



Information on Human Development : Technical Note

This Chapter has three Sections : the First Section is a Technical Note on the Human Development Indices, the second Section explains the tables in which data is presented on the State, and the third Section contains the statistical tables on the State and its districts.

1. Technical Note

The Technical Note is further divided into three sections. The first deals with the methodology for the Madhya Pradesh Human Development Index and the Gender Development Index. The second deals with the other indices presented in this Report, primarily the Human Development Measures. The third section explains the data and its analysis undertaken in the tables presented in this report.

1.1 Human Development Index

The Madhya Pradesh Human Development Index was first calculated in 1995 for all 45 districts. Based on the UNDP Human Development Index, it attempts to show the relative status of human development in districts.

The Human Development Index is a composite index comprising levels of human development in education, longevity or health, and in access to opportunities measured in per capita incomes, with the present status of districts in these parameters related with certain absolute achievement positions, or some desirable achievement positions. This index is a measure of how far a district has traveled, from a minimum level of achievement, and the path still to travel.

The index is calculated by the following formula:

$$\text{HDI}_{ij} (\text{Index}) = \frac{\text{Target}_j - \text{Value}_{ij}}{\text{Target}_j - \text{Min}_j}$$

HDI_{ij} = Index of deprivation for the i th district for the j th criterion.

Target_j = This is the maximum achievable target for the j th criterion (for example, it is 100 per cent for literacy).

Value_{ij} = This is the value of the i th district for the j th criterion.

Min_j = This is the minimum value for the j th criterion (it is 0% for literacy)

The methodology is illustrated later, with an example of Rajnandgaon district.

The criteria used for the district HDI and the methodology applied for the Madhya Pradesh Human Development Index (MPHDI) for districts are given below. It needs to be mentioned here that calculations for the indices and the data used for such calculations should not be used in isolation from the index. Much of the district data used is relevant in comparing districts and may not be a proper indicator in isolation to the index.

1.1.1 Education

UNDP uses literacy rate as one of the two parameters. Recently it has changed the second indicator from mean years of schooling to school enrolment. The MPHDI had used these two criteria in 1995, and they will be used for this year's education index also.

Literacy denotes the most basic and essential criterion. Literacy levels are available for each district from the Census of India, 1991, and these figures were used for the index on literacy. Literacy rate for the population was calculated as percentage share of all literate in a district over the total population of people above 6 years of age in the district. Literacy has also been assessed by the National Literacy Mission groups in districts. This figure, however, was not available to us from all the districts at the time of publishing of this Report. Further no estimates of literacy for years later than 1991 at district level have been released or available from any credible source.

In 1995 MPHDI, female literacy was given a weight greater than male literacy for the literacy index. However, this year since a separate Gender Development Index has also been calculated to assess the relative level of development of women vis-à-vis men, the literacy index for the 1998 Human

Development Index does not give any extra weight to female literacy.

For the target maximum figure for the purpose of calculating the Index of Deprivation in literacy, we use 100 per cent this time, as against 80 percent used in 1995. The minimum rate is taken as 0 percent.

The second component of education is the combined school level enrolment. The figures for children enrolled in schools in 1996 were provided by the Commissioner Public Instructions, Madhya Pradesh. The estimated population for 1996 was assessed. The share of population aged 6-19 years in the 1991 census, to total population then, was applied to the population estimates arrived for estimates for population in age group 6-19 for 1996. The enrolment numbers were divided by this figure to arrive at estimates for enrolment.

The enrolment figures in many cases exceeded estimated population in age group 6-19 years, and hence the figures required adjustment. These figures were adjusted to the enrolment rates in 1991. The number of school going population to total population in age group 6-19 years in the 1991 census was calculated, and compared to the enrolment figures in 1991 based on figures of Government of Madhya Pradesh.

The enrolment rates for 1996 were assessed as a combination of the enrolment rates based on the enrolment figures of Government of Madhya Pradesh and the ratio of enrolment rates in 1991 to enrolment rates in Census. For enrolment rates in 1996, we took half the enrolled figures according to the Commissioner of Public Instructions. Then the ratio of enrolment in 1991 by Commissioner of Public Instruction figures to enrolment in 1991 Census was applied to population in age groups 6- 19 years. Half of this figure was taken and added to the number arrived at above. These numbers were taken to be estimates for actual enrolment. The degree of correlation of these figures to the estimates through projections was very high (excess of 0.93). The population enrolled so arrived at was divided by estimates of population in 1996 in age group 6-19 years to get the enrolment rates, for entire district, and male and females separately.

The target maximum for this figure is difficult to assess, since the age group 6-19 includes ages at which many children would have passed out of the school after fully completing it, and would therefore not be counted. However, as we have no estimates to arrive at an acceptable figure for a target maximum for calculating

the Index of Deprivation in school enrolment, we use 100 per cent as the target maximum, and 0 percent as the minimum.

The two indices of literacy and school level enrolment were combined to get the Index of Deprivation for Education. The indices were combined in a weighted average, with 2/3 for literacy and 1/3 for all children in schools. A higher weight for literacy was taken to give importance to this most essential criterion and keeping in mind the problems of data in enrolment figures.

1.1.2 Health

Life Expectancy is the single criteria to assess the health status. In 1995, data for Life Expectancy was not available for all the districts and hence. Infant Mortality Rates were used for the year 1981 based on Census Fertility tables. Since then, Census has released Fertility tables for 1991 that permits us to arrive at indirect estimates for Life Expectancy at birth for districts. The indirect estimates have been arrived using the methodology applied by Census for calculating mortality tables for 1981¹. This is explained in detail later in this Chapter. These estimates are subject to corrections, after final fertility tables are released, and Census publishes estimates for Life Expectancy based on this data. Census has released estimates for child mortality, but are yet to publish estimates for Expectancy of Life at the time of the publication of this report. For the maximum target, a figure of 85 years was taken, and for the minimum value, figure of 25 years was applied to calculate the Health Development Index.

1.1.3 Income

The UNDP HDI uses 'adjusted per capita income for countries' to calculate the Index of Income. For the MPHDI Income Index, two criteria have been used. Since it is extremely difficult to assess district domestic products, and thereby come to an assessment of per capita income, we have used district incomes derived from the net state domestic product (NSDP) for our use. It has also been

¹ The methodology has been taken from 'Indirect Estimates of Fertility and Morality at the District Level. 1981, Occasional Paper No. 4 of 1994, Office of Registrar General of India.

argued that per capita incomes are not an adequate measure by themselves to measure ability to access opportunities and it needs to be adjusted by either indicator giving an idea of distribution of income amongst the population or levels of poverty. The incomes were adjusted by distribution and poverty levels, as will be explained later.

1.1.3.1 District Income

Data for calculating the District Domestic Product (DDP) is not available to enable a district - to - district calculation. The State Domestic Product (SDP) is calculated under 16 categories by using sources from the State's own production and economic activities (such as, for agriculture, fisheries, forests, electricity etc). Estimation of the volume of products is done from different sources using centrally administered surveys by the Central Statistics Organisation (CSO), Annual Survey of Industries (ASI), etc. (for Railways, Industry, Unregistered Manufacturing, Gas, Water) and a mix of various sources. Unfortunately this is not available for districts, and we have to resort to other means to divide the SDP district wise, under the 16 major categories. Further, while the State Domestic Product is a sum of estimates in 16 different categories, many of these 16 are a sum of different components. Unfortunately, no information of the break up of the 16 categories into its sub-categories was available. This was a major constraint in arriving at estimates for relative strengths of districts in per capita incomes. The Department of Economics and Statistics has recently undertaken the task of preparing district income estimates, but the data is not yet ready². This prevented us from more valid estimates for district and per capita incomes. However, the methodology adopted for arriving at district and per capita incomes is a "best possible" attempt by us, drawing on the methodology used by the Department of Economics and Statistics to arrive at

State level figures, and applying it to the district level. The basic methodology suggested by CSO was also applied wherever possible.

A note of caution is necessary here. Calculating district level incomes is a difficult task given the

² The CSO has issued instructions to States to calculate their district domestic products, along with suggested methodology. The methodology is drawn from the successful experience of assessing district domestic products by the states such as Kerala, Uttar Pradesh. and Rajasthan for the past two decades. Madhya Pradesh Government has now undertaken this task

lack of data at this level of dis-aggregation. What was needed for developing an index based on income was to get district level figures that would indicate the relative strength of districts in terms of per capita incomes drawn from estimates of share of districts to the state and NSDP. In the absence

of such data across all the categories for the NSDP, the income index for the MPHDI relies on various surrogate measures. The income component for the MPHDI should in no way be taken as calculations for the district domestic product. The district shares of NSDP, and the per capita derived from these estimates are neither a substitute nor a surrogate for district domestic product and per capita incomes from it, but only a comparable figure for districts for this report.

The State NSDP is calculated under the 16 categories, using different methods for each category. Much of the calculations and adjustments are made on the basis of estimates and data from CSO and other studies, and applied to State level data, to arrive at State level estimates. For example, in unregistered manufacturing estimates of value added for unregistered manufacturing for five digit level of NIC is derived from the 1984-85 survey of Directory Manufacturing Establishments (DME), Non - Directory Establishments (NDE), and Own Account Enterprises (OAE). The Industry wise estimates are adjusted by moving them backwards and forwards for the current years estimates. Since district level figures for DME and NDE are not available separately and or under five- digit levels,

we attempted to estimate district shares of unregistered manufacturing by using data on Establishments and Own account enterprises available district wise (rural and urban) from the provisional results of the Economic Census 1990 (though the results of the survey are not officially released we have used the data only for our estimates). Similarly, calculations for district shares are somewhat related to or correspond to, wherever possible, with the methodology of the NSDP.

For some categories like agriculture, industry, mining, forestry, banking and public administration fairly good district level indicators were available that were used to distribute the domestic products of these categories along districts. Using different indicators, share of districts (in percentage) to the specific domestic product was estimated, and this share was applied to the domestic product of that category to arrive at district level domestic product for that category.

For other categories, we used data for employment, own account enterprises and establishments, etc. to arrive at district level shares.

The methodology used for the major categories is given below. In all, 91.4 per cent of the net state domestic product for 1995-96 was allocated to districts on these lines. The share of the 16 categories of NSDP is given in what follows.

1. Agriculture (including Animal Husbandry)

Data was not available for agriculture, horticulture and animal husbandry separately. To estimate district shares of agriculture (including livestock production), district wise production of all major produce such as cereals, pulses, oilseeds was taken and states average prices for these were applied to get the district production in price for agriculture. The agriculture domestic product was then divided along districts according to the share of each district to the total production (in price) in cereals, pulses and oilseeds.

2. Forestry and Logging

Incomes from Forestry and Logging were not used in 1995, due to lack of data. While there is no data available to estimate districts share in the domestic product of Forestry and Logging, we have used surrogates instead. Figures for area of districts under forests and forest revenue accruing to the State from forestry from the districts were used. The share of area under forests for every district to total area of State under forests was given two thirds weight and contribution of district to total revenue from forestry of the state was give one third weight. The combined weights arrived at were applied to forests contribution to State Domestic Product.

3. Fisheries

Data on district wise fish production, the value of fish, and other fishery related data was available from the fishery department, and the domestic product corresponds largely to these figures. Fisheries domestic product was allocated to districts accordingly.

4. Mining and Quarrying

Data on production and value of production as well as royalty and cess from all major and minor minerals in the state was available district wise. The share of each district to the total production

value, and revenue from mining was taken and applied to the mining and quarrying domestic product of the state to arrive at district wise figures.

5. Manufacturing – Registered

In Small Scale Industries (SSI), we had data on district wise number of small units (SSI) and investments in them to date, and current employment. The Annual Survey of Industries gave district wise data on SSI units, employment, fixed investment and gross and net value added. For assessing contribution of SSI per district, we did a regression analysis between net value added (dependent variable) and units of SSI and fixed investment (independent variables). Using this equation, we arrived at an estimate of net value added by SSIs in each district for 1991-92, and the share of each district to this overall estimated SSI net value added was taken as the share of district SSIs to total SSIs contribution to the registered manufacturing domestic product.

Data was difficult for turnovers and outputs in the Large and Medium Scale Industries (LMI) sector. Available data gave us annual district wise large and medium scale industry investments, with current employment. We calculated the share of each district to LMI contribution to registered manufacturing domestic product by first adjusting the total LMI investment to the price levels of 1950-51, using the wholesale price index for industrial products. This was used to measure the district wise investment in LMI. We estimated from fieldwork, data available from surveys and regression analysis from available turnover and output data, the relative contribution of data of LMI units, employment and investment (adjusted) to total LMI sector. According to this estimate, LMI units was multiplied by a factor of 2, investment by 4 and employment by a factor of 1, and the weighted average of the total gave us a comparable column of data to calculate district wise shares of LMI. The share of each district in this table was taken to be the share of districts to LMIs share of registered manufacturing domestic product.

The SSI and LMI weighted share was taken together assigning a weight of 4 to LMI and 1 to SSI and share of districts to total states was applied to state domestic product in manufacturing - registered.

6. Manufacturing - Unregistered

For NSDP, unregistered manufacturing is calculated by using net value added from the 1984-85 survey on directly manufacturing establishments, non-directly establishments, and own account enterprises, which gives data for digit level under the NIC classification. District wise distribution of DME and NDE is not available and, data on establishments is not available below I digit NIC. We took data for unregistered manufacturing from the Economic Census 1990 (provisional for Madhya Pradesh), The Economic Census gives district-wise number of own account enterprises (non-agriculture) and establishments in manufacturing. No data was available to get a share of OAE, and establishments to unregistered manufacturing. We added up the number of OAE to establishments for every district. The resultant sums were divided by the total number of OAE and establishments in the state, to get percentage shares for each district. These shares were assumed to correspond to district shares of the domestic product of manufacturing-unregistered. This share was applied to manufacturing unregistered domestic product to arrive at district shares.

7. Construction

In construction district level data was scarce, and wherever available was not consistent or available in all districts. In the absence of such figures we had to resort to the provisional data from the Economic Census 1990. Taking figures of own account enterprises in construction, they were added to the number of establishments in construction in each district. The sums were divided by the total number of OAE and establishments in construction in the state. The shares so arrived at were taken as its share in construction domestic product. 8. Electricity, Gas and Water No satisfactory estimates could be developed due to absence of disaggregated data especially for gas and water, and this category was thus left out.

9. Railways

No data was available to estimate district wise share in Railways. The state level estimates are provided directly by the Central Statistical Organisation, and there was no basis available with

us to allocate state income from Railways to districts. Data on trains, railway lines and stations were not available for most districts, disabling us from making any kind of assessment.

10. Transport by Other Means and Storage

The assumption here is that the value of Transport and Storage should correspond to the vehicles and the revenue from transport, from a district. The average of share of each districts total vehicles to all vehicles in the state and vehicles on roads to total vehicles on road in the state was taken, and combined in equal weight with the total revenue contributed by the district to total revenue from transport in the State. The share so arrived at was multiplied to contribution of Transport by Other Means and Storage to NSDP. This section was not assessed in 1995.

11. Communication

No data was available to satisfactorily assess district share in communications.

12. Trade, Hotels and Restaurants

Domestic product from Trade, Hotels and Restaurants was distributed amongst the districts on the basis of Establishments and Own Account Enterprises in each district in Wholesale Trade, Retail Trade and Hotels and Restaurants, according to the Economic Survey 1990.

13. Banking and Insurance

Banking and Insurance domestic product was divided on the share on each district on the deposits and loans in each district over the last five years.

14. Real Estate, Ownership of Dwellings and Business Service

No satisfactory data was available for this category.

15. Public Administration

This was based upon estimates of expenditure on Public Administration by the State Government, and strengths of the employment of state administration employees in each district, based on actual salaries given to permanent and temporary employees. Since there was a high positive correlation between the two, share of salaries of government employees to total salaries of government employees in Madhya Pradesh was used. This share was applied to contribution of

Public Administration to NSDP to get estimates for districts.

16. Other Services

Figures for employment under other services were taken from the 1991 census. The employment figures were divided by the total employment in other services in Madhya Pradesh to arrive at district shares and these shares were applied to domestic product from other services to arrive at district figures.

1.1.3.2 Adjusted Incomes

Incomes so calculated were divide by the population of the district to arrive at per capita district income. These figures are calculated from 91.4 per cent of SDP of the state in 1995-96. By themselves, the estimates for per capita incomes does not give an idea of the distortions in distribution or the levels of poverty in the districts, and the depth of deprivation of the poor. UNDP for their income component of the Human Development Index, use Aitkinson's formula to adjust incomes, based upon marginal utility of incomes. This adjustment reduces the impact of very high incomes in some districts, and makes district more comparable to each other to assess relative levels of achievement in incomes. Thus the impact of industrial estates and industrial development in Raisen, or Dhar, and the agriculture prosperity of rich farmers in Narsinghpur does not give too distorted a picture of incomes in these districts. We have used the formula used by UNDP to adjust the per capita income, based upon the poverty line figures of the Planning Commission.

We calculated district wise poverty line by taking the poverty line developed by the Planning Commission based upon per capita monthly expenditure separately for rural and urban adjusted to 1991-92 prices. This figure was multiplied by 0.914 to make it comparable with our allocation of 91.4 per cent of NSDP. To arrive at district poverty line figures, we took a weighted average of rural and urban population with the adjusted rural and urban poverty line figures. The per capita incomes calculated for each district were divided by the resultant poverty line for each district, the product indicating the number of times district per capita was to the poverty line. To use Atkinson's formula and derive adjusted district incomes, we need one

poverty line to compare districts. To enable this, the state poverty line based upon the Planning Commission's adjusted poverty line was used (weighed to rural and urban), and district per capita incomes were calculated on a comparative score by multiplying the factor arrived by state poverty line.

Using Atkinson's methodology (based upon the principles of marginal utility of income above the poverty line), per capita income above the poverty line were adjusted. Adjustments were undertaken to arrive at figures of income that give a comparative strength of districts, not overly distorted by the range of incomes by the districts. The adjusted per capita incomes appear to be brought down and the range of income reduced substantially. However, the adjustment is only for the basis of developing an index, and the reduced range and reduced high and low ensure that the values of index of deprivation are not too skewed against districts with lower per capita incomes.

1.1.3.3 Poverty Index

The scale of poverty is the most important indicator of the welfare of people in the district. Data from IRDP surveys on rural poverty (Development Commissioner, Government of Madhya Pradesh) are available for 1992, and were used for estimating poverty levels in MPHDR 1995. However, these figures are not the best estimate for poverty. The only other reliable source for information on poverty in Madhya Pradesh available was the NSSO survey in 1993-94 that estimated poverty rates by expenditure method for sub-state regions, according to agro-climatic zones. These figures for Madhya Pradesh divided into five zones are now available.

For many of the categories, under which the district domestic product was available, certain measures were available for adjusting incomes to inequalities of distribution. These categories and their adjustment measures are : Agriculture and Animal Husbandry - Gini coefficient of operational holdings. Manufacturing - Registered - distribution of wages and remuneration to employees, workers and net value added. Public Administration - Gini coefficient of wages to Government employees. While the adjustments for different categories estimating distortions in distribution of incomes is a

better measure, we were constrained by lack of adequate measures for all the categories for which incomes are calculated across the 45 districts.

In the absence of such measures, regional estimates of poverty by NSSO in 1993-94³ were used. The rural and urban poverty rates for each agro-climatic zone was assumed to represent the poverty rates for all the districts in that zone. To get estimates of rural and urban poverty in each of the districts within an agro-climatic zone, estimated rural and urban population in 1995/96 was calculated. It was found that the relative per capita agriculture and forest incomes show a high negative correlation to the relative level of rural poverty across the agro-climatic zones. We therefore made an assumption that relative per capita agriculture and forest incomes would best reflect the relative levels of poverty in the districts within an agro-climatic zones, for which rural poverty estimates are available. The value of agriculture and forest output for the districts in each zone was divided by the total agriculture and forest output for the zone as a whole. The dividend was divided by share of the estimated rural population of the district to the estimated rural population for the zone as a whole. The poverty rate (head count ratio) for rural poverty for the entire zone was divided by the resultant dividend and the resultant figure was assumed to represent the rural poverty rate for each district within a zone.

For urban poverty, no single income measure was found significant enough, and we found that zonal urban poverty rates are sensitive to households which do not have access to safe drinking water, electricity and toilet. Similar to the calculation for rural poverty, we took the population in each district without access to all three facilities in the Census in 1991, and, the share of this population to the total such people in an entire zone. Similarly, the share of the estimated urban population in each district was divided by the total estimated urban population for each zone. The dividend from the

first was divided by the dividend from the second, and the result was multiplied with the NSS urban poverty rate (head count ratio).

The total poverty ratio was calculated from the weights of rural and urban poverty in each district. An index of poverty was calculated from these figures, with 0% as the target and 100% as the worst scenario.

Finally, the indices of poverty and income were combined a simple composite index with equal weightage, to arrive at an index of development for income. The three indices of development for health, education and income are then combined in a simple average to get the Human Development Index.

1.1.4 Calculation of HDI for Rajnandgaon

For example, in calculating the Index of Deprivation for literacy of Rajnandgaon:

Target for literacy = 100.0 per cent

Minimum. literacy = 0.0 per cent

Literacy of Rajnandgaon = 58.7 per cent

The calculation is:

$$\frac{100(\text{Target literacy}) - 58.7(\text{Literacy in Rajnandgaon})}{100(\text{Target Literacy}) - 0.0(\text{Minimum Literacy})}$$

Therefore, IOD for Rajnandgaon in literacy = $1 - 0.587 = 0.413$

1.1.5 Gender Development Index

The Gender Related Development Index (GDI) uses the same variable as the HDI. The difference is that the GDI adjusts the average achievement of each district in life expectancy, education attainment and income in accordance with the degree of disparity in achievement between woman and man. It is based on the GDI developed by UNDP, used first in the Human Development Report in 1995.

For the gender sensitive adjustment, we use a weighting formula that express a moderate aversion to inequality, setting the weighting parameter I equal to 2. This is the harmonic mean of the male and the female values. The harmonic mean is calculated by taking the reciprocal of the population weighted arithmetic mean of the female

³ These estimates have been taken from "Counting the Poor", Amaresh Dubey, Subhasis Gangopadhyay. Sarveloshana Analytical Report No I. Department of Statistics, GOI.

⁴ This note has been taken from the Technical Notes describing the methodology for Gender Development Index from the Human Development Report - 1995, Technical notes 1. Computing gender-equity-sensitive indicators, UNDP.

and male achievement levels (which are themselves expressed in reciprocal form). Although this may sound complicated, the basic principle is straight forward. The harmonic mean will be less than the arithmetic mean to the degree that there is disparity between male and female achievement.

1.1.5.1 Longevity

The first step in the calculation of the GDI is to index the variable for life expectancy and education attainment. Although the range for life expectancy is same for the women and men (60 years), the maximum and the minimum values are different. The value (or "fixed goal post") for male life expectancy is 82.5 years and the minimum value is 22.5 years. For female life expectancy the maximum value is 87.5 years and the minimum 22.5 years. The values for women and men are indexed accordingly.

Educational Attainment

The variable for educational attainment is a composite index. It includes adult literacy, with a 2/3 weight, and gross combined primary, secondary and tertiary enrolment with a 1/3 weight. Each of these sub components is indexed separately. Both indices use a maximum value of 100% and a minimum value of 0%. The two indices are added together with the appropriate weights to form the composite index for educational attainment.

1.1.5.2 Incomes

The calculation of the index for the income is more involved. In calculating the female and male shares of earned income, we used two pieces of information: the ratio of the average female wage to the average male wage and the female and male percentage shares of the economically active population aged 15 and above.

The ratio of the average female wage to the average male wage is not available for the state or the districts. The ratio is assumed to be the average ratio for the agricultural sector as well. The ratio of the female to the males was assumed to average to 67% based upon some recently conducted poverty assessment surveys in ten districts of Madhya Pradesh and reports on male and female wages from NGO reports from four other districts of the state⁶.

The ratio is crude proxy for gender income differentials in paid work. These approximations for wages aimed to be improved and assessed for each district, but due to lack of proper information for all districts, the same ratio was applied across the State. Apart from possible under estimating the male-female wage differential, the figure of 67 percent also does not account for the fact that women were more as casual labour and as marginal workers, working for less than 183 days a year. Men on the oilier hand work primarily as main workers (gainfully employed for 183 days or more per year). The ratio of 67 % also does not account for income disparities based on non-labour resources, such as land and physical capital. However, in the absence of better data we use this figure.

The next step in calculating gender disparity in income uses available information on the percentage share of men and women in economically active population aged 15 and above. Because of the lack of data on employment of gender, this procedure makes simplifying assumption that female employment and male employment are proportional to female and male participation in labour force. We have two choices here: one is to take the Workforce Participation Ratio (WPR), which includes main and marginal workers, and the second is to take only main workers, where the ratio of male to female main workers is very high. We choose to take main and marginal workers, for the sake of corresponding to the general WPR terms used to assess participation of people in the workforce. From the ratio of female to male wages we can derive two ratio: the ratio of the female wage to the overall average wage and the ratio of the male wage.

These total ratio are derived from the following definition of the total wage bill (WL):

$$WL = W_f L_f + M_m L_m$$

where W is the average wage and L is the total labour force, and the f subscript denote female, and m subscript denotes male.

Dividing the equation through by $W_m L$, we can solve for W/W_m

5 Social Assessment studies carried out in ten districts under the proposed District Poverty' Initiatives Project

6 This information was derived from NGOs working in Hoshangabad, Durg, Bastar, and Bilaspur.

$$W/W_m = (W_f/W_m) (L_f/L) + (W_m/W_m) (L_m/L)$$

we take the reciprocal of this result to solve for W_m/W . We can now also solve for W_f/W

$$W_f/W = (W_f/W_m) / (W/W_m)$$

a rough estimate of the female share of income can then be derived by multiplying the ratio of the of the average female wage to the overall average wage of the female share of the economically active population. The male share of the income can be calculated in the same way or by subtracting female share from I.

The third step in estimating disparities in the income is to calculate the female and the male share of the population. The adjusted per capita incomes are then discounted on the basis of the gender disparity in proportional income share. In using adjusted per capita incomes (adjusted on Aitkinson's formula and poverty ratio), we are already taking in account the diminishing marginal importance for human development of the additional income above the average world per capita income. Up to this point, the methodology is the same as that used for the human development index.

The discounting for the gender disparity is calculated as follows. We form two proportional income shares by dividing the female and the male shares of income by the female and male shares of the population if there were gender equality, each proportional share would be equal to I. We have apply the gender-equity-sensitive indicators (GESI) methodology of (1-ε) averaging - with equal to 2 in this case-to the two proportional income shares to derive the "equally distributed proportional income share". The more gender inequality there is, the lower this ratio will be related to I. We then multiply the adjusted per capita incomes by the equally distributed proportional income share to derive a measure of per capita income that, in effect, is now discounted for gender inequality. If there were no gender inequality, the ratio would be equal to I and per capita incomes would remain the same. As in the HDI, adjusted per capita income is proxy for access to basic resource necessary for human development. Finally, we index the adjusted per capita incomes with respect to maximum and minimum similar to those used in the HDI.

The last step in the calculating the GDI is to add index for the income that we have just derived to

the indices for life expectancy and the educational attainment and divide by 3. That gives each index a one third weight.

2. Note on Reading Data

This note explains the tables presented. In the preparation of this report, data has been used to state the level of development, and capabilities of people vis-à-vis human development, keeping in mind actual status and development of people. Extensive data has been presented to reflect most facets of human development, while care has been taken that it remains relevant to judging the quality people's lives and their society and living environment.

Human Development (denoted by HD)

HD I is the table on the Human development Index of Madhya Pradesh.

HD 2 gives the Gender related Development Index for all the districts of Madhya Pradesh. Presented for the first time for Madhya Pradesh, it is based on the methodology devised by UNDP's Human Development Reports, and reflects the relative development of females vis-à-vis males in each district, as well as the general level of human development.

Tables on Madhya Pradesh

Some tables have been presented on the state as a whole to give a snapshot picture of the state in terms of areas related to Human Development. The tables are self-explanatory, and contain information on Demography, Land Use, Agriculture, Health, Education, Employment, Infrastructure, Human Development and Gender Development Indices of the states on India, and estimates of Poverty in Madhya Pradesh and India.

District Human Development Profiles

On each of the district, selected information has been provided to give a comprehensive profile of the status of human development and deprivation in the district.

General Tables (denoted by GL)

The general tables give a multi-sectoral view on employment, SC/ ST, literacy access to infrastructure. The general tables are differentiated into rural/ urban and male/ female categories wherever possible.

Table GL I provides with estimates of rural and urban poverty in the districts of Madhya Pradesh, drawn from regional estimates of poverty estimated

by NSSO for 1993/94. These derived estimates are used in the construction of the Human Development Indices presented.

Table GL 2 gives demographic information on the scheduled castes. Taking primary data from the 1991 census, this table shows the share of SCs in population of districts, share of SC amongst the main workers to show disparities if any in between population strength and workers strength. The table also gives the district wise gender ratios and literacy rates. The table has been sorted in descending order of proportion of scheduled caste population to total population in the districts.

Table GL 3 gives demographic information on the scheduled tribes. Taking primary data from the 1991 census, this table shows the share of STs in population of districts, share of ST amongst the main workers to show disparities if any in between population strength and workers strength, and the district wise gender ratios and literacy rates. The table also gives information on the major and minor tribes amongst the STs in the districts. The table has been sorted in descending order of proportion of scheduled tribes population to total population in the districts.

Table GL 4 gives information on the road infrastructure in Madhya Pradesh. The table presents available data on pucca and kutcha roads in districts. Since no clear data is available on villages connected by any type of road, we have attempted other indices to show the extent of road coverage in this table. The table is sorted in descending order of rural roads in kilometres per 100 sq. kms. Area of the districts. Table GL 6 gives statistical information on selected people's institutions of Madhya Pradesh. Since little or no information was accessible of un-registered and informal people's institutions and organisations of people for political and economic rights and direct action, such institutions could not be incorporated into this table. This table attempts to assess the level of organisation of people, recognising that there is little information to assess the actual empowerment of people through participation in popular movements, through NGO and voluntary action, through nascent organisations etc. In place, we take the number of formally organised people's groups in every district, such as co-operatives, societies, development groups, and, separate them

into general bodies and economic, political and other development groups. The table is sorted in ascending order on the basis of the number of people in a district per economic, political or other organised bodies.

Habitat Tables (denoted by HA)

The tables present district-wise information on habitat in both urban and rural areas. The tables also give a comprehensive idea of households with respect to number of rooms, type of house (pucca, kutcha), fuel used and status of houses (rented, vacant) and the type and kind of business premises of various households.

Table HA I presents data on the forest cover and forest types in the districts of Madhya Pradesh comparing the situation in 1993 with 1997. The table is sorted in descending order of per capita forest area for the year 1991.

Table HA 2 provides information on the extent of slums in urban area in terms of population (percentage and density) and area occupied by slums, and towns in the districts. The table is sorted in ascending order of percentage urban population estimated to be residing in slum area. For many of these no specific information is available on slum dwellers, and no information for them has thus been provided.

Table HA 3 categorizes households into those residing in pucca, semi-pucca, kutcha, serviceable kutcha and non- serviceable kutcha houses in the year 1991, based on the household tables released for the 1991 census. These details are given separately for rural and urban areas. The table is sorted by the percentage of kutcha houses to total houses in a district.

Table HA 4 gives the percentage of households using different types of roofing materials. The type of roofing material used points to the quality of shelter afforded by people and the quality of protection from weather and other external elements to dwellers. While census also gives detailed information on types of materials used for flooring and walls in the house, roofing material appears to be the most informative and useful to assess quality of houses people dwell in. The table is sorted in ascending order of houses using grass/ leaves/ reeds/ thatch/ wood/ mud/ un- burnt bricks as roof material. These materials constitute the least strong indicating poor quality of houses.

Table HA 5 categorizes the total number of houses into those houses owned by the residents and houses taken on rented by the residents. The renting of houses in rural areas, exhibits to some extent the precarious nature of security of shelter, and the table is sorted in ascending order of rural houses taken under rent. The table also displays houses by number of people residing in it. This is an indication of over crowding in houses.

Table HA 6 derived from household tables from the 1991 census, gives the average number of persons residing per room in the districts of Madhya Pradesh. The households tables gives elaborate details of number of persons staying in one room, two room upto six room houses. This enabled calculation of distribution of persons per room in districts. From this data, the Gini coefficient of distribution of persons per room could be calculated, which estimates the gravity of deprivation with regard to housing in the state. The table is sorted in ascending order of the Gini coefficient in the districts.

Table HA 7 categorizes the households based upon the number of rooms occupied by them, ranging from no specified room, to upto six rooms per house. The table is sorted in descending order of share of households with six rooms to all households.

Table HA 8 gives the percentage of households with access to electricity, safe drinking water and toilet facilities for the year 1991. The access to safe drinking water, electricity and toilet facilities is one of the most informative and critical tables from the census. The access to these utilities, especially safe drinking water is a very good surrogate for estimating poverty and deprivation. Infact it has been found that across India, there is a high positive correlation between households without access to any of the three facilities and the levels of poverty estimated during the quinquennial surveys of the National Sample Survey Organisation. The table is sorted in ascending order of number of households without access to electricity, safe drinking water or toilet facilities.

Table HA 9 categorizes households by the sources of drinking water used. The census in 1991 categorizes households by access to drinking water from wells, tap water, hand pumps or tubewells, river or canal, tank and other sources. It also indicates the location of the water source so as to

estimate its accessibility. The table also shows households with source of water within the house or outside, indicating ease of access. The table has been sorted on households with tap water as the principle source of water, since tap water is perhaps the safest source of water.

Table HA 10 gives information on extent of institutional provision of safe drinking water to villages. The table presents data from the Public Health Engineering Department of the Government of Madhya Pradesh for villages covered with hand pumps for water. This is related with and the census information of 1991 showing population with access to safe drinking water from hand pumps in 1991, as well as the share of population with access to safe drinking water in 1981 and 1991. This table is sorted in descending order of access of population to safe drinking water in the year 1991 according to census tables.

Table HA 11 gives information on status of ground water and level of ground water exploitation besides giving information on the area under rural water bodies and irrigation reservoirs. The table also gives information on urban population with access to organised water supply. The level of ground water development is an indication of ground water already exploited, and lesser the level, higher is the un-exploited potential. The table is sorted in ascending order of the level of ground water development. Table HA 12 gives information on total, domestic and industrial consumption of electricity for urban and rural areas. The table gives further information on total and per unit electricity consumption for agriculture, street lighting and water works. The table is sorted in descending order of households with access to electricity.

Table HA 13 gives the percentage of households using different fuels for cooking and percentage of households using polluting and smoke emitting fuels. The table is sorted in ascending order of households using polluting fuels.

Employment and Livelihoods Tables (denoted by EL) These tables comprehensively represent the status of livelihood in Madhya Pradesh. The tables can be broadly grouped into two heads: Employment and Agriculture. Wherever possible the tables give rural/ urban and male/ female and SC/ ST break up. The Employment tables present a detailed view of the workforce in MP categorizing them into various

occupations. The Agricultural tables lay special focus on status of agriculture with special reference to developments in agricultural sector. Special grouping of tables related to agriculture can be adequately justified by the importance of agriculture and allied occupations, in the livelihood of the people of MP

Table EL 1 gives the Worker Participation Rate (WPR), percentage of main workers employed in Primary, Secondary and Tertiary sector, and the farm and Non- Farm sectors in 1991. The table besides detailing the percentage of Main Workers employed in different industrial categories also gives the percentage of children employed as main workers as per the 1991 census. This table is sorted on percentage share of children in age group 5-14 years who were working as main or marginal workers according to the 1991 Census.

Table EL 2 gives the Dependency Ratio of the population in 1981 and 1991 along with figures for persons without full employment in the ages between 15 and 59. Dependency ratios are defined as population in age groups below 15 years of age and above 59 years of age (considered the economically un-productive ages) to the population in the age group 15-59 years (considered the economically productive ages). There are no clear district level figures available except number of people seeking or available for work, which is a very small percentage of the population that gives us an idea of level on unemployment or under-employment. However, to get a rough estimate of the extent of under-employment or the demand for work, the table shows the percentage of number of persons without full employment to total population. Persons without full employment is defined as the number of people seeking or available for work, number of male and female marginal workers and the number of male non-workers, to the total population. These figures has been given for all, urban and rural and male and female. This table is sorted in ascending order of the Dependency Ratio in 1991. Table EL 3 gives the land use classification in Madhya Pradesh in the years 1992-93, with a break-up of total geographical area into net area sown, fallow land, cultivable waste land, uncultivable waste land and forest land and land not available for cultivation. It also gives figures on the land that can be brought under cultivation immediately and after some improvement. The total cropped area, the net area

sown along with the cropping intensity has also been given. Table is sorted in descending order of the percentage of net area sown to the total geographic area of the districts.

Table EL 4 this table gives the land use and the land cover statistics in Madhya Pradesh according to the National Remote Sensing Agency (NRSA) imagery (1988-89). The percentages of details of the area under Kharif, Rabi besides giving the double cropped area, net sown area and built up area. The table also gives the area under different forest types. These have been calculated out of the total geographical area so as to make comparison easier. The table is sorted in descending order of the percentage share of total agriculture area to total area of the district.

Table EL 5 lays special focus on the wastelands classifying them into various sub categories according to the National Remote Sensing Agency (NRSA) imagery (1988-89). The table gives comprehensive and reliable data on different categories of wastelands providing credible information for decision-making. The table also gives data on area under rivers, streams, and reservoirs. This table is sorted in ascending order of total wasteland area to total area of the district.

Table EL 6 provides information on the ownership of land by social categories. The Gini-coefficient of ownership of operational holdings for the 1992-93 given in this table is a critical indicator of the levels of inequality in the districts, primarily in rural areas. The information on the tenancy status of operational holdings is from the agriculture and land settlement statistics. The table also gives the share land held by the scheduled castes and the scheduled tribes. The table is sorted in descending order of the Gini-coefficient of operational holdings, i.e. in descending order in the level of equality in land such holdings.

Table EL 7 shows trends in average land holding size since 1981 in five yearly intervals thus giving a comparative picture. It also gives percentage decline in the holdings across a ten-year period between 1981 and 1991. The table is sorted in descending order of the average size of land holdings in 1990-91.

Table EL 8 gives the area, production, yield and per capita availability of food grains for the years 1971 and 1992. The mean annual percentage change has also been calculated for each of these.

This table is sorted in descending order of the per capita production of food grains in kilograms.

Table EL 9 gives net and gross irrigated area. It also gives the number and the area of wholly irrigated holdings, wholly un-irrigated holdings, partly irrigated holdings and holdings receiving irrigation in percentages for the years 1992-93. The table is sorted in descending order of number of holdings receiving irrigation.

Table EL 10 gives the percentage of gross and net irrigated area categorized on the basis of the source of irrigation in the years 1992-93. This gives us an idea about the source of water being used for the purpose of irrigation.

Table EL 11 gives the number and kind of agricultural implements in use for the year 1991-92 and 1992-93. The use of agriculture machinery is an indication of the level of mechanisation in agriculture, and the figures indicate both animal and power driven machines for a comparative picture. This table is sorted in descending order of the number of tractors in the district per 100 operational holdings.

Table EL 12 gives number of buffaloes and other animals disaggregated into sub-categories. It also gives information on the annual milk production and the number of veterinary centres in each district. The table attempts cross comparison across districts on intensity of animals, milch animals and milk production per capita. This table is sorted by number of milch animals per capita of population in descending order per district.

Table EL 13 gives a compact picture of the livelihood profile of Madhya Pradesh. It is a combination of data regarding major and minor occupation for the year 1981 and 1991, the table also lists out occupations with significant decadal growth rates and status of manufacturing. The table also analyses significant rates of growth and decline of various categories.

Education (denoted by ED)

The tables give a district-wise basic understanding of the status of education in Madhya Pradesh, with a special emphasis on female education. Whenever possible, the tables try to bring out the inequality between figures for male and female, rural and urban educational status.

Table ED1 highlights the literacy rates for 1991 which are a more accurate representation of

literacy, since they are calculated by number of literate in 1991 divided by the population in age 7 plus years. This is also termed as the crude Literacy Rate. The gap between male and female literacy and the ratio of male to female literacy shows the relative deprivation of females in literacy to males. The tables are sorted in descending order of the crude literacy rate of 1991.

Table ED 2 gives information on the educational status of population aged 19 years and above. This table suggests the level of education of population in different categories. These include the percentage of illiterates; Education attainment according to literacy received through formal and non-formal channels; and the level of schooling at different levels i.e. primary, middle, secondary, higher secondary, diploma, graduate and above level qualifications. This table is sorted in ascending order of the number of illiterates in 1991.

Table ED 3 gives the extent of deprivation of the population in education in 1991, This is estimated by taking the number of children in the age 7- 14 years who are not attending school, and are thus deprived of education, and illiterates in the age groups 15 years and above, who are deprived of education for life. The total population of children not attending school and illiterates is divided by population aged seven years and above to get the percentage of educationally deprived in districts, rural, urban, males and females. The tables are sorted in ascending order of level of deprivation for the entire district.

Table ED 4 gives retention rates for 1994-1995. Calculated from enrolment figures in different classes, the basic retention rate is the number of children enrolled in class five to those enrolled in class one. Other important indicators of retention, are the number of students in classes eight and ten to students enrolled in class one. To give a better picture, the table also calculated percentages of students enrolled in class eight to class five. The table is sorted in descending order of the retention rate (enrolment in class five to class one).

Table ED 5 gives information on illiteracy. It shows the number of illiterates and illiteracy rate in 1991, of the age group 15-35, 35-50 years, which are the target ages for literacy programmes and the illiterates and illiteracy in the age group 50 years and above. There figures are given separately for all, male and female. The table is sorted in

descending order of illiterates in age group 15-35 years, according to the census of 1991. The number of illiterates rather than the level of illiteracy gives us an indication of the quantum of the problem for decision making in the districts.

Table ED 6 gives information on the educational infrastructure. This includes the number of education institutions, stage wise enrolment of boys and girls and the number of teachers in primary schools, middle schools and high schools by districts in 1996. Total enrolment for boys and girls has also been calculated. Data on number of teachers is used to calculate the teacher pupil ratio. Information is also given on the number of education institutions per 10 square kilometres, to get an idea of the physical access of schools, and estimated population of children in the age group 6-19 years to number of schools to indicate basic provision of education institutions. The table is sorted in descending order of children in age group 6-19 years per education institution.

Health and Nutrition (denoted by HE)

The Health tables give a comprehensive picture of the health scenario in the state through selected health parameters such as Life Expectancy, Infant Mortality Rate (IMR), Crude Birth Rate (CBR), Total Fertility Rate (TFR), Child Mortality Rates (CMR) and access to Health infrastructure. The data is presented district-wise with rural/ urban and male/ female distinctions wherever possible.

Table HE 1 gives details on health infrastructure available in the district such as Community Health Centres (CHC), Primary Health Centres (PHC), Sub- Health Centre (SHC), District Hospitals, T B Hospitals etc. The table gives the percentages of population served by these health institutions along with the number of health personnel working in them. The total number of health centres per 100 sq. kms. is also given in order to indicate the physical accessibility of these. The table is sorted in ascending order of the coverage of primary health centres, denoted by rural population in lakhs covered by one primary health centre in the districts.

Table HE 2 gives the trends in the Total Fertility Rate and Child Mortality Estimates for 1981 and 1991. Besides giving Crude Birth Rate for the period 1976-81 and 1984- 90, the table also gives the TFR and CMR calculated using different methods. The data on estimated figures on child mortality from the census fertility tables form the only reliable district level source for output

indicators in health for mortality and fertility. The table has been sorted in ascending order of the estimates for child Mortality at age 1 year for the year 1991.

Table HE 3 presents indirect estimates for infant mortality rate, child mortality and life expectancy at age zero for different sections of the populations, for 1991, and some comparative Figures for 1981. These are estimates are based on fertility data on total number of children born and surviving of ever married women, given by the Census. Based on these data IMR is calculated using Pearson's method as suggested by Census of India. Mortpak Lite, a United Nation's programme for demography, was used extensive for these figures. While the estimates for infant mortality match well with the 1991 Sample Registration scheme (SRS) estimates, they are subject to modification, due to need to smoothen the population tables. Thus the estimates may get modified, but for the purpose of comparative analysis, and a fairly accurate picture of the status of longevity, the figures are very useful and suffice well. The estimates are also provided for rural and urban and males and females. Estimates of male and female life expectancy were also calculated using the widow techniques. However, the results did not compare well with SRS estimates and hence were dropped. The table also gives information on mean age of childbirth. The table is sorted in descending order of the estimated expectancy of life at birth for the years 1991.

Table HE 4 gives information on the Public Distribution System (PDS) in Madhya Pradesh for the year 1996. The table gives specific information pertaining to the number of Fair Price Shops (FPS) per 100 sq km and per lakh people, number of ration cards, population per ration card. These figures are compared with cereals distributed in 1994/95 per capita through the public distribution system, and cereals distributed per FPS per district. This table is sorted in descending order of Fair Price Shops per 100 square kilometres of area in a district.

Gender Tables (denoted by GE)

The Gender tables give an idea of the social, marital and the motherhood status of women in Madhya Pradesh. Gender tables are categorized district-wise and wherever possible give urban/ rural and SC/ ST differentiation.

Table GE 1 gives details on women currently married in ages 10-19 years based on census fertility tables for the year 1991. It gives the percentage share of married women aged less than 15 years and aged 25-19 years to all women married in the districts. Data on the number of children born per annum per hundred married women is also present in the table. This indirectly indicates one of the reasons for high infant and maternal mortality rates (IMR and MMR) in regions where these figures are high. The details are given for the total as well as for urban and rural women separately. The table is sorted in descending order of the mean age of marriage of women in the districts.

Table GE 2 gives details on Women Ever Married and Children Born per Annum in the districts. Information on married women in different age categories of 15 years and below and 16-19 years is critical for measures directed at fertility and population control. The table is sorted in ascending order of share ever married women aged 15 years and below to ever married women.

Table GE 3 gives the average age of first motherhood and the number of children of the 4th filial order and above born. The table also gives information on married women who are less than 15 years with children. The table also gives +

percentages of children born to women in the age group 40 plus. This table is sorted in ascending order of percentage of births of order four or more children born to mothers to total births in districts in 1991.

Table GE 4 gives details on average number of children born to mothers in the age group 45-49 years according to the fertility tables for the 1991 census. The average children born to this age group is a rough estimate of the number of average children being born to mothers, since births to women aged over 49 years is rare. The table is sorted in ascending order of average children born to mothers aged 45-49 years for the entire district.

Table GE 5 estimates the relative position of women in participation in political participation. There are no state-wide district level direct indicators available to assess women's political participation or empowerment. We use indirect measures, which are based on women representatives in the last three elections to the State Assembly (Vidhan Sabha). The measure for women's success in Vidhan Sabha Elections is measured by giving one third weight to women candidates securing more than 5 % votes to seats in Vidhan Sabha in every district and one third weight to all women candidates. This table is sorted by the index figures for women's participation in legislative assembly in Madhya Pradesh.