

ECONOMIC AND HEALTH INDICATORS OF NORTH EAST INDIAN STATES

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Abstract

North East India comprises of the eight States of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The region's economy is generally characterized by low per-capita income, low capital formation, in-adequate infrastructure facilities, geographical isolation and communication bottleneck. The analysis of trends of the economic and health indicators of the North-Eastern states reveal that the NSDP has grown at a rate of 14.3 percent during 1981 – 2010. The IMR has declined at a rate of 2.2 percent while the Birth rate and Death rate declined at a rate of 1.6 and 1.7 percent respectively. The Life Expectancy of the North-East region grows at a rate of 0.9 percent. The analysis of pre and post liberalization period reveals that the increment in NSDP and Life Expectancy of the North-East was more significant after the liberalization of the Indian economy. The decline in birth rate and infant mortality rate, although almost the same was more significant before the liberalization while the death rate has increased slightly after the liberalization of the Indian economy. This disturbing fact can be due to the sudden increase in population after the 1990s.

1. INTRODUCTION

North East India comprises of the eight States of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. This area is potentially one of the richest geographical units of the country as it is generously endowed with vast stretches of fertile land and rich expanse of forests which constitutes 52 per cent of its total geographical area. Reserves of petroleum and natural gas in North east India constitute a fifth of the country's total known potential. This region is served by the mighty Brahmaputra-Meghna river system and small rivulets, which makes the possibility of generating hydro-electricity and inland-water transportation systems.

However, the region today lags behind many of the Indian states in vital development indicators. Partition of the country in 1947 transformed the economic landscape of the region, which once was in the forefront of development. The region was connected through the sea-route, a network of inland waterways, and land transportation through road and railways. The railway network between Dibrugarh (in Assam) and Chittagong (now in Bangladesh) was one of the earliest projects implemented by the British in India. The rapid growth of the tea industry in Assam followed the first tea garden set up in the State in 1835, and the first consignment of tea export to London in 1838. The discovery of oil in Makum and establishment of a refinery in Digboi in 1890 gave an impetus to the industrialization of the then undivided Assam.

The pace of development in the hilly areas and plains differ considerably. The valleys are economically active areas of the region, the Brahmaputra valley being the most active. Tribal population forms only one fourth of the population of the North East, despite the fact that in four States i.e., Mizoram, Meghalaya, Nagaland and Arunachal Pradesh, tribal are in majority and in Mizoram, they constitute as high as 95 per cent of the population. Though the region is diverse and heterogeneous, it is also homogeneous in the sense that the social stratification found in other parts of the country is not present in the North East.

There are differences among the eight States in the North Eastern region with respect to their resource endowments; level of industrialization as well as infrastructural facilities of the region is still primarily agrarian. The industrial sector has mainly grown around tea, petroleum [crude], natural gas etc. in Assam and mining, saw mills and steel fabrication units in other parts of the region (KKHSOU 2011). Industrial production is only 2.16 per cent of the Gross Domestic Product (GDP) in the North East, compared to the all-India figure of 27 per cent. This creates endemic problems for finding remunerative prices for basic commodities and agricultural produce. The economy but its full potential is yet to be exploited. Since agriculture and industry has not really taken off in spite of the potential in the form of vast unexploited resource base available in the region. The pressure for employment is on the service sector.

Rao (2004) recognizes that health status is related to and determined by numerous factors such as per capita income, way of life, marital status, housing, water supply, infrastructure, nutrition, education, health services provided by the government etc. Study found that during 1986-99, the birth rate declined significantly by 10.10 percent while the death rate also climbed down from 9.9 to 8.2 percent. Another significant feature of health status is a significant fall in the infant mortality rate. Expansion and extension of health facilities to improve their accessibility and availability yielded positive results. The effective birth control programmes and family welfare efforts made by the government in the previous two decades forced the death rate downwards. However, study feels that the stagnant or marginally negative infant mortality rate during 1990-2000, particularly in rural areas, is a matter of greater concern that needs to be addressed immediately. A higher rate of per capita income seems to be necessary to bring down the death rate considerably in the future, particularly rural areas. The influence of per capita income and number of hospitals in Andhra Pradesh on the infant mortality rate, though not significant, is debatable. The rural-urban variations in the health status are significant. Higher rate of literacy, high levels of per capita income, larger expenditure on public health, improved medical facilities both in the public and private sectors contributed to an improvement in the health status in urban areas. The inadequate and unsatisfactory health facilities available resulted in high rate of infant mortality in rural areas.

Economic Indicators of North East India:

Despite being rich in natural resources, development in the North Eastern region has lagged behind the rest of the country. The region's economy is generally characterized by low per-capita income, low capital formation, in-adequate infrastructure facilities, geographical isolation and communication bottleneck, inadequate exploitation of natural resources like mineral resources, hydro power potential, forests etc., low progress in industrial field, lack of private and foreign direct investment and high unemployment rate among the relatively high literate people.

Although infrastructure has developed over the years, the region has a long way to go before it catches up with the national standards. The total rail length in the North East is 2578 kilometres, which is only four per cent of the total rail length in the country. Similarly, the 1.74 lakh kilometre road length in the region is seven per cent of the total roads in the country. Compared to the all-India road density (road length per 1000 square kilometre area) of 749, Manipur has a poor density of 490 and Meghalaya 379. Assam has a healthy density of 872 and Tripura 1405. The longevity of the majority of roads, the region's main communication link, however, remains affected by recurring floods, landslides and erosion. Serious erosion occurs in about 15 per cent of the total geographical area of the region and moderate erosion in about 47 per cent area.

Moreover, the region remains isolated from the rest of the country and has not been able to attract investors or produce skilled labour and entrepreneurial resources. It has failed to transform even the primitive agricultural practices of the region into modern commercial agriculture. In addition, the region has not received the attention of the central government in building the required essential infrastructure for progress. All this has alienated the northeast from the mainland and proved to be a prime factor for the continuance of insurgency in the region.

Table 1: NSDP of North-Eastern states at current price (as of 15-03-2012) (Rupee in crores)

States	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Arunachal Pradesh	1,665	1,961	1,920	2,193	3,188	3,439	3,765	4,407	5,199	6,521	7,632
Assam	33,760	35,094	39,394	42,927	47,181	52,440	57,033	62,342	71,498	82,495	92,970
Manipur	2,814	3,014	3,142	3,564	4,603	5,138	5,503	6,049	6,614	7,436	8,228
Meghalaya	3,593	4,057	4,310	4,723	5,846	6,461	7,701	8,619	10,260	11,602	13,156
Mizoram	1,567	1,752	1,933	2,083	2,400	2,664	2,944	3,411	4,151	4,800	5,504
Nagaland	3,286	3,874	4,382	4,699	5,421	6,116	6,728	7,477	8,789	9,557	10,334
Sikkim	855	956	1,078	1,209	1,511	1,734	1,871	2,140	2,796	4,144	4,943
Tripura	5,114	5,889	6,223	6,990	8,170	9,040	9,981	10,808	12,509	14,210	16,183
All India	1,723,200	1,869,428	2,010,938	2,258,122	2,651,537	3,534,547	4,097,390	4,738,370	5,433,587	6,463,938	7,410,578

Source: Central Statistical Organization

North Eastern Council (NEC)

The North Eastern Council, set up by an act of Parliament in 1971 as an Advisory body for all round development of the North Eastern region is now functioning as regional planning body since 2002. The Council plays an important role for the economic and social development of the North Eastern region. The funding of the council mainly lies with the central government. 3 year plan issued in 2017, envisages and annual budget of INR 2500 crore, 40% from the government and the rest 60% from the non-lapsable central pool of resources (NEC Final plan 2017). The distribution of financial resources spent has been 47% towards transport and communication, 14% in agriculture, 11% in human resource development and education, 9% in power, 4% in health, 3% in tourism and 3% in industries for fiscal year 2017 (necouncil.gov.in). The council has demonstrated considerable achievements in the provision of electricity, education, highways and bridges development in the North Eastern States.

Health Indicators of North East Indian states:

North-East India comprised of 8 states viz. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. They are known as the 'eight sisters'.

ARUNACHAL PRADESH

According to 2011 census, the population of Arunachal Pradesh is 13, 82,611. The state covers an area of 83743 sq. km. It has the lowest density of 17 persons per sq. km. The decadal growth rate is 25.92 percent. The sex ratio of the state at 893 females to 1000 males is lower than the national average of 933. The total fertility rate of the state is 3.03 percent. The IMR is 37. Crude birth rate is 22.2 and crude death rate is 5.1 (2007).

There are 379 Sub Centres, 85 Primary Health Centres and 31 Community Health Centres in the state. The number of Multipurpose Worker is 454 and Health Worker is 23. There are 78 doctors at PHCs. The state has 14 district hospitals, 1 Ayurvedic hospital, 2 Ayurvedic dispensaries, 1 Homeopathic hospital and 44 Homeopathic dispensaries.

ASSAM

The population of Assam is 3, 11, 69, 272 according to 2011 census. The state has the highest population density among N.E states, of 397 persons per sq. km. The area of the state is 78438 sq. km. The population of the state has grown by 16.93 percent over the period 2001-2011. The sex ratio of the state is 935 as compared to 933 for the country; crude birth rate is 24.3 and crude death rate is 8.6. IMR is 66 in 2007.

The total fertility rate of the state is 2.42. The IMR is 68 and maternal Mortality rate is 490(SRS 2001-03) which are higher than the national average. There are 5109 Sub Centres, 610 Primary Health centers and 100 Community Health Centres in the state. The number of Multipurpose worker is 5719. The state has 20 District Hospitals, 1 Ayurvedic hospital, 393 Ayurvedic dispensaries, 1 Unani dispensary, 3 Homeopathic hospitals and 75 Homeopathic dispensaries.

MANIPUR

The state of Manipur has an area of 22,327 sq. km. and a population of 27, 21, 756. It has a population density of 122 persons per sq. km. (as against the national average of 324). The decadal growth rate of the state is 18.65 percent. The total fertility rate of the state is 2.83. The infant mortality rate is 12 and the sex ratio of the state is 978 as compared to 933 for the country; crude birth rate is 14.6 and crude death rate is 4.4 (2007).

There are 420 Sub Centres, 72 Primary Health Centres and 16 Community Health Centres in Manipur. The number of multipurpose worker is 515 and Health worker is 371. The state has 13 civil hospitals, 96 doctors at Primary Health Centres; 87 district hospitals, 1 Homeopathic hospital and 9 Homeopathic dispensaries.

Medical facilities in the state are mainly provided by the state Government. Medical and Health care facilities were available to the people of Manipur through a network of 541 hospitals/dispensaries with a total manpower of 888 doctors and 1,055 nurses, midwives and dai's. The number of beds available was 2,290. Out of 10756 thousands patients treated in 2005-06, 51.8 thousands were indoor patients while 1023.8 thousands were outdoor patients.

MEGHALAYA

The population of Meghalaya is 29, 64,007 according to 2011 census. The state has a population density of 132 persons per sq. km. The decadal growth rate of the state is 27.82 percent. The sex ratio of Meghalaya is 986 females per 1000 males. Literacy rate of the state is 75.48. The total fertility rate of the state is 3.80. The infant mortality rate is 56, crude birth rate 24.4 and crude death rate is 7.5 (2007).

There are 404 Sub Centres, 104 PHCs and 28 CHCs across the state. The number of Multipurpose worker is 608 and Health Worker is 273, 106 Doctors at PHCs. The state has 3 Districts Hospitals, 1 Ayurvedic hospital, 7 Ayurvedic dispensaries and 4 Homeopathic dispensaries. The number of beds in government hospitals is 3726. There are 546 family welfare clinic centres, 671 doctors, 893 staff nurses and 1195 para medical staff.

MIZORAM

According to 2011 census, Mizoram has a total population of 10, 97, 206. The area of the state is 21081 sq km. It has a density of 52 persons per sq. km. As against the decadal growth rate of 21.54 percent at the national level, the population of the state has grown by 22.78 percent over the period 2001-2011. The sex ratio of Mizoram is 975 females to 1000 males. Literacy rate of the state is 91.58 percent. The total fertility rate of the state is 2.85. The infant mortality rate is 23, crude birth rate is 18.2 and crude death rate is 5.2 (2007).

There are 372 Sub Centres, 57 Primary Health Centres (PHCs) and 9 Community Health Centres in the state. The number of multipurpose worker is 423 and Health worker is 303. There are 35 doctors at PHCs. The state has a total of 8 District Hospitals and 6 Homeopathic hospitals.

NAGALAND

The state of Nagaland has an area of 16579 sq. km. and a population of 19,80,602 with a density of 119 persons per sq. km. Nagaland is the only state in India which shows a negative growth rate (-0.47). The sex ratio of the state is 931 females to 1000 males. Literacy rate of the state is 80.11 percent. The total fertility rate is 3.74; infant mortality rate is 21, crude birth rate is 17.4 and crude death rate is 5.0 (2007).

Nagaland has 397 Sub Centres, 84 Primary Health centers and 21 Community health Centres. There are 342 Multipurpose workers and 300 Health workers, 53 Doctors at PHCs; the state has 11 District Hospitals.

SIKKIM

The population of Sikkim is 6, 07,688 according to 2011 census. It has a density of 86 persons per sq. km. The state covers an area of 7096 sq. km. The decadal growth rate of the state is 12.36 percent as against 21.54 percent at the national level. The sex ratio of Sikkim at 889 females to 1000 males is lower than the national average of 933. Literacy rate of the state rose to 86.27 from 46.76 percent in 1991. Crude birth rate of the state is 18.1 and crude death rate is 5.3. Infant mortality rate is 34 (2007). Total fertility rate of the state is 2.02.

Sikkim has 147 Sub Centres, 24 Primary Health Centres and 4 Community Health Centres. There are 260 Multipurpose workers and 147 health workers; 48 Doctors at PHCs and 1 Surgeon. The state has 4 District Hospitals, 1 Ayurvedic Hospital, 1 Ayurvedic Dispensary, 7 Homeopathic Hospitals and 1 Homeopathic Dispensary.

TRIPURA

The population of Tripura is 36, 71,032 according to 2011 census. The state has density of 356 persons per sq. km. The decadal growth rate is 14.75. The sex ratio of the state is 961 females per 1000 males. Literacy rate of the state is 87.75 percent. The total fertility rate of the state is 2.22, the Infant Mortality rate is 39, crude birth rate is 17.1 and crude death rate is 6.5.

There are 539 Sub Centres, 73 PHCs and 10 CHCs in the state. The number of Multipurpose worker is 593 and Health worker is 268; there are 152 Doctors at PHCs. The state has 2 District Hospitals, 1 Ayurvedic hospital, 40 Ayurvedic dispensaries, 9 Homeopathic hospitals and 66 Homeopathic dispensaries.

RESEARCH METHODOLOGY:

Objectives of the study:

- 1) To find out the growth pattern of the economic and health indicators of North east India.
- 2) To compare between pre and post liberalization period and find out what effects Liberalization has on North East economy.

Data Collection:

This study is based on secondary data. The period 1981 - 2010 were taken to represent pre and post Liberalization period. The required data were collected from the website of Central Statistical Organization, Directorate of Health and Family Welfare website for each of the 8 states of Northeast India, indiastat.com and SRS Registrar General.

The economic and health indicators for North East Indian states have been analyzed using SPSS. Based on the objectives suitable statistical tools have been applied to analyse the collected data:

Compound Growth model has been fitted to predict the growth of Net State Domestic Product, Per Capita Income, Life Expectancy, Birth Rate, Death Rate and Infant Mortality Rate of North-east states as well as Mizoram. Growth rate is used to measure the growth in these variables and to note whether it is increasing or decreasing, and to identify reasons for its decline, and to suggest suitable policy measures.

Semi-Log model

$$\ln Y_t = a + b (\text{time}) + U_t$$

Where,

Y_t is a Time Series variable.

This model has been fitted for time series data of various economic variables related to health and economic variables.

The **simple growth** rate has been found by multiplying the estimated 'b' value by 100.

The **compound growth** rate has been estimated by using the following formula

$$CGR = [\text{anti Ln } (b) - 1] \times 100$$

Time series trend has been projected for the various health and economic variables and is done up to 2020. Time series helps in the analysis of past behaviour of a variable. Analysis of past data discloses the effect of various factors on the variable under study. With the help of such analysis the future behaviour of the variable under study can be predicted.

ANALYSIS

In this section, a study is made on the economic and health indicators of North Eastern states. Five indicators were used for this analysis, they are:

- a) Net State Domestic Product (in billion rupees)
- b) Infant Mortality Rate
- c) Crude Birth Rate
- d) Crude Death Rate
- e) Life Expectancy (in years)

Table 2: Economic and health indicators of North-East Indian states (1981-2010)

Sl.no.	Years	NSDP (in Billion rupees)	Birth rate	Death rate	IMR	Life expectancy (in years)
1	1981	4.06	30.2	9.4	106	54.4
2	1982	4.70	29.8	10.2	102	54.4
3	1983	4.90	30.0	10.0	94	54.4
4	1984	5.13	30.8	10.4	99	54.4
5	1985	5.36	31.8	10.6	111	54.4
6	1986	5.39	31.6	10.4	109	54.4
7	1987	5.76	30.6	9.1	102	54.4
8	1988	5.94	31.1	9.7	99	54.4
9	1989	6.36	28.0	9.1	91	58.3
10	1990	6.75	25.7	7.9	76	58.6
11	1991	7.21	25.6	8.2	81	58.6
12	1992	7.45	24.4	7.2	82	58.8
13	1993	25.73	24.8	6.9	81	59.3
14	1994	26.30	25.3	6.4	78	59.9
15	1995	27.66	24.0	7.6	77	60.3
16	1996	28.78	21.8	6.6	76	60.3
17	1997	29.90	21.8	6.9	76	62.1
18	1998	30.36	21.8	6.8	76	62.4
19	1999	61.19	21.7	6.7	75	62.6
20	2000	63.40	22.7	6.6	74	62.9
21	2001	66.73	21.3	6.3	70	63.1
22	2002	70.44	20.4	5.9	67	63.4
23	2003	74.98	19.6	5.9	66	63.1

24	2004	97.90	19.1	5.5	68	63.1
25	2005	102.53	19.9	5.6	60	64.7
26	2006	107.98	19.5	6.0	58	67.7
27	2007	113.76	19.5	5.9	64	67.7
28	2008	122.45	23.9	8.6	61	69.9
29	2009	133.06	23.6	8.4	61	69.9
30	2010	143.08	23.2	8.2	58	71.0

Source: indiastat.com, SRS Registrar General

Estimation of Compound growth rate for the economic and health indicators of North-East Indian states

The compound growth rates for each economic and health indicators was calculated using semi log growth model, taking time as an independent variable. Net State Domestic Product, Infant Mortality Rate, Crude Birth Rate, Crude Death Rate and Life Expectancy of the North-Eastern states are the dependent variables. The growth rate trend equation gives an estimate of constant rate of increase or decrease per unit of time.

Table 3: Estimation of Compound Growth Rate for the economic and health indicators of North-East States (1981-2010)

Variables	Constant	B value	't' value	Sig. value	R ²	F	SGR	CGR	Predicted (2020)
NSDP	0.956	0.143	22.761	0.001	0.949	518.079	14.3	15.37	791.44828
IMR	4.696	-0.022	-17.092	0.001	0.913	292.136	-2.2	-2.23	46.32801
CBR	3.450	-0.016	-8.784	0.001	0.734	77.166	-1.6	-1.61	16.38438
CDR	2.292	-0.017	-5.366	0.001	0.507	28.789	-1.7	-1.71	5.01543
LE	3.960	0.009	23.356	0.001	0.951	545.501	0.9	0.91	76.03744

Net State Domestic Product:

The net state domestic product (NSDP) equals the [gross state domestic product](#) (GSDP) minus [depreciation](#) on a state's [capital](#) goods. Net state domestic product accounts for capital that has been consumed over the year in the form of housing, vehicle, or machinery deterioration.

The above result shows the percentage increase in NSDP of North-East states over three decades. The R² value of 0.949 shows the co-efficient of determination. The NSDP of north-east states has grown at the rate of 14.3 percent and the Compound Growth Rate is calculated using

$$\begin{aligned} \text{C.G.R} &= [\text{AntiLn}(0.143) - 1] \times 100 \\ &= [1.1537 - 1] \times 100 \\ &= 15.37 \end{aligned}$$

The predicted value for 2020 is 791.44828 billion rupees. The result shows that the NSDP of North-East during 1981-2010 has increased at the compound growth rate of 15.37 percent per annum.

Infant Mortality Rate

Infant Mortality Rate is the number of deaths of infants or children under one year of age per 1000 live births. IMR reflects the overall health of a population to a large extent.

In the above result, the R² = 0.913 indicates the co-efficient of determination. Here, it is seen that the infant mortality rate has shown a decline in the thirty years studied. The IMR of North-East states declined at the rate of 2.2 percent per annum. The compound growth rate is -2.23 percent. The predicted value for 2020 is

46.32801. The result shows that the infant mortality rate of North-East during 1981-2010 has declined at the compound growth rate of -2.23 percent per annum.

CrudeBirth Rate

CrudeBirth rate is the number of births in a year per 1,000 populations. The above result shows that the birth rate of North-East over three decades has shown a negative result. It has declined at the rate of 1.6 percent. The R^2 value of 0.734 indicates the co-efficient of determination. The compound growth rate is -1.61 percent. The result thus shows that the Crude Birth Rate of north-east has declined by the compound growth rate of -1.61 percent per annum during 1981-2010, which can be mainly attributed to women's increased use of contraception. The predicted value of CBR of North-East for 2020 is 16.38438.

Crude Death rate

Crude Death Rate is the number of deaths in a year per 1,000 populations. The CDR of North-East for a period of the last thirty years is calculated and shown in the above table. The $R^2 = 0.507$ shows the co-efficient of determination. The result shows that the death rate of the north eastern states declined by 1.7 percent per annum, during 1980-2010. The compound growth rate has also shown a negative value of 1.71 percent per annum. The predicted value for CDR for 2020 is 5.01543. Thus, the result shows that the crude death rate of north-east has shown a decline over the past thirty years. This can be attributed to the increase in healthcare with increase in income, improvement in living conditions and environment which is also due to increase in people's income.

Life Expectancy

Life Expectancy is the expected number of years remaining at a given age or it can be said that it is the expected number of years a person will live. It is an important development and health indicator. It reflects the overall quality of life in a country and summarizes the mortality at all ages.

The above result shows the Life Expectancy of North-Eastern states over a period of three decades. The result shows that the Life expectancy of North-East states has grown at the rate of 0.9 percent per annum. The R^2 value of 0.951 shows the co-efficient of determination. The compound growth rate is 0.91 percent. The predicted value for 2020 is 76.03744 years. Thus, the Life Expectancy of Mizos' during 1981-2010 has increased at the compound growth rate of 0.91 percent per annum.

INDICATORS FOR PRE AND POST LIBERALIZATION PERIOD

Liberalization of the Indian economy started from 1991 and greatly affects the economy of the country. This liberalization effect for the North-East Indian states will be calculated by dividing the years before and after liberalization as 1981-1990 as pre-liberalization period and 1991-2010 as post-liberalization period. In this way, the impact of Liberalization on the north-east Indian economy can be examined.

Table 4 (a): North-East Pre Liberalization Period (1981-1990)

Variables	Constant	B	't' value	Sig. value	R ²	F	SGR	CGR
NSDP	1.411	0.050	16.890	0.001	0.969	285.285	5.0	5.13
IMR	4.719	-0.025	-2.805	0.021	0.466	7.867	-2.5	-2.53
CBR	3.474	-0.015	-2.530	0.032	0.416	6.403	-1.5	-1.51
CDR	2.376	-0.021	-2.954	0.016	0.492	8.726	-2.1	-2.2
LE	3.968	0.008	3.722	0.005	0.606	13.852	0.8	0.81

Table 4 (b) North-East Post-Liberalization Period (1991-2010)

Variables	Constant	B	't' value	Sig. value	R ²	F	SGR	CGR
NSDP	2.710	0.131	11.541	0.001	0.887	133.202	13.1	14
IMR	4.437	-0.020	-13.470	0.001	0.914	181.444	-2.0	-2.02
CBR	3.160	-0.007	-2.079	0.053	0.203	4.321	-0.7	-0.71
CDR	1.882	0.002	0.302	0.766	0.005	0.091	0.2	0.20
LE	4.056	0.010	13.562	0.001	0.915	183.920	1.0	1.01

Net State Domestic Product

The above two tables depicts the NSDP of North-East for a period of thirty years divided into two groups, pre and post liberalization. In the pre liberalization period, the R² value of 0.969 shows the co-efficient of determination. The simple growth rate of NSDP of North-east before liberalization stands at 5 percent while the compound growth rate is 5.13 percent. For the post liberalization period, the R² = 0.887 shows the co-efficient of determination. The simple growth rate is 13.1 percent while the compound growth rate is 14 percent. The result shows that the increase in the NSDP of North-East states during the post-liberalization period is more significant than the pre-liberalization period.

Infant Mortality Rate

The infant mortality rate of North-East in the pre liberalization period has shown a negative decline as seen in the table 4 (a) above. The simple growth rate stands at -2.5 percent while the compound growth rate stands at -2.53 percent. The R² = 0.466 explains the co-efficient of determination. Thus, the Infant Mortality Rate of North-East declined at a rate of 2.53 percent during the pre-liberalization period. During the post-liberalization period, the simple growth rate of IMR for North-East is -2 percent while the compound growth rate is -2.02 percent. The R² value of 0.914 explains the co-efficient of determination. The infant mortality rate of North-East has declined at the compound growth rate of -2.02 percent per annum in the post-liberalization period. Thus, the result reveals that the decline in the Infant Mortality Rate of North-East during pre and post liberalization period is the same, with not much improvement after the liberalization of Indian economy.

Crude Birth Rate

The crude birth rate of North-East states during pre liberalization period is given in the above table 1. The R² = 0.416 shows the co-efficient of determination. The simple growth rate is -1.5 percent and the compound growth rate is -1.51 percent. During the post liberalization period, the R² value is 0.203 which shows the co-efficient of determination. The simple growth rate for post-liberalization period stands at -0.7, while the compound growth rate is -0.71 percent. Thus, from the above discussion, it is seen that the birth rate of North-Eastern states declined during both the pre and post liberalization period, with the decline in the pre liberalization more significant.

CrudeDeath Rate

The table 5.1.3 (a) shows that R² value of 0.492 for North-East during the pre liberalization period, which explains the co-efficient of determination. The simple growth rate for pre liberalization period is -2.1 percent and the compound growth rate is -2.2 percent. Now, for the post liberalization period, the R² value of 0.005 shows the co-efficient of determination. The simple growth rate is 0.2 and the compound growth rate is also 0.2 percent. The result shows that during the pre liberalization period, the death rate of North-Eastern states has shown a decline while in the post liberalization period, it increases at a compound growth rate of 0.2 percent. This increase in death rate can be attributed to new killer diseases like cancer and AIDS. Also, drug related deaths are on the rise after the late 1990's.

Life Expectancy

The Life Expectancy of North-East states in the pre liberalization period have shown a simple growth rate of 0.8 percent. The compound growth rate is 0.81 percent. The R² = 0.606 shows the co-efficient of determination. During the post liberalization period, the simple growth rate of life expectancy for North-East is 1 percent and the compound growth rate is 1.01 percent. The R² = 0.915 shows the co-efficient of determination. Thus, the result shows that the increase in the life expectancy of North-East during the post liberalization period is

slightly significant than the pre liberalization period. With increase in income and improvement in living conditions, the number of years a person lives also increases. It is an important development indicator.

FINDINGS AND CONCLUSION:

The analysis of trends of the economic and health indicators of the North-Eastern states reveal that the NSDP has grown at a rate of 14.3 percent during 1981 – 2010. The IMR has declined at a rate of 2.2 percent while the Birth rate and Death rate declined at a rate of 1.6 and 1.7 percent respectively. The Life Expectancy of the North-East region grows at a rate of 0.9 percent.

The analysis of the compound growth rates reveals that that the NSDP of North-East during 1981-2010 has increased at the compound growth rate of 15.37 percent per annum. The predicted value for NSDP of North-East for 2020 is 791.44828 rupees. The infant mortality rate of North-East during 1981-2010 has decreased at the compound growth rate of -2.23 percent per annum. The predicted value for North-East Infant Mortality Rate for 2020 is 46.32801. The Crude Birth Rate of North-East during the last three decades has declined by the compound growth rate of 1.61 percent, which can be mainly attributed to women's increased use of contraception. The predicted value for CBR of North-East for 2020 stands at 16.38438. Similarly, the crude death rate of North-East has shown a decline over the past thirty years. This can be attributed to the increase in health care with increase in income, improvement in living conditions and environment which is also due to increase in people's income. Finally, the compound growth rate of Life Expectancy of North-Eastern states is 0.91 percent. The predicted value for 2020 is 76.03744. The result shows the Life Expectancy of North-East Indian states during 1981-2010 has increased at the compound growth rate of 0.91 percent per annum.

Thus, the analysis of the economic and health indicators of North-Eastern states reveals that there has been significant increase in the economic indicators of the North-Eastern states during 1981-2010. The health indicators like birth rate, death rate and infant mortality rates have shown a negative growth. The analysis of compound growth rates for these indicators show that for the three decades studied, the NSDP has increased at the rate of 15.37 percent per annum and the life expectancy of North-East also increased at the rate of 0.9 percent per annum. The birth rate, death rate and infant mortality rate has significantly declined during this period of study. IMR decreased at the rate of 2.3 percent while birth rate declined at 1.61 percent and death rate declined by 1.71 percent per annum.

The economic and health indicators of North-East are also examined with respect to pre and post liberalization, i.e., before 1991 and after 1991 (1981-1990 as pre Liberalization period and 1991-2010 as post Liberalization period). It is found that the NSDP of the North-East grows at a rate of only 5 percent during the pre-liberalization period, while in the post liberalization period it grows at a rate of 13.1 percent. The Birth rate of the North-East states declined at a rate of 1.5 percent during the pre-liberalization period while during the post liberalization, it declined at a rate of 0.7 percent. Here it is seen that the decline is more significant during the pre-liberalization period. The Death rate also declined more during the pre-liberalization period (2.5 percent) than the post liberalization period (2 percent). This can be attributed to the increase in people's income where they can spend more on healthcare facilities as well as the discovery of new drugs and medicines to prolong life span. The Infant Mortality Rate declined at a rate of 2.5 percent during the pre liberalization period while in the post liberalization, it declined at a rate of 2 percent. The Life Expectancy of the North-East grows at a rate of 0.8 percent in the pre liberalization period and grows at 1 percent during the post Liberalization.

The analysis of pre and post liberalization period reveals that the increment in NSDP and Life Expectancy of the North-East was more significant after the liberalization of the Indian economy. The decline in birth rate and infant mortality rate, although almost the same was more significant before the liberalization while the death rate has increased slightly after the liberalization of the Indian economy. This disturbing fact can be due to the sudden increase in population after the 1990s.

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