CHAPTER 3

HUMAN DEVELOPMENT[1]

1 This chapter heavily draws its content from HDR 2010.

In this Chapter, I will learn

- DIMENSIONS, INDICATORS AND GOAL POSTS FOR CALCULATING THE HDI

- CALCULATION

- NEW INDICES

The human development in the past was measured by per capita income, as income helps human beings to fulfill their basic needs. If per capita income is high, it means that the level of human development is also high and vice versa. But, there were many short comings in this method. It is just an average of National Income. It cannot reflect the correct picture of level of human development. For example, the rich may not spend income to increase their standard of living instead they may keep in saving or spend on things which are injurious to health. So, the per capita income is not a proper measure of Human Development.

So, the concept of human development was broadened beyond per capita income and included the level of achievement in education and health aspects as well. It has to be kept in mind that human development is not confined to these three alone. It is evident from the following observation: "However human development does not end there, other choices highly valued by many people, range from political, economic and social freedom to opportunities for being creative and productive and enjoying self-respect and guaranteed human rights".[2]

As said in the above description, human development is measured by three dimensions viz, Health, Education and Standard of living. These dimensions are measured using different indicators (which follows in detail) computed as three indices (sub-indices). These three indices are averaged and computed as Human Development Index (HDI) (master index).

The United Nations Development Programme (UNDP) defines HDI as follows: "The Human Development Index (HDI) is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living."[3]

The human development index was developed by Mahbub-ul-Huq along with Amartya Sen. This is used by UNDP. The UNDP brings annual report called Human Development Report (HDR) since the year 1990. The method developed by them was followed till 2009 (old method) and the 2010 (20th anniversary edition) (new method) Report adopted a slightly different method. And three new indices were introduced viz., Gender Inequality Index, Multi-dimensional Poverty Index and Inequality-adjusted HDI.

This chapter highlights the different dimensions, indicators, goal posts and calculation of HDI for both New and Old method. In addition, three new indices are also dealt with in this chapter.

2 Human Development Report 1997

3 http://hdr.undp.org/en/media/HDR_ 2010_EN_ TechNotes_reprint.pdf

DIMENSIONS, INDICATORS AND GOAL POSTS FOR CALCULATING THE HDI

Dimensions

The basic dimensions viz, Health, Education and Standard of living remain same but the indicators used to measure these dimensions, goal posts (maximum

and minimum values) and method of computing sub index and master index (HDI) has changed in the Twentieth anniversary edition. The table 3.1 shows the dimensions, indicators and goal posts.

Indicators and Goal Posts

The indicator for Health that is life expectancy at birth, remains the same

Table 3.1.Dimensions, Indicators and Goal posts for Calculating the HDI

Dimensions	Indicators		Maximum Value		Minimum Value	
	Old	New	Old	New	Old	New
Health	Life expectancy at Birth (years)	Life expectancy at Birth (years)	85	Observed Value*	25	20
Education	a) Adult Literacy rate (%)	a) Expected years of schooling for a school-age child	100	Observed value	0	0
	b) Combined Gross Enrolment Ratio (%)	b) Mean years of prior schooling for adults aged 25 and older.	100	Observed value	0	0
Standard of Living	GDP per capita (PPP US $)	GNI per capita (PPP US$)	40,000	Observed value	100	Observed value

Source: HDR 2009 and 2010

*Observed value means the actual value observed maximum or minimum value as the case may be from 1980 to the current year

for both New and Old method. The life expectancy is the average number of years people are expected to live. It is a probability calculation. It is calculated using the birth and death data of past.

The indicators for Education in the old method are the Adult literacy rate and the combined gross enrolment ratio. The indicators in the new method are Expected years of schooling for a school-age child and Mean years of prior schooling for adults aged 25 and older. Mean years of schooling is estimated based on duration of schooling at each level (primary, secondary and higher) of education. Expected years of schooling estimates are based on enrolment by age at all levels of education and population of official school age for each level of education. In the old method, the educational achievement is measured by just bifurcating the populace as literate and illiterate and enrolled and not enrolled. But the new indicators measure the educational achievements qualitatively. It measures the sustainability of enrolment by measuring the expected and average years of schooling.

The indicator for standard of living is changed from Gross Domestic Product (GDP) per capita to Gross National Income (GNI) per capita. The GDP per capita does not give the picture of how much of national produce accrues to the people of the country but GNI per capita gives a correct picture as it excludes the out flow of remittances and includes inflow of remittances, foreign aid etc. Therefore,

GNI per capita is better than GDP per capita and so, it is included.

Goal Posts

The goal posts are necessary to convert the values as unit less index that range from 0 to 1. The value change from 0 towards 1 shows progress.

In old index the goal posts were prefixed ones. It puts a 'base' and a 'cap'. The base doesn't have any scientific basis. But in the new index the minimum value is fixed either at a point below which the human kind cannot survive or at the actually observed point that is the value actually observed from 1980 to the current year. If life expectancy is below 20 years (the reproduction age) human kind cannot survive that is why the minimum value is fixed at 20 years. The HDR 2010 explains the rationale behind this as follows: "If a society or a subgroup of society has a life expectancy below the typical age of reproduction that society would die out".

A society can survive without education. That is why, the minimum values are fixed at zero. For income, it is observed value. For example the observed value for HDR 2010 is PPP US $ 163 per capita GNI (Zimbabwe's per capita in 2008 lowest in that period). Zimbabwe survived with this income. This shows that human kind can survive with this income. That is why this amount is fixed as minimum.

In the old method, the maximum value was fixed for education at 100 percent, for

health at 85 years and for standard of living at PPPS 4000. These are artificial caps. In the new method for all these three it is observed value. For example, maximum level of life expectancy observed is 83.2 years (Japan, 2010) for HDR 2010.

CALCULATION

The calculation method has also undergone some change in the New method. The sub index (Dimension index) calculation method remains the same for health. For education in old method, Adult literacy was assigned 2/3 weight and enrollment ratio was assigned 1/3. Then both of them added to one. But in New method, both the indices viz., Expected years of schooling and Average years of schooling are given same weightage and their Geometric mean is added to one. Performance for these dimensions is expressed as a value between 0 and 1 by applying the following formula:

Dimension Index = (Actual value – Minimum Value)/(Maximum value – Minimum Value)

But for income in the Old method log to the base 10 was used to calculate the index. The reason for using log is that, beyond a certain level, the income does not enhance the human capability much. In other words, the ability of income to increase human capability diminishes with increase in income. The log value assigns less importance to higher value. For example, the log value of 2 is 0.301 and log value of 8 is 0.903. Here, the number 8 is four times higher than the number 2 but the log value

is only three times higher. This means, the importance of higher value is getting diminished. So, the **law of diminishing capability of income** is ensured.

In the New method, instead of log to the base 10, natural logarithmic value is used. The natural logarithm is denoted by ln or $\log_e$. The value of e is 2.718. There is no valid reason for this change except that mostly economic literature uses natural log for income. The HDR 2010 observes the reason as follows: "This minor change has no effect on the value of the income index and is motivated by the fact that most of the economic literature uses the natural logarithm of income".

The method of converting the absolute value into indices by using the above formula is called **normalisation**.

HDI is then calculated as an arithmetic mean of the three dimension indices in the old method but in the New method it is calculated as Geometric mean. The arithmetic mean is influenced by extreme values that arise due to an uneven development across dimensions. This implies that low level of achievement in one dimension is compensated by higher level of achievement in another dimension, whereas geometric mean is a stable one not influenced much by extreme values. Therefore, Geometric mean is adopted in New method. This can be explained by an example.

Let us consider the following two cases.

Case 1

Education index: 0.4

Health index : 0.6

Arithmetic mean = 0.4+0.6/2 = 0.5

Geometric mean = 0.489

Case 2

Education index: 0.8

Health index : 0.2

Arithmetic mean = 0.8 + 0.2/2 = 0.5

Geometric mean = 0.4

Here, compared to the first case, health index fell down by 0.4 points in the second case but this is compensated by rise in education index by 0.4 points. The arithmetic mean ensures this because, in both the cases, arithmetic mean remains the same at 0.5. It means that rise in education index substitutes fall in health index. But the geometric mean doesn't remain same. It comes to 0.4 points from 0.489 because it gives less importance to higher value. Here the rise of 0.4 points in education index is less than adequate to compensate for fall of 0.4 points in health index. So the overall index comes down. Hence the perfect substitution like that of arithmetic mean doesn't take place.

Old Method

Example

Actual values:

Life Expectancy at birth = 66 years

Adult literacy rate = 86

Gross enrollment = 56

GDP per capita (PPP US$) = $ 8,840

1. Life Expectancy Index/Health Index

= (66 – 25)/(85 – 25)

= 41/60

= 0.683

2. Education Index

Adult Literacy Index

= (86–0) / (100 – 0)

= 0.860

Gross Enrollment Index

= (56 – 0)/(100 – 0)

= 0.560

Education Index

= 2/3 (0.860) + 1/3 (0.560)

= 0.759

3. Income Index/ Standard of living Index
= [log (8,840) – log (100)] / [log
(40,000) – log (100)]
= 3.946 – 2 / 4.602 – 2
= 0.748

4. HDI

HDI = (Health index + Education index + Per capita index) / 3

= (0.683 + 0.759 + 0.784)/3

= 0.742

New Method
Example

Table 3.2. Dimensions, Indicators, Goal Posts of Observed Maximum and Minimum Value

Dimensions	Indicators	Goal Posts	
		Observed Maximum	Minimum
1. Health	(i) Life expectancy at birth	83.2 (Japan, 2010)	20 years
2. Education#	(i) Mean years of schooling	13.2 (United States, 2000)	0
	(ii) Expected years of schooling	20.6 (Australia, 2002)	0
3. Standard of living	Per capita GNI (PPP US $)	108,211 (UAE, 1980)	163 (Zimbabwe, 2008)

Source: HDR 2010 (For observed values)

The combined education index maximum observed 0.951(New Zealand 2010). This observed value is used to calculate combined education index for other countries.

Table 3.3. Sample Actual Value

Dimensions	Indicators	Actual value
1. Health	Life expectancy at birth (years)	64.4
2. Education	(i) Mean years of schooling	4.4
	(ii) Expected years of schooling	10.3
3. Standard of living	Per capita GNI (PPP US $)	3337

1. Life expectancy index/ Health Index

$$= 64.4 - 20/83.2 - 20 = 0.702$$

2. Education Index

Mean years of schooling

$$= 4.4 - 0/13.2 - 0$$

$$= 0.333$$

Expected years of schooling

$$= 10.3 - 0 / 20.6 - 0$$

$$= 0.5$$

Education index

$$= \sqrt{0.333} \times 0.5 - 0/0.951 - 0$$

$$= 0.408$$

3. Income index/Standard of Living Index

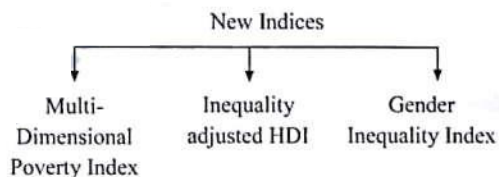$$= \ln (3,337) - \ln (163) / \ln (108,211) - \ln (163)$$

$$= 0.406$$

$$HDI = \sqrt{0.702 \times 0.408 \times 0.406}$$

$$= 0.5088$$

NEW INDICES

As already said, the 20th anniversary edition introduced three new indices namely Multidimensional Poverty Index, Inequality-adjusted HDI, and Gender Inequality Index. These are shown in the following figure 3.1.

Fig 3.1

Multi-Dimensional Poverty Index (MDPI)

Multi-dimensional poverty index measures the deprivation of people in health, education and standard of living. It is obverse of HDI while HDI measures the level of achievements of people in the dimensions of health, education and standard of living the MDPI index measures the under achievement in these dimension. For example HDI measures average years of schooling but MDPI counts households in which no one has completed five years of schooling. The dimensions and indicators are shown in the following table 3.4.

Table 3.4. Dimensions and Indicators of Multi-Dimensional Poverty Index

Dimensions	Indicators (house hold wise)	Weights
Health	At least one member is malnourished	1.67
	One or more children have died	1.67
Education	No one has completed five years of schooling	1.67
	At least one school-age child not enrolled in school	1.67
Condition of living	No electricity	0.56
	No access to clean drinking water	0.56
	No access to adequate sanitation	0.56
	House has dirt floor	0.56
	Household uses "dirty" cooking fuel (dung, firewood or charcoal)	0.56
	Household has no car and owns at most one of: bicycle, motorcycle, radio, refrigerator, telephone or television	0.56

Source: HDR 2010

Inequality-Adjusted HDI (IHDI)

Inequality adjusted HDI adjusts the HDI for inequality in distribution of the dimensions - life expectancy, years of schooling and household income or consumption - that exists across the age (life expectancy)

and individual (schooling and income/consumption). Adjusted means the inequality in each dimension is discounted from the average level of achievement in each dimension.

If HDI and IHDI are equal, it means there is no inequality. If IHDI is less than HDI, it means there is inequality.

Gender Inequality Index (GII)

Gender Inequality Index measures inequality that exists between men and women across three dimensions viz, reproductive health, empowerment and the labour market. To say more precisely, it reflects women's disadvantage in these dimensions. The indicators for reproductive health are Maternal Mortality Rate and Adolescent Fertility Rate (it is not applicable for men). The indicators for Empowerment are parliamentary representation and attainment at secondary and higher education. Labour market indicator is labour market participation.

GII ranges from 0 to 1. Zero represents fair equality and one represents very poor equality

Hybrid HDI

It is a different version of HDI. It applies the calculation method of New HDI for indicators of Old HDI. This enables the trend analysis of HDI.