Growth And Human Development In India - A Disaggregated Study

Thesis Submitted for the Degree of Doctor of Philosophy in Arts (Economics) of the University of North Bengal

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This is to certify that Sri Sabyasachi Roy has completed his Ph.D work on "Growth and Human Development in India — A Disaggregated Study" under my supervision. The work has been done by him and he himself has written the entire dissertation. I have trust in his honesty and integrity.

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PREFACE

The traditional theme in development economics has been to equate development with growth in per capita income. A very different perspective on development is provided by the UNDP's Human Development Report (HDR). The main idea of the UNDP's perspective is that while growth in income is an important objective, development must encompass improvements in other non-income indicators as well. This is because human well being cannot be equated with growth in income and wealth alone. In particular, the HDR advocates the use of the Human Development Index (HDI) as a more comprehensive measure of socio-economic development of a country. The HDI is a Composite of three basic components of human development; longevity, measured by life expectancy; knowledge, measured by a combination of literacy & mean year of schooling and standard of living, measured by income. The basic health and education are treated as ends of development policies.

In this study we describe the development experience of India, its States and the districts of West Bengal during the last two decades from this perspective, following the HDR methodology and suggestions. The primary purposes of this study are to construct the HDI of 16 major States of India and the districts of West Bengal for 1981 and 1991 and to compare the level of human development within the States at a particular time and also over time. We also introduce two new indicators of development as suggested by different HDRs and also by different scholars. The achievement indices and improvement indices for different indicators are also constructed at the State level.

The study is divided into six chapters. The first chapter deals with the different indicators of development and a review of literature on different issues. The second chapter is concerned with the origin and development of the UNDP's Human Development Index, its conceptual background, different modifications and the methodologies used by the UNDP. In chapter three we express our research questions, methodology and data sources of the present study. The fourth chapter analyses the different indicators of development and the structure of the States of India & districts of West Bengal on the basis of these indicators. In chapter five the results and trends of the disaggregated HDI for the States of India and districts of West Bengal are presented. The sixth chapter deals with some concluding observations about the relationship between growth and social indicators from Indian point of view.

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Chapter I

Indicators of Development - A Review of Literature

1.1 Introduction

The principal indicator of the measurement of economic development is usually identified by the growth rate of GNP or simply by GNP or by per capita GNP. Inspite of many difficulties with national income accounting in less developed countries, this indicator has continued to be the main focus of economic growth, both historically and for international comparison. The importance of GNP in economic growth took its pride place due to the influence of the economic theory of Keynes as a result of which attention was increasingly paid to national income accounts in less developed countries after the Second World War.

As thinking about what constituted development has evolved, especially over the past decades, so too have the use and in certain cases, the indicators desired to monitor development. The most significant trend over the period has been the move to emphasize putting people and their needs at the centre of the development process. Development has therefore come to be conceptualised as the process of broadening the scope of life enhancing opportunities and the individual's capacity to take advantage of these (UNRISD, 1991).

The notion of development is an ambiguous one and is subject to different interpretations (Ghai, 1988). Here we may mention two interpretations: Dag Hammer- Skjold Foundation (1975), Sen (1983). (1) Development is often treated synonymously with economic growth. Therefore, it is interpreted to mean increase in labour productivity, technological progress, falling share of agriculture in total output, industrialisation, migration and urbanisation. (2) Development is interpreted by concentrating on such indicators of living standards as poverty, income distribution, infant mortality, life expectancy, access to employment, literacy and similar amenities. Development is seen in such terms as greater understanding of social, political and economic process, enhanced competence to analyse and solve the problems of day-to-day living, greater control of economic resources, restoration of human dignity and self respect. That is the process of economic development can be seen as a process of expanding capabilities of people (Sen, 1983).

The two ways of looking at development are not mutually exclusive. The optimal pattern of development should embody elements of both. The growth of human capabilities and potentials must be accompanied by progressive reduction of material deprivation and social inequalities which should be generated from modernisation and structural changes of the economy (Ghai, 1988).

1.2 Problem in connection with GNP as an Indicator of Development and some other Alternatives:

The heavy emphasis on GNP or GNP per capita and their principal performance test of development was based on some doubtful assumptions. Hicks and Streeten (1979) explicitly argued that it was assumed that economic growth has a tendency to automatically 'trickle down' to the poor or it was assumed that where there was no trickle down of benefits to the poor automatically the government would take corrective measures. Morris and McAlpin (1982) claimed that simple arithmatic can show it obvious that no matter how rapidly low income countries grow, they can not look forward to a speedy achievement of the level of income at which significant welfare gains can be expected to 'trickle down' automatically. Dell (1979) also expressed the view that growth process often bypassed the poorer members of the community. The poorer members would be benefited from growth only if distributional goals were made a deliberate and explicit element of policy.

Dissatisfaction with per capita GNP as an index of well being has been widespread and seemed to be increasing. Ram (1982) explained three major types of problems involved in the use of per capita GNP as a measure of development or national well being. The first is the difficulty of the coverages of the GNP which change over time. The second is the problem of conversion of the local currency into a common denominator of the U.S dollar which gets a bias in the use of exchange rates for such conversion. The third relates to the distinction between income and well being and partly a concern with distributional equity which requires importance on other parameters of income distribution. Kelly (1991) observed that GNP per head as a single goal and measurement of national well being and development fail to capture the distribution of the benefits of economic progress, particularly the number and condition of persons living in poverty and it abstracts from a multitude of specific factors related directly to human welfare.

Clark (1951) was the first to attempt to convert national accounts using the purchasing power parities. This was the measuring of output of each country at a common price level which was usually the international price. The most recent and complete work on purchasing

power parities (PPP) has been undertaken by Kravis and other (1975, 78, 82). The details of the PPP approach will be discussed in a separate section.

Nordhaus and Tobin (1972) attempted to adjust GNP in such a way that it would become a better measure of economic welfare (MEW). In this approach an allowance for defence expenditure and other regrettable necessities such as disamenities of urbanisation namely pollution, congestion, crime etc. are subtracted from the GNP. At the same time an estimate of the value of leisure and services of consumer durables are to be added. They reclassified the expenditure on health and education as investment and not as consumption. The final result gave the MEW for the U.S.A which was twice as large as the GNP. This was largely due to the high value imputed to leisure and other non market activities. The growth rate of MEW for the USA between 1929-1935 was somewhat smaller than that of her GNP. This was mainly because the larger value of leisure and non-market activities in the base year (1929) reduced the proportionate growth. It was also partly because of the growth of defence expenditure and urban disamenities.

There were certain difficulties in the Nordhaus-Tobin corrections. Regrettable necessities were subtracted as it has no direct effect on household economic welfare (as defence expenditure). No reasonable household or country purchases national defence for their own sake. If there were no fear of war there would be no defence expenditure. Streeten *et. al* (1982) argued that same reasoning could be applied for the services of doctors and nurses as we do not purchase medical services for their own sake. If there were no disease or accidents we need not incur such expenditure. Streeten and Hicks (1979) argued that a logical consistent application of the MEW principle would lead to an inclusion in the national income those items that we do not really need.

Aluwalia and Chenery (1974) suggested it to be misleading to depend on the growth rates of GNP as an indicator of economic development as it would heavily weight by the income shares of the rich. They suggested two alternatives: either the equal weighting of each decile of income group or the introduction of poverty weights which would place more weights on the income growth of the lower 40 percent of the poor.

In their model the rate of increase in welfare of the society as a whole was defined as the weighted sum of the growth of income of all groups.

$$G = w_1g_1 + w_2g_2 + w_3g_3 + w_4g_4 + w_5g_5.$$

Here G is the weighted index of growth of social welfare , g_i are the growth rate of income of the ith quantile and w_i are the welfare weight of the ith quantile. As the weight of a

particular quantile is raised, G will reflect the growth of income of that group. Thus if one wants to measure the development of LDC on the relative performance of the poorest 20 %, then the value of $w_1 = 1$ and that of all other $w_i = 0$, so that growth in social welfare would be measured only by g_1.

Aluwalia and Chenery (1974) found that in four countries out of thirteen, performances were worse when measured by weighted indices, as growth was disproportionately concentrated in the upper income group. In four countries the weighted index were higher than the GNP growth as a result of improved income distribution for the poor. In five countries including India the use of weighted index did not alter much of the results obtained from the GNP growth as distribution of income remained unchanged.

1.3 Poverty, Inequality and Sen's Index of Poverty:

As a result of the limitations of GNP per head to be a good indicator of economic development, the issue of inequality of income distribution and poverty measures obtained a pride place in 1970's. The measurement of poverty has two distinct problems viz(1) identifying the poor in total population and (II) Construction of an index of poverty using the available information on the poor (Sen 1976). The former problem involves the selection of poverty line in terms of real income per head and then ascertaining those who fall below this line. In the vast and rich literature on poverty the first problem was tackled. [Atkinson (1970) and Weisbrod(1965)]. The most common procedure of solving the second problem is simply to count the number of poor and calculate the percentage of total population in this category.

This ratio is known as the head count ratio, H.Sen(1976) has derived a poverty index which is a weighting of individuals on the basis of how far the poor fall below the poverty line, thus combining poverty line and income distribution approaches together.

Sen's Index of Poverty (1976,82) is an axiomatic approach. We start with S to be the set of people in a community of n population. We take poverty line as Z and q to be the number of poor ranked (r) according to income y's. Then poverty gap of person i is defined as

$g_i = z - y_i$

The two standard measures of poverty, the head count ratio H and the income gap ratio I can be given by

$H = q/n$ and $I = g/n$

If the mean income of poor persons is y* and their mean poverty gap is g*, then the income gap ratio can be expressed as

$I=g^*/z$.

Let G be the Gini Coefficient of income distribution among the poor, then the normalised poverty index for a large number of poor is given by

$P=H\,[I+(1-I)\,G]$.

This poverty index is made up of the head count ratio H, income gap ratio I and Gini Coefficient G. The value of P lies between 0 and 1. When everyone has income greater than z, we have P=0 and if everyone has zero income then P=1. When all the poor have same income, G=0, the lower the income of the poor ,the closer will P approach to H and the larger the proportion of the poor, the closer will P approach to 1.

One modification of this index is to take I in the measure of deprivation by taking mean poverty gap, where m is the mean income of the entire community $I^*=g^*/m$

$HI^*=g^*/nm$

Then HI^* is the ratio between the aggregate poverty gap and the total GDP. Beckerman [1979 (a), 1979 (b)] put this measure to be good use as an indicator of the relative burden of poverty.

Anand's measure of poverty (1977) in Malaysia differed from P by a multiplicative constant reflecting normalisation of per unit of national mean income rather than poverty line income;

$P_I = PZ/m$

where P_I is sensitive to the income of a non-poor person as well. Given other things a rise in the income of a non-poor person would reduce I and would also reduce P_I.

Kakwani (1980) derived another poverty measure on the basis of income rank (r) of ith person and the weight of the poverty gap g_i, of the ith person. Another index of poverty was proposed by Blackorby and Donaldson (1980) as a function of head count ratio H. The Atkinson (1970)-Kolm(1969) equally distributed equivalent income eg, the poverty line income Z and the Gini social evolution function gives the following result

$P=H(z-eg)/Z$ with $eg = y(1-G)$

$P=H(z-e)/Z$.

Another Index of poverty was proposed by Takayama (1979). From the actual income distribution a "censured" income distribution is obtained .It replaced the income that would exceed the poverty line by income equal to poverty line Z. The Gini coefficient of the censured

income distribution is taken as a measure of poverty.

1.4: Purchasing Power Parity Approach

The Research Programme in International Comparisons of Products (ICP) has its origin among others in the study of Gilbert and Kravis (1954). This programme was the joint efforts set up by the UN and the University of Pennsylvania with the support of the World Bank. Phase I of this project by Kravis and others (1975) presented data for 1970 for ten countries. Results of Phase II (1978) dealt with sixteen countries for 1975 data. Phase III (1982) took care of thirty four countries for 1975 data and Phase IV provided with data for sixty four countries and some results of Phase V were provided by Heston and Summers (1991) dealing with one hundred thirty eight countries.

The awareness of the inadequacies of comparing per capita income without making adjustments for the Purchasing Power Parity (PPP) of national currencies is now widespread. In general, when official exchange rates are used for comparison, it tends to understate incomes in poor countries, even though they often have overvalued exchange rates. This is because price levels tend to be lower in these countries.

For the construction of PPP detailed community wise data from different countries over several years regarding prices and quantities of goods and services and their substitutes are gathered. With the U.S. composite GDP as the basis, cost of components both sectoral and aggregates are worked out and the purchasing power equivalence ratios are estimated. Purchasing Power equivalences are obtained on a binary basis. Technically when two countries are compared we have binary comparison.

Lancieri (1990) analysed the results from ICP, Phase IV for sixty countries and concluded that a systematic bias was present in the ICP formulation leading to a strong over valuation of the GDP of developing countries. Isenman (1980) argued that the treatment of services in their detailed analysis to be satisfactory and hence any short cut approach derived from it would be biased. Hicks and Streeten (1980) argued that the adjustment process of PPP calculation was misleading because of different expenditures on food, shelter, disease control depend on the climate of different countries.

1.5 : Social Indicator of Development

Indicators which attempt to define non-monetary measures of social progress are called

social indicators. These social indicators attempt to measure the development of health, nutrition, housing as well as other aspects of cultural and social indicators (Majumdar,1994). Some social indicators reflect input and some others output. Life expectancy, adult literacy are examples of output whereas school enrolment ratio, doctors per 1000 population are examples of inputs. However most outputs are also inputs.

Here the different categories of social indicators can be explained (Ghai *et al* ,1988). The first type refers to living conditions such as health, nutrition, shelter, access to pure drinking water etc. The second set comprises of information and cultural aspects consisting of literacy, libraries, newspapers etc. The third relates to some social concerns like human rights, status of women, participation etc. The fourth category refers to the indicators on the state of mind and spirit like happiness, satisfaction etc. However these indicators may be subjective or objective, qualitative or quantitative. They may also be collected through a wide range of methods. Naturally there is a great deal of variation in the quantity and quality of information available on social indicators of development from different countries. It also depends on factors like stages of development, the financial, technical and human resource available, the priority given to different types of informations and so on.

Social indicators are useful in many ways (Ghai *et al*, 1988). They provide informations on the matters of public concern. It also facilitates fruitful investigation into the relationship between the levels, rates and pattern of economic growth and social progress. Time series data on social indicators within a country permits monitoring of social progress and analysis of the distribution of the benefits of social progress. Information on social indicators can be useful in the formulation of development programme and policy. Informations on social indicators point out the critical area of weakness and hence send signals to the authorities about the potential dangers.

An early concern with the social indicators of development came from the United Nations Charter to promote higher standard of living, full employment and conditions of economic and social progress and development (UN,1968). In the earlier years the spirit of interest was in the measurement of social indicators. The first major UN document on this issue was the report of 1954 of a group of experts (UN 1954). This report formed the basis of subsequent work in this area. It defined 12 components to be included in the level of living : (1) Health, including demographic conditions (2) Food and nutrition (3) Education, including literacy and skill (4) Conditions of work (5) Employment situation (6) Aggregate consumption and savings (7) Transportation (8) Housing, including household facilities (9) Clothing (10)

Recreation and entertainment (11) Social security (12) Human freedom . The report also recommended a priority list of indicators. : (a) life expectancy at birth (b) infant mortality rate (c) national average food supplies in terms of calories at the retail level compared with estimated calorie requirement (d) proportion of children enrolled in school in the 5-14 age group (e) percentage of population literate above some appropriate age, total and by sex (f) proportion of economically active population employed (g) percentage distribution of economically active population by principal industrial and occupational categories (h) personal consumption as a proportion national income and index of changes therein.

Some works have been done in developing a system of social accounts to provide a kind of national income accounting framework for social indicators. Stone (1975) and Seers (1977) have proposed the use of lifetime activity sequences calculated by dividing total life expectancy into different segments. But the system presented many problems as some indicators could not be readily transformed into life expectancy (Hicks and Streeten, 1979) and also the system proved to be too complex for practical application in most countries (Ghai *et al* 1988).

Another effort in this area was concerned with the construction with Social Accounting Matrices (SAM) which was originally initiated by ILO [Pyatt and Roe (1977); Pyatt and Thorbecke, (1976); Pyatt and Round, (1977)] and subsequently taken up by the World Bank [Grootaert (1982)]. In addition to the usual sources of data used in the national income accounts, a SAM took care of data on household consumption and income distribution. Thus the economic inputs and outputs of households, governments and enterprises were included and expanded in a traditional input-output table in matrix form. Though SAM was a powerful tool of analysis but it was restricted in being confined to monetary and material side of social condition (Ghai *et al*, 1988). It also relied on the use of GNP data as a measure of welfare and was limited in its application by the absence of good income distribution data (Hicks and Streeten, 1979).

United Nations Research Institute for Social Development (UNRISD) working with cross national and socio-economic data has attempted to devise criteria for the selection and construction of indicators which could be used in analytical work on the basis of data already available [UNRISD, (1969); McGranahan *et al* (1985)] It developed a revised index that gave not the absolute level of a country in the field like education or health but its levels in these fields in relation to its general level of social and economic development .Hence it was possible to quantify the extent to which a country was more advanced in education or other indicators

that would be expected from its status in the other dimensions of development on the basis of available data.

McGranahan *et al* (1972) examined 73 indicators and found that there was high inter correlation between them. Through the process of elimination it constructed a "Development Index" based on 18 core indicators out of which 9 were social and 9 were economic indicators. The resulting index was highly correlated with GNP per capita. There were countries like Japan, Chile and Venezuela whose position substantially differed when ranked on the basis of Development Index than when ranked on the basis of GNP per capita. In general, the correlation of the Index and per capita GNP was somewhat lower for developing countries. The study concluded that social development occurred at a more rapid pace than economic development upto a level of about $500 per capita at 1960 prices. Because of high inter correlation, the composite index was relatively insensitive to the choice of component variables and the country ranking was virtually unchanged when the number of indicators was reduced.

Drewnowski and Scott (UNRISD,1966) developed a Level of Living Index which was defined as the level of satisfaction of the people's need which was measured by the flow of goods and services in a particular unit of time. This Index considered basic needs which was subdivided into physical need like nutrition , shelter, health and cultural needs like education , leisure, security . The "basic need" part of the index included items which were very difficult to obtain for many countries such as the amount of leisure time available, the quality of housing etc. This made Drewnowski and Scott to use shortcut approximation for their limited sample of 20 countries . Furthermore , the work once began did not continue after 1966 in the same form.

Different studies (McGranahan *et al*, 1972,UN,1975) have shown a high correlation between economic indicators, including GNP and social indicators. This might suggest that GNP can be used as a proxy of social development. Morawtez (1977) found rather weak correlation between the level of GNP and indicators of basic need fulfillment . Sheehan and Hopkins (1978) concluded that the average level of basic need satisfaction could easily be explained by the per capita gross national product . These different contradictory results were generated due to the selection of different indicators, sources of data , country samples and different interpretation of results.

Hicks and Sreeten (1979) worked with seven social indicators and found a modest correlation with GNP while a sample of five economic indicators showed somewhat higher correlation . When social indicators data were disaggregated the correlation coefficient becomes

r(square)=0.25 for developing countries and r(square)=0.18 for the developed countries . One reason for social indicators to be not highly correlated with GNP was explained by the non-linear relationship between the two and also because of the asymptotic limits of the indicators like life expectancy and literacy . It was concluded that GNP per head was likely to be misleading indicator of social development when some linear relationship was used.

Ram (1982) has also presented a composite index of development with principal component technique. Ram claimed that increased application of the method would constitute one significant step towards the evolution of a composite development index for each country and would facilitate international comparisons.

1.6 : The Basic Need Approach

In 1976, the World Employment Conference adopted its important resolution on the 'Basic Need' approach to development in the less developed countries (ILO,1976). In this context the basic needs (BN) considered two elements : first, they included certain minimum requirements of a family for private consumption like adequate food, shelter, clothing, certain household equipments and furniture. Second, they included essential services provided by and for the community at large such as safe drinking water, sanitation, public transport, health, education and cultural facilities. (ILO,1976)

The BN strategy concerned with removing mass deprivation, a concern which has always been at the heart of development. The discussion started in the 1950's, strongly influenced by Lewis (1955) who emphasised economic growth as the way to eradicate poverty. It was also claimed that growth was not an end itself but a performance that could be used to test development.

Streeten (1984) pointed out that BN can be interpreted in different ways :Firstly it can be interpreted in terms of minimum specific quantities of such things like food, clothing, water, shelter which are necessary to prevent ill-health, undernourishment and the like. But it invites many questions such as the precise relation between food intake and adequate nutrition and also the most effective way by which the resources could be provided to satisfy such needs. Secondly , BN can be interpreted subjectively as the satisfaction of the wants of the consumers as perceived by the consumers themselves rather than the specialists like doctors . This interpretation leads to the conclusion that people should be given the opportunities to earn the income to purchase the basic goods and services. Thirdly those who reject to assume that consumers are rational and best judges arrive at a more interventionist interpretation. In

this view public authorities decide the design of public services such as education, water supply as well as guide private consumption in the light of public considerations through some ways like food subsidy etc. A fourth interpretation emphasises the non-economic the non-material aspects of human autonomy and embraces individual and group participation in the formulation and implementation of projects and in some cases political mobilisation. This socio political interpretation is very near the concept of human rights, freedom from want is like the right not be tortured.

A question has been raised as to whether the BN fulfilment approach of development conflicts with the Third World aspiration for faster industrialisation and the establishment of New International Economic Order (NIEO). Singh (1979) examined the question and claimed that there was no conflict between the BN approach to development and accelerated industrial development to which the Third World countries attach highest importance for restructuring the world economy and the establishment of NIEO. On the contrary, there was a close interdependence between the two. To meet the BN of the poor in the Third World it is essential to raise the rate of economic growth in these countries. This will require the establishment of appropriate capital good industries. At the same time as the rate of growth of demand is likely to be an increasingly constraint in future and a BN type approach should positively help faster industrial development, especially given the present state of world economy.

In view of the emphasis on provision of BN during the process of development , it is interesting to study and compare the determinants of BN fulfillments. In particular since increase in per capita income and greater distributional equity are often believed to involve a trade off, it is useful to compare the impact of real income level with that of income equity on BN indicators. In their study, Sheehan and Hopkins (1979) examined the relationship between BN indicators and other variables, including income level and income equality for a large sample of LDCs. They did not find income or distribution to be important for most indicators.

Leipziger and Lewis (1980) considered the low income and middle income LDCs separately and provided simple correlation coefficients which indicated that in low income LDCs, income level is more important than distribution for improving BN performances. They also observed that distribution seemed more important in middle income LDCs. Ram (1985) criticised their work as it was based on simple correlation as because income levels and distribution are themselves correlated. Thus he suggested a multiple regression model.

In his study Ram (1985) used seven BN indicators and data on real GDP per capita were obtained in PPP values. The sample was divided into two groups, low income LDCs and

middle income LDCs. There were 19 countries in the first subgroup and 20 countries in the second category . The study observed that despite considerable parametric variation across different BN indicators income level seemed important in both low income and middle income LDCs. The importance of distribution appeared limited to one or two cases. Income seemed more important in low income LDCs than in the middle income LDCs.

In their study Newman and Thomson (1989) used lagged dependent variable models to evaluate the casual relationship among the variables of substantive interest. Their empirical findings showed that there was a relationship between economic growth and BN satisfaction . Indeed all their findings were quite unambiguous about the existence of the relationship. The study 'also suggested that BN preceded rather than followed economic growth.

From the time of development of BN literature, a new school of composite index was also growing. It was originated by the ODC (1977) to construct a new composite index .This was developed by Morris (1979) in the name of Physical Quality of Life Index.

1.7: Physical Quality Of Life Index

Among the different measures suggested as an alternative to income-based measures of welfare, the most widely used and best known measure is the Composite Physical Quality of Life Index (PQLI). This measure of physical well being is the product of social indicator research, sponsored by the Overseas Development Council (1977) and was developed by Morris (1979). To make this index internationally comparable Morris selected such indicators and process of calculation that would make it free from any preconceived ideas or values. The most important aspect of PQLI is that it can focus on the distribution aspect of the society.

The approach of Morris (1979) was that if only per capita GNP was taken to be the major indicator of prosperity , the direct comparison of unadjusted per capita GNP failed to reveal the real affluences of different nations. The problem arose mainly because of the inability of the exchange rate to ensure purchasing power parity . To overcome this problem one will have to express all the relevant figures in the denominator of a common currency. But perfect purchasing power parity does not hold good and this conversion understates the real situation of LDCs . To rectify this weakness Morris (1979) proposed to rank real per capita GNPs of different countries in terms of their purchasing power differentials. This suggestion was an improvement over the earlier one, but to compare purchasing power, the first question to encounter was what should be the reference commodity over which purchasing power to be defined.

So, instead of GNP per capita Morris constructed a composite index which could be applied at the same time for developed and less developed countries-combining demographic and social factors.

Morris selected only three indicators to construct the index of well being . These indicators are infant mortality rate (IMR). Life expectancy (LE) and literacy rate (LR) . IMR is directly connected with the quality of water supply, maternal mortality etc. LE shows the level of nutrition and medical facilities. So IMR measures the immediate environment of a child and LE indicates the social surroundings. LR is not a direct measure of welfare . But it constitutes a major resource from which the poor and weak people are often deprived off.

The justification of the selection of the above three indicators were clearly explained by Morris and McAlpin (1992). (a) None of the three measures assumed any particular pattern of development or did not depend on the particular organisation of the economy . (b) The three indicators were probably as unethnocentric as it was possible to get , in an imperfect world. (c) Each of the three indicators measured results. (d) Each of the measure was fairly sensitive to distribution effect. (e) The three indicators are fairly simple to construct and understand. (f) The individual indicators lend themselves to international comparisons.

The scale of three indicators constructed with 0 (zero) showing the worst performance and 100 the best. The scale being constructed , a composite index can be constructed by averaging the three indicators with equal weights . Then the value is called PQLI and placed in 0-100 scale. Morris (1979) observed that for the scale of IMR, the worst observed situation since 1950 in the UN came from Gobin in Africa where IMR was 229 per 1000 lives born. On the other hand, the number below which IMR could not go according to medical opinion was 7 per 1000. For LE at birth, the lowest value came from Vietnam in the 1950's which was 38 years. On the other hand WHO and other expert bodies expected LE to reach the highest value of 77 years for both men and women combined by the year 2000 A.D. For literacy rate the selection of highest and lowest values were easy by simply taking the actual values of literacy.

The equations used to calculate the scale of LE and IMR for different countries were

Index for LE at age one = {(LE at age one of the country)- 38}/ 0.39

Index for IMR = {229 - IMR of the country}/ 2.22

To measure the performance over a period of time the concept of Disparity Reduction Ratio (DRR) was introduced which was a tool developed by ODC in the course of work of PQLI. The DRR measures the rate of change of performance where there is an upper limit to

the attainable result . It measures the rate of which the disparity between a country's PQLI performance and the best projected performance (=100) decreased between two periods. Thus a high DRR indicates a rapid annual reduction and a low DRR reflects the slow annual reduction in the gap between current performance and a PQLI of 100. The DRR is calculated by the following formula

$$DRR_{(t+n)} = [\{(X_{(t+n)})/X_t\}^{1/n} - 1]\ 100\%$$

Here X is the disparity between actual PQLI performance and 100 at time t and (t+n).

Larson and Wilford (1979) assessed the usefulness of PQLI as a social indicator. They presented a correlation matrix for the three input variables used in the construction of PQLI . The study concluded that the PQLI composite as defective since the three independent variable were closely correlated and anyone of these three would serve equally well to rank countries. Further, the relationship between per capita GNP and the PQLI was sufficiently close and that the PQLI would rank countries approximately the same as per capita GNP with the exception of OPEC countries. Finally they concluded that per capita income measure might be a preferred indicator.

Leipziger and Lewis (1980) provided a more systematic treatment of indicators based on a priory theory of development. The work of Larson and Wilford showed the relationship between PQLI and per capita income to be non-linear. Leipziger and Lewis weaved the desperate threads into a meaningful explanation supported by empirical results. They worked with seven economic and social indicators. In their study direct indicators such as those included in PQLI were imperfect measure of actual welfare as they did not include information on the distribution of the particular indicator by income charts.

Newman and Thomson (1989) examined the relationship between social and economic development using a lagged dependent variable model for 46 developing countries for the year 1960, 1970, 1980. In their study life expectancy showed the strongest correlation with GDP and literacy rate generally showed the lowest association with GDP. The differences between the r values were not great, suggesting similar contribution of each component to PQLI and in turn its relationship with GDP. This examination of PQLI components provided some statistical justification for the use of the composite index.

Ram (1982) constructed PQLI with a principal component representation . Ram argued one objection that could be raised against PQLI was that equal weighting of the three component were arbitrary. In his principal component PQLI, Ram gave different weights to different indicators. Regarding the criticism of PQLI by Larson and Wilford (1979) to give the same

ranking of countries by GNP, Ram (1982) argued that ranking is not the only or even the major point of international comparison. The intensity of cross country difference might indeed be more important than a mere ranking.

1.8: Objectives and Plan of the Present Study :

In 1990 the UNDP first published the Human Development Report (HDR) and introduced a new index for the measurement of economic well being. The index is known as Human Development Index (HDI). Since 1990 the UNDP has been publishing the HDR every year to construct the HDI of different countries internationally. It has used three indicators to construct the HDI. These are the modified per capita real GDP at PPP$, life expectancy at birth and educational attainment combined with literacy rate and mean year of schooling upto 1994 and literacy and gross enrolment ratio since 1995.

Since 1990 different scholars and economists concentrated their interest on HDI and a vast literature emerged as a result, with the suggestion of improvement, introduction of new variables and above all disaggregation of HDI. As a result, different studies were undertaken in different countries for disaggregation on within the countries among regions, states etc. The primary purpose of this dissertation are :

1) To construct the HDI of major States of Indian, to compare the level of human development within the States and also internationally;

2) To construct the HDI of Indian States over time to see the level of performance in human development within the States over a period of time;

3) To construct the modified HDI of Indian States with the introduction of some new variables as suggested by different economists and also by the UNDP itself;

4) To explore the performance of the major Indian States by constructing improvement index and achievement index as suggested by Kakwani (1993);

5) To see the role of public spending and private income on the human development of the States of India (Anand and Ravallion , 1993); and

6) To construct at a further disaggregated level, the HDI of the districts of one of the more important States of India, namely West Bengal to have a micro idea and then to compare the HDI of the districts with those of the Indian States.

To fulfill the above objectives we shall introduce the genesis, conceptual framework and different suggestions and modifications of HDI in chapter 2. In chapter 2, we shall also

provide the theoretical framework behind the HDI of UNDP. We shall also take care of the different criticisms and limitations of the HDI as pointed out by different researchers and economists. That is, we shall have a review of literature on HDI in chapter 2 with the suggestions of improvements.

In chapter 3 we shall deal with the different methodologies used to construct the composite index of development in general and HDI in particular. From there we shall express the methodology to be applied in this dissertation to attain our objectives.

In chapter 4, we shall give an overview States of India in a nutshell regarding the indicators to be used in our study to construct the HDI of the Indian States and the districts of West Bengal. Here we shall also use some very simple statistical tools to compare the change and distribution of these indicators.

Chapter 5 will give the HDI of different States of Indian and the districts of West Bengal to have an International comparison and a comparison among the States over period. In this chapter we shall also construct the modified HDI of Indian States with the introduction of some new variables. Here we shall also construct the achievement and improvement indices for the States of Indian over time.

Finally in chapter 6, we shall conclude with the findings of the study and the policy issue emanating from the study. We shall also introduce some of the issues left out for further research in this area.

Chapter II

The Origin and Development of UNDP's Human Development Index

2.1: Genesis of Human Development Index (HDI)

In 1990 the United Nations Development Programme (UNDP) brought out its the first Human Development Report (HDR) prepared by a distinguished team of economists under the direction of Mehbub Ul Haq. The first HDR (1990), introducing the concept of human development, argued that the real purpose of development should be to enlarge the choices of the people. The central message of the HDR (1990) was that while growth of GDP was absolutely necessary to meet all essential human objective, what was important was to study how this growth translated or failed to translate into human development of various countries. To quantify and clarify the process of human development, the HDR introduced a new yardstick of human progress, namely the Human Development Index (HDI).

The HDR (1990) argued that a basic distinction needed to be made between the means and ends of development. Human beings are the real end of all the activities. Hence development must be centered on enhancing their achievements, freedom and capabilities. It is the lives they lead that is of intrinsic importance, not the commodities or income they happen to posses. Accordingly either income or wealth or commodities do have instrumental importance but they do not generate a direct measure of well being or living standard. It is not possible through income to account for individual differences in morbidity, mortality or disability. However, these features seem to deserve priority in any assessment of living standard (Anand and Sen, 1994, 12).

Therefore, the motivation to focus directly on the lives that people lead, what they succeed in being or doing. The questions to be answered for well being are whether people have the capability of living long, avoid illiteracy, freedom from hunger and under nourishment and whether they enjoy personal freedom and liberty. The basic features of well being are looking at people as the centre of all development activity. Enhancing their capabilities to function in these elementary ways is what lies at the core of human development. The basic

approach of the HDR values capabilities related to health, nutrition, basic education as ends in themselves and income is only a means to achieve these. Proponents of human development approach argues in favour of enhancing people's ability to read and write, to be healthy, even if the economic returns of investment in literacy and health care were zero.

The first HDR (1990) constructed HDI on the three essential elements of human life: longevity, approximated by life expectancy; knowledge, approximated by literacy rate and living standard, approximated by "log" of real GDP per capita based on PPP$. Judged by this new HDI, 44 countries were in the low human development (Niger 0.11 to Morocco 0.49), 40 countries in the medium human development (Egypt 0.50 to Albinia 0.79) and 46 countries in the high human development (Malaysia 0.80 to Japan 0.99) category. On the basis of these HDI values the countries were ranked and a ranking on the basis of GDP per capita was also shown in the Report. This Report revealed the value of HDI of India to be 0.44 and India's rank was 37 from the bottom of the scale but was 12 places higher than the corresponding rank in the scale of measurement based on GNP per capita.

Some other countries whose achievements in human development were higher than as indicated by their GDP per capita were Sri-Lanka, Vietnam, Myanmar, Laos, Cambodia, Thailand, Albania, Cuba, Costa Rica, Jamaica and Chile. On the other hand a number of countries mostly oil producing and exporting countries, countries of the Gulf showed their ranking in HDI to be substantially lower than their ranking on the basis GDP per capita.

The Second HDR (1991) took up the issue of financing human development and the role of the government. It concluded that the world had an enormous opportunity to increase investment in human development even with the existing resources.

The HDR 1992 extended the analysis by adding an international dimension. It focused specifically on global markets and on how they meet or failed to meet human needs. The Report discovered that global markets made developing countries a loss of economic opportunity worth about $500 billion annually which is ten times what they received in foreign assistance. The Report suggested two priority areas for further action. Firstly the LDC should invest massively in their people to sharpen their competitive edge in international market. Secondly there should be a radical dismantling of trade barriers and a major reform of international institutions to establish a new vision of global cooperation in the next century.

The HDR 1993 examined by how and how much people can and do participate in the events and processes that shape their lives. The main theme of the HDR 1993 was that of people's participation and touched on only a few aspects of a profound human revolution that

made people's participation the central objective in all parts of life. The Report included five new pillars of a people centered world order that must be build. It stressed on new concepts of human security with emphasis on the security of people and not only of nations, new strategies of sustainable human development that weaved development around people, new partnership between State and market, new pattern of national and global governance and new forms of international cooperations. A major feature of this HDR was the disaggregation of HDI by various population groups. It has also introduced new methodologies and concepts by which disaggregation within the countries could be made.

The HDR 1994 explored the new frontiers of human security in the daily lives of the people. It attempted to discover early warning signals that could spur preventive diplomacy and preventive development in order to save a society from reaching a crisis point. It outlined a new design for development cooperation in the post cold war period. It has also suggested a concrete agenda for the consideration of the World Summit for Social Development in 1995 claiming the urgency of international community to strengthen the role of the UN in the socio-economic field and to vest more decision making power in the UN to manage the new dimensions of global human security. The Report also disaggregated the HDI by various population groups and regions and presented case studies of nine countries.

The HDR 1995 analysed the process and progress made in reducing gender disparities in the past few decades. It also highlighted the wide and persistent gap, between women's expanding capabilities and their limited opportunities. It introduced two new measures for ranking countries on a global scale by their performance in gender equality. The two measures or the composite indices are the gender related development index (GDI) and the gender empowerment measures (GEM). The GDI captured gender inequality in human capabilities and the GEM reflected inequalities in key areas of political and economic participation and decision making. The Report concluded that the unvalued contribution of women was so large that any reasonable valuation would lead to a fundamental change in the premises on which today's economic, social and political structures are founded.

The HDR 1996 explored the complex relationship between economic growth and human development. The Report argued that if economic growth is not properly managed it can be jobless, voiceless , ruthless and futureless and thus detrimental to human development. It made important recommendations that all countries must strive to improve the nature and quality of their economic growth. The policies must be tailored to national circumstances. The global community can and must also help countries effect their own strategies of sustainable development.

2.2: The Concept of Well being -the base of HDI : Some Philosophical Issues

The term "quality of life", "standard of living" and "well being" are often used interchangeably to capture the concept of socio-economic aspects of life. However these terms are different from that of the term "welfare". Cohen (1993) gave two different interpretations of welfare, one in terms of enjoyment and the other in terms of preference satisfaction . These two corresponds to Sen's (1985,1987) "happiness" and "desire fulfilment" concepts. That the concept of "well being" or "standard of living" is broader than welfare is implicit in both Dasgupta (1993) and Sen (1985, 1987). Dasgupta started by distinguishing between two aspects of personhood- one views in doing things and the other sees us residing in states of being. In Dasgupta happiness or welfare belongs to the latter and the concept of well being includes both. For Sen , people's standard of living is a matter of the kind they live or what the people succeed in being and doing. Being happy, for Sen, is just one of many aspects of being that are relevant for an overall evaluation of well being.

Griffen (1986) described well being primarily in terms of prudential values - the goods making people's lives valuable to them. For him utility is best understood as a formal analysis of the concept of prudential value . Income as a measure of individual well being was first proposed by Pigou (1932). Being confronted by the difficulties to measure pleasure of happiness he proposed a narrow definition of 'economic welfare' which could be measured by using the 'measuring rod of money'. The practical advantage of income as a measure of individual's well being lies in the fact that it is a simple scalar measure of a complex flow of potential consumptive activities. Government's involvement in the provision of various goods and services breaks the direct connection between an individual's real income and his actual command over commodities. Thus one can measure individual's well being by focussing directly on the space of commodities (Chakraborty, 1995).

Rawls' (1971) theory of 'primary goods' differ in important ways from simple commodity view. Rawls listed social primary goods as rights and liberties, powers and opportunities, incomes and wealth and self respect. Rawls did not consider primary social goods as proxies of utility level but in his view they offer an alternative basis for a more settled social agreements on what is important to well being. Sen (1985,1987) argued that the standard of living is a matter of people's 'functioning' that is what they succeeded in doing or being or thei ''capabilities" to function . Sen argued for a different space in which the living standard should be evaluated.

Sen attacked utilitarianism on the ground that it was inadequate to provide a theory of well being. The main problem with the utility view of well being arose from the particular interpretation of well being exclusively in terms of the metric of happiness or desire fulfillment. The matric happiness might distort the extent of deprivation in a biased way. What Sen suggested is an alternative metric for assessing well being. His 'functioning and capabilities' approach intended to provide an alternative theory of well being.

2.3: Conceptual and Theoretical background of HDI

The concept of human development relates to the guaranteeing of sufficient resources so that basic capabilities are assumed and examines the use of these capabilities made by people (Desai, 1991). UNDP's Construction of HDI is based on the capability and functioning approach of well being.

As discussed in the earlier section (2.2), Sen (1977,1984,1985,1987) was critical of the use of both "opulence" (income, wealth or commodity possession) and "utility" (happiness, desire fulfillment or choice) as a measure of well being. This is because they constitute wrong space in which to make such assessment. Instead, Sen argues that well being has to do with being well, which in most elementary terms is about being healthy, being literate, being able to live long and so on. As Sen (1987) puts it, the value of living standard lies in the living and not in the possessing of commodities which has varying relevance. For example, to reach the same level of nutrition as another, one needs larger command over food if one has a higher metabolic rate or a larger body frame or one is pregnant or one lives in a colder climate or if food has other uses like festival. So what is valued intrinsically are people's achievement or their capabilities to function. Opulence can have importance as an instrument for expanding capabilities while utility can provide evidence of achievement. But Sen's argument is that the space in which well being should be evaluated has to be more directly linked to what matters most, not instrumental antecedents and nor its evidential correlates.

Sen's approach to well being (Sen 1985, 87, Dutta *et al*, 1994) in terms of functioning and capabilities can be briefly explained in the following way.

Let X be the commodity space with generic element x. For any individual i, the commodity entitlement is Xi, the set of commodity bundle that i can posses. Given x in X the vector of characteristics corresponding to x is given by c (x). In fact it does not give us the idea about how useful the bundle is to any specific individual. For example a book which may be treated as having the characteristic "reading pleasure" is not of much use to an illiterate person. Functioning tells us what a person can do with the commodities in his or her possession. Let

f_i be a personal utilisation mapping of individual i, generating a functioning vector out of a characteristic vector of commodities possessed by i. The set of utilisation function available to i be F_i. If individual i chooses the function fi and posses commodity bundle x, then the achieved functioning is given by the vector bi, where $bi = f_i[c(x)]$ Individual i's capability set is given by

$Bi = \{bi/bi = f_i[c(x)], f_i \subset Fi, x \subset Xi\}$

Hence the achievement in promoting well being of an individual is a vector of his functioning, the irrelevant functioning ranging from being adequately nourished, being in good health and avoiding escapable morbidity to more complex ones such as being happy or self respect . This functioning is an intrinsic part of an individual, and is quite distinct both from the commodities which are used to achieve the functioning as well as the utility or happiness achieved from the functioning. On the other hand, a capability set represents the various combination of functioning that a person can achieve. An obvious analogy is that the capability set in functioning space defines an individual's freedom to choose from possible livings just as the budget set in commodity space reflects a person's ability to buy different bundles.

In any exercise involving social evaluation the first step is to identify the objects of value. Sen defined functioning and capabilities as the objects of value. It is obvious that the functioning is an object of value as the achieved functioning indicates the quality of "being" of an individual. Sen pointed out that the well being of a person must be judged not only in terms of the actual achievements but also it must incorporate the freedom to choose between types of being.

The human development approach to the UNDP's HDR concentrated on the capability to lead worthwhile lives as the object of importance. It applied the universalist perspective to the freedom to lead lives that people today and in the future would value (Anand and Sen 1994,8). It was expressed in HDR (1990) that the term human development denotes both the process of widening people's choice and the level of their achieved well being. The Report also distinguished clearly between two sides of human development . One is the formation of human capabilities and the other is the use that people make of their acquired capabilities , for work or for leisure.

2.4: Methodology used for the construction of HDI

The HDI include three key components - longevity, knowledge and income which are combined to arrive at an average deprivation index. Longevity is measured by life expectancy at birth as the sole unadjusted indicator. Knowledge was measured by two educational stock

variable, adult literacy and mean year of schooling upto 1994. The measure of educational attainment was obtained by assigning a weight of 2/3rd to literacy and 1/3 to mean year of schooling .

$E = a_1$ literacy + a_2 years of schooling

with $a_1 = 2/3$ and $a_2 = 1/3$.

Since 1995 for educational attainment the estimate of mean years of schooling has been replaced by the combined enrolment ratio at primary, secondary and tertiary levels. This variable has been given a weight of one third and as before adult literacy a weight of two-thirds.

The HDI is based on the premise of diminishing returns from income for human development. It was an explicit formulation for the diminishing returns to be calculated. A well known and frequently used form (Dutta *et al*, 1994) is the Atkinson formulation for the utility of income (HDR'93). The new variable W is given as

$W(y) = \{1/(1-e)\}y^{1-e}$

Here W(y) is the utility or well being derived from income, and the parameter e measures the extent of diminishing returns. It is the elasticity of marginal utility of income with respect to income. If e=0, there is no diminishing returns. As e approaches 1, the equation become

$W(y) = \log y$.

The value of e rises slowly in the HDI as income rises (HDR '93). For this purpose the full range of income is divided into multiples of poverty line y*. Thus most countries are between 0 and y*, some between y* and 2y*, even fewer between 2y* and 3y* and so on . For countries with per capita income below y*, the value of e is set to be zero with no diminishing returns. For income between y* and 2y*, e is set to be 1/2, for income between 2y* and 3y* e is set to be 2/3 and so on.

In general, if a $y^* \leq y \leq (a+1)y^*$

This gives

$$
\begin{aligned}
w(y) &= y \text{ for } 0 < y \leq y^* \\
&= y^* + 2(y-y^*)^{1/2} \text{ for } y^* \leq y \leq 2y^* \\
&= y^* + 2(y)^{1/2} + 3(y-2y)^{1/3} \text{ for } 2y^* \leq y \leq 3y^*
\end{aligned}
$$

So the higher the income relative to poverty level, the more sharply the diminishing returns affect the contribution of income to human development.

The HDI is constructed in three steps. The first step is to define a country's measure of deprivation for each of the three variables- life expectancy (x1), educational attainment (x2) and adjusted real per capita GDP in PPP$ (x3). A maximum and minimum value is identified for the actual values of each of the three variables. The deprivation measure then places a country in the 0-1 scale defined by the difference between the maximum and the minimum.

Thus the deprivation indicator for country j with respect to variable Xi is defined as

$$I_{ij} = \{\max_k \{X_{ik}\} - X_{ij}\} / \{\max_k \{X_{ik}\} - \min_k (X_{ik})\}$$

The second step is to define an average deprivation indicator Ij for country j by taking the average of the three indicators

$$I_j = 1/3 \sum I_{ij}$$

The third step is to measure the human development Index (HDI) as one minus the average deprivation index

$$\{HDI\}_j = 1 - I_j$$

For example (HDR,1993), Singapore had a real per capita GDP of $15,108. The poverty line being $4,829, the equation for the determination of well being of Singapore becomes

$$w(y) = 4829 + 2(4829)^{1/2} + 3(4829)^{1/3} + 4(15108 - 14,487)^{1/4} = 5,039$$

In calculating the HDI of Singapore the following steps are taken

Max. Country life expectancy	= 78.6
Min Country life expectancy	= 42.0
Max Country educational attainment	= 3.00
Min Country educational attainment	= 0.00
Max Country adjusted real GDP per capita	= 5079
Min Country adjusted real GDP per capita	= 380
Singapore life expectancy	= 74.0
Singapore educational attainment	= 2.04
Singapore adjusted real GDP per capita	= 5039

Singapore life expectancy deprivation

= (78.6-74.0)/(78.6-42.0) = 0.126

Singapore educational attainment deprivation

= (3.00-2.04)/(3.00-0.00) = 0.320

Singapore GDP deprivation

= (5079-5039)/(5079-380) = 0.009

Singapore average deprivation

= (0.126+0.320+0.009)/3 = 0.152

Singapore HDI

= 1-0.152 = 0.848

Since HDR 1994 the above deprivation calculation and HDI methodology was slightly changed to get the direct result of HDI. Here instead of deprivation calculation indexed value of X_1, X_2 and X_3 were calculated by

$$\text{Indexed } X_{ij} = \{X_{ij} - \min_k\{X_{ik}\}\}/\{\max_k\{X_{ik}\} - \min_k(X_{ik})\}$$

Then summing for the indexed life expectancy, educational attainment and adjusted income we get the "summation" value. Dividing "summation" by 3 we get the HDI of jth country directly.

2.5: A critical review of the HDI provided by the UNDP :

The HDI was first published in the HDR in 1990 by the UNDP. It immediately attached a lot of attention by economists and researchers.

Rao (1991) started with the question whether human development as defined by HDR can assist human evolution and observed that the HDR would have achieved the highest degree of richness and fullness if it had devoted at least a small amount of space to human values as an integral part of human evolution- the evolution of the human races to manifest its real nature, that of humanness. Rao also noted two measurement problems, one relating to the use of equal weight to each of the three deprivation variable. The weighting problem may become more significant as more dimensions are added to HDI. The second problem is the way the deprivation in purchasing power was computed. In this report (1990) the logarithm of real GDP per capita was estimated to capture the income deprivation index. Rao observed that if the "logs" were discarded Kenya's HDI would become 0.383 against the earlier 0.481. If

poverty line of the industrial countries was set aside and the highest level of GDP per capita ($17,615 of the U.S) was used for the target, then Kenya's HDI would be 0.353. Rao also suggested that the measure of democratic freedom was another variable which should have been included in the HDI.

McGillivray (1991) examined both the composition and usefulness of HDI as a composite development indicator by using zero order and rank order correlation coefficients. The most striking feature of the results of zero and rank order correlation coefficients was the indication of redundancy of HDI vis-a-vis its individual components in terms of both values and ranking. The corresponding zero and rank order coefficients were both positive and statistically significant at 99% or greater level of confidence. A positive and often very large zero and rank order coefficients between HDI and GDP per capita was observed, irrespective of whether actual or logarithmic values of GDP per capita were used. Hence it was suggested that the HDI generally ranked countries in a manner not dissimilar from the way GNP per capita ranked them. Finally GNP per capita was positively correlated with each of HDI's components. Thus it was concluded that the composition of the HDI is flawed as it is significantly and positively correlated with each of its component variables individually. As a consequence assessing intercountry development levels on any one of these variables would yield similar results to those that the index itself yielded. With the exception of a minority of country group, the index largely provided with little more informations regarding intercountry development levels than the more traditional indicator, GNP per capita. Finally it was observed that the UNDP's index was yet another redundant composite intercountry development indicator.

Hopkins (1991) observed that the HDR of 1990 took up the new fashion on "meso" policies and called for "well structured" meso policies. These apparently required a mix of two main features. First, across-the - board provision of basic services to ensure that the benefits reach the deprived and second targeted schemes such as income support and food subsidies directed towards deprived groups. To be more useful to human resource planners the Report would have to discuss what human resources must be developed to meet the needs of a rapidly growing economy. This would require examining such questions as where does vocational training take over from formal education? How many trained numerical control experts does a country require? How much training should be provided by the State and how much by private sector? Hopkins also observed that the UNDP Report's policy suggestions were too general to be of very much help. Because it did not address how the government can redirect

expenditure away from costly hospitals towards primary health care without completely loosing the support of medical establishment. Nevertheless the Report was welcome for attention to human development issue, for its useful statistical annex and for its observation that poverty of people of the developing world has been no barrier to the affluence of their armies.

Kelly (1991) assessed the HDI (1990) with very wide interpretation, results and comments. He first took the view of maximum and minimum value of the indicators. For example the HDR took the adequate or derived value of life expectancy at 78, a value attained by Japan. But Kelley observed that a less exceptional and rational value might be 73, the average of developed countries in 1987 or even 71, the value of these other countries in 1975. Adopting the value 71, the HDI of China would rise from 0.72 to 0.78. Kelley also observed that problems would occur when various indicators are given equal weights. It might be argued that income should have been given a relatively higher weight. In the HDR, 1990, the developed country's poverty line was taken into consideration and then there was a log transformation. The log transformation of per capita GDP adequately captured the diminishing marginal utility of income. Kelley took a much higher value ($12,952) which is the average real per capita GDP in industrial countries as against $4861, the poverty level in HDR 1990. It was observed that the values of HDI does not appear to be particularly sensitive to the poverty line cut off, a disquiting finding. It is difficult to believe that such a large increase in per capita income would have only a small impact on enlarging "people's choice". Kelley also observed that there is plausibly diminishing marginal utility to health and education expenditure as well. He concluded that the present HDI (1990) provides only limited information on the distribution of indicators within countries and fails to include systematic information and analysis of political freedom and human rights.

Desai (1991) expressed that equal weighting to the three indicators reflect the equal importance of the three variable. But the equal weighting is not strictly true since the income variables truncated and then concavified. Thus for income it is not strictly the maximum range since many countries have actual income beyond the poverty line of the nine advanced countries. Desai also observed that the HDI fails to discriminate among rich countries as they are nearly at the maximum value of life expectancy and literacy and also they have been put at 1 (one) for the income variable. So it is necessary in future development of the index to examine ways of differentiating at the top. It was also claimed by Desai that the additivity over the three variables implied perfect substitution which can hardly be appreciated. To restrict the substitutability between the variables Desai proposed the use of log additive form. It was also

concluded that the variables like political freedom, human rights are not included in the HDI and it was suggested that the next HDR should include these variables.

Dasgupta (1990) observed that suitable increasing transformations need to be applied to each of the indicators of HDI before entering them in any aggregate measure of the state of well being or human development. The point was explained by the fact that an increase in life expectancy at birth from 45 to 46 years does not reflect the same achievement as an increase from 70 to 71 years. So an index of life expectancy at birth must be sensitive to this issue, also national income per head and literary rate should be taken care of in this regard. Dasgupta (1990,1992) took six indicators of living standard including income, life expectancy, infant mortality, literacy rate, political and civil right. The rank of the last two indicators has been taken from Taylor and Jodice (1983). It was observed by Dasgupta that political and civil rights over decades are positively and significantly correlated with growth in national income per head, with improvement in life expectancy at birth and also with improvement in infant survival rate. Political and civil rights, while not the same, are strongly correlated. Increase in national income per head is positively and significantly correlated with improvements in longevity and infant survival. Improvements in adult literacy is not correlated significantly with national income per head or with its growth or with improvement in infant survival rate. But they are negatively and significantly correlated with political and civil rights.

Anand and Ravallion (1993) attempted to identify and quantify the relative importance of the main channels through which aggregate economic growth might promote human development. The econometric study of cross countries suggested that at least for basic health, average affluence matters to the extent that it delivers lower income poverty and better public service. The commonly observed positive correlation across countries between life expectancy and affluence vanishes once the incidence of poverty and public spending on health is controlled. The same is also true for other indicators. Though both these variables matters it is notable that the quantitative significance of public health spending appears to be sizeable. Sri Lanka's example of progress of human development illustrated what the right sort of public action can achieve, independently of income.

Streeten (1994) distinguished between human resource developments and humanitarians as to whether human development concept is used as means or ends itself. He is in favour of using HDI as one indicator instead of income per head. As the distribution of literacy rate and life expectancy is much less skewed than income, the average of human indicators tells us something about the distribution. Any upward move in a human indicator may be regarded as

an improvement and also because high income can cause relative deprivation in others which is not true for human indicators. Streeten is in favour of constructing a separate index to cover the aspects of human freedom and human rights and also freedom is related to human development if they are recorded by separate indices.

Srinivasan (1994) was critical about using the HDI as it is conceptually weak and empirically unsound. It also involves serious problems of non comparability over time and space, Srinivasan argued that meaningful inferences about the process of development and performance as well as policy implications could hardly be drawn from variations in HDI.

Aturupane *et al.* (1994) analysed country progress on social indicators by using regression equations with changes rather than levels of social indicators for 71 countries. The study concluded that income growth, while important is not the primary determinant of improvement in social indicators, i.e. growth helps but it is not the only casual factor.

2.6: Further Improvement, Modification and Disaggregation of the HDI :

In incorporating income in the HDI, two major variants were tried by the UNDP. First in 1990, the logarithm of income was used rather than actual value . Second, the poverty level of 17 industrialised countries was averaged and converted to real PPP dollars. The log of this poverty level income was taken as the cut off point. If a country had per capita income above this level it was given no extra weight. The first of these two adjustments incorporated the principle of diminishing marginal utility of income and the second was designed to emphasise the interest of the HDR in poverty alleviation (HDR 1993).

In addition to the two "adjusted" HDIs for income there has been modification in other components, particularly the indicator of educational attainment. Educational attainment was originally measured by the sole indicator of adult literacy rate. But the 1991 Report broadened this measure to incorporate mean year of schooling.

In HDR 1994 a major refinement was introduced . When "goal posts" (HDR 1994) were fixed for each indicator to allow analysis over time. In the HDR 1995 two modifications were made with respect to poverty level cut off and educational attainment. The poverty level income increased from PPP$ 4829 to PPP$ 5448 and for educational attainment mean year of schooling was replaced by the combined enrolment ratio at primary, secondary and tertiary levels.

One way of improving the HDI is through disaggregation. A country's overall HDI can conceal the fact that different groups within the country have very different levels of

human development, between men or women or among different ethnic groups, different regions and States within the country or between different social class and religion. The HDR 1993 supplied separate HDI for different countries based on the availability of data. The HDR 1994 included mere countries in the work of disaggregation.

2.6.1 : Gender -disparity-adjusted HDI.

One of the most significant differences within the overall HDI score for any country is between men and women. In different countries life expectancy and literacy data are generally collected and analysed by gender. But for income, there is no way to determine how males and females share total GDP. The HDR 1993 had comparable data on relative wage and relative labour force participation rate between male and female workers in 33 countries . These data revealed the male-female wage ratio for 33 countries ranged from a low of 51% in Japan to a higher of 89% in Sweden. Again the HDR 1994 took care of 43 countries and almost the same result appeared for male -female wage ratio. In labour force participation the lowest male-female ratio was 40% in Costa Rica and the highest at 92% in Sweden in 1993 Report. In HDR 1994 the female-male ratio of non agricultural labour force participation revealed to vary between 22% in Bahrain to 89% in Finland.

In the HDR 1994 the above two ratios were multiplied to give an overall "female-male income ratio" for separate countries. The Report claimed that such ratios can print only a partial picture, but still they reveal remarkable pattern of discrimination. The Report (1994) observed that the combined ratio ranged from 21% in Bahrain to 83% in Sweden of the 43 countries where gender disparity HDI was calculated. Among the 43 countries 14 had ratio below 40% and only 11 had ratios above 60%. The Report concluded that even these disparities under estimated discrimination since female- male income differences are generally greater in agriculture and services than in manufacturing.

After calculation of gender disparity adjusted HDI for 43 countries in HDR 1994, no country improved its HDI value after adjustment. All countries treated women worse than men. But some countries do less badly than others. For example Japan got the rank from 3 to 19; Canada from 1 to 9 ; Switzerland from 2 to 17. Countries improved their rank after adjustment were Denmark from 15 to 4; Sweden from 4 to 1; Finland from 16 to 3 and New Zealand from 18 to 8.

In this calculation of gender disparity adjusted HDI a very simple method was used. First , female value of each component was expressed as a percentage of male value. These percentages were calculated separately for income, educational attainment and life expectancy. Then they

were averaged to give an overall gender gender-disparity factor. A country's overall HDI can then be multiplied by this factor to give gender disparity adjusted figure if the relevant data was available.

2.6.2: Income-distribution-adjusted HDI.

In many countries particularly, in developing countries income distribution is badly skewed. But a rich man cannot live a thousand times larger than a poor person, though their income may be in this ratio. Across countries the range of life expectancy is 42 to 72 or less than 2:1. Similarly the percentage of adult literacy varies from 18% to 99% a ratio of less than 6:1. In HDR 1993 it was observed that the range of GNP per capita over countries varied from $80 to $32,250 or a ratio of 403:1. For real GDP per capita the range was $367 (PPP) to $ 21,449 (PPP) or 58:1. This makes it important to discount the income component of HDI to reflect mal distribution of income.

In the HDR 1993, the ranking of per capita income was adjusted by multiplying a factor indicating distributional inequality-one minus the Gini Coefficient (1-G). In the 1993 Report for 41 countries data was available on the ratio of income share of the highest 20% to the lowest 20%. Of these 17 had data on Gini Coefficient as well. A strong association was found between the logarithm of the ratio of income share and the Gini Coefficient. So this regression result was used for another 11 countries to interpolate the Gini Coefficient.

In the HDR 1994, for income disparity factor the share of income of the bottom 20% of population was divided by the share of the top 20%. Multiplying this ratio by the country's overall HDI, the income-distribution adjusted HDI was obtained. This modified HDI for 55 countries was presented in the 1994 Report. No country has a perfect income distribution. Hence adjusting the HDI for income distribution reduces the score for all.

Among the industrial countries, the rank of Belgium improved nine place and that of Germany by seven. But other countries deteriorated significantly. Canada and Switzerland lost seven places and Australia by eight. In developing countries the income disparities appeared to be greater. Brazil's HDI ranking dropped by 7 places, Bostwana by eight places. But the improvement in ranking was observed for China by six, Sri Lanka by seven and Jamaica by eight.

2.6.3: Change in HDI over time :

In calculating the HDI, the minimum value of each indicator was set at the level of the poorest performing country and the maximum at the best performing country. Any country's

HDI components were thus its position between the best and the worst value. But the value of the maximum and minimum changed each year following the performance of the countries at extreme ends of the scale. This type of scaling change over years can produce frustrating results. An example can help better understanding (Griffen and Mckinley, 1993).

Let us suppose the life expectancy of Ruritiania in period 1 to be 40, halfway between minimum of 20 and maximum of 60. By period 10 Ruritiania may have improved its life expectancy to 50 but the minimum value may now be 30 ,and maximum 80. In such a case, the numerical value of the index indicating life expectancy in the HDI calculation falls from 0.5=[(40-20)/(60-20)] to 0.4=[(50-30)/(80-30)], despite the 25% improvement in life expectancy for the country over 10 years.

To solve the problem the HDR 1994 observed the importance of fixing the "goal posts" of maximum and minimum value of each indicator. These minimum and maximum are not observed values in the best and the worst performance but the most extreme values observed or expected over a long period. With the new fixed goal posts the minimum and maximum values of life expectancy are 25 years and 85 years. Demographic and medical information suggested these values. The corresponding values for adult literacy are 0% for minimum and 100% for maximum. The mean year of schooling has been fixed at 0 and 15 for minimum and maximum values. Similarly recent economic growth rates indicated that the maximum income that the richest countries are likely to achieve by 2020 A.D. is PPP$ 40,000 and the minimum to be PPP$ 200.

The main advantage in fixing the goal posts is that it can permit comparisons of the HDI over time. The comparisons over a period 1960-92 was shown in the HDR 1994, which revealed that all countries made substantial progress in human development. Between 1960-92 the overall HDI for the developing countries increased from 0.260 to 0.541. Many countries have shifted to higher human developed category, 30 countries moved from low to medium , 20 from medium to high and 4 from low to high category. The HDR 1994 concluded that no country saw its HDI value fall over this period, unlike GDP which has on occasion fallen in several countries. Hence human capital, once build up, is more likely to be sustainable (HDR 1994).

2.6.4: Disaggregation of the HDI.

There are very significant disparities within each country among ethnic group, among sub regions, between urban and rural areas and also between males and females. In the HDR 1993, it was expressed to be unfortunate that there was no sufficient data to present

disaggregation in most of the countries. In the HDR 1993, the disaggregation of HDI has been provided only for five countries, the United States, Mexico, India, Turkey and Switzerland. In the U.S. the disaggregation has been worked out for white, black and hispanic population separately . In India, the HDI in Uttar Pradesh was a third lower than the national average and 60% than that in Kerala. For Switzerland the disaggregation was made by region, for Mexico by State and for Turkey by region and gender.

Disaggregated HDIs were arrived at by using the data for HDI components pertaining to each of the groups into which the HDI was disaggregated, treating each group as a separate country. The methodology remained the same as for the national HDI.

In the HDR 1994 disaggregated case studies were prepared for nine countries further. These were South Africa, Brazil, Nigeria, Egypt, China, Malaysia, Canada, Germany and Poland. In case of South Africa disaggregation has been worked out between black and white. In Brazil a regional and income group disaggregation has been worked out. For Nigeria disaggregation by regional disparities, for Egypt between rural and urban, for Malaysia among communities, for Canada among aboriginals, for Germany, Poland and China regional disaggregation has been worked out and reported in the HDR 1994.

2.7: Further Improvement of Indicators since HDR 1995 :

An extremely valuable and innovative contribution of HDR 1995 was the construction of gender related development index (GDI) and gender empowerment measure (GEM) introducing further disaggregation. The GDI concentrated on the same variables as the HDI but focussed on both the inequality between men and women as well as on the average achievement of all people taken together. Actually the GDI is basically the HDI adjusted for gender inequality.

The GEM is an index to focus on three variable to reflect the participation of women in political decision making, their access to professional opportunities and their earning power. The GEM gives some indication of how much women are empowered in these spheres in different countries.

The GDI measures achievement in the same basic capabilities as the HDI does, but takes note of inequality of achievement between men and women. The methodology used in HDR 1995 imposes a penalty for inequality, such that GDI value decreases when the achievement levels of both women and men in a country go down or when the disparity between their achievement increases. The greater the gender disparity in basic capabilities, the lower a country's GDI compared to its HDI. (HDI 1995)

The GEM examines whether women and men are able to actively participate in economic and political life and take part in decision making. While GDI focuses on the expansion of capabilities, the GEM is concerned with the use of these capabilities to take advantage of the opportunities of life.

The HDR 1995 produced GDI for 130 countries and the GDI was always lower than the HDI because of the existence of gender inequality in every country. The GEM was estimated for 116 countries. The ranking showed that some developing countries outperformed much richer industrial countries in gender inequality in political, economic and professional activities. It was concluded that in most countries, industrial or developing, women are not yet allowed into the corridors of economic and political power. In exercising real power or decision making authority, women are distinct minority throughout the world (HDR 1995).

In the HDR 1996, a new index named Capability Poverty Measure (CPM) was introduced for 101 countries. CPM is a simple index composed of 3 indicators that reflect the percentage of people with capability shortfall in 3 basic dimensions of human development. These are (1) living a healthy, well nurished life, (2) having the capability of safe and healthy reproduction and (3) being literate and knowledgeable. The corresponding indicators are (a) % of children under 5 who are under-weight, (b) % of births unattended by trained health personnels (c) % of women aged 15 and above who are illiterate. That is CPM focuses on people's lack of capability rather than average level of capabilities in a country as done by HDI (HDR, 1996)

2.8: The path we follow :

The primary objective of this study is to construct the HDI of States of India and the districts of West Bengal with the indicators used by the UNDP and also different indicators suggested by others. Though the HDR 1995 introduced a new scope for women study, we shall not enter into this area. In our study we shall not concentrate on either gender-based or urban-based HDI study at micro-level. This is partly due to non-availability of relevant data at the micro-level and partly because it may make our present study unwieldy. Hence we leave the area of sex-biasedness or urban -biasedness from our study. For the same reasons we do not attempt to construct the CPM for the States India.

Chapter III

Research Questions, Methodology And Data Sources Of The Present Study

3.1: Introduction

The HDI published by the UNDP in different HDRs articulated researchers the dynamics of development and the linkage between economic growth and social concern. It established that development is not merely expansion of income and wealth but a process of enlarging people's choices. The three essentials adopted in the construction of HDI being long and healthy life, acquisition of knowledge and access to resources for a decent standard of living.

Human development issues have admittedly strong regional and global dimensions. Out of every seven persons in the world, one being an Indian is enough reason to examine the Indian perspective of human development. India accounts for almost half of the world population and is classified under 'low human developed' category in the HDRs, on the basis of HDI. Raising the level of development of India's population by the end of the century is being pursued in an environment of democratic policy and consequently in a framework of human freedom (Dalal, 1991). If India is able to move from the low human developed scale to the medium human developed scale, the global human development landscape would undergo radical changes.

3.2 Methodology used for the computation of HDI in the present study:

In the construction of HDI , the HDRs of the UNDP has used three dimensions e.g. adjusted real per capita GDP at PPP dollars, life expectancy and educational attainment. In case of income it has assumed the diminishing marginal utility of income with the well-known Atkinson formula taking utility of income as $w(y) = \{1/(1-e)\}y^{1-e}$ and the parameter e is the elasticity of marginal utility of income. The income range is divided into multiples of international poverty line y*. For income between y* and 2y*, e is the set to be 1/2 ; for income between 2y* and 3y*,e is set to be 2/3 and so on. Before constructing this , the GDP per capita of each country is converted into PPP dollars. In contrast to the earlier Reports, the

HDR 1995 used real GDP per capita rather than GNP per capita to minimise distortions in income ranking due to exchange rate fluctuations.

In all the HDRs, India's rank was shown at the low human developed category. So also its income was always below y*.

a) In our analysis we shall use the poverty level in the context of Indian poverty line and then use the formula provided by the UNDP. Actually when we use the poverty line concept in the Indian context we use this in terms of Indian Rupee and we do not convert it in PPP dollars. This is because the State per capita real SDP is always below the international poverty line even for the richest State of India.

b) We shall also convert the State per capita SDP in real PPP dollars to have an international comparison. That is , we put the States among thee countries of the World according to the respective HDIs calculated in our study.

c) We shall also use the logarithms of per capita SDP in a separate study to calculate the HDI of major States. This is because it was observed that in case of the absence of proper income distribution data the log value of income can capture income distribution to some extent (Kakwani, 1993).

d) In our study we shall use the per capita net SDP at current prices, although some researchers are in favour of using this at constant prices (Dutta *et al.*, 1994). We use current price data because we want to have a comparison among the States and in case of constant price data, the inflationary variable among the States would be avoided. We want to take care of the inflation rate within the States which may differ from the other and this object is fulfilled by the current prices of the variable concerned.

As far as education is concerned, the UNDP preferred to use the term 'educational attainment', as the combination of two variables. Upto 1994 in the calculation of educational attainment the UNDP used literacy rate with 2/3 rd weight and mean year of schooling with 1/3rd weight. But due to the lack of data the UNDP avoided mean year of schooling and instead used the gross enrolment ratio at primary, secondary and tertiary level, again with the same weight.

a) In India the literacy data is published by the Census of India, which is the main source of this indicator. The Ministry of Human Resource Development, Government of India publishes data on gross enrolment rate by various categories like primary, secondary and high school level annually. Gross enrolment is calculated as the ratio of total number of students

enrolled in the relevant stage by the estimated population in a specific age group. But it is shown that in many States this ratio is higher than 100%, which was used as maximum in the UNDP Report (1995). Hence there is a problem in using this ratio in our study . Also there are reasons to believe that this ratio is sometimes over inflated for various reasons (Shiva Kumar, 1996). Therefore we shall avoid using this data in our study.

b) Mean year of schooling data is not published in India in a form that can be used for the construction of HDI. So it is to be calculated by the researchers. Again the relevant data needed to calculate the mean year in schooling is absent at the State level. Hence we also avoid this variable.

c) In our study the 'educational attainment' will be indicated by the percentage of literates in the respective States. This is the method used in the HDR 1990 with full weight only on the percentage of literates in the country. So with full weight on percentage of literates within the State we shall calculate the educational attainment indicator.

For health related indicators, the UNDP has used unadjusted life expectancy at birth variable and this the only variable which is unadjusted.

a) In our calculation of the HDI for the States of India we shall be using the life expectancy data published by the Sample Registration System (SRS), India.

b) For the construction of HDI of the districts of West Bengal we shall take infant mortality rate (IMR) as the health related variable, as the life expectancy data at district level is not available.

With the help of the above three indicators we shall find out the maximum and the minimum values or the targets or the "goal posts" for each indicator. Then we shall use mainly the UNDP methodology of 1994 to construct the HDI to get the required results (sec 2.4 of the present study).

3.3: Objectives and Research Questions of the Study :

In this study the objective, to reitrerate, is to construct a new development indicator of the major States of India as well as the districts of West Bengal with the help of the methodology used by the UNDP . This is mainly a disaggregated study or a micro level study.

In our study we shall construct the HDI of different States and also the districts of West Bengal to have a comparison among the States of India and among the districts of West Bengal in view of their human development achievements.

We shall also examine whether the States with higher per capita income offer higher HDI . For this purpose we first of all divide all the States of India into two groups on the basis of per capita net SDP. After the calculations of HDI we shall see whether the ranking on the basis of income and HDI changes or not. That is we shall examine how does the income level affect the human development level.

Another question we shall be examining is whether over time the States have been improving regarding human development and also how their ranking have been changing over time in respect of the HDI.

We shall also participate in the debate whether government actions do have significant role in improving the human development in the Indian context . For answering these queries we shall use the econometric method and interpretations used in earlier studies (Dutta *et al.*, 1994; Kakwani, 1993).

3.4: Methodology for HDI Construction Over time :

One problem in the construction of HDI over time is the fixation of goal posts. It has been explained in the previous chapter (Sec 2.6.3) that change in goal posts in the construction of HDI would under value the achievements of the respective indicators . To avoid this problem it has been suggested by the UNDP to have a fixed minimum and maximum value of each indicator.

In our study we intend to calculate the HDI of States of India for 1981 and 1991 and thus we shall follow the UNDP procedure (HDR 1995) to compare change in HDI values over time .

a) The maximum percentage literacy rate will be taken to be 100 and that of the minimum value will be taken to be zero.

b) For life expectancy at birth the maximum value is 85 years and the minimum value is 25 years.

c) In case of income we find that in 1980-81 the minimum per capita net State domestic product (SDP) is from Bihar and it is Rs. 530.00. So we shall take the minimum value as Rs . 500.00 which is very close (asymptotic) to the actual minimum value . The highest value of net SDP is offered by Delhi in 1991-92. It is Rs. 12389.00. We shall not consider and calculate the HDI value of Delhi, so this value will be taken to be the maximum . Further this is the actual maximum value of income which was not attained by any of the States of our study.

3.5: Further Modification of Development Indicator and its Methodology:

In the calculation of the HDI a related problem is that deprivation is defined to be linear in the difference between maximum and the actual value of the different variables used . Kakwani (1993) pointed out that for the non- income indicators there exist biological and physical limits to the maximum achievements possible. It is difficult for a country to achieve improvement in the indicator for which its performance is very near to the maximum value at current level than a country with a current level value far from the maximum value. A linear measure of deprivation does not take into account this problem.

Kakwani (1993) suggested an alternative axiomatic procedure for deriving indices of achievement for indicators which have asymptotic limits. Let us take x to be some non income indicator for which higher level is desirable . Let the asymptotic upper limit be M, which x can never reach but comes very close to M . Let m be the lower limit for x. The problem considered by Kakwani is to define an appropriate index Q(x1,x2,M,m) to measure the achievement of a country when the value of the indicator moves from x1 to x2. Kakwani's improvement index is defined as

$$Q(x1,x2, M, m) = f(x2,M,m) - f(x1,M,m)$$

where f(x2,M,m) and f(x1,M,m) are the value of the achievement index. In order that achievement index lies between 0 and 1, Kakwani specifies

$$f(x, M, m) = \{g(M-m) - g(M-x)\}/g(M-m)$$

f(x,M, m) will lie between 0 and 1 for all g (x) provided $g'(x) > 0$ for $x > 0$ and limit $g(x) = 0$ as x approaches to 0.

The higher the values of x, the more difficult it is to record a further increase. In order to incorporate this into achievement index , it is sufficient to make g a concave function . A class of concave functions which has been widely used in economic literature of in equality was provided by Atkinson and used by Kakwani

$$g(x) = \{1/(1-e)\}/X^{1-e} \quad \text{for } 0 < e < 1$$
$$= Ln(x) \quad \text{for } e = 1$$

which provides a class of achievement functions

$$f(x, M, m) = \{(M-m)^{1-e} - (M-x)^{1-e}\}/(M-m)^{1-e}, \text{ for } 0 < e < 1,$$
$$= \{Ln(M-m) - Ln(M-m)\}/Ln(M-m) \text{ for } e = 1$$

where Ln stands for natural logarithms. Given the achievement index above, the improvement indices can be derived as

$$Q(x1, x2, M, m) = \{(M - x1)^{1-e} - (M - x2)^{1-e}\}/(M - m)^{1-e} \text{ for } 0 < e < 1$$

$$= Ln(M - x1) - Ln(M - x2)/Ln(M - m) \text{ for } e = 1$$

Kakwani concluded that the improvement index based on e = 1 would also satisfy all the axioms he started with. It has also been pointed out that at a different value of e = 0.5 , used for the same empirical study, the results did not change significantly and all the conclusions remained the same.

a) In our study we shall be introducing the achievement indices and the improvement indices for all the major States of India for which data are available. Although it was suggested to be used for non-income indicator, in our study we shall calculate the two indices for income variable also. The two time points in our study are 1981 and 1991 as before.

b) As pointed out by Kakwani, the results and conclusions did not differ with the value of e = 1 or e = 0.5 , in our study we shall use the value of e = 1 and as a result we shall calculate the above indices on the basis of natural logarithms.

3.6 : Introduction of New Indicators:

Different economists and researchers have pointed out that some important new indicators to be introduced in the construction of modified HDI (Dasgupta, 1990 ; Rao, 1991 ; Kelley, 1991 ; Desai, 1991). They have pointed out that the non-introduction of some important dimensions like political and civil freedom or rights made the HDI a defective indicator as an index of human development. The different HDRs (1993,94, 95) also acknowledged this defect. Similarly the issue of environmental sustainability has been ignored so far (HDR, 1994, Anand and Sen, 1994, 8).

Dasgupta (1990, 1993) presented an inter-country comparison of the quality of life with six variables including per capita income, life expectancy, infant mortality rate, adult literacy, index of political rights and index of civil rights. The value of last two variables were collected from the variable. compendium of Taylor and Jodice (1983) . Political rights are considered to be the rights of the citizens to play a part in determining who governs their country and what the laws are and will be. Civil rights are the rights the individual has vis- a-vis the State . That is it measures the extent to which people, because they are protected by an independent judiciary which are openly able to express their opinion without fear of reprisals.

Diamond *et al.* (1986,1990) regarded the level of political and civil liberties as the third important dimension of democracy. But the appropriate data needed for the construction of the indices at micro-level are not usually available. Again, these are published by international institutions for selected countries. In the context of India such a ready index is not available at State level.

Vanhanen (1991) presented an alternative measure of democracy by two indicators, competition and participation. Vanhanen asserted that the political and civil liberties are positively correlated with the indicators of electoral competition. It has been argued that the political and civil liberties are important characteristics of democracy but it is not necessary to measure their existence by a separate indicator as the level of competition and the index of democratisation indicate their existence or non-existence indirectly. In this study the share of smaller parties in the votes pooled in parliamentary or presidential election or in both is the measure of degree of competition. On the other hand the percentage of population who actually voted in the same elections is used to measure the degree of participation. Vanhanan constructed the index of democratisation with different weights to the above two indicators for 147 countries in the world.

Another issue which is challenging in modern world is that of the environment and the sustainable development . The HDRs referred to this issue time and again but it was not included in the construction of HDI of different countries. The idea of sustainable development arose essentially from the concerns relating to the over exploitation of natural and environmental resources (Anand and Sen , 1994(8)). However in the economic literature its importance has also been considered in economic development perspective particularly by Dasgupta (1993).

In our study for the construction of the modified HDI of the States of India we shall consider the above two issues separately.

a) We shall consider the construction of HDI at first with a fourth indicator of political right exercised by the people of the State in the State Assembly elections. This we shall do for the States where data are available. This is the indicator used by Vanhanan (1991) in the name of "participation" , in his study for the construction of index of democracy. Following Vanhanan we shall use this to indicate the political right . Vanhanen pointed out that participation can be indirectly used to measure political liberty. From the available data we shall find out the asymptotic limits of this variable and the same methodology will be followed to include this indicator in the modified HDI of States of India.

b) In order to capture the environmental issue we shall consider the degradation of renewable resources, viz, the forest cover. We shall use the percentage of forest area to total geographical area as a proxy of environmental indicator . Again with the help of asymptotic limits and the same methodology we shall add this indicator into the construction of modified HDI of the States of India.

3.7: Data Source Of The Present Study

India is one of the few countries in the world that can take pride of possessing a fairly decent statistical base on different socio-economic indicators which are also disaggregated by sex, groups, regions etc. (HDR 1993). Different social and economic data are collected and published by different State and Central Government departments. The Central Statistical Organisation (CSO) undertakes the task of coordination of official economic and social statistics. The Census and Sample Registration System (SRS) of the office of the Registrar General and Census Commission and National Sample Survey Organisation (NSSO) are the main source of the data based on nation wide sample surveys on different quantitative and qualitative dimensions of socio-economic development in India. Again , before the presentation of annual budget before the Parliament , the Government of India publishes the Economic Survey in which the socio-economic data are published to explain the trend of Indian Economy. It is one of the sources to find out the data on socio-economic aspects.

However, the data collected and published by different official agencies are scattered over a number of sources. Again, due to the absence of uniformity and periodicity and such other issues any standardarised presentation of data is very difficult. Some researchers have also raised doubts about the reliability of data. (Dutta *et al.*, 1994; Kurien 1983)

In our study we shall use the data published by the different departments of the Central and the State Governments. In our analysis of the HDI of the districts of West Bengal we shall use the different departmental sources of the Government of West Bengal. We shall also depend on the various Economic Surveys of the Government of India and the Economic & Political Weekly (EPW) Research Foundation . EPW Research Foundation publish data periodically in a consolidated form collected from different sources. We shall also borrow the published data used by different researchers in this particular area of research.

In the construction of the HDI, the UNDP has been using five different indicators so far, concentrated in three indices . These are the per capita income, life expectancy at birth, literacy rate, mean year of schooling and student enrolment ratio at primary , secondary and tertiary level.

It was claimed in the HDR 1993 that India is one of the few countries in the world where disaggregated HDI can be formed due to strong data base. But at the micro-level there are serious problems of collecting such data from reliable sources. Hence in our study we have to leave aside the last two indicators among the five used by the UNDP at State level. At the district level the problem is more serious. In the construction of the HDI of the districts of West Bengal we have to use the infant mortality rate (IMR) instead of life expectancy data even for 1981 due to the non-availability of this data at district level.

Chapter IV

Different Indicators Of Development : The Structure Of The States of India And The Districts Of West Bengal

4.1: Introduction

To prepare, present and analyse the HDI of the States of India we shall consider 16 major States of India. The States are Andhra Pradesh (AP), Assam, Bihar, Gujrat, Haryana, Himachal Pradesh (HP), Karnataka, Kerala, Madhya Pradesh (MP), Maharashtra, Orissa, Rajasthan, Tami Nadu (TN), Punjab, Uttar Pradesh (UP), and West Bengal (WB). It should be noted that in 1991, the 16 major States constituted about 95% of Indian population. Thus the exclusion of some very few States and Union Territories will not vitiate seriously our analysis of human development in India.

In this chapter we shall study the growth of per capita net State Domestic Product (SDP), the health and education related indicators of States of India. In this analysis the main focus will be on the nature and trend of the distribution of health and educational facilities in the 16 major States in the year 1981 and 1991. The main idea is to examine whether the distribution is biased against the low per capita income States and whether there exists a clear trend in the pattern of distribution over time.

We consider the per capita net SDP of 1991-92 at current prices as the basis of grouping the States of India. The all India per capita net domestic product for 1991-92 at current prices was Rs. 5630.00 and this figure is considered as the cut off point . In Table 4.1 it is clear that there were six States with higher per capita net SDP than the national average and the other States had a lower figure than this national average. Hence we form two groups in our study, the first group consisting of six States and the second group of 10 States. The first group is more developed and the second group is less developed from the point of view of this per capita net SDP . We start with this division to consider the health and education related indicators.

Table 4.1

Per capita Net State Domestic Product (at current Prices) in the States of India. 19991-92

(New Series) (Rs.)

States	1991-92	Rank of the States.
1. Punjab	9973	1
2. Haryana	8746	2
3. Maharashtra	8063	3
4. Gujrat	5994	4
5. Tamil Nadu	5878	5
6. Karnataka	5833	6
7.Himachal Pradesh	5578	7
8. Andhra Pradesh	5556	8
9. West Bengal	5227	9
10. Kerala	5140	10
11. Assam	4594	11
12. Rajasthan	4511	12
13. Madhya Pradesh	4377	13
14. Uttar Pradesh	3979	14
15. Orissa	3907	15
16. Bihar	2871	16
India	5603	-

Source: *Government of India, Economic Survey, 1995-96*

4.2: Health Related Indicators

The Government of India became a signatory of the Alma- Ata Declaration in 1978 on 'Health For All by 2000 A.D.' Primary health care was visualised as the nucleus of the health system of the country to make essential health care universally accessible.

4.2.1: Life Expectancy at birth (LE) :

Table 4.2 (a) illustrates the distribution of LE for 1981-88 and 1988-91 for male, female and total population for all the major States of India. It can be observed that in 1981-88 LE figures varied from 68.4 years in Kerala to 51.6 in M.P. This maximum figure increased to 70.76 in Kerala in 1988-91 and the minimum figure for the same year became 52.03 for U.P. Actually UP showed a falling rate of LE over the year 1981-88 to 1988-91.

By comparing the mean values of the variables of the two groups of States the idea of the distribution of the variables over the groups can be observed . The intra-group disparity in the distribution is obtained from the coefficient of variation (CV) of each group which are denoted by CV1, and CV2 for the groups respectively . The mean values and the standard deviation of the two groups are denoted by $\bar{x}_1$, $\bar{x}_2$ and s_1, s_2 respectively.

From Table 4.2 (a) and 4.2 (b) it is clear that the average LE in the Indian States in the period 1988-91 increased over that in the period 1981=88 for male, female and for all the population. However the average LE is higher in both groups over the second group of States in both the periods for both the sexes and for all the population . It is also observed that the average female LE is higher in both groups over the male LE in both the periods . However the LE of male population is higher than the female population in 1981-88 in Haryana , orissa and Bihar. Surprisingly the LE of male population becomes higher than the female population in Haryana, TN, WB, Assam , UP, MP and Bihar in 1988-91 . But the average figure in both the groups could not alter the result of higher LE for female population over the male population in the period 1988-91.

The t- test shows that the calculated values of t are less than the expected values at 5% and 1% level of significance. Hence the mean differences are insignificant in both the periods for male, female and aggregate population.

Table 4.2 (a)

Life Expectancy at birth of the States of India

States	1981-88 Male	1981-88 Female	1981-88 Total	1988-91 Male	1988-91 Female	1988-91 Total
1.Punjab	63	64.7	63.1	65.61	65.36	65.46
2. Haryana	61.5	59.5	60.3	63.41	61.97	62.74
3. Maharashtra	66.1	62.8	60.6	62.00	64.30	63.11
4. Gujrat	55.9	57.9	57.6	58.34	61.49	59.86
5. Tamil Nadu	57.4	58.5	56.9	60.85	60.80	60.83
6. Karnataka	59.8	62.4	60.6	62.15	63.31	62.72
7. H.P.	58.5	62.9	60.4	--	--	--
8. A.P.	57.3	60.3	58.4	59.1	62.23	60.64
9. W.B.	57.9	59.1	57.4	67.6	73.80	70.76
10. Kerala	65.9	72.2	68.4	67.6	73.8	70.76
11. Assam	52.4	52.5	51.9	55.74	55.23	55.47
12. Rajasthan	53.5	54.3	53.5	57.8	58.69	58.22
13. M.P.	50.6	51.8	51.6	56.24	54.71	55.5
14. U.P.	60.1	62.8	60.6	54.14	49.64	52.03
15. Orissa	53.6	53.1	53.0	57.13	55.15	56.15
16. Bihar	54.9	52.3	52.8	58.21	57.00	57.63

Source: Registrar General and Census Commission, Census of India, Paper 2 of 1992 , Final Population totals Brief Analysis of Primary Census Abstruct

(As ref. by EPW Research Foundation : EPW , vol 29 No- 21 May 1994)

4.2(b)

Distribution of LE over the States of India

	1981-88			1988-91		
Variables	Male	Female	Total	Male	Female	Total
$\bar{x}_1$	59.616	60.96	59.85	62.06	62.86	62.45
$\bar{x}_2$	57.07	58.13	56 .8	58.43	58.44	58.46
s_1	2.38	2.49	2.06	2.23	1.59	1.78
s_2	3.76	6.27	5.07	3.64	6.38	4.97
$C.V._1$	3.99	4.07	3.45	3.58	2.53	2.85
$C.V._2$	6.59	10.79	8.92	6.23	10.91	8.51
Calculated t value	.762	.346	.566	1.138	.550	.683

The S.D. had declined over the periods for the first group of States for both the sexes and for the aggregate population. But the S.D. increased in the case of female and had declined for the male population and aggregate population over the years in case of the second group of States. The intra-group disparity is explained by the values of the C.V. The values of the CV had declined for all the sexes and for the aggregate population over the years in the first group of States. But the intra-group disparity had increased in the second group of States in its female population, although it had declined in the case of male population.

4.2.2: Birth rate and Death rate in the States of India

The birth and death rates of the States of India in 1981-83 shows that the national average were 33.8 and 12.1 respectively. These figures declined to 29.5 and 9.8 respectively for birth rate and death rate in India for 1990-92. The State with highest birth rate (38.9) was U.P. in 1981-83 and the State with the lowest rate (25.6) was Kerala. In 1990-92 the State with highest birth rate was still U.P. (35.8) and the State with the lowest birth rate (18.5) was again Kerala. So far as death rate is concerned Kerala registered the lowest (6.6) in 1981 and U.P. the highest (15.7) for the same year. In 1990- 92, M.P. became the State with the highest death rate (13.0) and the State Kerala again had the lowest figure (6.1)

Table 4.3 (a)

Death Rates and Birth Rates of the States India

States	Birth Rates		Death Rates	
	1981-83	1990-92	1981-83	1990-92
1.Punjab	30.3	27.5	9.1	7.9
2. Haryana	36.4	32.3	9.8	8.4
3. Maharashtra	29.3	26.3	9.2	7.8
4. Gujrat	34.3	28.3	11.8	8.8
5. Tamil Nadu	27.9	21.0	11.6	8.6
6. Karnataka	28.3	27.0	9.2	8.5
7. H.P.	-	27.9	-	8.7
8. A.P.	31.2	25.6	10.7	9.3
9. W.B.	32.5	26.6	10.6	8.3
10. Kerala	25.6	18.5	6.6	6.1
11. Assam	34.0	30.4	12.4	10.8
12. Rajasthan	38.5	34.4	13.3	10.1
13. M.P.	38.2	35.7	15.4	13.0
14. U.P.	38.9	35.8	15.7	12.1
15. Orissa	31.5	28.9	12.5	12.1
16. Bihar	37.9	31.9	13.6	10.4

Source : *Sample Registration Bulletin, 1994, Vol XXVIII, No. 12*

Table 4.3 (b)

Distribution of Birth Rates and death rates in the States of India

Variables	Birth Rates		Death Rates	
	1981-83	1990-92	1981-83	1990-92
$\bar{x}_1$	31.08	27.06	10.11	8.33
$\bar{x}_2$	34.47	29.57	12.32	10.09
s_1	3.17	3.33	1.14	0.36
s_2	4.16	5.06	2.63	1.97
Cv_1	10.19	12.29	11.30	4.36
Cv_2	12.07	17.12	21.32	19.53

Table 4.3 (a) and 4.3 (b) show that the average birth rate and death rate in both the groups had reduced over the period 1981-83 and 1990-92. The values of S.D. increased in the case of birth rate for the first and second group over the periods 1981-83 and 1990-92. Thus the disparity in the distribution within the group had increased over time. In case of death rate this disparity had reduced in both the groups of States over time.

The intra-group disparity is analysed by the value of the C.V. In the birth rate the intra-group disparity had increased over time in the first group of States. In case of death rate it has reduced over period for the same goup. But for the second group of States this disparity in birth rate had increased while this disparity in death rate had reduced over 1981-83 and 1990-92.

4.2.3: Infant Mortality Rate (IMR) and its distribution in the States of India:

Table 4.4 (a) and 4.4 (b) shows that the IMR per thousand had reduced from 107 in 1981-83 to 96 in 1990-92 for India as a whole. In 1981-83 the lowest number of infant death rates (34/1000) came from Kerala and the largest number was (15 1/1000) in U.P in the same year . The number of infant deaths has reduced to 17 per 1000 in Kerala in 1990-92 to be the lowest among States and the highest figure was 120 per thousand for the State of Orissa.

A disaggregation of the IMR of the States between urban and rural areas over the same period shows that in all the States the urban people are more concerned about infant health over their rural counterpart. In 1981-83 the IMR of India in rural and urban areas were 116 and 65 respectively. These figures declined to 86 and 52 for rural and urban areas respectively in 1990-92. As expected, both the urban and the rural IMR were the lowest in Kerala (35 and 25 respectively) in 1981-83. The highest IMR (159) was recorded in rural U.P. and also in urban U.P. (99) in 1981-83. The rural and urban IMR declined to 17 and 15 per thousand in Kerala- the lowest figures among States of India in 1990-92. The highest number of IMR was recorded at 124 per thousand in rural Orissa and 73 per thousand in urban Orissa and U.P. in 1990-92.

Table 4.4 (b) shows the distributional features of the IMR in States of India for the two groups of States over 1981-83 and 1990-92. The mean value of IMR was 84.83 for the first group of States in 1981-83 which had declined to 64.5 in 1990-92. Similarly for the second group of States the mean value had decreased from 104.22 to 78.5 over the same period. The calculated and expected t value comparisons show that for the two periods the differences in mean value is insignificant at 1% and 5% level of significance.

Table 4.4(a)

Infant Mortality Rates of the States of India

States	Rural		Urban		Combined	
	1981-83	1990-92	1981-83	1990-92	1981-83	1990-92
1.Punjab	85	61	58	42	79	57
2. Haryana	162	75	60	52	95	71
3. Maharashtra	86	67	53	41	76	59
4. Gujrat	121	74	82	55	111	69
5. Tamil Nadu	100	67	55	40	87	58
6. Karnataka	76	83	45	42	16	73
7. H.P.	-	72	-	37	-	-
8. A.P.	87	76	52	52	81	71
9. W.B.	95	71	50	42	87	66
10. Kerala	35	17	25	15	34	17
11. Assam	102	79	73	44	105	76
12. Rajasthan	113	88	66	58	105	84
13. M.P.	114	118	78	70	134	111
14. U.P.	159	103	99	73	151	98
15. Orissa	136	124	68	73	131	120
16. Bihar	114	74	61	47	110	72
All India	116	86	65	52	107	96

Source : *Sample Registration Bulletin, 1994, Vol XXVIII, No. 12*

Table 4.4 (b)

Distribution of IMR in the States of India

Variables	1981-83	1990-92
$\bar{x}_1$	84.83	64.50
$\bar{x}_2$	104.22	78.50
s_1	15.66	6.620
s_2	32.64	27.03
$C.V._1$	18.45	10.27
$C.V._2$	31.32	34.42
Calculated t value	-1.35	-0.99

The S.D. of the first and second group of States show a downward trend indicating that the dispersions within both the groups of States had reduced over the period. The intra-group disparity value (indicated by the C.V.) has reduced for first the group of State and increased for the second goup over the periods we consider.

4.3: Literacy and Other Education Related Indicators:

The Directive Principles of the Constitution of India (Article 45) stated in 1950 that the State should endeavour to provide, within a period of ten years from the commencement of the Constitution, for free and compulsory education for all children until they complete the age of 14 years. The National Policy of Education, 1968 has also emphasised that strenuous efforts should be made for the early fulfillment of the Directive Principles under Article 45 of the Constitution seeking to provide free and compulsory education for all children upto the age of 14 years. The National Policy of Education 1986 also reiterated the resolve that by 1995 all children upto 14 years age will be provided free and compulsory education.

The Constitution directives has received further boost with increasing research evidences which established the fact that the contribution of primary education in development is very significant and essential. Primary education has its own intrinsic value, enhancing human capabilities to enjoy life including better approach to life and thereby enriching the quality of life (Tilak, 1996).

For this reason literacy and enrolment ratios in school education have become an integral part of measurement of human development in the different HDRs of the UNDP. In this section we shall analyse the trend and distribution of literacy rates and enrolment ratios of the students of Indian States during 1981 and 1991.

4.3.1: Literacy Rates:

From table 4.5 (a) we see that the overall literacy rate of India increased from 43.47% in 1981 to 52.19% in 1991. The corresponding figures of literacy for male and female were 56.5% and 29.85% in 1981 and 64.2% and 39.19% in 1991. Therefore over the ten years period from 1981 to 1991 there is a clear improvement in the literacy rate of male, female and as a result, of the combined population in India.

For 1981 the figure of literacy in the State of Assam is not available. But among the remaining major 15 States the literacy rates of male and female population were highest in Kerala , they were 87.73% for male and 75.65% for female population . Next to Kerala was the State of Maharashtra where the figures of male and female literacy were 69.65% and

Table 4.5(a)

Literacy Rates of the States of India

States	1981			1991		
	Male(%)	Female(%)	Combined(%)	Male(%)	Female(%)	Combined(%)
1.Punjab	55.56	39.70	48.17	65.66	50.41	58.13
2. Haryana	58.51	26.93	43.88	69.1	40.47	55.85
3. Maharashtra	69.65	41.01	55.83	76.56	52.32	64.87
4. Gujrat	65.14	38.46	52.21	73.13	48.64	61.29
5. Tamil Nadu	68.05	40.43	54.39	73.75	51.33	62.66
6. Karnataka	65.14	33.17	46.12	67.26	44.34	56.04
7. H.P.	64.27	37.72	51.18	75.36	52.13	63.86
8. A.P.	48.83	24.16	35.66	55.13	37.72	4409
9. W.B.	59.93	36.07	48.65	67.81	46.56	57.70
10. Kerala	87.73	75.65	81.56	93.62	86.13	89.79
11. Assam	-	-	-	61.90	43.00	52.90
12. Rajasthan	44.77	14.00	30.11	54.99	20.44	38.55
13. M.P.	48.12	19.00	34.23	58.42	28.85	44.20
14. U.P.	47.45	17.19	33.35	55.73	25.39	41.60
15. Orissa	56.45	25.14	40.97	63.09	34.68	49.09
16. Bihar	46.60	16.52	32.05	52.49	22.89	38.48
All India	56.50	29.85	43.67	64.20	39.19	52.19

Source :*1. C.S.O.- selected socio-economic indicators*

2. As Table 4.2(a)

Table 4.5 (b)

Distribution of Literacy Rates in the States of India

Variables	1981			1991		
	Male	Female	Combined	Male	Female	Combined
$\bar{x}_1$	62.60	36.61	50.10	70.91	47.91	59.80
$\bar{x}_2$	56.01	29.49	43.08	63.85	39.77	52.02
s_1	5.27	5.04	4.35	3.85	4.20	3.38
s_2	12.87	18.13	15.27	11.90	18.37	14.85
$C.V._1$	8.43	13.76	8.69	5.43	8.77	5.65
$C.V._2$	22.98	61.41	35.45	18.64	46.19	28.55
Calculated t value	1.107	1.346	1.021	1.327	0.999	1.18

41.01% respectively . The literacy rate for male population of Rajasthan (44.77%) was the lowest among the 15 States. The female literacy rate of Rajasthan (14%) was also the lowest in 1981.

In 1991 the highest figures of male and female literacy were registered in the State of Kerala. The figures were 93.62% and 86.13% for male and female literacy rate respectively. In 1991, Bihar recorded the lowest percentage of male literacy (52.49%) . The lowest female literacy rate (20.44%) was recorded in Rajasthan again in 1991.

It is interesting to note that in 1981 the percentage figure of literacy of male population of Punjab was even lower than the national average, though it had the highest per capita net SDP in that year among the major States of India. Similarly, the female literacy figure for Haryana was lower than the national average in 1981. Again in the per capita net SDP rank, Haryana's position was the third among the 16 States of our study.

The average literacy rate of the first group of States was 50% in 1981 and it increased to 59.80% in 1991 for all the population combined. The average literacy of male population increased from 62.60% in 1981 to 70.91% in 1991 and that of female population it increased from 36.61% to 47.91% over 1981 and 1991 for the first group. The combined literacy of the second group of States increased from 43.08% in 1981 to 52.02% in 1991. The figures of average male and female population in 1981 was 56.01% and 29.49% respectively. These figures increased to 63.85% and 39.77% in 1991 for the female population of the second group.

From the table value and calculated t values it is observed that the mean difference is insignificant in 1981 and 1991 for male, female and combined population. The S. D. of male litarcy in 1981 was 5.27 for the first of group of States and this reduced to 3.85 in 1991. This revelas a reduction in the intra State disparity within the group. This reduction in S.D. value is also true for the female literacy and the combined literacy in the first group of States. For the second group of States the S.D. value of combined population and male population had reduced but it had increased slightly for female population.

The value of C.V. gives the inter group disparity figures. Table 4.5 (b) shows that as compared to the first group of States the value of C.V. is very high for the second group of States in both 1981 and 1991 for male, female and combined population. However, the corosponding value of C.V. for male, female and combined population decreased over 1981 and 1991 showing a reducing trend of the disprity between the groups for the two groups of States.

4.3.2. Students Enrolement Ratio :

The UNFP has used mean year of schooling for the construction of educational index upto 1994 and gross students enrolement ration at primary, secondary and tertiary level in 1995 to construct the HDI of differnet countries. Table 4.6 (a) and 4.6 (b) presrnt th gross enrolment ratio and their distribution in States of India over 1983-84 and 1992-93. The gross students enrolment ratio figures are disaggrageteed betwen class I to V (age 6-11 years) and class VI-VIII (11-14 years). The gross enrolment of students in India had increased from 93.4 in 1983-84 to 104.5 in 1992-93 for class I-V. The enrolment figure had improved from 48.9 in 1983-84 to 67.7 in 1992-93 for class VI-VIII.

Table 4.6 (b) shows that the average enrolment ratio had increased from 107.77 to 116.13 for the first group of States between 1983-84 for class I to V and also from 59.8 to 75.9 over the same year for class VI to VIII. For the Second group of States the average figure had also increased over two period of times of both class I - V and for class VI - VIII. The S.D. value of both group of States had increased between the two period in two group of classes revealing an increase in the intra-group disparity over 1881-83 and 1992-93. The inter group disparity figure provided by the C.V. shows declining the trend for the both set of classes in the second group of States. In the first group of States distarity was reduced for the students for class I - V but it had increased for the students for class VI - VIII between 1983-84 and 1992-93.

4.4 Income and Related Indicators

The primary of objective of this study is to construct and compare the HDI of major States of India and their movement over 1981 and 1991. For this purpose the data on per capita net SDP is essential. We, therefore, take the per capita net SDP for 1980-81 and 1991-92 at current prices. The year 1991-92 is choosen as it is the latest available actual figure published by the C.S.O. so far and used in the Economic Survey of the Government of India (1995-96). It will also be the helpful to convert Indian Rupee into the international PPP dollars and be used for international comparision of HDI with the States of India based on HDR 1995, where this year is the base for income of different countries. This year's income was also accepted by Shiva Kumar (1996). Our study of HDI will easily be comparable with the previous one. The choice of 1980-81 has been dictated by the non-availabiligy of data for 1981-82 from a reliable source.

Table 4.6(a)

Students Enrolment ratio of the States of India

States	1983-84		1992-93	
	Class I-V (6-11 years)	Class VI-VIII (11-14 years)	Class I-V (6-11 years)	Class VI-VIII (11-14 years)
1.Punjab	103.7	63.5	90.6	67.8
2. Haryana	88.9	54.9	102.8	70.9
3. Maharashtra	125.9	59.9	119.4	80.7
4. Gujrat	111.7	55.3	119.4	79.6
5. Tamil Nadu	129.8	65.3	145.0	101.4
6. Karnataka	86.9	59.9	119.9	65.0
7. H.P.	126.2	87.0	118.0	111.8
8. A.P.	97.3	39.4	108.4	63.7
9. W.B.	96.0	54.5	123.9	93.8
10. Kerala	96.8	90.2	102.8	107.0
11. Assam	62.9	47.6	130.0	77.7
12. Rajasthan	74.8	36.4	91.0	53.9
13. M.P.	80.3	35.0	104.5	68.0
14. U.P.	80.2	42.3	89.3	55.0
15. Orissa	89.5	36.5	96.8	57.0
16. Bihar	82.3	30.5	76.1	34.7
All India	93.4	48.9	104.5	67.7

Source : *1. For 1981-83-- Report of Education Commission, Govt. of W.B., Augest 1992*

2. For 192-93-- Economic Survey, Govt. of India, 1994-95

Table 4.6 (b)

Distribution of Students Enrolment Ratios in the States of India

Variables	1983-84		1992-93	
	Class I-V	Class VI-VIII	Class I-V	Class VI-VIII
$\overline{x}_1$	107.76	59.8	116.13	75.90
$\overline{x}_2$	88.25	49.91	102.64	71.51
s_1	16.62	3.83	16.81	12.39
s_2	15.54	19.40	15.72	22.56
$C.V._1$	15.42	6.41	14.47	16.33
$C.V._2$	17.61	38.88	15.31	31.55

From Table 4.7 we see that in 1981-82 the per capita net national product at current prices for India was Rs. 1630.00 and there were five States in that period where the per capita net SDP had a higher value than the national average. The States, according to their ranking, were Punjab, Maharashtra, Haryana, Gujrat and H.P. Punjab had the highest per capita net SDP at Rs. 2674.00. Among the other eleven States W.B. was with the highest per capita net SDP (Rs. 1612.00) and was ranked 6th among the all 16th States. The lower figure of per capita net SDP (Rs. 917.00) was reported for Bihar.

For 1991-92 the per capita net national product at current prices for India increased to Rs. 5603.00 about 3.5 times higher than the 1980-81 figure. At this point there were six States which had higher per capita net SDP at current prices the highest figure (Rs. 9973.00) was for Punjab. In our studies these six States, Punjab, Haryana, Maharashtra, Gujrat, T.N. and Karnataka constitute the first group on the basis of per capita income higher than the national average. Among all the 16 major States of India the lowest per capita net SDP was reported for Bihar (Rs. 2871.00).

Between 1980-81 and 1991-92 the States of Haryana, T.N., Karnataka, A.P., Assam improved their ranking. T.N's improvment was the highest form the rank of 9th in 1980-81 to the rank of 5th in 1991-92. Between the two period Maharashtra, H.P., Kerala, M.P. and Orissa experienced deterioration in their ranking position. The States of Punjub, Gujrat, U.P. and Bihar had no change in ranking between the two periods.

It should be noted in this connection that in 1991-92 Delhi's per net SDP at current prices was the highest at Rs. 12389.00 among all the States of India. In our analysis for the construction of HDI of the States of India this value will be considered as the tergeted highest limit for the States of our study.

Poverty and Inequality in the States of India

The Planing Commission of India estimated the percentage of people below poverty line of 1983-84 by using the poverty line of Rs. 108.8 per capita per month for rural areas and Rs. 117.5 per capita per month for urban areas at 1983-84 prices. The corsponding rural and urban poverty levels for 1973-74 were Rs. 49.1 and 56.6 respectively. The figure of 1983-84 revaled that there were 37.4% of Indian people living below the poverty line. Bihar accountaed for the largest percentage of population (49.5%) living below poverty line in the same year and H.P. accounted for the minimum percentage of people (13.5%) living below poverty line in the same year (Table 4.8).

Table 4.7

Per Capita Net SDP for the States of India (Current Prices)
1980-81 & 1991-92
(New Series)

States	1980-81 (Rs.)	Rank	1991-92 (Rs.)	Rank
1.Punjab	2674	1	9973	1
2. Haryana	2370	3	8740	2
3. Maharashtra	2435	2	8063	3
4. Gujrat	1946	4	5994	4
5. Tamil Nadu	1498	9	5878	5
6. Karnataka	1527	7	5833	6
7. H.P.	1704	5	5578	7
8. A.P.	1380	10	5556	8
9. W.B.	1612	6	5527	9
10. Kerala	1508	8	5140	10
11. Assam	1317	12	4594	11
12. Rajasthan	1222	15	4511	12
13. M.P.	1358	11	4377	13
14. U.P.	1278	14	3979	14
15. Orissa	1314	13	3907	15
16. Bihar	917	16	2871	16
All India	1630	-	5603	-

Source : *Economic Sirvey, Govt. of India, 1995-96*

Table 4.8

Poverty and Inequality in the States of India

States	Percentate of Population below poverty line		Gini-Coefficient of per capita consumption Expenditure (1987-88)	
	1983-84	1987-88	Rural	Urban
1.Punjab	13.8	7.2	.30	.28
2. Haryana	15.6	11.6	.29	.28
3. Maharashtra	34.9	29.2	.32	.34
4. Gujrat	24.3	18.4	.26	.28
5. Tamil Nadu	39.6	32.8	.33	.36
6. Karnataka	35.0	30.1	.30	.34
7. H.P.	13.5	9.2	.28	.28
8. A.P.	36.4	31.7	.31	.36
9. W.B.	39.2	27.6	.26	.35
10. Kerala	20.6	17.0	.32	.36
11. Assam	23.5	22.8	.23	.31
12. Rajasthan	33.3	24.4	.32	.35
13. M.P.	46.2	36.7	.29	.33
14. U.P.	45.3	35.1	.29	.33
15. Orissa	42.8	44.7	.27	.31
16. Bihar	49.5	40.5	.26	.31
All India	37.4	29.9	-	-

Source :

1. Economic Survey, Govt. of India, 1994-95

2. Dreze and Sen (1995), India- Economic Development and Social Oportunity, OUP, Delhi

The estimates of people below poverty line for 1987-88 were derived by using the poverty line of Rs. 131.8 per capita per month for rural areas and Rs. 150.1 per capita per month for urban areas at 1987-88 prices. The estimate shows that the percentage of people below poverty line in India decreased from 37.4% in 1983-84 to 29.9% in 1987-88. In 1987-88 the highest population below poverty line lived in Orissa (44.7%) in the same year the lowest percentage of population (7.2%) living below poverty line were Punjab.

One of the available measures of inequlity of the States of India is the Gini-coefficient of per capita consumption expenditure in rural and urban for 1987-88 (Dreze and Sen, 1995). The coefficient values varied from 0.26 to 0.33 in the rural areas of the States of India. In case of urban areas this figure lies between 0.36 and 0.28 for 1987-88. It clearly indicates that inequality per capita consumption expenditure is higher in urban areas of the States than the rural areas.

4.5: Some Earlier Studies On The Construction of HDI For The States of India :

Shiva Kumar (1991) attempted to construct the HDI of 17 major States of India for 1987 and ranked these States among the countries for which HDI has been constructed in HDR 1990. It has used the per capita net SDP of 1986-87 at a constant price with base 1970-71, projected adult literacy rate for 1987 and LE for the year 1981-86. In this calculation Kerala occupied the highest value of HDI (0.651) and U.P. the lowest value (0.292). It was observed that four States viz; Haryana, Punjab, Maharashtra and Kerala had a HDI value more than 0.5, implying that they were among the medium human developed category countries. The other thirteen States were within the low human developed category countries with a value of HDI less than 0.5. In this study Shiva Kumar converted the per capita net SDP in the real PPP dollars by a very simple arithmetic process. If Ko is the ratio of per capita net SDP to national per capita income at constant prices in 1987 then India's real per capita GDP in PPP $ estimated at PPP $ 1053 for 1987 has been multiplied by ko for each State to arrive at an estimate of the level of State's per capita real SDP.

Tilak (1991) applied the UNDP (1990) methodology to Indian data and estimated the HDI for 17 major States of India. Tilak used the logarithm of per capita net SDP at current prices for 1988-89, life expectancy at birth estimated for 1986-91 and literacy rate of 1991 in the construction of HDI of States. Tilak argued that as the study attempted for only one country and for one point of time it was not neccessary to make any adjustment for prices or for real purchasing power as was done by the UNDP. In this study the values of HDI ranged from 0.109 in Jammu & Kashmir to 0.775 in Kreala. The level of human development was low in

ten States and it was medium in seven States. Tilak also observed while there was a high correlation between human development and economic growth, poverty and human development were not so correlated.

Dutta *et al.* (1994) constructed the HDI of 17 States of India for four sub periods from 1970-71 to 1990-91. They also constructed the achievement and improvement indices for the Indian States over the same four sub periods with the help of the methodology developed by Kakwani (1993). They have used the State Gross Domestic product and converted all values into 1970-71 prices. The study used literacy rate, Gross Enrolment ratio at various stages of school education, life expectancy at birth, IMR and child mortality rates for its purpose. The study has pointed out the problems in using linear deprivation or achievement indices for health. It has argued in favour of using non-linear measures such that an increase in the indicator, translated into a larger improvement, if it was nearer to the maximum value. The study pointed out increasing trend in the achievement level of health and education for most of the States between 1970's and 1980's. The relative position of various States revealed almost a stagnant pattern of human development. Kerala occupied the predominant position in health and education achievement and poorer in terms of income. The correlation between per capita income and achievement in education or health was low. The study also considered gender bias in education and health, and found that it was falling over time. All States revealed substantial urban bias in infant and child mortality rates but this bias was falling over time. It was also observed that neither anti- female nor anti-rural bias in social sectors in India was highly correlated with income.

Shiva Kumar (1996) computed the HDI and gender-related development index (GDI), for 16 States of India for the period 1991-92. It has emphasised on GDI construction which was based on the methodology provided in HDR 1995. For the conversion of the per capita net SDP of 1991-92 at current prices into the PPP $ it used its old HDR methodology (1991). The study used LE for 1990-92 and percentage of adult literacy rate for the year 1991. It has not used the gross enrolment ratios due to its misleading and non-satisfactory character. It has used the maximum and minimum values of all the indicators as provided in the HDR 1995.

In its computation of GDI, it was found that there were only 13 countries in the world which had a lower value of GDI than Bihar and U.P. - the two States having lowest GDI values among the Indian States. The low value of GDI in almost all the States in India reflected serious problems of Gender-inequality in India.

4.6: Education , Health and Income Related Indicators in the Districts of West Bengal:

This section attempts to present and analyse the district level data for the State of W.B. relating to education , health and income related variable for the construction of HDI at the district level.

Education:

In the late 1970's (1977) the Left Front Government took over the legislative and administrative power in the State of W.B. Since then the LF Government has given special emphasis on the eradication of illiteracy, introduction of free compulsory education for all upto higher secondary level, supply of books and papers to the students upto class VIII, developing facilities for non-formal and adult education with the aim of wiping out illiteracy (Chakraborty *et al.* 1993)

Table 4.9 explains the trend of literacy rate in the districts of W.B. over 1981 and 1991. The overall literacy rate for the State of W.B. increased from 48.65% to 57.70% between 1981 and 1991. During the same period the male literacy rate increased from 59.93% to 67.81% and female literacy increased from 36.07% to 46.57% (Table 4.5 (a)). This indicates that the overall performance of female literacy was better than that of the male literacy over the 10 year period.

In our analysis of the districts of W.B. we rank them on the basis of the per capita district SDP at current prices for 1988-89 . Thus Calcutta had the highest per capita income and Cooch Behar had the lowest In 1988-89 period. In terms of literacy Calcutta had the highest percentage of literate people in both 1981 and 1991 among the districts of W.B. The percentages of literates increased from 75.33% to 77.61% in Calcutta between 1981 and 1991. The lowest percentage of literate people (28.23%) lived in Malda in 1981.

Table 4.9

Literacy Rates in the districts of West Bengal

Districts	1981 (per cent)	1991 (per cent)
1. Calcutta	75.33	77.61
2. Howrah	60.21	62.62
3. 24 Parganas	54.75	66.81*
4. Burdwan	50.11	61.89
5. Hooghly	57.15	66.78
6.Darjeeling	49.59	57.94
7. Birbhum	40.57	58.56
8. Murshidabad	30.67	38.28
9. Purulia	35.32	43.28
10. Bankura	45.13	52.04
11. Nadia	44.21	52.53
12. Jalpaiguri	35.12	45.09
13. Midnapore	51.47	69.34
14. W.Dinajpur	33.02	39.32
15. Malda	28.23	35.62
16. Cooch Bihar	36.97	45.79
West Bengal	48.65	57.70

Source : *Census of India , Table c-2, part IV A*

** North 24 Parganas.*

The district level figures on literacy pertaining to 1991 are approximations and have been computed by the Education Commission, Govt. of West Bengal, (August 1992)

In 1991, again Malda recorded the lowest percentage of literate people (35.62%). It is interesting to note that although Midnapore has the rank 13 according to the per capita income it occupies the second position in literacy rate, only next to Calcutta with a figure of 69.34%. Midnapore improved its rank from 5th in terms of literacy in 1981 to 2nd in 1981.

Health

In the sphere of health the State Government emphasised on both preventive and curative sides of health service. Intensification of programmes and activities in the health sector continued by the State Government with the aim at "Health For All by 2000 A.D."

Although there are different health related data like LE and IMR at aggregate State level, it is very difficult to get LE data at the district levels for W.B. However upto 1996, the IMR data for 1991 has not been published officially. Due to this limitation it is impossible to compare the IMR over 1981 to 1991. We are here concerning ourselves with the under 5 year child mortality rate in the districts of West Bengal for 1981 only.

Table 4.10 shows that under 5 years mortality rate in W.B. the best figure (57/1000) of male child mortality was found in Calcutta and the worst value (184) in the district of Cooch Behar. It is interesting to note that in the case of under 5 mortality, although Cooch Behar had the worst value, the probability of survival of a girl child was equal to that of a boy here. The districts in which under 5 mortality rate for girls was better than that of the boys are Darjeeling, Jalpaiguri, Nadia, Purulia and Hooghly. In the other districts as well as for the State as a whole the under 5 mortality rate of boys was lower than the girls per 1000 lives born.

Income and Related Indicators

Table 4.11 shows the share of districts in the per capita SDP at current prices for 1980-81 and 1988-89. The per capita SDP in W.B. at current prices increased from Rs. 1612.00 to Rs. 3423.00 between 1980-81 and 1988-89, indicating almost two fold increase in eight years. Between the two periods rural per capita income increased from Rs. 1179.00 to Rs. 2528.00 and urban income from Rs. 3197.00 to Rs. 5827.00. In the year 1980-81 the best performance in per capita income was shown by Calcutta (Rs. 3156.00) and the worst by Murshidabad (Rs. 983.00). In 1980-81, there were six districts viz. Calcutta, Darjeeling, Howrah, Burdwan, Hooghly and 24 Parganas which had a per capita income higher than the State level. In rural income the best and worst districts respectively were Burdwan (Rs. 1754.00) and West Dinajpur (Rs. 787.00). The best and worst urban per capita income districts respectively were Darjeeling (Rs. 4501.00) and Nadia (Rs. 2289.00).

Table 4.10

District Wise Under Five Years Child

Mortality Rates for 1981

Districts	Male	Female	Combined
1. Calcutta	57	66	61
2. Howrah	73	74	74
3. 24 Parganas	81	79	80
4. Burdwan	49	51	50
5. Hooghly	69	62	66
6.Darjeeling	62	50	56
7. Birbhum	90	103	96
8. Murshidabad	107	106	107
9. Purulia	56	52	54
10. Bankura	65	72	68
11. Nadia	103	98	101
12. Jalpaiguri	95	88	92
13. Midnapore	84	89	86
14. W.Dinajpur	90	90	90
15. Malda	85	78	82
16. Cooch Behar	101	101	101
West Bengal	73	74	73

Source : *Census of India (1981), Fertility and Child Moterlity Estimates of W.B. Occasional Paper No. 9 of W.B.*

Table 4.11

Per Capita S.D.P. in the District of W.B. (Current Prices)

Over 1980-81 & 1988-89 (New Series) in Rupee

Districts	1980-81			1988-89		
	Rural	Urban	Total	Rural	Urban	Total
1. Calcutta	-	3156	3156	-	5450	5450
2. Howrah	1425	3355	2219	2874	5919	4307
3. 24 Parganas	1127	3065	1789	2408	5585	4126
4. Burdwan	1754	3224	2114	3627	4296	3985
5. Hooghly	1354	3751	1988	2729	6447	3945
6.Darjeeling	1557	4501	2235	2468	5323	3412
7. Birbhum	1358	2982	1456	3185	5445	3348
8. Murshidabad	821	2909	983	1995	6241	3162
9. Purulia	1187	3465	1363	2629	7178	3003
10. Bankura	1255	2544	1322	2823	5869	2994
11. Nadia	850	2289	1111	2116	4457	2799
12. Jalpaiguri	1036	2593	1197	2364	3989	2776
13. Midnapore	986	2851	1093	2221	5650	2515
14. W.Dinajpur	787	3952	1091	1704	6916	2435
15. Malda	941	2565	986	2078	4980	2254
16. Cooch Behar	871	3202	1000	1811	6644	2154
West Bengal	1179	3197	1612	2528	5827	3423

Source : *Statistical Abstract, W.B., 1978-89 (Combined), Govt. of W.B., Bureau of Applied Economics and Statistics*

Table 4.12

Poverty and Inequality

In W.B.

Area	Gini Coefficent	FGT Index
Rural	0.29	0.0170
Urban	0.54	0.0105

Source : *Sarvekshana (1991), Issue 48, Vol. XV No. 1*

In 1988-89 the best and worst performers in per capita income were Calcutta and Cooch Behar respectively. In case of rural income Burdwan's performance was the best (Rs. 3627.00)and West Dinajpur's performance was the worst (Rs.1704.00). Including Calcutta the urban per capita income was the best for Purulia (Rs. 7178.00) and the worst for Jalpaiguri (Rs. 3989.00). In 1988-89 there were six districts viz. Calcutta, Howrah, 24 Parganas, Burdwan, Hooghly and Darjeeling which had a per capita income higher than the State level.

To tackle the problem of inequality and poverty the Government of W.B. adopted and followed an economic policy based on land reforms and decentralisation of administration through the Panchayats (village level local self Government) since the late 1970's.

The achievement in land reforms in the name of "Operative Barga" is noteworthy. According to the 32nd 43rd rounds of the NSS, in W.B. 60% of the total cultivable land is owned by small and marginal farmers while the corresponding all India average is 29%. The figure of W.B. will increase by another 15% if the holdings of the share - croppers are also added . W.B. holds 3.5% of the total cultivable land in India but 48% of the beneficiaries due to land reforms are in this State (Chakraborty *et al.* 1993). Along with the policy of land redistribution the Government has distributed agricultural inputs to the farmers. As a result of the policy of decentralisation and involvement of masses in the process of development, agricultural production increased. Daily wage rate of agricultural workers also increased from Rs. 5.60 in 1976-77 to Rs. 21.50 in 1990-91 (Chakraborty *et al.* 1993).

The estimated value of Gini-Coefficient of consumer expenditure for 1991 in rural and urban areas (Table 4.12) shows to be 0.29 and 0.54 respectively, implying less inequality in rural areas. Similarly the Foster *et al.* (1984) measure of FGI index also gives higher inequality in urban area than in rural area.

4.7: Conclusion

From the review of early literature on the construction of HDI of Indian States some problems and limitations may be observed. In our study we shall try to overcome these limitations in the following manner;

a) The HDR 1990 used the log values of real GDP per capita for the countries on the assumption of diminishing marginal utility of income on the basis of poverty line . This concept was used in HDRs to compare the purchasing power of the standard of living. As it was observed that the per capita income in India in terms of PPP$ was much less than the international poverty line, the adjustment of income of States of India on the basis of poverty

line has not been done in any earlier study. But the concept of poverty is very useful when we compare the HDI within the States of India. In our study we shall use the concept of diminishing marginal utility on the basis of poverty line in the Indian context in terms of Indian Rupees.

b) The study of Dutta *et al.* (1994) is the only one which compared the change in the value of HDI over a period of time while other studies were concerned only with a particular point of time . In the study of Dutta et al the whole period from 1970's to 1990's was subdivided into four periods. In our study we shall construct the HDI of the States of India over 1981 and 1991 separately and compare and analyse the trend of the HDI values of States of India.

c) All the earlier studies constructed the HDI of States of India with the help of the three variables used in the UNDP's HDRs. New indicators have not yet been used in any study. In our study we shall construct the modified HDI of States with two new variables namely political participation and environmental indicator separately . For the former we use the percentage of votes polled in the State Assembly election and for the latter we shall use the total forest area to total area of the respective States as a proxy of environmental indicator.

d) So far different studies were made to construct only the PQLI at district level. But in our study we shall try to construct the HDI at the district level for the State of West Bengal.

Chapter V

Results And Trends Of Disaggregated HDI For The States Of India and Districts Of West Bengal

5.1. Introduction

In this chapter we shall explain and analyse the results and trends of the HDI of the States of India and the districts of West Bengal (W.B) based on our construction of the HDI, following the UNDP methodology at different HDRs. The three indicators used by the UNDP for the constriction of HDI being (1) per capita income (2) life expectancy at birth and (3) educational attainment.

1) Income : The HDRs used real per capita adjusted GDP or GNP converted into PPP dollars as a proxy of standard of living indicator. In the construction of HDI it is assumed that for income, diminishing marginal utility holds true. Therefore, the full range of income is divided into multiples of poverty line. Until 1993 the threshold value was set at PPP $4829 and since 1994 it was set at PPP $5120. In the HDR 1996 the average world income of PPP $5711 was taken as the threshold level. In the Indian context the real per capita GDP adjusted at PPP $ is always much below the threshold level. This is also true for the States and districts of India. Hence the change in the threshold values will not affect the construction of the HDI at State and district levels in India.

For converting the per capita income at the aggregate and also at the State level into adjusted real value of PPP $, we use a very simple arithmetic procedure. For example, the estimated per capita net national product at current prices for India in 1991-92 was Rs.5603. The HDR 1995 gave the real GDP per capita to be PPP $ 1230. The ratio 1230/5603 = 0.2195 is then multiplied by the per capita net SDP at current prices of the respective States to arrive at the value of real per capita SDP at PPP dollars. This method has already been used by Shiva Kumar (1994,1996). He claims that though this method is crude, it leads us to have a comparison of the States of India with the international values of income at PPP$. For the same purpose we start with this method. In our study we shall construct the values of HDI with per capita net SDP of different States converted into PPP$ by this method as one of the variables for the year 1991-92.

2) Educational attainment : Educational attainment was originally measured by the UNDP through adult literacy rate (HDR, 1990). The HDR 1991 broadened this measure to incorporate the mean year of schooling. Since 1995 the mean year of schooling was replaced by the combined enrolment ratio at primary, secondary and tertiary level.

However, data on gross enrolment rates of boys and girls at different age groups available in India are misleading. For example, in 1992-93 the gross enrolment rate of all students varied from 145% in Tamil Nadu to 76.1% in Bihar [Table 4.6(a)] for the age group 6-11 years. There were eleven States where the gross enrolment rates exceeded 100% for the same year. The gross enrolment rates of boys for the year 1992-93 of the age group 6-11 years exceeded 100% in 14 States and in case of girls enrolment rates for the same age group it exceeded 100% in 9 States. Such a picture is misleading and does not represent the true picture of the State level enrolment ratios. It is also useless for the construction of HDI for the different States of India and compare the HDI values with that of the international values because in the UNDP methodology the highest or the maximum enrolment ratio was assumed to be 100%.

Shiva Kumar (1996) puts forward several reasons for the gross enrolment ratios to be higher than 100% in different Sates of India. The first reason is that both over-age students and high repetition rates typically occur in the first year of a particular level, tending to inflate the numerator. Secondly the head and other teachers falsify the enrolment figures if their services depend upon the level of enrolment. Generally it was found that official enrolment ratios are about 25% higher than the actual enrolment as reported by Census and Household Surveys (Kurrien, 1983; Mehta, 1994; Tilak,1996)

As a result of the above limitations and difficulties we do not use the gross enrolment data to get the 'educational attainment' figure. Again, due to the non availability of required data from a reliable sources we also ignore the mean year of schooling. We give full value of educational attainment to the adult literacy rates of the respective States. The adult literacy rate figures are provided by the Census of India and we consider the 1981 and 1991 adult literacy rates from this sources for our study.

3) Life Expectancy at Birth (LE)

It is very difficult to get data on LE for a particular period in the States of India from a reliable source. In our study we use the SRS data published by the Office of the Census Commissioner, Government of India. In our study we use the date on LE for two periods of time, 1981-88 and 1988-92 for the calculation of HDI values of 1981 and 1991 respectively in the States of India.

5.2 HDI of the States of India for 1991 and International comparisons :

With the above three indicators we construct the HDI of 16 major States India for 1991 which are presented in Table 5.1. The three indicators used are adjusted real per capita net SDP of 1991-92 in PPP$, LE of 1988-92 and adult literacy rate of 1991.

In the calculation of the HDI for the States of India we at first choose the maximum and minimum values of the respective indicators as used by the HDR 1995. The maximum and minimum values of adjusted real per capita SDP are taken to be PPP$ 5448 and PPP$ 100 respectively. For LE the maximum and minimum values are 85 years and 25 years respectively. For literacy rate the maximum and minimum values are 100 and zero respectively. In our calculation these are set as the goal posts for respective indicators.

In the HDR 1995 the HDI value of India was shown to be 0.439 for 1992. In our Table 5.1 the recalculated value of India is slightly less than this value. It is 0.432. In all the earlier studies Kerala produced the maximum HDI value. For example, in Shiva Kumar, the HDI of Kerala was 0.651 in 1987 and 0.603 in 1991-92 (Shiva Kumar, 1994,1996), and in the study of Tilak (1996) it was 0.775 for 1990. In both the studies of Shiva Kumar the minimum HDI valued State was UP. In 1987 it was 0.292 and in 1991 it was 0.348. In the study of Tilak, Jammu and Kashmir had the minimum value of HDI at 0.109 and it followed U.P. which had the HDI value of 0.110. The differences in the minimum HDI valued State in the different studies are due to the choice of different goal posts and also the differences in the sources from which data of the indicators are collected.

Table 5.1 shows that there are eight States in India among the major 16 States which had a HDI value higher than the all India value (0.432). It was accepted by the UNDP that if the value of HDI is higher than 0.8 for a country, then it belongs to 'high human developed' category. If the HDI value ranges between 0.5 and 0.8 the country belongs to 'medium human developed' category. And finally, if the value of the HDI is less than 0.5 it belongs to the 'low human developed' category. Since 1991 the HDI value of India was less than 0.5 in different HDRs, calculated by the UNDP. In our study also, India belongs to a low human developed country category with the HDI value less than 0.5.

Table 5.1 shows that four States of India viz. Kerala, Punjab, Maharashtra and Haryana have HDI value higher than 0.5. Following UNDP, these States fall in the category of medium human developed States. The other twelve States have the HDI value less than 0.5 and these States have low human development.

Table 5.1
HDI of the States of India, 1991

States	Per Capita Net SDP (Rs.)1991-92	Life Exp. at birth 1988-92	Lit. Rate 1991	Real SDP per Cap. (PPPS)	Adj. Real SDP per. cap.	Life Exp. Index	Literacy Index	Adj. SDP per cap. Index	HDI	Rank HDI (R_1)	Rank SDP (R_2)	Rank difference (R_2-R_1)
1.Punjab	9973	66.6	58.51	2189	2189	.693	.585	.591	.556	2	1	-1
2. Haryana	8740	662.5	55.85	1918	1918	.625	.558	.340	.508	4	2	-2
3. Maharashtra	8063	63.4	64.87	1710	1710	.640	.649	.312	.534	3	3	0
4. Gujrat	5994	59.5	61.29	1316	1316	.575	.613	.227	.472	7	4	-3
5. Tamil Nadu	5878	61.5	62.66	1290	1290	.608	.627	.222	.486	5	5	0
6. Karnataka	5833	62.2	56.04	1280	1280	.620	.560	.221	.467	8	6	-2
7. H.P.	5578	60.4*	63.50	1224	1224	.590	.635	.210	.478	6	7	1
8. A.P.	5556	60.2	44.09	1220	1220	.587	.441	.209	.412	10	8	-2
9. W.B.	5227	61.4	57.70	1147	1147	.607	.577	.196	.460	9	9	0
10. Kerala	5140	71.1	89.1	1128	1128	.772	.898	.192	.621	1	10	9
11. Assam	4594	54.1	52.89	1008	1008	.485	.529	.170	.395	11	11	0
12. Rajasthan	4511	56.3	38.55	990	990	.522	.385	.166	.358	14	12	-2
13. M.P.	4377	53.4	44.20	961	961	.473	.442	.161	.359	13	13	0
14. U.P.	3979	55.4	41.60	873	873	.507	.416	.144	.356	15	14	-1
15. Orissa	3907	55.4	49.09	858	858	.507	.491	.142	.380	12	15	3
16. Bihar	2871	57.5	38.48	630	630	.542	.385	.099	.342	16	16	0
India	5603	58.7	52.21	1230	1230	.562	.522	.211	.432	-	-	-

Source : *Col. 2 : Economic Survey, Govt. India, 1995-96*

Others : As Cited in the Tables of Ch. 4.

Note : *(*) 1981-88 data*

A positive difference between the rank of per capita net SDP and HDI rank shows that HDI rank is better than the GDP rank and the State has done better in human development. In the HRD 1995 the difference between the two ranks for India was shown to be +7, revealing that India was doing better in human development. Table 5.1 shows that in case of three States - Kerala, Orissa and H.P. - the difference between the two ranks gives positive values, indicating that these States are doing better in human development. In seven States of India the value of the rank difference is negative and in other six it is zero.

To compare the value and rank of the States of India according to their respective HDI and that of the countries of the World we refer to the HDR 1995. In the HDR 1995 the rank and value of HDI of 174 countries was provided. In this Report the rank of India was shown to be 134th among the 174 countries. In Table 5.2 we see that the position of India is again 134th with the recalculated value of HDI (0.432). It is the same value obtained by Madagascar in HDR 1995. The position of Kerala (0.621) lies between 105th country Guyana (0.622) and the 106th country Iraq (0.617) in the medium human developed category. Punjab (0.556) takes the place between Honduras (0.578) the 116th and Morcco (0.554) the 117th country. Maharashtra (0.534) is placed between Cape Verde (0.536) and Swaziland (0.522) the 123rd and 124th country. Haryana (0.508) takes its place between the 126th Papua New Guina (0.508) and 127th Cameroon (0.503). It is clear from Table 5.2 that these four States are placed among the medium human developed countries.

Twelve States of India are placed among the low human developed countries. In the HDR 1995, the first country in low human developed category was Pakistan with the HDI of 0.483. Tamil Nadu (0.486) now takes the first position among the low human developed countries and is placed between Cameroon (0.503) the 127th and Pakistan (0.486) the 128th country. Himachal Pradesh (0.478) takes the place between 130th country Kenya (0.472) and 131st country Lesothe (0.473), Gujrat (0.472), Karnataka (0.467) and West Bengal (0.460) takes place between the 131st country Lesothe and 132nd country Myanamar (0.452), Andhra Pradesh (0.412), Assam (0.395), Orissa (0.380), Madhya Pradesh (0.359) have the HDI value less than the national average. Among all the States Bihar has the lowest HDI value. The place of Bihar is between Nepal (0.343) the 151st country and Senegal (0.340) the 152nd country. In the HDR 1995 there are still 23 countries in the World which shows a HDI value less than that of Bihar.

Table No. 5.2

Rank of the States of India among the HDR (1995) Countries accroding to HDI.

HDI Rank	HDI
Medium Human Development	
104. Indonesia	.637
105. Guyana	.622
KERALA	.621
106. Iraq	.617
107. Egypt	.613
108. Namibia	.611
109. Nicaragua	.611
110. Mongolia	.604
111. China	.594
112. Guatemal e	.591
113. Bolivia	.588
114. Gabon	.579
115. El.Salvador	.579
116. Honduras	.578
PUNJAB	.556
117. Morocco	.554
118. Maldives	.554
119. Vanuatu	.541
120. Viet Nam	.539
121. Zimbabwe	.539
122. Congo	.538
123. Cape Verde	.536
MAHARASHTRA	.534
124. Swaziland	.522
125. Solomon Islands	.511
126. Papua New Guinea	.508
HARYANA	.508
127. Cameroon	.503
Low Human Development	
TAMIL NADU	.486
128. Pakistan	.483
129 Ghana	.482
130. Kenya	.481
HIMACHAL PRADESH	.478
131. Lesotho	.473
GUJRAT	.472

HDI Rank	HDI
KARNATAKA	.467
WEST BENGAL	.460
132. Myanmar	.457
133. Sao Tome & Principe	.451
134. India	.439
135. Madagascar	.432
136. Zambia	.425
137. Yemen	.424
138. Leo People's Dem.Rep.	.420
ANDHRA PRADESH	.412
139. Camoros	.415
140. Togo	.409
141. Nigeria	.406
142. Equatorial Guinea	.399
ASSAM	.395
143. Zaire	.384
ORISSA	.380
144. Sudan	.379
145. Cote d' Ivoria	.369
146. Bangladesh	.364
147. Tanzania,U.Rep.	.364
148. Haiti	.362
149. Central African Rep.	.361
150. Mouritania	.359
MADHYA PRADESH	.359
RAJASTHAN	.358
UTTAR PRADESH	.356
151. Nepal	.343
BIHAR	.342
152. Senegal	.340

5.3 Modified Human Development Index (MHDI) of the States of India with Forest resources as one of the extra Indicators :

One of the limitations of the construction of the HDI is the exclusion of environmental dimension of different countries. This limitation was pointed out by different Reports of the UNDP and also by different scholars (Anand and Sen, 1995, Dasgupta, 1993). Till the HDR 1996 - the latest published so far - the UNDP has not considered this issue as one of the variables in the construction of the HDI of different countries.

Increasing population, along with widespread poverty has generated pressure on natural resources and this contributed to the degradation of environment in the LDCs. In our analysis we shall not be able to consider all the issues relating to environmental degradation due to the non-availability of data at disaggregated form for State and district levels. We shall be including only one aspect of this issue which is the denudation of the forest resources of the States where data availability is ensured from a reliable source. This does not definitely cover the whole aspect of environment. Yet this maiden effort to include at least one of the environmental variables may be considered to be a modification in the right direction in the construction of HDI at the State level.

The Economic Survey, 1995-96 (Government of India) reports that out of 329 million hectares (m.ha.) of total land area of the country about 174 m.ha. is degraded. This consists of agricultural as well as non agricultural land and forest. The forest resources are under constant threat due to overgrazing and other form of over exploitation, both for commercial and household needs, encroachment, unsustainable practice like unscientific shifting cultivation and development activities. The recorded forest cover of the country is 75 m.ha. in 1995-96 which consists of 19.5% of the total geographical area as against the broad national goal of 33% for plains and 66% for hilly regions. It has been estimated that the total fuel wood removed from forests extended to 235 million cubic metres per year as against the sustainable level of production of only 48 million cubic metres per year.

In the construction of the MHDI for the States of India we take into account the percentage of forest area to geographical area as a proxy variable for the state of environment. The data on this indicator supplied by the Government of India, Forest surveys of India, 1991 (Ministry of Environment and Forest) is the most reliable one and we use this source in our calculation.

From Table 5.3 it is revealed that the percentage of forest area to total geographical area in India is 23.4% in 1991. Among the 16 major States this percentage varies from 3.9% in

Table 5.3

Modified HDI of the States of India with Forest Resources as an Extra Indicator

States	% of Forest Area to Geo. area, 1991	Index of Forest Res. by log value	Index of Per capita SDP	Index of L.E.	Index of Literacy	Modified HDI (MHDI)	HDI (original)	Rank of HDI(R_1)	Rank of MHDI(R_2)	Rank difference (R_1-R_2)
1.Punjab	5.5	.395	.391	.693	.585	.516	.556	2	6	-4
2. Haryana	3.9	.315	.340	.625	.558	.460	.508	4	13	-9
3. Maharashtra	20.3	.697	.312	.640	.649	.575	.534	3	3	0
4. Gujrat	9.9	.531	.227	.575	.613	.487	.472	7	11	-4
5. Tamil Nadu	17.5	.663	.222	.608	.627	.530	.486	5	4	1
6. Karnataka	20.2	.696	.221	.620	.560	.524	.467	8	5	3
7. H.P.	67.7	.976	.210	.590	.635	.602	.478	6	2	4
8. A.P.	23.2	.728	.209	.587	.441	.491	.412	10	10	0
9. W.B.	13.4	.601	.196	.607	.577	.495	.460	9	9	0
10. Kerala	28.9	.779	.192	.772	.898	.660	.621	1	1	0
11. Assam	39.1	.849	.170	.485	.529	.508	.395	11	7	4
12. Rajasthan	9.2	.514	.166	.522	.385	.397	.358	14	16	-2
13. M.P.	35.0	.823	.161	.473	.442	.475	.359	13	12	1
14. U.P.	17.5	.663	.144	.507	.416	.433	.356	15	14	1
15. Orissa	38.2	.844	.142	.507	.491	.496	.380	12	8	4
16. Bihar	16.3	.646	.099	.542	.385	.418	.342	16	15	1
India	23.4	.730	.211	.562	.522	.506	.432	-	-	-

Source : *Col. 1: Forest Survey of India, 1991, Govt. of India (Ministry of Environment and Forest)*

Others : As Cited in the Tables of Ch. 4.

Haryana to 67.7% in Himachal Pradesh for the same year. The targeted percentage of forest cover in India is 33% for plain and 66% in hilly region. But H.P. has already covered the targeted percentage among the hilly States.

For the construction of MHDI of the States of India with this additional indicator we consider the asymptotic highest limit to be 75% and the minimum to be zero. Climatic variations experienced by the different States of India indirectly and directly affect the growth of forest area and as such we do not use the percentage figures. We also do not consider the division of plain area and hilly area among the States. As a result, instead of taking the percentage value of the forest area we use the log value of the percentage of forest area to total geographical area in different States. It is expected that the use of log value will solve the problem of disaggregation between hilly area and plain area to some extent.

Table 5.3 shows that the value of MHDI of increased to 0.506 from the HDI value of 0.432. This occurs after the inclusion of the fourth indicator in the system. If we still retain the classification of low, medium and high human developed categories, India's position improves from a low human developed to a medium human developed country. The MHDI shows that there are seven States which attain values of more than 0.5 and they fall in the category of medium human developed States as against only four States in this category when the fourth variable was not included (table 5.1). It is interesting to note that although Kerala has only 28.9% forest area to its geographical area, it has still the highest value of MHDI (0.660). The highest and lowest HDI values for States are 0.621 and 0.372. But in case of both the highest and lowest values the MHDI improves to 0.660 and 0.397. The lowest valued MHDI State is now Rajasthan as against Bihar being the lowest valued HDI State.

The difference between the rank of HDI and that of the MHDI gives positive value for eight States indicating an improvement in the rank by including the fourth indicator. Four States having a negative value of the rank difference indicates a deterioration in their ranking after the fourth variable is included. For the other four States the value of this difference is zero. That is eight States are doing better, four worse in so far as forest resource is concerned for the major 16 States of India and four other without any deterioration or improvement in this field.

5.4 Modified Human Development Index with Political Participation as a fourth Indicator.

In different HDRs, the UNDP stated that the HDI could be improved by including various other indicators. Two such indicators are the Political and Civil rights enjoyed by the

Table 5.4

Modified HDI of the States of India with Political Participation as one Extra Indicator

States	% Turn out in Assembly Election 1989-90	Perticipation Index 1989-90	Per capita SDP Index	L.E Index 1988-92	L.R. Index 1991	MHDI 1991	HDI 1991	Rank of HDI	Rank of MHDI
3. Maharashtra	61.6	.632	.312	.640	.649	.558	.534	1	2
4. Gujrat	51.1	.422	.227	.575	.613	.459	.472	3	6
6. Karnataka	63.8	.678	.221	.620	.560	.519	.467	4	4
7. H.P.	66.7	.734	.210	.590	.635	.542	.478	2	3
8. A.P.	67.6	.752	.209	.587	.441	.497	.412	6	5
9. W.B.*	78.8	.976	.196	.660	.577	.589	.460	5	1
12. Rajasthan	56.5	.530	.166	.522	.385	.400	.358	9	9
13. M.P.	52.8	.456	.161	.473	.442	.378	.359	8	10
14. U.P.	48.5	.310	.144	.510	.416	.359	.356	10	11
15. Orissa	55.5	.510	.142	.507	.491	.412	.380	7	7
16. Bihar	62.2	.644	.099	.542	.358	.417	.342	11	8

Source : *Col. 1: Yadav, Y. (1996) "Reconfiguration In Indian Politics : State Assambly Election 1993-95", E.P.W. Vol. 31 No. 2,3*

** - Banerjee, Dilip (1992), Election Results of the Legislative Assembly (VIDHAN SABHA) & House of the People (LOK SABHA), W.B., 1991, Book Front Publication Fourm, Calcutta.*

citizens of the country. Dasgupta (1990) emphasised this aspect and constructed an index of well being with the published international political and civil right data.

In our analysis we use political participation as one of the indicators in our construction of second MHDI for the States of India due to the non-availability of published political and civil right data at the State level. In our construction of MHDI we use the percentage turnout in the State Assembly elections during 1989-90 to proxy the indicator of political participation. In a federal structure like India citizens participate in both Parliamentary and State Assembly elections. We use the percentage turnout in the State Assembly election and not the Parliamentary elections because it would reflect more clearly the willingness or unwillingness of the people to participate in the process of electing candidates by whom they want to be ruled within the State. Again, in Indian politics regional parties, which may have strong base and influence within the States, do not participate in the Parliamentary election. For these reasons and also as we are more concerned with State level study, we consider the participation in the Assembly elections for the construction of MHDI of the States of India.

In the construction of MHDI with political participation as one of the variables we can get data for only eleven States. It is clear from Table 5.4 that the percentage turn out in the State Assembly election varies from a maximum of 78.8% in West Bengal to 48.5% in U.P. To get the participation index by the HDR methodology we consider the maximum value to be 80% and the minimum value to be 30%. The maximum percentage turnout in 1989-90 Assembly election was 80.6% in Monipur, the State which we do not consider in our study. Therefore, we take the asymptotic highest limit to be 80% and the minimum value is fixed by the past records of Assembly elections (Yadav, 1996).

In the MHDI values W.B. gives the highest value (0.589) and U.P. gives lowest value (0.356). Four States viz. West Bengal (0.589), Maharashtra (0.558), H.P. (0.542) and Karnataka (0.519) fall within the medium human developed category States and the other seven States are still in the low human developed category.

In this MHDI, the rank of West Bengal improves from 5th position by HDI ranking to 1st position by MHDI ranking among the eleven States of our study (table 5.4). However we do not get data for other five States Punjab, Haryana, T.N., Kerala and Assam for which we are unable to construct their MHDI with political participation as one of the indicators. Among the five States we miss the most important State Kerala and three other States which are more developed in per capita net SDP ranking. We also miss data on Assam. It may be pointed out that during this period election did not take place in some States as it was not due, in other

states due to political troubles and still in some other States due to the terrorist activities. Therefore we are limited with the construction of second MHDI for only eleven States.

5.5 A Comparison of the States of India on the basis of HDI and two MHDIs :

Table 5.5 gives the value of HDI, $MHDI_1$, with forest resources as an extra variable and $MDHI_2$ with political participation as an extra variable. However, due to the inclusion of $MHDI_2$ the comparison among States is new limited to only eleven States as the $MHDI_2$ is not available for other five States. It is clear from the table that the value of $MHDI_1$ is higher than that of HDI for all the States except Punjab and Haryana - the first two States ranked according to the per capita net SDP. This is due to the fact that Punjab has only 5.5% forest area to its geographical area and Haryana has still a lower percentage at 3.9%. A remarkable improvement is observed in case of H.P. where $MHDI_1$ increases to (0.602) from HDI of 0.478.

Including political participation as one of the indicators in $MHDI_2$ all the eleven States improve their position except Gujrat where the percentage turn out in Assembly election is 51% in 1989-90. A remarkable progress is observed in West Bengal when political participation index is included. The value of $MHDI_2$ rises to 0.589 from the HDI of 0.460 for West Bengal. Within eleven States the HDI, $MHDI_1$ and $MHDI_2$ values together show an improvement of $MHDI_1$ and $MHDI_2$ over the HDI for all the States except Gujrat where $MHDI_2$ has a lower value than the HDI. Therefore all the eleven States are doing better in environmental issue captured by the forest resource variable. Again, the political right enjoyed by the States improves the $MHDI_2$ value over the HDI value.

5.6 Change in HDI value of the States of India over time

In this section we consider the change in the value of HDI of the States of India over 1981 and 1991. The assessment of the change in the values of HDI is worked on by two different methods.

1) In the technical note of HDR 1991, different uses of income in the construction of HDI values have been worked out. In the original work, HDI was calculated by taking the log of per capita income and putting a cap at the poverty level as the maximum. It was done on the assumption that the HDI assumes a sharply diminishing contribution of income to human development. It also asserted that any income above the poverty level shall get a diminishing weight. It was also observed by different studies that in the absence of proper income distribution data the log value of per capita income could be considered to be an adequate measure of economic welfares (Kakwani, 1993). In our first exercise we calculate the HDI of the different

Table 5.5

HDI, and MHDIs of the States of India, 1991

States	HDI	$MHDI_1$	$MHDI_2$
1.Punjab	.556	.516	-
2. Haryana	.508	.460	-
3. Maharashtra	.534	.575	.558
4. Gujrat	.472	.487	.459
5. Tamil Nadu	.486	.530	-
6. Karnataka	.467	.524	.519
7. H.P.	.478	.602	.542
8. A.P.	.412	.491	.497
9. W.B.	.460	.495	.598
10. Kerala	.621	.660	-
11. Assam	.395	.508	-
12. Rajasthan	.358	.397	.400
13. M.P.	.359	.475	.378
14. U.P.	.356	.433	.359
15. Orissa	.380	.496	.412
16. Bihar	.342	.418	.417
India	.432	.506	-

States of India by taking the log values of per capita net SDP at different periods. The results are shown in table 5.6

2) In the subsequent HDRs (1993 onwords) the calculation of adjusted incomes was a little more complex. For this purpose, the full range of income was divided into multiples of poverty line, y* and the utility of income was derived by using the formula

$$w(y) = y^* \text{ for } O < y < y^*$$

$$= y^* + 2(y^*)^{1/2} + 3(y^* - 2y^*)^{1/3} \text{ for } 2y^* \leq y \leq 3y^*$$

and so on.

In our second exercise we use this poverty line concept in the Indian context. For the calculation of y* we use the informations supplied by the Economic Survey 1995-96 (Govt. of India). This Economic Survey shows that the preliminary percentage of people below poverty line in 1993-94 to be 18.96%. The estimates for 1993-94 is derived by using the poverty line at Rs. 228.9 per capita per month in Rural areas and Rs. 264.1 per capita per month in Urban areas in 1993-94. We calculate the value of y* for India and its States on the basis of very plausible assumption that 70% of Indian population live in Rural area and 30% in Urban area. Hence

$$y^* = \text{Rs. } 2874 \text{ per year per month}$$

$$= \text{Rs. } [(229 \times 0.7) + (264 \times .03)] \times 12$$

We now use another information that in India in 1991-92 the per capita net SDP at current prices for Delhi to be Rs 12,389.00. This value is assumed to be the target for 16 major State in 1981 and 1991 for which we calculate the HDI.

Now, the 'discounted value' (HDR 1993 onwards) of maximum income of Rs. 12,389.00 is calculated by using the UNDP methodology as

$$w(y) = y^* + 2(y^*)^{1/2} + 3(y^*)^{1/3} + 4(y^*)^{1/4} + 5\{(12389 - 4y^*)^{1/5}\}$$

$$= \text{Rs. } 3072$$

This w(y) is calculated on the premise of diminishing returns from income for human development. The calculated w(y) for each State can be observed from Table 5.8 and the values of HDI from Table 5.7. It should be noted here that in 1980-81 the per capita net SDP at current prices for all the 16 States was less than Rs. 3072.00. Hence we give full weight of the income of the States for this period.

Table 5.6

Change in the HDI Value of the States of India Over Time(Using log of Income)

States	Per cap. net SDP 1981	L.R. 1981	L.E. 1981-88	log of per cap net SDP	Index of per cap. net SDP	L.R. Inx. 1981	L.E. Inx. 1981-88	HDI 1981	Rank	log of per cap net SDP	per cap. SDP Inx. 1991-92	L.E. Inx. 1988-82	L.R. Inx. 1991	HDI 1991	Rank
1. Punjab	2674	48.12	63.1	3.427	.415	.481	.635	.510	2	3.999	.917	.693	.585	.731	2
2. Haryana	2370	43.85	60.3	3.375	.369	.438	.588	.465	5	3.941	.867	.625	.558	.683	4
3. Maharashtra	2435	55.83	60.6	3.385	.379	.558	.593	.510	3	3.906	.836	.640	.649	.708	3
4. Gujrat	1940	62.21	57.6	3.289	.293	.622	.543	.486	4	.377	.723	.575	.613	.637	7
5 Tamil Nadu	1498	54.38	56.9	3.175	.194	.544	.531	.423	7	3.769	.715	.608	.627	.650	5
6. Karnataka	1527	46.62	60.0	3.184	.201	4.66	.593	.420	8	3.766	.712	.620	.560	.630	8
7. H.P.	1704	51.17	60.4	3.231	.243	.512	.590	.448	6	3.746	.695	.590	.635	.640	6
8. A.P.	1380	35.66	58.4	3.140	.163	.357	.356	.358	11	3.745	.694	.587	.441	.474	10
9. W.B.	1612	48.56	57.4	3.207	.222	.386	.540	.416	9	3.718	.671	.607	.577	.618	9
10 Kerala	1508	81.56	68.4	3.178	.197	.816	.723	.578	1	3.711	.664	.772	.898	.778	1
11. Assam	1317	-	51.9	3.19	.145	.529*	.448	.374	10	3.662	.621	.485	.529	.545	11
12. Rajasthan	1222	30.09	53.5	3.087	.117	.300	.475	.297	15	3.654	.615	.522	.385	.507	13
13. M.P.	1358	34.22	51.6	3.133	.157	.342	.443	.314	14	3.641	.603	.473	.442	.506	14
14. U.P.	1278	33.33	60.6	3.106	.134	.333	.593	.353	12	3.600	.567	.507	.416	.496	15
15. Orissa	1314	40.96	53.0	3.118	.144	.409	.466	.339	13	3.591	.560	.507	.491	.591	12
16. Bihar	917	32.03	52.8	2.962	.000	.302	.463	.261	16	3.458	.442	.542	.385	.456	16
India	1630	43.56	-	3.212	.226	.436	.562**	.408	-	3.748	.697	.562	.522	.593	9

Note : * *As L.R. of 1981 is not available we use the L.R. Index of 1991.*

** *As L.E. of 1981-86 is not available we use the L.E. Index of 1988-92.*

In HDR 1993 it was explained that for the construction of HDI of States or Countries over time the maximum and minimum values of all the indicators should remain constant over time. Any change in the maximum or minimum value will lead to some conceptual problem. Hence in the construction of HDI over time for the States of India the goal posts are constant over 1981 and 1991.

Income : In our exercise for the construction of HDI of 16 major States of India over 1981 and 1991 we do not convert the value of per capita net SDP in PPP dollars because we do not compare these values with those of the other countries of the World. We are concerned only with the change in the HDI values over 1981 and 1991 in the States of India. For this purpose we take the per capita net SDP of 1980-81 and 1991-92 at current prices for the construction of HDI in 1981 and 1991 respectively. It can be observed from the per capita net SDP data over the two period of time that the lowest value is in Bihar (Rs. 917.00) in 1980-81 and the highest value is in Delhi (Rs. 12,389.00) in 1991-92. As a result we take the goal posts in out calculation of income index at Rs. 12,389.00 as the maximum and Rs. 900.00 as the minimum. In our first exercise we use the value of maximum income to be the log of Rs 12,389 = 4.093 and that of the minimum income to be the log of Rs 900 = 2.954. In our second exercise the maximum adjusted value of income is Rs. 3072 and the minimum is Rs. 900.

Life Expectancy at Birth (LE) : It was pointed out earlier that reliable source for the LE values for a particular period is not available for the States of India. As a result we take the LE of 1981-88 and 1988-92 to calculate the HDI of 1981 and 1991 respectively for the State of India. In case of LE we take the international maximum and minimum values of 85 years and 25 years respectively as suggested by the HDR 1995. For India as a whole these LE data for 1981-88 are not available and we use the 1988-92 data for the period.

Educational attainment : In calculation of the HDI we give full weight on adult literacy rate for educational attainment calculation in the States of India. The highest and lowest values are considered to be 100 and zero for literacy rate as suggested by the HDR 1995. It should be pointed out that for Assam, the adult literacy rate of 1991 is used in the calculation of 1981 index as Census data for this period is not available for this State.

From Table 5.6 we observe that the highest value of HDI in 1981 is in Kerala (0.578) and the lowest value is in Bihar (0.261). In 1981 three States, viz Kerala, Punjab and Maharashtra fall in the medium human developed category. The HDI of India stands to be 0.408 and there are nine States during 1981, having HDI value higher than the all India average. In this table we take the log value of per capita net SDP.

In 1991 the HDI value of India in increases to 0.592 from 0.408 in 1981, an increase of 45% over the ten year period. Nine States in 1991, have higher values of HDI than the all India figure. In 1991 the maximum value of HDI among the 16 major States of India is seen in Kerala (0.778) and the minimum value is in Bihar (0.456). In 1991, only two States Bihar and U.P. fall in the low human developed category and the other fourteen States fall in the medium human developed category. It is also observed that between 1981 and 1991 the HDI value of all the States increases substantially.

Between 1981 and 1991, Kerala, Punjab and Maharashtra retains, according to the HDI values, their 1st, 2nd and 3rd positions in ranking. Gujrat looses its 4th position held in 1981 and is placed at 7th rank in 1991. Haryana improves its position from 5th place in 1981 to 4th place in 1991. Tamil Nadu improves from 7th to 5th place between 1981 and 1991. States like West Bengal, Bihar, M.P. do not show any change in their ranking between the two periods.

Between the two periods the HDI value in creases by 45% in India. Among the States the maximum improvement occurs in Bihar (74%) followed by Rajasthan (70.6%) and Andhra Pradesh (62.8%). The minimum, improvements are observed in Gujrat (33.6%) and Kerala (37.7%). In case of Kerala the lower percentage improvement is due to the fact that it has already achieved the literacy rate and LE very near to the highest value. In case of Gujrat the decrease in literacy rate from 62.21 to 61.29 between 1981 and 1991 contributed to its lower percentage of improvement in the HDI values. Again, between 1981 and 1991 the HDI of India increases by 55%, with a contribution of 208% by income and 20% by literacy and no improvement in LE is assumed.

In Table 5.7 we show the change in the HDI values of the States of India between 1981 and 1991 with an adjustment in per capita net SDP of 1991-92 on the basis of poverty line concept. The Table shows that the HDI value of India increases from 0.445 to 0.679 between 1981 and 1991, showing an increase of 52.58% between the two periods. For this improvement the contribution of income index is 184%, and that of literacy rate is 20%, with no improvement in LE assumed.

Table 5.7 shows a very interesting result in respect to the HDI value of Kerala in 1981. It is almost well known from the different studies (Shiva Kumar 1996, Tilak, 1996) of social indicators that Kerala's position and rank has been and is the highest among the States of India. But in 1981 the HDI value is Kerala (0.609) is revealed to be below the HDI values of Punjab (0.644) and Maharashtra (0.619). Thus the rank of Kerala is 3rd according to the

Table 5.7

Change of the HDI Value of the States of India Over Time(Using Poverty Line Measure)

States	1981							1991						
	Index of per cap SDP	L.E. Index	L.R. Index	HDI 1981	Per capita SDP rank R_1	HDI rank R_2	R_1-R_2	Index of per cap. SDP	L.E. Index	L.R. Index	HDI	Rank of SDP R_1	Rank of HDI R_2	R_1-R_2
1. Punjab	.817	.635	.481	.644	1	1	0	.989	.693	.585	.756	1	2	-1
2. Haryana	.677	.588	.438	.567	2	4	-1	.984	.625	.558	.722	2	6	-4
3. Maharashtra	.707	.593	.558	.619	3	2	0	.976	.640	.649	.755	3	3	0
4. Gujrat	.479	.543	.662	.561	4	5	-1	.966	.575	.613	.718	4	7	-3
5 Tamil Nadu	.275	531	.544	.450	9	9	0	.965	.608	627	733	5	4	1
6. Karnataka	.288	.593	.466	.449	7	8	-1	.964	.620	.560	.715	6	8	-2
7. H.P.	.370	.590	.512	.490	5	6	-1	.957	.590	.635	.727	7	5	2
8. A.P.	.221	.556	.357	.378	10	11	-1	.956	.587	.441	.661	8	10	-2
9. W.B.	.328	.540	.486	.451	6	7	-1	.953	.607	.577	.712	9	9	0
10 Kerala	.280	.723	.816	.609	8	3	5	.952	.772	.898	.874	10	1	9
11. Assam	.192	.448	.529*	.389	12	10	2	.947	.485	.529	.654	11	11	0
12. Rajasthan	.148	.475	.300	.307	15	15	0	.946	.522	.385	.618	12	15	-3
13. M.P.	.211	.433	.342	.332	11	14	-3	.945	.473	.442	.610	13	14	-1
14. U.P.	.174	.593	.333	.366	14	12	2	.939	.507	.416	.621	14	13	1
15. Orissa	.190	.466	.409	.355	13	13	0	.938	.507	.401	.645	15	12	3
16. Bihar	.007	.463	.320	.263	16	16	0	.907	.542	.385	.611	16	16	0
India	.336	.562**	.436	.445	-	-	-	.954	.562	.522	.679	-	-	-

Note : * *As L.R. of 1981 is not available we use the L.R. Index of 1991.*

** *As L.E. of 1981-86 is not available we use the L.E. Index of 1988-92.*

measure of the HDI value of 1981 among the States. This is due to the very poor income index in Kerala (0.280) in 1981 as against Punjab (0.817) and Maharashtra (0.707). Although the literacy and LE index of Kerala are much higher than those of Punjab and Maharashtra, the low value of income index puts Kerala in the 3rd position.

From Table 5.7 it is observed that in 1981, eight States observe the HDI value higher than that of the all India value. The highest and lowest HDI valued States are Punjab (0.644) and Bihar (0.263) in 1981. In 1981, five States in India fall in the medium human developed category with the HDI value more than 0.5. It may be recalled that in our previous exercise with log value of per capita net SDP there are only three States in medium human developed category in 1981. The two States improving their position in this exercise are Haryana and Gujrat.

The difference between the rank value of per capita net SDP and that of HDI gives positive values for Kerala, Assam and U.P. in 1981, implying better provision for human development in these States. In eight States the difference gives a negative value and in five other States zero value, implying that in eight States the performance in income is better than human development and in five States the rank in two indicators for the States are the same.

In 1991 the HDI values of India improves to 0.679. For this year the highest and lowest HDI are observed in Kerala (0.874) and Bihar (0.611). Nine States of India have a higher HDI than the all India value in 1991. It is interesting to note that in 1991 none of the States of India are in the low human developed category. Fifteen States are in the medium human developed category and Kerala, again with the highest HDI value, is in the high human developed category.

The difference between the rank of per capita net SDP and that of the HDI gives positive value for five States viz, Kerala, Tamil Nadu, H.P., Orissa and U.P. that is these States have a better performance in human development than the performance in income. Seven States show better performance in income over human development and four States show no improvement in ranking either by income of by HDI values.

5.7 Achievement Index (AI) and Improvement Index (II) for the States of India :

To compare the standard of living accross the countries Kakwani (1993) put forward the Achievement Index (AI) and Improvement Index (II) separately. The indicators used in the paper had asymptotic limits, reflecting physical and biological maxima. Another important feature of the functions are that as the standard of living reaches progressively higher limits,

Table 5.8

Per Capita Income of the States of India
(Adjusted by Poverty Line Measure)
(Rs.)

States	Per capita SDP 1980-81	Adj. per capita SDP 1980-81	Per capita SDP 1991-92	Adj. per capita SDP 1991-92
1.Punjab	2674	2674	9973	3048
2. Haryana	2370	2370	8740	3037
3. Maharashtra	2435	2435	8063	3021
4. Gujrat	1940	1940	5994	2999
5. Tamil Nadu	1498	1498	5878	2997
6. Karnataka	1527	1527	5833	2994
7. H.P.	1704	1704	5578	2978
8. A.P.	1380	1380	5556	2977
9. W.B.	1612	1612	5227	2971
10. Kerala	1508	1508	5140	2969
11. Assam	1317	1317	4594	2957
12. Rajasthan	1222	1222	4511	2955
13. M.P.	1358	1358	4377	2952
14. U.P.	1278	1278	3979	2940
15. Orissa	1314	1314	3907	2938
16. Bihar	917	917	2871	2871
India	1630	1630	5603	2978

Note : *Calculation of Adjusted per capita SDP of*

Punjab $= y^* + 2y^{*1/2} + 3y^{*1/3} + 4(9973-8622)^{1/4}$

$= 2874 + 107.2 + 42.6 + 24.2$

$= 3048$

Haryana $= 2874 + 107.2 + 42.6 + 13.2$

$= 3037$

and so on.

incremental improvements would represent much higher achievement levels than similar incremental improvements from a lower base. The paper used axiomatic approach to derive the AI which was normalised to lie between zero and one. The II was derived as the difference between the values of AI in any tow periods of time.

Here we construct the AI and II for 16 major States of India for four indicators, per capita net SDP, LE, literacy rate and infant mortality rate (IMR) over the prior 1981 and 1991 using the same data, we used for the construction of HDI for the States of India. For the construction of AI of the first three indicators the formula used by Kakwani is

$AI = (M-Mo)^{1-e}-(M-x)^{1-e}/(M-Mo)^{1-e}$ for $0<e<1$

and $AI = \{Ln(M-Mo)-Ln(M-x)\}/Ln(M-Mo)$ for $e=1$

with M and Mo being the upper and lower limits respectively. The value of AI for different countries was computed by Kakwani himself with both e=1 and e=.5. However, the results did not change significantly and the conclusions remained exactly the same. So in our study we construct AI values for the States of India with e=1.

The formula used for II is given by

$II = \{Ln\ (M-x_1) - Ln\ (M-x_2)\}/Ln(M-Mo)$ for $e = 1$

Here x_1 and x_2 are the value of the indicator for two particular periods.

For the fourth indicator, IMR the formula is some what different to have consistent order in ranking. It is given by

$AI = \{Ln\ (M-Mo) - Ln\ (x-M0)\}/Ln(M-Mo)$ for $e = 1$

and $II = \{Ln\ (x_1-Mo) - Ln\ (x_2-Mo)\}/Ln(M-Mo)$ for $e = 1$

The results of AI and II are presented in Tables 5.9. to 5.12

5.7.1. Achievement Indices of Income

We construct the AI of 16 major States of India for per capita net SDP at current prices with the asymptotic maximum (M) to be Rs 12,389.00 and minimum (Mo) to be Rs. 900.00. These values are chosen because the maximum per capita net SDP for Delhi was Rs. 12,389.00 in 1991-92 and of Bihar Rs. 917.00 in 1980-81, both at current prices (Sec. 5.6).

From Table 5.9 we see that in 1980-81 the AI for India as a whole is 0.007 which increases to 0.049 in 1990-91. Thus an increase of over seven times in AI value over the two periods of time. In 1980-81 these are six States in India which have an AI either more than or

Table 5.9
Achievement Index of Income in the States of India
During 1980-81 & 1991-92

States	AI(1980-81)	AI(1991-92)
1.Punjab	.018	.167
2. Haryana	.015	.123
3. Maharashtra	.015	.104
4. Gujrat	.010	.063
5. Tamil Nadu	.006	.061
6. Karnataka	.006	.060
7. H.P.	.008	.056
8. A.P.	.005	.056
9. W.B.	.007	.051
10. Kerala	.006	.049
11. Assam	.004	.041
12. Rajasthan	.003	.040
13. M.P.	.004	.039
14. U.P.	.004	.033
15. Orissa	.004	.032
16. Bihar	.000	.020
India	.007	.049

Table 5.10
Achievement Index of L.E. in the States of India
During 1981-88 & 1988-92

States	AI(1981-88)	AI(1988-92)
1.Punjab	.246	.289
2. Haryana	.217	.240
3. Maharashtra	.220	.250
4. Gujrat	.191	.209
5. Tamil Nadu	.185	.229
6. Karnataka	.220	.236
7. H.P.	.218	.218
8. A.P.	.199	.216
9. W.B.	.190	.228
10. Kerala	.314	.361
11. Assam	.145	.162
12. Rajasthan	.157	.180
13. M.P.	.143	.157
14. U.P.	.220	.173
15. Orissa	.186	.173
16. Bihar	.154	.199
India	-	.201

Table 5.11
Achievement Index of Literacy Rate of the States of India
During 1981 & 1991

States	AI(1981)	AI(1991)
1.Punjab	.143	.191
2. Haryana	.125	.178
3. Maharashtra	.177	.227
4. Gujrat	.211	.206
5. Tamil Nadu	.170	.214
6. Karnataka	.136	.178
7. H.P.	.156	.219
8. A.P.	.096	.126
9. W.B.	.113	.187
10. Kerala	.367	.496
11. Assam	-	.163
12. Rajasthan	.078	.106
13. M.P.	.091	.127
14. U.P.	.088	.117
15. Orissa	.144	.147
16. Bihar	.084	.105
India	.124	.160

Table 5.12
Achievement Index of IMR in the States of India
During 1981-83 & 1990-92

States	AI(1981-83)	AI(1990-92)
1.Punjab	.215	.286
2. Haryana	.176	.238
3. Maharashtra	.223	.278
4. Gujrat	.144	.244
5. Tamil Nadu	.195	.282
6. Karnataka	.247	.232
7. H.P.	-	-
8. A.P.	.210	.238
9. W.B.	.195	.254
10. Kerala	.411	.639
11. Assam	.156	.223
12. Rajasthan	.156	.202
13. M.P.	.106	.144
14. U.P.	.082	.170
15. Orissa	.111	.129
16. Bihar	.146	.235
India	.152	.212

equal the all India value. Punjab (0.018) has the highest AI value followed by Haryana (0.015), Maharashtra (0.015). Bihar has the lowest value of AI at zero.

In 1991-92 there are 10 States in India which have AI values higher than that of the all India average (0.049). The highest value is again retained by Punjab (0.167) followed by Haryana (0.123), Maharashtra (0.123) and Gujrat (0.104). The lowest value of AI is again obtained by Bihar (0.020) in 1991-92.

Between 1980-81 and 1991-92 the ranks of four States viz. Punjab, Haryana, Maharashtra and Gujrat have not changed as they retained the first four places during both the periods. Tamil Nadu and Karnataka improved from 7th and 8th positions in 1980-81 to 5th and 6th positions in 1991-92 respectively. There is an improvement in the ranking of Rajasthan from 15th to 12th position over the periods. Orissa's position in ranking deteriorates from 12th place in 1980-81 to 15th in 1991-92.

5.7.2 Achievement Indices of LE for the States of India :

Table 5.10 shows the AI of LE for the 16 major States of India over 1981-88 and 1988-92. However, due to the non-availability of LE data for 1981-88 at all India level from our source, the AI of LE for India as a whole is not constructed. We now construct and compare the AI values of LE for 16 major States of India. The AI figure for Kerala (0.314) is the highest in 1981-88, followed by Punjab (0.246). The lowest value of AI is obtained by M.P. (0.143) for the same year.

For 1988-92, the AI value of India as a whole is 0.201 and there are ten States in India which have values of AI higher than the all India figure. Again the highest value of AI is shown by Kerala (0.361) followed by Punjab (0.289) Maharashtra (0.250) and Haryana (0.240). The lowest AI valued States is Bihar (0.191) in the same period.

Over the period 1981-88 and 1988-92, Haryana, performs well as its ranking order improves from 7th to the 4th place during the two periods of time. Tamil Nadu improves its rank from 11th to 6th position in ranking. Bihar and West Bengal also improve their ranking between the two periods of time. The ranking order of Gujrat, H.P. and A.P. deteriorate between the two periods of time.

5.7.3 Achievement Indices of literacy rate :

In literacy rate the AI value of India increases from 0.124 in 1981 to 0.161 in 1991, an increases of 29% over the ten year period. In 1981 the maximum value of AI for literacy rate is obtained by Kerala (0.367) followed by Gujrat (0.211) Maharashtra (0.177) and Tamil

Nadu (0.170). The minimum value of AI in literacy rate is 0.078 for Rajasthan. In 1981 nine States have higher AI values than the all India figure.

Kerala again has the maximum value of AI for literacy rate (0.496) in 1991. The increase in the AI of Kerala is 35% between 1981 and 1991. However, the AI of India as a whole increases by 29% between 1981 and 1991. Again, in 1991 ten States of India show an AI value higher than the all India figure.

The States which performed better in ranking order between 1981 and 1991 are Maharashtra, Punjab, H.P., West Bengal, Rajasthan and M.P. The States which deteriorate in ranking position are Gujrat, A.P., Orissa and Bihar.

5.7.4. Achievement Indices of IMR for the States of India.

Table 5.12 shows that the all India figure of AI for IMR is 0.152 in 1981-83 which improves to 0.212 in 1990-92, an increase of 39% between the two periods of time. In 1981-83 ten States show a higher value of AI over the all India figure. Kerala's AI value (0.411) is the highest in 1981-83 followed by Karnataka (0.247) Gujrat (0.223) and Punjab (0.215). The lowest value of AI is in U.P. (0.082)

In 1990-92 eleven States have higher AI value than the all India figure (0.212). The highest value of AI among the 16 major States is in Kerala (0.639). The increase in the AI value for Kerala over the period of time is 57%, much higher than the all India increase of 39%. Kerala's, AI is followed by Punjab (0.286), Tamil Nadu (0.282), Gujrat (0.278) and West Bengal (0.254). The lowest value of AI in this regard is in Orissa (0.121).

Among the States improvement in ranking order is observed in Punjab, Haryana, Tamil Nadu, West Bengal, U.P. and Bihar. The States which deteriorated their ranking position between the two period of time are Maharashtra, Kernataka, A.P., Assam, Rajasthan and Orissa.

5.7.5 Improvement Indices (II) of different Indicators for the States of India :

The II of different variables are shown in table 5.13 for 16 major States of India. The individual index of each indicator can be calculated by the formula provided by Kakwani (1993) which is simply the difference between the two period AI.

In case of II for income the value of the India is 0.042 and there exists 10 States in India which show II values higher than this figure. Punjab has the maximum value of II (0.149) among the States of India followed by Haryana (0.108) Maharashtra (0.89), Gujrat (0.53) Tamil Nadu (0.55) and Karnataka (0.54). Bihar has the lowest value (0.20) of II in income among the States of India.

Table 5.13

Improvment Index of Different Indictors in the States of India

States	II of Income	II of LR	II of IMR	II of LE
1.Punjab	.149	.049	.071	.043
2. Haryana	.108	.052	.062	.023
3. Maharashtra	.089	.050	.055	.030
4. Gujrat	.053	-.005	.100	.018
5. Tamil Nadu	.055	.043	.088	.044
6. Karnataka	.054	.042	-.015	.016
7. H.P.	.048	.063	-	-
8. A.P.	.051	.030	.028	.017
9. W.B.	.044	.074	.059	.038
10. Kerala	.043	.129	.228	.047
11. Assam	.038	-	.068	.017
12. Rajasthan	.037	.028	.046	.023
13. M.P.	.034	.036	.038	.018
14. U.P.	.030	.029	.087	-.047
15. Orissa	.029	.032	.018	-.013
16. Bihar	.020	.022	.089	.037
India	.042	.036	.071	-

The II for literacy rate in India is 0.036 and nine States show values either higher than or equal to this value. Kerala has the highest value of II (0.129) on literacy rate followed by West Bengal (0.074) and H.P. (0.063). It should be noted here that these two States have lower per capita net SDP in 1991-92 than the all India average. In fact the ranking of West Bengal according to its per capita net SDP in 1991-92 among the 16 major States is 9th and that of H.P. it is 7th. The lowest value of II on literacy rate among the States of India gives a negative value for Gujrat (-0.005). This is due to the fall in the percentage of literates between 1981 and 1991 within the State. Among the positive valued II, the lowest valued States is Bihar (0.022).

The II for IMR in India is 0.071 and five States show higher values than this figure. The highest value of II for IMR among the major States of India is in Kerala (0.228), followed by Gujrat (0.100), Bihar (0.089), Tamil Nadu (0.088), U.P. (0.087) and Punjab (0.071). It is clear that among these five States with II for IMR higher than the all India value, only two States, Punjab and Tamil Nadu belong to the category of States which have a higher per capita net SDP than the national average in 1991-92 at current prices. Keeping aside the exceptional value of Kerala, Bihar and U.P. have shown very high value of II for IMR although their ranking in 1991-92 are 16th and 14th respectively from the per capita net SDP point of view.

The II for LE of India as a whole is not available due to the non-availability of data from our source. The highest value of II for LE among the Indian States is still in Kerala (0.047) followed by Tamil Nadu (0.44) Punjab (0.43) West Bengal (0.38). Two States have a negative value of II for LE among the Indian States viz U.P. (-0.047) and Orissa (-0.013).

5.8 Rank Correlation Coefficient Analysis :

Given the values of AI for income, LE, literacy rate and IMR, Table 5.14 presents together the rank of the states according to their AI for different variables separately. Table 5.15 gives the pair wise rank Correlation Coefficient of the AI for different indicators in 1981 and 1991 separately. In terms of AI for per capita net SDP the rank of Tamil Nadu, Karnataka, A.P., Assam and Rajasthan improve between 1980-81 and 1991-92. The position of H.P., West Bengal and Kerala deteriorate in ranking between the two periods. In case of LE, the states Haryana, Maharashtra, Tamil Nadu, West Bengal and Bihar improve their position between the two periods of our study and Gujrat, H.P., A.P., Karnataka, and U.P. have deteriorate in their ranking order. In regard to the AI for literacy rate improvements in ranking order are observed for Punjab, Haryana, Maharashtra, H.P. and West Bengal. The States which show deterioration in ranking are Gujrat, Karnataka, A.P. and U.P. For the AI ranking by IMR

Table 5.14

Rank of the States of India According to the AI of the Different indicators during 1981 & 1991

	1981				1991			
States	Income	LE	LR	IMR	Income	LE	LR	IMR
1.Punjab	1	2	7	4	1	2	6	2
2. Haryana	2.5	7	9	8	2	4	8.5	7.5
3. Maharashtra	2.5	4	3	3	3	3	2	4
4. Gujrat	4	9	2	12	4	10	5	6
5. Tamil Nadu	8	11	4	6.5	5	6	4	3
6. Karnataka	8	4	8	2	6	5	8.5	10
7. H.P.	5	6	5	-	7.5	8	3	-
8. A.P.	10	8	11	5	7.5	9	13	7.5
9. W.B.	6	10	10	6.5	9	7	7	5
10. Kerala	8	1	1	1	10	1	1	1
11. Assam	12.5	15	-	9.5	11	15	10	11
12. Rajasthan	15	12	15	9.5	12	12	15	12
13. M.P.	12.5	16	12	14	13	16	12	14
14. U.P.	12.5	4	13	15	14	13.5	14	13
15. Orissa	12.5	13	6	13	15	13.5	11	15
16. Bihar	16	14	14	11	16	11	16	9

Table 5.15

Rank Correlation Coefficient

	1981			1991		
Variables	LE	LI	IMR	LE	LR	IMR
Income	0.58	0.50	0.50	0.73	0.65	0.71
LE	-	0.45	0.58	-	0.70	0.73
LR	-	-	0.35	-	-	0.75

the States which improve in their ranking order are Punjab, Gujrat, Tamil Nadu, U.P. and Bihar but the States which deteriorate in their ranking orders are Assam and Rajashtan.

Table 5.15 shows stronger rank Correlation Coefficient between income and LE in both 1981 and 1991 than those of income and literacy & income and IMR. However the value of rank Correlation Coefficient of all the three pairs of variable, one being income, increased from 1981 to 1991. A weaker rank Correlation Coefficient between LE and literacy in 1981 improves from 0.45 to 0.70 1991. Similarly, the weaker value of the Correlation Coefficient between LE and IMR increases from 0.58 to 0.73 between 1981 and 1991 respectively. The weakest rank Correlation Coefficient value of 0.35 between literacy rate and IMR in 1981 increases to 0.75 in 1991, giving the highest value among all the pairs.

The rank Correlation Coefficient results reveal that the degree of association between non-income indicators is lower than the association between income and non-income indicators in 1981. This result is just the opposite of what was observed by Dutta *et al.* (1993). The results for 1991 are somewhat different in our study when the degree of association between the non-income variable like literacy rate and IMR becomes very strong . The degree of association between LE and income have exactly the same value as that of between LE and IMR in both 1981 and 1991. But still in 1991 the degree of association between income and LE & income and IMR are stronger than those values obtained in 1981.

5.9 HDI of the Districts of West Bengal

In this section we construct the HDI of the 16 districts of West Bengal for 1981. The districts are Bankura, Birbhum, Burdwan, Calcutta, Cooch Behar, Darjeeling, Hoogly, Howrah, Jalpaiguri, Malda, Midnapure, Murshidabad, Nadia, Purulia, 24-Parganas and West Dinajpur. We are unable to construct the HDI for 1991 of the districts of West Bengal due to the non availability of data on income and health indicators like LE and IMR for this year. In fact the LE data for the districts of West Bengal are not available for 1981 also and as a result we use the IMR as the health related indicator for this year.

In our construction of the HDI for the districts of West Bengal we use the per capita net district incomes at current prices of the period 1980-81, literacy rate of 1981 and IMR of 1981. To compare these values of HDI for the districts of West Bengal and States of India we use the same method and 'goal posts' in this study. For example, we use the log value of income of the districts and take the same upper and lower limits to get the income index. For literacy rate the maximum and minimum values are 100 and zero as before. In case of IMR the highest and lowest values are 230 and 5 respectively as used by Kakwani (1993).

Table 5.16

HDI of the District of W.B., 1981

Districts	LR 1981	IMR 1981	log of per cap SDP (1980-81)	Index of SDP	LR Index	IMR Index	HDI 1981	Rank of SDP R_1	Rank of HDI R_2	R_1-R_2
1. Calcutta	77.33	52	3.499	.479	.753	.791	.674	1	1	0
2. Howrah	60.21	56	3.346	.344	.602	.773	.573	3	2	1
3. 24 Parganas	54.75	87	3.250	.260	.547	.635	.480	6	6	0
4. Burdwan	50.11	79	3.325	.326	.501	.671	.499	4	4	0
5. Hooghly	57.15	62	3.298	.302	.571	.746	.539	5	3	2
6.Darjeeling	49.59	89	3.349	.347	.496	.626	.489	2	5	-3
7. Birbhum	40.57	103	3.175	.194	.406	.564	.388	7	9	-2
8. Murshidabad	30.67	104	2.992	.033	.307	.560	.300	16	14	2
9. Purulia	35.32	75	3.134	.158	.353	.389	.400	8	8	0
10. Bankura	45.13	83	3.121	.147	.451	.653	417	9	7	2
11. Nadia	44.21	99	3.045	.080	.442	.582	.368	11	11	0
12. Jalpaiguri	35.12	127	3.078	.108	.351	.458	.305	10	12	-2
13. Midnapore	51.47	104	3.038	.074	.515	.560	.383	12	10	2
14. W.Dinajpur	33.02	116	3.037	.073	.330	.506	.303	13	13	0
15. Malda	28.23	128	2.993	.034	.282	.453	.256	15	16	-1
16. Cooch Behar	36.97	127	3.000	.040	.370	.457	.289	14	15	-1
West Bengal	48.56	95	3.207	.222	.486	.600	.436	-	-	-

Source : *Statistical Abstract, W.B., 1978-89 (Combined), Govt. of W.B., Bureau of Applied Economics and Statistics*

In case of the construction of IMR index our formula is adjusted (Kakwani, 1993) as

IMR index $= (M-x_i)/(M-Mo)$ and for other two indicators the Index $= (x_i-M)/(M-Mo)$

Here M and Mo are the highest and lowest asymptotic values of the respective indicators.

The results of the HDI construction of the districts of West Bengal are shown in Table 5.16. In this Table the HDI of West Bengal is 0.436 as against 0.416 in Table 5.6 for the year 1981. This increase in the value of HDI is due to the use of IMR index instead of LE index for the same year. In 1981 six districts of West Bengal exhibit higher HDI values than the West Bengal average. The districts are Calcutta (0.674) Howrah (0.573) Hoogly (0.539) Burdwan (0.499), Darjeeling (0.489) and 24 Parganas (0.480). The maximum value of HDI among the 16 districts is obtained by Calcutta (0.674).

It should be noted that for the same year the value of HDI of Kerala, the highest among Indian States is much lower than that of the HDI value of Calcutta. For Kerala the HDI value is 0.578. The higher value of Calcutta HDI is due to the much higher per capita income (Rs. 3156.00) in 1980-81 as against the per capita income of Kerala (Rs. 1508.00) for the same period.

The HDI of Kerala is also recalculated using IMR as one of the indicator instead of LE. As a result the HDI of Kerala for 1981 becomes 0.626 = [(0.866+0.816+0.197)/3]. It is still lower than the HDI value of Calcutta in 1981 at 0.674 = [(0.791+0.753+0.479)/3]. The higher value of the HDI for Calcutta than that of Kerala is due to the higher value of the income index of Calcutta. It can be observed from Table 5.6 and Table 5.16 that in 1980-81 Calcutta has a higher per capita income than that of Punjab, the later having the highest per capita net SDP among the 16 major States of India.

From Table 5.16 it is observed that in 1981 three districts viz. Calcutta (0.674), Howrah (0.573) and Hoogly (0.539) show HDI values higher than 0.5. These districts fall in the category of medium human developed Countries or States. The lowest HDI value among the districts of West Bengal is in Malda (0.256). Among the 16 major States of India in 1981, the lowest value of HDI is for Bihar (0.261). So Malda has a lower HDI value than that of Bihar.

The rank differences by per capita income and HDI give positive value for five districts, negative value for five districts and no difference for six districts. The value of rank Correlation Coefficient between the HDI values and per capita district income is 0.947 for the 16 districts as a whole. The value of rank Correlation Coefficient is 0.60 for first six districts with higher income than the State level. The rank Correlation Coefficient values of the other ten districts

is 0.866. This implies that the degree of association between income per head rank and HDI rank is stronger in poorer districts than in the richer districts.

5.10. Conclusion :

We have constructed the HDI of different States of India and compared these results with the international value of HDI. In the subsequent sections we have developed the achievement indices of the States of India for different social indicators. We have also constructed the HDI values of the districts of West Bengal.

We have divided the 16 major States of India in two groups on the basis of per capita net SDP at current prices for 1991-92. There are six States in the first group having per capita net SDP higher than the national average and ten in the second group having per capita net SDP lower than the all India average. It is observed that the rank Correlation Coefficient values of the first set of six States is 0.48 in 1991 between HDI rank and per capita rank. For the second set of ten States the rank Correlation value is 0.39. The value of rank Correlation Coefficient for all the 16 States taken together is 0.83. That is as the States become richer the degree of association between HDI rank and income ranked becomes stronger.

An opposite result emerges is the case of the district level study for West Bengal. We have also six high income districts and ten low income districts. The value of rank Correlation Coefficient between HDI and per capita income value is 0.60 for richer districts, 0.86 for poorer districts and 0.947 for all the 16 districts taken together in 1981.

The HDR 1995 provides the ranking of 174 Countries according to HDI values and income value. For 63 high human developed countries the rank Correlation Coefficient is 0.63, for 64 medium human developed countries it is 0.54 and for 47 low human developed countries it is 0.35. The value of rank Correlation Coefficient for 174 Countries taken together is 0.95.

The above results show that at the macro level the rank correlation is stronger and at the micro level this Coefficient becomes weaker. Again the degree of growth level measured by income and HDI values do not give any sound reason for an association that high income growth gives high value of HDI. This is one of the justifications of studying the HDI of different countries at micro level without much concern about the level of income.

Chapter VI

Growth and Social Indicators : Some Concluding observations

The debate on the relationship between the growth of per capita GDP and social indicators has important implications for the public policy of a country. It is true that the higher the average income of a country, the more likely it is that it will have a higher life expectancy, lower infant mortality rate, higher rate of literacy and a higher value of human development index (HDI). To the extent that growth in per capita income is an instrument in raising levels of achievements in literacy and life expectancy, there is less of a need for public provisioning of social services by means of spending on health and education., If, however, only a weak link exists between growth in per capita income and achievements in social indicators the development policies can not be centred on the growth of levels of income. There would then be a need of public provision of social services.

The case of Sri Lanka is often used as an example in this context. This issue has been the centre of debate in the 1980's. Sen (1981) and Isenman (1980) have concluded that it is the public action which made Sri Lanka an exceptional country in achieving such a high standard of living even with low per capita income. Bhalla and Glewwe (1986) and Bhalla (1988) have argued that Sen's and Isenman's conclusions are flawed because they did not take into account the initial conditions of the country. Again, they have argued that it is not the levels but the changes in social indicators which should be taken into account. Using an alternative methodology Bhalla and Glewwe (1986) concluded that Sri Lankan improvements (i.e. changes) in the standard of living is not exceptional.

Using Sri Lankan time series data Anand and Kanbur (1991) found a negative correlation between IMR and both social spending and income growth but social spending had a stronger impact . These finding are justified as Child Vaccination campaigns can reduce IMR more quickly than can income growth. Kakwani (1993) presented axioms that measures of social indicators should satisfy. His residual analysis suggested that Sri Lankan achievements in the standard of living between 1970-1990 in relation to its per capita income to be exceptional.

Kakwani also challenged the Bhalla and Glewwe thesis which was found to have theoretical flaws and the conclusions to be inconsistent. Anand and Ravallion (1993) presented further evidence that both social spending and growth matter for social indicators. Their analysis showed a significant income effect, but this effect seemed to be small relative to the effects of public health spending. Aturpane et al (1994) studied this issue as a comparison between Pakistan and Sri Lanka and concluded that income growth, while important, is not the primary determinant of improvement in social indicators.

Isenman (1980) fitted the following model using the data from 59 countries :

log (life expectancy) = 3.2+0.13 log (GDP per capita).

The model implies that a 1% increase in per capita GDP will increase the life expectancy at birth by 0.13 percent.

We have used the same model for 15 States of India in 1991 and our model gives.

log (life expectancy) = 2.77)+0.15 log (net SDP per capita)

(6.05)* (2.99)*

$R^2 = 0.39$.

Our model implies that a 1% increase in per capita SDP will increase the life expectancy at birth by 0.15 percent and in our model the t Statistics are significant at 5% level of significance. The Correlation Coefficient between the two variables are observed to be 0.62. However, net SDP per capita alone can explain only 0.39 percent variation of the variables. Lest there be error of omitted variables we introduce another variable in the same model as :

log (LE) = 2.78 + .14 log (net SDP per capita) + .018 log (expenditure on health per capita)

(5.82)*, (2.13)* (.02)

$R^2 = 0.392$.

The introduction of new variable does not have significant impact as explanatory variable as R^2 remains almost the same. Hence we introduce another new variable in our model as :

log (LE) = 3.32 + 0.10 log (net SDP per capita) - 0.001 log (expenditure on health per capita)

(3.74)* 1.24) -.01

- 0.04 log (population below poverty line)

(-.75)

$R^2 = 0.42$.

With the introduction of the new variable R^2 increases to .42. In our exercise the value of Correlation Coefficient between LE and expenditure on health per capital is 0.42 and the value of Correlation Coefficient between LE and population below poverty line is -0.58 as against the value 0.62 between LE and per capita net SDP. So far as the value of Correlation Coefficient is concerned, the association between income and LE is the strongest and that of expenditure on health and LE is the weakest.

We carry on the same exercise for literacy rate of 15 States of India in 1991 and other variables as follows :

log (Literacy rate) = 0.73+0.37 log (net SDP, per capita)

(.52) 2.40)*

$R^2 = 0.29$.

This model implies that one percent increase in per capita net SDP will increase the literacy rate (LR) by 0.37 percent. In this model per capita net SDP can explain only 29% variation in literacy rate. The second model gives :

log (Literacy rate) = 0.54 - 0.09 log (net SDP per capita) + 0.92 log (expenditure on education on per capita) (.52) (-.53) (3.46)*

$R^2 = 0.63$.

With the introduction of expenditure on health (public action) in the same model, the sign of the coefficient of income per capita becomes negative. The expenditure on educations by government has a significant role on the literacy rate. Again this model can explain 63% of the variation in literacy rate by the two factors of the model. The third model gives:

log (LR) = - 2.20 + 0.02 log (net SDP per capita)+1.16 log (expenditure on health per capita)

(-1.11) (0.11) (4.03)*

+ .20 log (population below poverty line)

(1.67)

$R^2 = 0.70$.

Here again the coefficient of income has a very negligible and insignificant effect on the literacy rate and the strongest and significant effect is shown by per capita expenditure on health. The model gives $R^2 = .70$.

The value of Coefficient of Correlation between LR and income is .54, between LR and per capita expenditure on health is .79 and between LR and population below poverty line is -.44. Hence the degree of association between LR and per capita expenditure on health is the strongest and the negatives association between LR and population below poverty line is the weakest.

Anand and Ravallion (1993) introduced the following model to measure the proportionate reduction in shortfall of LE from 80 years against the log of mean national income across 22 Countries: - log (80 - LE) = - 6.15 + 0.45 log (GNP per capita)

(2.07) (4.00)

$R^2 = 0.45$.

From this model they concluded that there is significant partial Correlation between life expectancy and average income. The model also implies that income variations tend to explain not much more than half the differences in life expectancy as $R^2 = .45$. So the association between income and LE is far from perfect.

We have also used the same model and obtained the following result

- log (80 - LE) = - 6.94 + 0.46 log (per capita net SDP)

(- 3.83)* (2.28)*

$R^2 = 0.27$.

Our results confirm that variation in income tend to explain only one-fourth the difference in LE. Other conclusions of the previous model are also confirmed in this model.

On adding poverty index and public health spending per person in the above regression, the significant positive relationship between life expectancy and average income vanishes entirely. This is given by the following equation

- log (80 - LE) = - 1.08 - 0.28 log (GNP per person) - 0.21 log (proportion of population
(2.34) (1.34) (2.36)
consuming less than PPP$ 1 per day in 1985) + .30 log (public health spending per person)
(3.02)

$R^2 = 0.71$.

With the addition of these two variables, the Coefficient of log (GNP per person) reverses sign

though it ceases to be significantly different from zero.

Our data on the States of India obtained the following equation:

- log (80 - LE) = - 3.98 + 0.17 log (SDP per head) + 0.74 log (public spending on health per
(-1.17) (0.52) (0.21) capita)

- 0.22 log (proportion of population below poverty line)

(-1.05)

$R^2 = 0.35$.

In our model the significant positive relation between LE and per capita net SDP has reduced sharply, though it has still a positive sign for the Coefficient on log (net SDP per capita). The Coefficient of log (public spending on health per capita) in our model has a much higher positive value than that of the model of Anand and Ravallion (1993). The negative values of the Coefficient of people below poverty line are almost the same for Indian states and 22 Countries of the earlier study.

From the above results we can conclude, as Anand and Ravallion (1993) did , that it is not true that per capita income is less important in expanding life expectancy; rather it is clear that the importance of income lies in the way that its benefits are distributed between people and the extent to which growth in income supports public health services.

On regressing a suitable nonlinear transformation of literacy to measure the proportionate reduction in shortfall of the literacy rate from 100 against the log GNP per person across 22 countries Anand and Revellion obtained the following result

- log (100 - Literacy) = - 10.21+ 0.95 log (GNP) per person)

(3.56) (4.55)

$R^2 = 0.51$.

In this model income variations tend to explain half of the differences in literacy rate with R^2 of 0.51.

Using the same regression our exercise gives

- log (100 - LR) = - 6.86 + 0.36 log (per capita net SDP)

(-2.24)* (1.05)

$R^2 = 0.07$

Adding the poverty index and public spending on education per person, Anand Revellion

obtained the regression:

- log (100 - LR) = - 9.5 + 1.12 log (GNP per person) - 0.27 log (proportion of population
(1.86) (2.56) (1.24) consuming less than
PPP$ per day in 1985 + 0.33 log (public spending on education per person)
(1.02)

$R^2 = 0.56$.

They explained that the lack of any significant correlation between literacy and public spending on education reflects the fact that a large share of public spending on education goes to secondary and tertiary levels of schooling in poor countries and literacy impact should be largely confined to spending on primary level schooling. The lack of any significant Correlation with poverty reflects the fact that most people in developing countries, particularly poor people, attend publicly provided free primary schools.

However our results from the regression equation gives

-log (100 - LR) = - 9.81 - 0.58 log (net SDP per capita) + 2.28 log (expenditure education
(-2.09) (-1.36) (3.36)* per head) + 0.19 In (population
below poverty line) (+ 0.65)

$R^2 = 0.55$.

Adding the extra two variables in our equation the sign of the coefficient on log (net SDP per capita) becomes negative by. The public expenditure on health per capita has a significant positive role in the literacy rate of Indian States. It should be noted that the Coefficient of log (population below poverty line) gives a positive value against the expected negative value. This also confirms the Anand and Revellion explanation that poor people attend publicly provided free primary schools. Again in India different steps have been taken to increase the literacy rate of the poor people like mid-day meal free provision of text books, and similar measures.

From the above analysis and results it is not evident that econimic growth does not expand social indicators like life expectancy and literacy rate. It is indicated that their connections are seriously contingent upon and depends on how the fruits of economic growth are shared, in particular what the poor get and how far additional resources are used to support public services. In other words, our results also support the recent views of the relationship between income and social indicators; that growth, while important, is not the only explanation for improvement in social indicators.

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