Economic Growth and Development
Dr. Rajshree Bedamatta
Department of Humanities & Social Sciences
Indian Institute of Technology, Guwahati

Lecture – 19
Measuring Human Development-II

Hello and welcome to lecture 19 of the NPTEL MOOC's course on Economic Growth and Development. In today's class we will continue with our previous discussion on measuring human development index. In the last class we saw how the first ever human development index was computed based upon the definitions and the explanations of the human development concept that was given in the human development report of 1990. In this class, we will see how the computation of human development index itself has changed over a period of time starting from the 1990's 1991 onwards, and how the concept is evolved or the index computation has evolved over a period of time.

So, we will be looking at the list of indicators that have changed since 1990 and the method of computation of HDI that has changed since 1990. Before we do that let me also inform you a few things about a development index. Since we are looking at a human development index here, and going by the definitions provided by sense capability approach, we know that human development here lastly refers to expansion of human choices or enlargement of human choices and social opportunities and so on. Which means that a development index encompasses a lot of achievements to lead to lead a good human life.

So, in that sense, there are various indicators that can ideally be a part of a development index, but sometimes it is not entirely desirable to include a lot of variables; because when we are including new variables to the existing development index, the significance of the previous indicators diminished. And then that may not be highly permissible, as far as what we want the human development index to reflect. So, in that sense the human development reports follow a 2 tired approach of presenting their results with respect to human development.

The first thing that the do is to provide a list of all the achievements they provide an overall profile of the relevant information with regard to the respective ways, which are analyzed in different reports which is why different reports have different themes, and

they are structured thematically. So, which means that a certain, as I had shown in one of the earlier classes that different HDI's follow different themes. So, in one of the years the focus may largely be on sustainable development and how economies have been developing or not developing sustainably in some other report the focus maybe on human rights on one report the focus maybe on gender issues and so on.

The second the second way of reporting of the HDI's is to focus on the human development index and the human development index as I have already mentioned is a summary statistics is a summary index of 3 important dimensions or domains of human development. By one of the reasons why the human development index became very important was the easy communicability that it provided with respect to how countries have been developing.

Now in the last class we looked at the computation of the HDI of 1990. There were basically a 3 steps in the computation of the HDI. The first step involved identification of the dimensions of development. And the dimensions were a longevity, education and income. Now, based upon these dimensions of development 3 indicators were specified; the longevity indicator was represented by life expectancy at birth. The knowledge dimension was represented by adult literacy rate. And the income dimension was represented by the logarithmic transformation of real GDP per capita in purchasing per parity terms in US dollars.

Once the 3 indicators were identified, a list of based upon the list of achievements of based upon the achievements of the list of countries that were considered for computation of the HDI in 1990, minimum and maximum values were identified. So, the minimum value showed, the minimum the achievements of the countries in, each of these indicators, and the lowest attainment levels achieved by each of these some the by the by the list of countries. And certain desirable goal posts also certain desirable maximum values were also identified based upon the maximum values achieved in each of these indicators by the countries.

And then based upon these maximum and minimum values a deprivation measure was as constructed; which placed the country in the range of 0 to 1. And this range was defined by the difference between the maximum and the minimum and the deprivation index was then calculated by doing a simple average of all of these indicators. And then for the final

calculation of the HDI, the third step was to measure the HDI which was basically 1 minus 3 average deprivation index.

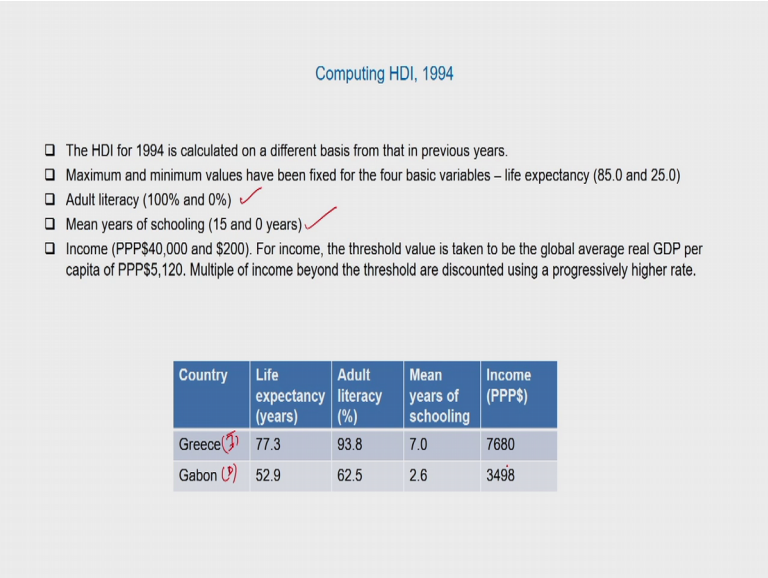
Now, once the HDI computation came out into the open and the HDI's for the concerned countries came out, it received a lot of attention among the policymakers the academics the press and the larger public. And the way lot of questions also with regard to the robustness of the HDI as an index. And one of the questions that was being asked was why is it that the reason unweighted arithmetic average of all of these 3 indicators, why not provide weights to 1 or 2 indicator such as education or health or income.

And the response to this question was that for flourishing of human life, it is not necessary that education can be the only important variable or indicator or health or income can be the important indicator, all of them are required together to lead to lead a flourished life. So, in that sense it was not necessary that some indicator or 2 indicators be given more weight than the other. So, all the indicators were basically weighed equally.

Another question that was that came up was with regard to why was the income indicator, why was the income indicator dealt with separately then or differently in comparison to the education and the health indicator the longevity indicator because a logarithmic transformation was used to calculate the income indicator.

And of course, the reason regarding this was dealt within the last class where, all those countries which had incomes below a poverty threshold, the value on income is very high, because any increase in incomes will lead to an increase in marginal utility, or that you that can be derived out of that increase in income because it adds to the basic levels of human development. But any incomes which is above the poverty threshold will lead to a diminishing marginal utility of income, because it can provide less and less facilities or less and less amenities it can take care of basic levels of human development. And therefore, a logarithmic transformation was carried out with respect to the income indicator.

(Refer Slide Time: 08:56)



Now, in today's class we will see how the HDI computation has evolved since 1990, as I have already mentioned in 1990 there were 3 dimensions. In 1994 the HDI was calculated on a different basis from that in the previous years. In this HDI calculation minimum and maximum values were fixed for the 4 basic variables. So, between 1990 and 1993 the minimum and maximum were taken from the list of the countries for which the achievements were shown. But in 1994 the maximum and minimum values were fixed for the 4 basic variables life expectancy, adult literacy, mean years of schooling and income.

There were 2 changes that took place; one was the fixation of goalposts or fixation of minimum and maximum values. And the second was the change in the indicator list compared to the earlier years. In HDI 1994 along with adult literacy rate, mean years of schooling was introduced. And in while computing the education attainment indicator, adult literacy was given a weight of two thirds and mean years of schooling was given a weight of one-third for being able to compute the education index or the education indicator.

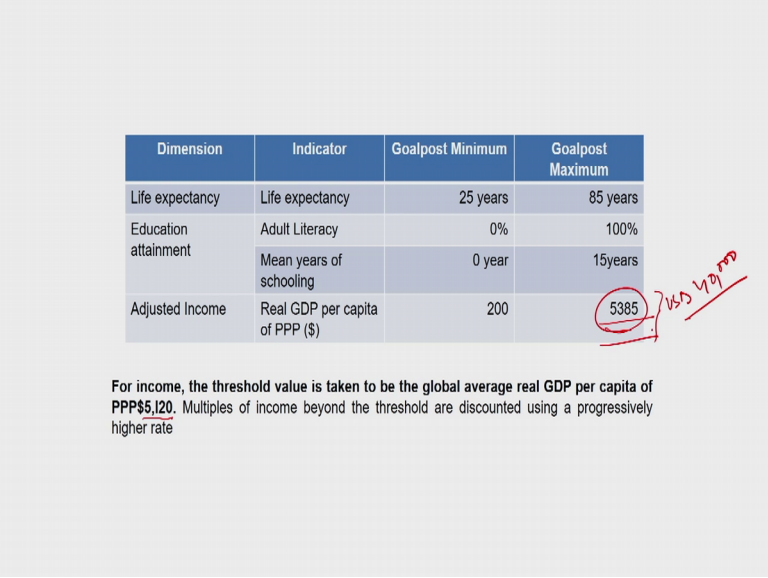
One of the reasons why the adult literacy rate was given 2 thirds weight was basically to show that the importance of being literate and educated, the working age population being literate and educated; such that they can add 2 capital formation within the economy. Or that can also lead to higher levels of human development achievement, if

the productive workforce within the country is highly educated or is educated enough to be able to make a difference to their daily standards of living.

The income minimum and maximum were fixed at 40000 us dollar and 200 US dollar. For income the threshold value was taken to be the global average real GDP per capita of 5120 dollars that was the global average that was taken. And multiple of income beyond the threshold were discounted using a progressively higher rate.

Let us illustrate the computation of HDI 1994 with the example of 2 countries Greece and Gabon. Greece here is an industrial country is in advanced country and Gabon is a developing country. These are the actual estimates for life expectancy adult literacy mean years of schooling and income for Greece in Gabon. 77.3, 52.9 in terms of life expectancy huge difference. Adult literacy 93.8 in Greece, 62.5 Gabon; mean years of schooling 7 for Greece and 2.6 for Gabon. And the incomes, this is the real GDP per capita in purchasing per parity, the income of Greece almost being the double of Gabon.

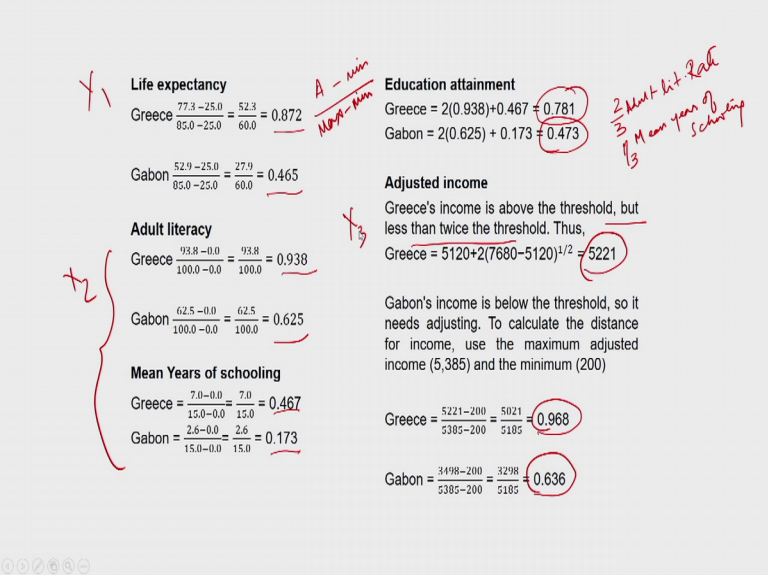
(Refer Slide Time: 12:08)



Now, these are the dimensions life expectancy education attainment adjustment adjusted income. And these are the goal posts in 1994, the goalposts were fix the minimum and the maximum were fixed. And the life expectancy was the minimum life expectancy was fixed at 25 years maximum was fixed at 85 years.

Adult literacy minimum 0 percent goalpost maximum 100 percent, mean years of schooling minimum 0 and maximum 15 years; which means that the 15 years of schooling shows that that an individual should have completed at least high school, at least secondary school education. And adjusted income the minimum was fixed at 200 US dollars and the goal post maximum was 5385; which is basically discounted using a progressively higher rate. And for income as I have already mentioned the threshold value was taken to be the global average real GDP per capita 5120 dollars.

(Refer Slide Time: 13:13)



Now, let us look at the calculation of the individual indices first. For life expectancy, the actual estimate for Greece was 77.3. So, that is actual minus the minimum divided by maximum minus minimum. Note this difference in formula used in 1994 compared to that which was used in 1990; where the formula that produces maximum minus the actual divided by maximum minus minimum. So, here the actual minus the minimum divided by maximum minus minimum, that gives the life expectancy value of 0.872.

So, this is actual minus the minimum divided by maximum value minus the minimum. Similarly, for Gabon the life expectancy value came out to be 0.465 Gabon's estimate for life expectancy being 52.9, and the maximum and the minimum being 85 and 25. The adult literacy rate was similarly computed for Greece the adult literacy rate being 93.8 and for Gabon 62.5 so, 0.938 and 0.625.

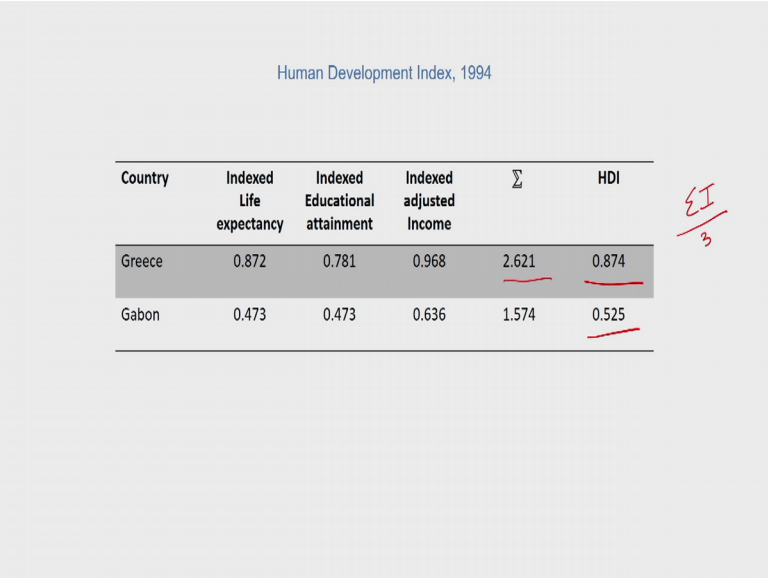
So, these are the individual indices so, this is the life expectancy index, adult literacy index, the mean years of schooling index. Similarly, the minimum mean years of schooling index was calculated for Greece 7 years, Gabon 2.6 years, the minimum being 0 and the maximum being 15. So, accordingly we get 0.467 and 0.173. Now, the sense the education dimension contain the 2 indicators here. Adult literacy and mean years of schooling.

The education attainment index was calculated by giving a two-thirds weight to adult literacy rate, and a one-third weight to the mean years of schooling; which ultimately came out to be 0.781 and Gabon's 0.473. So, this is two-thirds weight to adult literacy rate, this calculation is based upon giving two-thirds weight to adult literacy rate, and one-third to the mean years of schooling.

The adjusted income greases income is above the threshold. If you look at greases income which is 7600; whereas, the threshold income is 5120. This is the poverty line threshold income. And this is the adjusted income maximum adjusted income. The real income that was the income that was actually provided from the list of the countries was USD 40000 in terms of purchasing per parity. But, when this amount when discounted using the progressively higher rate comes out to be 5385. So, greases income is above the threshold, but it is less than twice the threshold. So, accordingly based upon the Atkinson's utility function formula Greece's adjusted income comes to 5221.

Gabon's income is much below the threshold 3498. And so, to calculate the distance for income we use the maximum adjusted income and the minimum. So, the index comes out to be for Greece, 5221 minus the minimum which is 200 divided by maximum minus minimum that comes to 0.968 and for Gabon 0.636. Now, once the individual indices have been computed so, this is X 1, this is xX 2; taking adult literacy and mean years of schooling together. And this is X 3 the adjusted income.

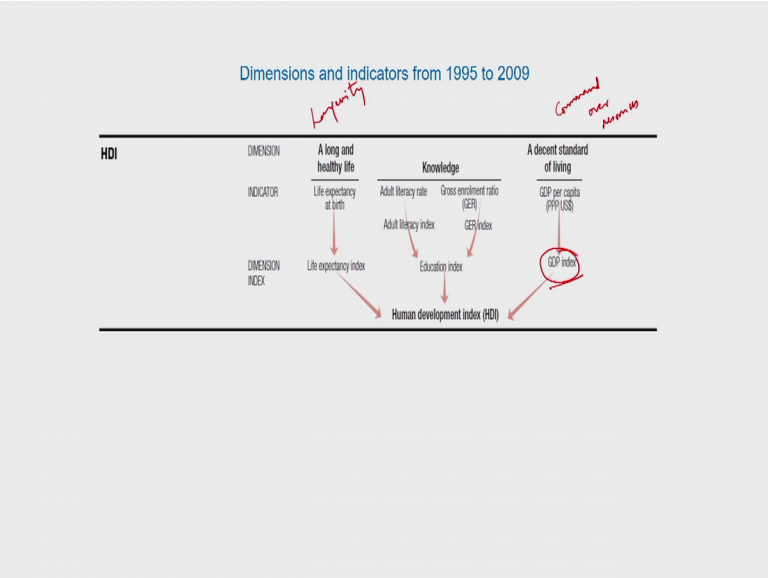
(Refer Slide Time: 17:28)



So, we have the indexed life expectancy, indexed educational attainment, indexed adjusted income; which is then summed up which comes to about 2.621. And the HDI is basically the submission the index the submission of all the indices X 1, X 2, X 3 divided by 3; which is basically the taking an average or arithmetic mean of all of these indexed life expectancy educational attainment unadjusted income, and this is the final HDI computation. And of course, the Greece's HDI is much higher than that of Gabon; which means Gabon has a lot of catching up to do in terms of human development achievements as far as Greece is concerned.

So, the difference between the 1994 HDI computation compared to 1990 are primarily to; one is the addition of mean years of schooling along with adult literacy rate. Second is fixation of goal posts minimum and maximum goal posts. And then following a similar kind of a methodology for calculation of individual indices based upon the individual dimensions, the dimension of educational attainment give the two-third weight to adult literacy, and the one-third weight to mean years of schooling. And then adjusted income and then a final HDI by construction of HDI which is based upon a simple arithmetic mean of the 3 indices constructed.

(Refer Slide Time: 19:08)



So, in 1994 there was the change in this the indicator. Another change came about in dimensions and indicators particularly not in dimensions between in 1995, and this change in indicators continued from 1995 to 2009 if you see the dimension long and healthy life knowledge and this is an standard of living, it continues to be the same till the recent HDR. In the first 1990 HDR this was referred to as longevity; knowledge is knowledge and decent standard of living dimension was refer to as command over resources, command over resources.

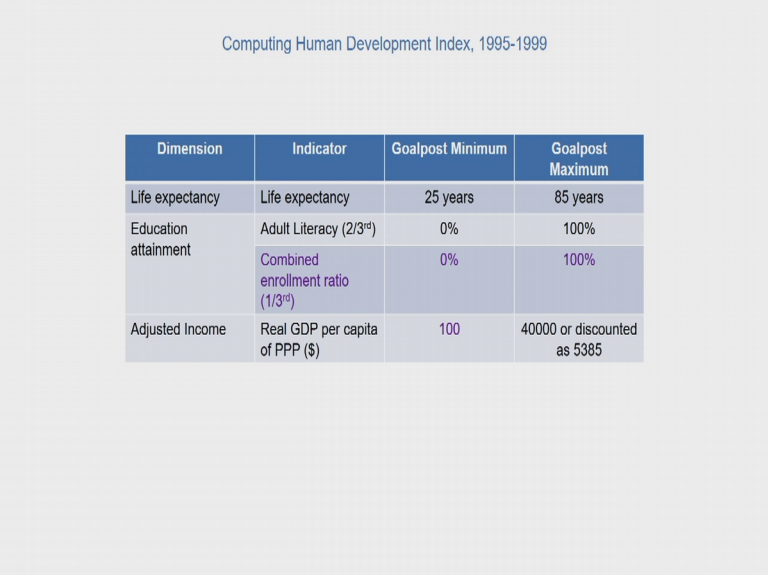
Overtime, the dimensions have remained more or less the same; however, to increase the robustness of the HDI as to how representative it can be based upon the real availability of data across countries, some of the indicators have undergone a change.

And the next change came about in 1995. So, the indicator or the added in 1995 was gross enrolment ratio in place of mean years of schooling. And one of the reasons for including gross enrolment ratio was that, the difficulties in availability of mean years of schooling data from different countries. Because different countries or different school going age for different children. And therefore, the it led to some kind of mismatch as far as the different countries are concerned a, and b there was also problems with regard to availability of data of mean years of schooling. And therefore, the enrolment ratio was considered.

In the end of this class I will give you a small definitions of what do these indicators mean. But let us first do away with the computation, the formulas for the computation of the HDI that has undergone a change since the first HDR of 1990. So, there are again similar kinds of steps as followed in the earlier HTR's first we specify or identify the indicators and the actual values of each of these indicators, and then followed by a dimension index.

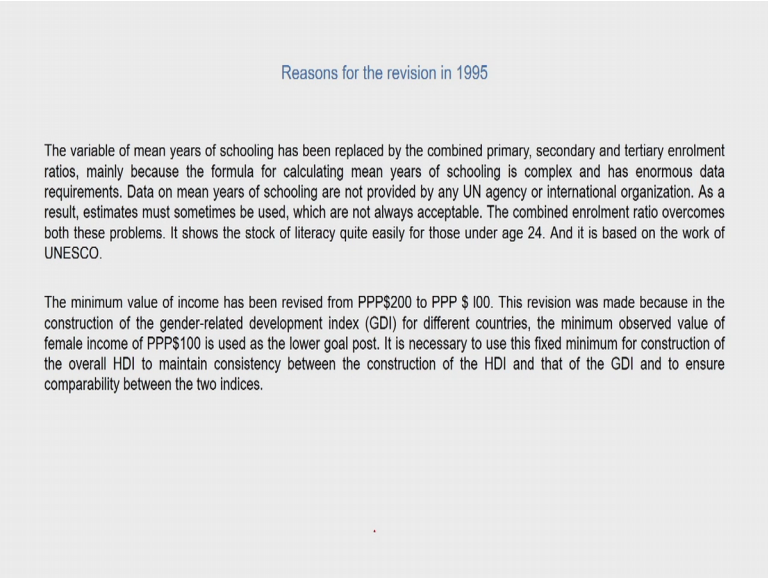
So, life expectancy index education index and the GDP index. The weighting formula is just the same for adult literacy rate and GER or gross enrollment ratio. So, this is two-third weight and this is one-third weight. And then again all of these individual dimension indices are averaged out, or there is the simple arithmetic mean average followed to come up with the human development index. We will also look at a small illustration based upon this change of formula here.

(Refer Slide Time: 22:06)



So, this is the, these are the list of dimensions and indicators. The goalposts remain the same there was no change in the goal post. In the goal post remain the same from 1995 to 1999. The only change here is the combined enrollment ratio, and the goal post was 0 percent and 100 percent here.

(Refer Slide Time: 22:29)



So, there are the reasons for the division in 1995, the variable of mean years of schooling was replaced by the combined primary, secondary and tertiary enrolment ratios. Mainly, because the formula for calculating mean years of schooling is complex and has a amorphous data requirements. And data on mean years of schooling are not provided by any UN agency or international organization.

So, as a result estimates have to be used which are not always acceptable; which means that the mean years of schoolings since, it was not available for the many of the countries, it was replaced with some other data which may lead to errors subsequently. Therefore, the combined enrolment ratio seems to overcome both of these problems. And it shows the stock of literacy which is quite easily for those under age 24. And it is based on the work of UNESCO which one of the important sources for churning out due to reliable statistical data.

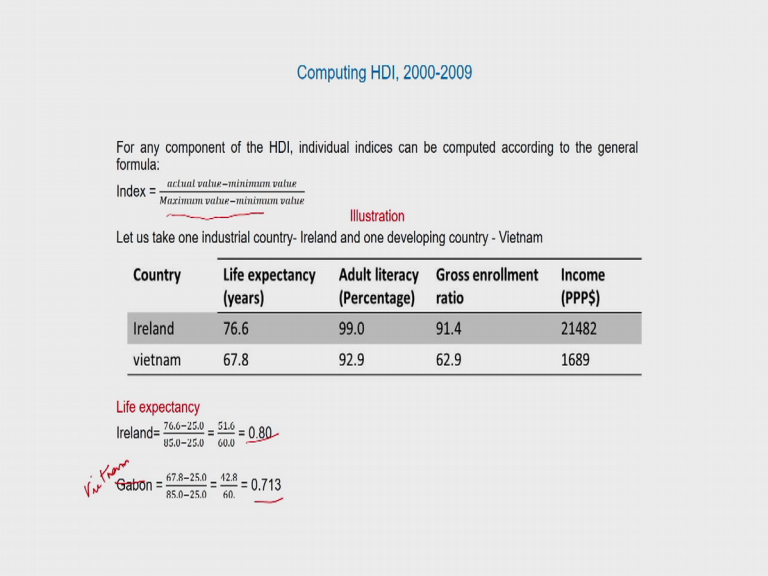
The other change that happened in 1995 was revising the minimum value of income downwards from 200 US dollars to 100 US dollars. And there was a significant reason why this revision was made. This revision was made because in the construction of the gender related development index for different countries, the minimum observed value of female income came out to be 100 US dollars. And therefore, that was used as a lower goal post. And it is necessary to use the fixed minimum for construction of the overall

HDI to maintain consistency between the construction of HDI and that of the GDI and to ensure compatibility between the 2 indices.

So, in 1995 if you remember from the last class, I had shown you an excel sheet which showed the computation of different industries over a over the years, over the human development reports that were published in different years. And you would see that in 1995 2 new measures were introduced which we will do in the next class; the gender development index and the gender empowerment measure. Although, male female achievement difference was gender differences was been dealt with in some ways in the earlier reports; however, an index was not attempted between 1990 and 1994.

So, in 1995 for the first time data on male and female achievements was collected separately, and then the gender develop index may gender empowerment measure were constructed. And since the data was collected it very clearly showed that the wage rates or income levels achieved by women are much lower compared to the wage rates of their male counterparts. And therefore, that had to be incorporated into the data analysis so that the HDI and the GDI and the GEM all become comparable. I also have a few definitions of all of these indices towards the end of today's lecture which will come in sometime.

(Refer Slide Time: 25:34)



So, as an illustration let us look at computation of HDI between 2000 and 2009. So, this is the index, the index is calculated by this formula; actual value minus the minimum

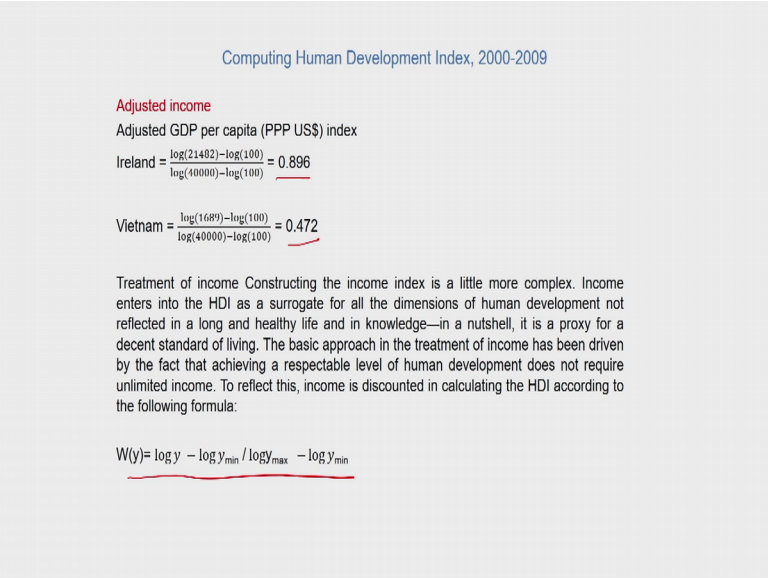
value divided by maximum minus minimum. And here Ireland is an advanced country, and this is this is Vietnam which is a developing country. And the life expectancy adult literacy gross enrollment ratio and income data are given as such. So, we first calculate the life expectancy index going by this formula actual minus minimum divided by maximum minus minimum. So, we have 0.8 and 0.713.

(Refer Slide Time: 26:25)

Similarly, an index is calculated for adult literacy. I am sorry, this has been mentioned as Gabon whereas, this should be Vietnam.

Similarly, combined primary secondary tertiary enrollment ratio, and the education attainment is are calculated by giving two-thirds weight to the adult literacy rate, and one-third weight to combined primary secondary tertiary enrolment ratio, and this is the education index these are the 2 education indices.

(Refer Slide Time: 27:04)

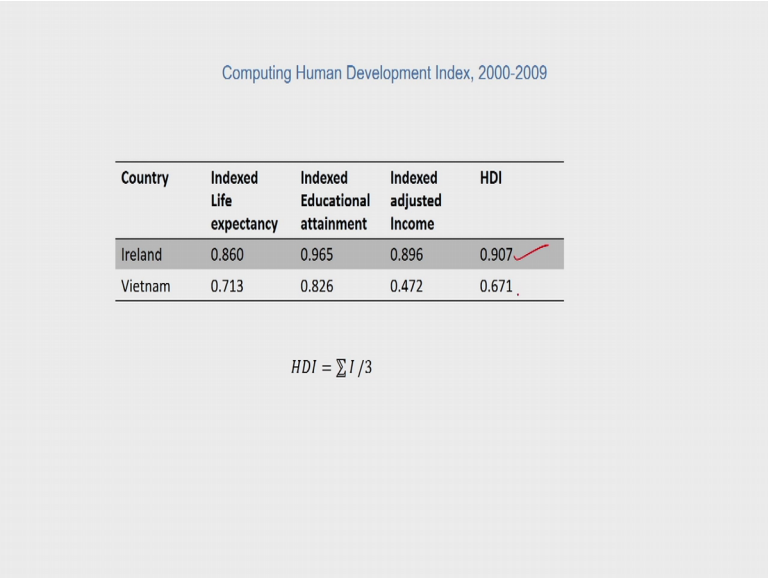


Similarly, the adjusted income index is calculated by the form by the same formula. In 2 between 2000 and 2009 there was again a logarithmic transformation of income going by the idea that increasing income levels give rise to a diminishing marginal utility in terms of being able to provide basic standards of living or basic levels of human development.

So, this is the actual value of Ireland. So, log of the income minus the minimum log of 100, divided by the log of maximum income value minus the log of 100; that comes to 0.896 and similarly for Vietnam. So, this is the income utility function which is given by log y minus log the y minimum divided by maximum minus minimum.

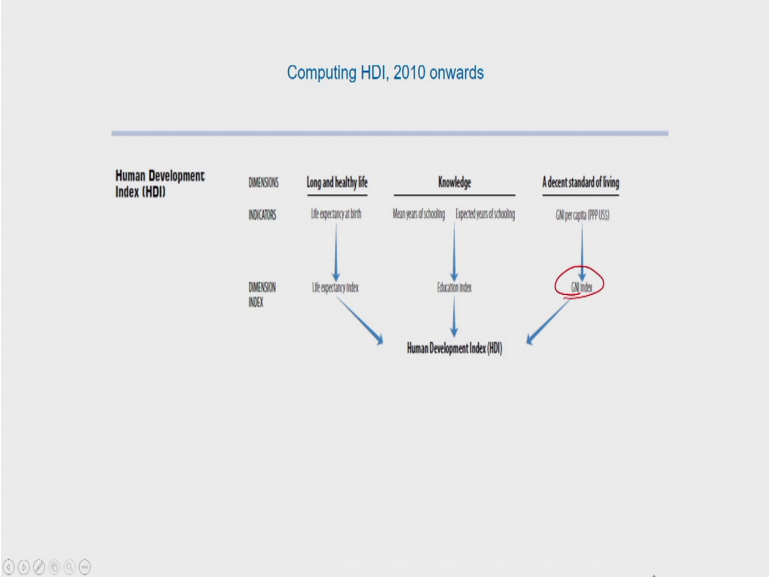
And one of the reasons as I have already mentioned the treatment of income is a little more complex, because income enters into the HDI as a surrogate for all dimensions of human development; which is not reflected in long and healthy life and in knowledge. So, a nutshell it is a proxy for decent standard of living, and the basic approach in the treatment of income has been driven by the fact that achieving a respectable level of human development does not require unlimited income. So, to reflect this income is discounted in calculating the HDI according to the following formula the utility function or income utility function has given by Atkinson.

(Refer Slide Time: 28:39)



So, then based upon those individual indices, a similar method of computation of HDI simple arithmetic mean of the indexed values of life expectancy, education attainment and incomes, and the HDI of Ireland being far better than the HDI of Vietnam.

(Refer Slide Time: 28:57)



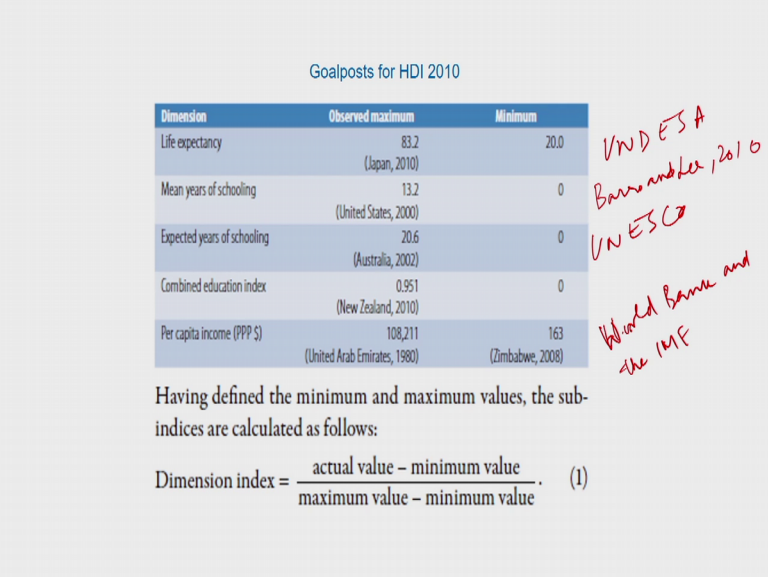
Now, from 2010 onwards there were, there was an important change in the calculation of in the methodology of the computation of HDI. The methodology mostly changed from. There were to changes one was the change in the list of indicators and the other was the

change in the method of calculation of the HDI. We moved from a simple arithmetic mean average calculation to a geometric mean calculation.

And these were the dimensions of the indicators. The long and healthy life or longevity dimension remain just the same. The knowledge dimension changed from again from adult literacy rate and combined enrolment ratios to many years of schooling and expected years of schooling, and then the education index was constructed. This education index was also constructed by taking a geometric mean average of both of these indicators. And then a decent standard of living, this also changed from a product calculation to an income calculation.

So, if you remember in 2000, if you look at this dimension here, the decent standard of living indicator is represented by the GDP; which is a product based calculation of the gross domestic of national output. Whereas, in 2010 it changed to a GNI index or a Gross National Income index which was considered to be a more representative indicator.

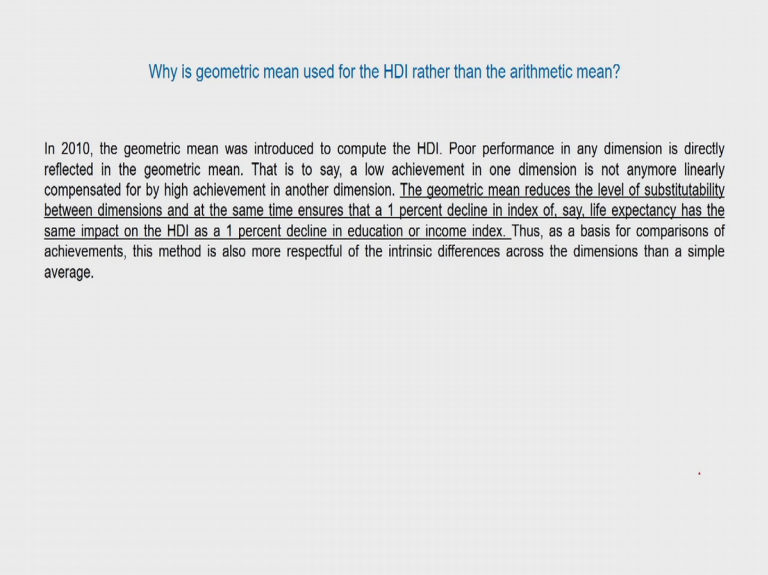
(Refer Slide Time: 30:33)



So, this were the observed maximum and the minimum, and these were taken from reliable sources. The HDR of 2000 mentions that these goalposts were for life expectancy at birth the information was taken from UNDESA Department of Economics and Statistics of the United Nations. Mean years of schooling was taken from a paper by barrow and lee in 2010.

Expected years of schooling data was taken from UNESCO, statistics combined education index was then calculated based upon it. And the per capita income of gross national income data was taken from the World Bank and the was taken from the was taken from the World Bank and the IMF. So, this were the data that was collected from various sources. The dimension index was calculated based upon this formula actual minus minimum divided by maximum minus the minimum. And for each of the for calculation of each of the indices dimension indices this formula was followed.

(Refer Slide Time: 31:56)



Now, this is the more systematic explanation of why the geometric mean was used for HDI rather than arithmetic mean calculation. So, poor performance in any dimension is directly reflected in the geometric mean. So, that is to say a low achievement in one dimension is not anymore linearly compensated for by high achievement in another dimension. So, geometric mean basically reduces the level of substitute ability between dimensions; in the same time, ensures that a one percent decline in index of say life expectancy has the same impact on the HDI as a 1 percent decline in education or income index. So, the basis for comparisons of achievements, this method is more respectful of the intrinsic differences across the dimensions in a simple average.

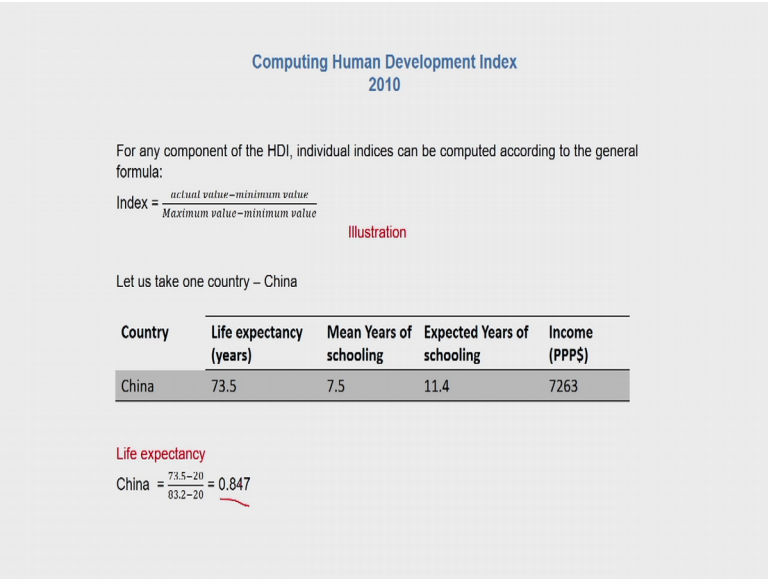
Now, let me also inform my class here that, the methods of computation of HDI has been in a real flux it is, still in ongoing project. And there are many more ways of being able to calculate the human development index it is still coming up; which is why you would

see that while the dimensions have remain the same, while there is that there is conclusive evidence with regard to the fact that the income health and education dimension by themselves can reflect a lot about the expansion of choices that people phase on an in an on an everyday basis. But there are a lot of debates and there are there are a lot of inconsistencies with regard to which should be the best indicator for reflecting achievement or deprivation with regard to each of the dimensions that we are considering here.

And it is important here to remember and understand that, one of the reasons for publishing the human development report is also for advocacy is also for policy making. So, this is also for evidence based policy making. So, which means given the data available given what the data is reflecting to be able to make relevant policies that can deal with, or that can take care of the deprivation that people face in different countries across the world.

So, in that sense there is it is inconclusive the HD the methods of computation of HDI itself is also inconclusive although, the dimensions continue to remain the same. And there is a lot of consensus with regard to the use of dimensions, but there is not much consensus with regard to the use of indicators which is why there is a lot of change in the indicators used over the years.

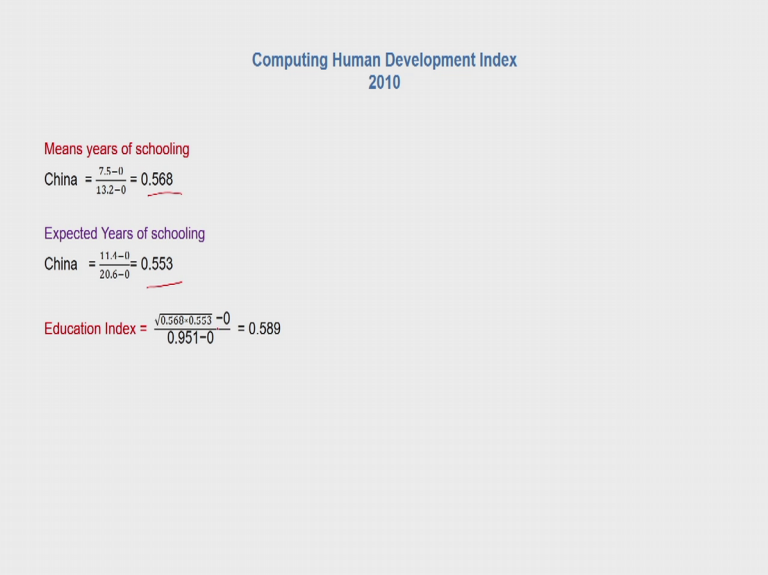
(Refer Slide Time: 34:48)



So, this is an illustration for computing the HDI based upon the 2010 indicator. Here I have taken the example of china. The index is calculated as such as we have been seen, the actual estimates of life expectancy, mean years of schooling, expected years of schooling and income is as follows for china 73.5, 7.5 mean years of schooling expected years of schooling 11.4, and income 2063.

So, the life expectancy index is calculated as follows, actual minus minimum divided by 83.2 minus 20 you would see where the life expectancy has also been brought down compared to 2009; where it was 25 years. It has been brought down to 20 years now. So, the index shows 0.847.

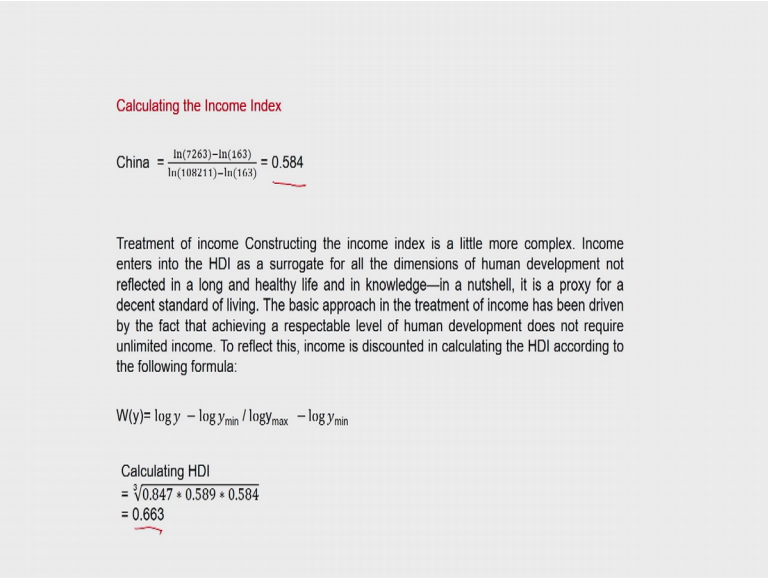
(Refer Slide Time: 35:35)



Similarly, the mean years of schooling index has been calculated. So, this is yeah so, this is for china here, 7.5 divided by 13.2 minus the minimum 0.568. Expected years of schooling is 0.53.

And then the education index is basically the geometric mean of both of these indicators, and then that is then transformed into this index value by using the same formula. Actual value the geometric mean value is the actual value of the index minus minimum divided by maximum minus the minimum; which comes out to be 0.589.

(Refer Slide Time: 36:20)



The income index there is a logarithmic transformation of the income the goal posts are change now. The goalposts in 2010 because it is based upon the actual achievements of the countries which have been considered. You must been formed here that in 2010, the numbers of countries for which rankings of HDI are being, rankings based on HDI are being done has increased. And therefore, the goalposts have also changed.

So, the goal posts have changed in 2010 and based upon the logarithmic transformation of income, the income index is calculated. And then finally, based upon the individual indices, the final HDI is calculated by taking a geometric mean of all of these indicators which comes out to be 0.63. So, between 2009 and 2010 the HDI computation change from being calculated in terms of a simple arithmetic mean to a geometric mean calculation.

(Refer Slide Time: 37:21)

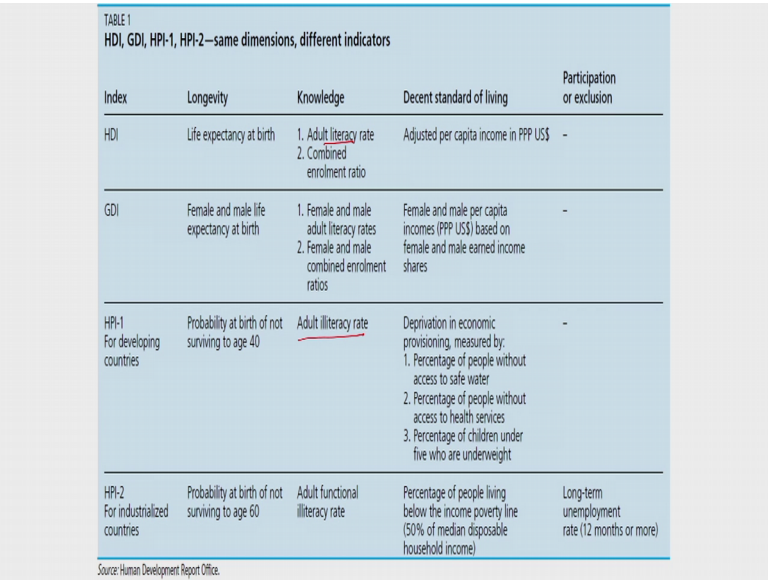


TABLE 1
HDI, GDI, HPI-1, HPI-2—same dimensions, different indicators

Index	Longevity	Knowledge	Decent standard of living	Participation or exclusion
HDI	Life expectancy at birth	1. Adult literacy rate 2. Combined enrolment ratio	Adjusted per capita income in PPP US$	-
GDI	Female and male life expectancy at birth	1. Female and male adult literacy rates 2. Female and male combined enrolment ratios	Female and male per capita incomes (PPP US$) based on female and male earned income shares	-
HPI-1 For developing countries	Probability at birth of not surviving to age 40	Adult illiteracy rate	Deprivation in economic provisioning, measured by: 1. Percentage of people without access to safe water 2. Percentage of people without access to health services 3. Percentage of children under five who are underweight	-
HPI-2 For industrialized countries	Probability at birth of not surviving to age 60	Adult functional illiteracy rate	Percentage of people living below the income poverty line (50% of median disposable household income)	Long-term unemployment rate (12 months or more)

Source: Human Development Report Office.

This is how the computation of HDI evolved since 1990. And till the recent HDR the formula that was followed in 2010 is still being followed. However, that have been a number of additions in terms of indices 2 different HDRs is between 1990 and 2016, and that is what I had shown you in one in the last class as to when the human poverty index, indices such as human poverty index, the gender development index, the gender empowerment measure or the multidimensional poverty index and so on have been included.

Now, just to give you a sense of what are the indicators that are being considered, you would see that there are more or less similar indicators that are being considered for each of these indices; however, there are with slide differences across the indices. However, all of these indicators together go a long way in trying to explain the levels of human development within countries as compared to the 1970's and the 1980's when there was an overwhelming focus on the indicator of income.

So, the HDI as we have this is being shown on your slide now. The HDI as we have seen had the dimensions continue to be the same for each of these indices. So, you have HDI GDI HP-1 HP HPI-1 and HPI 2. So, this is human poverty index 1 and human poverty index 2. Notice that the dimensions are the same for each of these indices, but the indicators are different for each of these indices.

So, it make sense to take different indicators, and it also takes care of the limitations of the HDI index since the one of the limitations of HDI is when you does not take into account other indicators. Say for example, political freedoms has one of the indicators in the HDI, because it is not possible to include these indicators for all countries, but a lot of it is compensated through the computation of various associated indices which can go a long way in supporting the HDI to be able to give us more conclusive evidence of human development in different countries.

So, the longevity indicator for GDI is female and male life expectancy at birth. Basically, tells us what is the difference in life expectancy at birth of female with respect to the male counterpart. Knowledge female and male adult literacy rates and female and male combined enrollment ratios for decent standard of living female and male per capita incomes based on female and male earned income shares.

If you remember the first class of this course and which I was referring to distributive shares of a, I was referring to GDP at factor cost gross domestic product at factor cost, I was referring to the distributive shares of different factors of production within the economy. These kinds of calculations are taken place with respect to national incomes to see what is the share of different stakeholders within the economy, then we were referring to shares of different factors of production; here we are referring to the shares of female and male in the overall national income of a country.

So, for GDI because we are looking at gender differences in levels of human development achievements; for the same dimensions of longevity knowledge and decent standard of living the indicators are separated for males and females. HPI-1 is human poverty index which is calculated for developing countries. And they are done separately for so which is why you have HPI-1 and HPI 2.

It is done separately for developing and developed countries, because the requirements of the developed and developing countries are of course very different. The data available for both these sets of countries are also very different. Therefore, it makes sense to separate them out. So, for the longevity indicator dimension the indicator considered for HPI-1 was probability at birth of not surviving to age 40.

So, basically how many the numbers of people who have survived till the age of 40 or who have not survive till the age of 40, that is a severe deprivation if individuals within a

country are not able to reach the age of 40, then they will not be able to part take in various kinds of activities that they can be engaged in for a flourished human life. So, probability at birth of not surviving till the age of 40 can be a serious deprivation in the developing countries. So, that is the longevity indicator. The knowledge indicators adult illiteracy rate if you notice here the for measuring achievements the indicator taken is adult literacy rate.

But here this is one way of for measuring deprivation. It is equally important to measure deprivation as we are measuring achievements. Measuring achievements gives a more optimistic view of how far we have reached in terms of the human development goals. That says how much we have already achieved, but measuring deprivation also tells us that how many of us have been left behind in terms of the basic levels of human development. So, adult illiteracy rate is a very significant indicator in terms of the amount of deprivation that exists.

Decent standard of living also measures deprivation in economic provisioning, and it is measured in 3 dimensions percentage of people without access to safe water, percentage of people without access to health services and percentage of children under 5 who are underweight. So, notice that these indicators which also reflect severe deprivation in the developing countries which are not been included in HDI; which is a more comprehensive development index, which is calculated based upon data common data available across countries for compatibility of countries. And the limitations of that exercise is being compensated by the computation of indices such as the HPI-1.

Similarly, HPI 2 which is computed for the industrialized countries, longevity indicated is probability at birth of not surviving to age 60, which is slightly higher for the industrialized countries. The knowledge indicator has adult functional illiteracy rate. Now the term functional here is interesting, this basically means that it is trying to measure the education skills of people within a country, who can be able to write a simple statement about their everyday life with some understanding.

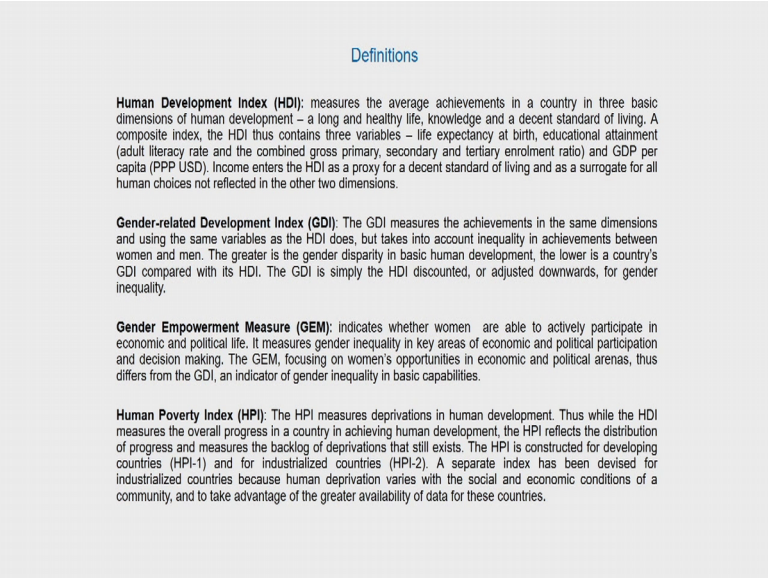
So, that tells us how people can be engaged in leading an active work life in their own countries. So, in that sense it is functional, whether it is whether an individual who has been sufficiently educated is able to lead a meaningful life on an everyday basis. So, adult functional illiteracy rate tells us what is the level of deprivation. In HPI 2 the

decent standard of living is computed based upon percentage of people living below the income poverty line; which is the 50 percent of median disposable household income. So, the disposable household income for the industrialized countries or advanced countries are calculated, and all those households which are receiving less than 50 percent of the median disposable income will be considered as below the poverty threshold. And therefore, they will not be able to leave a decent standard of living.

In HPI 2 fourth dimension has been added which is call participation or exclusion or social exclusion. So, that basically tells us about the long term unemployment rates amounting to 12 months or more, that will basically exclude those individuals from being able to avail the basic amenities of life.

So, these are the some of the important indices which were calculated in the successive HDR's starting from 1995. In the next class we will look at the computations of the GDI HPI and the HPI 2. Because also the gender empowerment measure along with GDI which tells us how much women are participating are participating in political life and how and because that has an important influence on what decisions are taken with respect to women in respective countries.

(Refer Slide Time: 46:33)



These are certain definitions of the indices. To give you a most systematic we have already seen the computation of the HDI, but if one has to give a definition of waters in HDI. This is the more systematic definition of HDI, it measures the achievements of

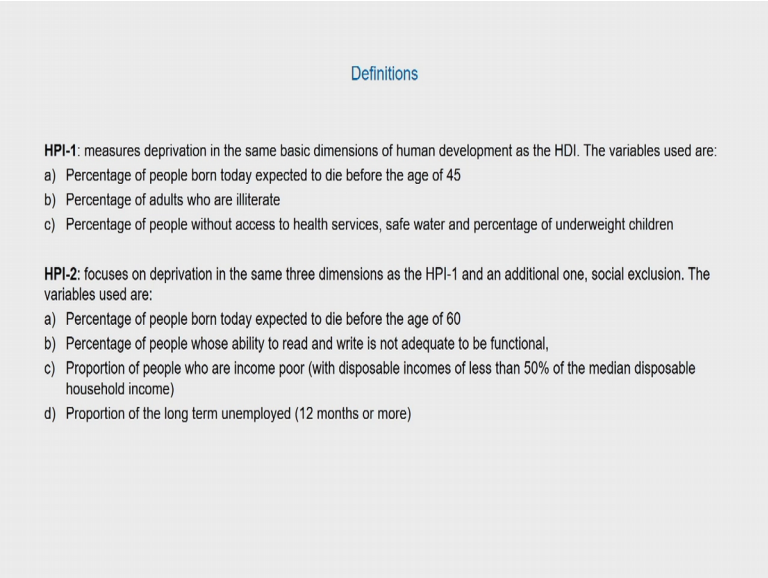
average achievements in a country in the basic dimensions of human development; long and healthy life, knowledge and decent standard of living. It is a composite index and it contains 3 variables, life expectancy at birth, educational attainment in terms of adult literacy and combined gross primary, secondary and tertiary enrolment ratio. Later, mean years of schooling unexpected years of schooling and GDP per capita later GNI per capita. Income enters the HDI as a proxy for a decent standard of living and as a surrogate for all human choices not reflected in the other 2 dimensions.

The gender related development index measures the achievements in the same dimensions as the HDI, but takes into account inequality in achievements between women and men. So, greater is the gender disparity in basic human development, lower is a country is GDI compared with it is HDI. So, GDI is simply the HDI discounted or adjusted downwards for gender inequality. So, it is expected that the GDI HDI distance should not be very high. Gender empowerment measure indicates whether women are able to actively participate in economic and political life. So, it measures gender inequality in key areas of economic and political participation and decision making, and GEM focusing on women's opportunities in economic and political arenas differs from GDI which is an indicator of gender inequality in basic capabilities.

So, it was important to calculate GEM along with GDI, because GDI is the more passive index in that sense because it just tell us what are the levels of achievement among women vis a vis that of their male counterparts. But the GEM tells us whether women are more actively involved in their economic and political life, because that leads to expansion of opportunities for women in different economic in political arenas.

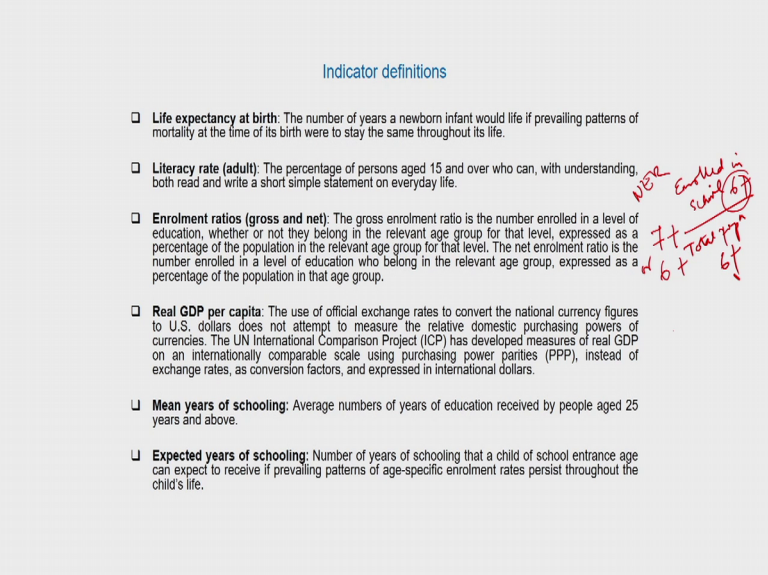
The human poverty index as we have just seen measures deprivations in human development compared to HDI which measures the achievements in human development. So, while HDI measures the overall progress in country in achieving human development, HPI reflects a distribution of progress and measures the backlog of deprivation that still exists. So, HPI-1 is constructed for developing countries and HPI 2 is constructed for industrialized countries. And the separate index and has been devised for industrial countries because human deprivation varies with the social and economic conditions of a community. And therefore, there is a need to take advantage of the great availability of data for these countries.

(Refer Slide Time: 49:20)



So, these are the indicators which we have already seen for HPI-1 and HPI 2 therefore, there is no need to repeat them here.

(Refer Slide Time: 49:27)



But it also let us end today's lecture by looking at some of the definitions of the indicators that we have seen. Life expectancy at birth, the longevity indicator tells us the number of years a newborn infant would leave if prevailing patterns of mortality at the time of it is birth were to stay the same throughout it is life. So, the life expectancy at now there is a difference between calculating life expectancy by different age groups. So,

when we calculating life expectancy at birth that is the most comprehensive indicator of how long human being can live, how long an individual lives, that tells us the expectation of the probability that the individual will survive a certain age at birth.

Adult literacy rate is the percentage of persons aged 15 and over who can with understanding both read and write a short simple statement on everyday life. So, notice this definition of adult literacy rate compared to the literacy rate, overall literacy rate definition which tells us the a number of people who can read and write.

For example, in India the number of people who can read and write above the age of 7 with some understanding in any Indian language compared to the percentage of persons aged 15 and above who can with some understanding read and write a short simple statement on everyday life. That tells us their capability of being able to participate in everyday economic decisions, economic or social or political decisions that they are making on an everyday basis.

Enrollment ratio has two concepts the gross enrolment ratio and the net enrolment ratio. Gross enrolment ratio is the number enrolled in a level of education, whether or not they belong in the relevant age group for that level, expressed as a percentage of population in the relevant age group for that level. Net enrolment ratio is the number enrolled in a level of education who belong in the relevant age group expressed as a percentage of the population in that age group.

So, to give you an example so, if in India the number of children who should enrolled get enrolled in school is age of children we should get enrolled in our school is 7 and above or 6 and above, then gross enrolment ratio will include all those children enrolled in school who are 6 and above, divided by the total population 6 and above.

So, it includes all those children enrolled in school who has 6 and above, divided by total population 6 and above. If the relevant age group that should be in school is 6 and above, then this will be referred to as net enrolment ratio. If all those enrolled in school if we take the population all of those enrolled in school irrespective of whether they have attained age 6 and above. So, which may include children below 6 years of age or above 6 years of age then we would referred refer it to as gross enrollment ratio.

So, gross enrolment ratio is the number enrolled in a level of education whether or not they belong in the relevant age group for that level expressed as a percentage of population the relevant age group for that level. And net enrollment is the number enrolled in a level of education who belong in the relevant age group. The indicator real GDP per capita shows us the use of official exchange rates to convert national currency figures to US dollars, and it does not attempt to measure the relative domestic purchasing powers of currencies. And the this estimate real GDP per capita is based upon the UN international comparison project which has developed measures of real GDP on an internationally comparable scale using the purchasing power parities.

Mean years of schooling refers to the average numbers of years of education received by people aged 20 years and above. And the expected years of schooling refers to number of years of schooling that the child of school entrance age can expect to receive if prevailing patterns of age specific enrolment rates persists throughout the child's life.

So, to end today's lecture what we, if I have to summarize today's lecture we did look at the evolution of the human development index, or the computation of the human development index. While we do understand that the concept of human development is all encompassing, it looks at opportunities and creation of capabilities, enlargement of capabilities, but measuring human development through an index or a development index is an overwhelming task; however, the HDI's because they are also a tool in advocacy they have taken it upon themselves to compute the HDI, because it can easily communicate with the policy makers as to which are those concerned areas the that requires more attention from the policymakers.

So, we saw how the HDI has evolved since 1990, how the dimensions have continue to remain the same. Whereas, because of data availability issues the indicators have changed, the methods of calculation of a of HDI has also seen changes over a period of time and there is a lot lack of consistency with regard to the number of indicators used.

That also tells us the enormous data requirements and challenges that exist with regard to ranking and comparison of countries on the basis of the human development index. We also saw the some of the definitions of other indicators which were which have been introduced to compensate for the limitations of the HDI; which takes while the dimensions remain the same, different indicators have been introduced to give a more

comprehensive picture of how countries have progressed or have been deprived over a period of time.

In next class we will look at the computation of the associated indices. Particularly, the GDI, GEM, HPI and the multidimensional poverty index. And by the end of the next class, we will summarize the measurability of human development indices for this course. And we will also have a very brief discussion with regard to what is the significance of looking at so many different indices. And what is the way forward and what are the different what are the recent experiments that are being carried out with regard to calculation of indices. See you in the next class.

Thank you.