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An analytical study of HDI among India and its adjoining nations with reference to the relationship of literacy rate

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Abstract: Economic growth is consistently a concern for any country. GDP growth and per capita income is a vital indicator on economic growth. These pointers portray the increase or decrease in productivity and income of the economy. Humans are an important part of productivity, but human welfare, equity, and social justice are not recorded. Economic advancement cannot be measured through GDP contribution, as it overlooks the disparity of income, poverty, unemployment, and other issues in the economy. The concept of the human development index proposed by Mahbub-ul-Haq and later refined by UNDP provides the correct parameter for evaluating economic development. This paper endeavours to comprehend the pattern of HDI among Indian and its adjoining nations and to check the contribution of each parameter in calculating the HDI of any country. The impact of the literacy rate on the HDI rate is also studied in the paper.

Keywords: economic growth; GDP; economic development; literacy rate; HDI.

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Biographical notes: Sugandha Agarwal is a research scholar at AKTU, Lucknow. She is MBA, MCom and NET qualified and has vast teaching experience of 12 years in various government and non-government institutions in the subject domains of HR, OB, Indian economy, international business management, business ethics, and talent management. She is dedicated and has contributed to academics by her diverse experience in domains such as heading the student society, organising national conference, HR conclave, organising job fair, etc. She has been recognised for conducting the workshop, catering to the need of section officers by Ministry of Power. She has published and presented ten research papers in various national, international journals and conferences/seminars.

Deepa Gupta is a new age woman and an innovative educationist with entrepreneurial zeal. She has a Doctorate in the field of Corporate Social Responsibility and has more than 21 years of academic experience in the field of management studies. She had worked as an Adjunct Faculty for Michigan Tech University, Michigan, USA and an active researcher, critical thinker and avid reader having hands-on experience in the field human resource management. She has organised and conducted various conferences, workshops, symposiums, faculty development programs, management development programs, and executive development programs and has been a panellist/keynote speaker to various conferences and seminars. She has presented and published various research papers in various international and national conferences and journals. She is an active member of SHRM, AIMA, ISTD, NHRDN, MTC Global, IIER, UPUA, etc.

1 Introduction

For any country, economic growth and human development should move simultaneously and if it is not witnessed, then government interference is required to achieve the increase HDI rate along with the GDP growth (Xiao and Wang, 2021). In recent years countries had realised that for a growing nation the growth of people will push the economic growth of the country too. Today countries are targeting to achieve the 7 sustainable goals by 2030 and this is directly affecting the three components of HDI laid by UNDP. The concept of the HDI was first explained by a Pakistani Economist Mahbub-ul-Haq and followed by the Indian Nobel prize winner Amartya Sen. With the sustainable development agenda 2030 UNDP is also working on the reduction of inequality and poverty, increase in health prospects, building institutional capabilities and resilience. It is well observed that a country might rise at its GDP indicators but may not have a positive effect on the country's human development. Developed nations might raise their productivity but focus on resolving social issues like gender inequality, health problems, violence, and crime may not be addressed (Cook and Davíðsdóttir, 2021). A country falling under low-income or medium-income countries might have increased the standard of living and carried social justice and equity (Han and Lee, 2020). Purba (2019), This is in line with the hypothesis that says that as the number of poor people decreases, it will increase the HDI.

The economic development and the expansion of the monetary business sectors have given the residents plenty of speculation items to coordinate his/her pay towards. Nonetheless, the low degrees of education, just as monetary proficiency, prevent the person from settling on a prudent decision concerning his/her monetary planning. Henceforth, to guarantee judicious decision making, it is high time that nation should guarantee making the strides in elevating education and training to its residents (Ryu et al., 2020). The requirement for advancing education among residents emerges because of different demographic, market-driven (economic and financial), innovative, technological, and social variables. (Bhatia, et al., 2021)

Imparting education and training is vital for the country's human development, economic development, and improvement and henceforth the fruitful execution of the education projects would prompt different advantages like the expansion and high confidence, making better arrangements for future requirements, purchaser assurance,

financial inclusions and consumer protection leading to the development for human capital for the nation. (Sahi, 2009)

The human development approach advises us that economic development is a bigger number of means than the end. More material assets matter, when genuinely conveyed and inside planetary limits, because they grow individuals' chances, starting with one generation then onto the next. For sure, the pay part of the original HDI was intended to fill in as an intermediary for material assets that empower a set-up of fundamental capacities that extend individuals' opportunities. Two abilities – carrying on with a healthy life and having an education – are of such basic significance that they have been estimated as a component of the HDI since its commencement. In contrast, to pay or economic growth AND development, they are implied as well as closures in themselves. (Human Development Report 2020)

The 2019 Human Development Report contended that another age of upgraded capacities is turning out to be more significant for individuals to flourish in the digital age. The focal principles of human improvement have not changed. What has changed is the specific situation. Consider that more than 1 billion individuals have been lifted out of outrageous neediness and lack of education inside an age, irrefutably perhaps the best achievement. Yet additionally consider that the COVID-19 pandemic may have driven around 100 million individuals into outrageous destitution, unemployment, illiteracy, the most exceedingly terrible mishap in an age. Human development may have endured a big hit in 2020. Disposing of neediness and lack of education in the entirety of its structures – and keeping it dispensed within a unique world – stays focal, yet aspirations are persistently being raised, as they ought to be, close by a strong responsibility not to abandon anybody simultaneously. Human advancement is a continuous excursion, not a destination (Çilingirtürk and Koçak, 2018). Its focal point of gravity has consistently been about something beyond addressing essential requirements. It is tied in with engaging individuals to distinguish and seek after their ways for a significant life, one moored in growth opportunities (Efehan and Burak, 2017). Human development is about empowering individuals to recognise and seek after their ways for a significant life, one secured in growth opportunities and freedoms (Human Development Report, 2020).

2 Conceptual model HDI

The concept and measurement parameters of calculating the HDI are being studied and refined with the changing needs and time (UNDP, 2016). According to UNDP to the HDI includes three dimensions:

- Long and Healthy Life: we calculated it by obtaining the statistical data related to the life expectancy at birth, leading to the development of the life expectancy index.
- Knowledgeable: education dimension index is developed by obtaining the statistical data of expected years of schooling and mean years of schooling.
- Standard of Living: Purchasing Power The parity tool is used to calculate the standard of living.

The new HDI is the mathematical mean of life expectancy index (LEI), education index (EI), and income index (II). After this computation, the values lie somewhere in the

range of 0 and 1. According to the qualities acquired, nations are put in the rundown of the division of nations.

The HDI of India is 0.640 and ranked at 130th position in the world. To calculate the economic development of a country, HDI plays a vital role. In this research, an attempt is made to understand three parameters, first, the trend of literacy rate in India and neighbouring countries for the last 10 years, second, the trend country, of HDI rate in India and neighbouring countries for the last 10 years, and third, to identify that how one component, i.e., literacy rate is affecting the HDI rate for last 10 years. It is stated by the authors that education and economic growth have a co-integration among themselves (Derick Taylor Adu, 2017), so considering that literacy rate and HDI are analysed in the third part of this paper.

3 Literature review

Türk et al. (2021) this paper analyses, carry out and test the legitimacy of a super-nearby variation of HDI with regards to instructive execution of youthful students. The HDI gives a learning potential that might be bridled to upgrade experiences into the size of human potential at super-neighbourhood levels.

Mundra and Singh (2017) this study as the HDI is perhaps the main marker of a practical turn of events, thus, this investigation looks at the effect of the development (GSDP) on an HDI score for particular territories of India and attempts to investigate the aberrations among various Indian states on specific HDI pointers.

Roopchand (2017) had identified the correlation between the HDI and economic growth. Statistics show that Mauritius witnessed high economic growth and a high HDI rate. The researcher had illustrated the direct connection between the HDI rate and the Economic rate. According to his findings, any country for economic growth should invest in human development, although there are many other variables responsible for economic growth, so it becomes difficult to enumerate each variable. Sahani (2020) examined the relationship between economic growth and human development in various states of Gujrat. Regional disparity in terms of lack of access to basic facilities like education and health is studied. The paper concluded that the growth strategy of Gujrat should be more people-oriented.

Quang (2020) this paper discusses the role of foreign direct investment in economic growth and human development. Major exploration made by the author is on three foremost elements of HDI which are education, life expectancy, and standard of living. The author had discussed variables like foreign capital flows, human capital, economic growth, institutional quality, macroeconomic variable, and gender equality.

Malathi (2021) in this paper, the author had discussed the nation's growth measured through economic growth. He had further discussed the HDI and scrutinised the fitness of the index to quantify the various HDI parameters.

Jacob (2021) this paper is discussing the sustainability index concerning the HDI, adding no new indicator. The author had combined the dependence on sustainability with complete achievements. The paper concluded that using SHDI a policy can be created which will boost sustainable human development.

Sarkodiea (2020) the paper examines the nexus of seven sustainability development goals by using the nonparametric regression technique. The study concluded that the

labour' market should be effectively promoted and socio-economic capacity should be improved so that human development can be endorsed.

Kansal and Singhal (2018) this study is to foster an altered skill model for an information-based association. An ability model is an association-wide structure and an illustrative device that recognises the skills needed for powerful execution in a particular work, occupation, industry, or association. It is a quantifiable rundown of the information, abilities, and characteristics showed through singular conduct that outcomes in exceptional execution in a particular work setting.

Eko Wahyu Nugrahadi (2018) the study aims to see how unemployment, per capita income, education, and health affect the HDI in North Sumatra. The findings show that the variables utilised in this study have a substantial impact on the HDI in both the short and long term. If per capita income, education, and health improve together with a fall in the unemployment rate, it will be a win-win situation.

Kai Liu (2020) this paper found a positive correlation between the HDI and infection rate of COVID in Italy.

Aparajita (2020) in this paper, the author had tried to develop the two generalised models of HDI without breaking the law of UNDP. Based on UNDP goals and making them more year-specific, a relative measure of GHDI is proposed. A multi-criterion decision-making model and implemented on countries based on HDR data available.

Niranjan (2020) this paper is investigating the four-dimensional disproportion in HDI at the district level of Karnataka. The results helped to decrease the spatial inequalities at the sub-state level which will further help to attain the sustainable goals by 2030.

Chaudhary (2014) had to find out the trend of major factors affecting HDI in various states in India. To conclude, the ranking method applies to the HDI of different states and the subfactor of HDI of a different state.

Stanton (2007) talked about the theoretical history of HDI by UNDP's. The Paper started with social welfare and further discussed three sequential revolutions in the development of measurement techniques of HDI. Research started with the origin of the idea by Mahbub-ul-Haq and Amrataya Sen. Further, all the social welfare measures used in economic development, national income, and other composites of HDI are used in past and present were chronically explained. Further, Ngo (2021) the paper focuses on the impact of FDI in fostering economic growth and human development. The three determinants of HDI are investigated in 102 countries from 1990 to 2015 using the two-stage least square method. The findings of the study highlight the productive role of foreign capital flow to support HDI parameters.

Nayak (2019) describes that the HDI and growth as prescribed by INDP is the widely accepted measurement for computing economic development. The paper describes three aspects of HDI: its origination, emergence of scale, and methods applied to its measurement.

Kovacevic (2011) explained the review of critiques on HDI in 20 years. The critiques are mostly given on the indicator chosen, correlation of HDI, the functionality of HDI, normalisation, aggregation vs multiplication, and weighted issues. The analysis of critiques provides various modifications of HDI.

Klasen (2012) despite considering all the human welfare aspects in the calculation of HDI still, ignores the unequal distribution of human development in the economy. The researcher has proposed a method of proving the HDI at the household level. Across the population and subgroup, the inequality in human development is analysed in the paper. Analysis was made among 15 developing countries and it was concluded that although

HDI was high in many countries still inequalities among the population were also high might be because of unequal distribution of education and income.

Squire (2006) an index of UNDPs is being criticised. The researcher addresses the equal weights applied in HDI and CDI and other substitute weighting schemes. From the respondents from 60 countries, an electronic survey was conducted. It explained although there is widespread criticism of equal weights still it is more convenient and consistent to adopt a simple scheme based on equal weights. The top 15 countries based on HDI and CDI have also been identified. The information has been portrayed graphically. Thus, it can be assumed that a high HDI does not ensure a high CDI value as the CDI is a lot more in-depth (Prakash and Garg, 2019).

Ranis (2004) in the paper recognised the interrelationship between economic growth and economic development. Income growth increases the capabilities of an individual to choose among the resources, but it does not guarantee sustainable development in the country. Government policy and public funding play an important role in HD improvement. Paper emphasised fixing the priority towards improving education level and health for an increase in the standard of living and improving the HDI growth rate.

Bontis (2004) to manage the undetectable treasure of the country, the articulation of a system is required for improving the intellectual capital of a nation. Human capital can become the potential future source of raise in intellectual wealth by creating an enhanced understanding of values, individuals, enterprises, institutions, and communities.

Najam (1998) A series of human development reports including the computed HDI is been regularly published by UNDP. Unlike the traditional method of measuring economic development through GDP, this HDI gives better clarity. The researcher has attempted to evaluate the conceptual method of ranking the countries based on HDI and also the further scope of development in measurement scale.

Khan et al. (2019) With the internet and mobile penetration, observational results show GDP has a positive and important effect on the HDI. With both internet and smartphone penetrations, FDI contributes to human growth, ICT stimulates human development, and trade detracts from human development.

4 Research objectives and methodology

4.1 Research objectives

The study was undertaken with the following objectives.

- To study the literacy rate pattern in India and its neighbouring countries
- To study the HDI pattern of HDI in India and its neighbouring countries
- To study the contribution of literacy-rate in HDI of India and its neighbouring countries.

4.2 Research methodology

The research methodology is the method of taking care of the research issue in efficient and logical ways. It is seen as a sequence of stages underlying the plan and execution of a research project, including the foundation of the research objectives, aim, reason and

thoughts, data assessment, research design, and execution. Research methodology for this research has been investigated as under:

4.2.1 *Research design*

The purpose of this work was to study the HDI pattern of the HDI in India and its adjoining nations and to study the contribution of literacy rate in the HDI of India and its neighbouring nations. Hence, the descriptive research design has been used. There are three aspects covered in this descriptive research.

4.2.2 *Data collection and period of study*

The data is collected from a secondary source like the UNDP report, World Bank report, various government websites, journals, published articles and reports, books, etc. The period of study considered is from 2011 to 2021. Data collected for the study is limited to India and its neighbouring countries, namely Bangladesh, Bhutan, China, India, Myanmar, Nepal, Pakistan, Sri Lanka.

4.2.3 *Statistical tools and data analysis*

To identify the results and estimating the relationship among variables, regression analysis as a statistical tool is applied. This method is applied to investigate the relationship between the dependent and independent variables, creating a linear equation (Kaya Uyanık, 2013). The study aims to find out the pattern of literacy rate and HDI rate over years so trend analysis as a statistical technique is applied.

Table 1 Research design

<i>Data</i>	Secondary
<i>Data source</i>	UNDP reports, journals, books
<i>Period of study</i>	2011–2019
<i>Type of research</i>	Descriptive and explorative
<i>Statistical techniques</i>	Regression analysis, trend analysis,
<i>Sample size</i>	Bangladesh, Bhutan, China, India, Myanmar, Nepal, Pakistan, Sri Lanka

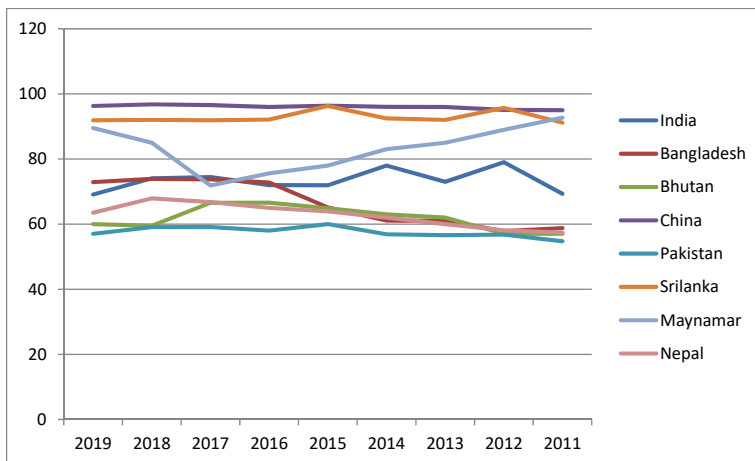
5 Analysis

5.1 *The trend of literacy rate*

The trend of literacy rate of India, Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, and Sri Lanka for 2016, 2017, and 2018 are analysed.

Table 2 Literacy rate

Literacy rate	India	Bangladesh	Bhutan	China	Pakistan	Srilanka	Myanmar	Nepal
2019	69.1	72.89	60	96.3	57	91.9	89.5	63.49
2018	74.04	73.91	59.5	96.8	59.1	92	85	67.91
2017	74.45	73.76	66.56	96.56	59.13	91.9	71.85	66.8
2016	72	72.76	66.6	96	58	92.13	75.6	65
2015	71.96	65.14	64.9	96.4	60	96.3	78	63.9
2014	78	61.09	63	96.02	56.89	92.5	83	62
2013	73	61.02	62	96	56.59	92	85	60
2012	79	57.86	57.03	95.09	56.76	95.7	89	58.09
2011	69.3	58.77	57	95	54.74	91.18	92.7	57.4

Figure 1 Graph of literacy rate for 2016, 2017 and 2018 (see online version for colours)

After analysing the above data we can understand the following points:

- The literacy rate of India is varying from 69 to 75 not having any wide difference.
- The literacy rate of Bangladesh is varying from 58 to 72 progressively.
- The literacy rate of Bhutan is varying from 57 to 60 in a progressive manner but decreases after 2017.
- The literacy rate of China is varying from 95 to 96.
- The literacy rate of Pakistan is varying from 54 to 60 progressively up to 2015 after that the rate is fluctuating every year.
- The literacy rate of Sri Lanka is varying from 91 to 96, but the rate is fluctuating each year.
- The literacy rate of Nepal is varying from 71 to 92, but the rate is fluctuating each year.

- The literacy rate of Myanmar is varying from 57 to 67 in progressive manners.

Inferences: From the above results, it can be easily determined that the literacy rate is escalating for Bangladesh and Myanmar. Countries like Pakistan, Sri Lanka, Bhutan, and Nepal observe the oscillated behaviour. India and China do not observe major variation over the period.

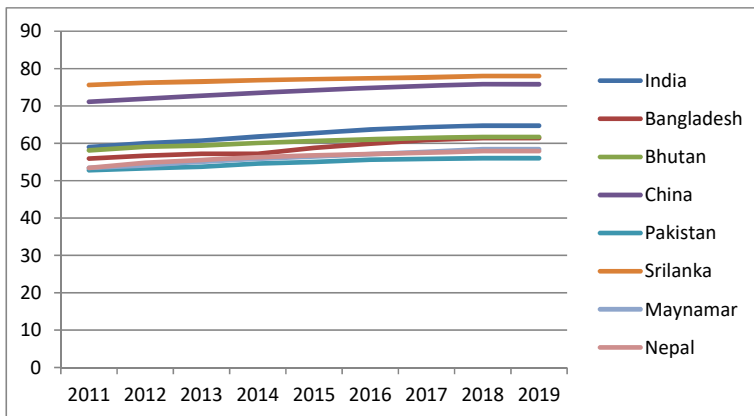
5.2 Trend of HDI

HDI is a method to rank the countries and measure the average achievement and progress in terms of the citizen of the country. The literacy rate in India and China had witnessed no major variation over the year.

Table 3 HDI

HDI	India	Bangladesh	Bhutan	China	Pakistan	Srilanka	Myanmar	Nepal
2019	64.7	61.4	61.7	75.8	56	78	58.4	57.9
2018	64.7	61.4	61.7	75.8	56	78	58.4	57.9
2017	64.3	60.9	61.5	75.3	55.8	77.6	57.7	57.4
2016	63.7	59.9	61	74.9	55.6	77.4	57.1	57.2
2015	62.7	58.8	60.6	74.2	55	77.2	56.5	56.8
2014	61.8	57.2	60.1	73.5	54.6	76.9	55.8	56.2
2013	60.7	57.2	59.4	72.7	53.7	76.5	55.1	55.5
2012	60	56.7	59.1	71.9	53.3	76.2	54.1	54.8
2011	59	55.9	58.1	71.1	52.8	75.6	53.4	53.4

Figure 2 Graph for HDI rate (see online version for colours)



The HDI rate of all the countries is increasing progressively. Inferences: After reviewing the two datasets, literacy rate and HDI separately, it is observed that although the literacy rate pattern is different for countries, still all the countries observed are showing the speeding up HDI rate. We can conclude that apart from literacy rate the other two-factor health and standard of living supported to boost of the HDI of the country.

5.3 Regression analysis

Regression analysis is conducted to find the impact of literacy rate on the HDI of India and neighbouring countries. The purpose is to check that whether an improved literacy rate affects the HDI rate or not.

5.3.1 Regression analysis of India

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). From the result derived R-square (0.031) and checking the p-value ($0.65 > 0.05$) it can be concluded that literacy reliably does not predict the HDI rate in India.

Table 4 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	70,452		4,121	0.004
Literacy rate	-0.110	-0.175	-0.471	0.652

Note: $R^2 = 0.031$, regression equation: $- Y = 70,452 - 0.1X$.

5.3.2 Regression analysis of Bangladesh

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). 94.8% improvement in HDI can be predicted using literacy rate. When p-value 0.000 is compared to alpha level (0.05), it is smaller, so we can conclude that literacy reliably predicts the HDI in Bangladesh.

Table 5 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	38,720		21,664	0.000
Literacy rate	0.303	0.974	11,301	0.000

Note: $R^2 = 0.948$, regression equation: $- Y = 38,720 + 0.3X$.

5.3.3 Regression analysis of Bhutan

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). From the result derived R-square (0.279) and checking the p-value ($0.144 > 0.05$) it can be concluded that literacy reliably does not predict the HDI rate in Bhutan.

Table 6 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	49,164		7,218	0.000
Literacy rate	0.181	0.528	1,646	0.144

Note: $R^2 = 0.279$, regression equation: $- Y = 49,164 + 0.2X$.

5.3.4 Regression analysis of China

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). 80.5% improvement in HDI can be predicted using literacy rate. When p-value 0.001 is compared to alpha level (0.05), it is smaller, so we can conclude that literacy reliably predicts the HDI in China.

Table 7 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	-167,147		-3,730	0.007
Literacy rate	2,511	0.897	5,379	0.001

Note: $R^2 = 0.805$, regression equation: $- Y = -167,147 + 2.6X$.

5.3.5 Regression analysis of Pakistan

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). 52.8% improvement in HDI can be predicted using literacy rate. When p-value 0.02 is compared to alpha level (0.05), it is smaller, so we can conclude that literacy reliably predicts the HDI in Pakistan.

Table 8 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	23,270		2,069	0.077
Literacy rate	0.547	0.727	2,800	0.027

Note: $R^2 = 0.528$, regression equation: $- Y = 23,270 + 0.6X$.

5.3.6 Regression analysis of Sri Lanka

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). From the result derived R-square (0.015) and checking the p-value (0.75 > 0.05) it can be concluded that literacy reliably does not predict the HDI rate in Sri Lanka.

Table 9 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	113,500		1,766	0.121
Literacy rate	-0.268	-0.121	-0.321	0.757

Note: $R^2 = 0.015$, regression equation: $-Y = -113,500 - 0.3X$.

5.3.7 Regression analysis of Myanmar

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). From the result derived R-square (0.231) and checking the p-value ($0.19 > 0.05$) it can be concluded that literacy reliably does not predict the HDI rate in Myanmar.

Table 10 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	66,776		9,192	0.000
Literacy rate	-0.126	-0.480	-1,450	0.190

Note: $R^2 = 0.231$, regression equation: $-Y = 66,776 - 0.1X$.

5.3.8 Regression analysis of Nepal

Inferences: R – is the correlation between the observed and predicted value of the independent variable whereas R-square is the proportion of variance in the dependent variable (HDI) which can be predicted from the independent variable (literacy). 84.1% improvement in HDI can be predicted using literacy rate.

Table 11 Regression analysis summary for literacy rate predicting HDI

<i>Variable</i>	<i>B</i>	<i>Beta</i>	<i>T</i>	<i>P</i>
Constant	32,459		8,267	0.007
Literacy rate	0.381	0.917	6,093	0.000

Note: $R^2 = 0.841$, regression equation: $-Y = 32,459 + 0.4X$.

When p-value 0.000 is compared to alpha level (0.05), it is smaller, so we can conclude that literacy reliably predicts the HDI.

The HDI includes three important components – education, health, and standard of living. The relative change in these three attributes depicts the change in the HDI rate for the countries. This means education, health, and standard of living are the independent variables and HDI rate is the dependent variable. If multi-variate regression, the equation will be.

$$Y = a + bX_1 + bX_2 + bX_3$$

where Y = HDI, X1 = literacy rate, X2 = education, and X3 = standard of living

In this paper, only single attribute education is considered, so the equation formed for each observed country is

where $Y = \text{HDI}$, $X_1 = \text{literacy rate}$

So the simple regression equation formed is

$$Y = a + b X_1$$

Table 12 Regression analysis HDI and literacy rate

Countries	R	Regression equation	F-test	Sig. (ANOVA table)	Sig/not sig.
India	0.175	$Y=70.452 - 0.1X$	0.222	0.652	Not significant
Bangladesh	0.974	$Y=38.720 + 0.3X$	127,712	0.000	Significant
Bhutan	0.528	$Y=49.164 + 0.2X$	2.708	0.144	Not significant
China	0.897	$Y=-167.147 + 2.6X$	28,934	0.001	Significant
Pakistan	0.727	$Y=23.270 + 0.6X$	7,841	0.027	Significant
Sri Lanka	0.121	$Y=113.500 - 0.3X$	0.103	0.757	Not significant
Myanmar	0.480	$Y=66.776 - 0.1X$	2,101	0.190	Not significant
Nepal	0.917	$Y=32.459 + 0.4X$	37,125	0.000	Significant

R explains the correlation between the variables. Here the value of R squared explains the correlation between the HDI and Literacy rate. As per the R for Bangladesh, China, Pakistan, and Nepal are 0.974, 0.897, 0.727, and 0.917 respectively, indicating a strong correlation between the literacy rate and HDI. On the other hand for India and Sri Lanka, the R is 0.175 and 0.121 explaining the weak correlation between the variables this may be because the Standard of living and life expectancy rate is overshadowing the effect of literacy on HDI.

Coefficient defines the positive or negative direction of effect of each independent variable on the dependent variable. It only explains the expected increase or decreases on the dependent variable with any change in the independent variable. In the study, Literacy is the independent variable and the HDI is the dependent variable, as the study is about the effect on the HDI by the change in the literacy rate in the country. According to the theory of HDI given by the Mahbub-ul-Haq and redefined by the UNDP, HDI includes three parameters literacy rate, the standard of living, and life expectancy. So conceptually there should be a positive relationship between the literacy rate and HDI Rate. But when the results are studied it is not favourable for India, Sri Lanka, and Myanmar. This implies that for these countries literacy or education is not playing a vital role in accelerating the HDI rate.

For every change of 0.3 in the literacy index the HDI changes by 0.1. So these countries every investment in education causes an improvement in the HDI rate.

6 Conclusions and implications

Countries all over the world aim to achieve economic growth and development. Although development is directly proportional to growth, it is not the correct picture. UNDP had laid down parameters on which the development of countries is assessed at different intervals. Presently, each country is looking forward to achieving the sustainable goals laid by UNDP by 2030. Many authors had also discussed the countries' development

through HDI, SHDI, etc. and is observed that literacy is an important part of these scales. An attempt is made in this study to understand the pattern of literacy rate and HDI and to scrutiny that is contributing to the HDI. This will help to check on the literacy pattern so that they can frame further strategies for strengthening the education system of the country.

6.1 Implications

Education is discovered to be powerful in upgrading human abilities and their efficiency levels and amount to the ideal results of desired outcomes of economic advancement and development. It affects the socio-economic and improvement of a nation and impacts raising the quality of human life and capital

Of the three variables, affecting individuals' advancement and their capacities according to HDI, literacy is one of the three. The research explores the role of literacy and its impact on HDI among India and its adjoining nations assuming the other two factors to be improved if literacy improves. The motive is to comprehend whether literacy affects or not as this will help strategy creators to redraw the need to work on the status, especially in those countries which are lingering behind and getting antagonistically affected by being developed.

6.2 Scope of future research and limitations

Few aspects, like collecting data for all the countries, dividing them into three different strata of developing, developed and underdeveloped countries can be done in future research. We have considered the single attributes in the study, which in turn gives ample scope of including the other two attributes. The research was limited to the secondary data collected

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