Population Growth and Levels of Education in Bihar

Shahid Imam

Associate Professor, Ex. Head, Department of Geography, D. S. College, Aligarh, India

Abstract: *The present paper tries to analyse the trends of population growth and literacy rate and their correlation in India and Bihar, since 1951 to 2011, which indicates high level of positive correlation and is significant at 95% level of confidence in terms of Bihar, but in India, it indicates low level of positive correlation and is not significant. Apart from this, we have tried to understand district level disparity in population growth rate and literacy rate as well as sixteen other variables to assess the level of education in Bihar. On the basis of composite z - score value it has been established that out of 38 districts only four districts recorded positive composite z - score, which clearly reflects the level of education in Bihar, which can be authenticated by means of the lowest literacy rate of 61.80 percent of Bihar, among all Indians state in 2011. It has been clear from the study that all the four districts having high population growth rate are located in North Bihar and all of the four districts having high literacy rate are located in South Bihar. Attempt has also been made to identify the coefficient of correlation by means of Karl Pearson's method, between population growth rate and seventeen variable related to level of education, including literacy rate at district level. Population growth rate and literacy rate have medium level of negative correlation, and is significant at 99% level of confidence. Apart from this, two other variables like number of affiliated college and Constituent colleges are having low level of negative correlation, and are not significant. Whereas, rest of the fourteen variables are positively correlated with population growth rate.*

Keywords: Population Growth, Levels of Education, Bihar, Literacy Rate, Coefficient of Correlation, Z - Score, Trends of Population Growth, Trends of Literacy Rate

1. Introduction

Overpopulation is a major cause of most of the world's problem. Population affects everything whether it is food shortage, lack of drinking water, energy resources or the education system, which is in one way or the other is necessary for today's world. Increment in population size is known as population growth which brings changes not only in culture, tradition, behaviors and customs but level of education too. Growth of population reduces the amount of education received by children in a developing country like India and especially Bihar state. The population of Bihar is on the rise with a decadal growth rate of 25.42 percent in 2011, as against 17.70 percent in the country as a whole. Apart from this India is working hard to maintain an educational system which ensures a better education to every student, irrespective of cast, creed and religion. In this stage of demographic transition, where there is fall in both the mortality and fertility rate, leads to growing number of youth, who are required to be educated by means of proper education, so that they may be productively employed. Smaller family size allow more children to be educated and can even promote education for girl child, as girls from large family size and with limited resources are least likely to attend schools. Higher growth rate of population is one of the major roadblock to the development of education system in Bihar. It has been established in population studies that education is strongly related with demographic characteristics, especially population growth. Education is an important aspect of today's society, which produces skilled and specialized manpower and creates awareness among the people regarding social, cultural and political aspects of the society. But education system in Bihar has been adversely affected by the growing population, which always remained high, above 20 percent since 1971, whereas India as a whole showed a declining trend. Due to fast growth rate, there has been a continuous increase in the number of school going children. Increasing number of school going children, due to higher growth of population, also demand more schools, teachers and other facilities too, like books, and many other things related to it, which is still a challenge to fulfill the demand in Bihar, where there is very scarce resources for education.

When we consider the problem of education it is not possible to ignore the problem of population growth, with this growing population it is needless to say that we should start new schools for the increasing number of aspirants, which are ever thicker than even before, which has affected all students, teachers, curriculum and even, teaching methods. There are many students who vary in their interests and intellectual capacity, which requires multifarious educational facilities to fulfill the need of these students. Hence apart from the tradition government schools, various types of schools are required to be started. Providing better education to all seems to be very difficult in a state like Bihar, because of fast growing population, as there may be a direct correlation between the population growth and level of education.

According to 2011 census report Bihar has an overall literacy rate of 61.8 percent as against national average literacy rate of 74.04 percent. As per the survey of All India Survey of Higher Education (AISHE), Bihar has recorded the lowest gender population, where female to male teacher ratio is 1: 4 in other words 75.3 percent male and only 24.7 percent female teachers. Due to increasing population there has been inadequate and mismatched educational infrastructure. Educational scenario in the state of Bihar is very bleak and has lost its pre - eminent position from the Nalanda University to almost stagnant higher education. The higher education and overall educational status is characterized by low enrolment and larger dropouts, especially among girls. In terms of

Educational Development Index, College Population Index for professional Education (2001 - 02), Gross Enrolment Ratio (2009 - 10) and Gender Parity Index (2009 - 10) in higher education, Bihar's rank is the lowest (Educational Infrastructure and Education in Bihar, State General Knowledge, by Jiyaur Rahman). According to the figure released by NITI Ayog, Bihar has recorded a slight improvement of 7.3 percent in 2016 - 17 in the overall performance, compared with 30 percent in 2015 - 16, and has emerged as the second lowest in the school Education Quality Index (SEQI), after Jharkhand, bagged the lowest rank. India's sixth poorest state, Bihar, spend least amount of money per student according to an India spend analysis of government of India. Due to this fact there is crisis in primary education system in Bihar and its classrooms are India's most crowded and have the fewest teacher (Bihar has the most illiterate people in India, but spends the least per elementary school student, Khushboo Balani, Indiaspend. com, scroll. in, August 17, 2021).

2. Objective of the Study

The main objectives of this research paper have been given below:

- To analyse the trend of population growth and literacy rate and their correlation as well as level of significance, both in India and Bihar, since 1951 to 2011.
- To analyse the spatial variation in population growth and literacy rate at district level (2011)
- To analyse the spatial variation of variables related with the levels of education as well as to find out the levels of education, using Z - Score statistical technique.
- To analyse the relationship between population growth and seventeen variables related with the levels of education, including literacy rate and to test the degree of relationship and level of significance between population growth and these independent variables, related to the levels of education in Bihar.

3. Database and Methodology

This research paper has been primarily based on secondary sources and data have been collected from different census report, District Census Handbook of all the districts of Bihar, from the official website of Officer of the Registrar General and Census Commissioner, Ministry of Home Affairs, Government of India and Economic Survey 2019 - 20, Finance department, Government of Bihar. In the present research paper most suitable statistical and cartographic techniques, like line graph, bar graph, Z - Score and Karl Pearson's method of correlation have been applied to understand level of education and population growth as well as their correlation and their level of significance at 95 and 99 percent level of confidence. For this study districts have been considered as the smallest unit of study and the study is based on 2011 census report to study in the variation in population growth at district level, whereas data related to level of education has been taken between the periods 2017 - 18, because of the latest available data.

For the identification of level of education in Bihar at district level seventeen related variables (Independent), which includes, literacy rate X1, Total Enrolment in Primary X2, Total Enrolment in Upper Primary X3, Total Enrolment (SC) in Primary X4, Total Enrolment (SC) in Upper Primary X5, Total Enrolment (ST) in Primary X6, Total Enrolment (ST) in Upper Primary X7, Number of Primary Schools X8, Number of Upper Primary Schools X9, Number of Teachers in Primary X10, Number of Teachers in Upper Primary X11, Coverage of MDMS (Class I - V) Total Enrolment X12, Coverage of MDMS (Class I - V) Coverage per day X13, Coverage of MDMS (Class VI - VIII) Total Enrolment X14, Coverage of MDMS (Class VI - VIII) Coverage MDM per day X15, Number of Colleges Affiliated X16, Number of Colleges Constituent X17, whereas, (Dependent) Population Growth Rate is Y

The z - score values of these selected seventeen variables have been calculated by means of the following formula,

$$Z \text{ - score} = \frac{X - \overline{X}}{\sigma}$$

Where,
X = Individual value
$\overline{X}$ = Mean of the given variable
σ = Standard deviation of the given variable

Formula says that the z - score is simply the raw score minus the mean of the variable and divided by standard deviation of the variable. Moreover the z - score value of each variable have been clubbed together and a composite score of all the variables for each district have been worked out to assess the overall level of education in Bihar. Thereafter selected seventeen independent variable related to the education level in Bihar are correlated with the dependent variable (growth of population, 2011) using Karl Pearson's method of coefficient of correlation and their level of significance have been tested at 95% and 99% level of confidence.

Apart from this discussion of population growth and status of education will be based on percentage calculated on the basis of data obtained from different secondary sources.

4. Study area

Bihar shows an interstate boundary as well as inter - national boundary with Nepal. Nepal is located in the North of Bihar, whereas, Indian state Uttar Pradesh in west, Jharkhand in south and west and West Bengal is located on the east of Bihar. Bihar is located between latitude 24°20'10" N to 27°31'15" N and 83°19'50" E to 88°17'40" E longitude with an area of 94163 sq. km, which is 2.68 percent of the total area of India. Bihar comprises 38 districts in 2011 and the largest city is the capital city Patna. Himalaya Mountain lies to the north of Bihar and Chhotanagpur plateau to the south. The state has been divided by river Ganga into two parts, North Bihar plain and South Bihar plain, both of which are part of lower middle Ganga plain. River Ganga and its tributaries and distributaries like Gandak, Bagmati, Kosi,

Kali, Son and Ghaghra are the perpetual source of water for agriculture in Bihar. The soil in this region consists of mainly older alluvium, composed of dark clay or yellow loam. State of Bihar is characterized by humid and subtropical climate with three important seasons, the hot weather season (March to June), rainy season (mid June to October) and cold weather season (November to February). The hottest month is June and the coolest month is January. About 70 to 80 percent of the population is engaged in agriculture and is the mainstay of the economy, because of almost unavailability of the non - agricultural and service sectors. Bihar is one of the top producer of fruits and vegetables in India. Bihar is the third largest state in terms of population after Uttar Pradesh and Maharashtra. As per census report 2011, Bihar with a total population of 104099452, registered an absolute increase of 21100943 accounting for a percentage increase of 25.42 percent as against national average increase of 17.70 percent. Out of the total population of Bihar, 54278157 are males and 49821295 are females. Out of the total population 11.29 percent live in urban areas, which has increased by 11.29 percent in the last 10 years. The total literacy rate of Bihar is 61.8 percent, as against 74.04 percent of India. The male literacy rate is 71.2 percent and the female literacy rate is 51.5 percent, whereas the rural literacy rate is 59.78 percent as compared to urban literacy rate of 76.86 percent. The male literacy rate in rural area is 69.67 percent as compared to 49 percent female literacy rate, whereas the male literacy

rate in urban area is 82.56 percent as compared to 70.49 percent female literacy rate. Educational scenario in Bihar is in bleak condition and higher education is almost stagnant in the state. The educational infrastructure is mismatched with the growing population, which has led to the migration of people, especially younger.

Trends of Population growth and Literacy Rate in India and Bihar (1951 - 2011)

Literacy rate affects the population growth in one way or the other. Higher literacy rate bring higher standard of living. Developed countries of the world which have higher literacy rate normally show low population growth. There is an inverse correlation between literacy rate and population growth. Higher literacy rate comes with late marriages, which shorten the period of fertility and ultimately leads to lesser number of children. Population growth as well as literacy have been a concern for India just after independence. India was the first country to introduce family planning Programme in 1952, but still it is the second most populous country of the world. Population growth is a complex phenomenon and is influenced by several factors, but literacy rate continues to be significant factor, especially female literacy rate. Literacy help people to delay their marriageable age, which directly affects in the delay of child birth, hence affects the family size.

Table 1: Trends of Population Growth and Literacy Rate (1951 - 2011)

Year	Population Growth (%)		Literacy Rate (%)	
	India	Bihar	India	Bihar
1951	13.31	10.58	18.33	13.49
1961	21.51	19.79	28.3	21.95
1971	24.8	20.91	34.45	23.17
1981	24.66	24.16	43.57	32.32
1991	23.87	23.38	52.21	37.49
2001	21.54	28.62	64.84	47.53
2011	17.7	25.42	74.04	61.8
			India	**Bihar**
Coefficient of Correlation (Population Growth & Literacy Rate)			0.171826721	0.800303753
P - value			0.712584928	0.03063817
t Stat			0.390016877	2.984571656

Source: Census Reports

Education is the pre - requisite condition for the development of the state of Bihar as well as whole of country. The literacy rate in Bihar is not satisfactory and is at the lowest rank in the country as a whole. Bihar is the India's third most populous state with a total population of 104099452 after Uttar Pradesh (199812341) and Maharashtra (112374333). According to the Census report the literacy rate in Bihar is 61.80 percent as against 74.04 percent in India in 2011. Bihar has more illiterate people than any other state, which may be due to crisis in education system right from the primary school to higher education. In spite of this government has taken several steps to improve the educational status in Bihar, like scholarship, mid - day meal, Samagra Siksha Abhiyan as well as several other awareness programmes about the importance of education. Government also provided school uniform, textbook, stationary to the students, to encourage their parents to send their children to school. In

spite of these steps taken to improve the level of education in Bihar, it remained very low as compared to other states in India. Complex web of social and economic divide have led to low level of literacy in Bihar. This vicious circle of illiteracy has been aggravated by several other factors like economic disparity among people of different castes, gender discrimination, caste discrimination as well as largest number of adults due to faster population growth rate of 25.42 percent as against 17.70 percent in India. Since 1951 there has been a continuous growth in literacy rate. The trend of literacy rate shows that since 1951, every decade registered a growth of at least 10 percent in literacy rate except the census year 1961 and 1991, registered a literacy rate of 21.95 percent and 37.49 percent respectively. Bihar registered a literacy rate of 13.49 percent in 1951 which increased to 61.80 percent in 2011, recorded an increase of 48.31 percentage point. The highest growth in literacy rate has been observed during

2001 and 2011, with an increase of 14.27 percentage points. If we go through Table - 1, we find that the maximum increase in literacy rate in India occurred during 1991 to 2001, with an increase 12.63 percentage points, whereas maximum increase in literacy rate in Bihar occurred during 2001 to 2011, with an increase of 14.27 percentage point. In the year 1951, the literacy rate of India was 18.33, whereas, it was 13.49 in Bihar, which is 4.84 percentage point lesser than the national average literacy rate. In the year 1961 literacy rate in India increased to 28.3 percent and 21.95 percent in Bihar, with an increase of 9.97 percentage point in India and 8.46 percentage point in Bihar, from the previous decade. In the year 1981, India registered a literacy rate of 43.57 percent, which is 9.12 percentage point higher than the

previous decade, whereas, Bihar registered a literacy rate of 32.32 percent which is 9.15 percentage point higher than previous decade but it is 11.25 percentage points lesser than the national literacy rate (43.57). In the census year 2001, India registered a literacy rate of 64.84, whereas, Bihar registered literacy rate of 47.53 percent, which is 17.31 percentage points lower than the national literacy rate. Census year 2011 registered a literacy rate 74.04 percent in India, which is 9.2 percentage points higher than previous census year 2001, whereas Bihar registered a literacy rate of 61.8 percent, which is 12.24 percentage point less than the national literacy rate but it is 14.27 percentage point higher than the previous census year 2001.
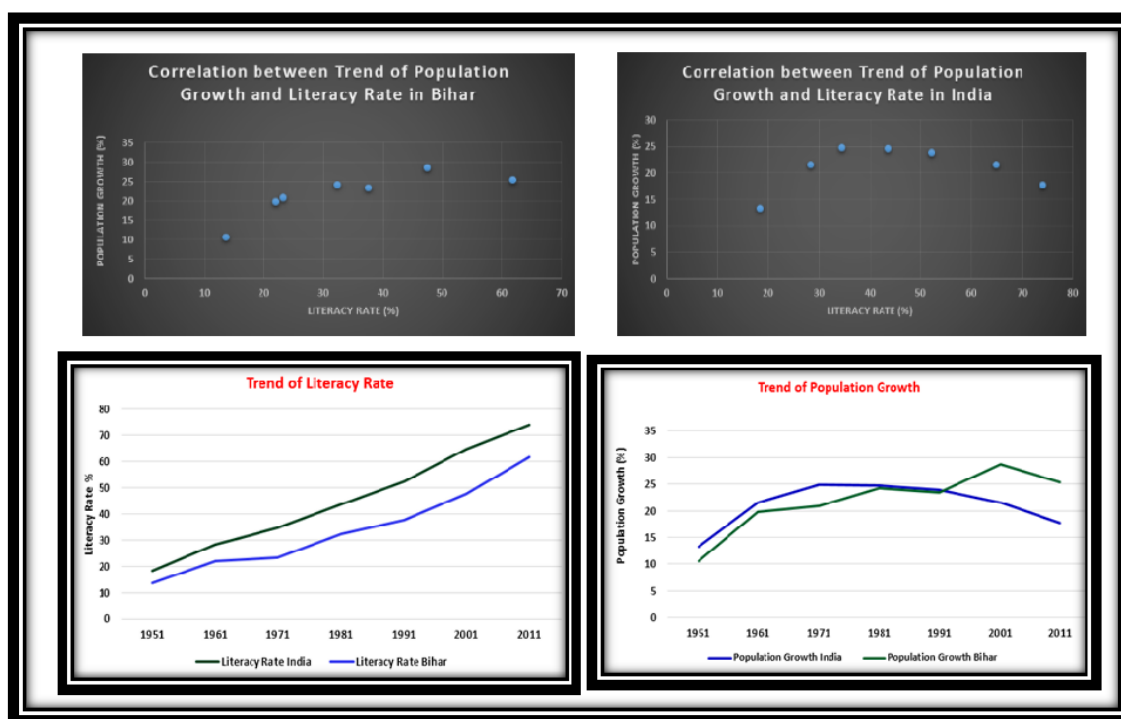
If we compare the literacy rate with the population growth rate we find that Bihar has recorded the highest growth rate of 25.42 percent in 2011, since 1951, but India as a whole recorded a continuous decline in population growth, since 1981 with a growth rate of 24.66 percent to 17.70 percent in 2011. Census year 1951 recorded a growth of 10.58 percent which increased to 25.42 percent in 2011, registered an increase of 14.84 percentage point over six decades in Bihar, whereas India registered a growth rate of 13.31 percent in 1951 to 17.70 in 2011, with an increase of only 4.39 percentage point as compared to Bihar. It is important to note here that Bihar with a total population of 104099452 accounts for 8.6 percent of the total population of the country. The pace of population growth in Bihar remained continued from 1951 to 2011, but the census year 1991 registered a decline of 0.78 percentage point from 24.16 percent in 1981 to 23.38 percent in 1991. Similarly 2011 also registered a decline of 3.2 percentage point from 28.62 percent in 2001 to 25.42 in 2011. Over this six decade from 1951 to 2011, the high growth of population occurred during 1951 to 1961, with an increase of 9.21 percentage point from 10.58 percent in 1951 to 19.79 in 1961 in Bihar. India too

registered the highest growth during this period, from 13.31 percent in 1951 to 21.51 percent in 1961, with a percentage increase of 8.2 percentage point. This rapid increase in population during this period may be attributed to the improved trade, transport, employment, health facilities and education. The improvement in living conditions due to improved health and socio - economic condition resulted into decline in death rate, which led to faster natural increase of population.

To understand the trend of population growth and literacy rate in India and Bihar since 1951 to 2011, the study of correlation between literacy rate and population growth is of immense significance. Therefore, to find out the correlation, Karl Pearson's method of coefficient of correlation has been applied. In this study literacy rate has been considered as an independent variable, whereas population growth has been considered as a dependent variable. It has been observed that there is a high level of positive correlation in Bihar, and value comes to + **0.800303753** (high level of positive correlation +0.75 to +1), and the P value is **0.03063817** which makes it significant at 95% level of confidence, whereas in India,

there is a low level of positive correlation and the value of coefficient of correlation is **0.171826721** (Low level of positive correlation 0 to +0.25), and the P value is **0.712584928,** and is not significant.

Spatial Variation in Population Growth and Literacy Rate

Bihar as whole recorded a high growth of population since 1951 to 2001, except the census year 1991, when the population growth rate dipped by 0.78 percent from the previous census year 1981. Census year 2011 also recorded a decline of 3.2 percentage point from the previous decade. District wise growth of population in 2011 shows that there has been a significant variation in the growth of population. According to 2011 census report, out of 38 districts of Bihar, none of them recorded population growth rate lower than the average growth rate of the country as a whole, which is 17.70 percent, but there are twenty two districts, which have recorded population growth rate higher than the state as a whole (25.42 percent), Madhepura with a total population of 2001762 in 2011, recorded the highest growth rate of 31.12 percent which is followed by Kishanganj (30.40 percent), Araria (30.25 percent), Khagaria (30.19 percent)

and East Champaran (29.43 percent). The literacy rate of Madhepura with the highest population growth rate is 52.25 percent in 2011 as compared to 36.07 percent in 2001. If we compare the literacy rate of Madhepura with the state average literacy rate (61.80 percent) we find that it is 9.55 percentage point lower than the state average. Similarly the literacy rate of Kishanganj is 55.46 percent which is 6.34 percentage point lower than the state average, Araria with a literacy rate of 53.53 percent is lower than 8.27 percentage point than the state average. Apart from this Khagaria recorded a literacy rate of 57.92 percent and East Champaran 55.79 percent. The literacy rate of all these four districts clearly indicate that lower the literacy rate higher the growth of population. The lowest growth rate of population has been observed by Gopalganj district, with a growth rate of 19.02 percent, which is followed by Arwal (19.23 percent) and Darbhanga (19.47 percent). It is interesting to note here that Gopalganj and Arwal both recorded a literacy rate of 65.47 percent and 67.43 percent respectively, which is higher than the state average literacy rate (61.80 percent) and it clearly indicate that literacy rate played an important rate in the growth of population in these districts.
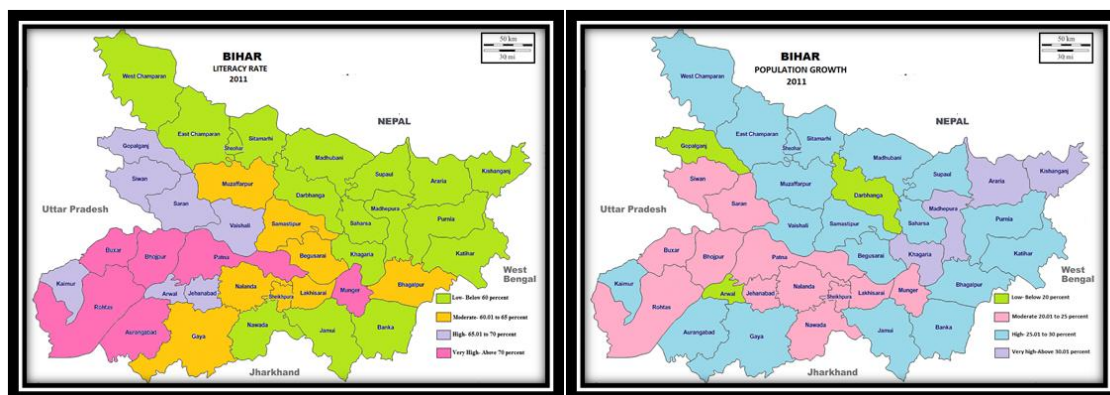
If we categorize all the 38 districts of Bihar into low (below 20 percent), moderate (20.01 to 25 percent), high (25.01 to 30 percent) and very high (above 30 percent) of population growth, we find that there are three districts, named as Gopalganj; Arwal and Darbhanga, which can be categorized under low population growth below 20 percent. There are twelve districts, named as Patna, Nalanda, Bhojpur, Buxar, Rohtas, Jehanabad, Nawada, Saran, Siwan, Munger, Sheikhpura, Lakhisarai, which can be categorized under moderate level of population growth between 20.01 to 25 percent, whereas nineteen districts, named as Kaimur, Gaya, Aurangabad, W. Champaran, E. Champaran, Muzaffarpur, Sitamarhi, Sheohar, Vaishali, Madhubani, Samastipur, Begusarai, Jamui, Bhagalpur, Banka, Saharsa, Supaul, Purnea, Katihar, can be categorized under high level of population growth rate and only four districts can be categorized under very high level of population growth above 30 percent, The districts with very high level of population growth above 30 percent are Madhepura, Kishanganj, Araria and Khagaria, and all of them lie in North Bihar plain.

Literacy is the ability to read and write with understanding in any language which affects the socio - economic conditions of any region, especially growth of population in other words fertility rate. Bihar is the most illiterate state of India. Out of total population of 104099452, there are 52504553 literate and out of which 31608023 are male literate and 20896530 are literate female. In other words female literate accounts for 51.50 percent of the total population and rest of the illiterate females cannot help their children in their study. One of the important reason behind low literacy in Bihar is the poverty due to agro - based economy and unavailability of the non - agricultural and service sector. Apart from this low literacy rate among females are due to girl child prejudice, as family normally choose their son over daughter, whenever they want to send their children to school. There is also a crisis in primary education system in Bihar. Because of the third most populous state of India, classrooms are crowded, and there are fewer teachers to teach them. Bihar government during 2019 - 20 allocated higher ever budget of Rs.34798.69 crores for education (NDTV - Education, 12 Feb., 2019). The literacy rate of Bihar jumped from 47.53 percent in 2001 to 61.8 percent in 2011, due to

government efforts, especially by means of Sarva Siksha Abhiyan. Census year 2011, registered an increase of 14.27 percentage point and is the highest among all the Indian states during 2001 - 2011. A special package should be given to Bihar in order to elevate the literacy rate, as Bihar has been a victim of funds from the central government.

According to the census report 2011, out of 38 districts in Bihar 22 districts recorded literacy rate higher than the state average literacy rate of 61.80 percent. Out of these 22 district, seven districts, named as Saran, Siwan, Gopalganj, Muzaffarpur, Vaishali, Samastipur, and Begusarai lie in North Bihar plain, whereas rest of them are located in South Bihar plain. According to census report 2011, Rohtas with a literacy rate of 73.37, recorded the highest literacy rate, which is followed by Patna (70.68), Bhojpur (70.47), Munger (70.46) and Aurangabad (70.32). It is important to mention here that Rohtas recorded a literacy rate of 61.28 percent in 2001 and ranked second after Patna, but gained 12.09 percentage point and ranked first in literacy rate in the census year 2011. All these four districts, ranked top in literacy rate, are located in south Bihar and have recorded low population growth below 25 percent, except Aurangabad recorded a population growth of 26.28 percent. Rohtas, which recorded the highest literacy rate is known as rice bowl. According to Bihar Economic Survey 2019 - 20, it is important to mention here that 3.38 lakh children are enrolled in primary school in Rohtas and 1.07 lakh are in upper primary school. Beside it there are 1525 primary school and 1031 upper primary school and the number of teachers in primary schools are 3538 and in upper primary schools are 2780, which substantially support high literacy rate in Rohtas. But it is very surprising to mention here that Patna with 7.32 lakh children in primary schools, 3.12 lakh in upper primary school, 2190 primary schools, 1176 upper primary school, 9220 teacher in primary schools and 11127 teachers in upper primary school ranked second after Rohtas in literacy rate. Apart from this Purnea with the lowest literacy rate of 51.08 percent recorded very high population growth rate of 28.33 percent, but Purnea recorded more students in primary and upper primary, even in number of teacher in primary and upper primary schools than Rohtas. But Purnea lagged behind Rohtas in terms of number of primary schools (1326) and upper primary (955).

According to the census report 2011, we can categorize all the 38 districts of Bihar into low (below 60 percent), moderate (60.01 to 65 percent), high (65.01 to 70 percent) and very high (above 70 percent). According to this categorization there are seventeen district, named as Nawada (59.76), West Champaran (55.70), East Champaran (55.79), Sitamarhi (52.02), Sheohar (53.78), Darbhanga (56.56), Madhubani (58.62), Jamui (59.79), Khagaria (57.92), Banka (58.17), Saharsa (53.20), Supaul (57.67), Madhepura (52.25), Purnea (51.08), Kishanganj (55.46), Araria (53.53) and Katihar (52.25), can be categorized under low level of literacy rate below 60 percent. Whereas, there are eight districts, named as Nalanda (64.43), Gaya (63.67), Muzaffarpur (63.43), Samastipur (61.86), Begusarai (63.87), Sheikhpura

(63.86), Lakhisarai (62.42) and Bhagalpur (63.14), which can be categorized under moderate literacy rate between 60.01 to 65 percent. There are seven districts, named as Kaimur (69.34), Jehanabad (66.80), Arwal (67.43), Saran (65.95), Siwan (69.45), Gopalganj (65.47) and Vaishali (66.60), which can be categorized under moderate level of literacy rate between 65.01 to 70 percent, but there are six districts, named as Patna (70.68), Bhojpur (70.47), Buxar (70.14), Rohtas (73.37) and Munger (70.40) and Aurangabad (70.32) can be categorized under very high level of literacy rate above 70 percent and all of these five districts having very high literacy rate are located in South Bihar plain and are having literacy rate higher than the national average literacy rate of 70.04 percent.

Levels of Education

Education provides us knowledge, skill, information regarding different field and techniques, which makes us responsible towards our family, society and above all towards our nation. It gives us vision to understand the world around us and make us capable to fight against corruption and injustice prevailing in our society. For the development of any region into better place to live, education occupies the highest position. As we go through the level of literacy rate in India, as well as state, like Bihar, we find that area with higher literacy rates are comparatively more developed and have superior infrastructure as compared to areas having low literacy rate. Education helps us to reduce the gap between different societies by means of knowledge, skills, culture, values and different facts related to the societies. Our society which strives for the development realizes the importance of education, which can be imparted by means of good schools, colleges and universities. We require better education to fight in this contemporary, competitive and industrialized world. Younger generation can be better nurtured by an educated society, so that they can adapt to their environment better than illiterate. The horizon of knowledge can only be extended by means of better and authentic education because the behavioral aspects of the society even individual depend upon the education the literacy rate. Education empowers individual, removes poverty, empowers women, creates more employment opportunities, helps in securing higher income, develops skills to solve the problems, provides prosperous and happy life, creates equal opportunities for all and above all improves the economy.

Bihar was the important educational hub in ancient India and was the home of two major universities, Nalanda University and Vikramshila University and now it can be considered as the home to relics of educational institutions of ancient India. A survey conducted by NITI Ayog in 2019 ranked Bihar, the second lowest in School Education Quality Index Report. At present there is a 40 percent vacancy of staff in government schools in Bihar. A recent survey by National University of Education Planning & Administration (NUEPA) revealed that mere 21 percent of all primary school teachers in the state had passed the 10th grade (What Can Turn Around Bihar's Education Scenario for the Better, YKA, By Malvika in Democracy Adda, Bihar, Education, Governance, 19th Oct.2020). A

huge gap has been developed in Bihar between demand and supply because of insufficient and improper educational facilities. In spite of the irregularities in the education system of Bihar it has been improving faster than rest of the country. To keep this pace continue, Bihar needs to provide better educational facility, like more classrooms and teachers per student as well as better drinking water facilities and sanitation, especially toilets for girl students. India's one of the poorest state Bihar has undertaken several policies to make people educated, even for those who are not able to afford. The Kendriya Vidyalayas and Jawahar Navodaya Vidyalayas made a significant contribution towards the primary level education in Bihar. The Bihar Education Project Council, which was started in the year 1991, providing Universal Elementary Education throughout the state of Bihar irrespective of caste, creed and religion and especially provides accessibility for underprivileged section of the society and minorities. Major schemes by the government include, Sarva Shiksha Abhiyan, Kasturba Gandhi Balika Vidyalaya, Mukhya Mantri Samagra Vidyalaya Vikas Yojana, Mukhya Mantri Poshak Yojana, Avsar Badhe Aage Padhen and Vocational Guidance Programmes etc. The education system in Bihar has been divided into different levels, like primary, upper primary, secondary and senior secondary level schools. There has been an outstanding progress towards the betterment of education at district level in Bihar, due to increase in the number of schools and higher education institution, which has been reflected in terms of increase in the literacy rate of Bihar from 47.53 percent in 2001 to 61.80 percent in 2011, registered an increase of 14.27 percentage point.

Table 2: Levels of Education on the Basis of Seventeen Selected Variables

		Y	X1	Z-Score	X2	Z-Score	X3	Z-Score	X4	Z-Score	X5	Z-Score	X6	Z-Score	X7	Z-Score
1	Patna	23.73	70.68	1.39	5.32	1.82	3.25	0.39	4.40	- 14.02	5.12	1.52	1.17	- 0.39	2.60	0.00
2	Nalanda	21.39	64.43	0.42	4.25	1.10	3.26	0.40	6.28	- 12.83	6.29	2.24	0.29	- 0.63	0.65	- 0.06
3	Bhojpur	21.63	70.47	1.36	1.34	- 0.87	3.79	0.74	2.32	- 15.34	3.03	0.24	1.17	- 0.39	1.30	- 0.04
4	Buxar	21.67	70.14	1.31	3.01	0.26	1.73	- 0.58	1.78	- 15.68	2.41	- 0.14	1.75	- 0.23	2.60	0.00
5	Rohtas	20.11	73.37	1.81	2.45	- 0.12	1.11	- 0.97	1.64	- 15.77	1.01	- 1.00	1.17	- 0.39	1.30	- 0.04
6	Kaimur	27.5	69.34	1.18	1.61	- 0.69	1.43	- 0.77	2.05	- 15.51	2.95	0.19	3.22	0.17	2.60	0.00
7	Gaya	26.43	63.67	0.30	4.47	1.25	2.58	- 0.03	6.81	- 12.49	6.52	2.38	0.29	- 0.63	0.65	- 0.06
8	Jehanabad	21.46	66.80	0.79	1.07	- 1.06	0.84	- 1.14	1.14	- 16.09	1.40	- 0.76	0.00	- 0.71	0.00	- 0.07
9	Arwal	19.23	67.43	0.89	0.81	- 1.24	0.56	- 1.32	0.57	- 16.45	0.62	- 1.24	2.05	- 0.15	0.00	- 0.07
10	Nawada	22.63	59.76	- 0.31	2.37	- 0.18	2.65	0.01	3.66	- 14.49	3.34	0.43	0.58	- 0.55	0.65	- 0.06
11	Aurangabad	26.18	70.32	1.34	2.65	0.01	2.13	- 0.32	3.56	- 14.55	4.11	0.90	0.88	- 0.47	1.30	- 0.04
12	Saran	21.64	65.96	0.66	1.89	- 0.50	5.99	2.13	2.92	- 14.96	3.18	0.33	2.92	0.09	3.25	0.02
13	Siwan	22.7	69.45	1.20	2.67	0.02	2.07	- 0.36	1.88	- 15.62	2.10	- 0.33	5.26	0.73	6.49	0.11
14	Gopalganj	19.02	65.47	0.58	1.71	- 0.63	3.87	0.79	2.25	- 15.38	2.17	- 0.29	4.39	0.49	5.19	0.07
15	W. Champaran	29.29	55.70	- 0.95	3.13	0.34	5.39	1.75	3.39	- 14.66	2.72	0.05	14.04	3.13	13.64	0.31
16	E. Champaran	29.43	55.79	- 0.93	2.94	0.21	7.96	3.38	4.50	- 13.96	3.80	0.71	4.68	0.57	3.90	0.03
17	Muzaffarpur	28.14	63.43	0.26	7.20	3.10	5.12	1.58	5.54	- 13.30	6.21	2.19	0.58	- 0.55	0.65	- 0.06
18	Sitamarhi	27.62	52.05	- 1.52	3.73	0.74	2.40	- 0.15	1.88	- 15.62	1.94	- 0.43	0.00	- 0.71	0.00	- 0.07
19	Sheohar	27.19	53.78	- 1.25	0.71	- 1.30	0.48	- 1.37	0.64	- 16.40	0.62	- 1.24	0.29	- 0.63	0.65	- 0.06
20	Vaishali	28.57	66.60	0.76	2.48	- 0.10	3.81	0.75	3.99	- 14.28	5.28	1.62	0.29	- 0.63	0.00	- 0.07
21	Darbhanga	19.47	56.56	- 0.81	2.61	- 0.01	3.87	0.79	3.59	- 14.53	3.65	0.62	0.00	- 0.71	0.00	- 0.07
22	Madhubani	25.51	58.62	- 0.49	4.97	1.59	2.37	- 0.17	4.06	- 14.23	1.71	- 0.57	0.29	- 0.63	0.00	- 0.07
23	Samastipur	25.53	61.86	0.02	4.39	1.20	3.14	0.32	4.43	- 14.00	3.73	0.67	0.00	- 0.71	0.00	- 0.07
24	Begusarai	26.44	63.87	0.33	4.92	1.56	3.28	0.41	3.26	- 14.74	3.42	0.48	1.17	- 0.39	1.30	- 0.04
25	Munger	20.21	70.46	1.36	0.46	- 1.47	1.73	- 0.58	1.07	- 16.13	1.09	- 0.95	1.46	- 0.31	1.30	- 0.04
26	Sheikhpura	21.09	63.86	0.33	0.55	- 1.41	0.68	- 1.25	0.74	- 16.34	0.54	- 1.29	0.00	- 0.71	0.00	- 0.07
27	Lakhisarai	24.77	62.42	0.10	1.07	- 1.05	0.73	- 1.21	0.77	- 16.32	0.78	- 1.14	0.58	- 0.55	0.65	- 0.06
28	Jamui	25.85	59.79	- 0.31	1.78	- 0.58	1.25	- 0.88	1.75	- 15.70	1.71	- 0.57	5.26	0.73	3.90	0.03
29	Khagaria	30.19	57.92	- 0.60	1.74	- 0.61	1.11	- 0.97	1.78	- 15.68	1.48	- 0.71	0.29	- 0.63	0.00	- 0.07
30	Bhagalpur	25.36	63.14	0.22	2.06	- 0.39	3.18	0.34	1.81	- 15.66	1.94	- 0.43	3.80	0.33	3.90	0.03
31	Banka	26.48	58.17	- 0.56	1.88	- 0.51	2.33	- 0.19	1.24	- 16.02	1.48	- 0.71	4.68	0.57	3.25	0.02
32	Saharsa	26.02	53.20	- 1.34	1.78	- 0.58	2.29	- 0.22	2.48	- 15.23	1.79	- 0.52	0.88	- 0.47	0.65	- 0.06
33	Supaul	28.66	57.67	- 0.64	2.52	- 0.07	1.70	- 0.60	2.38	- 15.30	0.85	- 1.10	0.58	- 0.55	0.00	- 0.07
34	Madhepura	31.12	52.25	- 1.49	1.94	- 0.47	1.92	- 0.46	2.05	- 15.51	2.10	- 0.33	0.88	- 0.47	0.65	- 0.06
35	Purnea	28.33	51.08	- 1.67	3.44	0.55	3.07	0.28	2.28	- 15.36	3.34	0.43	9.65	1.93	12.99	0.29
36	Kishanganj	30.4	55.46	- 0.98	1.60	- 0.69	1.47	- 0.74	0.60	- 16.43	0.47	- 1.33	2.92	0.09	3.25	0.02
37	Araria	30.25	53.53	- 1.29	2.35	- 0.19	2.63	0.00	0.87	- 16.26	1.55	- 0.67	5.56	0.81	8.44	0.16
38	Katihar	28.35	52.24	- 1.49	4.15	1.03	2.81	0.11	3.63	- 14.51	3.57	0.57	16.37	3.77	12.34	0.27
	Bihar (Total)				137.71		96.03		29.79		12.88		3.42		1.54	

X8	Z-Score	X9	Z-Score	X10	Z-Score	X11	Z-Score	X12	Z-Score	X13	Z-Score	X14	Z-Score	X15	Z-Score	X16	Z-Score	X17	Z-Score	Composite Score
5.10	2.15	3.78	1.01	5.21	2.09	4.77	1.55	3.72	0.88	3.80	0.94	3.98	1.12	4.00	1.11	14.1	4.52	13.7	4.31	10.40
3.19	0.48	2.58	- 0.04	2.80	0.14	4.15	1.10	2.41	- 0.18	2.44	- 0.15	2.42	- 0.17	2.56	- 0.04	4.96	0.92	2.17	- 0.18	- 7.50
2.82	0.16	2.70	0.06	2.48	- 0.12	2.82	0.13	2.27	- 0.29	2.17	- 0.36	2.59	- 0.03	2.40	- 0.18	4.37	0.68	2.17	- 0.18	- 14.43
1.89	- 0.64	1.72	- 0.80	2.10	- 0.43	1.60	- 0.75	1.43	- 0.97	1.51	- 0.90	1.70	- 0.76	1.79	- 0.67	2.78	0.06	1.81	- 0.32	- 21.25
3.55	0.80	3.32	0.60	2.00	- 0.51	1.19	- 1.04	2.55	- 0.06	2.53	- 0.08	3.04	0.34	3.01	0.31	7.34	1.86	2.89	0.10	- 14.16
1.51	- 0.97	2.01	- 0.54	1.25	- 1.12	1.75	- 0.64	1.42	- 0.98	1.55	- 0.87	1.75	- 0.72	1.87	- 0.60	2.98	0.14	0.72	- 0.74	- 22.48
3.96	1.15	4.61	1.73	3.63	0.81	3.84	0.88	4.13	1.22	3.82	0.96	3.90	1.05	3.47	0.69	6.35	1.47	2.53	- 0.04	0.63
1.30	- 1.16	1.16	- 1.29	1.02	- 1.31	1.44	- 0.86	0.94	- 1.37	0.89	- 1.39	1.07	- 1.29	0.94	- 1.36	1.79	- 0.33	1.08	- 0.60	- 30.01

0.78	-1.61	0.62	-1.76	1.31	-1.08	0.39	-1.63	0.70	-1.57	0.63	-1.61	0.84	-1.47	0.66	-1.58	0.60	-0.80	0.36	-0.88	-33.57
2.32	-0.27	2.24	-0.34	4.03	1.13	2.97	0.25	2.15	-0.39	2.14	-0.39	2.18	-0.37	2.18	-0.36	1.79	-0.33	1.44	-0.46	-16.69
2.24	-0.34	3.09	0.40	2.36	-0.22	2.38	-0.18	2.50	-0.10	2.49	-0.11	2.93	0.25	3.12	0.40	2.58	-0.02	1.81	-0.32	-13.37
3.67	0.90	3.71	0.94	3.40	0.62	4.31	1.22	3.97	1.08	4.04	1.13	4.34	1.42	4.71	1.69	2.58	-0.02	4.33	0.66	-2.58
3.05	0.36	4.19	1.36	5.03	1.94	4.97	1.70	2.39	-0.19	2.58	-0.04	2.94	0.26	3.23	0.49	2.58	-0.02	2.53	-0.04	-8.42
2.55	-0.07	2.60	-0.03	2.48	-0.12	2.92	0.21	2.23	-0.33	2.36	-0.21	2.37	-0.21	2.62	0.00	1.39	-0.49	1.81	-0.32	-15.95
3.95	1.14	3.59	0.84	3.48	0.69	5.13	1.81	4.07	1.17	4.58	1.57	3.26	0.53	3.58	0.78	1.39	-0.49	1.08	-0.60	-2.60
4.94	2.01	5.57	2.57	4.34	1.39	5.29	1.93	5.74	2.53	5.90	2.63	5.35	2.25	5.54	2.36	0.99	-0.65	2.89	0.10	7.13
4.17	1.34	5.05	2.12	3.38	0.61	4.70	1.50	4.29	1.35	4.37	1.40	4.77	1.78	4.80	1.76	3.57	0.37	6.86	1.64	7.08
2.80	0.15	2.79	0.14	1.96	-0.55	2.89	0.19	4.06	1.16	3.77	0.92	3.82	0.99	3.89	1.02	1.59	-0.41	2.17	-0.18	-14.33
0.52	-1.83	0.67	-1.72	0.54	-1.70	0.70	-1.40	0.86	-1.44	0.87	-1.41	0.75	-1.55	0.85	-1.42	0.00	-1.04	0.00	-1.02	-36.79
2.53	-0.09	3.07	0.38	2.19	-0.36	3.57	0.68	2.87	0.19	2.58	-0.04	3.21	0.49	2.92	0.24	3.37	0.29	2.53	-0.04	-10.21
3.52	0.77	2.93	0.26	3.16	0.43	3.16	0.39	3.75	0.90	3.90	1.02	3.68	0.87	3.86	1.00	5.56	1.15	7.94	2.06	-5.88
4.57	1.68	3.23	0.53	3.85	0.99	3.39	0.55	5.08	1.99	5.05	1.95	5.14	2.08	5.02	1.93	3.97	0.53	6.50	1.50	-0.84
3.98	1.17	3.32	0.61	3.11	0.39	3.40	0.55	3.70	0.87	3.80	0.94	4.28	1.37	4.08	1.18	3.77	0.45	5.42	1.08	-3.98
2.01	-0.54	3.28	0.57	4.62	1.62	3.79	0.84	2.54	-0.08	2.78	0.12	2.77	0.12	3.14	0.42	1.98	-0.26	2.17	-0.18	-9.76
1.29	-1.17	1.68	-0.84	0.90	-1.40	1.89	-0.54	1.16	-1.19	1.16	-1.18	1.30	-1.09	1.32	-1.04	0.40	-0.88	2.53	-0.04	-27.50
0.68	-1.69	0.92	-1.50	0.39	-1.82	0.67	-1.42	0.58	-1.66	0.59	-1.64	0.62	-1.66	0.69	-1.56	0.40	-0.88	0.72	-0.74	-35.30
1.15	-1.28	0.80	-1.61	0.94	-1.37	1.00	-1.19	1.01	-1.31	1.04	-1.27	1.03	-1.32	0.96	-1.33	0.00	-1.04	0.72	-0.74	-32.70
1.93	-0.61	2.69	0.05	3.05	0.34	0.97	-1.21	2.06	-0.46	2.10	-0.42	1.91	-0.59	1.99	-0.51	0.40	-0.88	0.72	-0.74	-22.31
1.32	-1.14	1.59	-0.92	1.07	-1.26	2.04	-0.43	1.83	-0.65	1.85	-0.63	1.65	-0.80	1.63	-0.80	0.60	-0.80	1.81	-0.32	-27.03
2.24	-0.34	2.71	0.07	2.52	-0.09	2.73	0.07	2.81	0.15	2.85	0.18	2.88	0.21	3.03	0.33	2.58	-0.02	4.69	0.80	-14.20
2.98	0.31	2.91	0.24	1.81	-0.67	2.16	-0.34	1.80	-0.67	1.86	-0.62	1.91	-0.59	1.99	-0.51	2.18	-0.18	0.72	-0.74	-21.19
1.79	-0.73	1.71	-0.81	1.62	-0.82	2.38	-0.19	2.24	-0.31	2.11	-0.41	1.80	-0.68	1.79	-0.67	1.19	-0.57	3.25	0.24	-23.38
2.59	-0.04	2.29	-0.30	3.78	0.93	0.86	-1.28	2.32	-0.26	2.26	-0.29	2.08	-0.45	1.90	-0.58	1.19	-0.57	1.08	-0.60	-21.76
2.24	-0.34	2.08	-0.48	2.19	-0.36	2.30	-0.24	2.18	-0.37	2.19	-0.35	1.96	-0.55	1.93	-0.56	1.98	-0.26	1.81	-0.32	-22.61
3.09	0.40	3.07	0.39	3.25	0.50	2.19	-0.32	3.71	0.88	3.44	0.66	2.94	0.26	2.54	-0.07	2.18	-0.18	2.17	-0.18	-11.22
1.92	-0.62	1.60	-0.91	2.13	-0.41	1.08	-1.13	1.89	-0.60	1.86	-0.62	1.67	-0.79	1.52	-0.89	0.99	-0.65	0.72	-0.74	-27.42
3.09	0.40	1.81	-0.72	4.08	1.18	0.90	-1.26	3.11	0.39	2.92	0.23	2.08	-0.45	1.82	-0.64	1.39	-0.49	0.72	-0.74	-19.53
2.78	0.13	2.31	-0.28	2.55	-0.06	3.31	0.49	3.52	0.72	3.24	0.49	3.07	0.37	2.65	0.02	2.18	-0.18	1.44	-0.46	-9.00
42932		31074		177052		233263		126.59		79.55		62.84		36.24		504		277		

Note: - Z - Score and Column X2 to X17 are the percentage calculated by the author for all the variables obtained from Bihar Economic Survey 2019 - 20, Finance Department, Government of Bihar, whereas X1 is the Literacy Rate and Y Population Growth Rate.

There has been a substantial increase in the elementary education system of Bihar during the first three decades after independence. The number of primary schools increased two and half times to 51.2 thousand and upper primary school seven times to 10.4 thousand by 1976 - 77. But the expansion of primary education became much slower in eighties and nineties due to resource constraints. Due to Sarva Siksha Abhiyan this scenario started to change in 2000 - 01. To strengthen the elementary education in Bihar, one of the most important priorities of the government of Bihar was to increase the number of schools and teachers by means of opening new primary schools and starting upper primary classes in the existing primary schools. There is wide inter - district disparity in the availability of primary and upper primary schools. According to Bihar Economic Survey 2019 - 20, there are 42932 primary schools in Bihar during 2017 - 18. Out of these total primary schools 2190 primary schools are located in the capital city of Bihar i. e., Patna, which constitutes 5.10 percent of the total number of primary school Patna is followed by East Champaran and Muzaffarpur with a total number of primary school as 2122 and 1790 respectively. East Champaran constitutes 4.94 percent of the total primary schools and Muzaffarpur constitute 4.17 percent of the total primary schools of Bihar. Sheohar is the district where there is lowest number

of primary schools which is just 225 in number and constitutes only 0.52 percent of the total primary school of Bihar. Apart from this there are 31074 upper primary schools in Bihar. Out of these 31074 upper primary schools, 1730 upper primary schools are located in East Champaran and 1569 are in Muzaffarpur, which constitutes 5.57 and 5.05 percent respectively. Gaya occupies the third position in terms of number of upper primary schools with a total number of 1432 upper primary schools, which constitutes to 4.61 percent of the total primary schools in Bihar. Out of 31074 upper primary schools, there are only 193 schools, which are located in Arwal and constitute only 0.62 percent, lowest in the state, whereas Arwal was second lowest in terms of primary school (0.78 percent).

Along with the substantial increase in the number of primary and upper primary schools, during 2017 - 18, the state government recruited additional teacher to fulfill the need of the students, which was unfortunately inadequate in view of the substantial increase in the number of primary and upper primary school as well number of students in these school. There are 177052 primary school teachers in Bihar. Patna has the highest number of primary school teacher, which accounts for 9220, constitute 5.21 percent of the total primary school teacher of the state. Patna is followed by Siwan with a total number of 8897 primary school teacher, constitutes to 5.03 percent of the total primary school teacher of the state. It is important to mention here that districts having higher number of primary and upper primary schools and teacher have higher literacy rate, above 65 percent except East Champaran.

If we go through the total number of children enrolled in primary and upper primary school, we find that there are 137.71 lakh children in primary schools and 96.03 lakh in upper primary school. In terms of number of children enrolled in primary school, Muzaffarpur ranks top with 9.91 lakh children in primary school, constitute 7.20 percent of the total children enrolled. Muzaffarpur is followed by Patna with 5.32 percent of the total children. Out of the total 137.71 children enrolled in primary schools, 29.79 lakh are SC and 3.42 lakh are ST. Whereas out of total 96.03 lakh children enrolled in upper primary, 12.88 lakh are SC and 1.54 lakh are ST. Gaya has got the highest number of SC children enrolled in primary and upper primary school which constitute to 2.03 percent and 0.84 percent respectively. West Champaran ranked first, both in the ST children enrolled in primary and upper primary school with 0.48 per cent and 0.21 percent of the total ST children enrolled respectively. There are 126.59 lakh students, who are enrolled in class I to V and out of this 126.59 lakh children 79.55 lakh are covered under Mid - Day Meal provided by the government. Similarly there are 62.84 lakh children are enrolled in class VI to VIII, but only 36.24 lakh are covered under Mid - Day meal in the state. As expected, the most immediate consequences of the expansion of primary and upper primary schools in the state resulted into the increase in the enrolment of children in schools, whereas Mid - Day meal has also attracted children from the poor family too. Bihar state comprises 504 affiliated colleges and 277 constituent colleges. Out of 504 affiliated colleges 71 are located in Patna, which constitute to 14.09 percent of the total affiliated college, which is followed by Gaya which constitute 6.35 percent of the total affiliated college in Bihar. Similarly out of 277 constituent colleges, Patna alone accounts for 33 colleges, which constitute to 13.72 percent of the total constituent college in Bihar. Patna is followed by Darbhanga with a total number of 22 constituent colleges, which constitute to 7.94 percent of the total constituent colleges in Bihar.
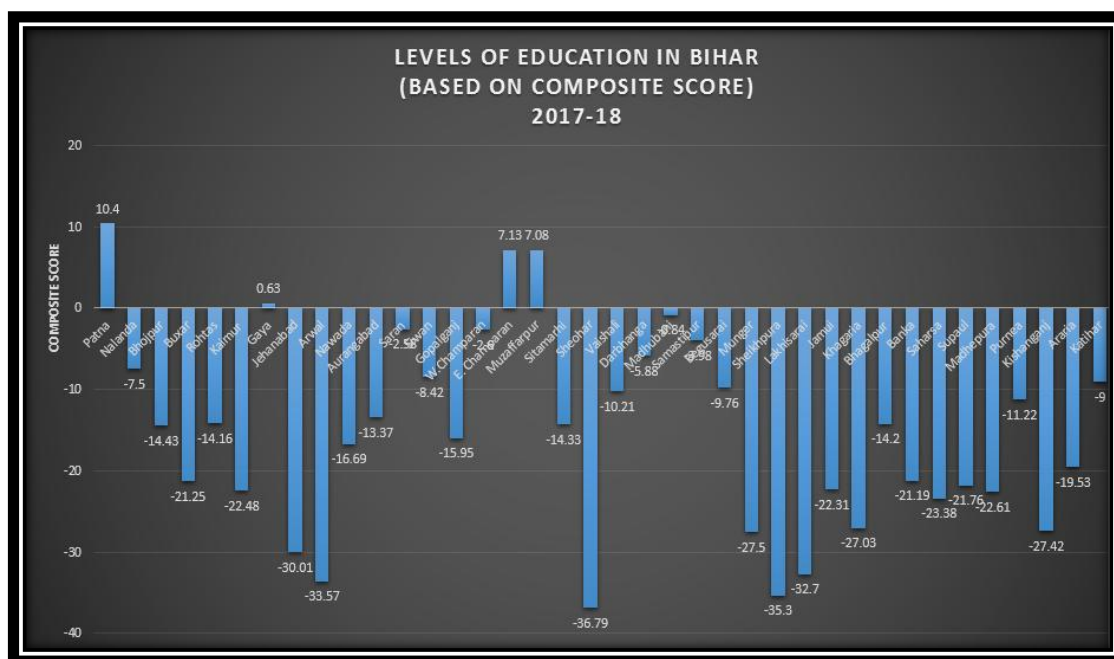

To find out the level of education in Bihar seventeen variables have been selected and z - score statistical technique has been applied and z - score has been calculated for each value. Furthermore, the z - score values of each variable were clubbed together for separate districts and a composite score were worked out to assess

the level of education in Bihar. The composite score of all the indicators for separate districts shows that there is a great disparity in the level of education among all the 38 districts of Bihar. This in equal level of education may be attributed to the in equal infrastructural facilities for education in Bihar and imbalance between the student - teacher ratio as well as due to insufficient number of

educational institution and lack of classrooms. Out of 38 districts of Bihar only four districts recorded positive z - score value, which includes Patna (10.40), Gaya (0.63), East Champaran (7.13) and Muzaffarpur (7.08). On the basis of the composite score we can say that the level of education in rest of the 34 districts are not satisfactory and are below the mark.
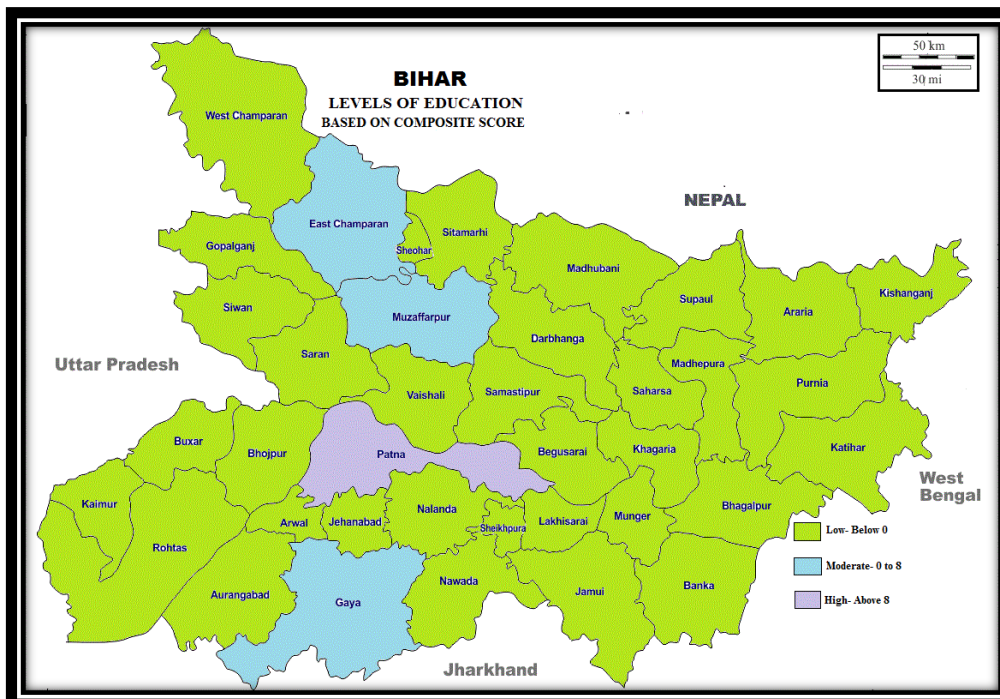
Correlation

A simple association between population growth (dependent variable) and each of the seventeen independent variables have been computed and tested with the assumption that the relationship exists between all the variables. Selection of each of the variable has been based on the ability to develop a rational hypothesis of relationship between seventeen independent variable and population growth rate. Selected independent variable were correlated with dependent variable (population growth rate) by means of Karl Pearson's coefficient of correlation method and were tested at 99% and 95% level of significance. Correlation matrixes has been prepared to find out the relationship between different parameters and are compared against each other too. On the basis of

correlation matrix we can say that population growth rate with literacy rate shows negative correlation of medium level (medium level negative correlation - 0.25 to - 0.75) and the value comes to - 0.636, which is significant at 99 percent level of confidence. Apart from this, number of affiliated colleges and number of constituent colleges are also correlated in negative direction, having a correlation value of - 0.220 and - 0.162 respectively, and both of them are not significant. Out of the seventeen variables, fourteen are positively correlated with population growth rate. Out of these fourteen variable one variable i. e. total enrolment of students under Mid - Day Meals shows a medium level of positive correlation +0.318 (medium level of positive correlation +0.25 - +0.75) and is significant at 95% level of confidence.

Correlation Matrix

Correlation of Population Growth with Different Variables

	Y	X1	X2	X3	X4	X5	X6	X7	X8
Y	1								
X1	- 0.636**	1							
X2	0.244	- 0.063	1						
X3	0.131	- 0.103	0.445**	1					
X4	0.087	0.049	0.773**	0.587**	1				
X5	0.072	0.161	0.710**	0.578**	0.913**	1			
X6	0.282	- 0.338*	0.077	0.279	- 0.035	- 0.003	1		
X7	0.280	- 0.320**	0.108	0.304	- 0.044	0.030	0.949**	1	
X8	0.127	- 0.043	0.723**	0.718**	0.699**	0.593**	0.183	0.239	1
X9	0.161	0.084	0.688**	0.761**	0.716**	0.670**	0.155	0.193	0.860**
X10	0.145	- 0.042	0.653**	0.575**	0.561**	0.491**	0.210	0.303	0.760**

X11	0.075	0.052	0.653**	0.800**	0.755**	0.722**	0.205	0.221	0.748**
X12	0.318*	- 0.289	0.713**	0.770**	0.682**	0.558**	0.249	0.282	0.897**
X13	0.296	- 0.261	0.710**	0.800**	0.677**	0.546**	0.260	0.293	0.905**
X14	0.165	- 0.051	0.747**	0.757**	0.725**	0.618**	0.097	0.118	0.906**
X15	0.118	- 0.014	0.717**	0.786**	0.699**	0.594**	0.082	0.105	0.884**
X16	- 0.220	0.396**	0.532**	0.190**	0.525**	0.557**	- 0.163	- 0.095	0.627**
X17	- 0.162	0.185	0.581**	0.377*	0.491**	0.463**	- 0.203	- 0.142	0.649**

	X9	X10	X11	X12	X13	X14	X15	X16	X17
Y									
X1									
X2									
X3									
X4									
X5									
X6									
X7									
X8									
X9	1								
X10	0.732**	1							
X11	0.822**	0.664**	1						
X12	0.828**	0.689**	0.734**	1					
X13	0.845**	0.710**	0.769**	0.992**	1				
X14	0.885**	0.680**	0.786**	0.954**	0.954**	1			
X15	0.894**	0.682**	0.818**	0.926**	0.944**	0.986**	1		
X16	0.455**	0.444**	0.423**	0.376*	0.370*	0.478**	0.453**	1	
X17	0.490**	0.483**	0.535**	0.534**	0.548**	0.630**	0.630**	0.785**	1

Note: Coefficient of Correlation calculated by the author for all the variables obtained from Census 2011 and Bihar Economic Survey 2019 - 20, Finance Department, Government of Bihar.
**Significant at 99% level of confidence *Significant at 95 % level of confidence

Remaining thirteen variables are positively correlated with population growth rate. Out of these thirteen variable two variable named as total enrolment of ST children in primary schools (+0.282) and total enrolment of ST children in upper primary schools (+0.280) have medium level of positive correlation and are not significant. Apart from this only one variable named as coverage of MDM per day in class I - V has got high level of positive correlation (+0.296), but it is not significant.

When we go through the correlation against each other we find that most of them are significant at 99 percent level of confidence except few.

5. Conclusion

The population of Bihar is on the rise and the rate of population growth according to the census year 2011 is 25.42 per cent as against 17.70 per cent in India as a whole. There has been a continuous increase in the population growth rate since 1951 and recorded population growth. Over the six decades from 1951 to 2011, population growth rate dipped by 0.78 percentage point in 1991 and 3.2 percentage point in 2011. Since 1951 to 2011, there has been a growth of 14.84 percentage point. Therefore Bihar has to work hard to maintain an educational system that ensures a proper education to every student, irrespective of caste, creed, religion and their financial ability.

It seems very difficult for Bihar to provide such type of education, because of economic constraints. Due to higher number of children in school age, more teachers, schools and classrooms are needed, which places a strain on an already stressed education system in Bihar. Due to over stressed education system, overcrowding has occurred on the limited education infrastructure, which leads the migration of student to other state. To stop this migration of students, Bihar needs to build bigger school and decrease the teacher student ratio, so that proper education can be provided to student. Over population has always been a major roadblock in the development of education system in Bihar. Since 1951, no doubt, there has been a continuous increase in literacy rate from 13.49 percent in 1951 to 61.80 percent in 2011. In spite of this fact Bihar registered the lowest literacy rate in the census year 2011, among all the Indian state. If we try to find out the correlation by means of Karl Pearson's method of correlation between the trend of population growth (Dependent variable) and literacy rate (independent variable) in Bihar, we find that there is a high level of positive correlation +0.8003 and is significant at 95% level of confidence.

District level analysis clearly indicates that there is an intra - state disparity in the growth of population, literacy rate as well as sixteen other variables selected to assess the level of education in Bihar. It has been observed that districts which are located in the north Bihar have low literacy rate and higher population growth. Five districts, named as Madhepura (31.12), Kishanganj (30.40), Araria (30.25), Khagaria (30.19) and East Champaran (29.43), ranked higher in population growth rate and are located in North Bihar, whereas, five districts which recorded higher literacy rate like Rohtas (73.37), Patna (70.68), Bhojpur (70.47), Munger (70.46) and Aurangabad (70.32) are located in the South Bihar plain.

If we go through the level of education obtained by composite z - score, we find that there are only four districts, named as, Patna, Gaya, East Champaran, and Muzaffarpur recorded in positive direction, which reflects,

that the educational infrastructure developed in these districts are not bad like other districts. The coefficient of correlation obtained by means of Karl Pearson's method at district level, between population growth rate (dependent variable) and seventeen variable related to level of education, including literacy rate, clearly indicates there is a medium level of negative correlation between population growth rate and literacy rate (- 0.636) and is significant at 99% level of confidence. Apart from this population growth rate and number of affiliated and constituent colleges are also correlated in negative direction, but are not significant. Rests of the fourteen variables are positively correlated.

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