into a single measure in the form of loss of healthy years of life.

Value Choices:

The value choices which have been incorporated in the formulation of the DALY index are based on the general concepts which had been agreed upon by consensus. The following are the four value choices which have been incorporated in the index[37]:

1. The duration of time lost due to premature death: For DALYs the standard expected years of life lost has been chosen which measures the healthy years of life lost due to premature death as a difference between the actual age at death and a model life expectancy of 80 years for males and 82.5 years for females.
2. Social value of time lived at different ages: Unequal age weights were chosen so that a greater value could be given to the young and middle ages, since they have a greater social role .
3. Non-fatal health outcomes: Six disability classes were chosen and weighted on the basis of severity, ranging between 0(good health) and 1(death). Disability was defined as the impact of impairment due to ill health on the performance of the individual.
4. Time preference: A greater preference was given to the present than to the future years of life lost, and therefore 3% discounting was done on the future years of life lost. The time preference value has been incorporated on the basis of the economic concept that individuals prefer benefits now than in the future.

Method Of Calculation:

According to the World Development Report(1993)[38], for each death, the number of years of life lost were calculated. Disability incidence by age, sex, and demographic region was estimated , and the number of years of healthy life lost was obtained by multiplying the expected duration of the condition by a severity weight that measured the severity of the disability in comparison with loss of life. The death and disability losses were then combined and suitably adjusted by the discount rate of 3% and the age weights to finally arrive at the DALYs.

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[37] Ibid., p. 432.
[38] World Development Report,1993, p.26.

Advantages:

DALY is an objective measure of health status and has the following major advantages:

1. It is comparable across countries and regions.
2. It enables the measurement of cost-effectiveness of health interventions (the larger the number of DALYs gained per unit of money invested, the more the cost-effectiveness of the intervention).
3. It identifies priority areas or priority populations which are suffering from the highest disease burdens and therefore require immediate health intervention.
4. It can be used as an outcome measure to check health interventions in terms of effectiveness.

Limitations:

Though the DALY index has been projected as an effective tool in health policy and planning, it suffers from major limitations which restrict its usefulness. The major limitations as pointed out by critics have been summarised below:

1. It is not an equitable measure on several counts, particularly because of the differential age weights, and because socio-economic status of individuals are completely excluded from the measure.
2. Disability weights are independent of the social context in which disability occurs, which is a major limitation because the social context affects the severity of the disability and the amount of functional loss suffered by the individual.
3. Anand and Hanson[39] have questioned discounting for the future on ethical grounds because it would justify all forms of environmental degradation and over-use of resources.
4. The assumption that DALYs across age are separable is doubtful, because there is an interdependence of health statuses at different stages in life, and in such a case DALYs give a faulty guidance to policy.
5. The economic cost of illness to an individual is not included, which implies that no effort has been made to include the extent of loss of income suffered by the individual due to absence from work and the financial burden on the family as a whole because of the treatment cost.
6. DALY index assumes a strictly medical model of health. It does not consider the effect of non-medical intervention such as improvement in living environment and educational level on health status of individuals.

Since the index has the patronage of the WB, it has been accepted as a tool for health policy and planning especially among the developing nations whose economic policies are to a large extent influenced by the WB guidelines.

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[39] Anand, S. & K. Hanson (1998), 'DALYs: Efficiency versus Equity', *World Development*, vol.26 (2), p.309.

II.6 HEALTH STATUS MEASURES AND ETHICAL CONCERNS:

The two major questions which have been closely associated with the process of health status measurement are:-

- Whether health status measurement is ethical per se;
- Whether the measure is equitable.

Any critical analysis of health status measures deals mainly with these two questions.

II.6.1 ETHICS AND HEALTH STATUS MEASUREMENT:

The economic appraisal of health programmes through the use of health status measures has been attacked by many critics as being contrary to ethical principles. Williams lists out the different kinds of objections to health status measures on ethical grounds[40]:

1. Collective priority setting is unethical, hence not advisable.
2. Though collective priority setting is needed, it is not ethical.
3. Though collective priority setting is needed and ethical as well, the role of health status measures like QALYs is not ethical.
4. Collective priority setting is regarded necessary, but no specification is given as to how it should be operationalised.

Priority setting at the level of the clinician has been opposed on the grounds that it is contrary to medical ethics to decide which treatment has greater priority since all treatments must be carried out regardless of costs. However, at the level of collective priority setting for the community as a whole, this ethical objection is not prevalent.

Health status measures themselves have been criticised especially for the incorporation of discounting for time preference and unequal age weights, since it violates the principles of ethics and equity, i.e., equal care for all irrespective of their physical and social characteristics and economic status. A second criticism is that health status measures which are an aggregation of individual preferences cannot be applicable in social decision making since the society is more than an aggregation of individuals. The collective needs of the society may differ from the individual preferences of the people that comprise it.

II.6.2 EQUITY AND HEALTH STATUS MEASURES:

The ethical principle of distributive justice is the main concern in issues relating to collective priority setting at the community level. Distributive justice implies equity in the distribution of health care. Equity,

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[40] Williams A. (1996), 'QALYs and Ethics: A Health Economist's Perspective', Social Science and Medicine, vol. 43(12), p. 1795.

efficiency and effectiveness form the three essential qualities of a health system. G. Mooney[41] lists out the dimensions of equity in health which implies:-

⇒ equal expenditures/resources for equal need/demand;

⇒ equal access for equal need/demand;

⇒ equal utilisation for equal need/demand;

⇒ equality in health (suitably standardised for age and sex).

Culyer[42] classifies equity into horizontal equity (equal treatment to all in the same condition), and vertical equity (different treatment to those with different need). According to P. Musgrove, 'inequity results from differences in the ability to obtain health care, whatever the reasons may be, that prevent some people but not others from getting need assistance'.[43] Since there are so many aspects of equity in health, it is difficult to incorporate all dimensions of equity in a single health status measure.

Most health status measure developed by health economists are based on the ethical theory of utilitarianism which focuses on efficiency (maximising social benefit from the available resources) rather than equity. In order to incorporate measures of equity in health, the health status measures will have to give equal value of life to all persons and will have to be sensitive to differences in socio-economic characteristics of the population covered.

II.7 MEDICAL GEOGRAPHY: DEVELOPMENT AND STATUS:

The field of medical geography includes the studies in health with a geographical; perspective, using geographical techniques and approaches. According to Meade et al[44], 'medical geography uses the concepts and techniques of the discipline of geography to investigate health related topics.' The subject is highly interdisciplinary in nature, borrowing freely from other fields such as medicine, psychology, sociology and economics.

The antecedents of medical geography can be traced back to two thousand years ago in the realisation of the influence of physical environment on human health, as expressed by Hippocrates, the ancient Greek scholar. Ancient Indian and Chinese literature also contains accounts of regional patterns of various diseases. This ecological perspective continued into the mid nineteenth century, till the germ theory of disease causation gained acceptance.

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[41] Mooney, G. (1987), 'What does Equity in Health Mean?', *World Health Statistics Quarterly*, vol. 40, p.297.

[42] Culyer, A.J. (1995), 'Need: The Idea Wont Do - But We Still Need It', *Social Science and Medicine*, vol. 40 (6), p. 727

[43] Musgrave, P. (1986), 'Measurement of Equity in Health', *World Health Statistics Quarterly,* vol.39, p.333.

[44] Meade, M. et al (1988), Medical Geography, p. 1

The germ theory or the doctrine of disease causation due to a single cause spurred a number of studies which involved mapping of occurrence of diseases and explanation of their origin and geographical associations, especially with the physical environment. Several epidemic diseases were analysed in this way, such as cholera, yellow fever, plague etc. For example, Akhtar[45] quotes Dr. John Snow's investigation into the outbreak of cholera in London through mapping of the disease.

The second major phase in medical geography began after the second world war, especially through the works of Sir Dudley Stamp and Jacques May. May moved away from the emphasis on germ theory of single causation and realised that disease causes are far more complex. Both Stamp and May talked of the complex ecological factors which affect human health and influence disease causation. Medical geography thus moved from medical topography to a wider approach to study of human health. McGlashan[46] also relates this change in approach to the quantitative revolution in geography. Use of statistical methods such as factor analysis helped multi-factorial studies into disease causation. The causative factors hitherto unrecognised were brought to light. The subject also gained greater acceptability among other disciplines due to the scientific approach. The focus thus shifted from disease ecology to other fields such as disease diffusion and studies into the location of health facilities.

In the earlier part of the twentieth century the research was restricted to medical topography studies in Europe and North America. May prepared an atlas of diseases in the USA, while Rodenwaldt and Jusatz of Germany produced the 'World Atlas of Epidemic Diseases' in the 1940s. Apart from USA and Western Europe, medical geography also flourished in USSR, though the approaches were quite different in the latter. In the USSR the emphasis was on 'multifactorial disease complexes'[47] and on public health in order to economic productivity of regions. In the West, however, medical geography is a research tool with emphasis on reducing the burden of ill health and suffering caused by ill health to humankind. In the USA the medical geography research focused on either disease mapping through field studies, or studies in disease diffusion, or investigations into the provision of health services which were important in health planning. In UK the focus was on disease ecology and disease mapping. Pyle[48] lists out four topics common in medical geography studies:

1) Relationship between natural environment and communicable diseases;
2) Methods for disease mapping;
3) Analysis of disease diffusion
4) Administration and provision of treatment facilities.

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[45] Akhtar, R. (1982), The Geography of Health, p.3.
[46] McGlashan, N.D. (1972), 'Medical Geography: an Introduction' in McGlashan (ed), *Medical Geography - Techniques and Field Studies*, p. 4.
[47] Akhtar, R. (1982), *op cit.*, p.11.
[48] Pyle, G.F. (1979), Applied Medical Geography, p. 3.

Medical geography has now gained a much wider scope with the influence of different approaches to social and economic development as well as political and institutional influences. Political and economic influences have been particularly strong in medical geography. Pyle describes medical geography as overlapping of environmental, genetic, epidemiological, behavioural and socio-economic approaches to study of health related problems[49]. Medical geography or the geography of health is thus today a highly multidisciplinary approach, with active research focus on a number of health related problems, especially dealt with using geographical techniques and approaches on a spatial or spatio-temporal scale.

Medical Geography in India:

The earliest works in medical geography in India basically were offshoots of the concern with medical topography in UK. A number of scholars such as McClelland (1859), McNamara (1880), Chevers (1886-Diseases of India), Fayrer (Climate and Fevers in India)[50] produced pioneering works on medical geography in India. The distribution and epidemiology of diseases such as cholera, malaria, nutritional disorders and other diseases apart from general health problems were studied in detail in several studies. The contribution of Learmonth was significant in the study of disease ecology in India. His work was pioneering in providing a scientific research base to medical geography in India.

Geographers in India over the years have produced comprehensive works on disease ecology, nutrition, socio-economic and cultural aspects of health behaviour and distribution of health facilities resources. However, the scope of medical geography is immense in India, especially because of the widespread diseases, the irregularities in provision of health services and allocation of resources to health, and the outcome of specific health programmes targeting different sections of the population.

II.8 HEALTH STATUS STUDIES IN INDIA:

Studies on health status in India are few in number. Most of the studies are not in the strict sense dealing with health but are multifaceted, dealing with aspects of health, family welfare, nutrition, health care services utilisation, expenditure on health services, etc.

A major exercise on quality of life was the work by Morris D. Morris and Mc Alpin who calculated the PQLI for 12 Indian states from 1971 data with male/female and rural/urban breakdown[51]. The PQLI

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[49] Ibid., p.9.
[50] Akhtar, R. (1982), *op cit.*, p.22.
[51] Morris D. Morris & McAlpin (1982), *op cit.*

value ranged from 70 in Kerala to 25 in Uttar Pradesh, and for the first time enabled comparison of the level of quality of life of the states among themselves as well as with the other nations of the world.

In 1976 Ganguly and Gupta[52] carried out a significant study in the measurement of levels of living following the UNRISD methodology of Drewnowski and Scott. In this study the level of living was defined as the satisfaction of needs of population assured by a given flow of goods and services in a unit of time. The authors further identified the components of level of living, each component comprising a set of human needs. These components were grouped under the following major heads - nutrition, housing, medical care, education, clothing, leisure, security and environment. The methodology followed was of three stages:

1) Identification of suitable indicators for each class of human needs;
2) Construction of indicator indices for each component;
3) Construction of composite index of level of living by combining the indicator indices.

The indicator index was calculated using the following formula:

$$I = (I - i0 / i100 - i0) \times 100$$

I= observed value of indicator

I0 = least value of indicator for any state (level of destitution)

I100 = median value of indicator for any state (adequate level).

Principal component analysis and taxonomy were the two methods used to calculate the composite index. The results were then compared. The results showed that states with higher literacy had a higher level of living.

Though an extensive exercise, the major limitation of the study was the choice of indicators, which was restricted by data availability. No indicator for clothing was available, hence it was excluded from the exercise. Indicators such as number of letters delivered and number of policemen can be questioned regarding their explanatory power.

Duggal and Amin[53] in 1989 published the report of a morbidity survey carried out in Jalgaon district of Maharashtra in 1987 covering 6 villages and 6 urban wards. The survey involved three repeat visits and cross checking in the case of doubtful entries. The results of the survey showed a high prevalence of infectious diseases followed by respiratory diseases. Morbidity and cost of treatment rises with socio-economic status, so does the share of private provider in the treatment.

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[52] Ganguly, B.N. & D.B. Gupta (1976), Levels of Living in India, an Inter State Profile.

[53] Gumber, A. & P. Berman (1995), Measurement and Pattern of Morbidity and Utilisation of Health Services, p.6

The main drawback of the survey lies in the absence of stratification in the sample, lack of distinction between acute and chronic diseases and the categorisation of the diseases. Nevertheless, it was an important exercise in morbidity survey outside the official surveys of the NSSO.

Yesudian[54] in 1990 analysed the utilisation of and expenditure on health care in Bombay city covering three municipal wards. The results showed highest incidence of fever and cold. The share of public providers was higher in the case of chronic and catastrophic diseases than short term illnesses.
The main drawback of this survey was absence of stratification in sampling and the arbitrary classification of illness in short term, chronic and catastrophic, the latter two categories often overlapping. Delivery was described as a 'catastrophe' and so was any surgery carried out. This makes the category ambiguous, and affects adversely the results derived from the survey.

PGK Panikar and CR Soman[55] have presented a detailed account of the conditions of the nutrition, morbidity and mortality in Kerala in their work on the health status of Kerala. Their study is based on the analysis of official data. The health care delivery system has also been discussed. The study includes a comprehensive analysis of socio-economic determinants of health status.

In a paper by M Chakravarti and KK Das (1985)[56], a comparative mortality ratio has been suggested. The method for calculating the index is:

CMR = (% deaths < 1 Year / % deaths 50 Years and above) x 100

The index is based on mortality data because of the easy availability and reliability of such data. The index has the advantage of simplicity and can effectively show macro level picture of the level of well being of the regions.
A study on the health and nutrition trends in Andhra Pradesh was published by K Rani Gopal[57] in 1987. She explores the health status of the state from 1961-62 to 1973-74. She has taken three sets of indicators for health status:

1. Vital rates (death rate, maternal mortality rate and infant mortality rate)
2. Morbidity rates (number of cases registered in medical institutions of the state)
3. Health facilities (medical institutions per thousand population, per capita expenditure on health, bed population ratio, doctor population ratio, etc.)

To analyse the nutritional status the author used data on expenditure on food and per capita intake of calories and proteins.

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[54] ibid.
[55] Panikar, P.G.K. & C.R. Soman (1984), Health Status of Kerala.
[56] Chakraborty, M. 7 K.K. Das (1985), 'Comparative Mortality Ratio - A Health Index', *Indian Journal of Public Health* , vol. XXIX (1), pp. 22-28.
[57] Rani Gopal, K. (1987), Economics of Health and Nutrition.

KP Kannan et. al.[58] published their work on the health status of Kerala in 1991, based on health interview surveys carried out by Kerala Shastra Sahitya Parishad (KSSP). Morbidity and disability pattern was discussed on the basis of data from the survey. Utilisation of health services, child care and expenditure on health care were also covered. The households were divided in terms of two status groups - Socio economic status and Environmental status. Socio economic status was based on 4 categories and environmental status was based on 6 categories. These categories were ranked from 1-4 and the ranks were added up to give the weight for each household.

Table2.2: Status Groups of Respondents according to the KSSP Survey.

Socio Economic Status	*Environmental Status*
per capita income	drinking water
land ownership	sanitary facilities
educational status	cooking medium
housing condition	waste water disposal
	solid waste disposal
	existence of stagnant water

The major limitation of the survey was again regarding the sampling procedure and classification of diseases. From each of the selected villages, 10 households were selected randomly for the survey. This is a serious lapse. No stratification of sample was carried out and no distinction was made between prevalence and incidence of diseases. Diseases were divided into 19 acute and 12 chronic diseases. However, six of the twelve chronic diseases overlapped with acute diseases also. This increased the possibility of double counting. A large majority of the illnesses were not classified. Thus, all these major lapses eroded the credibility of the results. Due to the many limitations in the survey methodology, the authenticity of the pattern derived is doubtful.

A comprehensive study of health status in Kerala, it explored the relationship between health and development, and offered explanations for the paradox of high social development with low per capita income levels which exist in Kerala. Kerala also shows the paradox of the lowest mortality rate along with the highest morbidity rate in India.

Kundu[59] analysed the availability of health care facilities in urban areas in his study on urban amenities in India in 1993. His work provides a comprehensive discussion on the organisation and management of the bodies which provide urban amenities. He created an index of health facilities called 'health index' by giving weightage to different types of medical facilities and dividing the aggregate values by the population (in thousands) for different size classes of urban centres. Hospitals were given the highest weightage, followed by dispensaries and primary health centres. The results indicated that the lower classes of towns had a higher health index which decreased with increase in size class. The author

[58] Kannan, K.P. et al (1991), Health and Development in Rural Kerala.
[59] Kundu, A. (1993), In the Name of the Urban Poor.

describes this as an indicator of government's success in covering a large section of urban population. However, the results may be distorted because of the low population base for the smaller size classes of urban centres. Again, the quality of infrastructure was not analysed by size classes of towns, which may have shown a trend different from that reflected by the health index.

Greater investigation of the quality of facilities available, and the extent of accessibility to these facilities by the different categories of population would have been desirable. Nevertheless, it is an objective and comprehensive study though health is only a component of several indicators of urban amenities, and not the subject of the study.

The National Council for Applied Economic Research (NCAER)[60] sponsored a major health survey in 1990 covering the whole country. It was a single visit survey which collected information on morbidity and health care utilisation. Multi-stage simple random sampling was chosen for the sampling design. The survey results showed that the highest prevalence among the diseases reported was of fevers followed by respiratory and digestive problems. The survey found ample evidence of gender disparity in morbidity prevalence and treatment of the diseases. Information in this survey was sought only for treated illness, hence males reported more illness than the females. The prevalence rates for females were lower than the males, which the authors feel may be due to under-reporting. The treatment of disease was lower for females than for males which is the result of lower perceived need of treatment for females as well as social restrictions.

The authors also examined the determinants of cost of treatment- among the major factors were socio-economic status, socio-demographic characteristics of the patient, type of disease and duration of illness. This survey was one of the more systematic of health surveys examined. However, no distinction was made between prevalence and incidence of diseases, it was also not clear as to how the diseases were classified.

The NCAER carried out another morbidity survey in 1992 directed by Dr. Monica Dasgupta and Dr. S.P. Pal[61]. The survey was to assess rural health care needs and availability and the role of private providers in rural areas. The survey was restricted to rural areas in two districts each of Madhya Pradesh, Rajasthan and Uttar Pradesh (Gwalior and Datia in Madhya Pradesh, Mathura and Hardoi in Uttar Pradesh, and Alwar and Tonk in Rajasthan). The districts were selected on the basis of child mortality and literacy , one being better off and one worse off.

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[60] Sundar, R. (1992), 'Household Survey of Medical Care', *Margin*, vol. 24(2), pp. 169-175.

[61] Summary of survey on Rural Health Care Needs and Availability (19920, *Margin*, vol. 24 (2)pp.416-418.

The result showed that mortality decreased by socio-economic status in Madhya Pradesh and Uttar Pradesh but not in Rajasthan. Fevers (viral fever and malaria) again recorded the highest prevalence. Share of public provider was low in Madhya Pradesh and Uttar Pradesh but high in Rajasthan. Prevalence rate was higher in the worse off district. The prevalence of anaemia was found to be very high among the lower income groups especially adult females. Over 85% of the illness cases were treated. The survey did not seem to bring out any major inter-district trend. The purpose behind the choice of the three states with similar socio-economic characteristics was not clear. Comparison between states of different levels of development would have been more meaningful. The method of classification of diseases was again on an arbitrary basis, rendering the morbidity data unreliable, for example, delivery was considered a 'gynaecological problem' while aches and pains were classified under skin diseases. Thus there was much greater scope to make the survey more meaningful.

The International Institute of Population Studies (IIPS) carried out the National Family Health Survey in 1992-93. This was a major step in a comprehensive all India survey covering issues of health as well as family planning and maternal health, fertility-related practices, nutritional status of children, etc. The survey covered the whole country with uniform questionnaires and uniform sampling method across the states. The respondents were only ever married women aged 13-49 years. Stratified systematic sampling design was adopted. The survey was carried out in three phases between April'92 and June'93. While the survey has collected comprehensive information on matters of family planning, ante and post natal care, breast feeding, immunisation etc., the section on morbidity is comparatively insufficient. Only major problems have been considered, such as TB, malaria, leprosy and blindness. Among children the incidence of diarrhoeal diseases figure prominently. But because of this insufficient coverage of morbidity, the data is of little use in comprehensive analysis of overall morbidity pattern. It is useful only if specific diseases are considered for which data is available. Data on anthropometric measures was also incomplete, since for some states height data had not been collected. All these points create limitations in survey data from the point of view of morbidity analysis. It is hoped that such surveys would in future devote a greater focus to overall morbidity pattern especially since such data can be useful for analysis of health status.

A report on survey in rural Haryana regarding morbidity, child health, maternal health and food intake was published by Kumtakar et al in 1993. The households below poverty line with working mother and child below 6 years of age only were considered. The survey covered four villages in each district. The survey carried out in 1989-90 was executed by six bimonthly visits. The results showed that morbidity was higher among the children and mothers, fevers being the main problem followed respiratory diseases and diarrhoeal diseases. Morbidity was higher among labourers than cultivators. About 48% of the illnesses were not treated or home treated. Among the treated illnesses only 9% were treated by public providers.

The repeat visits in the survey greatly increased the morbidity reporting and thus helped cover a larger extent of the actual morbidity. It was important in the sense that for the first time a survey took such a close look at the morbidity patterns and treatment behaviour among the rural poor in India. However, classification of diseases was again a major problem, since it was carried out arbitrarily.

George et al (1994) report on a household survey on morbidity carried out in 1990-91 in two districts of Madhya Pradesh covering three villages and two towns from each district. A total of 770 districts were covered, with no stratification used in sampling. The survey included two visits to the households. The results showed a rise in morbidity reporting and treatment but decline in share of public providers with increasing socio-economic status. Cost of treatment also increased steeply with socio-economic status. The classification of diseases was done arbitrarily on the basis of the responses. No proper distinction was maintained between chronic and acute diseases. No stratification was carried in sampling. These limitations erode the credibility of the results.

A third morbidity survey was carried out by the NCAER in 1993[62] as a result of its focus on study of morbidity patterns and medical care. It was the second all India survey by NCAER after 1990. Several changes were made in this survey as reported by Sundar. Data on both treated as well as untreated illness were taken and attempt was made to separate the hospitalised from the non-hospitalised disease episodes. Data on morbidity, health care utilisation and expenses was collected. While the total prevalence rate of illness was 106.7 per thousand, the prevalence rate of treated illness was 94.1 per thousand, which is higher than estimated by previous survey. The survey did not detect any significant sex differentials in disease prevalence but the differentials were very prominent in the case of hospitalised treatment, being lower for females than for males. 73% of reported illnesses were acute in nature. Private providers accounted for majority of treated cases in both rural and urban areas, followed by public hospitals and PHCs. Dependence on public health facilities was higher in cases regarding hospitalisation and in cases of delivery. The survey also reported a high illness prevalence among the elderly population above 60 years of age, highlighting the need for a comprehensive package for health care for the elderly in India.

This survey was an improvement on the earlier survey since it had a definite stratified sampling design taking into account socio-economic characteristics of the sample regions. However the survey was restricted to reporting of diseases in only summer months of 1993, hence not reflecting seasonal variations. No distinction was made between illness prevalence and incidence. The reporting of the diseases was also more systematic since the symptoms reported were classified on the basis of WHO's

[62] Sundar, R. (1995), Household Survey of Health Care Utilisation and Expenditure, working paper no. 53, NCAER.

Manual on Lay Reporting of Health Information into disease categories. A longer duration of the survey with repeat visits would have given a greater insight into the morbidity patterns.

Another study on the health and the nutritional status of the people of Andhra Pradesh was brought out by G Kamalamma[63] in 1996, in which she discusses at length the current status of morbidity, health services utilisation and nutritional status of Andhra Pradesh.

Anil Gumber[64] has calculated the burden of disease for the Indian states using the DALY index in 1997. In another study he has also calculated the burden of injury for Indian states. The paper on burden of disease is part of the groundwork carried out for planning health interventions during the 9th five year plan. He discusses the trends in morbidity patterns as emerging from analysis of the data collected by health interview surveys conducted by National Sample Survey Organisation in 1986-87, and by the NCAER in 1990 and 1993, for the whole of India. Some of the important findings of the study are that more than half of total DALYs lost in India are because of child mortality (< 5 Years of age). The burden rate is higher for females than males and the gap is wider in backward states.

Table 2.3 Classification of States According to Burden of Morbidity and Mortality:

Mortality Burden	**Morbidity Burden**		
	Low	Medium	High
Low	Maharashtra, Tamil Nadu	-	Kerala, Punjab
Medium	Gujarat, Haryana, Bihar	Andhra Pradesh, Rajasthan, West Bengal	Karnataka
High	Uttar Pradesh	Assam, Madhya Pradesh, Orissa	-

The study ends with a discussion on the government's health intervention programmes planned for the ninth plan period.

The review of major works on health status in India show that there has not been any significant work on the development of a comprehensive index of health status. Studies have been limited to statistical analysis of data (whether secondary or primary), or an index developed at the global level has been used (like the DALY index). This leaves a large scope for research into the formulation of a health status index that could be sensitive to the Indian socio-cultural environment, and hence facilitate a meaningful study of regional variations in the health status in India.

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[63] Kamalamma, G. (1996), Health and Nutritional Status in India.
[64] Gumber, A. (1997), 'Burden of Ill Health in India', *Margin*, vol. 29(2), pp. 133-165.

CONCLUSION:

The survey of literature reveals that the question of health status has been a well researched one in the West, and has over the years modified from its original form as a result of the influence of changing economic and political ideologies. Health status, which later expanded into the more comprehensive quality of life research, has had considerable political influence, possibly because of its implications in the field of policy formulation, and also because of the role it played in global politics of development.

In India, however, the role of health status research has been limited. It is apparently only since the 1980s that major studies on the assessment of health status of the population have been carried out. The nature of India's health problem is quite different from the West and therefore there is need for the development of a comprehensive health which is suitable for Indian conditions, instead of adoption of Western approaches.

CHAPTER III

HEALTH-RELATED STATISTICS : SOURCES AND LIMITATIONS

III.1 INTRODUCTION:

Availability of a reliable and extensive set of statistical information is a major requirement for spatio-temporal analysis in social science research, and also for the purpose of developmental planning and management. An efficient information system should provide a multiplicity of data on a regular basis in accordance with the need of the users. The type of data required must be clearly identified through an appraisal of user needs. The instruments of data collection should be chosen on the basis of the type of data required and the level at which data has to be collected. Different social sectors differ in terms of data requirement, depending on the information relevant to them.

All types of information relevant to the health sector is provided through the health information system. In the words of Park &Park[1], the objective of a health information system 'is to provide a reliable, relevant, up-to-date, adequate, timely and reasonably complete information' and the 'sharing of technical and scientific information by all health personnel participating in the health services of a country; and also to provide at periodic intervals data that will show the general performance of the health services and to assist planners in studying their current functioning and trends in demand and work load.' The provision of data relevant to the health sector is thus a part of the health information system.

Health as a comprehensive state of well being and not merely the absence of disease, requires a wide information base to facilitate a comprehensive inquiry into the factors which influence the health of a person, such as the level of nutrition and the availability of food, the condition of the environment, socio-economic status, availability of health facilities, the degree of public investment in health policies and programmes, etc. The health sector, therefore, has an extensive data requirement covering demographic variables, morbidity statistics, environmental variables, data on health financing and statistics on health institutions.

Ramachandran[2] listed out the following heads for which information is required in a health information system

1. Population to be served by health services, its composition at the national, state and relevant local levels.
2. Vital events with special reference to births, deaths, marriages and migration.
3. Mortality statistics including cause of death data.

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[1] Park, J.E. & K. Park (1991), Textbook of Preventive and Social Medicine, p.449.
[2] Ramachandran, k. (1990), 'Some Thoughts on Database in Health in India' in K. V. Rao et al (eds.) *Statistics in Health and Nutrition,* p.76.

4. Morbidity data including data on disability.
5. Nutritional status and immunisation status data.
6. Data on physical facilities, their geographical distribution, accessibility and utilisation.
7. Health manpower data including data on training facilities for such manpower.
8. Data on physical and social environment.
9. Data on physical resources, both current and potential including drug production & medical supplies.
10. Data on financial allocation to health services & their relationship to total government expenditure.
11. Non-governmental health resources and activities.

III.2 DATA REQUIRED IN HEALTH STATUS RESEARCH:

The three important aspects for which data is required in the assessment of health status of population are morbidity, mortality and nutritional status. A region with high mortality and morbidity rates, and a low nutritional status has a low health status and vice versa. Morbidity, mortality and nutritional status thus constitute the key indicators of health status of a region.

III.2.1 MORTALITY:

Mortality indicators are very important in health status analysis, especially in countries with high mortality rates attributable to widespread poverty, malnutrition and high morbidity. A high death rate reflects a low health status. Apart from the crude death rate, other measures of mortality, such as the infant mortality rate (IMR), child mortality rate (CMR) and maternal mortality rate (MMR) reflect the survival rate of specific vulnerable sections of the population which suffer greater risk of morbidity. A high IMR, for example, is the result of a number of factors such as poor nutritional status, lack of hygiene and proper care resulting in increased morbidity, as well as lack of effective health care facilities available to the people. The IMR is thus a sensitive indicator of health status. It is also widely used as an indicator of the level of development of a region.

Another important component of mortality statistics is cause of death data. Such data provides an insight into the major causes of death in a region, such as the proportion of deaths attributable to infectious diseases, the proportion of deaths attributable to degenerative diseases, deaths due to malnutrition, accidents and injuries, etc. This is useful in identifying those causes which make a significant contribution to the mortality burden of a region, specially those which can be prevented. Such information is valuable not only in health status research but also in planning health interventions.

Mortality data is easily available due to the registration of births and deaths, and is collected by the census and vital statistics departments. It is available on a spatial as well as temporal basis and also by age, sex and residence. Mortality data is particularly useful in developing countries because of its wide availability and

reliability as compared to other data sets. It often forms single most reliable indicator of health status in some countries. It is useful in inter-country comparisons as well. Data regarding the number of deaths is widely available but data on causes of death suffers from limitations, particularly in developing countries. Since most of the deaths are not medically certified, cause of death statistics are not available on a census basis. Thus their availability is restricted. Even if available, they are likely to suffer from poor coverage and reliability.

III.2.2 MORBIDITY:

Morbidity refers to the degree or level of sickness in a population and is therefore a major component of health status since the very definition of health implies absence of disease and infirmity. The higher the morbidity in a population the lower the health status and vice versa. Morbidity data covers the incidence and prevalence of disease in a population.

There are some inherent problems in data on morbidity which render it difficult to collect and also affects the reliability of such data. The following are the main factors which create problems in morbidity data:

1. Certain diseases are specific to certain environmental conditions and therefore show a high prevalence in regions with environmental conditions conducive to their incidence. Morbidity is a seasonal event because with changing seasons, the changing climatic conditions spur the growth of some diseases while inhibiting the growth of others. For example, the summer season in India is a period of high morbidity from water borne diseases such as cholera and other diarrhoeal diseases. Thus the time of the year in which the data is collected will effect the level of morbidity reported.
2. Morbidity is a recurring event, which implies that the same person may experience more than one episode of illness in a given time period. The duration of illness also varies for different diseases, some lasting only for a few days while others may continue for years. Even for a specific disease the duration depends on the degree of severity. All these factors make it difficult to obtain accurate data on the level of morbidity in a region, since it is almost impossible to record all the episodes of illness and their duration for a large population. Such an exercise is possible only in small sample surveys which conduct a detailed study stretching over a large period of time.
3. Many morbidity events go unreported, especially minor episodes like cold and cough. In developing countries like India where there is widespread poverty, many common ailments do not receive prompt treatment because of the lack of adequate resources required for the treatment. In some patriarchal societies where there is a strong male bias, morbidity of females may not be reported vis-à-vis that of males. Also, the diseases which carry a social stigma or taboo are often under-reported, for example, in India cases of leprosy , tuberculosis and venereal diseases are not reported for the same reason.

The above-discussed factors lead to problems in data collection and influence the accuracy and reliability of such data. Morbidity data is collected mostly through sample surveys. Cases of various diseases reported in

the health centres and their outcomes (whether the cases were treated or resulted in the death of the patient) are also compiled to provide information on diseases prevalent in the population. Though suffering from lack of accuracy and reliability, such data does help in generating broad regional patterns regarding the overall morbidity rate, the diseases with the highest fatality rates, etc. Despite its limitations, morbidity cannot be ignored in any analysis of health status.

III.2.3 NUTRITION:

Food intake is the basic necessity for human existence and determines the nutritional status of the person. Nutrition deals with the level of nutrient intake of individuals through their daily diet. The intake of nutrients through food in suitable amounts is essential for the maintenance of body functions. Any imbalance in nutrient intake affects adversely the functioning of the body and leads to ill health. The nutritional intake, therefore, has a profound influence on the health status of the individual, and is an integral part of any health status study. Malnutrition increases the risk of a number of diseases. For example, vitamin A deficiency is associated with measles, and obesity increases the risk of heart diseases. Thus the surveillance of the nutritional status ofd the population is very important especially in developing countries where a large proportion of the poor population suffers from undernutrition and associated ill health.

The measures which have been devised to assess the nutritional status of individuals can be classified into three major categories:

1. **Anthropometric Measures:** Severe malnutrition in the early formative stages of life leads to impaired physical development of the individual when the full potential of physical growth is not achieved due to lack of sufficient nutrients. The extent of such deficiency is measured by anthropometric techniques which measure the physical growth such as height, weight, mid-arm circumference, etc., and compare these measures with given standards of weight-for-height, weight-for-age and height-for-age. One of the popular measures is the Body Mass Index (BMI). It is calculated by the following method:

   BMI = Weight in kg / Height in m.

   The BMI is an effective indicator of the level of physical growth of the individual and is useful in assessing the nutritional status of growing children specially.

2. **Diet Survey:** In order to assess the amount of nutrient intake through daily diet, special surveys called diet surveys are carried out. In these surveys the composition of the diet of the households covered is noted, the constituents are weighed and then converted to the nutrient equivalents. Diet surveys involve either a survey on a single day, or continuous surveillance for a period of time. The number of meals and the constituents are noted, and then converted to nutrient equivalents. Diet surveys are possible only for sample studies since they are cumbersome and time consuming. But they form the most important means of assessing the amount of daily nutrient intake such as calories, proteins, fat and vitamins for individuals.

3. **Clinical / functional assessment:** Malnutrition affects the functional capacity of the individual, reducing his/her ability to perform work. It also affects the brain development of the individual. Assessing the effect of malnutrition on the physical and mental work capacity of the individual requires some equipment and is therefore restricted to clinical or laboratory studies. For example, assessment of physical work capacity is done through the Harvard step test which measures the work capacity by working the individual on a treadmill. Another such instrument is the bicycle ergometer. Brain development tests are more popularly known as IQ tests. All such measures are highly restricted in their coverage of individuals and cannot be applied at the level of the community.

The collection of data on nutrition suffers from some inherent problems and limitations which are discussed below:

1. Nutrition data is difficult to collect on a population basis. Coverage of diet surveys is limited to sample populations. So is the case with anthropometric surveys.
2. It is difficult to detect cases of mild and moderate malnutrition in the field, and their effect on health have also not been fully comprehended.
3. The most important problem in nutrition studies is that of deciding the cut-off point for classifying cases of malnutrition. There has been much debate about the feasibility of comparing nutrient intakes with the 'Recommended Daily Intake' (RDI). The setting of RDIs has been questioned since the optimum nutrient intake varies for each individual according to his/her inherent physical characteristics.

In spite of the many problems in data collection and assessment of nutritional status, it is vital as an indicator of health status, and as such forms an independent field of investigation too.

III.3 FACTORS WHICH AFFECT HEALTH STATUS:

Several factors are responsible for determining the health status of the population, since they exercise a great influence on the variables of health status. Factors such as the socio-economic status, availability of food, physical environment, health care infrastructure and official programmes for health and sanitation are all important in understanding the variations in health status. Data on theses factors , therefore, is also a part of the health information system.

III.3.1 HEALTH CARE INFRASTRUCTURE:

This includes two aspects - health care personnel and health care centres. Data on health care personnel includes the number of physicians, specialists, nurses, health workers, paramedics, etc. and is available through official statistics. Data on health care centres also implies health centres ofd all types and at all levels. This data is required to assess the availability and degree of accessibility of health manpower as well as the physical infrastructure. Some of the measures to assess the different aspects of health services are the following:

Availability of health care services:

1. Hospital-population ratio: This is the ratio of hospitals to total population and can be calculated separately for rural and urban population.
2. Physician-population ratio: This is the ratio of physicians to total population and can be expressed as doctors/specialists/others per thousand population.
3. Nurse-bed ratio: This is the ratio of nurses to the total beds available.
4. Bed-population ratio: This is the ratio of beds tot the total population and is expressed as beds per thousand population. It is an effective measure of the adequacy of health care infrastructure in the region.

Accessibility to health care services:

Some measures of the accessibility of health care services to the population are the average time taken to reach the nearest health centre and the average cost of travel incurred to reach the nearest health centre.

Utilisation of Health Care Services:

1. The number of outdoor patients per physician/health centre.
2. Utilisation of health services by kind of facility (such as the patients per ward type, proportion of patients treated under different systems of medicine etc.).
3. Cases of hospitalisation as a proportion of the total cases reported.
4. Utilisation by different sources of treatment, such as the proportion of patients utilising primary health centres, government hospitals, private clinics, etc.

III.3.2 HEALTH FINANCING:

Information on funds allocated to the health sector by the government, and the proportion of these funds to the total government expenditure is required to assess the degree to which health is prioritised by the government in relation to other sectors, and whether the funds allocated are sufficient for a satisfactory provision of health services in the region. Indicators for the assessment of the degree of health financing are the per capita state expenditure on health and the percentage of the net domestic product of the state which is spent on health.

III.3.3 ENVIRONMENTAL FACTORS AFFECTING HEALTH:

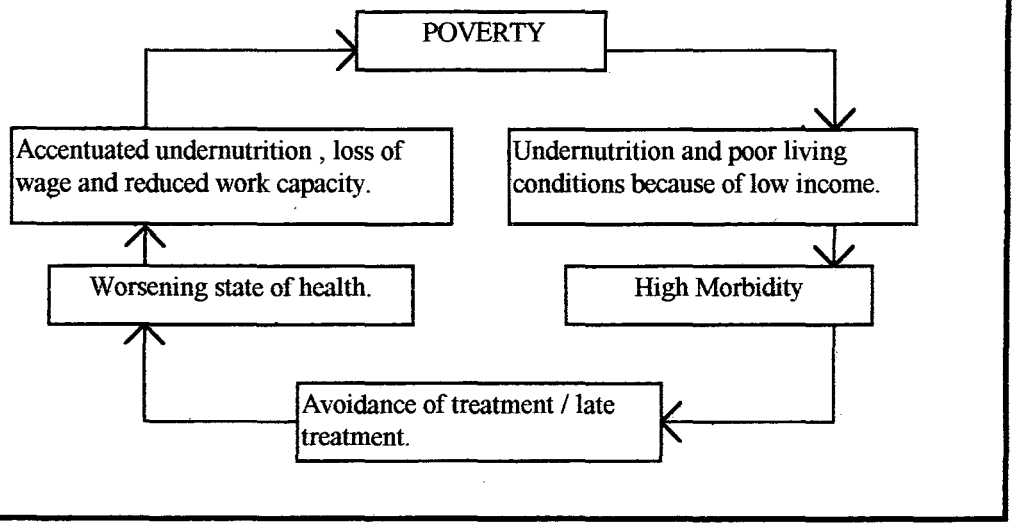
To a large extent human health is conditioned by the physical environment. Four major factors - climate, pollution, housing condition and sanitation constitute the environmental factors affecting health. The climatic condition of a region may be conducive to the growth of certain specific diseases which would show a high incidence in that region. Environmental pollution is also a major factor which affects health. For example, in areas experiencing high air pollution, there is a high prevalence of respiratory infections, while in areas suffering from water pollution there is a high incidence of water-borne diseases. Houses with proper

ventilation and no dampness, proper toilet facilities and no waterlogging around the house are very important to keep diseases at bay. Data on house type, availability of toilet facilities, sources of drinking water, electricity are all important indicators of the quality of living environment. However, it is difficult to compile data on the degree of waterlogging , personal hygiene, ventilation of households, etc. , which is possible only through sample surveys. Data on the level of pollution is available but special studies are required to correlate the level of pollution with the health status of the region.

III.3.4 SOCIO-ECONOMIC FACTORS AFFECTING HEALTH STATUS:

Income, education and the availability of food are the most important socio-economic factors affecting health. The level of income of a person determines his/her ability to seek treatment in case he/she is suffering from a disease. In countries like India with widespread poverty, the proportion of population below poverty line is vast. The poor suffer from high morbidity resulting from poor living conditions and severe undernutrition, but cannot seek treatment since they cannot bear the cost of treatment. As far as possible they avoid rest since it would lead to loss of wages, which in turn leads to worsening of health. This affects their ability to work and adversely affects their income.

Box III.3.1: Vicious Circle of Poverty and Ill Health.



Data on the income level of households is required for analysing the effect of income on health status.

Education also influences health status because the level of education determines the person's awareness regarding health, personal hygiene, sanitation and prevention of diseases. Of particular importance is female literacy since the females play a pivotal role in influencing the household health to the greatest extent by maintaining cleanliness in the household and surroundings, adopting hygienic cooking and storage practices and educating the children about health. Data on educational status of population is therefore an essential input in the analysis of factors affecting health status.

III.4 SOURCES OF HEALTH-RELATED STATISTICS IN INDIA:

In India the collection and compilation of data related to health is done exclusively by government departments. Data on health can be classified into four categories on the basis of the agencies providing the data.

III.4.1 DATA FROM THE CENSUS:

The census is an extensive survey, undertaken in the first year of each decade in India since 1881 in which information related to social, economic and demographic attributes is collected from each person inhabiting the country. It is thus a decennial exercise in the collection of demographic data covering the whole nation. Census taking is carried out in most of the countries of the world , and the data so derived enables comparability on the international scale. The Indian census provides information on the total population count by age, sex and residence. It gives detailed tables on fertility, mortality and migration. Among the socio-cultural attributes, detailed information is provided on language, religion, marriage and literacy. The economic tables contain information on the occupational categories and employment levels of the population. This information is available for all the states and union territories in detail.

Census data is the most extensive data available for any analysis on demographic and socio-economic attributes of the population and hence is used extensively in social science research. The fact that it covers the entire population and is available for regular time intervals (of10 years) makes it very suitable for spatio-temopral analysis. Data on mortality, educational status and data on housing and amenities are some of the data which can be utilised in a health status study.

Some of the major limitations observed in census data particularly in developing countries like India have been listed below:

1. The problem of changing definitions and coverage: Different censuses may adopt different definitions of the same concept and collect information accordingly. This renders the data incomparable to some extent across different censuses.
2. The problem of changing political and administrative boundaries: The boundaries of administrative units at different levels may undergo a change between two different censuses, rendering the data incomparable over time.
3. Problems with the respondents: India has a vast majority of population which is rural and suffers from a high level of illiteracy, backwardness and ignorance. Such a population often adopts a suspicious and hostile attitude towards the census enumerators. Also, the data provided by them lacks accuracy. For example, in the villages there is no system of age-keeping, which is why the age data in rural India lacks reliability.

4. Problems with the enumerators: The attitude of the census enumerator also affects the accuracy of the data. Enumerators are often apathetic to their work and lack sincerity. This often leads to false enumeration, under-enumeration and inaccuracy. Low pay and lack of resources offers no incentive for the enumerators who are often government employees on special duty, and therefore are not trained in professional census-taking.

Though the limitations affect the reliability and comparability of data, the census remains the major source of population-related data in India.

III.4.2 REGISTRATION OF BIRTHS AND DEATHS:

Most oft he countries of the world have adopted a civil registration system in which all births, deaths, marriages, adoptions, divorces etc. are recorded. It is the prime source of vital statistics in such countries. India too has a system of registration of vital events, for which a population register is maintained with the urban governments for the urban areas and the local revenue officers in the rural areas. Every birth and death has to be compulsorily registered with the concerned officials. Registration of vital events has been described as the 'precursor of health statistics'[3] and is a valuable source of health information. Since its inception in 1873 by the Births, Deaths and Marriages Registration Act, registration of vital events has spread throughout the country. However, in spite of improvement since independence, the registration system suffers from inadequate coverage, lack of accuracy and completeness and lack of reliability. Park & Park state that 'the extent of under-registration in some states ranged from 38 to 97% in case of births and 3 to 83% in case of deaths.'[4] The reasons for this lack of reliability and incompleteness lie in the ignorance of the population, lack of motivation and apathy on part of the officials, and the multiplicity of registration agencies.

Sample Registration System:

The limitations of the statutory civil registration system rendered the data on vital events unreliable, and hence the government was prompted to device a method for obtaining 'quick and reliable estimates of birth and death rates on a current and continuous basis'.[5] This was very important since the country was facing an acute population problem and such data was required to measure short term changes in population growth and to project its future trends. It was also vital for evaluating the effects of family planning programmes. It was for this purpose that the Sample Registration System (SRS) was initiated in 1964-65 on a pilot basis by the Office of the Registrar General, India. In 1969-70 it was launched on full scale. Its main objective was to provide reliable fertility and mortality estimates for the state and national level in India.

SRS enumerates the vital events in a chosen sample population at two levels. There is a continuous enumeration of births and deaths by the resident investigator in all the sample units, and alongwith this an

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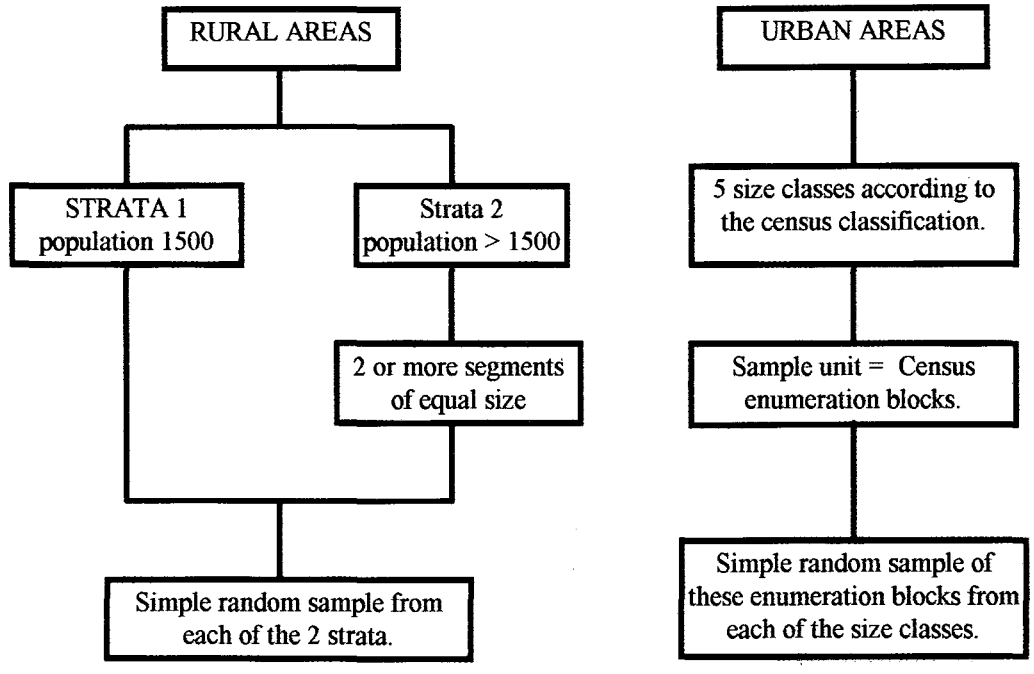
[3] Park, J.E. (1991), op cit., p. 450.
[4] Ibid.
[5] Ibid.

independent half-yearly survey by a supervisor is also carried out to verify the enumeration on a continuous basis. Updating of the house list is also done in the half-yearly survey.

Box III.4.1 : Sample Design Of SRS At The District Level:



Source : SRS Report 1995

All the districts in all the states and union territories are covered in the SRS. Information on births and deaths is obtained through informants, household visits and from hospitals, burial grounds and crematoriums. The population covered by the SRS was 5.9 million at the national level in 1994, with 4.7 million rural population and 1.2 million urban population. Different agencies implement the SRS in the states such as the Directorate of Census Operations, Directorates of economics and Statistics and the Directorates of Health Services. The central co-ordinating agency is the Vital Statistics Division of the Office of the Registrar General, India.

The data collected by the SRS is published in its annual reports for each year. The report contains data on fertility indicators such as general fertility rates, age-specific fertility rates, marital fertility rates etc. and mortality indicators of which some indicators such as the infant mortality rate, neo-natal and peri-natal mortality rates, still birth rates, % deaths of children in the age group 0-4 years and % distribution of deaths by type of medical attention received before death are particularly important for health status analysis.

III.4.3 SAMPLE SURVEYS:

In order to supplement the data covered by the census, and to collect data on the aspects not covered by the census, a system of sample surveys was introduced. The gap of a decade between two censuses is a long time and in order to study the trends in intercensal years such sample surveys were very important. The following are some major organisations conducting sample surveys across the country on different aspects and providing vital information in relation to health sector.

National Sample Survey Organisation:

The National Sample Survey Organisation (NSSO) was set up in 1950 by the Government of India in order to obtain a more comprehensive information regarding socio-economic and demographic attributes through a system of continuous multipurpose surveys held across the country. The surveys are held in the form of successive rounds which cover different subjects. The subjects are repeated generally after every five years, making it a quinquennial survey. The NSSO is the largest organisation in India for conducting country wide sample surveys. It not only provides information complementing the census data, but also provides information on aspects which are not covered by the census. Some of the subjects on which the NSSO has been continually providing information are household income and expenditure, employment and unemployment, size of land holdings, savings and consumer expenditure on different commodities, morbidity and nutrition, utilisation of health care facilities and expenditure on health, occupational structure, indebtedness and demographic details. The NSSO surveys on morbidity, health expenditure, health care services utilisation and nutrition are very useful sources of data related to health. Morbidity has been covered in nine rounds of the NSS, while disability has been covered in six rounds. Initially the coverage of morbidity surveys was small. For example, in the first morbidity survey (1953-54) in the seventh round the sample consisted of only 8235 rural and 1720 urban households. The survey was lacking in details and therefore not very comprehensive. However, since then the surveys have gradually improve their coverage and the amount of data collected. The morbidity surveys also faced the problems inherent in any investigation of morbidity - under-reporting, inaccurate knowledge of type of illness, lack of response, etc. Gradually the focus was shifted from morbidity to the utilisation of health services. In the 1950s there were four reports on morbidity, two in the 1960s, one in 1970s and two surveys in 1980s which covered utilisation of health services also and not only morbidity patterns. Alongwith this they also covered maternal and child care and family planning.

Data on nutrition has been collected in a number of rounds, the main rounds being 26th round (1971-72), 27th round (1977-78), 38th round (1983), 43rd round (1987-88) and the 50th round (1993-94). The information gathered covers the diet composition of the households, the per capita and per household daily nutrient intakes, and nutrient intake levels by monthly expenditure classes. The NSS surveys on consumer expenditure are also useful since they provide data on the proportion of total monthly expenditure spent on food items per capita as well as on income groups.

Though the NSS data is sample data, yet it has been widely used in research because of its country wide coverage and comprehensive nature of information collected. The reports of the surveys are published in NSS special reports and annual publications, such as Sarvekshana, the journal of the NSSO. A major limitation of the NSS data on morbidity is the changing extent of coverage and methodology of collecting information which renders the data for different rounds incomparable. Changes in the nature of questions asked, or the length of the recall period adversely affect the comparability and reliability of the morbidity rates generated. However, the NSS remains a major source of data on morbidity, disability and nutrition apart from other socio-economic characteristics.

Survey of Causes of Death (Rural):

The analysis of deaths by cause throws light on the health status of population, especially on those diseases which have a large share in the total number of deaths. The identification of such diseases and other causes of death is also useful in planning health interventions. In India the system of medical certification of cause of death suffers from gross irregularities and information on cause of death from this source is highly inadequate, especially for the rural areas where there are very few medical institutions and medical certification is almost non-existent. Thus, in order to fill this gap and to provide information on causes of death for rural areas the office of the Registrar General, India initiated a scheme called the 'Model Registration Scheme' in the 1960s which was subsequently renamed as the 'Survey of Causes of Death (Rural)' in 1982. The survey collects information on causes of death in rural areas.

The coverage of the survey has gradually increased from two primary health centres (PHC) per million rural population (as per 1981 census) to 2500 PHCs at the rate of 4 PHCs per million rural population (as per 1991 census) in 1992. All the events of birth and death related to usual residents of the selected villages are covered under the survey. The cause of death is ascertained by the method of 'lay diagnosis reporting' in which a verbal inquiry is made after a death about the symptoms, condition and duration of disease from the family members of the deceased. Returns are sent from the field to the selected PHCs which then compile the returns. The survey covers only the sample village of the selected PHC. The condition for sample village selection is that it should have a population of 2000-5000 persons and must be situated 3-6 km from the PHC. The field agents are generally the paramedical staff such as Lady Health Visitors and other government employees such as the primary school teacher , who are guided by the Medical Officer in charge in the identification of causes of death. The implementing agencies of the survey at the state level are the Directorates of Health and Family Welfare and the state bureau of Economics and Statistics. The results of the survey re published in its annual report. Data about the causes of death is published in accordance with the International Classification of Diseases (IX revision ,1977). The proportion of deaths by cause are analysed separately for some specific vulnerable groups , such as infant deaths, maternal deaths, child mortality and female mortality.

In spite of the wide coverage and useful nature of the data reported, the survey suffers from several limitations , which have been noted by the survey report itself. The Survey report lists out the following limitations of the survey:-

1. The technique of 'lay diagnosis reporting' itself renders the data unreliable as the cause of death is based on mere verbal enquiry and not through autopsy and medical certification.
2. The reliability of the information is dependant on the efficiency of the family members of the deceased in describing the symptoms, which again is not satisfactory especially in the rural set-up.
3. The number of deaths covered are too small and do not provide substantial estimates. They are subject to large fluctuations and hence not comparable over time.
4. There is a large scope of bias on part of the field agent, who may identify the causes correctly. For example, in the case of 'senility' deaths which are deaths of persons aged more than 60 years with no clear symptom of sickness, the field agent may tend to club deaths over 60 years of age into this category as a matter of routine. Lack of sincerity and proper judgement regarding cause of death on part of the field agents affects the accuracy of the data.
5. The survey covers only rural areas and therefore the estimates derived from the data cannot be said to represent the entire states or the country.

Keeping these limitations in mind, an attempt is being made to improve the coverage, efficiency and reliability of the survey through special training workshops for the field agents, and field verifications of the returns. These are some of the measures proposed to improve the survey. The data provided by the survey is the only source of cause of death statistics, and can be used to assess the broad patterns of causes of deaths across states in India.

National Nutrition Monitoring Bureau:

The collection of information related to the nutritional status of the population required the execution of extensive diet and nutrition. The need for such data as an input in health and nutrition policy formulation prompted many such surveys which were undertaken by the Directorates of Public Health in different states. The Nutrition Research laboratories compiled and published these studies. It was later renamed as the National Institute of Nutrition (NIN). The NIN also published a diet atlas and a nutrition atlas based on the data collected from these studies.

A major limitation of these surveys was that they were not very comparable since they were carried out in different locations and by different agencies using different sampling designs. In order to lend accuracy, scientific approach and greater reliability to these surveys NIN set up the National Nutrition Monitoring Bureau (NNMB) in 1972. The twin objectives of the NNMB are to collect and analyse data on nutritional status of representative population groups on a continuous basis and to periodically evaluate the progress of ongoing nutrition programmes.

The surveys conducted by the NNMB employ a multi-stage sampling procedure. The districts are divided into four categories on the basis of development, and from each category one third or one sixth are selected. The villages in the selected districts are divided into three size categories small, medium and large from which 5, 10 or 20 households are selected after the villages have been randomly selected from each category. The houses are selected to ensure equal representation of different social and economic groups. The proportion of the rural sample corresponds to the proportion of rural population in the state.

Data on food consumption is obtained by weighing the raw food materials in each household for three consecutive days. The 24 hour recall method is used to obtain individual information on food intake. Anthropometric measures and clinical assessments of nutritional status are also carried out. For this reason the survey team includes a medical officer and a nutritionist trained at NIN.

The results of NNMB surveys are published in the annual reports of NNMB. The NNMB units are located in the states of Andhra Pradesh, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal. Though the major states have been covered by the NNMB, the smaller states being left out implies that the surveys do not cover the whole country. The crucial states of Bihar, Assam, Haryana and Punjab have also not been covered. The NNMB has also evaluated almost every major nutritional supplementation programme.

The NNMB surveys have been very useful in generating information on food intake and nutritional status of the people, and have played a vital role in bringing to light the magnitude of undernutrition suffered in rural India. Analysis of temporal trends in diet composition and nutritional status have been made possible.
The major limitation of the NNMB is its incomplete coverage of the country because of which no national estimates can be made. Srikantia[6] points out the serious limitation of inability to complete the data collection within the time frame. This erodes the reliability of the data. He further states that 'true representativeness' of the samples cannot be ensured, but that is a limitation inherent in the methodology of sample surveys, particularly diet surveys since three day weighment methods and 24 hour recall are not sufficient to ensure accurate estimates.

The data provided by the NNMB is essential for studies in health and nutrition as well as for developmental planning in terms of health and nutrition interventions. For this purpose it is very important that the coverage of the surveys be improved and extended to the whole country. The staff and facilities should also be increased to enable faster data collection and analysis. Only then the nutritional aspect of India's population would be more comprehensively and efficiently analysed with better quality data available in the hands of researchers and planners.

Sample surveys provide valuable information relating to health sectors on those aspects which require detailed investigation, and therefore sample surveys are indispensable. However, there is much scope for improvement in the methodology, execution and data compilation of the surveys.

III.4.4 OFFICIAL REPORTS:

Apart from the census, civil registration and sample surveys, the ministry of Health and Family Welfare also publishes some reports and volumes which statistical information related to the health sector as recorded by the ministry. The information contained in these reports relates only to the government institutions, and hence the private sector is completely excluded from them. The central body which is responsible for the collection and compilation of such data is the Central Bureau of Health Intelligence (CBHI), under the ministry of Health and Family Welfare. The following are the major reports published by the CBHI on a regular basis:

Monthly Health Statistical Bulletin:

This bulletin is published on a monthly basis and contains the monthly returns of the PHCs regarding the reported cases of morbidity. The report covers only the rural areas. The information contained is regarding only the major communicable diseases, and not on all diseases. The total number of cases and deaths reported are published. Reporting of communicable diseases derives from the system of notification of infectious diseases which was initiated by the colonial government in order to monitor the prevention and control of such diseases. The diseases covered by this report are cholera and diarrhoeal diseases, diphtheria, whooping cough, tetanus, measles, polio, tuberculosis, viral hepatitis, enteric fever, Japanese encephalitis, acute respiratory infection (ARI), pneumonia, meningitis, rabies, syphilis and gonococcal infection along with special sections on epidemiological situation of malaria and the performance of the National Leprosy Eradication Programme. The bulletin contains information on all the states and union territories. The data suffers from the major limitation of gross irregularities in receipt of returns from PHCs, because of which the data is highly unreliable. Data is often not available in some states; there may be gross misreporting and under reporting; PHCs often do not send the returns regularly. The very fact that the bulletin contains only those cases which were reported and that too only in government institutions, makes it an understatement of the morbidity situation in the first part. Another limitation is that it is available only for rural areas and not for urban areas. Non-communicable diseases which are significantly rising in rural India also are not covered. Despite these limitations it remains the only source of official statistics on morbidity.

Health Information of India:

This is the most comprehensive volume on statistical information related to health sector. It is an annual publication of the CBHI. It contains detailed information on registered medical personnel such as nurses and

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[6] Srikantia, S.G. (1988), 'The National Nutrition Monitoring Bureau', *NFI Bulletin*, vol. 9 (2), pp. 1-5.

midwives, doctors and specialists, paramedics and medical officers etc. working in the government and its health centres.

In the section on medical care statistics details are available on the number of hospitals, dispensaries, hospital beds and dispensary beds of all types - by residence and ownership. The number of sub centres, CHCs and PHCs and the population served by them is also available.

The public health section of the report contains the details on communicable diseases compiled from the Monthly health Statistical Bulletin, and also details on other diseases such as STD, cancer, mental disorders and AIDS. The number of cases and the population covered under the different disease prevention and control programmes are also published.

The limitations suffered by the data in this report are the same as mentioned earlier - irregular reporting and poor coverage, information content pertains only to the government sector completely excluding the private and non registered medical institutions and practitioners - all these factors affect the accuracy and reliability of the data. Apart from the CBHI publications, two more reports published from the Ministry of Health and Family Welfare deserve mention.

Bulletin on Rural Health Statistics in India:

this report is published by the Rural Health Division of the Directorate General of Health Services. It contains details on the state-wise rural health infrastructure. It includes the number of PHCs, CHCs, sub centres, etc., and the state-wise health manpower in rural areas such as doctors, specialists, nurses, Auxiliary Nurse and Midwives (ANMs), Lady Health Visitors and Health workers. It also contains the status of training being imparted to medical and paramedical personnel. There is a section on the various rural health schemes being operated by the government giving details on the population covered by them and the progress made by them.

Annual Report - Ministry of Health and Family Welfare:

The annual report of the Ministry of Health and Family Welfare, besides containing information on the annual activities of the ministry, also contains information on the progress of various health intervention programmes such as the National Malaria Eradication Programme, cholera control programme and the Leprosy Eradication programme. Other statistics reported in the volume are the number of registered medical practitioners in Indian medicine and homeopathy, and also the immunisation coverage of pregnant women and children.
Other official reports such as the Statistical Abstract also carry informatrion on medical and public health which is basically a reproduction of the information collected by the sources discussed above.

III. CONCLUSION:

India has an elaborate infrastructure for the collection of health-related statistical information, ranging from the census to specialised sample surveys on health and nutrition and also a well established hierarchy of health centres set up by the government from the village level to the state level which provide the officially reported health information. However, though the infrastructure exists, the information available is far from satisfactory. The limitations have been discussed in detail in the chapter, and can be summarised into the following main points:

1. The official reports carry only that data which accrues to utilisation of public health care facilities. There is no information available on the private health care practitioners, the services rendered by them and the amount of population covered by them. This constitutes a large chunk of health services provided and the omission of this sector renders all health data incomplete.
2. The statistics made available regarding public health institutions is also incomplete, since the PHCs and other health centres are not regular in sending back returns to the district headquarters. The problems that plague theses institutions are generally lack of interest, apathy, administrative incompetence and time lag in sending reports.
3. The field workers who collect data on morbidity and cause of death are not adequately trained, lack diagnostic skills and are often not regular in reporting.
4. The rural and the urban aggregates of data vary in their reliability, the rural being generally less reliable than the urban data and hence much more deficient. The data generated by the different states also varies in the degree of reliability. Lack of uniformity in concepts and definitions, lack of uniformity in forms and returns, differences in the method of tabulation - all contribute to this problem because of which inter state comparisons lack reliability and credibility.
5. The temporal data available through sample surveys also lacks comparability because of changing formats of data collection (which is the case with NSSO surveys on morbidity).

The serious deficiencies and limitations which plague the health information system in India must be removed before any meaningful analysis can be facilitated. Measures which need to be taken include the improvement of the quality and quantity of information provided by the PHCs, especially vital for rural morbidity assessment. A system for collecting information on private health service providers must be set up since they form a major chunk of health care providers. Sample surveys gathering information on morbidity on a continuous basis with a standardised format and executed by adequately trained field personnel are also very crucial and need to be established.

Only if requisite changes are made in the process of health-related statistical information can the health information generated serve the purpose of an effective input into meaningful research and developmental planning.

CHAPTER IV

REGIONAL PATTERN OF HEALTH STATUS IN INDIA

IV.1 INTRODUCTION

Health Status has different connotations and definitions - some so broad as to include a variety of factors influencing the quality of human life and some narrowing down to the investigation of human physical health only. Since the definition of health status should be in accordance with the characteristics of the region, in this case health status has been defined in the narrow sense as the level of physical health and nutritional status. This is because India is a developing nation faced with a large proportion of population suffering from poverty and undernutrition leading to high morbidity and mortality. The question of basic health and survival predominates rather than the more holistic concept of quality of life, which has ample scope for investigation in the developed countries where these basic problems have long been overcome and survival is no longer an issue. This is the reason why the focus in this study is on mortality, morbidity and nutritional status as measure of health status of the population.

In the last five decades India has been able to reduce its death rates substantially and bring it at par with many developing countries. The expectation of life at birth has also been rising consequently and has now reached 62 years, though this is considerably lower than the life expectancy in some of the developed countries such as USA (76 years), UK (77 years), Canada (78 years) and Japan (80 years). In the early part of the twentieth century, India's substantial disease burden was attributable mainly to communicable diseases which flourished in conditions of widespread poverty resulting in severe undernutrition and poor living standards as well as inadequate public health care facilities. However, over the years the communicable diseases have been reduced significantly due to improvements in immunisation, public health care programmes and facilities. Non-communicable diseases on the other hand, have shown an increasing trend within rising longevity and urbanisation leading to changes in the lifestyle and environment. Communicable diseases continue to contribute more than 50% of India's disease burden which shows that India still has a long way to go in reducing the burden of disease and achieve the health and nutritional level of the developed countries. This chapter first presents a picture of the state-wise pattern of mortality indicators which give an overview of the health status of population across the states. This is followed by a detailed analysis of patterns of morbidity and an investigation into the nutritional status.

IV.2 REGIONAL PATTERN OF MORTALITY

The mortality rate of a region is a reflection of the health of its inhabitants. The higher the mortality rate, poorer the heath status and vice versa. Mortality indicators have the advantage of easy availability and reasonable accuracy of data which makes them more preferable over other health status indicators. In the case of India they are useful as macro level indicators of health status. Four measures of mortality have been analysed in this study - crude death rate, infant mortality rate, maternal mortality rate and age specific death rate for the age-group of 0-4 years (as an indicator of child mortality).

IV.2.1 CRUDE DEATH RATE (CDR)

India's death rate has been considerably lowered in the span of this century, and it now stands at par with most developed countries of the world. There has been a dramatic decline in the crude death rate in India from more than 40 per thousand and population in the beginning of this century to 9.3 per thousand in 1994.

Table 4.1: Crude Death Rate in India - 1901-91

YEAR	CDR/1000 pop.
1901 - 11	42.6
1911 - 21	47.2
1921 - 31	36.3
1931 - 41	31.2
1941 - 51	27.4
1951 - 61	22.8
1961 - 71	19
1971 - 81	15
1981 - 91	11.2

Source: SRS Report - 1994.

The life expectancy at birth has also risen along with the fall in death rates from 23 years in 1901 to 62 years in 1995. However, it is yet to reach the level of the developed countries. The sharp decline in CDR in a relatively short span over about 50 years was possible because of the achievements in the field of public health and medicine technology which made a large impact on the reduction of mortality. Though the mortality rate of the country has been brought down, there are considerable regional variations reflected in the inter-state pattern of the CDR. The pattern of CDRs has been analysed below for the years 1961, 1971, 1981 and 1994 in order to get a comprehensive spatial as well as temporal picture of the variations in the CDR. The pattern of the CDRs has been analysed below for the years 1961,71,81 and 94 in order to get a comprehensive spatial as well as temporal picture of variation in the CDR.

1. REGIONAL PATTERNS OF CDR:

The CDR for India in 1961 was recorded as 8.63 while in 1971 it almost doubled to 14.9. This difference is basically because the 1961 figure is based on the report of the Civil registration System which suffered from heavy underestimation because of the low prevalence of the registration practice which a left a large number of births and deaths unreported. The 1971 figures, on the other hand are based on the SRS estimates. The gap between the 1961 and 1971 figures reflects the extent of under reporting in the Civil Registration System. In spite of these limitations, 1961 figures have been included in the study because they do bring out the broad regional patterns at the state level. However, the problem of irregularities in 1961 figures is evident in the fact that the states of Assam and Bihar which show very low CDRs in 1961, shoot up in 1971.

Table 4. 2: Crude Death Rate Across The States - 1961-94.

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUE	STATE WITH LOWEST VALUE
High >10	1961	Maharashtra, Orissa, Tamil Nadu, Gujarat, Karnataka, Punjab.	Tamil Nadu (14)	Rajasthan (10.9)
> 15	1971	Assam, Gujarat, Himachal Pradesh, Orissa, Madhya Pradesh, Rajasthan, Uttar Pradesh,	Uttar Pradesh (20.1)	Orissa (15.5)
>12	1981	Assam, Bihar, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh.	Madhya Pradesh (16.6)	Assam (9.2)
> 9	1994	Assam, Bihar, Madhya Pradesh, Orissa, Uttar Pradesh	Madhya Pradesh (11.6)	Assam (9.2)
Moderate 7.5-10	1961	Andhra Pradesh, Madhya Pradesh, Rajasthan, Uttar Pradesh, Himachal Pradesh.	Himachal Pradesh (8.9)	Rajasthan (7.5)
12-15	1971	Tamil Nadu, Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh	Andhra Pradesh (14.6)	Karnataka (12.1)
11-12	1981	Tamil Nadu, West Bengal, Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh	Gujarat (12)	West Bengal (11)
8-9	1994	Karnataka, Rajasthan, Tamil Nadu, West Bengal	Rajasthan (9)	Tamil Nadu (8)
Low: < 7.5	1961	Assam, Bihar, Kerala, West Bengal	Kerala (7.2)	Assam (3)
< 12	1971	Haryana, Kerala, Punjab	Punjab (10.4)	Kerala (9)
< 11	1981	Karnataka, Kerala, Maharashtra, Punjab	Punjab (10.4)	Kerala (6.6)
< 8	1994	Kerala, Maharashtra, Punjab	Punjab (73.6)	Kerala (6.1)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high CDR:

1961: Tamil Nadu had the highest CDR of 14 in 1961, followed by Maharashtra, Orissa Karnataka and Punjab (10-14). These high rates may be the result of better reporting than actual high mortality and therefore are not reliable.

1971: Uttar Pradesh with a CDR of 20.1 had the highest CDR , followed by Rajasthan, Gujarat and Assam, all with rates above 16. Other states with high CDRs between 15-16 were Himachal Pradesh, Madhya Pradesh and Orissa.

1981: In 1981 all states except Madhya Pradesh registered a decline in CDRs; Madhya Pradesh registered an increase in CDR from 15.6 in 1971 to 16.6 in 1981. The 'BIMARU' states (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh) showed the highest CDRs in 1981, followed by Orissa and Assam.

1994: In 1994, Madhya Pradesh, Orissa, Uttar Pradesh and Bihar had the highest CDRs of above 10, Assam and Rajasthan being very close at 9.2 and 9 respectively. Thus the BIMARU states along with Orissa and Assam have consistently shown high CDRs across the years.

b) States with moderate CDR:

1961: In 1961 the states of Andhra Pradesh, Himachal Pradesh, Madhya Pradesh , Rajasthan and Uttar Pradesh showed moderate CDRs of between 7.5 to 10.

1971: Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu showed moderate CDRs in 1971 between 12-15, all declining slightly in 1981.

1981: Moderate CDRs of between 9.5 to 12 were recorded in the states of Andhra Pradesh, Haryana, Himachal Pradesh, Tamil Nadu, West Bengal and Maharashtra in 1981.

1994: Seven states had moderate CDRs between 8-9 in 1994 - Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Tamil Nadu and West Bengal. The state of Gujarat, which had the fourth highest CDR in 1971 was able to bring it down sharply and in 1994 it had a CDR of 8.7 as compared to 16.4 in 1971.

c) States with low CDR:

1961: Assam, Bihar, Kerala and West Bengal had the lowest CDRs below 7.5. This could have been more the result of under-reporting rather than actual low CDRs.

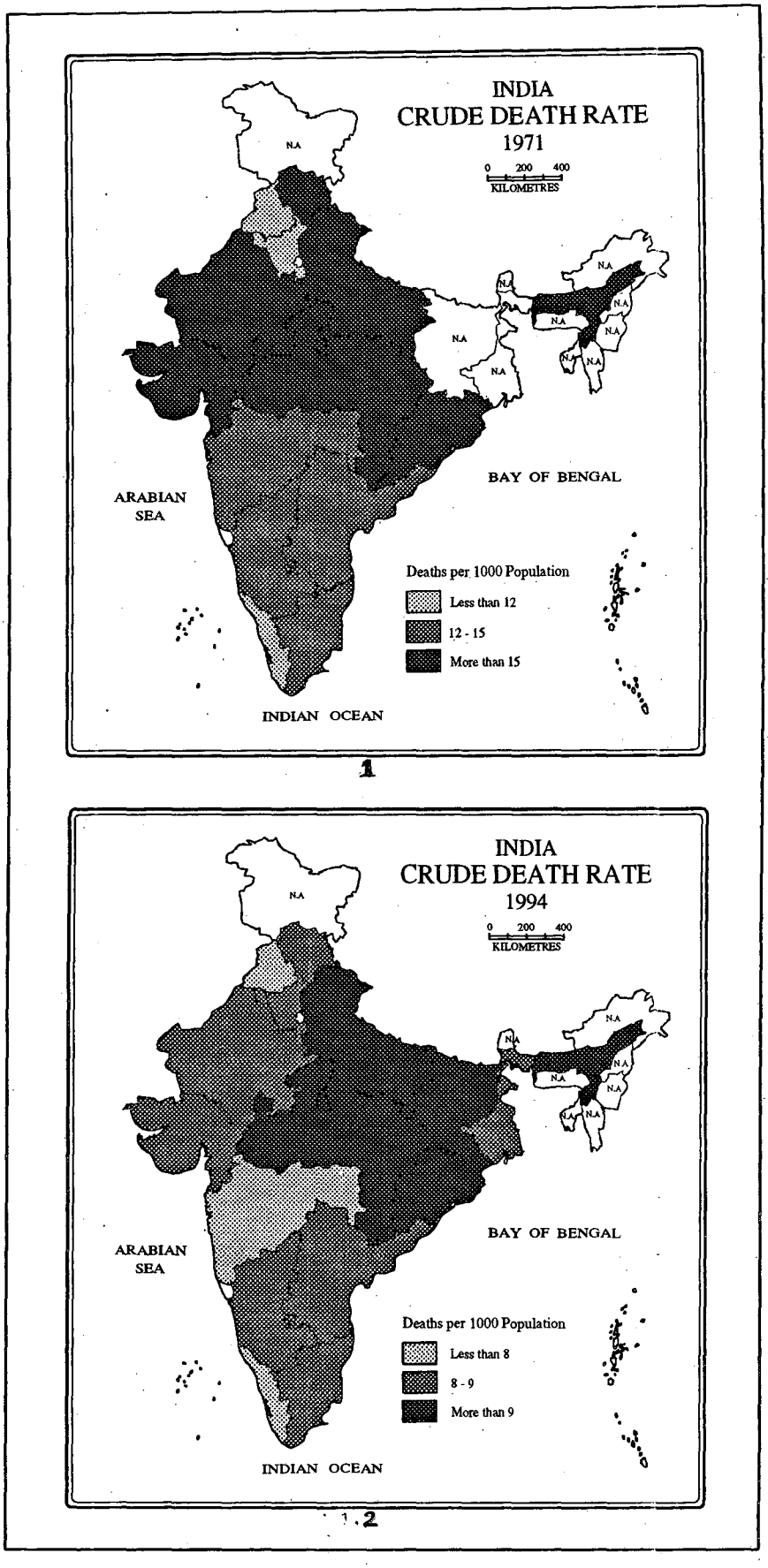
1971: Haryana and Kerala were the only two states recording low CDRs below 10.

1981: States with low CDRs below 9.5 were Karnataka, Kerala, Maharashtra and Punjab.

1994: Kerala has maintained its position as the state with the lowest CDR in India through 1981 to 1994, declining from 9 in 1971 to 6 in 1994. The other states which showed a low CDR of less than 8 in 1994 were Maharashtra and Punjab. Punjab has also shown consistently low CDRs from 10.4 in 1971 to 7.6 in 1994.

On the whole, while the northern, eastern and central region of the country has shown high CDRs, the southern states including Maharashtra have shown moderate to low CDRs, and the north-western states of Haryana, Punjab and Himachal Pradesh have also shown moderate to low CDRs.

FIGURE IV. 1


INDIA
CRUDE DEATH RATE
1971
0 200 400
KILOMETRES
N.A
BAY OF BENGAL
ARABIAN SEA
INDIAN OCEAN
Deaths per 1000 Population
Less than 12
12 - 15
More than 15
1
INDIA
CRUDE DEATH RATE
1994
0 200 400
KILOMETRES
N.A
BAY OF BENGAL
ARABIAN SEA
INDIAN OCEAN
Deaths per 1000 Population
Less than 8
8 - 9
More than 9
2

2. DIFFERENCES IN CDR BY RESIDENCE:

Within the states there are large differences in the CDR between rural and urban areas. The rural areas across the whole country show a higher CDR than the urban areas.

Table 4.3 India: Crude Death Rate By Residence: 1961-94

YEAR	CRUDE DEATH RATE		
	RURAL	URBAN	RUR
1961	8.2	8.8	0.94
1971	16.4	9.7	1.69
1981	13.7	7.8	1.76
1994	10.1	6.7	1.51

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

Problems of poverty leading to poor living standards and undernutrition along with lack of proper health care facilities have kept the rural mortality above the urban mortality. The magnitude of difference in CDR between rural and urban areas is reflected in the ratio of rural to urban CDR referred to here as the Rural-Urban Ratio (RUR). The RUR has been analysed for 1961-94 to bring out the regional patterns in the magnitude of difference in CDR by residence.

Table 4. 4. Rural-Urban Ratio in CDRs Across the states - 1961-94

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUE	STATE WITH LOWEST VALUE
High > 1.1	1961	Karnataka, Himachal Pradesh, Punjab, Orissa, Tamil Nadu, Rajasthan, Karnataka, Assam	Punjab (1.69)	Orissa (1.25)
> 1.7	1971	Himachal Pradesh, Andhra Pradesh, Himachal Pradesh, Rajasthan, Madhya Pradesh	Himachal Pradesh (2.22)	Andhra P. (1.73)
> 1.75	1981	Andhra Pradesh, Bihar, West Bengal, Madhya Pradesh, Maharashtra, Orissa.	Himachal Pradesh (2.25)	West Bengal (1.77)
> 1.5	1994	Himachal Pradesh, Karnataka, Uttar Pradesh	Madhya Pradesh (1.70)	Uttar Pradesh (1.51)
Moderate .8-1.1	1961	Tamil Nadu, West Bengal, Gujarat, Madhya Pradesh, Maharashtra, Maharashtra, Gujarat, Haryana, Maharashtra	Maharashtra (1.07)	West Bengal ((.8)
1.3 - 1.7	1971	Madhya Pradesh, Assam, Haryana, Karnataka, Maharashtra	Madhya Pradesh (1.69)	Gujarat (1.35)
1.4- 1.75	1981	Orissa, Punjab, Tamil Nadu, Uttar Pradesh, Andhra Pradesh.	Uttar Pradesh (1.75)	Punjab (1.41)
1.3 - 1.5	1994	Andhra Pradesh, Assam,, Bihar, Gujarat, Tamil Nadu,	Tamil Nadu (1.45)	Assam (1.31)
Low: < .8	1961	Andhra Pradesh, Assam, Bihar, Kerala, Uttar Pradesh	Uttar Pradesh (.77)	Assam (.48)
< 1.3	1971	Kerala, Punjab	Punjab (1.25)	Kerala (1.08)
< 1.4	1981	Gujarat & Kerala (Both 1.16)q		
1.3 & below	1994	Haryana, Kerala, Punjab, Rajasthan, West Bengal	Punjab (1.3)	Kerala (.92)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high RUR:

1961: High RURs of more than 1.1 were recorded in the states of Karnataka, Himachal Pradesh, Punjab and Orissa.

1971: The states of Assam, Himachal Pradesh, Karnataka and Rajasthan had high RURs of above 1.8 in 1971. The national average was 1.69. Himachal Pradesh had the highest RUR of 2.22.

1981: The highest RURs above 1.8 were recorded in Andhra Pradesh, Bihar, Himachal Pradesh, Rajasthan and Madhya Pradesh.

1994: Five states had the highest RURs of above 1.5 in 1994 - Madhya Pradesh, Maharashtra, Orissa, Himachal Pradesh and Karnataka.

Karnataka and Himachal Pradesh have shown high RURs though actual RURs have been declining over the years. Maharashtra is the only state where RUR has been increasing over the years, while for all other states it has been declining especially since 1981.

b) States with moderate RURs:

1961: Moderate RURs between .8-1.1 were recorded in the states of Gujarat, Madhya Pradesh, Maharashtra , Tamil Nadu and West Bengal.

1971: The states of Andhra Pradesh, Madhya Pradesh, Orissa, Tamil Nadu and Uttar Pradesh have shown moderate RUR of between 1.5 - 1.8 in 1971.

1981: The states with moderate values ranging between 1.5 - 1.8 were Assam, Haryana, Karnataka, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal.

1994: Uttar Pradesh had an RUR equalling the national average of 1.51 in 1994. Other states with moderate RURs between 1.3 - 1.5 were Andhra Pradesh, Assam, Bihar, Gujarat and Tamil Nadu.

c) States with low RURs:

1961: The states of Andhra Pradesh, Assam, Bihar, Kerala and Uttar Pradesh had low RURs below .8, showing lower rural CDRs than urban CDRs.

1971: Gujarat, Haryana, Kerala, Maharashtra and Punjab had low RURs below 1.5, Kerala being the lowest with 1.08.

1981: Low RURs of less than 1.5 were recorded in Gujarat, Kerala, Maharashtra and Punjab.

1994: In 1994 the states with RURs less than 1.3 were Haryana, Kerala, Punjab, Rajasthan and West Bengal. Kerala was the only state with RUR below 1, indicating lower rural CDR than urban CDR, which is a phenomenon of most of the developed countries.

Kerala has shown consistently low RURs while Karnataka and Himachal Pradesh have shown consistently high RURs. The other states have been fluctuating between different levels of RURs. The data indicates that rural death rates have on an average remained more than 1.5 times the urban death rates across the country.

3. DIFFERENCES IN CDR BY SEX:

Data for CDRs by sex is available for the years 1981 and 1994. Sex differentials in mortality rate indicate that females have a marginally lower death rate than males. This is due to the greater biological strength and resistance in females, which makes them biologically the stronger sex.

Table 4.5 India: Crude Death Rate By Sex: 1981-94

YEAR	CRUDE DEATH RATE		
	MALE	FEMALE	FMR
1981	12.04	11.71	0.97
1994	9.6	8.9	0.93

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

The CDR for females was less than that of males in India in 1981 as well as 1994, the ratio of female to male death rates (FMR) being .97 and .93 respectively. State-wise patterns of FMRs have been analysed below.

Table 4.6 : Ratio of female to male CDRs across the states - 1981-94

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUES	STATE WITH LOWEST VALUES
High >1	1981	Assam, Bihar, Haryana, Madhya Pradesh, Rajasthan, Uttar Pradesh	Bihar (1.21)	Assam (1.02)
1 & above	1994	Bihar, Haryana	Bihar (1.04)	Haryana (1.0)
Moderate .8 - 1	1981	Maharashtra, Punjab, Tamil Nadu, West Bengal, Andhra Pradesh, Gujarat, Karnataka, Orissa.	Karnataka, Orissa (.99)	Punjab (.86)
.8 - 1	1994	Maharashtra, Punjab, Uttar Pradesh, West Bengal, Rajasthan, Andhra Pradesh, Assam, Gujarat, Madhya Pradesh, Orissa, Tamil Nadu	Orissa (.99)	Rajasthan ((.82)
Low: <8	1981	Himachal Pradesh, Kerala	Kerala (.71)	Himachal P. (.57)
<.8	1994	Himachal Pradesh, Karnataka, Kerala	Karnataka (.76)	Himachal P. (.57)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high FMR:

The FMR in 1981 was more than 1 for the states of Assam, Bihar, Haryana, Madhya Pradesh, Rajasthan and Uttar Pradesh indicating that the CDR for females was higher than that for males. Bihar had the highest FMR of 1.21. This suggests possible negligence of female health needs in the dominantly patriarchal society. In 1994 Bihar was the only state with FMR above 1 followed by Haryana with FMR of 1. In all other states the FMR was below unity.

b) States with moderate FMR:

in 1981 the bulk of Indian states had moderate FMRs ranging between .8 to 1. The eight states in this category were Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Orissa, Punjab, Tamil Nadu and West

Bengal. Moderate FMR between .8 - 1 in 1994 was recorded in a total of 11 states - Andhra Pradesh, Gujarat, Assam, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

c) States with low FMR:

Himachal Pradesh (.57) and Kerala (.71) recorded the lowest FMRs in 1981. In 1994 Himachal Pradesh, Karnataka and Kerala had low FMRs of below .8.

The general trends that can be observed are that while the north Indian belt shows high to moderate FMRs, the states of Kerala and Himachal Pradesh maintain consistently low FMRs. Though the FMR has fallen below 1 in all the states, the ratios are very close to 1 and the difference between male and female CDRs is very narrow. The FMR has shown a decline over the years, but it has been very slow from .97 in 1981 to .93 in 1994, indicating the persisting social bias against females which reflects in their poor health vis-à-vis that of males.

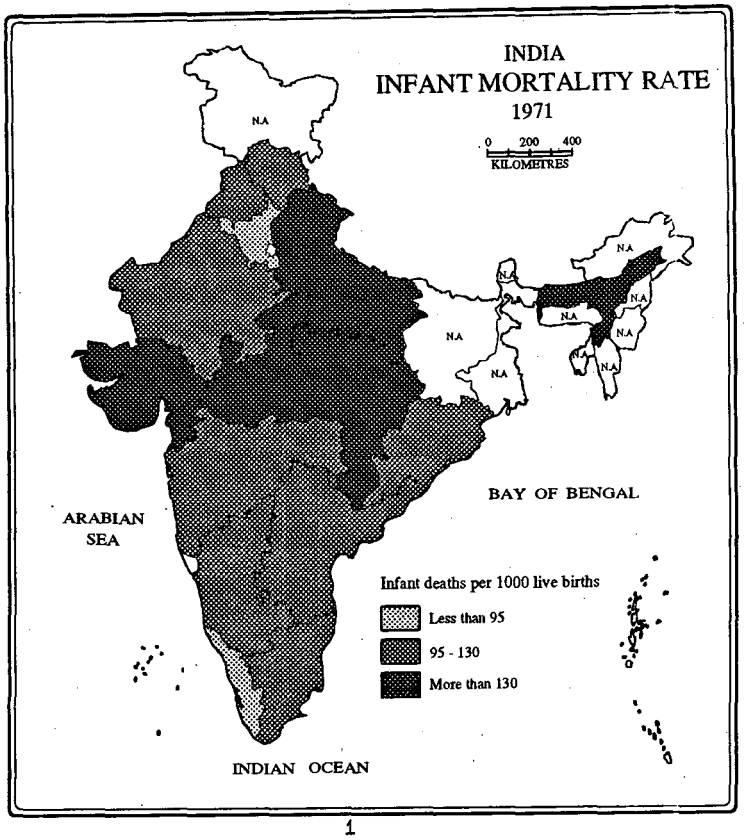
IV.2.2 INFANT MORTALITY RATE (IMR):

The IMR is a more sensitive indicator of health status as it reflects on the nutritional status of mothers, the level of pre and post natal care available, the standard of living and level of hygiene maintained, and the level of awareness and nature of traditional practices related to child birth and infant care. In a nutshell, the IMR is a good indicator of the social development of a region. India is among the countries with high IMRs, its IMR at 74 being more than thrice the average for the developed countries. This shows that India has a long way to go in curbing preventable deaths and reducing the mortality burden.

1. REGIONAL PATTERN OF IMR:

The IMR at the state level shows wide variations ranging from a low of 16 in Kerala to a high of 103 in Orissa for 1994. The pattern of IMRs across the states show only marginal change from 1961 to 1994.

FIGURE IV.2



1

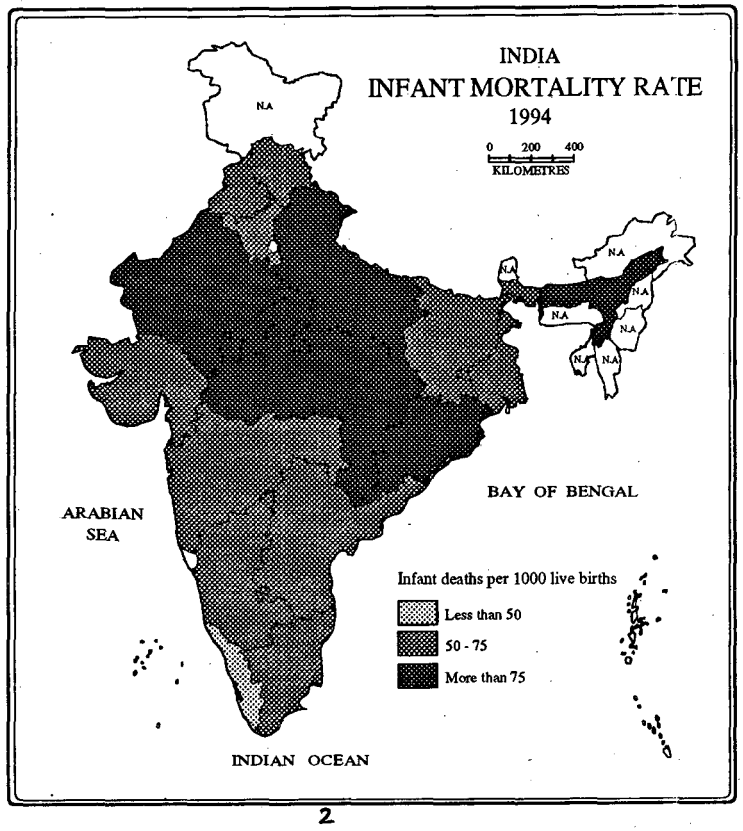


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Table 4.7 Infant Mortality Rates Across the states - 1961 - 94

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUES	STATE WITH LOWEST VALUES
High 90& above	1961	Orissa, Rajasthan, Madhya Pradesh, Uttar Pradesh, Punjab, Maharashtra, Uttar Pradesh, Gujarat, Madhya Pradesh	Orissa (124)	UP, Maharashtra (90)
> 120	1971	Assam, Orissa, Rajasthan, Bihar, Gujarat, Haryana, Maharashtra, Punjab.	Uttar Pradesh (167)	Rajasthan (123)
> 100	1981	Tamil Nadu, West Bengal	Uttar Pradesh (150)	Bihar (105)
> 75	1994	Orissa, Madhya Pradesh, Uttar Pradesh, Rajasthan, Assam.	Orissa (103)	Assam (78)
Moderate 70-90	1961	Tamil Nadu, Bihar, Assam, Andhra Pradesh, Gujarat, Maharashtra, Punjab	Tamil Nadu (89)	Gujarat (73)
100-120	1971	Tamil Nadu, Bihar, Assam, Andhra Pradesh, Gujarat, Maharashtra, Punjab	Himachal Pradesh (113)	Punjab (102)
80-100	1981	Andhra Pradesh, Tamil Nadu, Punjab, West Bengal,	Tamil Nadu, West Bengal (91)	Punjab (81)
60-75	1994	Andhra Pradesh, West Bengal, Bihar, Gujarat, Haryana, Karnataka	Himachal Pradesh (70)	West Bengal (62)
Low: < 70	1961	Himachal Pradesh, Kerala, Karnataka, West Bengal	Himachal Pradesh (65)	Kerala (42)
< 100	1971	Karnataka, Haryana & Kerala	Karnataka (95)	Kerala (58)
< 80	1981	Kerala, Karnataka, Himachal Pradesh, Maharashtra	Maharashtra (79)	Kerala (37)
< 60	1994	Kerala, Punjab, Maharashtra, Tamil Nadu, Himachal Pradesh	Tamil Nadu (59)	Kerala (16)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high IMRs:

1961: Orissa had the highest IMR of 124 in 1961, followed by Rajasthan (103). These were the only states which showed IMRs above 100.

1971: In 1971 Uttar Pradesh emerged as the state with the highest IMR of 167 followed by Gujarat (144), Assam (139) and Madhya Pradesh (135). The performance of these states inflated India's IMR to 129 in 1971.

1981: In 1981 Uttar Pradesh continued at the top with an IMR of 150 followed by Madhya Pradesh, Orissa, Bihar and Gujarat, all with IMR above the national average of 110. Other states with IMRs above 100 were Haryana, Rajasthan and Assam. Madhya Pradesh and Orissa actually showed an increase in IMR from 1971 to 1981.

1994: In 1994 , five states had IMR above the national average of 74 - Orissa, Madhya Pradesh, Uttar Pradesh, Rajasthan and Assam. Orissa was the only state with IMR above 100 (103).

The states of Andhra Pradesh, Himachal Pradesh, Maharashtra, Punjab and Tamil Nadu which showed high IMRs in 1971 were able to substantially reduce their IMRs by 1994, reaching the moderate category. Orissa, Uttar Pradesh, Madhya Pradesh and Rajasthan have shown consistently high IMRs which reflects their persistent social backwardness.

b) States with moderate IMRs:

1961: The states of Andhra Pradesh, Assam, Bihar, Gujarat, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu and Uttar Pradesh had moderately high IMRs of between 70-100.

1971: States with moderately high IMRs between 95-130 were Andhra Pradesh, Himachal Pradesh, Karnataka, Maharashtra, Orissa, Punjab, Rajasthan and Tamil Nadu.

1981: Andhra Pradesh, Tamil Nadu and Punjab were able to reduce their IMRs from 100-120 to 80-100, but were still moderately high at 86, 91 and 81 respectively. West Bengal also had a moderate IMR of 91.

1994: As many as nine states were in this category in 1994. These states were Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Maharashtra, Punjab, Tamil Nadu and West Bengal.

c) States with low IMRs:

1961: Himachal Pradesh, Karnataka, Kerala and West Bengal had low IMRs of below 70 in 1961. Kerala had the lowest IMR of 42.

1971: Only two states had low IMR of below 95 in 1971 - Haryana with 72 and Kerala with 58.

1981: In 1981 the lowest IMR was again recorded in Kerala (37). It was followed by Karnataka (69), Himachal Pradesh (71) and Maharashtra (79).

1994: Kerala again recorded the lowest IMR of 16. In fact it was the only state in the low category of IMR below 50. Kerala has consistently recorded the lowest IMRs in India and other states show much higher IMRs.

The overall regional pattern of IMRs which emerges is similar to that of the CDR. The northern and central belt along with Assam has very high IMR followed by the north western states of Punjab, Haryana and Himachal Pradesh. The four southern states along with Maharashtra show low to moderate IMRs, though the gap between Kerala and the rest is very large.

2. DIFFERENCES IN IMR BY RESIDENCE:

There is a large difference between IMRs in rural and urban areas, the former being much higher than the latter. The reasons for this are the differences in the level of awareness, standard of living, level of health care facilities and the nutritional intake along with the nature of infant care practices followed in the rural areas.

Table 4.8 India - IMR By Residence - 1971-94.

YEAR	IMR		
	TOTAL	RURAL	URBAN
1971	129	138	82
1981	110	119	62
1994	74	80	52

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

IMR in the rural areas was more than 1.5 times the urban IMR for India throughout from 1971-94. The RUR from 1971 to 1981 increased from 1.68 to 1.92, showing the initial urban bias in the reduction of IMRs across all the states. Only since the 1980s has the gap between rural and urban IMRs started reducing. The RUR declined from 1.92 in 1981 to 1.54 in 1994.

Table 4.9 Rural-Urban ratios for IMR across the states - 1961-94

RANGE	YEAR	STATES	STATES WITH HIGHEST VALUE	STATES WITH LOWEST VALUE
High > 1.5	1961	Himachal Pradesh, Assam, Madhya Pradesh, Punjab, Assam, Karnataka, Madhya Pradesh, Andhra Pradesh	Himachal Pradesh (2.79)	Punjab (1.53)
> 1.6	1971	Himachal Pradesh, Rajasthan, Tamil Nadu, Madhya Pradesh, Maharashtra.	Assam (1.97)	Tamil Nadu (1.65)
> 1.8	1981	Bihar, Haryana, Orissa, Rajastha, West Bengal, Madhya Pradesh, Maharashtra, Orissa, Punjab.	Rajasthan, West Bengal (2.23)	Maharashtra (1.84)
1.4 & above	1994	Karnataka, Himachal Pradesh, Rajastha, Uttar Pradesh	Madhya Pradesh (1.84)	Himachal Pradesh, UP, Rajasthan (1.4)
Moderate 1-1.5	1961	Tamil nadu, Orissa, Andhra Pradesh, Bihar, Karnataka, Kerala, Maharashtra	Karnataka (1.34)	Bihar (1.06)
1.4-1.6	1971	Gujarat, Orissa, Punjab, Uttar Pradesh	Orissa (1.56)	Gujarat (1.41)
1.6-1.8	1981	Punjab, Uttar Pradesh, Karnataka, Kerala, Andhra Pradesh	Andhra Pradesh (1.79)	Uttar Pradesh (1.62)
1.2-1.4	1994	Andhra Pradesh, Tamil Nadu, Gujarat, West Bengal	Gujarat (1.37)	West Bengal (1.23)
Low: < 1	1961	Gujarat, Uttar Pradesh, West Bengal	Gujarat (.84)	West Bengal (.58)
< 1.4	1971	Kerala, Maharashtra, Karnataka	Karnataka (1.28)	Kerala (1.25)
< 1.6	1981	Assam, Himachal Pradesh, Gujarat	Assam (1.41)	Himachal P. (1.11)
< 1.2	1994	Assam, Bihar, Haryana, Kerala	Kerala (1.14)	Assam, Haryana (1.03)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high RUR:

1961: Himachal Pradesh and Assam showed a very high RUR of more than 2 in 1961.

1971: In 1971 no state had an RUR above 2. The highest RUR was 1.97 for Assam followed by Karnataka (1.94), Madhya Pradesh (1.8) and Andhra Pradesh (1.77).

1981: The figures for 1981 show an inflation in the RURs with five states having RURs above 2. These states are Bihar, Haryana, Orissa, Rajasthan and West Bengal. Madhya Pradesh and Tamil Nadu also had high RUR of between 1.85-2.

1994: In 1994 Madhya Pradesh, Maharashtra, Orissa and Punjab had high RURs of above 1.6.

States of Madhya Pradesh, Maharashtra and Rajasthan show consistently high RURs over the years.

b) States with moderate RURs:

1961: Moderate levels of RUR between 1.3-2 were observed in Karnataka, Madhya Pradesh and Punjab.

1971: The levels of RUR increased in 1971 under the SRS. Himachal Pradesh, Orissa, Rajasthan and Tamil Nadu had moderate RURs of between 1.5-1.75.

1981: Punjab and Uttar Pradesh remained in the moderate category with RUR between 1.5-1.85 along with Maharashtra, Karnataka, Kerala and Andhra Pradesh.

1994: In 1994, the moderate category of 1.3-1.6 included Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Rajasthan, Tamil Nadu and Uttar Pradesh.

c) States with low RUR:

1961: In 1961 Andhra Pradesh, Bihar, Gujarat, Kerala, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal had low RURs of below 1.3. Gujarat, Uttar Pradesh and West Bengal showed RURs below 1 which indicated lower IMRs for rural than urban areas. This may have been due to the gap in reporting between rural and urban areas, because in the SRS figures all states have consistently shown RUR above 1 over the years.

1971: In 1971 Kerala had the lowest RUR of 1.25 followed by Maharashtra (1.26) and Haryana(1.28). Other states with low RURs below 1.5 were Gujarat, Punjab and Uttar Pradesh.

1981: In 1981 Assam, Gujarat and Himachal Pradesh had low RURs of below 1.5.

1994: The lowest RURs of below 1.3 were recorded in Assam, Bihar, Haryana, Kerala and West Bengal.

The states show a wide variation in the patterns of RURs across the years. Maharashtra with high urbanisation also has high rural-urban disparities in IMR, along with Madhya Pradesh and Orissa with low urbanisation. Agriculturally developed Punjab still has high RURs while Haryana with similar conditions has the lowest RUR of 1.03 in 1994. Only since the 1980s have the differences in IMR by residence started to decline after rising from 1971 to 1981. This shows that there was a rise in disparity initially when the facilities had a pronounced urban bias, and their gradual narrowing down indicates greater spread of awareness and health care facilities to rural areas also.

3. DIFFERENCES IN IMR BY SEX :

Though infants are all highly susceptible to illness, females have greater biological strength and hence male IMRs are expected to be slightly higher than female IMRs. However, the data which is available for 1981 and 1994 shows a contrary picture. In India the female IMR in 1981 (111) was slightly more than the male IMR of 110. Thus the female-male ratio (FMR) of IMR was 1.01. In 1994 this came down to .97, when female IMR (73) fell below the male IMR (75). Excess of female deaths over male infant deaths is often the result of negligence in the care of female infants. The inter-state disparities highlight the regional pattern of FMRs.

Table 4.10 Female-male Ratios for IMRs across the states, 1981-94

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUES	STATE WITH LOWEST VALUES
High >1	1981	Rajasthan, Uttar Pradesh, Assam, Bihar, Gujarat, Haryana, Punjab.	Haryana (1.24)	Assam (1.01)
>1	1994	Punjab, Haryana, Uttar Pradesh, Gujarat, West Bengal, Tamil Nadu, Himachal Pradesh, Orissa.	Punjab (1.28)	Maharashtra (1.01)
Moderate 9-1	1981	Orissa, Tamil Nadu, West Bengal, Karnataka, Madhya Pradesh, Maharashtra, Bihar, Kerala	Karnataka (.99)	Maharashtra (.91)
.9-1	1994	Madhya Pradesh, Maharashtra, Rajasthan	Rajasthan (.99)	Maharashtra (.91)
Low: <.9	1981	Andhra Pradesh, Himachal Pradesh, Kerala	Andhra Pradesh (.87)	Himachal P. (.61)
<.9	1994	Andhra Pradesh, Karnataka, Assam	Karnataka (.87)	Andhra Pradesh (.77)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high FMR:

In 1981 as many as seven states had FMR above 1 - Assam, Bihar, Haryana, Punjab, Rajasthan and Uttar Pradesh. Haryana had the highest FMR of 1.24 followed by Bihar (1.11). In 1994 the states of Punjab, Haryana and Himachal Pradesh had highest FMRs above 1.1.

b) States with moderate FMR:

States which showed moderate FMRs ranging between .9 and 1 in 1981 were Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu and West Bengal. In 1994 the states with moderate FMR between .95-1.1 were Bihar, Gujarat, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

c) States with low FMR:

Only three states recorded FMRs lower than .9 in 1981 - Andhra Pradesh, Himachal Pradesh and Kerala. Himachal Pradesh had the lowest FMR of .61. Six states had low FMRs below .95 in 1994. These were Andhra Pradesh, Assam, Karnataka, Kerala, Madhya Pradesh and Maharashtra.

The FMR has increased in the states of Gujarat, Himachal Pradesh, Kerala Orissa, Punjab, Tamil Nadu and West Bengal while it has either declined or remained constant in the rest of the states.

4. SEX DIFFERENCES IN IMR BY RESIDENCE :

IMRs by sex for different residential categories available for 1994 indicate that the ratio of female to male deaths is lower in urban than in rural areas. In 1994 the ratio was .98 for rural and .96 for urban areas. The state level pattern of rural FMRs (RFMR) and urban FMRs (UFMR) has been discussed below:

Table 4.11 Female-male ratios in IMRs by Residence - 1994

CATEGORIES	RANGE	STATES	STATE WITH HIGHEST VALUES	STATE WITH LOWEST VALUES
Rural High	> 1	Punjab, Haryana, Himachal Pradesh, Gujarat, Uttar Pradesh, Tamil Nadu, West Bengal, Orissa, Bihar, Kerala, Madhya Pradesh.	Punjab (1.31) Rajasthan (.98) Karnataka (.86)	Orissa (1.02) Maharashtra (.93) Andhra Pradesh (.70)
Moderate	.9 - 1	Maharashtra, Rajasthan	Rajasthan (.98)	Maharashtra (.93)
Low	< .9	Andhra Pradesh, Assam, Karnataka	Karnataka (.86)	Andhra Pradesh (.70)
Urban High	> 1	Rajasthan, West Bengal, Andhra Pradesh, Assam, Bihar Punjab.	West Bengal (1.47)	Punjab, Rajasthan, Andhra Pradesh (1.12)
Moderate	.9-1	Madhya Pradesh, Tamil Nadu, Uttar Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka.	Madhya Pradesh, Tamil Nadu (1)	Uttar Pradesh (.98)
Low	< .9	Kerala, Maharashtra, Orissa	Himachal Pradesh (.89)	Kerala (.75)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) **States with high RFMR:** Gujarat, Haryana, Himachal Pradesh and Punjab had the highest RFMRs of above 1.1.

b) **States with moderate RFMR:** States with moderate RFMRs ranging between .9 and 1.1 were Uttar Pradesh, Tamil Nadu, West Bengal, Orissa, Bihar, Kerala, Madhya Pradesh, Maharashtra and Rajasthan.

c) **States with low RFMF:** Andhra Pradesh, Assam and Karnataka were the only states with low RFMRs below .9. Andhra Pradesh had the lowest RFMR of .7.

d) **States with high UFMR:** Andhra Pradesh, Assam, Bihar, Punjab, Rajasthan and West Bengal had high UFMRs above 1.1.

e) **States with moderate UFMR:** Madhya Pradesh, Tamil Nadu and Uttar Pradesh had moderate UFMRs between .9-1.1.

f) **States with low UFMR:** Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra and Orissa have low UFMRs of below .9.

On the whole, three states had high UFMRs as well as high RFMRs - Punjab, Tamil Nadu and West Bengal. In Punjab the RFMR was higher than the UFMR, while it was vice versa in West Bengal. Tamil Nadu, on the other hand, had almost equal male and female infant mortality rates in both rural and urban areas.

The states of Andhra Pradesh, Assam, Bihar, Madhya Pradesh and Rajasthan had high UFMRs but low RFMRs. This may have been caused by the under reporting of female infant deaths in rural areas. The low UFMRs and high RFMRs in Gujarat, Haryana, Himachal Pradesh, Orissa, and Uttar Pradesh reflects the gap between rural and urban IMRs for females, the females being at a greater disadvantage in rural than in urban areas. Karnataka, Kerala and Maharashtra are the only states showing low UFMRs as well as low

RFMRs. In the latter two states, however, RFMRs are slightly above the UFMRs, indicating that females in the rural areas are still at a disadvantage as compared to females in the urban areas.

IV.2.3 MATERNAL MORTALITY RATE:

Data on maternal mortality rate (MMR), though not available uniformly for all the years, was available for the years 1961 and 1971, but only for towns with population above 30,000. MMR is a crucial indicator of the health and nutritional status of females in the reproductive age-group. A high MMR would mean a lower health status of females and lack of adequate health care facilities (especially ante and post natal care) and also lack of awareness regarding proper practices related to child birth. MMRs also reflect the social status of females.

1. REGIONAL PATTERNS OF MMR ACROSS THE STATES:

The broad patterns which emerge in the analysis of MMRs across the states do provide a picture of how the states stand with regard to maternal health, though the analysis is restricted to only the urban areas in 1961 and 1971, and thereby the more recent changes across the states are not available.

Table 4.12 Maternal Mortality Rates - 1961-71

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUE	STATE WITH LOWESTVALUE
High > 4	1961	Rajasthan, Madhya Pradesh, Orissa, Assam, Maharashtra	Rajasthan (13.4)	Maharashtra (4.4)
> 3	1971	Assam, Rajasthan, Orissa, Uttar Pradesh	Assam (8.4)	Uttar Pradesh (3.1)
Moderate 2-4	1961	West Bengal, Andhra Pradesh, Karnataka, Uttar Pradesh, Kerala, Tamil Nadu, Bihar, West Bengal.	Bihar (2)	Tamil Nadu (3.6)
1-3	1971	Gujarat, Madhya Pradesh, Maharashtra	Madhya Pradesh (2.6)	Maharashtra (1.2)
Low: < 2	1961	Gujarat, Punjab	Gujarat (1.9)	Punjab (1)
< 1	1971	Punjab, Haryana, Karnataka, Kerala	Punjab (.8)	Karnataka, Kerala (.2)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high MMR:

The highest MMR in 1961 was 13.4 per lakh population which is more than twice the state with the second highest MMR. Assam had the highest MMR in 1971 of 8.4, followed by Rajasthan (6.7), which showed a reduction of almost half in the MMR.

b) States with moderate MMR:

The states with moderate MMR of between 5-10 were Assam(5.4), Madhya Pradesh(6.3) and Orissa(5.5). In 1971 moderate MMRs of between 3-6 were recorded in Orissa and Uttar Pradesh.

c) States with low MMR:

In 1961 Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal had low MMRs of less than 5. In 1971 Andhra Pradesh, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu and West Bengal had low MMRs of less than 3. Karnataka and Kerala had the lowest MMRs of .2 only.

Though the analysis is restricted to maternal health in urban areas only, it is seen that states with generally high overall mortality rates have high MMRs also, while states with low mortality rates have low MMRs. The southern region shows low to moderate MMRs along with the north western states of Punjab and Haryana. The northern, central and eastern region show high MMRs. A more detailed discussion on maternal mortality follows in the subsequent sections.

IV.2.4 AGE-SPECIFIC DEATH RATES IN THE AGE GROUP 0-4 YEARS:

The pattern of age-specific death rates is generally a J-shaped curve indicating a higher death rate in the lower age group of 0-4 years, after which the mortality falls and then rises again in the age higher age groups above 50 years. The age-specific death rates for the age group of 0-4 years have been taken to represent child mortality rate, though infant deaths are also included in them. For this reason the measure has been termed 'Child mortality rate' (CMR). Children in this age-group have not yet developed immunity and hence are more susceptible to diseases, which is why the mortality in this age group is high.

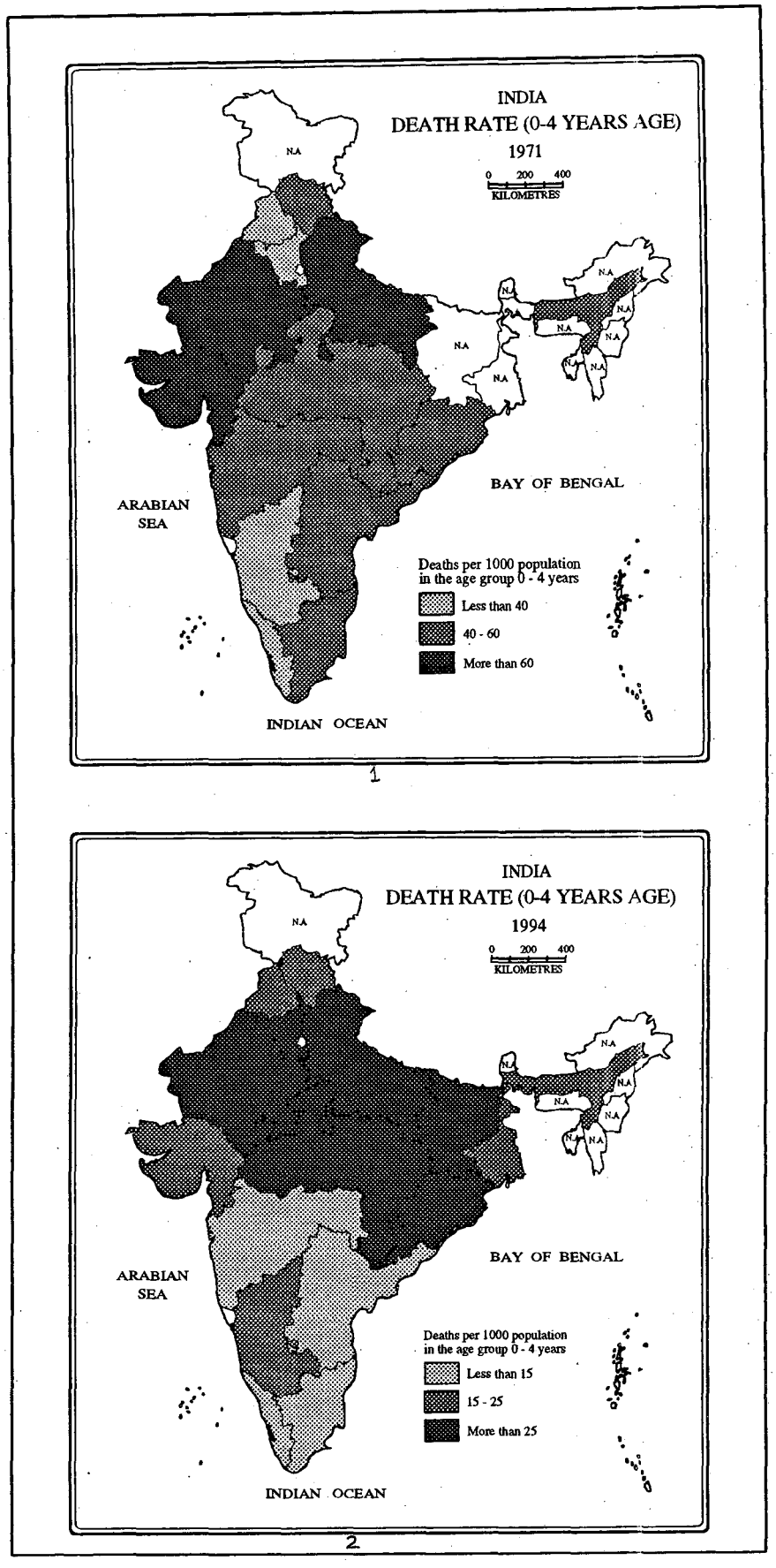
1. REGIONAL PATTERN OF CMR:

The CMR in India is very high. In 1971 it was 51.9 per thousand, which fell to 41.25 in 1981, and further to 24.2 in 1994. Though there has been a consistent fall in the CMRs, the rate still remains very high by international standards. SRS data on CMR has been analysed for the years 1971, 1981 and 1994. The 1961 data was not available.

Table 4.13 Child Mortality rate across the states - 1971 - 94

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUE	STATE WITH LOWEST VALUE
High > 48	1971	UP, Gujarat, Rajasthan, Orissa, Madhya Pradesh,	UP (83.7)	Madhya Pradesh (49.8)
> 42	1981	UP, Madhya Pradesh, Rajasthan, Bihar, Orissa	UP (60.8)	Orissa (42.18)
> 25	1994	UP, Madhya Pradesh, Orissa, Rajasthan, Haryana, Bihar	UP & MP (34.9)	Bihar (25.3)
Moderate 40-48	1971	Andhra Pradesh, Assam, Himachal Pradesh, Maharashtra, Tamil Nadu, Gujarat, Assam.	Himachal Pradesh (48)	Tamil Nadu (40.7)
30-42	1981	Haryana, Tamil Nadu, West Bengal, Andhra Pradesh, Gujarat, Assam.	Gujarat (40.6)	Andhra P. (30.4)
15-25	1994	Punjab, Himachal Pradesh, Karnataka, West Bengal	Gujarat (24)	Karnataka (17.4)
Low: < 40	1971	Punjab, Haryana, Karnataka, Kerala	Punjab (38.9)	Kerala (25.5)
< 30	1981	Punjab, Karnataka, Kerala, Himachal Pradesh, Maharashtra	Maharashtra (26.25)	Kerala (12.2)
< 15	1994	Andhra Pradesh, Tamil Nadu, Karnataka, Kerala	Karnataka (17.4)	Kerala (3.2)

FIGURE IV. 3


INDIA
DEATH RATE (0-4 YEARS AGE)
1971
0 200 400
KILOMETRES
N.A
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
Deaths per 1000 population in the age group 0 - 4 years
Less than 40
40 - 60
More than 60
1
INDIA
DEATH RATE (0-4 YEARS AGE)
1994
0 200 400
KILOMETRES
N.A
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
Deaths per 1000 population in the age group 0 - 4 years
Less than 15
15 - 25
More than 25
2

a) States with high CMR:

1971: The states with had the highest CMRs of above 60 were Gujarat, Rajasthan and Uttar Pradesh, the latter with the highest CMR of 83.7.

1981: The highest CMRs of above 45 in 1981 were recorded in Madhya Pradesh, Rajasthan and Uttar Pradesh, the latter again with the highest figure of 60.8.

1994: High CMRs above 25 in 1994 were recorded in Bihar, Haryana, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh, the latter continuing with the highest figure of 34.9, along with Madhya Pradesh with the same figure.

The BIMARU states and Orissa have shown consistently high CMRs in the country, though the actual values have reduced substantially. The decline has been most dramatic in the states with high CMRs.

b) States with moderate CMR:

1971: States with moderate level of CMR between 40-60 were Andhra Pradesh, Assam, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu.

1981: Moderate CMRs of between 30-45 were recorded in Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Orissa, Tamil Nadu and West Bengal.

1994: Assam, Gujarat, Himachal Pradesh, Karnataka, Punjab and West Bengal had moderate CMRs of between 15-25.

c) States with low CMR:

1971: In 1971 the states with low CMRs below 40 were Haryana, Karnataka, Kerala and Punjab, Kerala having the lowest CMR of 25.5.

1981: The states with low CMRs of below 30 were Himachal Pradesh, Karnataka, Kerala, Maharashtra and Punjab. Kerala had the lowest CMR of 12.5.

1994: Lowest CMRs of below 15 were recorded in Andhra Pradesh, Kerala, Maharashtra and Tamil Nadu. Kerala had substantially reduced the CMR to 3.4, making it much below the other states.

2. DIFFERENCES IN CMR BY RESIDENCE:

As with the measures analysed earlier, CMRs also register higher values in rural areas than in urban areas. They have been analysed through the regional pattern of RURs.

Table 4.14 India: Child Mortality Rate By Residence: 1971-94

YEAR	CHILD MORTALITY RATE		
	RURAL	URBAN	TOTAL
1971	58.1	32.2	51.9
1981	45.6	20.45	41.25
1994	26.1	15.7	24.2

In 1971 the RUR for India in the case of CMR was 1.8, which increased to 2.23 in 1981 and then fell again to 1.66 in 1994. The increase in RURs between 1971-81 was the same as in the case of IMRs and CDRs.

Table 4.15 Rural-Urban ratios in CMRs across the states - 1971-94

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUE	STATE WITH LOWEST VALUE
HIGH > 2	1971	Tamil Nadu, Haryana, Himachal Pradesh, Rajasthan	Himachal Pradesh (2.32)	Rajasthan (2.01)
> 2	1981	Orissa, Rajasthan Tamil Nadu, UP, West Bengal	Rajasthan (2.98)	Andhra Pradesh (2.05)
> 5	1994	Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab	Madhya Pradesh (2.29)	Karnataka (1.64)
Moderate 1.5-2	1971	Assam, Haryana, Madhya Pradesh, Orissa, UP>	Assam, Madhya Pradesh, (1.75)	UP (1.51)
1.75- 2	1981	Bihar, Karnataka, Maharashtra, Punjab	Karnataka (1.94)	Maharashtra (1.86)
1.3-1.5	1994	West Bengal, Andhra Pradesh, Gujarat, Himachal Pradesh, Rajasthan	Andhra Pradesh, Bengal, Rajasthan (1.34)	Gujarat (1.49)
Low: < 1.5	1971	Gujarat, Kerala, Maharashtra, Punjab	Punjab (1.4)	Kerala (1.26)
< 1.75	1981	Assam, Gujarat, Himachal Pradesh, Kerala	Assam (1.67)	Gujarat (1.39)q
< 1.3	1994	Assam, Bihar, Haryana, Kerala, Tamil Nadu	Tamil Nadu (1.19)	Kerala (.78)

Source: Vital Statistics Report 1962 & SRS Reports 1971-95.

a) States with high RUR:

1971: In 1971 though the RUR for India was 1.8, five states had much higher RURs of more than 2. These states were Himachal Pradesh(2.32), Karnataka, Tamil Nadu, Andhra Pradesh and Rajasthan.

1981: The highest RURs were above 2.45 and were recorded in Rajasthan and West Bengal.

1994: The state of Madhya Pradesh had the highest RUR of 2.29. Other states were much below this level.

b) States with moderate RUR:

1971: Moderate RURs of between 1.6 -2 were recorded in Assam, Madhya Pradesh and Orissa.

1981: Moderate RURs of between 2-2.45 were recorded in Assam, Haryana, Madhya Pradesh, Orissa Tamil Nadu and Uttar Pradesh.

1994: In 1994, the states of Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Orissa, Punjab, Rajasthan, Uttar Pradesh and West Bengal had moderate RURs of between 1.3-1.8.

c) States with low RUR:

1971: Low RURs of less than 1.6 were recorded in Gujarat, Haryana, Kerala, Maharashtra, Punjab and Uttar Pradesh.

1981: The states of Assam, Bihar, Gujarat, Himachal Pradesh, Karnataka, Kerala, Maharashtra and Punjab had low RURs below 2.

1994: Low RURs of less than 1.3 were recorded in the states of Assam, Bihar, Haryana, Kerala and Tamil Nadu with Kerala having the lowest value of .78.

3. DIFFERENCES IN CMR BY SEX:

CMR for females is generally higher than CMR for males which may be due to the negligence of the female child with regard to nutrition and morbidity leading to higher female deaths. For India the ratio of female to male deaths in the age group 0-4 (FMR) was 1.11 in 1971 which declined marginally to 1.1 in 1981 and a little further to 1.01 in 1994. It is to be noted that though the FMR has been declining over the years, the decline has been very marginal and female deaths still number more than male deaths in India in this age group. The regional pattern of FMRs is explained by residence also, by calculating the FMR for rural areas (RFMR) and the FMR for urban areas (UFMR). These measures are discussed after a sketch of the trends in overall FMRs presented below.

Table 4.16 Female-Male ratios in CMRs across the states - 1971-94

RANGE	YEAR	STATES	STATE WITH HIGHEST VALUES	STATE WITH LOWEST VALUES
HIGH >1.1	1971	Himachal Pradesh, Uttar Pradesh, Haryana, Punjab, Rajasthan, Gujarat	Punjab (1.5)	Gujarat (1.12)
> 1.1	1981	Haryana, UP, Assam, Bihar, Punjab Rajasthan	Haryana (1.3)	Bihar (1.12)
1.1 & above	1994	Haryana, Himachal Pradesh, Punjab	Haryana (1.17)	HP (1.1)
Moderate 1-1.1	1971	Orissa, Maharashtra, Madhya Pradesh, Kerala, Tamil Nadu, Karnataka	Orissa (1.07)	Kerala (1)
1 -1.1	1981	Orissa, MP, Maharashtra, Gujarat,	Madhya Pradesh (1.08)	Orissa, TN (1)
1-1.1	1994	Bihar, Gujarat, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, UP< West Bengal	Gujarat (1.08)	Rajasthan (1)
Low: < 1	1971	Andhra Pradesh, Karnataka, Tamil Nadu, Assam	Andhra Pradesh (.98)	Assam (.84)
< 1	1981	Andhra Pradesh, Himachal Pradesh, Kerala, West Bengal	Andhra Pradesh (.97)	Himachal Pradesh (.80)
< 1	1994	Andhra Pradesh, Kerala, Assam, Karnataka, Maharashtra	Other states (.94)	Andhra Pradesh (.8)

a) States with high FMR:

1971: The highest FMRs of above 1.3 were recorded in Punjab (1.52) and Uttar Pradesh (1.31).

1981: The highest FMRs of above 1.1 were recorded in Haryana, Uttar Pradesh, Assam, Bihar, Punjab and Rajasthan. The highest FMR of 1.3 was recorded in Haryana.

1994: Only three states had FMRs above 1.1 in 1994 - they were Haryana, Himachal Pradesh and Punjab, the highest being 1.17 for Haryana.

b) States with moderate FMR:

1971: Moderate FMRs ranging between 1.05-1.3 were recorded in Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa and Rajasthan.

1981: The states with moderate FMRs between .95-1.1 were Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu.

1994: The number of states with FMR between 1-1.1 was eight in 1994. The states were Bihar, Gujarat, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

c) States with low FMR:

1971: States with FMR below 1.05 were Andhra Pradesh, Assam, Karnataka, Kerala and Tamil Nadu.

1981: States with FMR below .95 were Himachal Pradesh, Kerala and West Bengal.

1994: Andhra Pradesh, Kerala, Assam, Karnataka and West Bengal had FMRs below 1, the lowest being .89 in Andhra Pradesh.

On the whole, all the states have slowly but surely progressed towards a reduction in female deaths in the age group 0-4 years vis-à-vis male deaths.

Differences in FMRs by residence:

a) States with UFMRs greater than RFMRs:

1971: As many as eight states showed greater FMRs for urban areas than rural areas. These were Rajasthan (UFMR 1.4 and RFMR 1.28), Tamil Nadu, Madhya Pradesh, Kerala, Karnataka, Himachal Pradesh, Gujarat and Assam. Of these states Rajasthan, Madhya Pradesh and Gujarat had both urban and rural FMRs above 1; Kerala, Tamil Nadu and Karnataka had only UFMRs above 1 and Assam had both rural and urban FMR below 1.

1981: Gujarat, Karnataka, Kerala, Maharashtra and Orissa came in this category in 1981. Gujarat and Karnataka had both RFMRs and UFMRs above 1, Maharashtra and Orissa had only the UFMR above 1 while Kerala had both below1.

1994: Six states were included in this category in 1994 - Andhra Pradesh, Assam and Rajasthan with RFMRs below 1, and Bihar, Madhya Pradesh and West Bengal with both above 1.

b) States with RFMRs greater than UFMRs:

1971: Of the five states in this category, Uttar Pradesh, Punjab and Haryana had both measure above 1, while Orissa and Maharashtra had UFMRs below 1.

1981: A total of 11 states were included in this category. States with both measures above 1 were Haryana, Madhya Pradesh, Rajasthan and Uttar Pradesh. States with only RFMRs above1 and UFMRs below 1 were Assam, Bihar, Punjab and Tamil Nadu. Three states had both measures below 1 - Andhra Pradesh, Himachal Pradesh and West Bengal.

1994: Ten states were in this category with Gujarat, Haryana, Punjab and Uttar Pradesh having both RFMRs and UFMRs above 1; Himachal Pradesh, Tamil Nadu and Orissa having UFMRs below 1 ; and Karnataka, Kerala and Maharashtra having below unity RFMRs as well as UFMRs.

IV.2.5 INFERENCES

Significant patterns are visible on the analysis of the state level data on mortality indicators. The inferences have been discussed below in two separate sections - one is at the national level and the second at the state level.

A. INFERENCES AT THE NATIONAL LEVEL:

The inferences which can be drawn for the country as a whole regarding trends in mortality are the following:

1. India has witnessed a steep decline in the death rate from 1920s to the present. This decline has been much steeper than the decline in birth rates, and is more the result of medical and public health interventions rather than overall socio-economic development. India is now said to have entered the fourth stage of demographic transition with low death rates and declining birth rates.
2. The country on the whole has higher rural CDRs than urban CDRs. The RUR actually increased from 1971 to 1981, but again declined from 1981 to 1994. This shows the initial focus of health facilities in urban areas, as well as better living standards and awareness which led to increased disparity in death rates between rural and urban areas. Though the gap has been reducing since the 1980s, the rural CDRs remain above 1.5 times that of the urban CDRs. This is the opposite of developed countries where the cleaner environment of rural areas leads to lower CDRs in rural areas than in urban areas.
3. Data for CDRs by sex, available only for 1981 and 1994, indicate that female CDRs are marginally lower than male CDRs in India. The ratio FMR was .97 in 1981 which came down to .93 in 1994. This FMR is much smaller than the same in developed countries. This trend raises the issue of the status of women in Indian society and the overall negligence suffered by them leading to high female mortality. The UNO data puts India's life expectancy at birth for males as 60.3 and females as 60.6 for 1995. Compare this to the figures for Japan - 76.4 for males and 82.4 for females - the gap between male and female life expectancy is six years in Japan while it is only .3 years in India. This is an adequate indicator of the distance India has to cover in reducing female mortality in the country.

B. INFERENCES AT THE STATE LEVEL:

The following are the main points which emerge after analysis of mortality rates at the state level.

1. It is seen from trends in CDRs over the states that five states have consistently shown high death rates - they are Uttar Pradesh, Rajasthan, Madhya Pradesh, Bihar and Orissa. These states make up more than half of the country's population also. Placed on the lowest levels of social and economic development, it is these states which inflate the national figures for mortality. Any significant decline in mortality can be achieved only through focusing on the development ofd these states.
2. Infant mortality is the major contributor to overall mortality in the country. The above mentioned states again lead in terms of IMRs. It is a field of preventable deaths and reflects on the health and nutritional status of the females also. States with high proportion of rural population generally show high IMRs also. The death rate in the age group 0-4 years generally follows the patterns of IMRs across the states since it is inclusive of deaths below 1 year of age.
3. Some states which have recorded initial high levels of mortality such as Gujarat, Tamil Nadu and Maharashtra have been able to appreciably reduce it to low or moderate levels by 1994. Karnataka, Andhra Pradesh, West Bengal and Himachal Pradesh have also maintained low to moderate death rates.
4. Kerala is the only state recording the lowest mortality rates consistently, now at par with the developed countries. It has also recorded low RUR below 1 indicating lower death rates in rural than in urban areas. It has also recorded low FMRs below 1 indicating that female mortality is below male mortality consistently. The states of Punjab and Haryana follow Kerala, but the gap between them is very large, which reflects upon the greater role played by social development as compared to economic development in improving the health status of population.
5. With regard to rural-urban disparity, no consistent state-level trends seem to emerge, except that the southern states generally show lesser disparity mostly at moderate levels. Maharashtra with high urbanisation level also shows high disparity in rural and urban death rates. Alongside, Orissa with very low urbanisation has the same trend as Maharashtra. Himachal Pradesh has shown extremely high RURs in 1971 which have declined substantially in 1994 possibly because of special focus on health care in hilly areas through special funds and plans.
6. Gender disparity in death rates is high in Punjab and Haryana in spite of overall low mortality which indicates the lower social development in the agrarian and highly patriarchal society and therefore reflects on the need to focus on social sectors also along with economic development.
7. In the case of infant mortality it is seen that gender disparity in rural areas is greater than in urban areas, though the distance is marginal. On an average female IMR is below male IMR, but states such as Punjab, Haryana and Gujarat show high FMRs in rural areas. However, quite low urban FMRs are recorded in these states (except Punjab) which shows the gap in female health between rural and urban areas.

8. Though FMRs in infant mortality are below 1 in several states, and on the whole at the national level, FMRs in child mortality are above 1 and have almost remained constant from 1981 to 1994. The only states with FMRs consistently below unity are Andhra Pradesh, Karnataka and Kerala. This shows the widespread negligence of the female child, and is a major cause for concern. On the whole the southern states show lower gender disparity, possibly because of relatively better social status of females in these states.

The trends in mortality across the states and over the years 1961-94 have built a broad picture of the level of health in India. A regional analysis of the patterns of morbidity and nutritional status follows and subsequently their reflection in the mortality levels can be analysed in further detail.

IV.3 REGIONAL PATTERNS OF MORBIDITY

Analysis of the regional patterns of morbidity in India provides an additional insight into the health status of the population which cannot be accomplished through mortality statistics alone because:

a) It enables a closer look at the diseases which account for most of the mortality burden, their regional manifestation and trends over time in their incidence and prevalence.

b) It helps identify those diseases which, though not contributing much to the mortality burden, yet have a high incidence and therefore have a greater disabling effect on the population. Disability in this sense implies lack of ability of the individual to function to his/her optimum level.

Health in the Indian context has been defined as the absence of disease, and therefore a study of health status would not be complete without an inquiry into morbidity patterns. Such studies can play a crucial role in establishing priorities for health intervention and in evaluation and monitoring of the public health activities.

India suffered from a very high incidence of communicable diseases till the early part of the twentieth century. These diseases also accounted for the high mortality rates in the country. It was primarily the control of these diseases which brought down India's death rate substantially. Thus, over the years, the communicable diseases have witnessed a declining trend. On the other hand, there has been an increase in the incidence of non-communicable degenerative diseases such as cancers and diseases of the heart, which has been the result of increasing urbanisation, changes in the living environment and the enhanced longevity of population. Though the communicable diseases in India have declined appreciably over the years, yet they still contribute more than half of India's disease burden (as quoted in the World Development Report, 1993). Thus India still faces the task of minimising the incidence of communicable diseases along with providing adequate facilities for the treatment of degenerative diseases.

IV.3.1 INDIA'S MORBIDITY PROFILE - 1961-94.

The analysis of morbidity pattern in India has been carried out on the basis of the International Classification of Diseases (9^{th} revision) of 1977. It also forms the basis of the data on morbidity collected by the ministry of Health and Family Welfare. The prevalence rates calculated from the data indicate that the diseases which have shown the highest prevalence over the years consistently are diseases of the nervous system, diseases of blood and blood forming organs, respiratory diseases, diseases related to pregnancy and diseases of the skin and musculo-skeletal system. Among the individual diseases within these groups anaemia and acute respiratory infection show very high prevalence rates.

Table4.17 Prevalence Rates For Major Disease Categories In India - 1961-94.

DISEASE CATEGORIES	Prevalence Rates per lakh Population:			
	1961	1971	1981	1993-94
A. Infectious and parasitic diseases	129	124	59	227.35
B. Neoplasms	89	11.6	44	-
C. Endocrine, nutritional and metabolic diseases	36.6	6	5.5	-
D. Diseases of blood and blood forming organs.	991	1391	1483	-
E. Mental, psycho-neurotic and personality disorders.	36	89	61	-
F. Diseases of nervous system and sense organs.	1858	1386	67	.81
G. Diseases of circulatory system	-	-	114	-
H. Diseases of respiratory system	1192	1301	328	9446
I. Diseases of digestive system	831	375	189	-
J. Diseases of genito-urinary system	1183	623	209	-
K. Diseases of pregnancy and child birth *[1]	2134	2992	1261	-
L. Diseases of skin and musculo-skeletal system *[2]	3587	2515	1323	-
M. Diseases of early infancy *[3]	806	2441	569	-

Source: DGHS, Ministry of Health and Family Welfare.

*[1] - prevalence rate calculated per lakh population of females in the reproductive age group.

*[2] - includes 2 disease categories - a) Diseases of skin and subcutaneous tissue
b) Diseases of musculo-skeletal and connective tissue.

*[3] - Prevalence rate calculated per lakh population in the age group 0-1 year.

The diseases which showed the highest case fatality rates (deaths as a percentage of cases reported) were those of the nervous system, circulatory system (both showing high fatality rates in 1981) and respiratory system (which showed consistently high fatality rates). Other categories which showed high fatality rates were diseases of the digestive system, genito-urinary system and diseases related to pregnancy and child birth.

Table4.18 India- Case Fatality Rates By Disease Categories - 1961-93.

DISEASE CATEGORIES	Case Fatality Rates: 1961	1971	1981	1993
A. Infectious and parasitic Diseases	.42	.38	.42	5
B. Neoplasms	.43	.30	.68	-
C. Endocrine, nutritional and metabolic diseases	.12	.06	.06	-
D. Diseases of blood and blood forming organs.	.14	.07	.01	-
E. Mental, psycho-neurotic and personality disorders.	.50	.08	.04	-
F. Diseases of nervous system and sense organs.	.15	.07	19.36	15.2
G. Diseases of circulatory system	-	-	2.87	-
H. Diseases of respiratory system	16.36	18.66	8.22	.34
I. Diseases of digestive system	11.41	5.37	4.74	-
J. Diseases of genito-urinary system	8.12	4.47	2.62	-
K. Diseases of pregnancy and child birth	3.35	4.85	3.65	-
L. Diseases of skin and musculo-skeletal system	.02	.01	.01	-
M. Diseases of early infancy	.77	.53	1.82	-

Source: DGHS, Ministry of Health and Family Welfare.

The case fatality rates (CFRs) are based on the number of reported cases of deaths by disease of indoor patients only, which are a very small proportion of the actual deaths. They must, therefore, be interpreted with caution. The data shows a fall in the CFRs of respiratory diseases over the years, a slight fall in the CFRs of nervous system diseases as well, but a rise in the CFRs of infectious and parasitic diseases. This indicates the continuing seriousness of communicable diseases in India. Respiratory diseases also include the diseases of pneumonia and acute respiratory infection, which are also communicable diseases.

A more detailed discussion on state-wise morbidity pattern by disease categories follows. The morbidity pattern of each disease category and its constituent diseases across the states is analysed in this section.

A. INFECTIOUS AND PARASITIC DISEASES:

This group of diseases includes the largest number of diseases for which data is available in India. As many as 23 diseases comprise this group. It includes diseases caused by viruses such as viral hepatitis, Japanese encephalitis, measles and polio; diseases caused by bacteria such as tuberculosis, cholera, leprosy and tetanus; and diseases caused by parasites such as malaria, filaria and guineaworm.

Disease Prevalence Rates (DPRs):

The infectious and parasitic diseases generally had a very low prevalence rate of less than 100 per lakh population in 1961. The only diseases which had higher prevalence rates were whooping cough, malaria syphilis and tuberculosis (TB). Diseases which have consistently recorded DPRs below 100 are measles, viral hepatitis, diphtheria, leprosy, meningococcal infection, tetanus, polio, cholera and gonococcal infection. However, among these diseases, viral hepatitis and gonococcal infection recorded an increase in

Table4.19: Prevalence Rates Of Infectious And Parasitic Diseases - 1961-94.

RANGE	YEAR	DISEASES	Diseases with prevalence rate: HIGHEST	LOWEST
<100	1961	Measles, viral hepatitis, rabies, filaria, diphtheria, leprosy, meningitis, tetanus, polio,cholera, gonococcal infection, others.	Gonococcal infection (94)	Rabies (24)
	1971	Measles, viral hepatitis, rabies, diphtheria, meningitis, leprosy, tetanus, polio, cholera, gonococcal infection.	Leprosy (98)	Rabies (2)
	1981	Measles, viral hepatitis, rabies, filaria, whooping cough, meningitis, leprosy, tetanus, polio, syphilis, gonococcal infection, cholera, others.	Others (95)	Rabies (3)
	1993-4	Guineaworm, diphtheria, tetanus, whooping cough, measles, rabies, syphilis.	Measles (96)	Jap. Enceph. (.09)
100-200	1961	Whooping cough, syphilis.	Syphilis (157)	W. cough (111)
	1971	Whooping cough, syphilis, malaria, filaria.	Malaria(180)	Syphilis(121)
	1981	-	-	-
	1993-4	Viral hepatitis, gonococcal infection.	V. hep. (173)	Gon. Inf.(108)
>200	1961	Malaria, tuberculosis (TB).	TB (618)	Malaria (587)
	1971	Tuberculosis, others.	Others (540)	TB (466)
	1981	Malaria, tuberculosis.	Malaria(245)	TB (202)
	1993-4	Acute diarrhoeal diseases (ADD), malaria, filaria, enteric fever, tuberculosis.	TB (1632)	Malaria (231)

Source: DGHS, Ministry of Health and Family Welfare.

DPRs in 1993 from below 100 to between 100-200. Most of these diseases showed low DPRs because they had been controlled through methods such as immunisation, public sanitation works and improvement in curative measures. The mean prevalence rate of infectious and parasitic diseases in 1961 was 159/lakh population, which fell to 128 in 1971, and then rose marginally to 133 in 191. The figure for 1993-94 is 239. It is high because of the inclusion of a larger number of diseases in the data for this year, and higher DPRs in some diseases.

States with high DPRs:

1961: The DPRs for diseases in this category in 1961 varied from more than 400 in Andhra Pradesh to less than 40 in Madhya Pradesh. The variation in DPRs was very high.

The state of Andhra Pradesh recorded a DPR of 499, which is more than mean + 2 standard deviations (SD) for this category. Other states which recorded high DPRs were Himachal Pradesh and Kerala (mean + 1 SD to mean + 2 SD). In the case of Andhra Pradesh and Himachal Pradesh, TB and malaria were the major contributors to the DPR, while in the case of Kerala the main contributors were TB, viral hepatitis, filaria and other communicable diseases.

1971: Only two states had high DPRs of above mean + 1 SD in 1971. They were Tamil Nadu (494) and Kerala (268). While Kerala showed a high prevalence of TB, diphtheria, whooping cough, leprosy, syphilis, gonococcal infection and other communicable diseases.

1981: Haryana and Punjab had the highest DPRs of 276 and 257 respectively, which is above mean + 1 SD. Haryana had a high DPR of malaria and other communicable diseases, while Punjab also suffered from a very high DPR of malaria followed by a high DPR of TB.

1993-94: In 1993 the highest DPR was recorded in Karnataka (2009) which recorded the highest DPRs in whooping cough, measles, enteric fever, viral hepatitis, syphilis, gonococcal infection and TB. Other states which recorded high DPRs of above mean + 1 SD but below mean + 2 SD were Andhra Pradesh (530), Madhya Pradesh (542), Rajasthan(528) and Uttar Pradesh (546). There is a very large gap between the DPRs of these states and that of Karnataka.

States with moderate DPRs:

States with moderate DPRs were those in which the DPRs ranged between mean and mean + 1 SD.

1961: In 1961 only Orissa and Tamil Nadu had moderate DPRs of 191 and 195 respectively.

1971: Andhra Pradesh and Orissa had moderate DPRs ranging between 128-243.

1981: Andhra Pradesh, Kerala, Orissa and Rajasthan came in this category with DPRs between 133-215.

1993: In 1993, no state was included in the category of mean to mean + 1 SD. Apart from the states in the high category, all the other states fell into the low category below the mean DPR.

States with low DPRs:

These states have recorded DPRs below the mean. The bulk of the states lie in this category.

1961: A total of nine states were in this category, ranging from Assam, Madhya Pradesh , Punjab and West Bengal with DPRs below 50, Gujarat, Maharashtra and Rajasthan with DPRs between 50-100, and Karnataka and Uttar Pradesh with DPRs between 100-200.

1971: Ten states came in this category in 1971. Of these, Gujarat had DPR below 50; Assam, Haryana, Himachal Pradesh, Karnataka, Maharashtra, Punjab and Rajasthan had DPRs between 50-100; Madhya Pradesh, Uttar Pradesh and West Bengal had DPRs between 100-150.

1981: In 1981 5 states had DPRs below the mean of which Himachal Pradesh, Karnataka and Kerala had DPR between 51-133 (mean - 1 SD to mean), and Gujarat and Maharashtra had DPRs below 51.

1993: Among the ten states in this category, Gujarat, Haryana, Punjab, Tamil Nadu and West Bengal had DPR below 100; Himachal Pradesh, Kerala, Maharashtra and Orissa had DPRs between 100-200; and Assam had a DPR of 232, slightly less than the mean value of 239.

The fact that the backward states such as Bihar, Madhya Pradesh and Orissa which have recorded consistently high mortality rates report consistently low DPRs of infectious diseases may be due more to lacunae in data collection and disease reporting rather than actual low prevalence.

Case Fatality Rates (CFRs):

The CFRs on the whole for infectious diseases was low at .22% in 1961, which declined marginally to .20 in 1971, but increased in 1981 to .29%. In 1993 the CFR for infectious diseases was only .15. However within the diseases in this group, there are some variations.

In 1961 diphtheria had a high CFR of 3.45 along with meningitis (1.19) and polio (.9). However, the highest CFR was of tetanus (10.1). Tetanus had the highest CFR in 1971 also (9.9%) followed by cholera (1.1%). In 1981 TB and diphtheria had high CFRs of .99 and 1% respectively. Meningitis also had a high CFR of 1.36 along with rabies (2.53). Again tetanus had the highest CFR of 11% in 1981. In 1993 tetanus had a high CFR of 16.8% in India. Rabies also had a high CFR of 15.1%. Other diseases with a high CFR were diphtheria (5.6%), polio (2.3%), viral hepatitis (1.1%) and Kala Azar (1.5%). But the highest CFR was of Japanese encephalitis (52.8%). Meningitis also had a high CFR of 15%. Diseases such as diphtheria, tetanus, polio, viral hepatitis and rabies can be prevented through immunisation. The insufficient immunisation coverage in India results in high fatality rate for these diseases.

CFRs across the states:

1961: The difference across the states in CFRs is not very large. In 1961 all the states had CFR below 1% for infectious and parasitic diseases. West Bengal had the highest CFR of .99% followed by Punjab (.89%). West Bengal had a high CFR in tetanus, cholera and diphtheria. Punjab recorded high CFRs in diphtheria and tetanus.

1971: In 1971 Andhra Pradesh, Gujarat, Haryana and Punjab recorded high CFRs of above 1%, the rest of the states having CFRs below 1. Andhra Pradesh had high CFRs in TB, cholera and tetanus. Gujarat and Haryana recorded high CFRs in diphtheria, meningitis and tetanus, while Punjab had high CFRs in meningitis and tetanus.

1981: In 1981 Maharashtra had the highest CFR of 3.7% followed by Gujarat (1.2%). All the states had CFRs uniformly below 1% ranging from .2-.5%. Maharashtra had high CFRs in TB, diphtheria, meningitis, polio, rabies, tetanus and viral hepatitis. Gujarat showed high CFRs in cholera, diphtheria tetanus, TB and viral hepatitis.

To examine further the trends in infectious and parasitic diseases, each disease has been discussed separately in this section.

A.1 <u>TUBERCULOSIS:</u>

Tuberculosis or TB is caused by the bacteria M. tuberculosis. It affects the lungs as well as other organs such as glands, bones, intestines etc. The source of infection for TB is human sputum and infected milk which is the bovine source of infection. TB was one of the major diseases the world over till a cure was discovered. Since then TB has been effectively controlled in the developed countries, but in the developing

countries it remains a major public health problem. In India also TB is highly prevalent. TB prospers in conditions of poor living standards, overcrowding, poor housing conditions, lack of awareness etc. and hence is related to the social development level. Being a major public health concern, the government also runs a TB control programme in order to check the disease.

1.1 Prevalence rate: - The DPR of TB in India in 1961 was 616 per lakh population. It has since shown decline from 616 to 467 in 1971 and further to 202 in 1981. However the DPR of TB in 1993 was 632 according to the official data. This is a phenomenal increase from the 1981 figure, but this may have been caused due to gaps in reporting in the earlier years. The NFHS'93 puts the TB prevalence rate as 467 per lakh in India. Among the states varying trends are observed. In 1961 the highest DPR for TB was recorded in Himachal Pradesh (4274/lakh) followed by Andhra Pradesh (3181/lakh) and Kerala (1215/lakh). Maharashtra and Tamil Nadu had DPRs between 500-1000 while it was below 500 in all other states. Assam had the lowest DPR of 53 lakh population. In 1971 while in Kerala the DPR was more or less constant at 1287/lakh, it rose in Tamil Nadu to 1126 but declined in other states, all recording DPRs below 700. In 1981 the DPRs were further reduced. Rajasthan had the highest DPR of 901 followed by Himachal Pradesh (893) and Kerala (809). All other states had DPRs below 600. In 1993 Karnataka recorded the highest DPR of 847 followed by UP (476) and Rajasthan (405). The lowest DPR of 8 was reported from West Bengal. The NFHS, however shows a completely different pattern of DPRs in 1993. Rajasthan and Tamil Nadu show the highest DPRs above 700 followed by Assam (638), while Karnataka has actually recorded the lowest DPR of 136. This shows the defects in the official data which shows uniformly low figures for most states.

1.2 Case Fatality Rates: -The CFR for TB in India shows a steady increase from .38 in 1961 to .81 in 1971 and .99 in 1981. It declined to .72 in 1993. The CFR in 1961 was uniformly below 1 except for the states of Karnataka and West Bengal where it was 1.13 and 1.34% respectively. In 1971 the highest CFR was recorded in Andhra Pradesh (4.2) followed by Gujarat and Himachal Pradesh (1-2%). In 1981 more states had CFRs above 1% for TB. Maharashtra had a CFR of 4% followed by Assam & Gujarat (2-3%), Haryana, Himachal Pradesh and Karnataka (1-2%). The CFR declined in 1993 and five states had CFR between 1-1.5 - Himachal Pradesh, Karnataka, Maharashtra, Orissa and West Bengal.

1.3 Proportional Morbidity: - The proportional morbidity (PMB) or the proportion of morbidity caused by TB to the total morbidity cases reflects the position of TB in relation to other diseases. The picture is grim as TB has the largest proportion of cases in the category of infectious and parasitic diseases. 30% of the cases in this category were of TB in 1961 which declined to 23.5% in 1971 and further to 21.4% in 1981. It declined appreciably to 8% in 1993, but maintained its relative position. The PMB in 1961 for TB was highest in Himachal Pradesh (71%). Madhya Pradesh showed less than 1% PMB

which was the lowest in India. In 1971 the PMB increased in Maharashtra to 69.3% which was the highest in the country, followed by Haryana (53%). 10 states showed an increase in PMB from 1961-71. In 1981 Himachal Pradesh showed the highest PMB of 49% followed by Maharashtra (45%). This time most of the states experienced decline in PMB. In 1993 the states showed much lower PMB at less than 10% for most of them. Only five states had PMB above 10%, the highest being 32% for Uttar Pradesh, followed by 23% in West Bengal, Tamil Nadu, Rajasthan and Maharashtra (10-20%).

1.4 **Proportional Mortality (PMT):** In terms of proportional mortality also, TB has the highest rates, and has maintained them over the years. in 1961, it had a proportional mortality of 27% which increased to 50.5% in 1971 and more or less remained constant at 50% in 1981, declining only in 1993 to 37%. In 1961, three states had PMT more than 60% in the case of TB. These were Gujarat (73%), Himachal Pradesh (65%) and Maharashtra (69%). The PMT in Himachal Pradesh rose to 96% in 1971, and then declined marginally to 91% in 1981. The PMT in 1971 was more than 50% in four other states- Andhra Pradesh (84%), Kerala, Assam and Gujarat (50-70%). In 1981 also the PMT was above 50% in four other states - Karnataka, Kerala, Assam and Gujarat. Four states had PMT above 50% in 1993 - Haryana, Andhra Pradesh, Karnataka and Kerala (all between 50-55%). West Bengal and Uttar Pradesh had the lowest PMT (10-15%) while the rest had PMT between 20-50%.

It has been widely accepted that the official figures for TB are an understatement. Control of TB involves identification of cases and pursuance of the whole course of treatment which can last up to six months or more. Any lapse in the treatment leads to development of resistance against the medication. In a country like India, with widespread poverty, ignorance and rigid social set up, the control of TB is indeed a daunting task. The control programme for TB alone cannot bring results unless it is accompanied by overall social development, better literacy and awareness, removal of social stigma and general improvement of the living environment of the population.

A.2 CHOLERA:

Cholera is a disease caused by the bacterium Vibrio cholerae and affects the intestinal tract causing acute diarrhoea. It has been known for its epidemic outbreaks. However, it is also endemic to some areas in India. Cholera spreads through consumption of contaminated food or water, and occurs in areas with poor quality of drinking water, lack of personal hygiene and general lack of awareness regarding sanitation and hygiene. Though a vaccine against cholera is available, it does not offer permanent protection from the disease. Treatment of cholera is possible through the simple oral rehydration therapy (ORT).

2.1 Prevalence Rate: Cholera cases are common in areas where the disease is endemic; though there is a seasonal fluctuation in the disease, it being more common in the monsoon months of August-September. Outbreak of cholera epidemics has reduced substantially but does occur occasionally. In 1961, cholera DPR was highest in Uttar Pradesh (410). In all other states it was much below this level, between 0-20 cases per lakh population. The high DPR in Uttar Pradesh may be the result of epidemic outbreak of the disease in the state. On the whole for India the DPR declined from 73 in 1961 to just 7 in 1971 and 4 in 1981. In 1971 all states recorded DPRs below 50, the highest being 32 for West Bengal. In 1981 two states showed a relatively higher DPR as compared to other states. They were Orissa (26) and Andhra Pradesh (17). This shows the very low prevalence of cholera. The DPR in 1994 was .6 for India. Gujarat and Tamil Nadu had higher DPRs at 1.3 and 1.4 respectively. Tamil Nadu also contains endemic foci of cholera, along with Maharashtra, Andhra Pradesh, Madhya Pradesh and Assam.

2.2 Case Fatality Rates: The CFR has been low for cholera over the years, being recorded as .5% in 1961, rising to 1.11% in 1971 and again falling to .34% in 1981. The figures for 1994 were not available. The CFRs have been consistently below 1% in most of the states. The exceptions are Andhra Pradesh and Maharashtra. Both3 had high CFRs of 13.8% and 11% respectively in 1961, which fell to 3.3% and 6.5% in 1971 and to .33% and 2% in 1981. Punjab, which had 0 CFR in 1961 and 1971, experienced a sudden rise in CFR to 50% in 1981.

2.3 Proportional Morbidity: The PMB for cholera has been very low in India. It has declined from 3.5% in 1961 to .4% in 1971, rising marginally to .7% in 1981. The figures for 1994 could not be calculated. In 1961 Uttar Pradesh had the highest PMB for cholera at 20%, followed by West Bengal(2.5%) and Assam (1.5%). It was below 1% for the rest of the states. In 1971 it was below 1% for all the states except West Bengal (1.7%) and Orissa (1%). No state showed PMB above 1% in 1981.

2.4 Proportional mortality: The PMT from cholera has declined from 4.1% in 1961 to 1% in 1971 and .36% in 1981. In 1961 West Bengal had the highest PMT of 18.7% followed by Maharashtra (7%), Uttar Pradesh, Andhra Pradesh and Orissa (3-5%).The rest of the states had PMT below 1%. In 1971 again West Bengal had the highest PMT (9%) followed by Maharashtra (3.2%). In 1981 Madhya Pradesh was the only state with PMT above 1 at 1.07%. In all the other states the PMT had fallen below 1%.

Cholera does not have a high share in the morbidity or mortality in India. Epidemics have become less common and cases reported are mostly from regions where the disease is endemic. The government's programme on the control of cholera and other diarrhoeal diseases focuses on better water supply and

improved sanitation and the education of people regarding ORT, the supply of which has been ensured through health workers in the rural areas. Cholera, which was once a dreaded disease because for its epidemic outbreaks and high mortality seems to have been successfully curbed in India.

A.3 ACUTE DIARRHOEAL DISEASES:

These are a group of diseases classified on the basis of the main symptom - diarrhoea. Acute diarrhoea normally has a sudden onset and lasts about a week. It is caused by a number of bacteria, viruses and other organisms such as intestinal worms. Diarrhoeal diseases are mostly confined to small children below 5 years of age and account for most of the child morbidity, especially in developing countries where they have a high incidence. Poor sanitation and lack of hygiene along with poor quality of food and water are its main causes of spread, as in cholera.

3.1 Prevalence Rate: Data on the prevalence of acute diarrhoeal diseases is not available for 1961-81. Thus, the temporal trend cannot be analysed. However, in 1994, the DPR of this disease group was 858/lakh population. Since in this study only the major states have been covered, the mean DPR of all the major states (except Bihar, Assam and West Bengal) is also relevant. This figure was 1594/lakh population. Thus, acute diarrhoeal diseases have the second highest DPR among all the infectious and parasitic diseases in India. Since they mainly occur among children, it reflects the poor state of health of children in India.

3.2 Case Fatality Rate: Diarrhoeal diseases do not contribute much to the mortality as the CFR is quite low at .05% in India. All states showed more or less uniform CFR. The proportional morbidity and mortality could not be calculated.

The government strategy to control this group of diseases is the same as mentioned for cholera - spread of health education and awareness regarding simple sanitation and hygiene methods, and the propagation of ORT for the treatment of the disease.

A.4 ENTERIC FEVER:

Enteric fever includes typhoid fevers as well as paratyphoid fevers. It is caused mainly by the bacilli S. typhi, and is in the form of fever lasting generally for 3-4 weeks. The disease prospers in conditions of poor sanitation and lack of food, water and personal hygiene. It is a commonly occurring disease in the developing countries and is endemic in India.

Data for enteric fever was not available for 1961-81. Hence only the spatial patterns have been discussed using the 1993 data. In 1993 the DPR of enteric fever was 525.6/lakh population in India, the average for the major states excluding Bihar being 91.5. In terms of DPR, enteric fever occupies the third position in

India, after TB and acute diarrhoeal diseases. In 1993 the highest DPR for enteric fever was recorded in Karnataka (647) followed by Madhya Pradesh (241). West Bengal had the lowest DPR of 4.1. The DPRs ranged between 50-100 in Andhra Pradesh, Assam, Himachal Pradesh and Rajasthan. It was below 50 in Gujarat. Haryana, Kerala, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal. The proportion of deaths in enteric fever is very small and therefore it had a very low CFR of .25%. All states had uniformly low CFRs. Enteric fever had a low proportional morbidity of 24%. The highest PMB of 12% was reported from West Bengal (which incidentally had the lowest DPR), followed by Madhya Pradesh (8.2%). In all the other states it was below 5%. Enteric fever had a low PMT of 4.1%, though higher than the PMB. All states had PMT below 5% except three states - Uttar Pradesh (14.25%), Tamil Nadu (8.1%) and Madhya Pradesh (5.8%).

Enteric fever with a high DPR remains a major health problem, especially because of the persistent poor sanitation, lack of hygiene and poor living conditions of the bulk of rural population as well as a large chunk of urban population. Health education on proper hygiene and sanitation is the best method for long term control of the illness. However, for immediate gains, typhoid immunisation is also carried out which reduces the severity rate of incidence but does not ensure full protection. As in the case of cholera and acute diarrhoeal diseases, enteric fever can be effectively controlled only through the spread of proper hygiene and sanitation.

A.5 DIPHTHERIA:

Diphtheria is caused by the bacteria C. diphthriae and affects mainly the throat. It is a disease common mostly among children below five years of age.

5.1 Prevalence Rate: The DPR of diphtheria has been low as compared to other diseases. It was 14/lakh in 1961 which increased to 37.5/lakh in 1971 and again fell to 6 in 1981. DPRs were below 30 in all states in 1961. In 1971 all states had DPRs below 20 except the highest which was 52 in Karnataka, followed by 27 in Tamil Nadu. In 1981 the highest recorded DPR was 29 for Kerala followed by 28.6 for Andhra Pradesh. The rest of the states had DPRs below 10. In1993 the DPR for India was 10.5, but the average for the major states was only .85. Karnataka recorded the highest DPR of 6 followed by Andhra Pradesh, Rajasthan and Madhya Pradesh (1-2).

5.2 Case Fatality Rate: The diphtheria CFR has shown a decline from 3.45 in 1961 to .74 in 1971 and slightly increasing to 1.01 in 1981. However, the low CFR may be the result of low reporting also. In 1993 the CFR was 5.6 for diphtheria in India. The highest CFR in 1961 was 9.1 in Himachal Pradesh. It was above five in Orissa, Punjab, Rajasthan and Uttar Pradesh. Other states except Andhra Pradesh (.79) and Assam (.98) had CFRs between 2-5. In 1971 only Gujarat, Haryana and

Maharashtra had CFRs above 5, the rest being below 4. In 1981 also the highest CFRs were recorded in Gujarat (7), Haryana (7.6) and Maharashtra (6). All the other states had CFRs of 4 or below. In 1993 all states have shown higher CFRs, the highest being 38 for Tamil Nadu, followed by 15.6 in Uttar Pradesh and Gujarat. Assam, Maharashtra and Orissa also had high CFRs. The lowest CFR of 0 was in Himachal Pradesh. High CFRs indicate lack of treatment and preventive facilities for diphtheria which may be due to the irregular coverage of immunisation.

5.3 Proportional Morbidity: The PMB was very low in India consistently being .67% in 1961, rising to 1.89% in 1971 and then again showing a low of .6% in 1981, which further reduced to .05% in 1993. In 1961 Gujarat had the highest PMB of 3% followed by West Bengal (2%). All other states had PMB below 2%. In 1981 Kerala and Andhra Pradesh were the states with the highest PMBs (1.1 and 1.3 respectively), while the rest of the states had PMB below 1. In 1993 the highest PMB of 27% was recorded in West Bengal while all other states had a PMB of less than .1%.

5.4 Proportional Mortality: Diphtheria PMT was among the higher ones in India consistently from 1961-81. In 1961 it was 5.5% which declined to 3.7% in 1971 and further to 1.5% in 1981. In 1993 it was 1.8%. In 1961 a high PMT of above 10% was reported from Assam (17.3%), Gujarat (15.5%), Madhya Pradesh, Maharashtra and UP. All these states showed appreciable decline in PMT in 1971 which was between 5.7 in these states. However Orissa (7.3) and Madhya Pradesh (7) recorded an increase in PMT over 1961. In 1981 Assam (4.6), Orissa (3.1) and Gujarat (3) showed higher PMT than other states which were below 2. In 1993 however, West Bengal had the highest PMT (8.2%) followed by Assam, Gujarat, UP and Tamil Nadu (2.4%).

Protection from diphtheria is possible through immunisation,3 33and has been taken up under the Expanded Programme of Immunisation (EPI) started by the government targeting full immunisation coverage to all children in India.

A.6 WHOOPING COUGH

Whooping cough or pertussis is also a disease mostly prevalent in young children. It is caused by the bacteria B. pertussis. It is found all over the world though the incidence is much higher in the developing countries.

6.1 Prevalence rate: In India data from 1961-81 shows a decline from 111 in 1961 to 84 in 1981. But in 1971 it was higher at 156.6. In 1993 the DPR was 70/lakh population. The highest DPRs in 1961 were 461 for Kerala and 213 for Tamil Nadu, the rest of the states having DPRs below 200. In 1971

again Kerala and Tamil Nadu had the highest DPRs of 510 and 574 respectively. Orissa (258) and Andhra Pradesh (235) were the other states with DPRs above 200. In 1981 Kerala again had the highest DPR of 368 followed by Orissa (291) and Rajasthan (216). In 1993 Karnataka had the highest DPR of 113 followed by Madhya Pradesh (38) and Andhra Pradesh (13.7). Other states had DPRs below 10.

6.2 **Case Fatality Rate:** Whooping cough has had a consistently low CFR of less than 1%. It was .04% in 1961, .03% in 1971, .06% in 1981 and .23% in 1993. In 1961 Karnataka had the highest CFR (.14%) while in 1971 Maharashtra had the highest CFR of .26%. Maharashtra again had the highest CFR of .53% in 1981. In 1993 the highest CFR was recorded in UP (3.07%) followed by West Bengal and Gujarat (1-1.5%).

6.3 **Proportional Morbidity:** The PMB of whooping cough was again low at 5.4% in 1961, increasing to 8% in 1971 and further to 1981. However the PMB in 1993 was negligible at .32%. This may have been the effect of immunisation against the disease. States with high PMB in 1961 were West Bengal and Assam (17%) followed by Punjab, Rajasthan and Madhya Pradesh (10-15%). In 1971 Assam had the highest PMB of 21%. As many as 7 states had PMB above 10%. In 1981 the PMB in Assam rose to 50% while in other states it was below 10% (except Kerala (14%) and Orissa (10%)). The PMB in 1993 had fallen below 1% in all states except Madhya Pradesh were it was 1.3%.

6.4 **Proportional Mortality:** The PMT for whooping cough was low at .5% in 1961 and .6% in 1971, but rose to 1.3% in 1981, again falling to .5% in 1993. Maharashtra had the highest PMT in 1961 (7%) as well as 1971 (2.2%) but in 1981 Madhya Pradesh had a high PMT of 12.7% followed by Kerala (2%) while all other states had fallen below 1%. In 1993 UP was the only state with PMT above 1% (2.6%).

Whooping cough has shown steady decline from 1981 to 1993, and can be fully controlled through vaccination. It is also covered under the EPI scheme.

A.7 MEASLES:

Measles is also a disease of childhood caused by a kind of virus of the group myxoviruses. Thought he disease has low fatality, its incidence is quite high especially in the developing countries. In India too the disease is endemic as well as epidemic and has a high share in morbidity.

7.1 **Prevalence Rates:** DPRs were below 50/lakh in 1961-81. It was 36.8 in 1961, 44 in 1971 and 36.7 in 1981. In 1993 however the DPR was high at 96/lakh population. DPR was high in Kerala and

Himachal Pradesh (300) in 1961. In 1971 Kerala (300) and Orissa (130) had highest DPRs while in 1981 Orissa (240) and Himachal Pradesh (140) had highest DPRs. In 1993 the highest DPR was in Karnataka (55) followed by Kerala (28). The average DPR for major states in 1993 was 10.6 only.

7.2 Case Fatality Rates: The CFR for measles was very low consistently at .15, .06 and .09% respectively for 1961, 71 and 81. In 1993 the figure was .47% for India, while the average for the major states was .7%. CFR was highest in Andhra Pradesh in 1961(1.53) , Gujarat in 1971 (2.5) and Orissa in 1981 (2). In 1993 it was highest in West Bengal (3.6) followed by Uttar Pradesh (2.2). All other states have shown consistently shown low CFRs of below 1.5%.

7.3 Proportional Morbidity: The PMB for measles has increased from 1.8% in 1961 to 2% in 1971 and 4% in 1981, but has come down drastically to .44% in 1993. At the state level no significant trends are visible except that Assam had the highest PMB from 1961 to 1981. In 1993 West Bengal had the highest PMB of 2%.

7.4 Proportional Mortality: The PMT from measles was quite low at .65 in 1961, .38 in 1971 and .84 in 1981. However in 1993 it was 1.4%. Maharashtra and Orissa have shown consistently high PMT from 1961-81. In 1993 Tamil Nadu, Uttar Pradesh and West Bengal had the highest PMT of 3.6, 4.4 and 2.5% respectively. The rest had PMT of less than 2%.

Measles incidence and severity is high among malnourished children, and hence good nutritional intake is very important in resisting measles. It is also possible to get full protection through immunisation.

A.8 MENINGITIS:

Meningococcal meningitis or meningococcal infection , or cerebro-spinal fever is caused by the bacterium N.meningitidis. It is common in children and young adults. Overcrowding and poor housing conditions favour the spread of the disease. It has a high fatality rate but can be effectively treated if detected early.

8.1 Prevalence Rates: The DPR of meningitis has been low in India - 10 in 1961, 14 in 1971, 8 in 1981 and .8 in 1994. Andhra Pradesh reported the highest DPR in 1961, 71 and 81 of 59, 80 and 53 per lakh population respectively. In 1994 also it had the highest but much reduced DPR of 2 followed by Maharashtra (1.7). All other states have shown consistently low DPRs below 50 for all the years.

8.2 Case Fatality Rates: Though the CFR for India was low from 1.2% in 1961 to .75% in 1971 and 1.4% in 1981, it was variable among the states. Maharashtra consistently recorded the highest CFRs

in the country of 9.5 in 1961, 12.8 in 1971 and 24.3% in 1981. The CFRs for 1994 could not be calculated.

8.3 Proportional Morbidity: The PMB was low in India at .5, .7 and .9% in 1961, 71 and 81 respectively. The figure could not be calculated for 1994. PMB was high at 3.5% in Madhya Pradesh in 1961, but was below 1% in all other states except Assam and Gujarat. In 1971 it was above 1% only in Karnataka, Gujarat, Andhra Pradesh and Assam. PMB was highest in Karnataka (2.7%) followed by Andhra Pradesh (2.3%).

8.4 Proportional Mortality: The PMT was also low at 1.4% in 1961, 1.45% in 1971 and 3% in 1981. Figures for 1994 could not be calculated. Gujarat had the highest PMT of 7.7% in 1961, while in 1971 Orissa had the highest PMT of 5%, which rose to 7% in 1981 keeping Orissa in the highest position. Maharashtra also had a high PMT in 1961 of 6.4% which declined to 2.7% in 1971, but rose to 4% in 1981. The lowest PMT was recorded consistently in Assam.

The preventive measures for this disease are basically prevention of overcrowding and proper housing conditions, both of which are a problem in India.

A.9 **POLIOMYELITIS:**

Poliomyelitis or polio is a viral infection. Polio is a serious health problem because of its severe effects in the form of paralysis leading to permanent disability and even to death. Though it has been conquered in developed countries, the disease thrives in the developing countries. It is an endemic disease in India. It strikes children below 5 years of age mostly. There have also been epidemic outbreaks of polio in India. The spread of polio is caused by poor hygiene and lack of sanitation.

9.1 Prevalence Rates: The DPR for polio in India was reported as 6.8 per lakh population in 1961, 9 in 1971 and 8 in 1981. In 1993, the official figure for India was 11 while the average of the major states was only 1.13. In 1961 exceptionally high DPRs were recorded in Himachal Pradesh (40) and Orissa (84) which may have faced epidemics of the disease. In 1971 the highest figures were recorded in Punjab (45). The highest DPR in 1981 was of Andhra Pradesh (44) followed by Punjab (27.6). In 1993 the DPR was below 10 in all the states, the highest being 5.5 in Rajasthan followed by 3.2 in Karnataka and 2.2 in Andhra Pradesh.

9.2 Case Fatality Rates: The CFR for polio was low at less than 1% all through 1961-81. In 1961 the CFR was .9%, in 1971 it was .46% and in 1981 it was .75%. however, in 1993 it was higher at 2.3%. exceptionally high CFR was recorded in Karnataka (11.76) in 1961 followed by Uttar Pradesh

(4.6%) while in 1971 all states had uniformly low CFRs of below 2%, in 1981 3 states had CFRs above 2. The highest CFR in 1981 was 7.9 in Assam, which had experienced a jump from 0 CFR in 1961 and 1971.

9.3 Proportional Morbidity: Though the PMB was below 1% it showed a steady increase from .33% in 1961 to .46% in 1971 and .88% in 1981 but declined to .05% in 1993.

9.4 Proportional Mortality: The PMT for polio was also low at .73 in 1961, .56 in 1971 and 1.56 in 1981. In 1993 the figure was .8%.

Though the proportion of polio cases may be declining over the years, in terms of absolute numbers they have increased. Polio can be eradicated successfully through immunisation and that is why government has initiated the Pulse Polio immunisation programme in order to ensure full coverage of immunisation against polio in India.

A.10 VIRAL HEPATITIS:

Hepatitis caused by a number of different viruses leading to liver infections is termed viral hepatitis. The disease spreads through poor quality food and water and lack of personal hygiene. Hepatitis A or jaundice is the more prevalent disease in India, commonly occurring more in the monsoon months.

10.1 Prevalence Rate: The prevalence rate of infectious hepatitis was 71 per lakh in 1961, which rose to 79/lakh in 1971 and again fell to 51 in 1981. In 1993 the disease showed a DPR of 173 for India, but the average for the major states was only 18.8. in 1961, 71 and 81 Kerala recorded the highest DPR of 340, 248 and 504 respectively. Karnataka had the second highest DPR in 1961 of 296 while Tamil Nadu held the position in 1971 with a DPR of 205. In 1993 Assam (47), Madhya Pradesh (39) and Orissa (28.4) also recorded high DPRs.

10.2 Case Fatality Rates: Viral hepatitis has shown a very low CFR of .37%, .48% and .84% in 1961, 71 and 81 respectively. It was slightly higher at 1.1% in 1993. Thus, in spite of low CFRs the trend over the years has been increasing. Most of the states also show a trend of increasing CFRs over time.

10.3 Proportional Morbidity: The PMB for this disease was 3.4% in 1961 which increased to 4 in 1971, and further to 5.4 in 1981. This declined to 0.8% in 1993. Among the states in 1961, Karnataka, Assam and Madhya Pradesh had high PMBs of 17.5, 16 and 11.6 respectively. In 1971

Rajasthan (14) followed by Karnataka (10.6) was highest. Kerala (19) followed by Maharashtra (17.4) was the highest in 1981. In 1993 PMB was uniformly below 2% in all the states except West Bengal which had a comparatively high PMB of 2.24%.

10.4 Proportional Mortality: The PMT was comparatively higher than PMB and stood at 3% in 1961, 5.1% in 1971 and 10.7% in 1981, from which it again declined to 5.9% in 1993. Exceptionally high PMT was recorded in Himachal Pradesh, Kerala and Madhya Pradesh (10 - 15%) in 1961, Karnataka and Orissa (10-15%) in 1971 and Punjab and Orissa (15-20%) in 1981. Karnataka, Kerala, Madhya Pradesh and Orissa showed high PMTs consistently over the years from 1961-81. High PMT of over 10% was recorded in Gujarat, Assam and Maharashtra in 1993.

Viral hepatitis is a disease easily preventable through simple hygiene and sanitation measures for which health education is required. But widespread poor hygiene and sanitation in the population has sustained the disease in India.

A.11 MALARIA:

Malaria had been the mast pressing public health problem in India in the early 20th century. Mass scale measures were introduced to curb the disease. Malaria is caused by the parasites of genus plasmodium transmitted through the female anopheles mosquito. Measures to eliminate mosquito had a positive effect on the lowering of malaria incidence. It reached its lowest ebb in the mid 1960s, but gradually showed a resurgence due to growing resistance of vectors to insecticides and the creation of favourable environments for mosquito breeding by humans themselves, leading to epidemics in regions hitherto safe from malaria.

11.1 Prevalence Rates: Malaria DPR was 587 in 1961, which declined to 179 in 1971 but rose again to 245 in 1981. The 1971 figure reflects the successful control of malaria in the 1960s while the 1981 figure reflects its resurgence. The DPR in 1994 was 231. Highest DPR of malaria in 1961 was recorded in Andhra Pradesh and Orissa (3409 and 1681 respectively), both having endemic foci of malaria in the forested tribal belts. In 1971 Madhya Pradesh had the highest DPR of 1439 followed by Andhra Pradesh (342). Malaria is endemic in the tribal belt of Madhya Pradesh also. In 1981 the picture is different with Punjab and Haryana showing the largest DPRs of 3162 and 1430 respectively, which reflects the extensive outbreaks of epidemic malaria in these regions due to the creation of favourable environment for mosquito breeding through the construction of canals, dams and other irrigation works. In 1994 the highest DPR was recorded in Orissa (791) followed by Assam (571) and Gujarat (523). Gujarat is also a non-traditional region for malaria prevalence. It ranged between 300-500 in Karnataka, Madhya Pradesh, Maharashtra and Rajasthan.

11.2 Case Fatality Rates: The CFR of malaria was quite low at .53% in 1961, .02% in 1971 and 1981, and .05% in 1994 though the average for the major states was .02%. Andhra Pradesh (1.08) was the only state with CFR above 1% in 1961. The highest in 1971 was .32% in Assam, and in 1981 was .27% in Kerala. It was highest in Rajasthan (.21) in 1994.

11.3 Proportional Morbidity: Malaria had a high PMB as compared to other diseases. It was 28.4% in 1961, declining to 9% in 1971, and again rising to 26% in 1981. PMB and PMT for 1994 could not be calculated. PMB was between 40-50% in Andhra Pradesh, Madhya Pradesh and Rajasthan while it was highest in Orissa (55%). It was between 20-40% in Assam, Gujarat, Punjab and Uttar Pradesh. In 1971 the highest PMB of 72% was recorded in Madhya Pradesh, followed by 23% in Himachal Pradesh. In 1981 the PMB was highest in Punjab (77%) followed by Madhya Pradesh (56%). In 5 states it ranged between 20-30%. Kerala consistently recorded the lowest PMB of .54%, 0 and .88% in 1961, 71 and 81 respectively.

11.4 Proportional Mortality: The PMT from malaria was very high in 1961 at 35.6% but declined drastically to .55% in 1971 and 1.05% in 1981. The decline in mortality from malaria was possible because of the treatment with quinine drugs. Andhra Pradesh had the highest PMT of 79% in 1961. The PMT had declined uniformly below 5% in all states in 1971 and 1981, but Assam recorded higher PMT at 9.9% and 6.7% in 1971 and 1981 respectively.

Efforts in malaria eradication and treatment by the National Malaria Eradication Programme (NMEP) bore fruit in the 1960s, but the eradication could not be successfully achieved. At present the major hurdles in malaria eradication efforts are the growing resistance of vector to insecticides, the growing resistance of parasites to anti-malarial quinine based drugs, and the artificial creation of malaria-favourable micro environments by human activities leading to spur in epidemic outbreaks of malaria.

A.12 FILARIASIS:

Another disease spread by mosquitoes is filariasis. It is caused by entry into the bloodstream of nematode worm types through mosquito bites. The disease causes features such as elephantiasis of limbs or eosinophilia, often resulting in deformity. It is a major problem the world over as in India. It is endemic in the southern and central states including Uttar Pradesh and Bihar. As the population of India increases, so does the number of people at risk from the disease and the number infected by the disease.

12.1 Prevalence Rates: Filaria DPRs are not very high as in malaria. The DPR in 1961 was 83.6/lakh, which increased to 130/lakh in 1971 and then again declined to 82.4 in 1981. The states with the

highest DPRs in 1961 were Andhra Pradesh (134), Kerala (452) and Tamil Nadu (433). In 1971 the states with highest DPRs were Kerala (823), Orissa (667), Tamil Nadu (508) and Andhra Pradesh (180). All these states have endemic foci of filariasis. In Kerala it was a major problem, but was greatly reduced by vector control. This is evident from the DPR in Kerala for 1981 which declined to 279. However, Orissa has shown a doubling of DPR to 1239 in 1981, and in Andhra Pradesh also the DPR has gone up to 225. In 1994 the number of people infected from filariasis was estimated as 2410/lakh population. Kerala again had the highest DPR of 8248 followed by Uttar Pradesh (5298) , Orissa (4675), Tamil Nadu (2274) and Andhra Pradesh (2180).

12.2 Case Fatality Rates: The CFR for filaria is very low. It was .03% in 1961, .02% in 1971 and .01% in 1981. Data for 1994 was not available. All states recorded very low CFRs consistently.

12.3 Proportional Morbidity: The PMB of filaria was much lower than that of malaria. It was 4% in 1961, went up to 6.5% in 1971 and further increased to 8.7% in 1981. This probably implies an increase in the reporting of filaria for treatment over the years.

12.4 Proportional Mortality: The PMT for filaria is very low, since the CFR is also low. The PMT for 1961 was .28%, for 1971 it was .14% and for 1981 it was .15%. All states had uniformly low PMT, hence no specific trends were visible.

The National Filaria Control Programme aims to restrict the spread of filaria but it has a daunting task since it is faced by newer problems such as artificial creation of mosquito breeding areas through urbanisation and irrigation works, and the spread of the disease to non-endemic areas through migrants.

A.13 RABIES:

Rabies is a highly fatal disease caused by a virus and is transmitted to human beings through animal bites such as dogs, cats, etc. It is a very common and widespread disease in India.

Data on rabies DPRs was not available for almost all states in 1971 and seven states in 1981. Hence no reliable inference can be drawn from the available data. However, the data shows that rabies DPR declined from 24/lakh in 1961 to .02 in 1971 and slightly increased to .03 in 1981. More comprehensive data in 1993 showed the rabies DPR as 6.96/lakh. The highest DPR was of Karnataka (27.5), the rest of states having DPRs below 3/lakh.Rabies has one of the highest CFRs since it almost surely results in death. However, the data for 1961 puts the CFR as .5%, and that of 1971 shows a CFR of .4%. In 1981 the figure is 2.5%. But this reflects only the inaccuracy of data. Since for 1993 the CFR is 15% for India and 38% for the major states on an average. 50-100% CFRs were reported from Maharashtra, West Bengal, Andhra

Pradesh, Gujarat, Orissa, Tamil Nadu and UP. The proportional morbidity from rabies is very low for 1961-81. It is 1.19% in 1961, and below .5% in 1971 and 1981. The 1993 data also shows a very low PMB of .03%. All state have a uniformly low PMB. The PMT from rabies was high in 1961 at 10.72%, but declined to .1% in 1971 and 2.4% in 1981. In 1993 the PMT was 3.3%.

Rabies vaccines are now widely available for prevention from rabies, to be taken in case of any animal bite. No cure for the disease has been devised as yet.

A.14 JAPANESE ENCEPHALITIS:

This disease, as the name suggests, was endemic to East Asian regions of Japan, China and Korea, but spread to India and other Asian countries as well. It is transmitted by mosquitoes and is caused by a virus. The disease also affects other animals apart from humans. In the 1980s the disease has been on the rise in different states in India. The spatial pattern of occurrence of this disease can be examined by the 1994 data on prevalence rates and CFRs.

14.1 Prevalence rates: The DPRs for 1994 indicate that only five states had cases of Japanese Encephalitis. These were Andhra Pradesh, Bihar, Haryana, Tamil Nadu and West Bengal. The average DPR for India was .1/lakh population, the highest being .48 in Haryana, followed by .41 in Tamil Nadu.

14.2 Case Fatality rates: Japanese Encephalitis has a high CFR, and for India it was 52.8% in 1994. It was highest in Haryana (83%) followed by Andhra Pradesh (61%) and Tamil Nadu (52.4%). It was 39% in West Bengal and 37% in Bihar.

Methods to control the disease include vaccination and vector control methods such as fogging and spraying of insecticides. Not many cases of this disease have as yet been reported in India.

A.15 KALA AZAR:

Another localised zoonotic disease is Kala Azar, which is found only in pockets in Bihar, Adjoining Uttar Pradesh and west Bengal. It is spread by house flies. Its prevalence rate is highest in Bihar, the state of its origin. In 1994, Bihar had a DPR of 26.8/lakh population. UP had a DPR of less than .01/lakh while West Bengal had a higher DPR of 1.4/lakh. The CFR for this disease is low. It was 1.51 for India. In Bihar it was 1.56% while in West Bengal it was .32%. Kala Azar is a serious problem in the localised regions of its incidence. But its spread to outside areas is of concern, and must be checked.

A.16 GUINEAWORM:

This is a kind of worm which breeds in water bodies. Consumption of contaminated water leads to guineaworm infection. Guineaworm is a problem in the state of Rajasthan, where the highest prevalence rate is reported. Data for 1994 shows that the states of Andhra Pradesh, Gujarat, Karnataka, Rajasthan, Madhya Pradesh, Maharashtra and Tamil Nadu had guineaworm cases. The DPR for India was .13.

Rajasthan had the highest DPR of 1.8 followed by Karnataka (.37) and Madhya Pradesh (.14). In other states it was less than .1. Data on CFRs was not available but the disease is generally not fatal.

A.17 TETANUS:

Tetanus is an acute bacterial disease of high fatality, caused by the bacteria Clostridium Tetani. It is found globally and is endemic in India. Tetanus occurs in age group of up to 40-50 years mostly. Tetanus bacilli enter the body through wounds and cuts made by unclean materials, which leads to contamination. Use of unsteralized instruments in surgery or delivery often leads to tetanus contamination. Unclean methods of delivery cause tetanus among infants as well as mothers. Tetanus among infants is termed 'neonatal tetanus'. In India, the disease is common especially in rural areas where mostly unclean traditional delivery practices lead to tetanus morbidity.

17.1 Prevalence Rates: The tetanus DPR was not high relative to other infectious diseases. It was 15/lakh in 1961, rose to 24 in 1971, and again fell to 9 in 1918. In 1993 the tetanus DPR in India was 32.25, of which 9.7 was the DPR of neonatal tetanus. Tetanus DPR was highest in Orissa in 1961 (65); it was highest in Karnataka (127) in 1971; and in 1981 Punjab had the highest DPR of39. In 1993 Karnataka had the highest DPR of Tetanus (29.3), which was much above the state with the second highest DPR, Rajasthan (12). The average of the major states was only 4, which reflects the overall low recording of tetanus in the major states.

17.2 Case Fatality Rates: Tetanus is a highly fatal disease and therefore it has high CFRs. The CFR was 10% in 1961 and 1971, and 11% in 1981. These CFRs are an understatement because they refer only to deaths of inpatients in government hospitals and other public health centres. In 1993 the reported CFR was much higher at 33.62%. The CFR for neonatal tetanus was 21%, much higher than tetanus in others (12.67%).

17.3 Proportional Morbidity: The share of tetanus in total morbidity due to infections and parasitic diseases was very small, being .73% in 1961, 1.2% in 1971, .98% in 1981 and .72 in 1993. On the whole the PMB shows a declining trend. Punjab recorded the highest PMB in 1961 (3.3) and Haryana in 1971 (4%). Maharashtra had the highest PMB in 1981 of 3%. In 1993 all states had PMB below 1% except West Bengal (2.8).

17.4 Proportional Mortality: The PMT from tetanus was high, being 17% in 1961, 32% in 1971, 26% in 1981 and 15% in 1993. The trend in PMT is also declining over the years from 1971-93.

Prevalence of tetanus in India is widespread because of the large rural population since tetanus thrives in areas with predominant agricultural practices. Unclean delivery methods used by birth assistants and traditional midwives in rural India coupled with poor overall hygiene supports tetanus. Vaccination is a very effective way of tetanus control and is being promoted by the government especially for pregnant females and infants.

A.18 LEPROSY:

Leprosy is a chronic disease caused by the bacteria M. liprae. Severe untreated cases lead to deformities. The disease is found all over the world but is more common in developing countries. High humidity, overcrowding and lack of ventilation favours the spread of the disease.

18.1 Prevalence rates: The DPR of leprosy in India averaged at 88/lakh in 1961, 98 in 1971 and 39 in 1981. However estimates in 1994 put the DPR of leprosy at 2.42/thousand population, or 242/lakh which is quite high. The DPR of leprosy in India as estimated by the NFHS in 1992-93 is 120, the mean of the major states being 91.5/lakh. The highest leprosy DPRs were recorded in Tamil Nadu (482) in 1961 followed by Andhra Pradesh (134). In 1971 also the same trend continued with Tamil Nadu recording a DPR of 794, and Andhra Pradesh recording a DPR of 185. In 1981, data for Tamil Nadu was not available, but the highest DPR was of Orissa (267) followed by Andhra Pradesh (174). In 1993 the DPR was highest in Bihar (536) followed by Orissa (508), Tamil Nadu (372) and Andhra Pradesh (323). Kerala, Madhya Pradesh and Maharashtra also had high DPRs of between 200-250. The NFHS data, however, shows the highest DPR in UP (222) followed by Tamil Nadu (209). Traditionally the southern and eastern states have been the major leprosy-prone regions and this is reflected in the DPRs.

18.2 Case Fatality Rates: Leprosy CFRs were available only for the years 1961-81. They show a low CFR of .05% in 1961, .07% in 1971 and .08% in 1981. The CFR was uniformly low for all states.

18.3 Proportional Morbidity: The PMB and PMT data for leprosy was available only for 1961-81. The PMB was almost constant at 4.25 in 1961, 4.9 in 1971 and 4.1 in 1981. PMB was highest in all years for Tamil Nadu (10-15%). It increased in Orissa from 1% in 1961 to 3% in 1971 and 9% in 1981. In Andhra Pradesh it increased from 1.7% in 1961 to 6% in 1971 and 8% in 1981. It was fluctuating in the other states. In Gujarat it shot up from 1% in 1971 to 12% in 1981.

18.4 Proportional Mortality: The PMT from 1961-81 was less than 1%. It was .5% in 1961, .92% in 1971 and .8% in 1981. Tamil Nadu and Kerala showed relatively high PMT in all the Years. No other significant trend averaged from the data.

Leprosy is now a fully curable disease, but the social stigma attached to the disease makes it difficult to identify cases and provide treatment to them. The National Leprosy Eradication Programme (previously 'control') has stepped up its efforts in detection and treatment of leprosy cases in India, where, because of the large population, even a tiny percentage implies very large absolute numbers of leprosy affected persons in terms of the global scenario.

A.19 SYPHILIS:

Syphilis is a disease belonging to the group 'Sexually Transmitted Diseases' (STD). The major problem in estimating the extent of STDs is the social stigma attached to them and the secrecy surrounding them because of which a large proportion of the cases go undetected and unreported. Figures for these diseases are always much below the actual rates. However, some idea is possible through study of the available figures.

19.1 Prevalence Rates: The DPR for syphilis was 157/lakh in 1961, 121 in 1971 and 26 in 1981, increasing to 64 in 1993. However the mean of the major states in 1993 was only 11.5. The highest DPRs for syphilis were reported from Orissa (726), Andhra Pradesh, Tamil Nadu, Himachal Pradesh, Gujarat (300-400) and Kerala (240) in 1961. In 1971 Tamil Nadu and Andhra Pradesh had DPRs above 500, followed by Orissa (228) and Kerala (214). In 1981 Andhra Pradesh was the only state with DPR above 100 at 131. Orissa, Tamil Nadu and Kerala followed with DPRs ranging between 70-100. DPR in 1993 was again highest in Karnataka (108) and Andhra Pradesh (35). Madhya Pradesh was at 13.5, and all other states had DPRs below 4/lakh population. The high DPRs in South Indian states may be the result of greater reporting rather than other factors.

Syphilis had very low CFRs of .07% in 1961, .03% in 1971 and again .07% on 1981. The figure for 1993 was .02%. There was no significant trend in the CFR among the states except that Madhya Pradesh had the highest CFR of 1.78% in 1971 and in 1981 (.45), as well as in 1993 (.03%). The PMB for syphilis shows a declining trend from 7.6% in 1961 to 6.1% in 1971, 2.8% in 1981 and .29% in 1993. However, it is difficult to say whether the picture is true or not. The PMT was much lower at 1.25% in 1961 and less than 1% in the subsequent years. The PMT was high in 1961 in Assam (14.7%) and Gujarat (22%), while in 1971 and 81 it was highest in Madhya Pradesh (4.5 & 3.5%).

A.20 GONOCOCCAL INFECTION:

Also known as gonorrhoea, it is also a disease belonging to the STD group and suffers from the same as syphilis.

20.1 Prevalence Rate: DPRs for gonococcal infection were about the same as syphilis, though lower in 1961 and 1971. They were 94 in 1961, 77 in 1971, 47 in 1981 and high at 108 in 1993. This increase may be due to better reporting and coverage of this disease. Andhra Pradesh had the highest DPR in 1961 (360) and 1981 (317), while Tamil Nadu (400) had the highest DPR in 1971. In 1993 Karnataka had the highest DPR of 123, followed by Andhra Pradesh (75). The rest had lower DPRs below 15. On the whole, the southern states have shown higher DPRs in the case of gonorrhoea.

The CFRs are again quite low for this disease, being less than 1% consistently from 1961-93. Rajasthan had the highest CFR of 1.4% in 1961. The PMB of gonorrhoea was below 5% from 1961-81 which further declined to .5% in 1993. The PMB in Andhra Pradesh has increased over the years from 4.5 in 1961 to 15 in 1981, but was only 2.7% in 1993. Karnataka has recorded consistently high PMB from 1961-81. Other states have also shown fluctuating trends in PMB. The PMT was also consistently low at 1% in 1971 and below 1% for the other years.

Another important disease in the STD group is AIDS which has increased phenomenally in the past decade in India. However, the data available for AIDS in India is sporadic and unreliable. Measures for prevention of all STDs including AIDS are being propagated throughout the country and include education of people towards preventive measures to be adopted.

A.21 OTHER COMMUNICABLE DISEASES:

There are many other infectious and parasitic diseases which have a small distribution in India as compared to the main diseases. These have been clubbed into the category 'other communicable diseases'. Their DPR in 1961 was 77 which increased to 540 in 1971 and again declined to 91 in 1981. Kerala had the highest DPR in 1961 of 1838/lakh, while Tamil Nadu had the highest DPR of 3566 in 1971. In 1981 Haryana had an exceptionally high DPR of 2409. No information has been given on the diseases which constitute this category. This category had a very low CFR of below .1% from 1961-81. No significant inter-state trends could be observed. The PMB was also low for this category at 3.75% in 1961, but increased to 26% in 1971 and fell again to 4% in 1981. The proportional mortality was again low at .25% in 1961, 1.8% in 1971 and .24% in 1981.

The analysis of infectious and parasitic diseases has shown the dominance of TB, malaria, diarrhoeal diseases and typhoid in the morbidity burden caused by this group of diseases. This is the reason why

these diseases are the focus of health intervention programmes started by the government. Diseases of childhood and infancy are also highly prevalent, but can be easily controlled through measures such as basic health education and immunisation. India still has a very high prevalence of communicable diseases as compared to other countries and therefore there is great need to effectively control their incidence. Often termed as 'diseases of poverty', the bulk of these diseases are associated with poor living standards, lack of sanitation and poor hygiene as well as aggravated undernutrition. All these conditions are suffered by the poor population. The focus, therefore, cannot be mainly on health interventions as overall social development plays an equally important and much more sustained role in the control of these diseases.

B. NEOPLASMS

Neoplasms are a group of non-communicable diseases associated with development and the process of ageing. The developed countries have very high prevalence rates of these diseases. The diseases group of cancers also belongs to this category. The developing nations show lower incidence of neoplasms, but the rate is increasing steadily with growth in urbanisation and industrialisation, changes in lifestyle and increase in life expectancy. India also reflects the same trend. However, insufficient data makes analysis difficult, since data for 1993 is only regarding those cases treated in specialised cancer hospitals. Because of this limitation, the data for 1993 has not been included in the analysis.

Table4.20 India - Neoplasms - 1961-81

YEAR	DPR	CFR	PMB	PMT
1961	89	.43	1.23	3.47
1971	11	.3	1.6	3.89
1981	44	.68	1.11	5.34

Source: DGHS, Ministry of Health and Family Welfare.

The above table shows that the share of neoplasms in total morbidity is as yet quite low. The data on PMT shows clearly the rising contribution of neoplasm deaths to the total mortality from diseases. A detailed analysis of the two sections in this category (malignant neoplasm and benign & other neoplasms) is presented below.

B.1 MALIGNANT NEOPLASM:

This term describes all cancerous growths and hence all cancers are included in this category. Factors which encourage cancer incidence are the lifestyle features such as smoking, excessive alcohol consumption, exposure to radiation and some harmful chemicals, food habits, etc. cancer can affect different parts of the body. In India oral cancer has the highest prevalence due to widespread tobacco consumption habits.

1.1 Prevalence Rates: The DPRs for this category were quite low at 150/lakh in 1961, 195 in 1971 and 80 in 1981. In 1961 DPR was highest in West Bengal (352) followed by Uttar Pradesh (348) and lowest in Gujarat (.22). in 1971 Tamil Nadu had the highest DPR of 1022. In 1981 Punjab had the highest DPR of 583. No significant state-level pattern seems to emerge from the data. States with generally high DPRs are Andhra Pradesh, Kerala, Punjab, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal.

The data available shows very low CFRs for this category, being continuously below .5%. the highest CFRs were recorded consistently in Maharashtra while other states were much behind. The proportion of malignant neoplasm cases to total neoplasm cases is very high. It has increased from 88% in 1961 to 90.5% in 1981. In 1961 it was above 80% in 8 states , being above 50% in the rest. In 1971 it was above 80% in 9 states. In 1981 Himachal Pradesh had the lowest PMB of 69%. All other states had PMB above 80% (except Haryana at 72%). The PMT was very high, increasing from 86% in 1961 to 93% in 1981. The figures were above 80% for almost all the states all through the years.

B.2 BENIGN AND OTHER NEOPLASMS:

These are non-cancerous neoplasms. Their share in total morbidity and mortality due to neoplasms was much smaller as compared to malignant neoplasms.

The DPR for India was 22/lakh in1961, which increased to 28 in 1971 and again declined to 8 in 1981. Tamil Nadu, Rajasthan and Kerala showed relatively high DPRs consistently. No significant state-level trend could be observed. This category registered uniformly low CFRs of less than 1% from 1961-81. Maharashtra again consistently recorded the highest CFRs - 1.2 in 1961, 3.4 in 1971 and 6.1 in 1981. All the other states had very low CFRs consistently. The PMB of benign neoplasms was low compared to malignant cases. It was 12% in 1961 and 71, and 9.5% in 1981. No pattern was visible at the state level. The PMT was also low at 14% in 1961, 12% in 1971 and 7% in 1981. The PMT has been declining over the years, and so has the PMB. The states have variable trends in PMB as well as PMT.

Neoplasms as a whole do not display any state-level trends in their prevalence rates, except that they have increased significantly in Punjab from 84 to 350 in 1961-81. In all other states the rates have been fluctuating. The proportional mortality has shown an increasing trend in most of the states. Since this group of diseases is associated with greater development and urbanisation, it is possible that the economic prosperity in Punjab is the reason behind high neoplasm prevalence rates there. However, data available is only for public health centres, and therefore not adequate enough to arrive at definite conclusions.

C. ENDOCRINE, NUTRITIONAL AND METABOLIC DISEASES.

Under this category, details are available only on two diseases - diabetes and nutritional deficiency disorders. Both diseases are quite different in nature and occurrence. This group shows a very low prevalence and fatality as compared to other diseases.

Table4.21: India - Endocrine, Nutirtional And Metabolic Disorders , 1961-81

YEAR	DPR	CFR	PMB	PMT
1961	366	.12	5	4
1971	6	.06	10.4	4.8
1981	5	.06	9.3	3.8

Source: DGHS, Ministry of Health and Family Welfare.

While the DPR and CFR have declined drastically the proportional morbidity and mortality have increased from 1961 to 1971 and then declined marginally in 1981. The state level data shows the highest DPR of 1603 in 1961 in Tamil Nadu. All states except Madhya Pradesh and West Bengal had DPRs above100 in 1961, but in subsequent years all states had DPRs below 50/lakh population. While CFRs declined in most of the states, they increased in Orissa, Maharashtra and Gujarat. In most states the PMB increased from 1961-71 but again declined in 1981. The PMT also had a fluctuating trend across the states.

C.1 DIABETES MELLITUS:

Diabetes is caused by the deficiency of insulin, the hormone that is responsible for glucose, fat and amino acid metabolism. It is a degenerative disease, generally affecting adults in urban areas who are associated with a sedentary lifestyle. In India its prevalence is not high and is greater in urban than in rural areas.

1.1 Prevalence Rates: The DPR for diabetes was 73/ lakh population in 1981, which is lower than 105 in 1961 and 151 in 1971. Diabetes DPR has been highest in Kerala over the years except in 1961 when Maharashtra recorded the highest DPR of 607. Relatively high rates have been maintained in Andhra Pradesh, which shows an increasing trend from 1961-81. All other states show fluctuating patterns in DPRs.

1.2 Case Fatality Rates: The CFR was quite low, being consistently below .4% from 1961-81. Gujarat showed a definite increase in CFRs 1.1 in 1961 to 2.7 in 1981. Kerala consistently recorded the lowest CFRs.

1.3 Proportional Morbidity: The PMB from diabetes is much lower than the PMB from nutritional disorders, being 14% in 1961 , 10% in 1971 and 9.8% in 1981. This shows the increase in morbidity due to nutrition disorders over the years across the states.

1.4 Proportional Mortality: The PMT for diabetes is higher than the PMB and has been increasing over the years from 37.4% in 1961 to 41.3% in 1971 and 53.9% in 1981. Thus, gradually mortality from diabetes has overtaken the mortality from nutritional disorders. While all the states have registered an increase in diabetes PMT , Uttar Pradesh is the only state where the PMT shows a consistent declining trend. In Maharashtra also the PMT fell from 100% in 1961 to 48% in 1981.

The association of diabetes with urbanisation is evident in its morbidity being high in the relatively more urbanised and economically more developed states of Punjab, Gujarat and Maharashtra.

C.2 AVITAMINOSIS & OTHER NUTRITIONAL DISORDERS:

All malnutrition problems have been included in this category with the exception of anaemia which has categorised separately. Nutritional disorders are highly prevalent in India because of the widespread poverty leading to poor food intake and resultant deficiency disorders. The problem of obesity and over nutrition is also common in the urban areas.

2.1 Prevalence Rates: The DPR from nutritional disorders was 626 in 1961, which increased to 1295 in 1971 and 670 in 1981. While the 1981 figures are much depressed, it is disturbing to note the increasing trend in nutritional disorders. Andhra Pradesh, Kerala, Orissa, Punjab, Rajasthan and Tamil Nadu have shown consistently high DPRs. Tamil Nadu had the highest DPR of 3105 and 6497/lakh in 1961 and 71, but its data was not available in 1981. Kerala, which had the second highest DPR in 1961 and 71, occupied the first place in 1981 with a DPR of 4180. These states are also the ones with low nutritional intake levels in the country, as has been observed in surveys on nutrition. Gujarat, Madhya Pradesh, Maharashtra, Uttar Pradesh and West Bengal recorded very low DPRs below 100 consistently.

The CFRs were very low, being below .1% throughout from 1961-81. They show a declining trend over the years. Gujarat and Maharashtra showed relatively high CFRs but were below 1% consistently. The PMB was very high in comparison to that of diabetes, being consistently above 80% in most of the states. The PMT was also high but had a distinct declining trend from 62% in 1961 to 58% in 1971 and 46% in 1981. All states followed the same trend.

Nutritional disorders which are reported are generally a severe manifestation of malnutrition. With this category recording a high prevalence rate, the magnitude of mild and moderate cases of undernutrition

can only be imagined. The problem is a grave one and has direct bearing on the quality of the population and its susceptibility to morbidity and mortality.

D. DISEASES OF BLOOD AND BLOOD FORMING ORGANS

The only disease for which data is available in this group is anaemia. More often the result of nutritional deficiency in India, anaemia is the result of deficiency of iron in the body which leads to a low haemoglobin content in the blood. Anaemia is the most common nutritional problem in India and is widespread especially among females and children.

Table4.22 India - Diseases of Blood and Blood Forming Organs - 1961-81

YEAR	DPR	CFR	PMB	PMT
1961	991	0.14	6.81	6.15
1971	1391	0.07	9.98	5.33
1981	1483	0.05	18.6	5.98

Source: DGHS, Ministry of Health and Family Welfare.

D.1 Prevalence Rates: Anaemia has a very high prevalence rate in India and has shown an increasing trend over the years. It was 991 in 1961, 1391 in 1971 and 1483 in 1981. Kerala showed the highest DPR in anaemia from 7577 in 1961 and 7320 in 1971 to 10608 in 1981. In Punjab it increased from 1053 in 1961 to 8908 in 1981. In Andhra Pradesh also it increased from 1232 in 1961 to 3393 in 1981. The only states which showed a declining trend in anaemia were Karnataka and Maharashtra. Gujarat had consistently lowest DPRs of less than 100 from 1961-81. In Rajasthan DPR was low at 739 in 1961 but increased to 2248 in 1981.

D.2 Case Fatality Rate: The CFR for anaemia is quite low consistently at .14% in 1961, .07% in 1971 and .05% in 1981. The trend is therefore declining over the years. No significant trend was observed in the states except that Gujarat and Maharashtra were the only states with increasing CFR over the years. Anaemia being such a widespread problem in India, has invited special efforts by the government in its reduction through the National Nutritional Anaemia Prophylaxis Programme through which iron and folic acid supplements are provided to the expectant mothers covered under the MCH programme.

E. MENTAL, PSYCHO-NEUROTIC AND PERSONALITY DISORDERS

Good health implies not only good physical health but also good mental health. Mental health of a person falls due to excessive stress or hereditary factors in cases such as schizophrenia. Mental diseases in India are often not reported because of the social stigma they carry.

E.1 PSYCHOSES:

The only mental disorder for which information was available was psychoses which is mainly caused by too much stress or excitement and often leads to insanity.

The DPRs for psychoses were low but showed a highly increasing trend from 51 in 1961 to 119 in 1971 and further to 316 in 1981. DPRs were high in Kerala (182) in 1961 and increased to 1093 in 1981. However, this may be due to greater reporting and treatment of the disorders. All other states had fluctuating values of DPRs. Most of the states have shown a decline in DPRs from 1971 to 1981. The CFRs show a distinct declining trend from .45 in 1961 to .25 in 1971 and further to .06 in 1981. The states again showed a fluctuating trend in the CFRs which were below 1% throughout the years.

E.2 MENTAL DISORDERS:

The latest data available is for 1992 under the category 'mental disorders' giving state-wise figures for the number of beds and number admitted. The highest number of cases reported were from Kerala where 6812 mental patients were admitted, but the bed capacity is only 1342. Bihar had the second highest number of mental patients at 5764 with 2473 beds. In the third position was Maharashtra which had 4888 mental patients admitted and 5990 beds, the beds being in excess of patients admitted. Haryana, Punjab and UP were the only other three states with the same trend. Punjab had the lowest number of admissions at 184.

People are often reluctant to seek treatment for mental disorders due to the stigma attached to it and the fear of social ridicule. This limitation can be overcome only with greater education, awareness and a broad attitude. Perhaps this is the reason why the state with the highest literacy also has the highest prevalence of mental disorders.

F. DISEASES OF NERVOUS SYSTEM AND SENSE ORGANS:

This is also a group of non-communicable diseases generally associated with the process of ageing. These diseases are highly prevalent in the developed countries but are increasing in the developing nations also with the rise in life expectancy. Data was available from 1961-81 for two categories within this group - diseases of the central nervous system and rheumatism and rheumatic fever.

F.1 DISEASES OF CENTRAL NERVOUS SYSTEM:

These include diseases such as epilepsy, paralysis and Parkinson's disease. Since all such diseases are grouped together, they show a relatively high prevalence but a declining trend over the years.

1.1 Prevalence Rates: The DPRs were high in 1961 at 2377 which declined to 1874 in 1971 and 136 in 1981, showing a sharp declining trend, though it may be the result of lower reporting of such diseases in government hospitals. As many as 11 states had DPRs above 2000 in 1961 the highest being 7977 for Rajasthan and the lowest 0 for Himachal Pradesh. In 1971 also the same trend was observed, Rajasthan having the highest DPR of 6733. Tamil Nadu, Kerala and Karnataka also had high DPRs consistently. No other significant trend was visible across the states.

1.2 Case Fatality Rates: The CFRs were consistently below 1% from 1961-81, Maharashtra and Gujarat recorded the steepest increase in CFRs, from .4% in 1961 to 11% in 1981 for the former and from 0 in 1961 to 17% in 1981 for the latter.

1.3 Proportional Morbidity: The PMB for this category was 88.8% in 1961, 87% in 1971 and 41.8% in 1981, which indicates the growing morbidity of rheumatism in relation to the diseases of the central nervous system.

1.4 Proportional Mortality: The PMT declined from 44% in 1961 to 36% in 1971, but rose again sharply to 95% in 1981. All states experienced a sharp rise in PMB. Maharashtra had a consistently high PMT of 98, 100 and 98% in 1961, 71 and 81 respectively.

F.2 RHEUMATISM AND RHEUMATIC FEVERS:

Rheumatism is also associated with the process of ageing. The trend in prevalence rates was a declining one over the years which seems contrary to the expected trend.

The DPR declined from 379 in 1961 to 316 in 1971 and further to 147 in 1981. High DPRs were consistently recorded in Kerala, UP and Tamil Nadu, but all states showed a declining trend. The lowest DPRs were recorded in Himachal Pradesh. The CFRs also declined from .37% in 1961 to .04% in 1981. CFRs were uniformly low over the years for all the states. The PMB showed an increasing trend from 11% in 1961 and 12.6% in 1971 to 58% in 1981. The PMT has declined from 56% in 1961 to 5.4% in 1981, though it had risen to 64% in 1971. Maharashtra was the only state with lowest PMT of below 2% from 1961 - 81.

On the whole diseases of the nervous system and sense organs had a high prevalence but low fatality rate throughout the years.

Table4.23 : India - Diseases Of The Nervous System And Sense Organs - 1961-81.

YEAR	DPR	CFR	PMB	PMT
1961	1857	.15	7.05	6.95
1971	1386	.07	10.62	5.78
1981	66	19.3	19.36	6.17

Source: DGHS, Ministry of Health and Family Welfare.

While the DPR has declined sharply over the years, the PMB has increased. This may be due to the decline in morbidity relative to this group. The CFR has increased but the PMT has remained constant, declining only marginally from 7% in 1961 to 6% in 1981.

G. DISEASES OF CIRCULATORY SYSTEM:

Heart diseases and acute rheumatic fever are the two categories for which data is available in this group. But data collection began only in the late 1970s, and therefore only the data for 1981 is available, which gives some idea about the spatial pattern of the diseases across the country. Heart diseases have a high incidence in the higher age groups. Their incidence is also related to the food habits and a sedentary lifestyle. The stresses and strains of urban life also cause heart trouble. Diseases of the circulatory system had a DPR of 114/lakh in 1981, with a CFR of 2.87%. The PMT was 16.6%.

G.1 HEART DISEASES:

Heart diseases include the data on chronic rheumatic heart diseases, hypertensive heart disease, ischaemic heart diseases, diseases of pulmonary circulation and other heart diseases.

The DPR for India was low at 160/lakh population. The highest DPR was recorded in Kerala (879) followed by Punjab (830), Andhra Pradesh (621) and Rajasthan (421). All other states had DPRs of less than 200. The CFR for India was 1.13% and showed significant variation across the states, the highest being 8% in Maharashtra and the lowest being .65% in Andhra Pradesh. The PMB for heart diseases was 70% of total diseases of circulatory system. The PMB was 100% in Kerala and lowest in Madhya Pradesh at 36%. The PMT was very high at 98.6%, being highest in Kerala (100%) and lowest in Himachal Pradesh (94%).

G.2 ACUTE RHEUMATIC FEVER:

Rheumatic fever is the delayed consequence of an untreated infection in the upper respiratory tract caused by the bacteria of the streptococci group. Since it results from a communicable disease, it is more common in developing countries. It is the most common cause of heart disease in the young age group below 30 years of age. In India also the disease has a high incidence.

In 1981 the DPR for rheumatic fever in India was 68/lakh. It was highest in Himachal Pradesh (2921) and lowest in Maharashtra (19). It was below 200 in all other states except Andhra Pradesh(281) and Orissa (285). The CFR for India was .0% and showed no significant variation across the states. The PMB for rheumatic fever was 30% in India. It was above 60% in Karnataka, Madhya Pradesh and Himachal Pradesh, and below 30% in the rest of the states. Kerala had the lowest PMB of 0. The PMT was very low at 1.36%, the highest being 5.7% in Himachal Pradesh. Rheumatic fever has a high occurrence in those regions which have a high incidence of respiratory infections. It is associated with lesser developed regions, where the incidence of infectious diseases is very high.

H. DISEASES OF RESPIRATORY SYSTEM:

Respiratory diseases have a high prevalence in India, particularly the infectious diseases such as influenza and pneumonia. Due to poor nutrition and poor living standards, children as well as adults are prone to respiratory infections. Diseases such as asthma and bronchitis are on the rise in cities which face the acute problem of air pollution. Data for 1961-81 is available for influenza and pneumonia, and 1993 data is available for pneumonia and Acute Respiratory Infection (ARI).

Table4.24: India - Respiratory Diseases - 1961-93

YEAR	DPR	CFR	PMB	PMT
1961	1191	16.4	16.4	4.9
1971	1301	4.5	18.7	7.5
1981	327	1.2	8.2	6
1993	18892	.67	87.38	29.81

Source: DGHS, Ministry of Health and Family Welfare.

The DPR has declined for respiratory diseases from 1961-81. The sharp rise in DPR in 1993 is mainly the contribution of ARI which reported more than 18,000 cases per lakh population. The case fatality is low. The effect of respiratory infections is therefore not reflected in mortality rates but their contribution to morbidity is very high.

H.1 INFLUENZA:

Influenza has a high prevalence all over the world, particularly in the developing countries. It is an infection caused by influenza virus. Outbreaks of influenza epidemics are very frequent.

The DPR of influenza was quite high at 1899 in 1961, 1361 in 1971 and 1302 in 1981. The DPRs show a declining trend over the years. Kerala, Tamil Nadu, West Bengal and Orissa have recorded consistently high DPRs. However, the highest DPR in 1961 was of Karnataka (7206). While in other states the DPR has been either constant or declining. Orissa has shown a sharp increase in DPR from 983 in 1961 to 3282 in 1981. Influenza has recorded very low fatality of .18% in 1961, .01% in 1971and .02% in 1981. CFR was uniformly low in all states. The proportion of influenza cases to all cases of respiratory diseases

was 50% in 1961, 60% in 1971 and 25% in 1981. The PMB is variable but was affected by high pneumonia PMB in 1981. It was constantly high in Madhya Pradesh and Rajasthan. The PMT from influenza was much higher than that of pneumonia. It was 75%, 96% and 97% in 1961, 71 and 81 respectively. All states had uniformly high PMT except UP where PMT was low in 1961 as well as 1971. Influenza prevalence is affected by the occurrence of epidemics and therefore tends to be sporadic in nature.

H.2 PNEUMONIA:

Pneumonia is not a single disease but is a group of diseases with similar symptoms caused by thirty different types of bacteria, viruses, mycoplasmas and other agents. Pneumonia agents attack the body when its resistance is lowered, often due to pre-existing disease, enter the lungs and inflame the air sacks. In course of time water is filled in whole or part of the lung, often leading to fatality. In India pneumonia has a high prevalence and fatality.

2.1 Prevalence Rate: The DPR for pneumonia was 1704 in 1961, 2828 in 1971, 303 in 1981 and 717 in 1993. The average of the major states in 1993 was 94.2 as compared to 161 in 1971, showing a decline in DPR in the major states. DPR was high in Assam, Himachal Pradesh, Maharashtra, Tamil Nadu and West Bengal (2000 & above). In 1961 Tamil Nadu had the highest DPR of 5268, in 1971 Kerala had the highest DPR of 9670. Punjab and Rajasthan also had high DPRs above 5000. In 1981 DPR was highest in Rajasthan at 1191. Rajasthan again had the highest DPR in 1993 of 3447, followed by Karnataka (320.5) and Himachal Pradesh (276.6). DPRs have been highly variable across the states with no trends emerging.

2.2 Case Fatality Rates: Pneumonia had relatively higher CFRs than influenza at 1.25 in 1961, 1.15 in 1971, 1.23 in 1981 and .64 in 1993. Maharashtra has recorded highest CFRs in 1971, 81 and 93 as well. All other states show consistently low CFRs.

2.3 Proportional Morbidity: The PMB was 50% in 1961, 40% in 1971, 75% in 1981 and 3% in 1993. The 1993 figure shows the proportion of pneumonia cases to all cases of communicable diseases, hence the low figure. In 1993 Rajasthan had an exceptionally high PMB of 12%.

2.4 Proportional Mortality: The PMT of pneumonia was lower than that of influenza at 25% in 1961, 6% in 1971 & 3.5% in 1981. In 1993 pneumonia contributed to 14.4% of all deaths due to infectious diseases, which is a significant contribution. PMT was highest in Orissa and Assam (more than 25%) in 1993. Rajasthan and Himachal Pradesh also had high PMTs of above 18%.

H.3 ACUTE RESPIRATORY INFECTION:

ARI includes all respiratory infections which generally occur in people and also includes influenza. It had the highest DPR in 1993 of 18174.96 persons per lakh population.

The DPR of ARI in Karnataka was 17,329/lakh, which makes up the bulk of the DPR. This indicates a possible influenza epidemic in Karnataka. It was second highest in Kerala (6382). The lowest DPRs below 1000 were recorded in Gujarat, Maharashtra, Punjab, Tamil Nadu, UP and West Bengal. The CFR for India was .64%, the average of the major states being 2%.

ARI accounted for as much as 84% of the total infectious disease morbidity. The PMB was above 75% in 1.0 states. It was lowest in West Bengal at 46%. ARI's PMT was 15.4%, the highest being in Himachal Pradesh (37.68%) and the lowest in West Bengal (6%). The PMT was above 15% in 10 states. The average PMT of the major states was 20%.

I. DISEASES OF DIGESTIVE SYSTEM:

Diseases of the digestive system are quite common in India due to the poor hygiene and of the poor quality of food and water consumed. Data on all diseases of digestive system was given together, except diseases of liver which was given separately.

Table4.25: Diseases Of Digestive System - India - 1961-81

YEAR	DPR	CFR	PMB	PMT
1961	831	.17	11.4	14.6
1971	374	.17	5.4	9.15
1981	189	.17	4.7	7.7

Source: DGHS, Ministry of Health and Family Welfare.

The DPR for this category has been declining over the years. The fatality is also low. Across the states, the maximum DPR in 1961 was in Kerala (2039), followed by Tamil Nadu (1883). These 2 states have recorded highest DPRs in 1971 and 81 as well. The lowest DPR was recorded consistently in Himachal Pradesh, and also in Gujarat and Maharashtra. On the whole the southern states showed higher DPR for digestive system diseases than other states.

I.1 DISEASES OF DIGESTIVE SYSTEM:

This category includes all diseases of digestive system except liver diseases. The prevalence in this group has been declining over the years in India, while the fatality has remained constant.

The DPR was 1499 in 1961, which fell to 696 in 1971 and further to356 in 1981. Kerala, Karnataka, Andhra Pradesh and Tamil Nadu had consistently high DPRs while Himachal Pradesh recorded the lowest DPRs. The CFRs were low at .17% constant for 1961, 71 as well as 1981. There was no significant trend among the states. CFRs in UP and Gujarat were slightly higher than the rest.The PMB was more than 90% as compared to liver diseases. It was 90% in 1961, 93% in 1971 and 94% in 1981. All states had uniformly high PMB. The PMT was also more than 75% at 80% in 1961, 78% in 1971 and 71% in 1981. Thus the PMT displayed a declining trend.

I.2 DISEASES OF LIVER:

This category includes generally non-infective varieties of liver diseases such as cirrhosis and Byler disease which are more associated with problems like alcoholism and the process of ageing.

The DPR in India is low and shows a declining trend. It was 161 in 1961, 66 in 1971 and 41 in 1981. The DPR has shown an increasing trend in Kerala (from 93 in 1961 to 185 in 1981) and Punjab, while it has a varying DPR in other states. The lowest DPRs were recorded generally in Himachal Pradesh. The CFRs were low, but higher than other digestive diseases. The CFR was .4% in 1961, .65% in 1971 and 1.17% in 1981. The CFR thus shows a rising trend The PMB was low at 9.8%, 7.1% and 5.7% in 1961, 71 and 81 respectively. Madhya Pradesh, Kerala and West Bengal have relatively high PMBs, while the lowest PMB was in Himachal Pradesh . The PMT is witnessing a rising trend from 20.1% in 1961, to 22.3% in 1971 and 29.2% in 1981. Kerala, Madhya Pradesh and Andhra Pradesh recorded relatively high PMTs.

J DISEASES OF GENITO-URINARY SYSTEM:

This group of diseases has a proportionately lower morbidity, and the prevalence rate has been declining over the years. The fatality is also low for this group. Data is available for this group as a whole from 1961-81.

Table 4.26 India - Diseases of Genito-Urinary System - 1961-81

YEAR	DPR	CFR	PMB	PMT
1961	1182	8.12	0.23	4.2
1971	622	4.47	0.22	6.4
1981	209	2.62	0.28	3.4

Source: DGHS, Ministry of Health and Family Welfare.

J.1 Prevalence Rates: -

The DPR of diseases in this group was 1182 in 1961, from which it declined to 622 in 1971, and further declined to 209 in 1981. Punjab and Kerala have shown consistently high DPRs while the states with low

DPRs have been Andhra Pradesh, Gujarat, Himachal Pradesh, Madhya Pradesh, Maharashtra, Rajasthan, UP and West Bengal.

J.2 Case Fatality Rates: -

The CFR for disease of genito-urinary system was low at .23% in 1961, .22% in 1971 and .28% in 1981. All states had uniformly low CFRs and no trends could be observed, except an increasing trend in CFR in Maharashtra where CFR increased from .04% in 1961 to 1.07% in 1981.

J.3 Proportional Morbidity: -

The PMB for this group was 8.12% in 1961, 4.5% in 1971 and 2.6% in 1981. In this case the PMB is in proportion to the total morbidity in the country. This shows a definite declining trend which may be due to increase in other diseases too. The PMB shows an increasing trend in Gujarat, Himachal Pradesh and Maharashtra, while it declined in other states.

J.4 Proportional Mortality: -

The PMT was 4.2% in 1961, 6.4% in 1971 and 3.4% in 1981. In all the states the PMT maintains a declining trend over the years.

K. DISEASES OF PREGNANCY AND CHILD BIRTH:

India has a very high prevalence of diseases related to pregnancy and child birth. The reasons for this are many - poor nutrition of mother, lack of adequate antenatal and postnatal care, ignorant practices, low age at marriage leading to a large proportion of young low-age mothers etc. India has one of the high maternal mortality rates in the world. Data for 1961-81 is available for analysis.

Table 4.27 India - Diseases of Pregnancy and Child Birth - 1961-81

YEAR	DPR	CFR	PMB	PMT
1961	2183	0.25	3.35	5.5
1971	2991	0.16	4.85	6.5
1981	1261	0.20	3.65	5.2

Source: DGHS, Ministry of Health and Family Welfare.

K.1 Prevalence Rates: The DPRs for India are quite high though they have declined from 1961-81. In 1961, the DPR was 2133 per lakh female population in the reproductive age group. In 1971 it increased to 2991 but fell again in 1981 to 1261. In 1961 the DPR was highest in Himachal Pradesh (10076), followed by Rajasthan (8321) and Karnataka (6753). It was 3902 in Tamil Nadu, and in other states it ranged between 2000-3000, except in Gujarat (1725), Assam (1202), Maharashtra (853) and Kerala (846).

In 1971 the highest DPR of 13,419 was recorded in Tamil Nadu followed by Kerala (6417) and Punjab (5917). The lowest DPRs were recorded in Maharashtra (46) and Karnataka (741). In 1981 Punjab had

the highest DPR of 8503 followed by Kerala (4913), Orissa (4090) and Haryana (3943). Orissa, Punjab and Rajasthan have shown consistently high DPRs while it has fluctuated in other states.

K.2 Case Fatality Rates: The CFRs in this category were low at .25 in 1961, .16 in 1971 and .2 in 1981. Maharashtra had relatively high CFRs in all the three years.

K.3 Proportional Morbidity: Morbidity due to pregnancy and child birth problems as a proportion of total morbidity in India was 3.35% in 1961, 4.85% in 1971 and 3.65% in 1981. A significant increasing trend is noticed in Gujarat, Madhya Pradesh and Maharashtra, while it is fluctuating in other states.

K.4 Proportional Mortality: The PMT for this category was 5.5% in 1961, 6.5% in 1971 and 5.2% in 1981. Orissa has maintained a consistently high PMT of 10-12% over the years, while in Assam the PMT came down from 16% in 1971 to 3.7% in 1981. Rajasthan has shown a marked increase in PMT from 4.45% in 1961 to 15% in 1981. The states of Orissa, Rajasthan, Madhya Pradesh and Haryana have high PMT in 1981.

L. DISEASES OF SKIN AND MUSCULO-SKELETAL SYSTEM:

This group includes all skin diseases and diseases affecting the bone such as arthritis. This group also has high prevalence rates, but the rates have been declining over time.

L.1 Prevalence Rates: The DPR was 3586 in 1961, which declined to 2514 in 1971 and further to 1323 in 1981. Tamil Nadu, Rajasthan, Punjab, Orissa, Kerala, Karnataka and Andhra Pradesh, all showed very high DPRs. In Andhra Pradesh the DPR increased from 150 in 1961 to 3624 in 1981. In Haryana it increased from 2249 in 1971 to 8226 in 1981. Rajasthan recorded the highest DPR of 11,048 in 1961, Tamil Nadu had the highest DPR of 10,434 in 1971 and Haryana was at the top in 1981. Assam, Gujarat and Maharashtra had relatively low prevalence rates.

The CFRs were very low at .02% in 1961, and .01% in 1971 & 81. The CFRs were uniformly low across the states with no significant trends emerging. The PMB from skin diseases was quite high at 24.6% in 1961, 18% in 1971 and 16.6% in 1981. Rajasthan consistently had high PMB. The PMT was low and declined from 2.67% in 1961 to .89% in 1971 and .83% in 1981. It declined appreciably in all the states as well. Overall the rates had remained lower in 1971 and 1981 than in 1961.

M. DISEASES OF EARLY INFANCY:

India is a country with a very high infant mortality rate, as we have examined earlier. The prevalence of diseases occurring in infancy is also quite high. In this section only those diseases which are peculiar to infancy have been included. Data for this category is available from 1961-81.

Table 4.28 India - Diseases of Early Infancy - 1961-81

YEAR	DPR	CFR	PMB	PMT
1961	805	0.77	1.58	8
1971	2440	0.53	1.19	5.2
1981	569	1.82	0.30	4

Source: DGHS, Ministry of Health and Family Welfare.

M.1 Prevalence Rates:

The DPR of diseases of early infancy per lakh population under 1 year of age was 805 in 1961, from which it rose significantly to 2440 in 1971, and then again declined sharply to 569 in 1981. The mean for the major states, however, shows a declining trend from 3189 in 1961 to 2185 in 1971 and to 1356 in 1981. In 1961 Andhra Pradesh had the highest DPR of 11,782. States with high DPR above 1000 were Karnataka, Kerala, Rajasthan and Tamil Nadu (3000-6000). In 1971 the DOR ranged between 8085 in Andhra Pradesh to 316 in Madhya Pradesh. High DPRs above 1000 were recorded in seven states ranging from 1201 in Assam to 5764 in Uttar Pradesh. In 1981 the DPR ranged from 4122 in Kerala to 216 in Rajasthan. States with DPRs above 100 were Gujarat, Karnataka, Orissa and Punjab. Haryana, Madhya Pradesh and Rajasthan showed low DPRs consistently which may be more the result of low reporting and hence cannot be taken as the true picture.

M.2 Case Fatality Rates:

The CFRs were quite low but showed an increasing trend from .77% in 1961 to .53% in 1971 and 1.82% in 1981. High CFRs were recorded consistently in Gujarat, Orissa, Rajasthan and West Bengal. The highest CFR was of West Bengal (10.5) in 1961, Gujarat (3.1) in 1971 and Maharashtra (6.3) in 1981. Assam, Uttar Pradesh, Karnataka, Kerala and Madhya Pradesh had consistently low CFRs of below 1% over the years.

M.3 Proportional Morbidity:

The PMB was consistently low at 1.6% in 1961, 1.2% in 1971 and .3% in 1981, thus showing a declining trend also. No state had significant trends except Himachal Pradesh which consistently showed the lowest PMB.

M.3 Proportional Mortality:

The PMT was higher as compared to the PMB though it also showed a declining trend from 8% in 1961 to 5.2% in 1971 and further to 4% in 1981. As many as five states had PMT above 10% in 1961, the highest being 18% in Gujarat. But in 1971 only one state had PMT above 10% and that was Tamil Nadu. In 1981 all states had PMT below 10%, the highest being 9.7% in Kerala. The lowest PMT was again consistently recorded in Himachal Pradesh. While all states experienced a decline in PMT from 1961 to 1981, Kerala was the only state where PMT increased from 4% in 1961 to 9.7% in 1981.

In spite of the overall decline in infancy diseases in India over the years, the infant morbidity and mortality is still very high and needs to be reduced substantially.

IV.3.2 INFERENCES

The analysis of morbidity data proves the fact that a large part of Indians disease burden is not reflected in mortality data since it does not have a high fatality, but has a considerably high prevalence rate. The diseases of respiratory system, anaemia, skin diseases and many infections diseases belong to this category. Another major fact which emerges is that the states with low mortality have recorded very high morbidity rates. Analysis of this fact follows, but first a brief acco9unt of the inferences at the national level is presented.

INFERENCES AT THE NATIONAL LEVEL :

1. On the whole the country shows very high prevalence rates, but the rates have shown a declining trend. In 1961 the average DPR in India was 1100/lakh, which increased marginally to 1113 lakh, but reduced substantially to 471 lakh in 1981. The mean of the major states,, however, showed a uniform decline from 1606 in 1961 to 1332 in 1971 and 1077 in 1981. However, the 1981 data pertained to only 11 major states.
2. Some diseases have shown uniformly high prevalence rates across the country, such as diarrhoeal diseases, anaemia, TB and diseases of the skin and musculo-skeletal system.
3. Diseases of pregnancy and child birth, as well as diseases of infancy are among the categories with very high prevalence rates throughout the years. This shows the extent of vulnerability of this section of the population.
4. The proportion of communicable diseases continues to be high as compared to non-communicable diseases., though the data was such that the exact figures could not be computed. (apart from the categories of infections disease and respiratory diseases, the category of diseases of the skin and musculo-skeletal system also contains some infections). The total DPR of communicable diseases was 3253 lakh in 1961, 3279 in 1971 and 1270 in 1981. Thus there has been a decline in their prevalence over time.

INFERENCES AT THE STATE LEVEL

1. At the state level it can be observed that some states have consistently shown high disease prevalence rates over the years. Kerala, Orissa, Punjab and Tamil Nadu belong to this category.

The states of Karnataka, Kerala, Rajasthan and Tamil Nadu had average DPRs above 2000 in1961, the highest being 2933 in Tamil Nadu. In 1971 also Tamil Nadu had the highest DPR of 3564, Kerala being the only other state with DPR above 2000. In 1981 Kerala held the top position with Punjab in the second place, these being the only states with DPRs above 2000. The states with DPRs between 2000-2000 numbered five in 1961, 6 in 1971 and 2 in 1981. 5 states had DPRs below 1000 in 1961, while 7 states had DPRs below 1000 in1971 and 1981.

2. The trend in DPRs across the states be studies on the basis of the following table:

Table 4.29 Average DPRs Across the States - 1961-81

RANGE	YEAR	STATES	STATE WITH VALUES	
			HIGHEST	LOWEST
HIGH	1961	Karnataka, Kerala, Rajasthan, Tamil Nadu	Tamil Nadu2933	Rajasthan 2458
> 2000	1971	Kerala, Tamil Nadu	Tamil Nadu3564	Kerala 2572
	1981	Kerala, Punjab	Kerala 2809	Punjab 2566
Moderate 1000-2000	1961	Maharashtra, Orissa, UP, Andhra Pradesh, Himachal Pradesh, Assam	Andhra P. 1819	UP 1168
	1971	Orissa, Punjab, Rajasthan, UP.	Punjab 1876	Assam 1064
	1981	Haryana, Orissa	Haryana 1418	Orissa 1389
Low < 1000	1961	Assam, Gujarat, Madhya Pradesh, Maharashtra, W. Bengal, Gujarat, Haryana, Himachal Pradesh	W. Bengal 9160	MP 4144
	1971	Karnataka, MP, Maharashtra, West Bengal, Andhra Pradesh, Gujarat, Himachal Pradesh	Haryana 979	Gujarat 284
	1981	Karnataka, MP, Maharashtra, Rajasthan	Rajasthan 990	Maharashtra 149

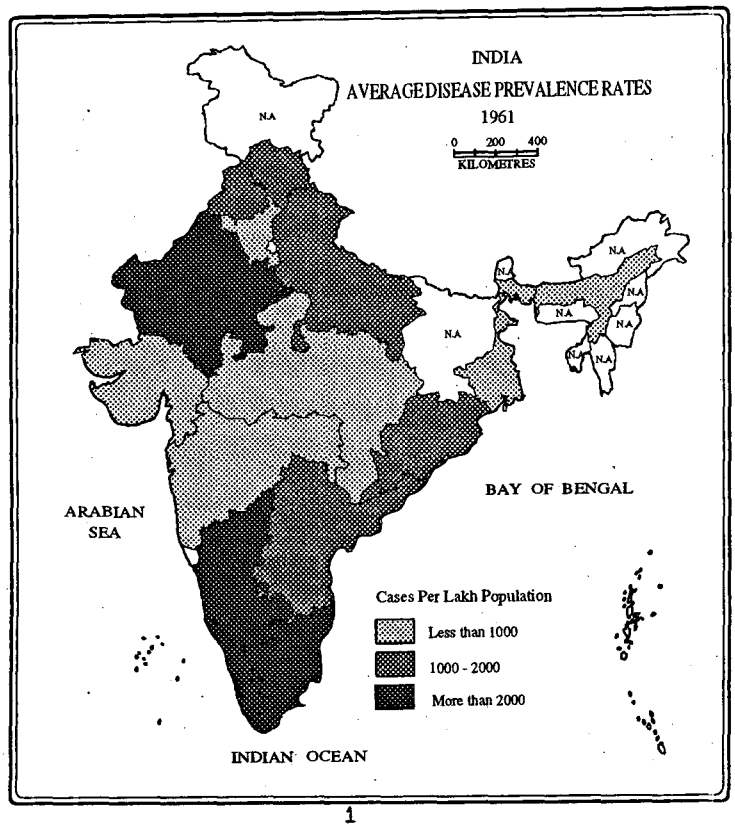
Source: DGHS, Ministry of Health and Family Welfare.

States can be divided into three categories :

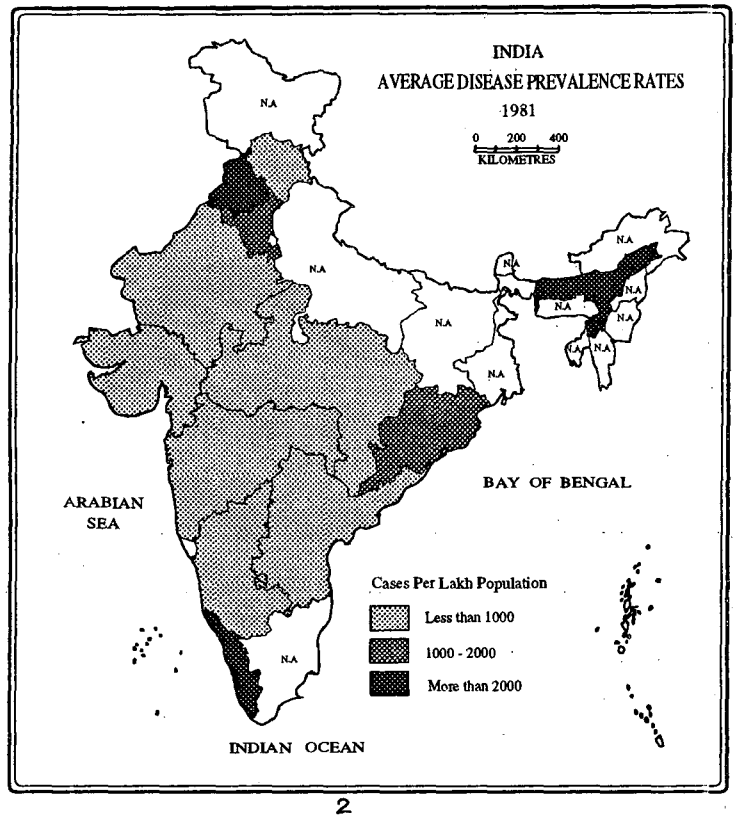
a) States where DPRs have increased from 1961-81 consistently 1436 in 1961 and 1876 in 1971 to 1566 in 1981. This rise may be due to better reporting and utilisation of the health care facilities. Tamil Nadu is another state where DPRs have increased, making it the states with highest DPRs in 1961 and 71, but data was not available for 1981. Assam and Haryana also show similar trends, but overall DPRs we much lower there than the former 2 states. Kerala has also shown uniformly high and rising DPRs from 1961-81.

b) States with varying DPRs : There are those states where DPR increased from 1961 to 1971 and then declined from 1971-91, or the DPR has been lower in 1981 than 1961, but the 1981 rate is higher than 1971 rate. This has been observed in the case of Himachal Pradesh only. The former trend has been observed in Madhya Pradesh and Orissa. However, the overall trend in these states has been that of decline in DPRs from 1961-81.

FIGURE IV. 4



1



2

c) States with consistently declining DPRs : The states of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, UP and West Bengal show this trend. The sharpest decline was in Karnataka from 2770 in 1961 to 744 in 1971, but then the DPR tapered off, remaining at 731 in 1981.

3. States with low mortality rates have shown high morbidity, such as Karnataka, Kerala and Punjab. On the low morbidity, such as UP and Madhya Pradesh. The reason behind this trend may be the higher reporting and utilisation of health care facilities in the states with low mortality , which may be the result of greater awareness of people regarding health. T he more backward states suffer from low treatment and reporting, as well as poor coverage and utilisation of public healthcare facilities, resulting in low morbidity rates.

4. The average morbidity in Kerala which was very high in 1961, 71 and 81 shows a marked decline in 1993. Since comparison can be made only with data on communicable diseases between 1961-81 and 1993, only the trend in communicable diseases was 2459 in 1961, rising sharply to 6930 in 1971 (mainly because of a spurt in respiratory infections), declining to 2303 in 1981 and finally reaching a low of 471 in 1993. This reflects a definite decline in the incidence of communicable diseases in Kerala. However the incidence of non-communicable diseases may have increased, but there is no data to support this assumption.

India's morbidity situation on the whole can be summarised as one of high prevalence of infections diseases and nutritional disorders along with increasing incidence of degenerative disease.

IV.4 REGIONAL PATTERNS OF NUTRITIONAL STATUS

Study of nutritional status is a very important component of the study of health status because of the many ways in which nutrition affects the human health and well being. Malnutrition, or imbalanced nutritional intake has serious implications on the functional performance of the individual in the following forms :

I. It affects the capacity of the body to perform physical work. Undernutrion specifically leads to reduced capacity to perform work since the person is weakened.

II. Undernutrition in early childhood retards the growth and physical development of the individual. This growth retardation is expressed in the form of stunting (low height for age) and wasting (low weight for height) and is measured through anthropometric measures.

III. Malnutrition is also understood to have an effect on mental development, though this issue remains under much debate especially regarding the methodology for measuring the level of mental development.

IV. In its most important manifestation in terms of health, malnutrition reduces the body resistance to infections and other diseases. The link between nutrition and infection is a two-way relationship, illness leads to increased body requirement of nutrients on the one hand, and reduced absorption of nutrients on the other hand, thus weakening the patient further. Epidemiological studies exploring

the link between nutrition and infection have often shown that nutritional status does not affect the incidence of morbidity, but it prolongs the duration of the disease and also its severity. Malnourished people are at a greater risk of mortality due to the prolonged and more severe disease episodes which leave them further malnourished. Obesity is another problem which is emerging especially in the urban areas. Obese people have a much higher risk of heart diseases than low weight persons.

V. Malnutrition affects the performance of reproductive functions affecting maternal as well as foetal health. A malnourished female focus a greater risk of pregnancy wastage as well as maternal mortality than a well nourished one. Undernutrition is also associated with low birth weight which further leads to greater risk of infant mortality and growth retardation of the infant.

VI. In its most extreme manifestation, undernutrition, or rather the lack of food itself, leads to loss of life. Reports of starvation deaths are heard occasionally in India also.

Deficiency in specific nutrient has different manifestations in different types of functional losses and different clinical problems. For example, protein-calorie malnutrition and anaemia increase the overall vulnerability to disease, apart from imposing the optimal functional performance of the individual. Vitamin A deficiency is closely associated with infection, particularly measles and diarrhoea.

The problem in India, however, is not one of only deficiency in specific nutrients, but of deficiency in food intake itself. The vast poor population suffers from chronic under nutrition. The major problem is of protein-calorie malnutrition (PCM) which is the result of overall low food intake. All over the country in villages and in urban slums, children with rusty hair and bloated bellies - the telltale signs of PCM are a common sight. Anaemia, as discussed in the previous section, is also widely prevalent in India, especially among the women and children. Anaemia increases in females during pregnancy, increasing the risk of pregnancy wastage among them. Vitamin a deficiency is another major problem causing Xerophthalmia (blindness) and increasing the risk of infections such as measles and diarrhoea.

In this section the extent of deficiency in calorie intake is analysed in order to assess the nutritional status across the state using data published by the NSSO. The relationship between income levels and calorie intake, as well as the proportion of income spent on food is also analysed.

IV.4.1 LEVELS OF CALORIE INTAKE - 1961-62 TO 1993-94

The consumption of calories per capita per day is a good indicator of the nutritional intake of people because a low calories intake is generally associated with low intake of other nutrients also. Data on calorie intake has been taken for the years 1961-62 (seventeenth round of NSS), 1972-73 (27th round), 1983 (38th round and 1993-94 (50th round).

Table4.30 : India - Calorie Intake Per Capita Per Day 1961-62 To 1993-94

YEAR	CAL. INTAKE - RURAL	CAL. INTAKE - URBAN
1961-62	2511	2063
1972-73	2266	2107
1983	2221	2089
1993-94	2153	2071

Source - NSSO Reports

Two disturbing facts come to light from the above table - firstly, these has been an overall decline in calorie intake over the years from 1961-62 to 1993-94, and secondly, the average per capita calorie intake for the country has fallen below the recommended minimum level of calorie intake for both rural and urban areas. In fact it was above the RDI for rural areas (2400 cals/capita/day) only in 1961-62, and it was above the RDI for urban areas (2100 cals/capita/day) only in 1972-73. The rest of the years it was below the RDI . This itself points to the extent of undernutrition in India. While the rural areas have faced a constant decline in average calorie consumption from 1961-62 to 1972-73, from which again there has been a constant decline.

An examination of the calorie consumption pattern across the states also reveals greater information about differences in t he pattern of calories consumption at the state level. Data for 15 major states is available for 1961-62 and for 16 major states for the rest of the years.

1. States with very high calorie intake of the years

This category includes those states where calorie intake levels per capita per day were above the third quartile for that year.

1961-62 : In 1961-62 the three states which had very high calories intake levels in rural areas , Rajasthan (3147), Punjab (3079) and Jammu & Kashmir (3033). The states which had highest urban calorie intake levels were Rajasthan (2469), J&K (2361), Bihar (2330) and Orissa (2233).

1972-73 : Punjab had the highest rural figure of 3493 followed by Haryana (3215), Himachal Pradesh (2945) and Rajasthan (2730). The some states had highest urban levels as well - Punjab (2783), Himachal Pradesh (263), Haryana (2404) and Rajasthan (2357).

1983 : While the same from states of Punjab, Haryana, Himachal Pradesh and Rajasthan had very high calorie intake levels in rural areas, there was a slight change in the pattern of urban rural areas, there was a slight change in the pattern of urban calorie consumption. Punjab showed a decline in calorie consumption in urban areas, and was replaced by Orissa in this category. Therefore, Haryana, Himachal Pradesh, Orissa and Rajasthan had calorie intake levels above the 3rd quartile value of 2160 kcal per person/day.

1993-94 : Haryana had the highest rural cal. Intake level of 2491 kcals/capital/day followed by Rajasthan (2470), Punjab (2418) and Himachal Pradesh (2324). In the urban areas cal. intake levels were highest in Himachal Pradesh (2416) followed by Orissa (2261), Bihar (2188) and Rajasthan (2184).

Thus over the years the same four states have shown the highest cal. Consumption in rural areas, while there have been changes in the urban cal. consumption pattern. Another important point to be noted is that in 1993-94, the lowest value among the states in this category (Himachal Pradesh - 2324) fell below the RDI level of 2400 kcals. On the other hand urban cal. intake levels in this category have continued to be above the RDI level.

The states lying in this category can be divided into two types - Punjab and Haryana which are agriculturally developed states with the lowest levels of rural poverty and highest income levels in the country; and Rajasthan and Himachal Pradesh where the diet constituents are mainly course cereals and wheat which are cheaper an affordable in larger quantities than other cereals.

1. States with high calorie consumption

These are the states whose calorie consumption values be between the second and the third quartile values.

1961-1962 : The five states in this category were Madhya Pradesh, UP, Karnataka, Bihar an Gujarat, with rural calorie consumption levels between 2500-3000.

Punjab, Madhya Pradesh, UP, Gujarat and Assam had the high calorie intake levels in urban areas (2100-2200).

1972-73 : In the rural areas UP, Madhya Pradesh, Bihar and Karnataka (2200-2600) had high calorie intake levels.

In the urban areas Orissa, Madhya Pradesh, Gujarat and Bihar (2164-2300) had high calorie intake levels.

1983 : High levels of calorie intake were recorded in Andhra Pradesh, Karnataka, Madhya Pradesh and UP (2200-2400). in the rural areas. In the urban areas high calorie intake levels of between 2112-2160 were recorded in Bihar, Karnataka, Madhya Pradesh and Tamil Nadu.

1993-94 : Madhya Pradesh, Orissa, UP and West Bengal had high rural calorie intake levels of between 2150-2310. High calorie intake levels of between 2100-2150 kcals/person/day in urban areas were recorded in Assam, Haryana, UP and West Bengal.

States in this category came below the RDI levels for rural areas in 1972-73, but remained above the urban RDI levels throughout.

The states of Karnataka, Gujarat and Andhra Pradesh have a mixed diet, the former two particularly consuming a large amount of course of cereal in their staple diet. Since course cereals were much cheaper and hence could be consumed in large quantities, there states had high calorie intake levels. But as the prices of course cereals increased steeply, lesser quantities were consumed, or there was a switch over to

wheat and rice, leading to lowering of calorie intake levels so much so that these states ultimately fell below this category itself.

Madhya Pradesh and UP which have remained constantly in this category have a mixed diet with high wheat consumption which is cheaper than rice and can be consumed in larger quantities. Bihar also has a mixed diet though Orissa and Bengal are dominantly rice consumption states.

3. States with moderate calorie consumption

The states in this category have calorie intake falling between the first and the third quartile.

1961-62 :Moderate rural calorie intake levels between 2180-2500 kcal were recorded in Orissa, Assam, Maharashtra and Andhra Pradesh. Moderate urban calorie intake levels between 1950-2100 were recorded in Karnataka, Andhra Pradesh and West Bengal.

1972-73 :Andhra Pradesh, Assam, Gujarat and Orissa have moderate levels of rual calorie consumption between 1985-2170 kcals. In the urban category Andhra Pradesh, Assam, UP and West Bengal have moderate calorie intake levels between 2050-2200.

1983 : A moderate calorie intake level of between 2091-2197 kcals in the rural areas was recorded in Bihar, Gujarat, Maharashtra and Orissa, while for the urban areas Assam, Kerala, Punjab and UP recorded moderate calorie intake levels between 2043-2112 kcals.

1993-94 : States falling in the moderate category for rural areas between 1991-2140 kcals were Andhra Pradesh, Bihar, Gujarat and Karnataka. For urban areas, states with moderate calorie intake levels between 2018-2099 kcals were Gujarat, Karnataka, Madhya Pradesh and Punjab.

The limits of the moderate category for all years had fallen below the RDI level for both rural and urban areas. States in this category are again of two types - states with mixed diet of course cereals an wheat/rice such as Maharashtra, Andhra Pradesh, Gujarat and Bihar; and states with predominantly rice consumption such as Orissa and Assam.

4. : States with low calorie consumption

States in this category have calorie consumption levels below the first quartile values.

1961-62 :West Bengal, Tamil Nadu and Kerala had the lowest rural calorie consumption levels (below 2184 kcals), and the states of Maharashtra, Tamil Nadu and Kerala had the lowest urban calorie consumption levels of below 1940 kcals.

1972-73 : Low rural calorie intake levels of below 1985 kcals were recorded in West Bengal, Tamil Nadu, Maharashtra and Kerala. Low urban calorie intake levels of below 2053 kcals were recorded in Karnataka, Kerala, Maharashtra and Tamil Nadu.

1983 :Assam, Kerala, Tamil Nadu and West Bengal recorded the lowest rural calorie intake levels of below 2091 kcals. In the urban areas Andhra Pradesh, Gujarat and Maharashtra recorded the lowest levels of below 2043 kcals.

1993-94 : The states of Assam, Kerala, Maharashtra and Tamil Nadu recorded the lowest rural calorie intake levels of below 1991 kcals. The lowest urban calorie intake levels of below 2018 kcals were recorded in Andhra Pradesh, Kerala, Maharashtra and Tamil Nadu.

Among the states with low calorie intake levels, most of them are rice consumption regions such as Kerala, Assam and Tamil Nadu. Thus predominantly wheat eating states have high calorie intake levels, followed pattern states, while the lowest levels of calorie intake are that of the rice eating states.

While all states recorded as decline in calorie consumption levels from 1972-73 to 1993-94, some states showed a different trend. The states of Kerala, Maharashtra, Orissa and over the years, perhaps due to better food availability and increase in purchasing power over the years. The states of Karnataka, Bihar, Kerala, Maharashtra, Tamil Nadu and West Bengal also showed a rising trend in urban calorie intake levels which may again possibly be due to increase in purchasing power as a result of rising incomes.

IV.4.2 CALORIE CONSUMPTION BY INCOME GROUPS : 1993-94

The average level of calorie consumption (kcals/capita/day) by income groups was calculated for all the states using the data of the 50th round of NSS (1993-94). The income groups that have been formulated are the bottom group which includes the bottom 30% of the population in terms of income levels, the middle group which includes the middle 40% of population in terms of income levels, and the top group which includes the 30% of population in terms of income levels. The calculation were carried out for both rural and urban areas.

1. Calorie consumption in the Bottom group :

It is obvious that calorie consumption levels in this group are the lowest; those in the middle groups are higher and the highest are in the top group. States have been divided into three categories - high, calorie consumption in this group.

High : The states with highest calorie intake levels in rural areas (above 1700 kcals/capita/day) in this group were Bihar, Madhya Pradesh, Orissa, Rajasthan, UP and West Bengal. For the urban areas the states in this category with calorie intake levels above 1750 kcals/capita/day were Bihar Himachal Pradesh, Orissa and UP.

Orissa had the highest rural calorie intake level of 1842.4 kcals, while Himachal Pradesh had the highest urban calorie intake level of 1918 kcals.

Moderate : States with moderate calorie intake levels between 1550-1700 kcals/capita/day were Andhra Pradesh, Assam; Haryana, Himachal Pradesh and Karnataka. States in this category for urban areas with

calorie intake levels between 1600-1750 kcals were Andhra Pradesh, Assam, Madhya Pradesh, Rajasthan and West Bengal.

Low : States in this category had rural calorie consumption levels of below 1550 kcals and urban calorie intake levels of below 1600 kcals. For the rural areas the states were Kerala. Gujarat, Maharashtra, Punjab and Tamil Nadu, Kerala had the lowest level of 1181.4 kcals. For the urban areas the states were Gujarat, Haryana, Karnataka, Tamil Nadu, Punjab, Maharashtra and Kerala with Kerala again recording the lowest intake levels of 1363.5 kcals.

2. Calorie consumption in the Middle group

High : States with high calorie consumption levels in this category for rural areas had calorie intake levels above 2200 kcals and were Bihar, Madhya Pradesh, Orissa, Rajasthan and UP. For urban areas states with calorie intake levels above 2100 kcals were Bihar, Himachal Pradesh, Rajasthan, Orissa, Madhya Pradesh and UP.

Moderate : States with moderate calorie intake level of between 2000-2200 for rural areas were Andhra Pradesh, Haryana, Himachal Pradesh, Karnataka and West Bengal. For urban areas the states in this category with calorie intake levels between 2000-2100 kcals were Andhra Pradesh, Assam, Haryana, Karnataka and West Bengal.

Low : States with calorie intake levels below 2000 kcals in rural areas were Assam, Gujarat, Kerala, Maharashtra. Punjab and Tamil Nadu; and those in urban areas were Gujarat, Kerala, Maharashtra, Punjab and Tamil Nadu.

3. Calorie Consumption in the Top group :

High : States with high rural calorie intake levels of above 28010 kcals were Bihar, Haryana, Madhya Pradesh, Orissa, Rajasthan, and UP. In urban areas the highest calorie consumption of above 2700 kcals were Himachal Pradesh, Bihar, Orissa and UP.

Moderate : Moderate calorie intake levels of between 2500-2800 kcals for a rural areas were Andhra Pradesh, Himachal Pradesh, Karnataka, Punjab and West Bengal. Moderate calorie intake levels of between 2550-2700 kcals for urban areas were recorded in Assam, Haryana, Karnataka, MP, Rajasthan and Tamil Nadu.

The urban calorie intake level of below 2550 kcals was observed in Andhra Pradesh, Gujarat, Kerala, Punjab, Maharashtra and West Bengal.

4. : Trends observed across the states

The trends in calorie consumption levels by income groups that can be observed are listed out below :

I. The states of Haryana and Punjab, while showing the highest average per capita calorie intake levels for rural areas as a whole, showed a high disparity between income groups in the rural areas. The difference between calorie consumption in bottom and top levels in Haryana was 1454 kcals, the highest in India, followed by Punjab (1218 kcals). However, the difference in calorie intake levels between rural and urban areas was generally low for bottom and middle groups in these states, and high for the top group.

II. States with overall low calorie consumption levels were Kerala, Gujarat, Maharashtra and Assam. States in the moderate to low calorie consumption levels such as Andhra Pradesh, Assam, Gujarat, Kerala, Maharashtra, Tamil Nadu groups in rural as well as urban areas with the exception of Kerala (high income disparities in both rural and urban areas), Gujarat and Tamil Nadu (high income disparity in urban areas).

III. Income disparities in calorie consumption were observed to be higher in rural areas than in urban areas for all states except Assam, Bihar, Gujarat, Kerala and Tamil Nadu.

IV. Rural calorie intake levels were higher than urban calorie intake levels in all income groups for only five states - Punjab, Rajasthan, UP, West Bengal and Karnataka, Haryana, Andhra Pradesh, Maharashtra and Orissa had higher rural calorie intake levels of at least two income groups.

V. Rural-urban disparities were high in states with lower rural calorie intake levels for all income groups with the exception of Bihar. It was vice versa for states with high rural calorie intake levels.

The fact that rural calorie intake levels which should normally be higher than urban calorie intake levels are actually much lower than urban levels in most of the states reflects the extent of poverty. The most disadvantaged is the bottom 30% of the population which suffers from undernutrition to a much greater extent in urban as well as rural areas. The rural calorie intake levels were above the RDI levels only levels only in the top group for all states except Assam, and Kerala which showed overall lower calorie intake levels than the RDI. In the urban areas only in six states the middle income groups had calorie intake levels above RDI, while in all the states the top group had calorie intake levels above RDI levels. On this basis it can be said that only 30% of the population is adequately fed in the rural areas while in the urban areas the proportion varies between 30-70% across the status. This is a telling indicator of the extent of undernutrition in India.

IV.4.3 RELATIONSHIP OF CALORIE CONSUMPTION WITH PROPORTIONATE EXPENDITURE ON FOOD

The consumption of per capital expenditure on food to total monthly consumption expenditure reflects the purchasing power of the population of a region and the extent of poverty faced by it. The higher the proportion of expenditure on food the poorer the population, assuming that food is the most basic necessity for existence and hence this need has to be fulfilled first before higher needs can be met.

The trend in calorie consumption in rural areas has a negative relationship with monthly per capita expenditure on food to total monthly consumption expenditure (MPCF). For the year 1993-94 it was observed that the top states with the highest average calorie consumption level average of 5 states - 2231) had the lowest average MPCF of 59.25%. The six states in the middle category with on overage calorie consumption of 2185 kcal had MPCF of 62% had average calorie intake of 2007 kcal /person/ day. The relationship is that the higher the MPCF the lower the average calorie intake per capita.

But the end in urban areas is entirely opposite with the calorie consumption level showing a positive relationship with the MPCF/ The 5 states with lower average MPCF of 54.4%had an average calorie intake level of 1979 kcals; in the 5 states with middle MPCF of 56% , the calorie intake increased to 2084 kcals; and in the 5 states with highest MPCF of 576% the calorie intake rose to 2180 kcals. The reasons for this may be the quality of the states with the lowest calorie intake levels are the from southern states and Maharashtra where rice is the staple diet (with the exception of Maharashtra). They also have the lowest average MPCF for urban areas. This could only indicate a deficient diet pattern rather than low food intake itself. It cannot therefore be said that there is a definite relationship between the expenditure on food and the level of calorie intake, and the relationship varies between rural and urban areas.

IV.4.4 INFERENCES

The following are the major points which summarise the inferences that can be drawn from the analysis of nutritional status of the population.

1. All states have shown a declining trend in the average per capita daily calorie intake. This may be due to the change in diet pattern with the substitution of course cereals with five cereals, and the reduction in quality consumed due to a rise in the food prices.
2. The calorie intake levels for rural areas are higher than the urban areas, but the decline in calorie intake has been steeper there narrowing the gap between rural and urban calorie intake levels.
3. States with high calorie intake levels are generally those which are highly developed agriculturally and have high per capital income levels, as well as those where coarse cereals form a major part of the staple diet, though they have been gradually replaced with other cereals such as wheat.

4. States with low per capital calorie intake levels are generally rice consuming regions. They also show a low rural-urban disparity in calorie intake levels.

In 1961-62 as many as 8 states had rural calorie intake levels above the RDI. But in 1972-73 this number was reduced to 6; in 1983 it was 4 and in 1993-94 it was 3. In 1. the case of urban areas also similar trend is observed. In 1961-62 10 states has urban calorie intake levels above the RDI, which increased to 11 in 1972-73, but since there steadily declined to 9 in 1983 and 8 in 1993-94.

The nutritional status of India's population is far from satisfactory and the situation seems to be worsening over the years, which is a major cause for concern.

IV.5 INDEX OF HEALTH STATUS

Since mortality, morbidity and nutritional status have been analysed as components of health status, it is important to study the regional picture emerging from a combination of the three components into a single index of health status. For this purpose the simple ranking method of Kendall has been used to calculate the composite index of health status. In this method the states have been ranked according to the performance of each variable. The three variables which have been used in this exercise are:

1) Average DPR (for all diseases combined) per lakh population as an indicator of morbidity.
2) IMR as an indicator of mortality.
3) Per capita per day calorie intake as an indicator of nutritional status.

DPR, which has a negative relation with health status has been ranked in such a way that the lowest DPR gets the highest rank of 1 and the ranks decrease with increasing DPRs. The same pattern is followed in the case of IMR. However, since higher calorie intake denotes better health status, the calorie intake has been ranked in such a way that the state with the highest calorie intake gets the highest rank of 1. The three variables thus give a set of three ranks for each state which has then been added to derive the combined value of the ranks, which is the composite index of health status. The lower the total of rank scores, the higher the health status, and vice versa.

The composite index of health status shows a major anomaly in the Indian context. The observed patterns of morbidity, mortality and nutritional status(NS) do not tally with the expected patterns which results in states expected to show a lower health status getting higher ranks than the states expected to show a higher health status. For example, in 1993 a state like Kerala has rank 1 in IMR but rank 14 in DPR and rank 13 in NS, making its index value of 27 the seventh ranked in India, with states such as Rajasthan and Uttar Pradesh ranked higher at 3 and 4 respectively. This anomaly can be observed across the years also.

Table4.31 Index of Health Status Across the States - 1961-81.

STATES	1961		1971		1981		1993	
	Index score	Rank	Index score	Rank	Index score	Rank	Index score	Rank
Andhra Pradesh	26	6	27	6	21	5	28	8
Assam	19	3	29	8	-	-	32	9
Gujarat	14	1	20	3	25	6	23	5
Haryana	-	-	12	1	19	3	23	5
Himachal Pradesh	-	-	12	1	8	1	20	3
Karnataka	20	4	20	3	14	2	26	6
Kerala	26	6	30	9	27	7	28	8
Madhya Pradesh	15	2	21	4	20	4	27	7
Maharashtra	20	4	20	3	14	2	21	4
Orissa	29	7	28	7	28	8	32	9
Punjab	19	3	18	2	28	8	14	2
Rajasthan	24	5	22	5	21	5	20	3
Tamil Nadu	34	8	36	10	-	-	21	4
Uttar Pradesh	19	3	27	6	-	-	21	4
West Bengal	19	3	-	-	-	-	13	1

In this analysis, Haryana and Himachal Pradesh have been excluded in 1961 because Haryana had not been formed then, and the nutrition data for Himachal Pradesh was not available. West Bengal has been omitted from the 1971 study because SRS estimates of IMR was not available for West Bengal for 1971. In 1981 morbidity statistics were not available for Assam, Tamil Nadu, Uttar Pradesh and West Bengal. Bihar has been excluded from the whole exercise for want of morbidity data, 1993 is the only year for which all the states' data was available. The health status index results for all states have been ranked and thus the state's ranking on the basis of health status is obtained. These results have been analysed below for each year.

1961:

The states in 1961 could be assigned eight ranks in terms of health status index, since some states shared the same ranks. The states with the top 3 ranks were Gujarat(1), Madhya Pradesh (2), Assam, West Bengal, Punjab and Uttar Pradesh(3). Gujarat had an overall low rank score because it showed third lowest morbidity, fifth lowest mortality and sixth highest calorie intake. In the case of Madhya Pradesh, its 11^{th} rank score in IMR was neutralised by lowest DPR and third highest calorie intake. In Uttar Pradesh, Punjab and Assam low morbidity, moderately high mortality and high to moderate NS led to their overall low rank score. In the case of West Bengal low DPR and IMR neutralised the high calorie intake score of 11.

Ranks 4,5 and 6 were held by Karnataka, Maharashtra (4), Rajasthan (5); and Kerala and Andhra Pradesh (6). Karnataka had a high morbidity score, low mortality and moderate nutrition score while Maharashtra had low morbidity but high mortality and low NS. Rajasthan had high morbidity and mortality, but had

the highest NS. Kerala had the sixth rank with lowest mortality but high morbidity and high nutrition rank score. Andhra Pradesh also had high morbidity and low NS but moderate mortality.

The highest rank of 7 and 8 went to Orissa and Tamil Nadu respectively. Orissa had high score in morbidity and mortality and moderate scores in NS, while Tamil Nadu had high morbidity and NS scores and moderate scores in mortality.

1971:

Ten ranks could be assigned to the states. The top three ranked states wee Haryana and Himachal Pradesh ranked 1 because of their overall low scores in all three variables, Punjab(2), Gujarat, Karnataka and Maharashtra (3). Punjab had high morbidity with low mortality and NS score, while among the latter three states Gujarat had the lowest morbidity score; Karnataka and Maharashtra scored low on morbidity and mortality.

States with ranks 4-6 were Madhya Pradesh (4), Rajasthan (5), Andhra Pradesh and Uttar Pradesh (6). Rajasthan, Uttar Pradesh and Madhya Pradesh had low to moderate NS scores, and moderate to high morbidity and mortality scores. The last four ranks were of the states Orissa, Assam, Kerala and Tamil Nadu. Kerala and Tamil Nadu had very high scores in DPR and NS which neutralised their IMR scores. Assam and Orissa had moderate to high scores in all 3 variables.

1981:

Among the 8 ranks assigned, the states with the top 3 ranks were Himachal Pradesh (1), Karnataka and Maharashtra (2), and Haryana (3). Himachal Pradesh, Karnataka and Maharashtra had low DPR and IMR scores. Himachal Pradesh had the highest NS in 1981, Karnataka and Maharashtra had low NS. Haryana had high DPR and IMR but the second highest NS, which neutralised the former two scores.

The moderate ranked states were Madhya Pradesh (4), Rajasthan (5), Andhra Pradesh (5) and Gujarat (60. Madhya Pradesh and Rajasthan had very high IMR scores ; Andhra Pradesh had moderate scores in all three while Gujarat in spite of low DPR had high IMR and low NS which led to high rank total.

The lowest ranks of 7 and 8 were assigned to Kerala (7), Orissa and Punjab (8). In Kerala again its lowest IMR was negated by high DPR and lowest NS. Orissa had moderate DPR and NS but high IMR while Punjab had low IMR and high NS but high DPR score.

1993:

The states were given 9 ranks in 1993 as per their overall rank scores. The states with the lowest rank score was West Bengal followed by Punjab (2), Rajasthan and Himachal Pradesh(3). West Bengal had low DPR and IMR but moderate score for NS. Punjab had moderate DPR but low IMR and NS score. While Rajasthan's IMR score was exceptionally high as compared to its DPR and NS score, Himachal Pradesh's DPR score was the highest in India, but its NS score was the lowest and its IMR score was also low.

The moderate ranked states were Maharashtra, Tamil Nadu and Uttar Pradesh (4), Gujarat and Haryana (5), and Karnataka (6). Maharashtra , Tamil Nadu and Uttar Pradesh each had low scores in two variables and high score in one variable - NS in the case of Maharashtra and Tamil Nadu , and IMR in the case of Uttar Pradesh. Gujarat had high NS score while Haryana had high DPR and moderate IMR score. Karnataka had moderate scores in all three variables.

The highest rank scores were recorded in Madhya Pradesh (7), Andhra Pradesh and Kerala (8), Assam and Orissa (9). Madhya Pradesh's rank score was inflated by high mortality and moderately high NS score; Andhra Pradesh and Kerala had low IMR but high DPR and NS scores, Orissa had high morbidity and infant mortality but low NS score, while Assam had high scores in all three variables.

IV.5.1 INFERENCES:

The states in India do not show a consistent pattern of low mortality accompanied by low morbidity and high NS. Rather some low mortality states have higher morbidity and lower NS, while some states have high morbidity and mortality but lower NS. If mortality alone is taken as an indicator of health status the state wise pattern is much different than that of the composite index including DPR and NS as well.

States with low score in at least two out of the three variables managed to get low to moderate overall rank score which influenced their standing vis-à-vis the other states in terms of health status index. For example, West Bengal and Maharashtra with overall low rank scores had low scores in DPR and IMR but high scores in NS, while the states of Kerala and Tamil Nadu with overall high rank scores had high rank score in morbidity and NS but low rank score in IMR.

The average of the health status index ranks over the 4 decades among the states indicates an overall high rank of less than 4 in West Bengal, Himachal Pradesh, Maharashtra and Haryana. States with overall moderate ranks were Gujarat, Karnataka, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh. Low ranks were recorded in Assam, Andhra Pradesh, Kerala, Orissa and Tamil Nadu. These states had high rank scores in two of the three variables. Thus a state like Kerala which has the lowest mortality in India emerges as a state with one of the lowest health status because of the high morbidity and low NS.

The question which arises on examination of the health status index is whether morbidity, mortality and nutrition can be effectively combined into a composite index of health status or not, keeping the Indian context in mind. Morbidity and NS patterns in India need further examination.

MORBIDITY AND HEALTH STATUS:

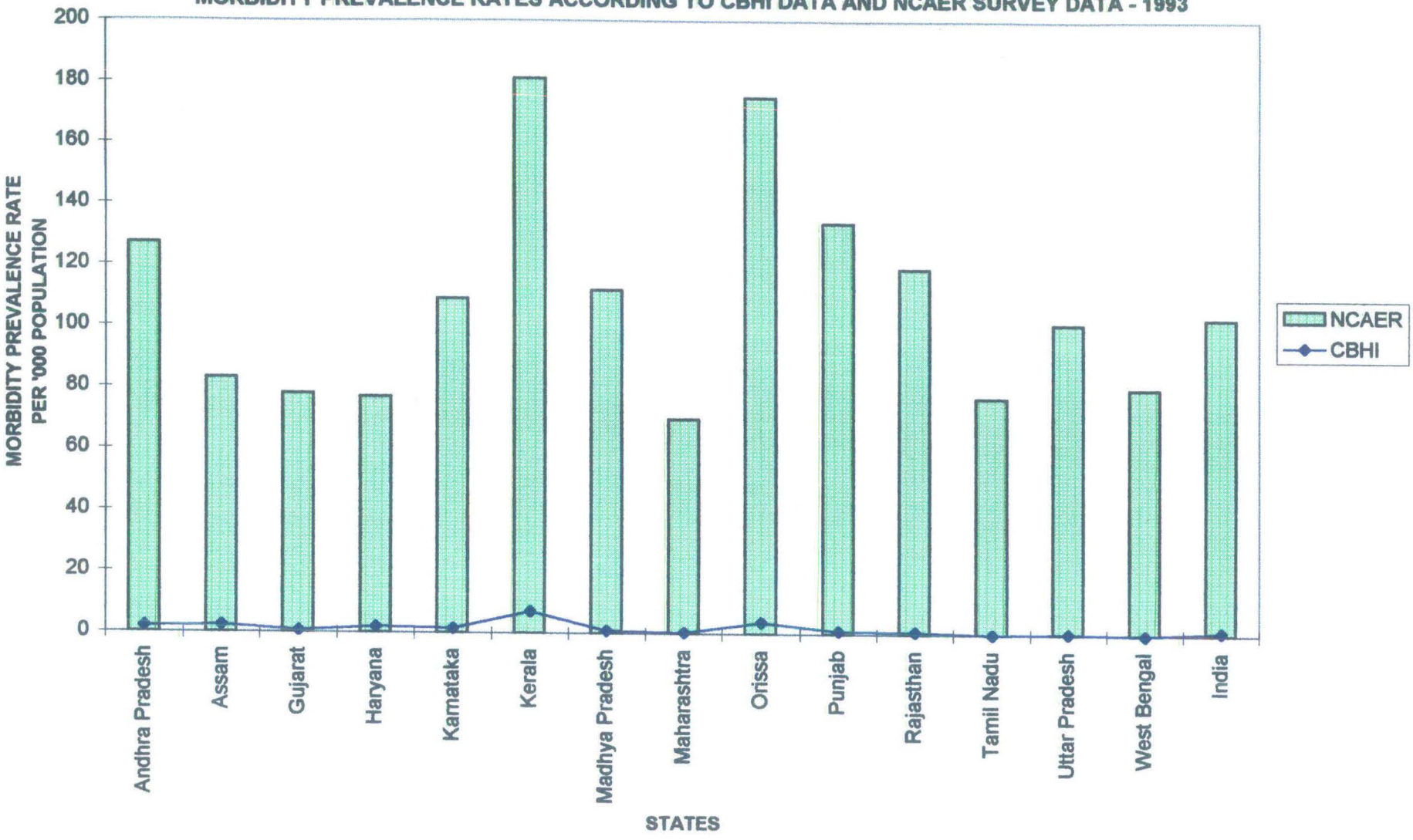
The relationship between morbidity and IMR in India is a weak negative one, the correlation coefficient being -.4. If we take the case of Kerala, in spite of lowest IMR it has highest morbidity. Several factors can be cited for this. The high literacy rate coupled with good health care facilities influences the morbidity perception of the people. They are more sensitive to their health and therefore all illnesses are reported and treatment sought for them. Morbidity reporting is influenced not only by the social perception factors but also the economic factors which influence disease reporting and treatment. This is specially important in the Indian society among the poorer sections of the population. High morbidity does not necessarily translate into high mortality if adequate treatment facilities are available. The backward states such as Uttar Pradesh, Bihar and Madhya Pradesh suffer from irregularities in disease reporting, functioning of the health system and low literacy levels which inhibits general awareness regarding health. Orissa, however, is the only backward state which has high morbidity. Given the assumption that morbidity reported in these states is much lower than the actual morbidity, the magnitude of morbidity can only be imagined.

Whether or not faulty data is behind the picture of morbidity as it appears in India can be judged by comparing the official figures with primary estimates arrived at through morbidity surveys. One such survey was the survey on morbidity undertaken by the NCAER in 1993. Comparison between the data from the NCAER and as published by the CBHI is made clear by the accompanying graph.

As it can be seen from the graph, there is a huge difference between the DPRs as calculated using official data and the Morbidity Prevalence Rate (MPRs) as calculated in the survey report, the former being much less than the latter. This shows the gap in data collection by official agencies. Another reason for this may be the fact that official data pertains only to communicable diseases 3while the NCAER data includes non communicable diseases as well. However, the trend of morbidity across the states has many similarities. Three of the five states recording highest morbidity are common to the two data sets - Kerala, Orissa and Himachal Pradesh. Also, four of the five states recording lowest morbidity are common to both data sets - Gujarat, Maharashtra, Tamil Nadu and West Bengal. There is slight shift in ranks of the states , though. Among the states ranking 6-10 in morbidity, Madhya Pradesh and Rajasthan are common to both data sets, and Andhra Pradesh has the same rank in both cases.

States whose ranks have undergone changes are Assam (which ranked 12^{th} in official data ranks 5^{th} in NCAER survey) ; Haryana has also witnessed a sharp increase from 11^{th} rank to 2^{nd} rank; the rank of Punjab has declined from 8^{th} to 11^{th}, and that of Uttar Pradesh has declined from 3^{rd} to 6^{th}. West Bengal, Rajasthan and Madhya Pradesh also witnessed a decline in ranks while Gujarat, Karnataka and Maharashtra witnessed an increase in ranks in the survey data. Since there is not much change in the

FIGURE IV.5
INDIA
MORBIDITY PREVALENCE RATES ACCORDING TO CBHI DATA AND NCAER SURVEY DATA - 1993



broad pattern of states in terms of morbidity levels between the official data and survey data, the health status index does not show any major change in ranks except in the case of Uttar Pradesh (from 4th to 7th rank), Rajasthan (from 3rd to 6th rank), Orissa (9th to 11th rank), Madhya Pradesh (7th to 10th rank) and Haryana (5th to 1st rank).

From this analysis it can only be inferred that morbidity does not reflect the health status of people in terms of its effects on mortality. Problems not only in data collection, but also in social perception of morbidity and the economic factors influencing treatment of diseases affects the reliability of morbidity data as a health status indicator. But morbidity as a health status indicator cannot be ignored, especially when adequate data is available, as in primary surveys, where there is greater scope for a more in-depth analysis of the factors influencing morbidity at the regional level.

NUTRITION AND HEALTH STATUS:

The assumption that higher the nutritional intake lower the morbidity does not seem to hold true in the case of relationship between NS and health status since some of the low mortality states have low NS also, such as Kerala and Maharashtra. NS shows a very insignificant relationship with morbidity the correlation coefficient being -.13, and a positive relationship with IMR, the correlation coefficient being .5. There are several points to be realised in the assessment of nutritional status. Firstly, the estimates of NS as measured by calorie intake in this study are not sufficiently reliable being sample estimates. Secondly, calorie intake levels are influenced more by cultural factors such as composition of food basket and preferences for certain food items which may not be nutritious, but may carry a higher social status. The eastern and southern states which are predominantly rice consuming states show lower calorie consumption than the other states where the diet is based on wheat consumption. Even with a rise in income levels it is not necessary that calorie intake levels would increase if the traditional food basket itself is of low value foods.

A major limitation in studies on nutritional status is the problem of choosing the right methodology for assessing the NS of population under study. Different methodologies yield different results and add to the ambiguity of the picture. For example, the calorie intake levels as derived in the NSS survey of 1993-94 are much below the estimates of the NNMB-NCAER survey[1] of 1994. Since the latter survey covered only eight states the comparison is restricted to these states.

Table4.32 Calorie intake Levels by NSS and NNMB-NCAER Surveys - 1993-94.

	Per capita per diem calorie intake: (kcal)	
STATES	**NSSO**	**NNMB-NCAER**
Kerala	2231	1965
Tamil Nadu	1814	1903
Karnataka	2196	2049
Andhra Pradesh	2430	2022
Maharashtra	2065	1964
Gujarat	2298	2010
Madhya Pradesh	2238	2128
Orissa	2106	2230

Source: Nutritional Intake in India (1996) & NNMB report, 1996.

The two data sets clearly show that the NSS seems to have underestimated calorie intake levels in all states analysed here, except Tamil Nadu and Orissa. Kerala shows a much higher calorie intake level in the NNMB survey. The data on BMI grades for adults in the NNMB survey also indicates Kerala as having a better nutritional status with a lower proportion of population showing chronic energy deficiency as compared to other states in the study.

The discrepancies in the two data sets are basically the result of differences in sampling design and methodology of assessing the nutritional intake. According to Ramachandran, the NSS data for Kerala is probably an underestimate because the standard questionnaire used by NSS for all states 'may not capture consumption of non-conventional food items like tapioca which is an important cereal substitute in Kerala'[2]. Also, the meals consumed outside the house may not be adequately covered in the questionnaire. These drawbacks erode the validity of the nutrient intake levels recorded by the NSS.

On the whole, survey methodologies have a significant impact on the results obtained in nutrition surveys and remain a point of much debate. In the context of this it can be said that the relationship of nutritional status with other health status variables has not been effectively brought out in the data available.

This analysis of health status of India's population thus shows some unique trends in morbidity and nutritional status which are not in conformation to the expected trends. Several factors are responsible for this, especially the social and economic factors which influence the health of people, not only in terms of actual health but also in terms of health perception and behaviour. These factors merit a closer look in order to understand the rends in health status, and therefore have been dealt with in detail in the next chapter.

CHAPTER V

DETERMINANTS OF HEALTH STATUS: A CORRELATION ANALYSIS.

V.1 INTRODUCTION

The regional pattern of health status which emerges from the study of health status variables, as seen in the last chapter, leads us to the question - Why is there disparity in the levels of health among the states? Why has Kerala maintained a good health status while the states of UP, Bihar, Rajasthan, Madhya Pradesh and Orissa have not shown much progress in health status over the years? All these questions can be answered through an inquiry into the determinants of health status and their patterns across the states.

The health of a person is a function of several factors which can be grouped into four broad categories.

1. Genetic factors
2. Environmental factors
3. Socio-economic factors
4. Institutional factors

1. Genetic factors:

An individuals bio-genetic makeup enhance or reduces his/her chance of falling ill with certain ailments. Certain diseases such as arthritis, bronchial asthma, haemophilia, some kinds of cancers, mental disorders such as schizophrenia, eye disorders such as colour blindness etc. are examples of genetically transmitted disorders. Genetically transmitted disease are generally chronic in nature. Some population groups have a greater genetic susceptibility to certain diseases. Meade et al[1] state that some kinds of cancers, and the virulence of diseases such as TB, measles and malaria are thought to be related to genetic susceptibility, though not proved as yet. Diseases which are caused genetically are associated with certain recessive traits running in the family, which, though important at the individual level, are not significant at the population level, except perhaps in a situation of inbreeding. Otherwise these harmful traits tend to be eliminated with time as the family gene pool gets diversified through marriages outside the family. Thus genetic factors do not seem to be significant at determinants of health status at the population level.

[1] Meade, M. et al (1988), Medical Geography, p. 12.

2. Environmental Factors:

Environmental factors play a major role in influencing the health of people, especially since they affect the incidence of communicable diseases. Environment can be divided into two types - the natural environment and the built environment which is created by human beings themselves.

Features of the natural environment such as climate, humidity, occurrence of forests, swamps and other water bodies favour the growth of certain pathogens and thus increase the incidence of those diseases in the region. For example, the hot and wet climate of the topics is conducive to the growth of communicable diseases to such an extent that most communicable diseases are studied under 'tropical diseases'. Infectious diseases thrive in tropical areas all over the world. A marked seasonal pattern is also noted in the incidence of diseases. While influenza and pneumonia are more common in the cold season, diarrhoeal diseases, jaundice and other water-borne diseases are associated with the wet season. The incidence of malaria and dengue fever increases in the late monsoon and post monsoon months. These were some of the examples of how climatic factors influence morbidity. Region with forests or water bodies also may be conducive to the growth of certain pathogens and disease carriers. For example, the incidence of filariaris in India is associated with marshy wetlands in coastal regions mainly, apart from some pockets in the interior. Similarly all the forested regional in central India are endemic to malaria.

Human beings themselves create environments favourable to disease occurrence through their activities. Features of housing and drainage, agriculture and urbanisation all have their effect on human health. One of the best examples of the way human activities such as Punjab, Haryana and Rajasthan with the extension of canals and other irrigation works. Malaria and dengue fever incidence has also increased in urban areas due to increasing number of coolers and features such as open drains and water logging. The presence or absence of a proper sewage disposal system, the availability of safe drinking water and toilets, the house type and ventilation - all affect quality of drinking water and lack of toilet facilities encourage the spread of many water-borne diseases and other infections such as cholera, diphtheria, jaundice, typhoid fever etc. Lack of cleanliness in the surroundings increase the growth of flies which act as carriers of disease germs. Houses which lack proper ventilation encourage TB and houses of thatch and mud (kuchcha houses) provide shelter to mosquitoes and flies which in turn cause illness.

The process of urbanisation also encourages disease resulting from air pollution such as asthma and bronchitis, as well as water pollution such as diarrhoea diseases, poisoning, etc. The more sedentary nature of urban life style also encourages a different set of diseases such as diabetes, rheumatism, cancers, cardio-vascular diseases and diseases of the central nervous system. urban areas are also the foci of irrigation and the migrate also bring with them diseases which may be knew to the cities they have migrated into. In India , malaria incidence has been associated with the migrant tribal labourers in

Andhra Pradesh, Maharashtra and Gujarat, as well as in other areas where migration from tribal areas has taken place. Migration, however, is more of a demographic migration, however is more of a demographic factor affecting disease causation rather than an environmental one. However, environmental factors play the external conditional are conducive to their growth and spread.

3. Socio-Economic factors:

Socio-economic factors are perhaps the most important factors influencing human health since they determine the living standard of the individual, his/her housing environment, awareness regarding disease prevention and cure, habits of personal hygiene and sanitation, nutritional intake, etc. Among the major socio-economic factor which influence human health are the level of education, the rigidness of social customs and traditions the status of women in society, food habits and taboos.

The level of income affects a person's food intake (a low food intake leads to undernutrition while in affluent households overnutrition is a problem). A poor household also generally is not able to afford good housing and therefore, inhabit kutcha houses with poor drainage and no toilet facilities. Their source of drinking water is also often not safe. The association between poverty and ill health is that of a vicious circle - poor people suffer from under-nutrition and greater risk of morbidity, when ill, the poor do not have enough money to afford treatment and hence they avoid treatment, which often aggravates the illness. They also suffer from loss of wages due to absenteeism from work caused by the illness; illness thus lowers their meagre financial resources and leads to loss of wages - all this further aggravates their poverty. The income level of a house-hold thus influences its susceptibility to disease by influencing the living environment; it also affects the accessibility of the household to health facilities in terms of cost as well as distance.

Another major social factor which affects the health status of a person is, the level of education. The more educated person is the more aware he/she is about the factors which cause disease and the preventive measures to be taken against them. He/she also readily avails the treatment facilities available in case of illness. It has been observed that female literacy is very important in improving the health status since the female splay a pivotal role in maintaining the health of the whole household through proper food, water and personal hygiene. They are also instrumental in imparting values of health and hygiene to the future generation overall,. Literacy implies greater awareness and hence greater acceptance of disease prevention methods.

Residence affects the health status in the sense that it influences the environmental factors which cause disease s well as the availability and accessibility of treatment facilities. As discussed earlier, urban environment encourages a different set of diseases than rural environment. Since the majority of hospitals

and private physicians as well as health centres are concentrated in urban areas, the urban population has greater availability of health services, while the rural population is at a disadvantage in this regard. The rural society is also more rigid in the observance of traditional customs and practices which may not be conducive to human health.

Among the social practices which affect human health are the norms related to food consumption (such as vegetarianism, or taboo on beef consumption), birth practices and breast feeding practices, food given to pregnant female beliefs related to the causes of certain diseases (such as the belief in India that chicken pox and measles are the result of the entrance of goddess into the human body, and the need to pacify hex in order to get well) etc. A major problem in Indian society is the institutionalised gender bias again women in the patriarchal Indian society. This leads to negligence of female health whether of the child or the pregnant female. The practice of female infanticide as also still practised in some parts of India . females suffer from a poorer health status than males in spite of their biological advantages due to these factors.

All the factors discussed above, i.e., income, education, residence and social practices are interrelated and interdependent, and constitute the socio-economic factors influencing health.

4. Institutional Factors:

The institutional factors are solely those which are related to governmental efforts in the health sector. In the framework of the welfare state, the maintenance of a good health status of the population and steps to improve the health status are a responsibility of the state, and are therefore looked after by governmental programmes. Institutional factors include the public expenditure on health sector and the development of health care infrastructure which includes health centres at all levels as well as medical and paramedical personnel. It also includes special programmes of health intervention to combat specific health problem, such as the immunisation programmes, for eradication/control of some specific diseases. The importance of development of public health infrastructure is greater in developing countries such as India where a large proportion of the population is poor and therefore cannot afford the cost of treatment facilities available in the private sector. For the poor, free health facilities are the only hope towards a better health status.

Though the health sector is vital for the maintenance of the quality of human resource, the developing countries generally do not invest adequately in this sector, and the health finance forms a very small proportion of public spending. In times of financial education that funds are diverted to meet the pressing temporary needs of economic growth, in spite of the fact that in the long run it is the expenditure on these sectors that leads to sustained greater regional development.

It is the responsibility of the government to ensure that all sections of the population have equal access to at least a minimum level of health care. The government also takes preventive measures against certain kinds of diseases. In India the public health care infrastructure has been elaborately outlined and a hierarchy of health centres with their threshold populations have been specified. However, the extent to which they are functional and actually benefiting the population is another story. The number of health workers working in the villages , the number of nurses and midwives available per health centre and the number of doctors are a vital part of the health care infrastructure. To sum up, institutional factors are important in ensuring an effective public health infrastructure and the accessibility to health facilities of all sections of the population.

The health status of a population is a function of all the four factors discussed above - genetic, environmental, socio-economic and institutional. The degree to which these factors affect the health status of population in India , as manifested through a correlation analysis using the data available, forms the focus of the following section.

V.2 FACTORS AFFECTING HEALTH STATUS - A CORRELATION ANALYSIS:

A correlation analysis was carried our with nineteen variables relating to morbidity and mortality, health facilities, health expenditure, literacy and education, amenities etc. The variables were selected in such a way that they represent all aspects related to health status and cover all determinants of health status, as discussed in the previous section. The selection of data was, however, limited by the type of data available and the format in which it was available. The exercise was carried out for fourteen major states since data for all parameters was available only for these states. The analysis is restricted to the year 1993-94.

V.2.1 VARIABLES IN THE ANALYSIS:

The following is a list of all the parameters and the indicators chosen to represent those parameters in the analysis:

1. Health Status :

The indicators for health state of the population in the states were of three kinds :

1) The **average disease prevalence rates per lakh population** for 1993 across the states (DPR) was selected as the morbidity indicator. However, the DPRs do not represent the full morbidity picture since date for 1993 was available only for communicable diseases.

2) The **average life expectancy at birth** was also chosen since it indicates the cumulative effect of health status on the longevity of the population. The life expectancy at birth (LEB) is the average of male and

female life expectancies as estimated by SRS for the years 1991-96.

3) The **infant mortality rate (IMR)** for the year 1994 as given by the SRS report was chosen to indicate that health status since it is conventionally a sensitive indicator of health status. The IMR reflects not only the level of health of infants but also the health status of mothers, the prevalence of infections to which infants are to prone, the lack of adequate immunisation facilities and the lack of overall health facilities.

4) A fourth indicator was chosen specifically to represent the status of female health and their social position in society. This is the **difference between the average female and male life expectancy at birth (FMDLEB)** across the states. This indicator reflects the extent of discrimination / bias faced by women. Ideally female life expectancy should be higher than male life expectant by a few years. However, in India, for most of the states the gap is quite small and in some states it is also negative indicating lower female life expectancy than male life expectancy. Thus, it is an effective indicator of female health status.

2. Economic Development:

A total of four indicators were chosen to represent different aspects of economic development across the states.

5) The **level of urbanisation (URB)** or the percentage of urban population to total population for 1991 across the states was choose as an indicator for urbanisation.

7) The **level of per capita income (PCY)** across the states at current prices in rupees for the year 1993-94 as published in the Statistical Abstract by the Central Statistic Organisation (CSO) was selected as an income indicator.

6) The **proportion of population below the poverty line (POV)** was selected to represent the poverty levels across the states. The data on percentage of population below the poverty line (as per the planning commission methodology) for the year 1992-93 was the latest available published by the CSO.

8) The fourth indicator in this category is the **proportion of total monthly consumption expenditure on food in percentage (FOOD)** for 1993-94 provided by the NSS (50th round). The proportion of expenditure on food to the total monthly consumption expenditure is an effective indicator of the extent of purchasing power among the states. The higher the proportionate expenditure on food, the greater the extent of poverty.

3. Nutritional Status:

9) Only one indicator was chosen to represent the nutritional status across the states. This was the **average per capita colour intake per day in kcal (CAL)**. This data was also taken from the NSS 50th round.

4. Educational Status:

Two indicators represent the educational status.

10) The **level of female literacy (FLIT)** was taken since it has been observed to be a sensitive indicator of the literacy level as well as the status of females. It has also been observed to have a close relationship with the health status of population. The data on female literacy rate has been taken from the census of India 1991.

11) A second indicator which represents the utilisation of educational facilities across the states is the enrolment rate, or the number of students calculated per lakh population. The **enrolment rate per lakh population (ENR)** was calculated using the enrolment data provided in the volume 'Eduation in India' 1991-92 published by the Ministry of Human Resource Development's Department of Educational statistics. The population do was taken from the 1991 census.

5. Institutional Factors:

The following are the five indicators chosen to represent various aspects of the availability of health facilities through the government.

12) The **per capita expenditure on health and family welfare by the government across the states (PCHE)** is an indicator of the extent of health financing in the states. The data is provided by the Central Bureau of Health Intelligence (CBHI) under the Ministry of Health and Family Welfare. It pertains to the year 1992.

13) The **number of hospitals and dispensaries per lakh population (HOSP)** including private hospitals and those run by non governmental organisations. This is an indicator of the availability of treatment facilities across the states. The data is also provided by the CBHI for the year 1992.

14) The **number of health workers per lakh population (HPER)** represents the availability of health workers and is basically an indicator of rural health facilities. The health workers are bestowed with the responsibility of carrying out health promotion, prevention and curative activities at the grassroots level and therefore they are more useful than the data on registered medical practitioners who show a distinct

urban bias. This indicator is specially suited to the Indian scenario because of the large percentage of rural population. The data published by the CBHI pertains to the year 1993.

15) The **proportion of hospital and dispensary beds per lakh population (BEDP)** is also an indicator of availability of health facilities, similar to the hospital population rates. The data again published by the CBHI was for the year 1992.

16) The estimated **percentage of population covered under immunisation programme (IMM)** was taken to indicate efforts towards control / eradication of the diseases which can be prevented through immunisation. The data which is published officially by the Ministry of Health and Family Welfare appeared unreliable, and hence the NFHS estimates for 1992-93 were taken.

6. Amenities:

Drinking water and sanitation are the two major amenities which have a direct bearing on health.

17) The **availability of drinking water from all sources (DRW)** measured by the percentage of households with access to drinking water to the total households as per the census of 1991 was taken to indicate the availability of drinking water across the states.

18) Another indicator related to drinking water availability is the **percentage of households receiving a piped / tap water supply (PTAP)** according to the 1991 census. This has been chosen on the assumption that tap water is the safest source of drinking water supply to the people.

19) The 1991 census estimates of the **percentage of households per state with adequate toilet facilities (TOIL)** was also taken as an indicator.

V.2.2 CORRELATION PATTERNS:

The degree of correlation between each of the indicator has been discussed separately in order to understand the nature of relationship between the factors affecting health status and the health status variables.

1. DPR: The DPR or the morbidity indicator has a positive correlates with LEB (.52) and a negative correlation of .4 with IMR. Ideally, states with a high life expectancy and low infant mortality (indicating better health status) should show a lower DP but the picture is opposite in India. This indicates that states with better health status also have high morbidity. This can be explained by the theory that population in such states is more aware about their health and therefore there is more reporting and utilisation of health

TABLE 5.1: CORRELATION COEFFICIENTS OF FACTORS AFFECTING HEALTH STATUS

	DPR	LEB	FMDLEB	IMR	URB	PCY	POV	FLIT	ENR	PCHE	HOSP	HPER	BEDP	DRW	PTAP	TOIL	FOOD	CAL	IMM
DPR	1.000																		
LEB	0.521	1.000																	
FMDLEB	0.537	0.806	1.000																
IMR	-0.405	-0.876	-0.799	1.000															
URB	-0.302	0.506	0.392	-0.503	1.000														
PCY	-0.186	0.558	0.176	-0.463	0.547	1.000													
POV	-0.058	-0.631	-0.470	0.598	-0.450	-0.650	1.000												
FLIT	0.583	0.811	0.717	-0.888	0.323	0.334	-0.299	1.000											
ENR	-0.103	0.211	0.353	-0.364	0.217	0.082	0.161	0.499	1.000										
PCHE	-0.038	0.438	0.111	-0.285	0.197	0.636	-0.490	0.169	-0.097	1.000									
HOSP	0.174	0.436	0.526	-0.540	0.484	0.419	-0.388	0.564	0.268	0.038	1.000								
HPER	-0.234	0.418	0.142	-0.328	0.426	0.411	-0.480	0.181	0.193	0.266	-0.205	1.000							
BEDP	0.559	0.652	0.703	-0.793	0.298	0.194	-0.366	0.855	0.301	0.151	0.749	-0.070	1.000						
DRW	-0.709	-0.127	-0.429	0.121	0.220	0.606	-0.364	-0.281	0.020	0.354	-0.104	0.516	-0.428	1.000					
PTAP	-0.471	0.207	0.095	-0.210	0.776	0.570	-0.308	0.051	0.135	0.321	0.461	0.029	0.057	0.400	1.000				
TOIL	0.459	0.650	0.655	-0.854	0.107	0.268	-0.391	0.850	0.449	0.237	0.513	0.126	0.810	-0.180	-0.076	1.000			
FOOD	0.026	-0.490	-0.166	0.357	-0.613	-0.513	0.440	-0.167	0.377	-0.419	-0.035	-0.396	-0.091	-0.120	-0.378	-0.011	1.000		
CAL	-0.130	-0.291	-0.583	0.495	-0.355	0.024	-0.084	-0.563	-0.634	0.321	-0.435	0.038	-0.430	0.255	-0.204	-0.413	-0.061	1.000	
IMM	0.085	0.750	0.489	-0.649	0.758	0.724	-0.485	0.623	0.285	0.342	0.459	0.448	0.407	0.222	0.565	0.276	-0.532	-0.435	1.000

care facilities in such states. Though the correlation coefficient (r) is not significant, yet the direction of the relationship confirms the above mentioned trend. DPR has a negative relationship with CAL, though r is only - .13 indicating a very weak relationship but it indicates that high morbidity states have lower calorie intake levels than low morbidity states.

The correlation of DPR with URB and PCV is negative, indicating a trend of declining DPR with increasing urbanisation and income levels, though the r is again insignificant at -.3 and -.18 respectively. With POV, DPR shows a highly insignificant negative relationship with an r of -.058 only. With FOOD also DPR has an insignificant relationship of .02 only. The correlation of FMDLEB and DPR is positive with a r of .53 which indicates that DPR is high in states with high difference between male and female life expectancy, such as in Kerala. In Kerala the FMDLEB is the highest at 6.2 and the DPR is also the highest at 728.

In case of educational status indicators, DPR has a positive r of .58 with FLIT, showing again the trend of higher morbidity with higher female literacy, which again may be possibly the result of higher awareness towards health and therefore higher reporting of illnesses. With ENR the DPR shows an insignificant but negative relationship of -.01.

The DPR has a low negative correlation with PCHE (-.1) and HPER (-.234) which is very insignificant. It has a low positive r of .085 with IMM. But with BEDP the r is higher at .559 which is important in social science research since population data rarely shows high correlation coefficients. This r of .559 shows that DPR is high in states with high BEDP and vice versa.

The most significant relation that DPR has is with DRW (r = -.709). This indicates a falling trend in DPR with rising DRW. The correlation with PTAP is also negative (r = -.471). However, with TOIL the r is positive (.46) which is contrary to the expected trend of falling DPR with rising TOIL.

2. LEB : Increase in life expectancy indicates better health status. The correlation of LEB with other indicators seems to be more in conformation to the expected trends. Its correlation with FMDLEB is significant at .806 (Significant at 10% level of significance) indicating that states with higher life expectancy show higher gap between male and female longevity. The negative correlation with IMR is -.876, also significant at 10% level of significance. With CAL the r is -.291 which is a weak negative correlation showing a trend similar to the one between DPR and CAL.

URB and PCV are positively correlated with LEB (r of .50 and .55 respectively) and negatively correlated with POV and FOOD (r of -.63 and -.49 respectively) which confirms the fact that life expectancy

increases with increasing income levels and with declining poverty. It also increases with increasing urbanisation.

Female literacy has a very positive correlation of .81 with life expectancy at birth. This shows the importance of social development in the improvement of health status. Though ENR also shows a positive correlation, the r is very low at .21.

LEB has a positive relationship with all the health facility indicators, which implies that better health facilities do improve the life expectancy levels. While the r is not very high at .438 in the case of PCHE, .436 in the case of HOSP and .41 in the case of HPER, it is higher at .652 for BEDP and the highest at .75 for immunisation coverage. This highlights the importance of immunisation in bettering the health status of population.

In the case of amenities, LEB has a very low negative correlation with DRW (r = -.127) but a positive correlation with PTAP (.207). The availability of toilet facilities has a stronger positive correlation at .65.

3. FMDLEB : States with a higher FMDLEB have low IMRs and vice versa. This relationship is confirmed by the r of -.799 for IMR. With CAL it shows a negative correlation of -.583. Its relation with economic status indicators shows that the FMDLEB is higher in regions with higher economic development and lower poverty, and it also increased with urbanisation. It r with URB is .39, with PCV =.176; with POV = -.47; and with FOOD = -.166.

FMDLEB has a strong positive r of .717 with FLIT which indicates the fact that female literacy is higher in states with higher female life expectancy - both indicate the status of women in the sates. The r with ENR is also positive at .353.

Among the health facility indicators, it has a weak correlation with PCHE (.11) and HPER (.14), but higher correlation with IMM (.489), HOSP (.526) and BEDP (.703). It shows a negative correlation with DRW (-.429), a very weak correlation with PTAP (.095), but a high positive correlation with TOIL (.655).

On the whole the FMDLEB shows a positive relationship with health status, economic development, educational development and health facilities.

4. IMR : The IMR is used communally as an indicator of health status and reflects to a greater extent the effect of the health determinants on health status. It has a strong negative correlation with LEB and FMDLEB, as discussed earlier. IMR has a declining trend with increasing economic development, as

indicated by the r of IMR with URB (-.503), PCY (-.463), POV (.598) and FOOD (.357). However, IMR has a positive r of .495 with CAL, which is contrary to the expected trend. This may also mean that IMR is more affected by health facilities and level of development rather than nutritional status.

IMR shows a very strong negative r of -.888 with FLIT, which highlights the influence of women's education on the health of their offspring. It has an r of -.364 with ENR.

IMR shows a negative relationship with all health facility indicators, the r being -.235 for PCHE, -.54 for HOSP, -.328 for HPER, -.649 for IMM and high of -.793 for BEDP. It relation is insignificant but positive with DRW (.121) and negative with PTAP (-.21). However, it is highly significant with TOIL at -.854.

5. URB: The level of urbanisation has a positive relationship of .547 with PCY. It has a low but positive relation with FLIT and ENR, as well as with the facility indicators of PCHE, HOSP, HPER and BEDP. However, it has a high positive r of .758 with IMM. This reflects the heavy urban bias of immunisation services in India. It has a low but positive relationship with DRW and TOIL while the r is high at .776 for PTAP. The r with FOOD and CAL is negative at -.613 and -.355 respectively.

Increasing urbanisation on the whole is coupled with increasing education and income levels, as well as increasing health facilities. All this brings an improvement in the health status.

6. PCY : The PCY is predictably negatively correlated with IMR, POV and FOOD, but has positive correlation with all other variables. It has a weak positive correlation with FLIT and ENR, as well as CAL, TOIL, BEDP, HPER and HOSP. The r is high for PCHE (.636), DRW (.60) and PTAP (.57), but highest for IMM (.724).

7. POV : The POV is negatively correlated with DPR, LEB, FMDLEB, URB, PCY, and the health facility variables of PCHE, HOSP, HPER, BEDP and IMM. It has an r of -.3 with FLIT and .161 with ENR. It is negatively correlated with DRW, PTAP and TOIL also. Its positively correlates with FOOD (.44) – the higher the poverty, the greater the proportionate expenditure on food.

8. FOOD : FOOD has a negative correlation with LEB (-.49), URB (-.61), PCY (-.51) and IMM (-.532). It has a negative relationship with all other health facility indicators though the r is low FOOD has a weak positive correlation with DPR, IMR (.357), and POV Food has a very weak negative correlation with CAL (-.061).

9. CAL: The per capita per day average calorie intake does not confirm to the expected trend in most indicators. It has a negative correlation with IMM (-.435), LEB (-.29) and FMDLEB (-.583) which is age the logical trend. It is positively correlated with IMR (.495) which is also reverse of the expected trend. It is negatively correlated with URB (-.35), and has very weak correlation with DPR, POV and PCY. The fact that is has a high negative correlation with FLIT and ENR (-.56 and -.63 respectively) confirms the contrary. All these factors seem to arrive at the conclusion that health and nutritional status are not interested and do not show any dependence on each other, nutritional status is also not showing any significant relationship with economic development. It seems to be independent of educational development also. It has a weak positive relationship with PCHE (.32) and HPER (.038), and weak negative relationship with HOSP (-.43), DEDP (-.43), PTAP (-.2) and TOIL (-.413). This also shows lack of significant relationship between CAL and the health facility as well as amenities indicators.

10. FLIT : Female literacy, as discussed earlier, has a positive r of .58 with DPR, .81 with LEB and .71 with FMDLEB; a strong negative r of -.888 with IMR; a weak positive r of .32 and .33 with URB and PCY, and a weak negative r of -.299 with POV and -.167 with FOOD. This indicates better health status (through higher morbidity) in areas of high female literacy and a weak positive relationship with urban and economic development. It has a positive r of .499 with ENR, as expected. FLIT has a very weak positive relationship with PCHE and HPER, but a strong r of .855 with BEDP, .564 with HOSP and .62 with IMM, showing that states with high level of development of health facilities also have high female literacy. FLIT has a weak r with drinking water availability (-.28 with DRW and .05 with PTAP) but a very strong positive relationship with TOIL (.85).

11. ENR: ENR shows the same trend FLIT and is less strongly related to any of the variables. It is weakly correlated with health status variables as well as with economic development variables. The relationship with all the variables is in the same direction but much weaker than FLIT. Thus it has a very weak positive correlation with health facility and amenities indicator; and a stronger negative correlation with CAL (-.634).

12. PCHE : PCHE shows a positive relationship with LEB and negative relationship with IMR. It has a weak positive relationship with URB but stronger with PCY (.636). It is negatively correlated with poverty levels and food expenditure. It has a very weak positive correlation with FLIT and ENR. It has a very weak positive correlation with other facility indicators of HOSP (.04), HPER (.5), BEDP (.151) and IMM (.34). The amenities indicators also show a weak positive correlation with PCHE.

13. HOSP : The relationship of HOSP with the health status variables indicates that the higher the HOSP, higher is the health status and vice versa. The same relationship is reflected in the case of urbanisation, economic development and education status. It has a positive relationship with other health facility variables, and the high r of .749 with BEDP is the result of colinearity between the variables. It is also positively correlated with amenities indicates, the r being slightly high for TOIL at .513.

14. HPER : HPER has the same relationship with health status variables as HOSP. It is moderately positively correlated to urban and economic development. Its relationship is not significant with FLIT and ENR, other health facility indicators (except .448 for IMM), CAL and the amenities indicators.

15. BEDP : BEDP has a higher positive relationship with health status but a low positive relationship with urbanisation and economic development. It has a very high positive correlation with FLIT (.855) and TOIL (.81). It has low correlation with all other indicators.

16. IMM : As expected, IMM has a high positive correlation with LEB and a high negative correlation with IMR. It has a high positive correlation with urbanisation, per capita income and female literacy, and a low positive correlation with other health facility indicators (.4 - .5). It has a weak positive correlation with the amenities indicates expect PTAP (r = .565). The level of immunisation is thus significantly influenced by urbanisation, economic growth and female literacy, and it in form influences the health status significantly.

17. DRW : The availability of drinking water from all source has a significant negative correlation with DPR but low correlation with other health status variables. It has a relatively high correlation of .606 with PCY but very low correlation with other economic status variables. Its relationship with FLIT and ENR is also quite insignificant. It has an insignificant relationship with other health facility variables except r of .516 with HPER.

18. PTAP : PTAP shows a negative relationship with DPR but to a lesser extent than DRW. It has a similar relationship with other variables as DRW, but has a high positive correlation with URB (.776) and PCY (.57). The r is quite low for POV, FOOD and CAL, as well as for FLIT, ENR, PCHE, HPER, BEDP and TOIL. It is relatively higher for IMM (.565) and HOSP (.461).

19. TOIL : The availability of toilet facilities has emerged as a more significant determinant of health status rather than availability of drinking water. It has a relatively strong positive relationship with LEB (.65) and FMDLEB, and a very strong r of -.854 with IMR. Its relationship with indicators of economic development is insignificant, but it has a very high correlation of .85 with FLIT and .45 with ENR.

Among the health facility indicators, it has a high correlation of .51 with HOSP and a very significant correlation of .81 with BEDP. On the whole the availability of toilet facilities shows a greater correlation with social development (such as female literacy) rather than economic development and urbanisation, which is the case with drinking water availability.

v.2.3 REGRESSION ANALYSIS:

The correlation analysis tells us the relationship between the determinants of health status and the variables as depicted through the data available. Another important aspect is the analysis of the contribution of the independent variables in the variations in health status which has been analysed through in regression.

The stepwise method of regression analysis was carried out to study the level of influence each independent variable had on the health status variables. The two dependent variables which were selected to represent the health status were the average DPRs of 1993 and the IMR of 1994. The number of independent variables were reduced to 10. Some of the variables showing multicolinearity or with insignificant correlation coefficients were removed. The regression analysis was carried out in the computer using the SPSS programme.

Though 10 independent variables were included in the analysis, the final result as derived through the computer, in the case of both dependent variables, included only two variables in the analysis. This means that the other variables showed insignificant contribution to variation in the dependent variables and hence were excluded by the computer in its results. In the regression with DPR as independent variable the variable of female literacy (FLIT) and urbanisation (URB) were included while in the regression with IMR as independent variable FLIT and poverty (POV) were included.

The regression results in the case of DPR as independent variable are listed below:

	Independent Variable	**R^2**	**SE**	**Adj. R^2**	**F**	**Regression Equation**
Step 1	FLIT	0.34	154.6	0.29	6.8	DPR= -129.17+6.96(FLIT) - step 1
						DPR=73.8+9.05(FLIT) - step 2
Step 2	URB	0.61	123.8	0.546	9.4	DPR=73.8-11.5(URB)

The R^2 in the first step was .34 which increased to .61 , indicating that the 2 variables explained 61% of variation in DPR. The adjusted r square also increased to .55. There was a decline in SE though the value was quite high. The F value showed an increase in the second step.

In this model it can be observed that DPR increases by 9.05 units per unit increase in female literacy in the second step. This shows the positive relationship between DPR and FLIT. This implies that DPR increases with increase in female literacy. The reasons for this have been discussed in the section on correlation analysis.

The only other variable in the analysis is URB which has a negative relationship with DPR. The equation formed indicates that with every unit increase in urbanisation there is a decline in DPR by 11.5 units. Greater urbanisation implies better facilities of sanitation and drinking water as well as greater access to health care and immunisation facilities, which is probably the reason why the disease prevalence declines with urbanisation. It must be remembered that the diseases included here are only the communicable diseases.

All other variables were not included in the equation though it was expected that factors such as availability of health facilities and level of immunisation would have a significant impact on health status. However, in the Indian case, the only factors which truly influence morbidity are level of urbanisation which exercises a negative influence on morbidity and female literacy which increases the morbidity reporting.

In the second part of the regression analysis the dependent variable was IMR and the independent variables included were FLIT and POV. The results of the regression are listed below:

	Independent Variable	**R^2**	**SE**	**Adj. R^2**	**F**	**Regression Equation**
Step 1	FLIT	0.89	10	0.77	48.7	IMR = 120.8 - 1.2 (FLIT) - step 1 IMR = 88.6 - 1.05 (FLIT) - step 2
Step 2	POV	0.91	6.8	0.89	60.1	IMR = 88.6 + .796 (POV)

The IMR is explained by the variables of FLIT and POV to as much as 91%, which shows how profoundly the two variables of female literacy and poverty influence infant mortality. The R^2 for FLIT is 89% which reflects the overwhelming explanatory power of the variable in this model. A unit increase in FLIT leads to 1.05 units decline in IMR, which is contrary to the trend observed in the case of morbidity. Thus though female literacy has a negative influence on mortality it has a positive influence on morbidity.

Glewwe[2] summarises the effect of mother's literacy on child health in the following three points:

1. Formal education directly teaches health knowledge to future mothers.
2. Literacy and numeracy skills acquired in school assist future mothers in diagnosing and treating child health problems.

[2] Glewwe, P. (1999), 'Why does Mother's Schooling Raise Child Health in Developing Countries?', *Journal of Human Resources*, vol.34(1), p. 126.

3. Exposure to modern society from formal schooling makes women more receptive to modern medical treatments.

Female literacy indicates not only high literacy but also overall social development, greater awareness regarding health and hygiene and greater acceptance of health and family welfare programmes and interventions. Educated mothers are more aware of the health of infants leading to prompt treatment of illness among infants. This translates to high morbidity rates, but since the diseases receive appropriate treatment, the morbidity does not translate into mortality and hence the IMR declines with increase in female literacy while it is vice versa in the case of morbidity.

The second variable influencing IMR is POV, which leads to an increase in the adjusted R square from .77 to .89, though its contribution to R2 is small at only .2 units. The regression coefficients are significant in both cases. Poverty has positive relationship with IMR. The reasons are obvious - high poverty implies poor nutrition, poor living conditions, high illness prevalence and lack of access to health care facilities. All these factors lead to high IMR.

This regression analysis shows that the social variable of female literacy has the maximum effect on health status, while URB and POV are the economic variables affecting DPR and IMR respectively. The overwhelming influence of the social variable indicates the importance of social development in bringing down the mortality levels and improving the health awareness of the population in India. It necessitates the need to focus on social factors of development rather than merely analysing economic variables in a research on health status, especially in the case of developing countries like India.

V.3 INFERENCES :

Some important points emerge from the correlation exercise relating to the patterns of health status and their determinants. Not all variables selected show strong correlation's, the major limitation being the nature of the data available and the level of its accuracy. However, some of the points which do emerge from the analysis are outlined below.

The DPR on the whole shows a negative relationship with economic development but it shows relatively significant positive relationship with factors of social development such as FLIT and FMDLEB. This is largely due to the fact that Kerala being a socially developed state also has the highest morbidity. States at a low level development do not show high morbidity because of the low reporting of illness and the loopholes in data collection.

The fact that per capita calorie intake shows a negative relationship with social development (FLIT and

ENR) as well as health status variables and health facility indicators is because states like Kerala, Maharashtra and Andhra Pradesh have high LEB indicating better health status, but low per capita calorie intake levels. Though the correlation coefficient is not significant, yet the trend does turn out to be a negative one. Calorie consumption does not seem to be influenced by variables of economic and socio development.

Female literacy again emerges to be a very important factor affecting health status of population of high female literacy indicates not only a greater awareness among women regarding matters of health and hygiene, but also an overall better status of women in society. This also means greater utilisation of health facilities since illness among females is less likely to be ignored in such a society. FLIT therefore has a high positive correlation with LEB (.81), FMDLEB (.71), BEDP (.85), TOIL (.85) and IMM (.62). FLIT also shows a very strong negative correlation of .89 with IMR. All these facts highlight the importance of promotion of female literacy for the improvement of the health status of the population and to ensure good health for generations to come.

The variables DRW and PTAP fail to emerge as effective indicators of the availability of safe drinking water. PTAP is related only to urbanisation and economic development and not health status. DRW also does not have a significant correlation with any variable except to some extent PCY and DPR. It can be said that while it has a negative correlation with morbidity, it does not have a significant correlation with other variables. DRW indicates the availability of drinking water but not whether it is safe or is properly shared and consumed. This may be the reason why it does not give significant results.

The availability of toilet facility in the household emerges a s a significant determinant of health status. It shows a highly positive correlation with indicators of social development, but little relationship with indicators of economic development. It is also highly positively correlated with health facility variables such as BEDP. This may also imply that population in socially more developed states is more aware of the benefits of proper toilet facilities and therefore the greater toilet facilities than other states. TOIL thus shows a high positive correlation with DRP, LEB and FMDLEB, and a very high negative correlation with IMR.

To summarise it has been observed by the correlation analysis that health status indicators clearly show a higher relationship with indicators of social development and health facilities than with indicators of economic development. This highlights the importance of social development in improvement of health status, the example of Kerala being the foremost before us.

CHAPTER VI

CONCLUSION

VI.1 SUMMARY OF CONCLUSIONS:

This study was executed keeping in mind certain definite objectives. The results obtained and the inferences that can be drawn from the results have been outlined in the course of the study. Presented below is a summary of the conclusions that have been drawn on the basis of the results obtained.

VI.1.1 Mortality and Health Status:

The analysis on mortality formed the first section of the fourth chapter. The aim was to understand the macro-level picture of health status which emerges through the regional variations in mortality. The following are the major conclusions arrived at in this analysis of health status:

a) There has been a steep decline in mortality from the 1920s to the present, the mortality rates declining from 47.2 per thousand population in 1911-21 to 11.2 in 1981-91. This steep decline has been largely the result of technological advances in medical and public health. However, it was also observed that there are significant regional disparities in the mortality rates, which implies the need for greater efforts towards control of death rates in some regions. These regions generally correspond to the backward areas with a large concentration of rural population, low economic development and low literacy levels.

b) Large differences were observed in death rates between rural and urban areas, the death rates in rural areas being higher than the urban areas. The reasons are in the differences of life style which again is the result of income differences, literacy differences, lack of access to proper health care services, lack of knowledge on personal hygiene and harmful social practices. The disparity in death rates by residence have, however, shown a decline since 1981.

c) The differences in mortality by sex indicate that the females are at a disadvantage in India, since their death rates are only slightly lass than that of males, while the differences are large in the case of developed nations. Female mortality in childhood and in the reproductive age is quite high, being higher than males in some regions. The social bias against females and their subordinate position in the largely patriarchal set up has led to this pattern. Again, though the female mortality has been declining over time specially since 1981, the process is very slow and can only come about through enhanced social development. The economically developed states also show high female disadvantage in terms of mortality. This proves that it is not economic development alone but rather social

development which alleviates the position of women in society and helps bring down female mortality vis-à-vis male mortality.

d) The infant mortality in India is still very high and its control can bring down the death rates substantially. Thus though India has low death rates, they can still be reduced further through decline in infant mortality, female mortality and alleviation of regional differences in mortality rates.

e) The regional patterns of mortality which emerge show a consistently high mortality in the less developed states of Orissa, Madhya Pradesh, Uttar Pradesh, Bihar and Rajasthan, while the comparatively better off states are the north western states and the southern states. The state of Kerala stands apart as the state with the lowest mortality in India. No other state has been able to reach the same level as Kerala.

VI.1.2 Morbidity and Health Status:

The aim of the analysis of morbidity patterns in India was to comprehend the morbidity burden which is an essential component of any study in health status. The study also examined the patterns resulting from a combined index of health status. Morbidity patterns in India were examined temporally as well as spatially and yielded the following results:

a) The country has shown very high morbidity prevalence rates on the whole, which have been declining over the years. the diseases which have shown the highest prevalence rates across the country are TB, diarrhoeal diseases, respiratory diseases, anaemia and skin diseases. Diseases related to pregnancy and child birth as well as diseases of infancy also show very high prevalence rates consistently. This shows the disadvantage that this section faces in terms of health risk.

b) The proportion of communicable diseases continues to be very high in India, and diseases such as TB, respiratory infections and diarrhoeal diseases are major public health problems. The reason for this is the continuing ignorance and poor living conditions of the masses coupled with poor nutrition. Not only is the largely rural population under constant risk of such diseases, but also the urban population suffers from high incidence of diseases such as malaria due to favourable environmental conditions for disease occurrence created by human activities itself. The proportion of non communicable diseases is also increasing which adds to the overall disease burden of the country. The rise in incidence of non communicable diseases such as diabetes, asthma, rheumatism and heart diseases has been the result of changing life styles and food habits mostly in urban areas. The effects of pollution are also a major problem in urban areas.

c) The states which have shown consistently high DPRs are Kerala, Tamil Nadu, Punjab and Orissa. The fact that states with low mortality (except Orissa) have reported high morbidity can be explained by the association of literacy and social development with decline in mortality. Literacy improves the

awareness and morbidity perception of the people and leads to greater reporting of diseases for treatment. The availability of proper health care facilities also encourages the morbidity reporting and treatment. The states which have shown continuously low DPRs are Maharashtra, Gujarat, Himachal Pradesh and Rajasthan. Himachal Pradesh however showed the highest DPR in 1993 mainly because it had the highest DPR of respiratory diseases in the country.

d) High prevalence of anaemia among the females and children specially indicates the poor health and vulnerability of this section. The prevalence of anaemia is high in all the states not indicating any prominent regional patterns. It has also shown consistently high prevalence rates over the years.

e) On the whole disease prevalence does not follow the same pattern as mortality since the factors which increase prevalence of diseases are basically those which encourage morbidity reporting and treatment rather than preventing morbidity as such. Widespread high morbidity is still a feature for the whole of the country, only its reporting is affected and this reflects in the patterns of morbidity across the states. The less developed states show much less morbidity than the more developed states because there is much less disease reporting for treatment due to economic factors as well as low awareness and social stigmas with regard to illness.

VI.1.3 Nutritional Intake and Health Status:

The levels of nutrition across the states were also analysed in order to assess the patterns in nutritional intake over the years and the manner in which they relate to health status. The nutritional intake was measured using the levels of per capita calorie consumption as indicator. The nutritional intake levels were also related to income groups to see the distribution of nutritional status across income groups in the states. The following are the inferences drawn from this analysis:

a) The intake of calories across the states over the years shows a declining trend which may be attributed to changes in the nature of food consumption, the shift in diet habits from coarse to fine cereals and lower amounts of consumption due to rise in food prices.

b) The calorie intake levels are slightly more for rural than for urban areas, but the decline in calorie intake in rural areas has been steeper in the rural areas, showing a greater problem in nutritional intake there.

c) The levels of calorie intake are higher in states with greater economic development and higher proportion of coarse cereals in the food basket. States with low calorie intake levels, on the other hand, are those where rice is the principal cereal in the daily diet.

d) The number of states showing adequate nutritional intake in terms of the recommended daily intake of calorie have been declining over the years in both rural and urban areas.

The nutritional status of India, thus offers much cause for concern, since it has been declining over the years. The occurrence of nutritional disorders, as seen in the morbidity section, is also quite high. In order to achieve a better health status for all, earnest efforts towards improvement in nutritional intake of the people are required. The several government programmes for improvement of nutritional status are piecemeal and need to be integrated with the overall economic development process in order to be effective.

VI.1.4 Index of Health Status:

The patterns derived from the index of health status which combines the indicators of morbidity, mortality and nutritional status indicate that the states with low mortality do not necessarily show high health status because they are generally accompanied by high morbidity and low nutritional intake. The index proves ineffective in reflecting the trends in health status as observed by the mortality patterns, because the variables of morbidity and nutrition do not reflect health status as such in India.

Morbidity is more a reflection of the level of treatment availed for morbidity and the level of health awareness in the society. This is positively related to the level of social development and negatively related to the mortality level. Hence the morbidity pattern is the opposite of the mortality pattern.

Nutritional intake also as reflected in the variations in calorie intake is much affected by factors such as the composition of food basket and the accessibility to food of the general population which in turn is affected by the food prices and the performance of the public distribution system. It therefore does not show a conclusive relationship with either morbidity or mortality. An index of health status in the Indian context is therefore not feasible unless in the case of a primary survey data where the morbidity levels reflect the actual morbidity and not the reported morbidity.

VI.1.5 Factors Affecting Health Status:

The exercise in correlation and regression analysis examined the influence of various socio-economic factors on health status. the variables of morbidity and mortality showed different trends in the relationships with the other variables.

The mortality variables show a negative relationship with urbanisation and income levels as well as all health facility variables. Morbidity, on the other hand shows a negative relationship with economic development but a positive relationship with female literacy indicating the role social development plays in improving the treatment seeking for morbidity by the people. Nutritional status does not show significant correlation with any of the variables in the analysis.

The regression analysis of the health status variables of DPR and IMR as dependent variables on ten other independent variables brings out significant results only in the case of two variables. Female literacy and urbanisation are the only two variables affecting morbidity, the former increasing the DPR while the latter decreases it. The standard error is quite large in this case. A much stronger result in the case of IMR shows that female literacy again has a strong effect on IMR, and leads to reduction in IMR. The other variable is poverty which leads to an increase in IMR. Thus the overriding effect of female literacy on health status is all the more evident after this analysis.

VI.2 LIMITATIONS OF THE STUDY:

The following are the major limitations of the study:

1) Problems in data availability in the case of some states for certain years hindered the continuity of inclusion of all states in the analysis for all the years. Crucial states being left out in certain years either in morbidity or mortality analysis led to gaps in the assessment of the temporal health status patterns for those states. Among the major states, Haryana was not formed in 1961 and hence does not figure in the 1961 analysis. Himachal Pradesh had no nutrition data for some of the years. in 1971 no SRS estimate of mortality were available for West Bengal. In 1981, no morbidity estimates were available for Tamil Nadu, Uttar Pradesh and West Bengal, while Assam had no census data for that year since the census was not carried out in Assam in 1981. No morbidity data was available from 1961-94 for Bihar. Hence it was excluded totally from the morbidity analysis. Jammu & Kashmir was also excluded from the study for want of consistent data.
2) No adequately representative data was available for several determinants of health status such as availability of safe drinking water and living environment which has a strong influence on health status. The proxy variables used did not yield significant results.
3) The results of the study pertain to patterns at the state level but are not representative of variations within the states. In all states there are significant intra-state regional differences in the health status, which is not reflected in the study. Inter-state disparities in India are the broadest level at which any regional analysis can be carried out. In order to analyse the regional pattern within the states, however, data is required at the requisite level.
4) Data on diseases does not include all disease categories, though majority of the diseases are covered. Data on non communicable diseases was not available for 1993-94. Another limitation is that the data available pertains only to public hospitals and health centres with the private health centres completely left out. It does not, however, affect the broad patterns of disease occurrence across the states.

5) Due to limitations in data availability, not all variables could be included as envisaged for all time periods. The data on causes of death was restricted to 1980 and 1994 for want of comparability between time periods. The latest data available for morbidity and nutritional status was for 1993-94.

VI.3 HEALTH POLICY IN INDIA: A CRITIQUE

India has suffered very high morbidity and resultant high mortality through the ages. Though the mortality has come down steeply in a relatively short period of about 70 years, the infant and female mortality remain very high as compared to other countries of the world. A complex association of poverty and socio-economic backwardness are the main factors responsible for this. Related to poverty and backwardness is the problem of widespread undernutrition.

In terms of morbidity, India is in a unique phase of health transition when the communicable diseases are high through declining but the non communicable diseases are rising simultaneously. Thus India has a high prevalence of communicable diseases and an increasing prevalence of non communicable diseases. In the context of the grim health situation in India, the efforts towards the improvement of health status by the state merit an examination.

This section takes a look at the background of public health in India, the health policy and programmes in India, their main features, achievements and limitations in order to understand the role that the government institutions and policies have played in influencing the health status of India's population.

VI.3.1 Background of Public Health in India:

The present public health system in India has been inherited from the colonial rule. The colonial government initiated some steps in public health such as provision of drainage system and sanitation works primarily in areas of British residence in order to prevent the deaths of the British people and the soldiers of the colonial army, who were succumbing in high numbers to epidemics of communicable diseases such as malaria, cholera, plague and small pox. The India Medical Service was started on the lines of the Indian Civil Service which gradually shifted from military dominance to civil health works, especially due to pressure from the British parliament and the nationalists. Public health legislations were passed and the public health measures included setting up of hospitals and dispensaries as well as immunisation of population. But this was restricted to centres of British residence and commerce and areas important to the British rule. This patchy development of the health care facilities led to wide disparities in the provision of health care facilities in India, which continued after independence also.

The growing need to reform the health system in India was increasingly felt and in 1946 the Health Survey and Development Committee , known popularly as the Bhore committee appointed in 1943 submitted an exhaustive report on the state of health in India, the limitations of the then public health

system and concrete proposals to revamp the system. The committee realised the importance of integrating preventive, curative and promotive health services. The report proposed a hierarchy of health centres in India with a primary health centre or PHC to be set up for every 40,000 population at the base of the hierarchy. The PHC was a short term programme, the long term goal being the setting up of primary health units for every 10-20,000 population and secondary units with 650 bedded hospitals. The report also set down norms for the number and type of health personnel in these centres.

The health planning in India after independence was modelled on the basis of the Bhore committee report recommendations. A series of committees over the years reviewed the health situation in India and suggested changes. All this shaped up India's health infrastructure to what it is today.

VI.3.2 Current State of Health Services in India:

India has currently a network of health centres with sub centres at the base of the hierarchy with a threshold population of 5,000 and a PHC for every 30,000 population, a community health centre at the block level and finally the district hospital at the district level. Each health centre has a stipulated level of health personnel. The paramedics working rural areas include the village health guide, lady health visitors, trained midwives and health workers (male as well as female). The auxiliary nurse and midwives (ANMs) work at the level of the PHC. Apart from the hierarchy of health centres a number of special programmes are underway which focus on control or eradication of specific diseases, for example, the National Malaria Eradication Programme, National Filaria Control Programme, National Tuberculosis Programme, Iodine Deficiency Disorders Programme, etc. There are several programmes which deal with nutrition and special programmes on maternal and child health also.

VI.3.3 Health Policy of India:

The first health policy in India came out only in 1983, over three decades after independence. This itself reflects on the priority given to health on the government. The shift in focus on health as merely a consumption sector and a social responsibility of the welfare state to that of a productive investment in human capital as well as the signing of the Alma Ata declaration on health for all by 2000 AD spurred India's efforts to come out with a concrete health policy document, approved by the parliament in late 1983.

The policy document refers to the achievements of the past, the constitutional commitment to eliminate poverty and ill health and also admits to the failures in terms of high infant, child and female mortality, nutritional disorders and communicable diseases as well as lack of access of rural people to adequate drinking water and sanitation facilities. The essentially 'curative' approach to health services in the past is blamed for this. The document admits the neglect of preventive and promotive health care. The alienation of the community from the health personnel and the programmes is also mentioned.

The commitment of India to achieve health for all by 2000 AD is possible only through universal provision of primary health care services, but for this goal to be achieved the document talks of the need to revamp the existing medical and public health system.

The following are the main features of the approach suggested to restructure the health system in India:

a) Provision of network of primary health care services linked with health education and promotion with active involvement of the people and the support of requisite number of health personnel.
b) Upgrading the quality of training of grass root level health workers;
c) Building an organised support at the secondary and tertiary levels to the primary health care system and establishment of an effective referral system;
d) Setting up of chain of sanitary-cum-epidemiological stations across the whole country functioning between the primary and secondary level of hierarchical structure to 'plan and provide, preventive, promotive and mental health care services';
e) Upgradation of facilities in the established health care centres and their proper maintenance;
f) Encouragement to private sector to further spread the network of health services;
g) Development of specialist services left to private sector while in public sector such services cater only to poor patients;
h) Special programmes on provision of mental health care and rehabilitation of the physically handicapped;
i) Priority in health services to tribal, hill and backward areas and to endemic disease affected population.

Some of the priority problems requiring prompt action have also been listed out, such as nutrition (improvement of eating habits, practice of breast feeding etc.), prevention of food adulteration and quality control of drugs, provision of safe drinking water and sanitation along with education of people regarding personal hygiene, environmental protection and adequate measures to prevent changes in environment which may be harmful to health, launching of extensive immunisation programmes, maternal and child health care services, school health programmes and occupational health services.

The other concerns on which the policy emphasises are health education, integration of indigenous systems of medicine with the popular system, health insurance programmes, low cost production of indigenous drugs and vaccines, revamping health legislation and continuous evaluation of health services and programmes.

VI.3.4 Critique of health policy:

In its basic postulates, the health policy document differs little from the Bhore committee report - both stress on the need to decentralise health care services in the rural areas and the need to focus on preventive and promotive health rather than just curative measures. Both also talk of greater community participation in health care management, enhanced training to medical and paramedical personnel. It is sad to note that even after so many years since the Bhore committee report was submitted, nothing much has changed in the overall structure of health services in India including its limitations and hence the goals and priorities in 1983 continue to be the same as in 1946.

The changes which have been suggested in the policy in order to achieve the goals put forward, face many problems such as lack of political will and sincerity, and the lack of adequate resources. Economic problems, people's attitudes, biases in terms of class and residence and inadequate economic viability all hinder the greater spread of health care facilities across the country.

Though the document is explicit about the need to involve the community in the process of health care administration and the need to bridge the gap between health care personnel and the people, no concrete steps have been laid down as to how the policy intends to achieve this. The statement also completely ignores the question of regional imbalances which exist in the level of health care services in India. No mention is made of the regional disparities in health status and the need for taking special steps to reduce these disparities.

In spite of the policy to being in operation for more than 15 years now, there is still no evidence of shift in focus from curative to preventive and promotive services. Health services continue to be 'hospital based' and concentrated in urban areas. There is seemingly no initiation of inter-sectoral action to improve the overall living conditions which alone can have a lasting impact on health. The problem of poverty and social inequality has led to inequalities in the access to health services - a question which has not been addressed as yet. Half hearted measures which were introduced to fulfil the policy goals eventually did not take off. Public health programmes such as immunisation, maternal and child health care, nutrition supplementation are all functional but their efficacy leaves much to be desired. These programmes suffer from poor coverage, lack of funds, implementation irregularities, poor quality of medicines / supplements and lack of effective involvement of the community.

Thus, in spite of so many years since the first health policy of India was formulated, the same problems continue to plague the country's health sector. There is no denying that there have been significant gains in the form of reduction in mortality and morbidity, and also the reduction in gender disparity as well as disparity by residence in health status. But while the former is still attributable basically to technological

advances and curative services, the latter has been an extremely slow change occurring only marginally in more than a decade.

The next section discusses the problems which remain in the health system in India and what can be done to tackle them.

VI.4 HEALTH SITUATION IN INDIA – PROBLEMS AND PROSPECTS :

In the light of the analysis undertake in this paper, it is necessary to look into the problems which plague the health services in India, since only a proper understanding of these problems can help us grasp the reality and work towards deriving suitable solutions in order to improve the functioning of the health system in India. The following are the major aspects which highlight the limitations of the health system in India.

VI.4.1 Regional inequalities :

There are wide regional disparities in the provision of health care facilities in India. Some of these inequalities are the legacy of the colonial rule. In the time of the Raj, only those regions, which were important tothe British, such as the towns and ports which were centres of British trade and commerce as well as seats of the military forces, and strategically important regions had more than adequate health facilities. The regions which suffered from poor health facilities were the great rural winterlalnd and the hilly and tribal areas which were remote and inaccessible.

Even after independence these inequalities continued and still continue. Though special plans have been formulated for hill and tribal areas in order to improve the health services there, the implementation of these plans suffers from many limitations. The large cities and towns are concentrations health facilities such as hospitals and specialised health care centres. The more urbanised and economically developed states such as Maharashtra, Gujarat and Punjab show a better network of health care facilities than the largely backward and predominantly agricultural states of UP, Madhya Pradesh, Bihar and Orissa.

VI.4.2 Urban Bias[1]:

The location of health centres shows a heavy bias towards urban areas. There are many reasons for this. Urban areas have a historical advantage since they had a good network of health care services since the colonial era. They also offer a greater purchasing power, or the 'demand' factor, because of which all health facilities tend to be located there, especially the private health providers. Duggal et al [1] state that in 1991 the rural areas had .57 hospitals and 20.3 beds per lakh population while the urban areas had 3.53

[1] Duggal et al (1995) : 'Health Expenditures Across States – Part I' Economic & Political weekly vol xxx (15). P 834.

hospitals and 283 beds per lakh population. This reflects the magnitude of urban bias in the location of health facilities.

The concentration of health care facilities in urban areas creates many disadvantages in the rural areas. People have to travel to urban areas for proper treatment and to avail of hospitals facilities, which sometimes impose an enormous cost burden on the already impoverished population. Since private facilities are governed by market forces, it is difficult to pursuade them to spread to rural areas. Therefore, it is the governments responsibility to ensure equal provision of health facilities in rural areas as well.

VI.4.3 Social Inequalities :

The inbuilt social inequalities in India reflect upon the health status as well. The most pressing problem is that of disparity by sex in the level of health. Women are at a disadvantage as compared to men with regard to level of health and hence suffer a greater mortality, especially in the reproductive ages. Females suffer a lower social status in a patriarchal society, and hence their nutrition and health needs are generally ignored as compared to the male members of the family. Though the maternal and child health programme has been given a lot of emphasis by the government, its progress has been quite slow. Low female health status can be removed only through social development rather than mere health programmes.

Other socially deprived sections of the society which suffer from poor health status are the scheduled castes (SCs) and scheduled tribes (STs). Tribal habitats are often endemic to several communicable diseases. Poor quality of health facilities inhibits timely and appropriate treatment of diseases leading to high mortality. The poor health status of the SCs is basically the result of their institutionalised social and economic backwardness as compared to the general population.

Social inequalities in health status and access to health services can be removed only by sincere efforts towards ensuring access to health services for all, a goal which though well documented on paper, has been ill executed in reality.

VI.4.4 Quality of Infrastructure :

The quality of health facilities provided by the government especially in the rural areas is far from satisfactory. Poor quality of building structures, lack of adequate testing and sterilizing material and non availability of medicines are very common problems. Lack of funds and corruption are basically the causes for this. The dispensation of expired medicines has also been brought to light occasionally. In some regions with a high prevalence of a particular disease, arrangement should be made to provide greater amount of medicines to combat that disease. However, due to the quota system, this does not happen and often the people seeking treatment are forced to visit private providers. Health centres in rural areas often do not receive their quota of medicine for months, the reason being given as 'no stock in the central

stores'. Deficit of medicines and injections, poor storage, testing and sterilisation facilities have all affected the functioning of PHCs in rural areas and have greatly eroded their viability.

VI.4.5 Apathy of Medical Personnel :

India is one of the largest donors of qualified medical personnel in the world, with a substantial reserve of physicians and specialists. However, the services of these physicians are restricted mostly to urban areas where there is greater economic benefit. The rural health centres face the problem of absenteeism of the doctors appointed there, while the urban areas witness constant mushrooming of private clinics and nursing homes. Postings in rural areas or backward hilly and tribal areas are considered a punishment, and hence doctors try their best for transfers out of such areas. The apathy and absenteeism of public health personnel pushes the rural population towards quacks and private clinics where a large fee has to be paid and medicines bought from outside. Many of the government doctors also run roaring private practices besides their occupation. The visits of paramedical staff to villages are also irregular and often a fee is charged in lieu of the services rendered. All this has created a gap between the health personnel and the community, which can only be bridged through concerted efforts towards providing health for all not just looking for opportunities of economic gain.

VI.4.6 Inequalities in Health Expenditure :

Health expenditure varies across the states in accordance with the priority given to the health sector by them. There are other reasons for these differences as well. Data on per capita expenditure on health indicates high health expenditures in North Eastern states as well as small states such as Goa and Himachal Pradesh, Kerala and Punjab are the only two larger states, which have a high per capita health expenditure. The North Eastern States and the small states have the advantage of low population base and special packages for development of hill and tribal areas. The larger states with the bulk of population have a much lower per capita expenditure on health and suffer from a large deficit in the provision of health facilities to all.

VI.4.7 Poor implementation of Health Schemes and Programmes :

The implementation of health programmes also has a low priority in state expenditure because of which the programmes are grossly underfunded. This is one of the reasons why the programmes do not yield satisfactory results and fail to make a dent on the diseases they aim to tackle. The low funding results in deficit of testing equipment and medicines. The health workers who implement these programmes are apathetic to the special needs of the programme. Most of the diseases and problems covered under these programmes are the result of poverty and socio – economic backwardness. Hence, instead of piecemeal programmes operating in isolation from development programmes, it is necessary to integrate the health programmes with the overall process of social development. For example, disease prevention and MCH

programmes can be linked to the literacy of health programmes remains a major problem and can only be solved by a shift in priority by the sate governments.

VI.4.7 Over – Emphasis on Family Planning :

India had its first health policy in 1983, but it has had a family planning policy much earlier. Population control being a major focus, the family planning goals and strategies were given more prominence and priority over health programmes. Health workers were required to dispense information on family planning also to the villages they covered. The initiation of target system worsened the problem since the health workers were preoccupied by fulfilling these targets rather than working on health problems in general. Health education and promotion thus suffered further. Duggal et al [2] quote a number of studies which have shown that PHCs have remained under-utilized to a large extent because of their focus on completing family planning targets, apart from the problems of lack of adequate funds and equipment. The focus on family planning shifted to MCH and immunization only after there was a shift in policy initiative with the realization of the relationship between infant mortality rate and the birth rates.

VI.5 CONCLUSION:

The above discussed factors provide only a broad overview of the problems faced in the health sector in India. Each of them is a topic of discussion and analysis in its own right. As long as these problems persist in the country, there will be no change in the health status of the population for the better. One of the major difficulties in dealing with these factors is their deep interrelationship with the overall process of socio-economic development. The problems of poverty and underdevelopment are the foremost obstacles to a better health status. The example of Kerala has shown that even without economic development the level of health can be improved appreciably. But it requires sincere efforts by the government along with active community involvement. However, health ranks at a low priority level, and the pursuit of personal economic gains seems to have eroded our sense of social responsibility.

It is indeed shameful that even today the vast majority of our population suffers from undernutrition and poor health. The success of health planning in India is possible only if the goals and strategies so well elaborated on paper are actually implemented with the same sincerity. Only then can India enter the new millennium assured of a better health status for all her people.

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APPENDIX - 4.2

INDIA - CRUDE DEATH RATE - 1961-94

STATES	1961			1971			1981			1994		
	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL
Andhra Pradesh	7	10.7	7.6	15.7	9.1	14.6	12.2	6.5	11.1	9	6.5	8.3
Assam	2.9	6.1	3	18.7	9.5	17.8	13	8	12.6	9.4	7.2	9.2
Bihar	4.8	6.5	4.9	_	_	_	14.7	8	13.9	10.8	7.5	10.4
Gujarat	10.7	11.4	10.9	17.6	13	16.4	12.4	10.7	12	9.6	6.9	8.7
Haryana	_	_	_	10.4	7.3	9.9	11.9	7.6	11.3	8.2	7.7	8.1
Himachal Pradesh	9	6.4	8.9	16.2	7.3	15.6	11.5	5.1	11.1	8.9	5.7	8.6
Karnataka	13.1	8.9	11.8	14	7.2	12.1	10.2	6.3	9.1	9.3	6	8.3
Kerala	6.9	11	7.2	9.1	8.4	9	6.7	5.8	6.6	5.9	6.4	6.1
Madhya Pradesh	8.8	8.7	8.8	16.6	9.8	15.6	18	9.3	16.6	12.6	7.4	11.6
Maharashtra	13.7	12.8	13.5	13.5	9.7	12.3	10.6	7.4	9.6	9.2	5.6	7.5
Orissa	13.3	10.6	13.1	15.9	10	15.5	13.5	7.9	13.1	11.7	7.3	11.2
Punjab	12.2	7.2	11.3	10.9	8.7	10.4	10	7.1	9.4	8.2	6.3	7.6
Rajasthan	2.4*	7.5	7.5	18.3	10.1	16.8	15.8	7.6	14.3	9.3	7.3	9
Tamil Nadu	14.2	13.6	14	16.5	9.3	14.4	13.5	7.9	11.8	9	6.2	8
Uttar Pradesh	8.5	11	8.8	21.1	13.1	20.1	17.3	9.9	16.3	11.8	7.8	11
West Bengal	6.4	8	6.7	_	_	_	12.2	6.9	11	8.8	7.1	8.3
India	8.2	8.8	8.63	16.4	9.7	14.9	13.7	7.8	12.5	10.1	6.7	9.3

STATES	1981			1994			RURAL-URBAN RATIOS			
	MALE	FEMALE	FMR	MALE	FEMALE	FMR	1961	1971	1981	1994
Andhra Pradesh	11.6	10.6	0.91	9	7.6	0.84	0.65	1.73	1.88	1.38
Assam	12.5	12.7	1.02	9.5	8.8	0.93	0.48	1.97	1.63	1.31
Bihar	12.6	15.3	1.21	10.3	10.7	1.04	0.74	_	1.84	1.44
Gujarat	12.2	11.8	0.97	8.9	8.5	0.96	0.94	1.35	1.16	1.39
Haryana	10.8	11.8	1.09	8.1	8.1	1.00	_	1.42	1.57	1.06
Himachal Pradesh	14.1	8.1	0.57	11	6.3	0.57	1.41	2.22	2.25	1.56
Karnataka	9.2	9.1	0.99	9.4	7.1	0.76	1.47	1.94	1.62	1.55
Kerala	7.8	5.5	0.71	7.1	5	0.70	0.63	1.08	1.16	0.92
Madhya Pradesh	16.1	17.1	1.06	11.8	11.3	0.96	1.01	1.69	1.94	1.70
Maharashtra	9.7	9.4	0.97	8	7	0.88	1.07	1.39	1.43	1.64
Orissa	13.1	13	0.99	11.2	11.1	0.99	1.25	1.59	1.71	1.60
Punjab	10.1	8.7	0.86	8.2	7	0.85	1.69	1.25	1.41	1.30
Rajasthan	14.1	14.6	1.04	9.8	8	0.82	_	1.81	2.08	1.27
Tamil Nadu	12.1	11.6	0.96	8.5	7.5	0.88	1.04	1.77	1.71	1.45
Uttar Pradesh	15.4	17.3	1.12	11.2	10.9	0.97	0.77	1.61	1.75	1.51
West Bengal	11.2	10.7	0.96	8.4	8.2	0.98	0.80	_	1.77	1.24
India	12.04	11.71	0.97	9.6	8.9	0.93	0.94	1.69	1.76	1.51

INFANT MORTALITY RATE: 1961-94

	1961			1971			1981			1994		
STATES	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL
Andhra Pradesh	75	80	63	106	115	65	93	52	86	69	52	65
Assam	86	93	45	139	144	73	107	76	106	78	76	78
Bihar	87	88	83	_	_	_	124	60	118	68	61	67
Gujarat	73	69	82	144	155	110	123	89	116	70	51	64
Haryana	_	_	_	72	74	58	108	52	101	70	68	70
Himachal Pradesh	65	67	24	113	115	69	72	65	71	60	43	59
Karnataka	62	67	50	95	105	54	77	45	69	73	50	67
Kerala	42	43	34	58	60	48	40	24	37	16	14	16
Madhya Pradesh	95	101	59	135	144	79	152	80	142	105	57	98
Maharashtra	90	94	81	105	111	88	90	49	79	68	38	55
Orissa	124	125	102	127	131	84	140	68	135	108	65	103
Punjab	92	98	64	102	109	76	88	51	81	59	36	53
Rajasthan	103	_	103	123	132	76	118	53	108	87	62	84
Tamil Nadu	89	94	82	113	127	77	104	55	91	64	48	59
Uttar Pradesh	90	86	104	167	173	119	157	97	150	91	65	88
West Bengal	64	56	96	_	_	_	98	44	91	64	52	62
India	82.5	82.9	71.5	129	138	82	119	62	110	80	52	74

	1981		1994		1994 - URBAN		1994 - RURAL	
STATES	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Andhra Pradesh	92	80	73	56	50	56	81	57
Assam	105	106	84	71	69	84	85	70
Bihar	112	124	69	66	57	66	70	66
Gujarat	114	118	62	66	54	46	65	75
Haryana	91	113	65	75	72	63	63	78
Himachal Pradesh	90	55	55	64	45	40	56	65
Karnataka	70	69	71	62	53	46	79	68
Kerala	44	31	16	15	16	12	17	16
Madhya Pradesh	147	137	101	94	57	57	108	102
Maharashtra	82	75	58	53	42	34	71	66
Orissa	139	130	103	104	71	59	107	109
Punjab	79	83	47	60	34	38	52	68
Rajasthan	107	109	84	83	59	66	88	86
Tamil Nadu	93	89	58	60	48	48	63	66
Uttar Pradesh	146	156	86	90	66	65	89	94
West Bengal	94	89	60	65	43	63	63	65
India	110	111	75	73	53	51	80	78

INFANT MORTALITY RATIOS - 1961-94

	RUR				MFR		MFR	
STATES	1961	1971	1981	1994	URBAN	RURAL	1981	1994
Andhra Pradesh	1.27	1.77	1.79	1.33	1.12	0.70	0.87	0.77
Assam	2.07	1.97	1.41	1.03	1.22	0.82	1.01	0.85
Bihar	1.06	_	2.07	1.11	1.16	0.94	1.11	0.96
Gujarat	0.84	1.41	1.38	1.37	0.85	1.15	1.04	1.06
Haryana	_	1.28	2.08	1.03	0.88	1.24	1.24	1.15
Himachal Pradesh	2.79	1.67	1.11	1.40	0.89	1.16	0.61	1.16
Karnataka	1.34	1.94	1.71	1.46	0.87	0.86	0.99	0.87
Kerala	1.26	1.25	1.67	1.14	0.75	0.94	0.70	0.94
Madhya Pradesh	1.71	1.82	1.90	1.84	1.00	0.94	0.93	0.93
Maharashtra	1.16	1.26	1.84	1.79	0.81	0.93	0.91	0.91
Orissa	1.23	1.56	2.06	1.66	0.83	1.02	0.94	1.01
Punjab	1.53	1.43	1.73	1.64	1.12	1.31	1.05	1.28
Rajasthan	_	1.74	2.23	1.40	1.12	0.98	1.02	0.99
Tamil Nadu	1.15	1.65	1.89	1.33	1.00	1.05	0.96	1.03
Uttar Pradesh	0.83	1.45	1.62	1.40	0.98	1.06	1.07	1.05
West Bengal	0.58	_	2.23	1.23	1.47	1.03	0.95	1.08
India	1.16	1.68	1.92	1.54	0.96	0.98	1.01	0.97

MATERNAL MORTALITY RATE - 1961 & 71.

	TOTAL		URBAN	
STATES	1961*	1971*	1961*	1971*
Andhra Pradesh	3.5	1.8	3.5	1.8
Assam	5.4	8.4	5.4	8.4
Bihar	2	_	2	_
Gujarat	1.9	1.3	1.9	1.3
Haryana	_	0.7	_	0.7
Himachal Pradesh	_	_	_	_
Karnataka	2.7	0.2	2.7	0.2
Kerala	2.4	0.2	2.4	0.2
Madhya Pradesh	6.3	2.6	6.3	2.6
Maharashtra	4.6	1.2	4.6	1.2
Orissa	5.5	3.2	5.5	3.2
Punjab	1	0.8	1	0.8
Rajasthan	13.4	6.7	13.4	6.7
Tamil Nadu	3.6	2.5	3.6	2.5
Uttar Pradesh	2.7	3.1	2.7	3.1
West Bengal	2.6	2.2	2.6	2.2
India		1.8		1.8

** - for towns with population 30,000 & above.*

DEATH RATE IN THE AGE GROUP 0 TO 4 YEARS: 1971-94.

	RURAL 1994			URBAN 1994			UFMR		
STATES	M	F	T	M	F	T	1971	1981	1994
Andhra Pradesh	21.3	15	18.2	12.5	14.7	13.6	0.98	0.84	1.18
Assam	26.8	23.1	24.9	19.3	24.2	21.6	0.92	0.89	1.25
Bihar	24.8	25.4	25.1	21.1	24.5	22.7	*	0.79	1.16
Gujarat	22.6	27.4	24.8	16.6	16.6	16.6	1.35	1.31	1.00
Haryana	19	26.5	22.5	19.5	24.6	21.8	1.12	1.08	1.26
Himachl Pradesh	14.7	18.2	16.3	12.2	11.4	11.8	1.20	0.71	0.93
Karnataka	21.9	20.1	21	14.5	11.1	12.8	1.25	1.13	0.77
Kerala	3.3	3.1	3.2	4.7	3.4	4.1	1.01	0.84	0.72
Madhya Pradesh	38.6	38.7	38.7	16.2	17.7	16.9	1.27	1.08	1.09
Maharashtra	18.3	16.4	17.4	10.9	9.1	10	0.89	1.10	0.83
Orissa	32.3	34.1	33.2	21.8	16.9	19.4	0.90	1.20	0.78
Punjab	15.9	20.4	18	9.7	11.1	10.3	1.08	0.99	1.14
Rajasthan	28.8	28.3	28.6	20.6	22.3	21.4	1.40	1.09	1.08
Tamil Nadu	13.5	14.6	14	12.7	10.8	11.8	1.06	0.99	0.85
Uttar Pradesh	32.7	37	34.7	23.2	23.2	23.2	1.09	1.18	1.00
West Bengal	20	21.8	20.9	12.7	18.6	15.6	*	0.70	1.46
India	25.7	26.5	26.1	15.8	15.6	15.7	1.06	1.05	0.99

	RFMR			RUR		
STATES	1971	1981	1994	1971	1981	1994
Andhra Pradesh	0.98	0.99	0.70	2.05	2.05	1.34
Assam	0.85	1.16	0.86	1.75	1.67	1.15
Bihar	*	1.14	1.02	*	1.87	1.11
Gujarat	1.07	1.01	1.21	1.29	1.39	1.49
Haryana	1.23	1.33	1.39	1.58	2.25	1.03
Himachl Pradesh	1.18	0.81	1.24	2.32	1.44	1.38
Karnataka	0.88	1.05	0.92	2.26	1.94	1.64
Kerala	0.99	0.83	0.94	1.26	1.54	0.78
Madhya Pradesh	1.04	1.09	1.00	1.75	2.36	2.29
Maharashtra	1.06	1.00	0.90	1.38	1.86	1.74
Orissa	1.06	0.99	1.06	1.70	2.05	1.71
Punjab	1.63	1.19	1.28	1.40	1.90	1.75
Rajasthan	1.28	1.16	0.98	2.01	2.98	1.34
Tamil Nadu	0.93	1.00	1.08	2.05	2.39	1.19
Uttar Pradesh	1.33	1.30	1.13	1.51	2.06	1.50
West Bengal	*	0.91	1.09	*	2.75	1.34
India	1.11	1.11	1.03	1.80	2.23	1.66

DEATH RATE IN THE AGE GROUP 0 TO 4 YEARS: 1971-94.

STATES		1971			1981			1994			FMR	
	M	F	T	M	F	T	M	F	T	1971	1981	1994
Andhra Pradesh	44.7	44	44.4	30.8	30	30.4	19	17	14.9	0.98	0.97	0.89
Assam	49.7	41.8	45.7	36.7	42.3	39.5	26.2	24.7	23.1	0.84	1.15	0.94
Bihar	–	–	–	40.2	44.9	42.55	24.5	24.9	25.3	*	1.12	1.02
Gujarat	61.4	68.7	64.9	39.4	41.8	40.6	20.6	22.2	24	1.12	1.06	1.08
Haryana	29.5	35.8	32.5	32.7	42.5	37.6	19.1	22.3	26.1	1.21	1.30	1.17
Himachl Pradesh	44.1	52.1	48.1	21.4	17.2	19.3	14.5	16	17.7	1.18	0.80	1.10
Karnataka	39	35.9	37.5	23.6	24.9	24.25	19.7	18.6	17.4	0.92	1.06	0.94
Kerala	24.5	24.4	25.5	13.3	11	12.15	3.6	3.4	3.2	1.00	0.83	0.94
Madhya Pradesh	48.6	51.2	49.8	58.2	63.1	60.65	34.6	34.8	34.9	1.05	1.08	1.01
Maharashtra	43.5	45.7	44.6	25.9	26.6	26.25	15.3	14.4	13.4	1.05	1.03	0.94
Orissa	50.7	54.2	54.2	42.2	42.1	42.15	31.2	31.6	32.2	1.07	1.00	1.01
Punjab	31.3	47.6	38.9	23.8	27.7	25.75	14	15.7	17.7	1.52	1.16	1.12
Rajasthan	52.8	68.3	60.2	46.8	54.1	50.45	27.4	27.4	27.3	1.29	1.16	1.00
Tamil Nadu	41.7	39.7	40.7	35.1	35.2	35.15	13.3	13.4	13.5	0.95	1.00	1.01
Uttar Pradesh	72.9	95.7	83.7	53.1	68.5	60.8	31.3	33	34.9	1.31	1.29	1.05
West Bengal	–	–	–	35.3	31.7	33.5	18.5	19.8	21.2	*	0.90	1.07
India	49.2	54.8	51.9	39.2	43.3	41.25	23.6	23.9	24.2	1.11	1.10	1.01

STATES	RURAL 1971			URBAN 1971			RURAL 1981			URBAN 1981		
	M	F	T	M	F	T	M	F	T	M	F	T
Andhra Pradesh	48.3	47.5	47.9	23.6	23.2	23.4	33.7	33.4	33.55	17.8	15	16.4
Assam	50.9	43.5	47.3	28.3	25.9	27.1	37.5	43.6	40.55	25.8	22.9	24.35
Bihar	–	–	–	–	–	–	41.6	47.4	44.5	26.6	21	23.8
Gujarat	65.9	70.7	68.2	45.2	61	52.7	43.5	43.8	43.65	27.1	35.5	31.3
Haryana	31.1	38.2	34.5	20.8	23.2	21.9	35	46.4	40.7	17.4	18.8	18.1
Himachl Pradesh	45.1	53.3	49.2	19.3	23.2	21.2	21.6	17.5	19.55	15.9	11.3	13.6
Karnataka	46.1	40.5	43.4	17.2	21.5	19.2	27.1	28.4	27.75	13.4	15.2	14.3
Kerala	25.2	25	25.8	20.2	20.5	20.4	14	11.6	12.8	9	7.6	8.3
Madhya Pradesh	51.1	53.3	52.1	26.1	33.1	29.7	63.4	68.8	66.1	27	29.1	28.05
Maharashtra	44.5	47.2	45.9	35.2	31.4	33.3	30.2	30.3	30.25	15.5	17.1	16.3
Orissa	51.8	55	55.6	34.6	31.1	32.8	44.1	43.7	43.9	19.5	23.4	21.45
Punjab	32	52	41.2	28.4	30.8	29.5	25.8	30.8	28.3	15	14.8	14.9
Rajasthan	57.8	74	65.5	27.1	38	32.6	53.1	61.5	57.3	18.4	20	19.2
Tamil Nadu	48.5	45.3	46.9	22.3	23.6	22.9	42	42.2	42.1	17.7	17.5	17.6
Uttar Pradesh	74.9	99.8	86.7	55.1	60.3	57.6	56.3	73.1	64.7	28.8	34	31.4
West Bengal	–	–	–	–	–	–	39.2	35.8	37.5	16.1	11.2	13.65
India	53.2	59.3	58.1	31.3	33.3	32.2	43.1	48	45.55	20	20.9	20.45

APPENDIX 4.2

DISEASE PREVALENCE RATES (CASES PER LAKH POPULATION), 1993-94 :

STATES	Leprosy	Cholera	ADD	Malaria	Kala Azar	Jap. Enc.	Menin.	A.R.I.	PNEUM.	ENT. F.	V. HEP.	DB/RAB.	SYPH.
	1994	1994	1994	1994	1994	1994	1994	1993	1993	1993	1993	1993	1993
Andhra Pradesh	3.23	0.12	1946.74	116.29	0.00	0.26	1.92	2249.60	53.84	84.96	30.83	0.14	34.89
Assam	0.81	_	_	570.66	0.00	0.00	_	3001.40	79.31	78.82	47.14	2.21	0.72
Bihar	5.36	0.00	_	27.04	26.81	0.10	_	_	_	_	_	_	_
Gujarat	0.61	1.40	566.92	522.93	0.00	0.00	0.07	466.78	5.27	9.86	8.07	0.03	0.29
Haryana	0.06	0.30	1927.78	171.81	0.00	0.48	0.43	1086.28	21.77	11.13	4.66	0.02	0.55
Himachal Pradesh	0.78	0.48	6742.42	59.78	0.00	0.00	0.72	4542.60	276.61	72.75	8.90	0.03	0.42
Karnataka	0.89	0.23	1322.65	323.63	0.00	0.00	1.50	17329.28	320.53	646.91	50.84	27.54	108.24
Kerala	2.24	0.12	2099.47	25.56	0.00	0.00	0.37	6382.37	37.21	25.79	23.09	0.17	1.29
Madhya Pradesh	2.42	0.44	1087.94	429.33	0.00	0.00	0.51	2231.18	152.08	240.65	39.01	1.21	13.55
Maharashtra	2.11	0.10	568.58	301.03	0.00	0.00	1.74	669.33	23.49	22.15	11.89	0.22	3.71
Orissa	5.08	0.01	2481.99	791.41	0.00	0.00	1.21	2006.95	34.92	41.87	28.37	0.04	2.57
Punjab	0.15	0.41	1057.50	75.03	0.00	0.00	0.09	911.82	8.71	7.71	11.84	0.02	0.01
Rajasthan	0.34	0.01	477.35	482.06	0.00	0.00	1.35	1985.18	344.69	67.08	15.12	1.25	1.51
Tamil Nadu	3.72	1.30	171.01	173.17	0.00	0.41	0.02	322.10	1.64	14.35	0.75	0.00	1.48
Uttar Pradesh	2.6	0.35	271.20	62.65	0.00	0.00	0.00	905.46	51.96	43.92	0.89	0.29	1.76
West Bengal	1.68	0.18	_	91.47	1.38	0.34	_	15.75	0.76	4.09	0.76	0.19	0.93
mean	**2.0**	**0.4**	**1594.0**	**264.0**	**1.8**	**0.1**	**0.8**	**2940.4**	**94.2**	**91.5**	**18.8**	**2.2**	**11.5**
std	**1.7**	**0.4**	**1720.7**	**233.6**	**6.7**	**0.2**	**0.7**	**4331.0**	**120.6**	**164.6**	**16.9**	**7.0**	**28.3**
India	2.42	0.59	858.17	230.84	2.85	0.09	0.81	18174.96	717.21	525.06	173.02	6.96	63.64

STATES	TB	TOTAL	Filaria	Guineaw	DIPTH.	POLIO	TET - N	TET - O	WCO	MEAS.	GON. I.
	1993	1993	1994	1992	1993	1993	1993	1993	1993	1993	1993
Andhra Pradesh	280.37	2833.70	2180.19	0.05	1.54	2.16	0.12	1.96	13.66	4.24	75.38
Assam	79.08	3311.56	401.53	_	0.33	0.08	0.40	0.86	5.79	11.45	3.96
Bihar	_	_	6749.68	_	_	_	_	_	_	_	_
Gujarat	45.23	538.46	338.90	0.00	0.25	0.51	0.32	0.33	0.21	1.05	0.26
Haryana	66.71	1192.90	_	_	0.08	0.15	0.43	0.43	0.35	0.18	0.15
Himachal Pradesh	104.27	5015.23	_	_	0.02	0.00	0.02	0.13	0.02	9.22	0.24
Karnataka	846.78	19659.66	177.87	0.37	5.92	3.23	13.02	16.28	113.23	55.02	122.84
Kerala	89.84	6595.43	8247.85		0.09	0.16	0.02	0.12	4.73	28.37	2.20
Madhya Pradesh	177.37	2926.25	120.88	0.14	1.08	1.55	2.89	3.72	38.22	9.81	13.92
Maharashtra	132.64	879.70	215.36	0.00	0.25	0.17	0.13	1.29	0.39	11.77	2.28
Orissa	59.07	2192.00	4674.71	_	0.21	0.25	0.79	2.16	5.58	5.92	3.30
Punjab	62.38	1005.21	_	_	0.07	0.14	0.28	0.74	1.03	0.15	0.31
Rajasthan	405.38	2857.91	_	1.80	1.21	5.52	4.68	7.21	5.65	5.89	7.54
Tamil Nadu	73.37	422.57	2273.58	0.00	0.05	0.52	0.07	0.33	0.01	6.03	1.86
Uttar Pradesh	476.00	1503.49	5297.88	_	0.80	1.66	4.15	2.27	3.68	8.71	1.93
West Bengal	7.87	33.82	44.07	_	0.91	0.78	0.12	0.82	0.12	0.70	0.00
MEAN	**193.8**	**3397.9**	**2560.21**	**0.34**	**0.85**	**1.13**	**1.83**	**2.58**	**12.84**	**10.57**	**15.7**
STD	**226.3**	**4843.6**	**2941.0**	**0.7**	**1.5**	**1.5**	**3.5**	**4.2**	**29.4**	**14.2**	**35.2**
India	1632.10	21620.46	2410.49	0.13	10.47	11.13	9.70	22.55	69.94	95.59	108.11

DISEASE PREVALENCE RATES:1961

STATE	nfectious + Paras. Dis	Neoplasms	Endoc., nut. metab dis.	Dis. of Blood	Mental Disorders	Dis. of Nervous sys	Respiratory Diseases	Digestive Disorders	Dis.- genito urinary sys	Dis.-pregn child birth	Dis. of skin mus-skel.sys	Dis- early Infancy
Andhra Pradesh	4.99	0.97	5.12	12.32	0.13	24.26	10.05	11.81	5.27	24.00	1.51	117.83
Assam	0.45	0.42	3.38	2.69	0.16	25.47	9.95	4.95	20.47	12.03	11.87	3.72
Gujarat	0.62	0.19	1.89	_	0.22	17.39	2.03	1.19	3.19	17.25	15.30	15.94
Himachal Pradesh	3.75	0.76	5.34	0.01	0.00	0.00	13.95	0.54	3.08	100.70	39.25	_
Karnataka	1.06	1.03	5.22	21.82	0.56	25.68	36.63	17.83	57.39	67.54	44.67	53.01
Kerala	3.29	1.25	14.07	75.77	1.82	25.75	21.30	20.40	22.52	8.46	65.37	40.04
Madhya Pradesh	0.39	0.41	0.75	2.27	0.39	7.32	2.56	3.81	5.46	_	15.22	10.23
Maharashtra	0.88	0.24	3.03	5.40	0.17	4.58	21.85	0.57	2.02	8.53	11.28	18.33
Orissa	1.91	0.11	5.40	4.51	0.16	1.77	5.55	17.88	51.14	28.69	57.83	24.85
Punjab	0.45	0.84	1.55	10.53	1.23	27.53	1.07	6.86	17.12	29.27	51.79	24.04
Rajasthan	0.80	1.10	2.40	7.39	1.09	40.92	1.56	8.62	6.32	83.22	110.49	31.07
Tamil Nadu	1.96	1.10	16.03	24.05	0.09	38.00	37.10	18.83	31.67	39.02	98.85	45.25
Uttar Pradesh	1.29	1.83	1.12	5.96	0.38	25.70	2.59	3.64	0.37	23.11	48.36	25.86
West Bengal	0.49	1.90	0.99	2.36	0.10	15.18	26.64	19.46	6.71	_	27.31	4.46
India	1.29	0.89	3.66	9.91	0.36	18.58	11.91	8.31	11.83	21.34	35.87	8.06

DISEASE PREVALENCE RATES:1971

STATE	Infectious + Paras. Dis	Neoplasms	Endoc., nut. metab dis.	Dis. of Blood	Mental Disorders	Dis. of Nervous sys	Respiratory Diseases	Digestive Disorders	Dis.- genito urinary sys	Dis.-pregn child birth	Dis. of skin mus-skel.sys	Dis- early Infancy
Andhra Pradesh	1.86	1.96	0.06	12.91	3.14	21.32	20.58	3.50	7.44	31.64	28.96	80.85
Assam	0.54	0.38	0.13	10.82	0.60	15.41	31.28	7.81	5.05	35.04	8.58	12.01
Gujarat	0.28	0.31	0.59	0.84	0.22	2.27	7.39	0.69	2.25	10.68	3.81	4.79
Haryana	0.53	0.49	0.03	13.93	2.04	23.16	7.80	2.09	6.95	29.67	22.50	8.30
Himachal Pradesh	0.86	0.04	0.02	21.24	0.29	0.45	17.86	0.01	0.35	–	–	–
Karnataka	0.78	0.47	0.09	10.15	1.28	14.84	9.94	6.37	5.43	7.42	28.81	3.70
Kerala	2.69	0.82	0.15	73.20	1.57	22.57	66.62	10.57	17.71	64.18	32.16	16.46
Madhya Pradesh	1.24	0.24	0.10	9.28	0.50	15.12	13.34	1.72	6.70	12.65	18.32	3.17
Maharashtra	0.57	0.13	0.20	5.10	0.08	2.13	0.92	2.73	1.09	0.47	2.18	26.44
Orissa	1.48	2.00	0.01	25.03	0.85	26.64	23.29	7.33	3.70	35.35	56.60	20.00
Punjab	0.53	1.09	0.08	23.04	3.88	29.18	30.65	2.97	17.61	59.18	34.91	22.03
Rajasthan	0.62	0.71	0.01	11.38	3.05	34.73	34.55	2.59	9.36	34.03	58.91	4.12
Tamil Nadu	4.94	5.40	0.03	51.57	0.50	33.70	21.18	14.76	14.76	134.19	104.34	42.25
Uttar Pradesh	1.18	1.11	0.06	7.75	0.42	9.04	1.61	1.62	7.71	25.79	15.82	57.64
West Bengal	1.17	1.41	0.01	4.58	0.27	9.85	6.66	2.41	3.46	23.70	15.01	4.15
India	1.24	1.12	0.06	13.91	0.89	13.86	13.01	3.75	6.23	29.92	25.15	24.41

DISEASE PREVALENCE RATES:1981

STATE	Infectious + Paras. Dis	Neoplasms	Endoc., nut. metab dis.	Dis. of Blood	Mental Disorders	Dis. of Nervous sys	Respiratory Diseases	Digestive Disorders	Dis.- genito urinary sys	Dis.-pregn child birth	Dis. of skin mus-skel.sys	Dis- early Infancy
Andhra Pradesh	1.34	1.28	0.05	33.93	0.74	2.04	4.52	5.98	2.14	1.87	13.10	36.25
Gujarat	0.33	0.10	0.08	0.84	0.08	0.06	_	0.43	0.62	2.86	8.47	4.44
Haryana	2.77	0.25	0.11	26.58	1.17	0.64	1.58	2.38	2.31	8.01	39.43	82.26
Himachal Pradesh	1.13	0.16	0.02	36.24	0.06	0.84	15.06	1.66	0,05	0.28	_	0.21
Karnataka	0.58	1.13	0.07	13.91	0.36	1.10	1.48	5.26	3.05	2.93	22.12	17.28
Kerala	1.68	1.70	0.06	106.08	10.94	4.92	4.40	21.36	15.33	15.24	49.13	66.74
Madhya Pradesh	0.63	0.60	0.04	8.64	0.07	0.84	0.87	1.96	0.45	0.76	7.75	1.35
Maharashtra	0.17	0.09	0.15	2.93	0.07	0.17	0.37	0.66	0.43	0.85	6.29	1.94
Orissa	1.77	0.79	_	46.76	_	0.31	2.32	16.41	5.78	2.29	40.90	10.39
Punjab	2.57	3.50	0.07	89.08	1.03	2.10	4.65	3.77	4.79	12.88	85.03	70.57
Rajasthan	1.65	0.52	0.02	22.48	0.89	1.04	2.58	5.69	5.93	4.17	31.54	41.78
India	0.59	0.44	0.05	14.83	0.61	0.67	1.14	3.28	1.89	2.09	12.61	13.23

APPENDIX IV.4

PER CAPITA CALORIE CONSUMPTION BY NSS ROUNDS ACROSS THE STATES

	17th Round		27th Round		38th Round		50th Round	
STATES	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
Andhra Pradesh	2184	1997	2103	2143	2204	2009	2052	1992
Assam	2334	2140	2074	2135	2056	2043	1983	2108
Bihar	2541	2330	2225	2167	2189	2131	2115	2188
Gujarat	2503	2115	2142	2172	2113	2000	1994	2027
Haryana	–	–	3215	2404	2554	2242	2491	2140
Himachal Pradesh	–	–	2954	2961	2636	2429	2324	2416
Karnataka	2758	2046	2202	1925	2260	2124	2073	2026
Kerala	1631	1554	1559	1723	1884	2049	1965	1966
Madhya Pradesh	2910	2162	2423	2229	2323	2137	2164	2082
Maharashtra	2280	1916	1895	1971	2144	2028	1939	1989
Orissa	2375	2233	1995	2276	2103	2219	2199	2261
Punjab	3076	2156	3493	2783	2677	2100	2418	2089
Rajasthan	3147	2469	2730	2357	2433	2255	2470	2184
Tamil Nadu	2147	1934	1955	1841	1861	2140	1884	1922
Uttar Pradesh	2854	2162	2575	2161	2399	2043	2307	2114
West Bengal	2175	2040	1921	2080	2027	2048	2211	2131
India	2511	2063	2266	2107	2221	2089	2153	2071

PER CAPITA MONTHLY EXPENDITURE ON FOOD (% OF MONTHLY INCOME) BY NSS ROUNDS

	27th Round		32nd Round		38th Round		50th Round	
STATES	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
Andhra Pradesh	73	68	59	65	60	56.37	59	52.77
Assam	77	68	62	75	73	66.4	70	57.6
Bihar	78	70	69	76	74	66.5	70	63.9
Gujarat	73	73	59	69	66	61.7	69	60.3
Haryana	67	63	60	62	64	57.7	61	57.9
Karnataka	74	67	62	63	64	58.1	64	56.8
Kerala	70	65	62	61	62	59.4	60	59.8
Madhya Pradesh	72	63	58	66	67	60.4	64	56.6
Maharashtra	68	61	56	50	62	58.2	58	55.9
Orissa	75	65	66	72	74	65.3	69	60.7
Punjab	63	61	55	60	59	55.8	58	55.2
Rajasthan	74	66	61	49	61	57.6	62	26.8
Tamil Nadu	72	64	61	66	65	58.5	64	54.8
Uttar Pradesh	70	66	62	66	63	59.6	62	57.2
West Bengal	77	64	63	73	74	60.8	71	57.6
India	73	65	60	64	66	59.1	64	55.9

% EXPENDITURE. ON FOOD OUT OF TOTAL MONTHLY EXPENDITURE BY INCOME GROUPS (1993-94):

	TOTAL		BOTTOM GROUP		MIDDLE GROUP		TOP GROUP	
STATES	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
Andhra Pradesh	63.2	53.83	72.19	68.76	67.85	61.79	50.14	46.54
Assam	72.25	59.68	76.15	70.88	74.28	76.06	68.52	44.88
Bihar	71	62.9	76.66	74.52	74.75	69.49	65.67	48.15
Gujarat	67.1	58.41	73.23	70.86	71.52	65.81	61.28	55.44
Haryana	60.06	53.88	69.88	65.26	66.03	58.94	53.36	49.57
Karnataka	61.97	55.71	69.61	68.26	66.73	62	56	46.74
Kerala	60.46	53.92	72.4	90.18	67.04	58.89	52.47	48.32
Madhya Pradesh	61.2	52.79	70.72	63.66	68.08	60.03	53.36	41.67
Maharashtra	59.48	53.02	68.26	67.32	66.45	60.09	52.29	45.58
Orissa	68.05	57.78	78.47	70.02	73.39	62.24	60.51	45.68
Punjab	57.92	53.02	68.75	65.01	65.61	58.28	49.03	51.43
Rajasthan	62.29	56.66	68.66	66.82	68.39	63.3	55.66	45.47
Tamil Nadu	62.83	54.61	74.4	69.77	71.17	63.74	54.22	49.09
Uttar Pradesh	61.45	55.99	71.22	68.63	67.32	62.58	54.26	45.48
West Bengal	66.83	55.92	76.09	71.39	73.74	62.87	58.39	48.62
India	63.2	54.7	72.75	68.96	69.44	62.49	55.82	46.54

APPENDIX V.2

VARIABLES FOR CORRELATION ANALYSIS

STATE	DPR	LEB	FMDLEB	IMR	URB	PCI	POV	FLIT	ENR	PCHE	HOSP	HPER	BEDP	DRW	PTAP
Andhra Pradesh	202.4	63.0	3.1	65	26.8	5802	22.2	32.7	182.3	40.2	3.3	33.6	40.6	49.0	24.4
Assam	236.5	58.6	-0.2	78	3.3	5310	40.9	43.0	233.1	65.4	2.7	9.2	56.7	58.9	10.5
Gujarat	80.4	61.8	1.8	64	34.4	7175	24.2	48.6	226.4	54.1	23.3	12.9	165.5	60.0	55.5
Haryana	213.9	64.7	-1.0	70	24.8	9037	25.1	40.5	181.9	96.9	1.8	23.6	45.1	67.1	47.9
Karnataka	161.4	64.8	1.1	67	30.9	6443	33.2	44.3	212.3	54.2	2.5	48.3	10.3	67.3	41.9
Kerala	728.2	71.8	6.4	16	26.4	5713	25.4	86.2	207.2	70.7	13.7	23.2	265.9	12.2	17.7
Madhya Pradesh	91.9	58.6	-1.2	98	23.2	4733	42.5	28.9	192.8	58.1	0.9	26.6	27.4	45.6	24.2
Maharashtra	52.7	65.0	1.9	55	38.7	9628	36.9	52.3	223.4	78.1	14.3	16.2	102.0	54.0	57.7
Orissa	390.4	59.3	-1.7	103	13.4	4097	48.6	34.7	184.2	47.1	1.6	13.8	46.2	35.3	9.0
Punjab	112.1	66.6	-0.1	53	29.7	11106	11.8	50.4	177.8	98.6	8.3	65.1	99.3	92.1	29.0
Rajasthan	94.1	60.9	0.8	84	22.9	5086	27.4	20.4	166.4	96.2	1.1	23.7	46.8	50.6	33.4
Tamil Nadu	23.8	62.7	0.8	59	34.2	6205	35.0	51.3	236.4	77.4	1.7	44.6	87.8	64.3	44.0
Uttar Pradesh	43.1	55.0	-4.3	88	19.9	4273	40.9	25.3	152.4	43.1	1.8	7.8	38.1	56.6	29.3
West Bengal	4.9	61.9	0.0	62	27.4	5775	35.7	46.6	252.8	54.9	1.4	53.0	80.5	59.1	21.1
India	114.2	61.2	1.1	74	25.7	6234	36.0	39.2	194.9	69.9	4.9	23.1	73.4	55.5	32.3

STATE	TOIL	FOOD	CAL	IMM
Andhra Pradesh	19.4	58.5	2022.0	45.0
Assam	36.8	66.0	2045.5	19.4
Gujarat	29.9	62.8	2010.5	49.8
Haryana	20.8	57.0	2315.0	53.5
Karnataka	23.4	58.8	2049.5	52.2
Kerala	53.1	57.2	1965.5	54.4
Madhya Pradesh	15.3	57.0	2123.0	29.2
Maharashtra	28.8	56.3	1964.0	64.1
Orissa	10.3	62.9	2230.0	36.1
Punjab	33.3	55.5	2253.5	61.9
Rajasthan	20.4	59.5	2327.0	21.1
Tamil Nadu	24.6	58.7	1903.0	64.9
Uttar Pradesh	19.3	58.7	2210.5	19.8
West Bengal	32.4	61.4	2171.0	34.2
India	26.0	59.0	2112.0	35.4