

# Region-Wise Analysis of Human Capital Index: With Special Reference to India

*by Preeti Dabas*

Research Scholar, Department of Economics  
Maharshi Dayanand University, Rohtak, Haryana  
Email address: preetiidabas871@gmail.com

## Abstract

This research paper discusses the World Bank's inaugural Human Capital Index (HCI) launched in October 2018. The paper at the outset presents the formula for the HCI. The main objective of the paper is to give a region-wise analysis of HCI. The countries have been divided into seven regions on the basis of geographical locations; namely, East Asia and Pacific (EAP), Europe and Central Asia (ECA), Latin America and Caribbean (LAC), Middle East and North Africa (MENA), North America (NA), South Asia (SA), and Sub-Saharan Africa (SSA). Along with the seven regions, the paper also focuses on the India's performance in the different indicators of HCI and makes a comparison with respect to South Asia and world average.

**Key Words:** education, health, survival, gender, human capital.

## Introduction

Human capital consists of the skills, knowledge and health that people accumulate over their lives, enabling them to realize their potential as productive members of society. It has large payoffs for individuals, societies, and countries.

The benefits of human capital transcend private returns, extending to others and across generations. These individual returns to human capital add up to large benefits for economies- countries become richer as more human capital accumulates. Human capital complements physical capital in the production process and is an important input to technological innovation and long-run growth.

Investments in human capital are central to development, delivering substantial economic benefits in the long-run. Human capital investment generates significant social returns as well. However, the benefits of these investments often take time to materialize and their benefits to society are not always visible, leading to underinvestment in human capital.

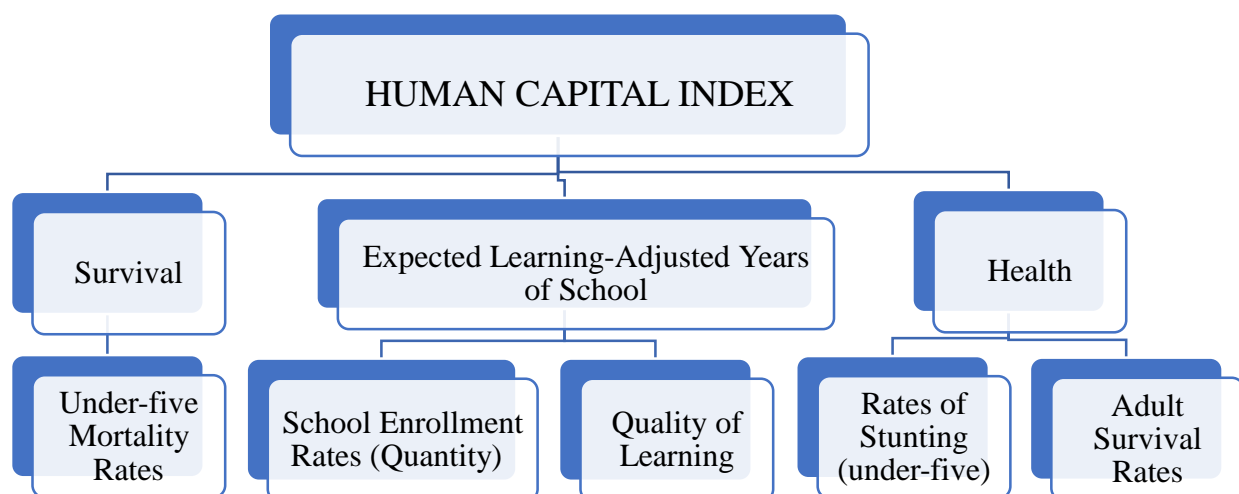
The Human Capital Index (HCI) is designed to highlight how investments that improve health and education outcomes today will affect the productivity of future generations of workers. HCI measures current education and health outcomes since they can be influenced by current policy interventions to improve the quantity and quality of education and health.

### Human Capital Index and Its Components

The index incorporates the dimensions of education and health into a single measure of human capital that a child born today can expect to attain by his / her 18<sup>th</sup> birthday, given the risks of poor education and health that prevail in the country where he / she lives. It is measured in units of productivity relative to a benchmark of complete education and full health. The value of HCI ranges from 0 to 1; where a value of  $x$  shows that a child born today can expect to be only  $x \times 100$  per cent as productive as a future worker as the child would be if the child enjoyed complete education and full health. In a nutshell, the index calculates how much the child's generation may fall short of achieving their full potential. The greater the value of HCI, the better the human capital position of that country.

There are five key indicators of HCI: child survival, school enrollment, quality of learning, healthy growth and adult survival. These indicators have been chosen because the global research has linked them directly to the productivity. These five indicators are clubbed into three components: survival (measured using under-five mortality rates), expected learning-adjusted years of school and health (measured by two proxy indicators; rates of stunting for children under age five and adult survival rate).

**Figure 1: Components of Human Capital Index**



For each country, HCI value tells about what the future of the generation born today will be compared to what it could be. For example, a country having an index value of 0.70 implies that the productivity of the workforce of the generation born today will be 70 per cent of what it could be if they had benefitted from complete education and full health; which means that such an environment is costing that country to 30 per cent of its income in the long-run.

The projected future per capita GDP will be approximately  $1/x$  times higher in the “complete education and full health” scenario than in the “status quo” scenario for a country where the value of HCI is  $x$ . That is to say, a country having an index value of 0.50 means that GDP per worker could be twice as high if country reached the benchmark of complete education and full health (World Bank’s Human Capital Project).

### **Research Methodology**

To fulfil the objectives of the study, secondary data has been retrieved from the World Bank’s Human Capital Project and World Development Report, 2019. The analysis is done for all the countries grouped into seven divisions on the basis of geographical locations. For easy comparison among the different regions and its comprehensibility, data has been presented in the form of figures and tables. Statistical tools like paired t-test, Pearson's product-moment correlation are used to draw the maximum from the data. R software has been used for hypotheses testing and graphics.

### **Objectives of the Study**

1. To provide an in-depth region-wise analysis of all the indicators of Human Capital Index.
2. To compare India’s performance in the different indicators of Human Capital Index with respect to South Asia and world average.

### **Hypotheses of the Study**

1. There is no statistically significant difference between ‘learning-adjusted years of school’ and ‘expected years of school’.
2. There is no significant relationship between ‘child survival’ and ‘adult survival’.
3. There is no statistically significant difference between HCI of boys and girls.

## Child Survival

It gives the probability of survival to age five, which is one minus under-five mortality rate. It represents the unfortunate reality that not all children born today will survive until the age of five, when the process of human capital accumulation through formal education begins.

**Figure 2: Probability of Survival to Age Five**

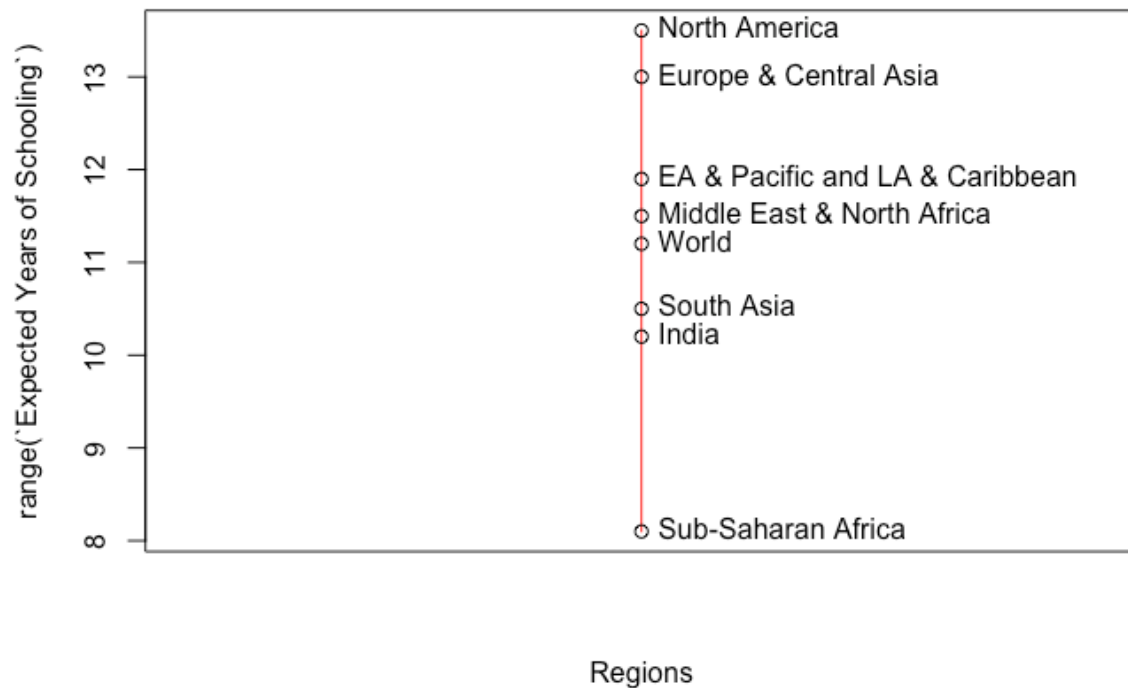


The above figure shows the probability of survival to age five. A child born in Europe and Central Asia and North America has a 99 per cent chance that the child would survive till the age of five years. Sub-Saharan Africa region has the least probability of 93 per cent. Whereas, that of India's is 96 per cent which is at par with South Asia as against the world's average of 97 per cent. However, East Asia and Pacific, Latin America and Caribbean, and Middle East and North Africa regions have equal chances of 98 per cent chance that the child would survive till the age of five years.

### Quantity of Education: Expected Years of School

Expected years of school reflects the quantity of education in the Human Capital Index. This indicator gives the number of years of school that a child can expect to attain by her 18<sup>th</sup> birthday if she starts preschool at age four and given enrollments rates in the country where she lives, for a maximum of 14 years. Expected years of school are calculated using repetition-adjusted enrollment rates by school level to proxy for age-specific enrollment rates up to age 18.

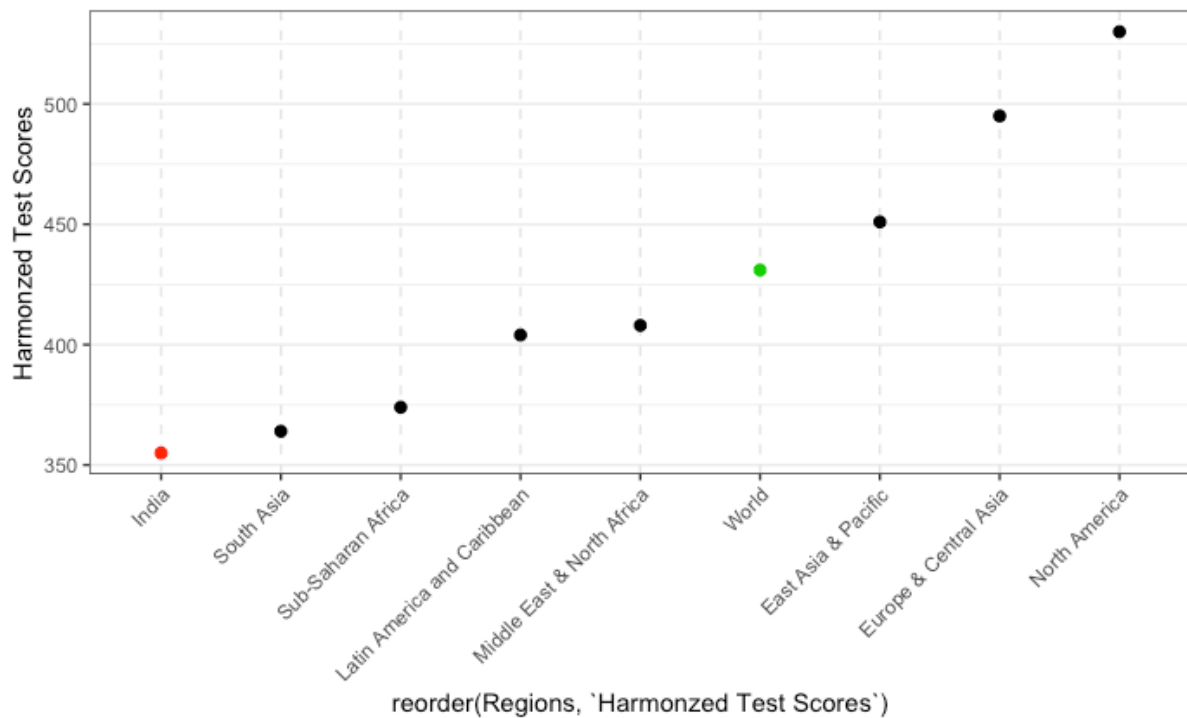
**Figure 3: Expected Years of School**



The best performer in this indicator has been North America (13.5 years against a maximum of 14 years) followed by Europe and Central Asia (13 years). On the other side, Sub-Saharan Africa has been the worst performer (only 8.1 years). Though, India's performance has also been quite sluggish (10.2 years) which is below than that of world's average (11.2 years) and of South Asia's also (10.5 years).

### Quality of Education: Harmonized Test Scores

Harmonized test scores combine the data from major international student achievement testing programs into common units, where a score of 300 represents minimal attainment and a score of 625 represents an advanced attainment to reflect the quality of education in the index.

**Figure 4: Harmonized Test Scores**

Harmonized test scores vary substantially. Similar to the expected years of school indicator (a measure of quantity of education), the top performer in harmonized test scores (a measure of quality of education) as well has been North America (530 against a maximum of 625 score) followed by Europe and Central Asia (495). But here, South Asia region stands at the bottom (364) and worst to that is India's score (355). While, the world's average is (431).

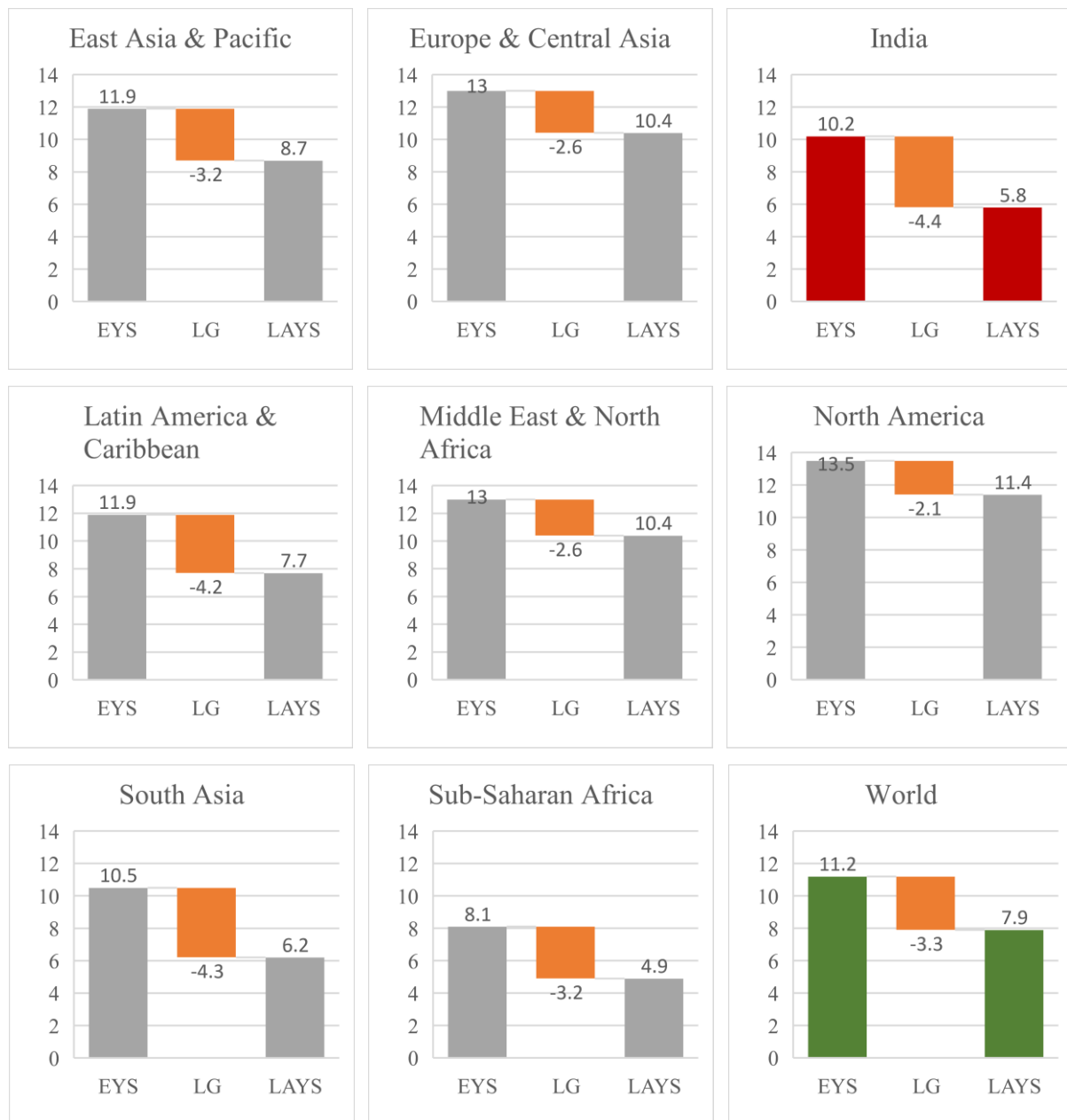
### **Expected Learning-Adjusted Years of School: How Much Are Children Actually Learning in School?**

Both the indicators of education, the expected years of school and harmonized test scores, are combined into another single indicator: expected learning-adjusted years of school which reflects how much in actually are children learning. This indicator discounts for the time spent in school by a factor measuring how much children learn. It is computed by multiplying expected years of school by harmonized test scores as a fraction of the advanced attainment benchmark score of 625.

For example, children in India are expected to complete 10.2 years of pre-primary, primary and secondary school by the age of 18. However, when these years of school are adjusted for the quality of learning, this is only equivalent to 5.8 years ( $10.2 \times 355 / 625$ ): that is, a learning gap of 4.4 years (10.2 years - 5.8 years).

Figure 5 shows the same for all regions.

**Figure 5: Showing Learning Gap**



Note: EYS – Expected Years of School; LG – Learning Gap; LAYS – Learning-Adjusted Years of School.

The orange colour in the above figure shows the learning gap which shows the gap between expected years of school and expected learning-adjusted years of school. India has the learning gap of 4.4 years which is higher than the average of all other regions indicating to poor quality of education. The best performance in education is again shown by the North America region with the highest expected years of school (13.5 years) and highest expected learning-adjusted years of school (11.4 years) and the lowest learning gap (of only 2.1 years). The least learning-

adjusted years of school are in Sub-Saharan Africa region (4.9 years only) with a learning gap of (3.2 years).

To see whether learning-adjusted years of school values are statistically less than the expected years of school; following hypothesis is formulated.

$H_0$ : There is no statistically significant difference between 'learning-adjusted years of school' and 'expected years of school'.

$H_A$ : 'Learning-adjusted years of school' are statistically less than 'expected years of school'.

The above hypothesis is tested using paired t-test.

### Box 1

```
Paired t-test
data: Learning-Adjusted Years of School and Expected Years of
School
t = -10.749, df = 6, p-value = 1.916e-05
Alternative Hypothesis: true difference in means is < 0
95 percent confidence interval:
    -Inf -2.750226
mean of the differences:  -3.357143
```

The box above shows the results of hypothesis testing. A low p-value and a high absolute t calculated statistic implies the rejection of null hypothesis, which thereby leads to the fact that 'Learning-adjusted years of school' are statistically less than 'expected years of school'.

### Health

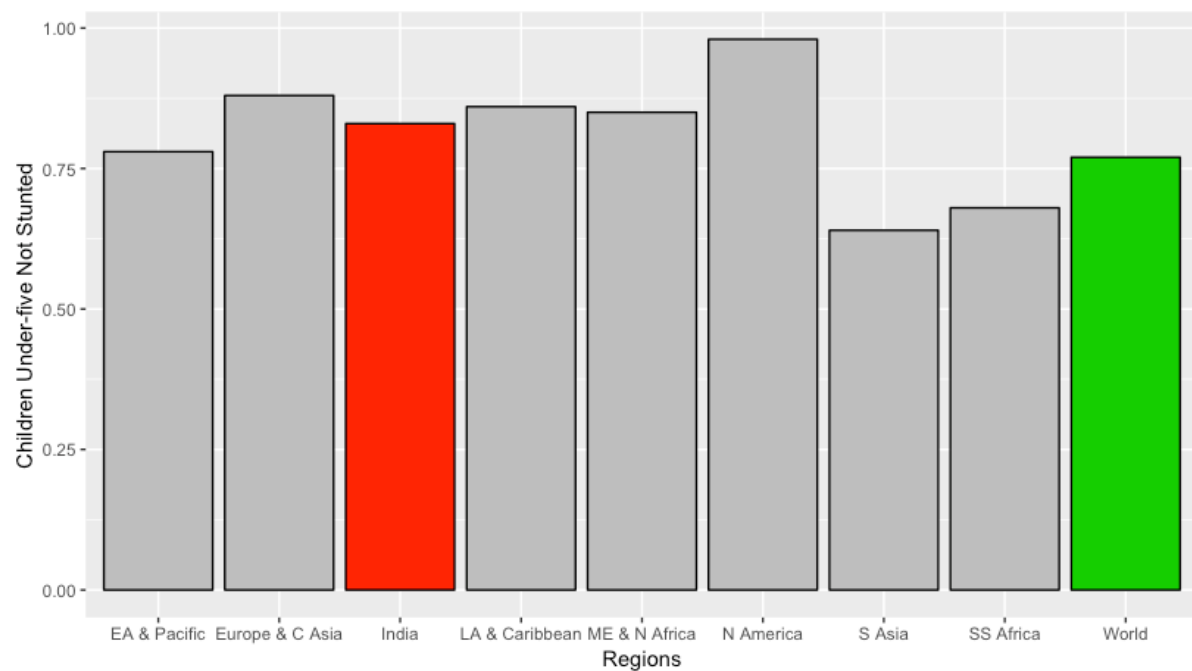
Health component is measured by two proxy indicators; namely, rates of stunting for children under age five and adult survival rate. Baseline estimates suggest that an improvement in overall health that is associated with a reduction in stunting rates of 10 percentage points and with an increase in adult survival rates of 10 percentage points raise the productivity by 3.5 per cent and 6.5 per cent respectively (World Bank Working Paper, September 2018).



### Children Under-five Not Stunted

This indicator gives the fraction of children under-five who are not stunted and are experiencing normal healthy growth. Stunting refers to low height-for-age. It summarizes the adverse health shocks experienced by children in their early years, with important consequences of adult health and well-being.

**Figure 6: Children Under-five Not Stunted**



In this indicator as well, North America has the highest number of children who are not stunted (98 per cent). Here, India's position (83 per cent) is better than that of South Asia (64 per cent) and world's average (77 per cent).

### Adult Survival

It is defined as the fraction of 15-year-olds that survive until age 60. This indicator serves as a summary indicator of the overall health environment in the context of HCI.

**Figure 7: Adult Survival**

Both child survival and adult survival are taken as the indicators in Human Capital Index. However, to see that the regions with low child survival rate are the ones with low adult survival rate; the following hypothesis is formulated and tested using Pearson's product-moment correlation test.

$H_0$ : There is no significant relationship between 'child survival' and 'adult survival'.

$H_A$ : There is significant relationship between 'child survival' and 'adult survival'.

**Box 2**

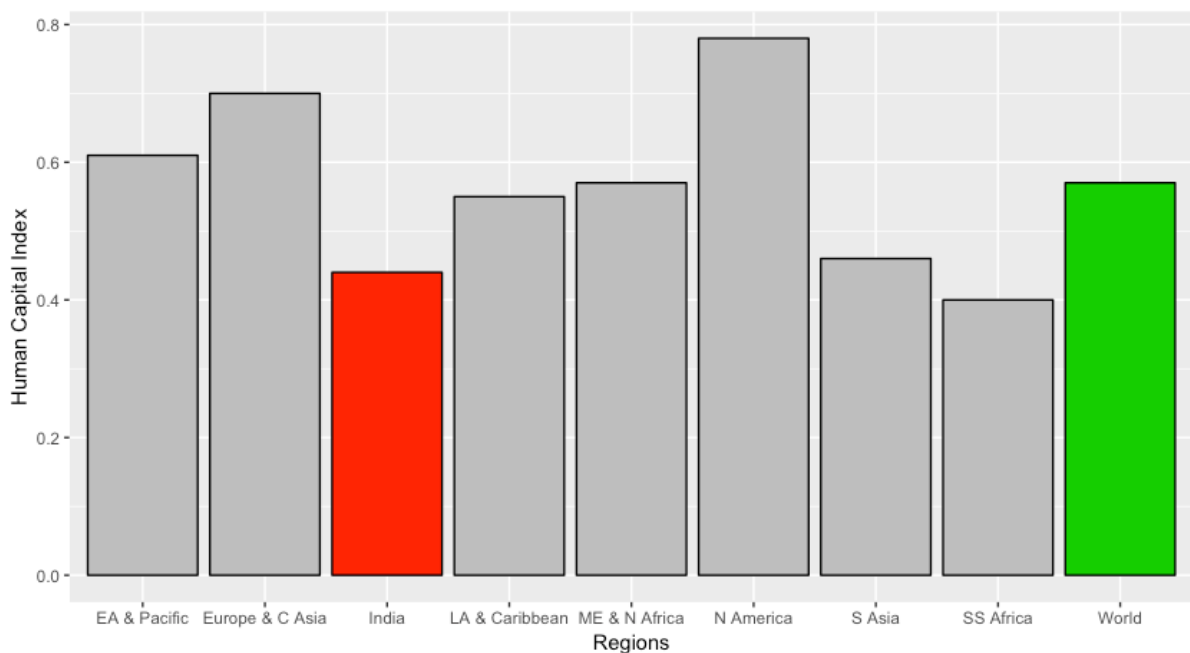
Pearson's product-moment correlation  
 data: **Child Survival and Adult Survival**  
 $t = 7.7698$ ,  $df = 5$ ,  $p\text{-value} = 0.0005651$   
 Alternative Hypothesis: true correlation is not equal to 0  
 95 percent confidence interval:  
 0.7525384 0.9944121  
 Cor = 0.9609954

The box above display the results for the same. The coefficient of correlation between child survival and adult survival is positive and very high ( $r = +.961$ ). The relation is high and significant as well as indicated by p-value less than 0.05 (checked at 5 per cent level of significance). Therefore, it can be drawn from here that the regions with low child survival rate are the ones with low adult survival rate.

**Human Capital Index**

Measures the human capital that a child born today can expect to attain by her 18<sup>th</sup> birthday, given the risks of poor health and poor education in the country where she lives. Units represent productivity relative to a benchmark of complete education and full health, on a scale of zero to one.

**Figure 8: Human Capital Index Value**



## Are There Gender Differences in Human Capital Index?

**Table 1: Human Capital Index of Girls and Boys**

Regions	HCI Girls	HCI Boys
East Asia & Pacific	0.63	0.60
Europe & Central Asia	0.73	0.68
India	0.45	0.43
Latin America & Caribbean	0.56	0.53
Middle East & North Africa	0.57	0.53
North America	0.78	0.76
South Asia	0.42	0.42
Sub-Saharan Africa	0.38	0.37
World	0.59	0.56

Source: Human Capital Project (World Bank).

To see if the HCI value differs between boys and girls, the following hypothesis is tested using paired t-test.

$H_0$ : There is no statistically significant difference between HCI of boys and girls.

$H_A$ : Girls HCI is greater than that of boys.

### Box 3

```

Paired t-test
data:  HCI Girls and HCI Boys
t = 3.9595, df = 6, p-value = 0.003728
Alternative Hypothesis: true difference in means is > 0
95 percent confidence interval:
 0.01309455      Inf
mean of the differences: 0.02571429

```

The box above display the results for the hypothesis. The p-value less than 0.05 implies rejection of null hypothesis. That means, girls HCI is greater than that of boys.

## Conclusion

Nurturing the human capital will fuel the prosperity of their generation and of the global economy. From the above discussion, it can be concluded that North America and Europe and Central Asia are two of the regions that have outperformed in all the indicators of Human Capital Index. On the other hand, Sub-Saharan Africa and South Asia were at the bottom of all indicators. India's performance has been below that of South Asia and the world's average in all the indicators except in proportion of children under-five not stunted.

It is also drawn from the data that the girls performance in HCI is statistically greater than that of boys.

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