Interlinkages between Human Development Indicators and Economic Growth in India: A Study with Reference to Kerala and Uttar Pradesh

THESIS

SUBMITTED TO

BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY

(A CENTRAL UNIVERSITY)

LUCKNOW

FOR THE AWARD OF DEGREE OF

Doctor of Philosophy

IN

ECONOMICS

Under the Supervision of

Dr. Surendra Meher

Submitted By

Ruchi Bhalla

DEPARTMENT OF ECONOMICS
SCHOOL FOR AMBEDKAR STUDIES
BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
(A CENTRAL UNIVERSITY)
Vidhya Vihar, Raebareli Road Lucknow-226025 (U.P.), India

Enrollment No. 1018/15

Year 2019

DECLARATION

I declare that the thesis entitled **"Interlinkages between Human Development Indicators and Economic Growth in India: A Study with Reference to Kerala and Uttar Pradesh"** submitted to Babasaheb Bhimrao Ambedkar University, (A Central University), Lucknow for the award of Doctor of Philosophy in Economics. It is my original work and it has not previously been produced for the award of any degree, diploma, fellowship or similar other titles anywhere.

This research study is carried out under the supervision of Dr. Surendra Meher, Department of Economics, School for Ambedkar Studies (SAS), Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India. This is also declare that the thesis is essentially free from all kinds of plagiarism.

Place: Lucknow

Date: 22/10/2019

Ruchi Bhalla
R. Bhalla
(Enrolment No. 1018/15)
Department of Economics
Babasaheb Bhimrao
Ambedkar University,
Lucknow, Uttar Pradesh

295/DE/BBAU/19
22.10.19

CERTIFICATE

This is to certify that the thesis titled "**Interlinkages between Human Development Indicators and Economic Growth in India: A Study with Reference to Kerala and Uttar Pradesh**" submitted by Ms. Ruchi Bhalla is an original research work and has not been previously submitted in part or full for the award of any other degree or diploma to this or any other university.

This thesis submitted to Babasaheb Bhimrao Ambedkar University, Lucknow satisfies all the requirements as stipulated in the Doctor of Philosophy (Ph.D.) regulations-1999 as mentioned in 2013 and it is fit for submission and evaluation for the award of the degree of Doctor of Philosophy of the University.

Date: 22/10/19

Supervisor

for Head of Department 22/10/19

ACKNOWLEDGEMENT

In gratitude to one and only ultimate power "GOD"

I would like to express sincere thanks to my supervisor **Dr. Surendra Meher**, Department of Economics, BBA University, Lucknow who has the attitude and substance of a genius. Without his guidance and persistent help this dissertation would have not been possible. His patient nature, timely advice, meticulous scrutiny and scientific approach have helped me to accomplish the task.

My heartfelt gratitude to Head of our Department, **Professor Sanatan Nayak** for taking keen interest in my research work. His valuable suggestions and constant encouragement have enabled me to complete the thesis within the specified time frame. I express thanks to other faculty members **Prof. NMP. Verma, Dr. Devendra Kr. Yadav, Dr. L.C Mallaiah and Dr. Pranav Anand** for advising, motivating and supporting in myriad of ways.

A sincere thankyou note to **ICSSR**, New Delhi for giving financial support in the form of ICSSR Doctoral Fellowship. My research work wouldn't have been this much smooth without their support.

A small note and a word of thank you won't be enough to show my deep gratitude to the number of people who bestowed their blessings upon me. I revere the patronage, love, motivation and moral support by **Guruji** and whole family of **Gulab Vatika.**

After Guruji, I would like to thank my **parents**, without their presence, I wouldn't have the instilled belief in me to take up such a big project. I am beholden towards them for recognizing my sincere and ingrained attitude towards research work. Thank You.

Last but not the least are those people who been my lifeline throughout my work, "Friends". **Mr. Adil Qadri, Mr. Draven Reign, Ms. Pragya Sharma, Ms. Deepanjali Das, Ms. Soma Samantha, Ms. Shivangi Gupta, Mr. Nikhil Yadav, Ms. Priti Jha, Mrs. Vandana Ahirwar, Ms. Pratinidhi, Ms. Kanti Devi, Mr. Ravindra, Mr. Pawan Gupta, Mr. Firdaus Malik.** A genuine apology if any of the well-wishers are missed out. I am very grateful to each and every one who has been a motivating spirit in the course of my study.

I thank profusely all the staff of the University **Mr. Atul Sahu, Mr. Sachin Srivastava and Ram Sagar** for their kind help and co-operation throughout my study period. Finally, a heartfelt thankyou to all the scholars, teachers, professors and non-academic personnel whose ideas have influenced me but have remained unintentionally unacknowledged.

Date: **Ruchi Bhalla**

Place: Lucknow **(Enrolment No. 1018/15)**

Plagiarism Certificate

URKUND

Urkund Analysis Result

Analysed Document:	edited chapter 1.pdf (D56229940)
Submitted:	9/30/2019 9:52:00 AM
Submitted By:	gbl.bbau@gmail.com
Significance:	2 %

Sources included in the report:

G. RAMAKRISHNAN.pdf (D31213485)
palag.docx (D36731698)
Final Dissertation of Anuradha Gogoi3.docx (D35820052)
https://ideas.repec.org/p/qeh/qehwps/qehwps18.html
https://link.springer.com/chapter/10.1007/978-1-137-37138-6_13
https://rrojasdatabank.info/hdr962nd.htm
https://ideas.repec.org/p/egc/wpaper/826.html
https://www.future.edu/wp-content/uploads/2018/06/1995-02-community-based-sustainable-human-development.pdf
https://www.un.org/esa/desa/papers/2005/wp8_2005.pdf
https://mpra.ub.uni-muenchen.de/47648/1/MPRA_paper_47648.pdf
f3ae1fbf-992f-40cf-9a5e-19ae7724673e

Instances where selected sources appear:

32

Preface

The study entitled "**Interlinkages between Human Development Indicators and Economic Growth in India: A Study with Reference to Kerala and Uttar Pradesh**" is integral in research of Development economics. Attaining the status of developed nation is the core objective of every economy. Development is a multidimensional process that is inclusive of all those concepts essential for achieving the status of developed nation. Human development and Economic growth are the means and ends component of development process. Development cannot be attained if both these concepts don't presuppose each other. The existence of dichotomous relationship between human development indicators and economic growth is essential for any economy to develop.

The study tries to explore the linkages between Human Development Indicators and Economic growth in the context of Indian economy. As per the recent HDI ranking India has managed to fix its spot as a medium developed category state from low category. Still a lot of efforts and planned initiative are needed for achieving the status of developed nation. Persistence of huge interstate discrepancies in relation to the allocation of resources among the states, it becomes necessary to analyse the level of disparities emerging in the economy. Study not only explore the linkage within Indian states, trends and disparities in terms of outlay incurred by the states in social sector components are also analysed. Apart from the Human development indicators the importance and the impact of Physical infrastructure indicators on growth is also studied. State wise indexes have been constructed through multivariate analysis using PCA methodology and the states are classified into four categories based on descriptive statistics. One key feature of the study is a detailed and descriptive district wise analysis of UP and Kerala districts have been done.

On the same front, the chapters are integrated accordingly with the aim to explore the linkage among Indian states as well as UP and Kerala economy.

List of Abbreviations Used

AP	Andhra Pradesh
AS	All States
BACK	Backward
BIMARU	Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh
CAGR	Compound Annual Growth Rate
Chha	Chhattisgarh
CSO	Central statistics office
CV	Coefficient of variation
DEV	Developed
DISE	District Information System for Education
EAG	Empowered action group
EDI	Educational Development Index.
EE	Education Expenditure
EG	Economic Growth
EYS	Expected Year of schooling
GBN	Gautam Budh Nagar
GDP	Gross Domestic Product
GER	Gross Enrolment Ratio
GNI	Gross National income
GR	Growth rate
Guj	Gujarat
Har	Haryana
HC	Human Capital
HD	Human development
HD	Highly developed
HDI	Human Development Index
HDR	Human development report
HE	Health Expenditure
HP	Himachal Pradesh
ID	Institutional Deliveries

IIPS	International Institute of Population Sciences
IMR	Infant Mortality Rate
Infras	Infrastructure
J&K	Jammu and Kashmir
Jhar	Jharkhand
JPN	Jyoti Phule Nagar
Karn	Karnataka
Ker	Kerala
LE	Life Expectancy
LPG	Liquefied petroleum gas
Maha	Maharashtra
MDEV	Moderately developed
MHRD	Ministry of Human Resource Development
MOSPI	Ministry of Statistics and Programme Implementation
MP	Madhya Pradesh
MYS	Mean Year of Schooling
NSDP	Net State Domestic Product
NUEPA	National Institute of Educational Planning and Administration.
Obs	Observation
Odi	Odisha
OECD	Organization for Economic cooperation and Development
PCA	Principal Component Analysis
PCNSDP	Per Capita Net State Domestic Product
PHC'S& CHC'S	Primary Health Centre's and Community Health Centre's
PTR	Pupil Teacher Ratio
Pun	Punjab
R&D	Research and development
Raja	Rajasthan

RBI	Reserve Bank of India
SD	Standard Deviation
SE	Social Expenditure
SHDR	State Human Development Report
SRS	Sample Registration System
TFR	otal Fertility rate
TN	Tamil Nadu
UNDP	United Nation Development Programme
UNDR	United Nation Development Report
UNESCO	United Nations Educational Scientific and Cultural Organization
UP	Uttar Pradesh
Utta	Uttarakhand
WB	West Bengal
WDR	World Development Report

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

1.1. Human development is an end and economic growth is a means towards development.

In the world of globalization and technological evolution, economies seek new ways to maintain competitive advantage. This competency by the economies depends in large part on people and the way they express their freedom. Nation's real wealth are its people. Providing a long and healthy life with decent standard of living is the main objective of every economy. Policies are framed in accordance with this objective. Now the most important question lies in the fact that what should be the ultimate concern of an economy? Should it be investment in productive infrastructure or in human resources?

Prior to 20th century, the term development was rarely used in the economic literature. Economic growth was the main objective of the policy makers, even the early development theories focused on attaining sustained economic growth (Harrod, 1939 and 1948, and Domar, 1946). Hence, this era saw the growth of an economy in terms of material output of goods and services. Gross National Income [1]in the traditional approach used to be the best measure of welfare. It was believed by the economist that growth has a trickle-down effect [2]and would result in sustained development in the long run. During this period, performance of each economy was assessed by the means of growth and output. But in 1970s and 1980s the economy of Europe experienced the great destruction in terms of productive infrastructure. The reason behind this was the war that broke down during this time. It was seen that though the income of the people were increasing unemployment also witnessed a surge. Experience of such industrialized countries revealed that economic growth can take place even in the presence of social ills, such as inequality in the distribution of income, poverty, unemployment. It was the time when economies were facing the problem of development. They were growing only in terms of quantity and not quality. The trickle- down concept of growth was questioned by the economies (HDR 1990)

[1] Gross National Income more widely known GDP is an estimate of the total value of all goods and services produced within a nation for a set period usually a year.
[2]Trickle-down effect states that tax cuts for all the sections of society spur economic growth.

This destruction led to the emergence of new paradigm in terms of quality and welfare of people as a whole. Focusing on welfare in terms of people's choice and values was the main objective of this new paradigm. Now the concept of economic growth was identified as a means of development but not as an end component of development.

Quality aspect of development was the new concept which came to be known as human development. It was first time bought into notice by UNDP in its first report in 1990. The report shifted the focus from income to choices and freedom. It presented us with the comprehensive framework which would benefit the economies to develop in actual sense. In continuation with this National Human Development Report (2001) considered development as a process whose impact can be assessed on quality of life and human well-beings. Development process includes both the concept i.e. growth and human development. Long term development can only be attained if both these concepts show a bi-directional relationship between them. Increase in income and attainment of decent standard of living are necessary for the purpose of attaining development. The evidences from the academic literature show that though human development is a necessary condition but it's not a sufficient condition of development. Hence the concept of growth cannot be discarded at all. Since then, the link mechanism between human development and economic growth started gaining importance.

Link mechanisms between Human Development and Economic Growth occupy two important strands. These are

- Washington consensus neo- liberal approach [3]is the first strand which regards economic growth as a precondition for human development. According to them human development can be postponed till the time economies have sufficient amount of productive resources. This approach defines the concept of well-being in terms of utility maximization.

- The Gustav, Ranis view of link mechanisms between human development and economic growth. According to them strong link mechanism between human development and economic growth helps economies to reach development

[3]It refers to set of ideas broadly consisting of free economic market generally supported by international organizations such as IMF, World Bank and EU.

early as compared to economic growth lopsided or human development lopsided.

The two strands occupy a central position in the literature of link mechanisms. Adam Smith in his capability approach said that human being should have a freedom of choice. Their needs and choices form the basic in the development of every economy. The needs and choices of the people are best explained through Human capital concept.

Human capital is both quantitative as well as qualitative. The theories related to human capital focus on the factors that help in shaping economic development. The initial idea of investment in human capital started with Theodore W. Schultz's in December 1960. According to him human capital can be simply defined as the "body of knowledge which is possessed by the people and the way in which people use this knowledge effectively" (Schultz, 1961). Human capital formation means the policy which would enrich the skills, education and experience amongst the population. This enrichment is very necessary for any economy for its social and economic development (Harbinson, 1962).Economists like Simon Kuznets (1966), Woodhall (1985), Becker (1964) Dennison (1967), Morris and Morris (1970) have given a growing recognition to human capital as a central force of development policy. Endogenous growth theories like that of Arrow (1962), Lucas (1988) and Romer (1986) focussed on the impact of investing in human capital components like that of education and health. According to them this investment will lead to innovation of new ideas and will also bring advancement in research and development which in turn will help economies to grow. Human capital forms a dichotomous relationship between its components and economic development. This relation can be explained through many channels. The result of investing in human capital would just not create a productive labour force but also will help in improving the quality of life of the people's as well as of society. However, after a while human capital concept due to some of its limitations in 80s was changed to human development concept which has a much broader perspective than human capital. Human Development began to receive crucial importance in development literature. It was not a new concept but it started gaining importance when UNDP started publishing human development report which carries all the dimensions. The human development approach emphasizes investment in education, health, nutrition and income.

1.2. Human development as a means towards development

Economic development is considered as a means end of everything. But what is economic development? is it just an increase in income of people or something that expand the capabilities of the people? Development in general terms is the growing of economies in terms of quality as well as quantity. Generally, concept of development is viewed as a multidimensional process that involves the reorientation and reorganisation of the whole economic and social system (Bhullar 2012). With this it can be said that development is not only an increase in the income and output but a process that involves a change in economic, social and cultural attitudes of the people. There is a long-time debate about this concept. Development is not only about growth in physical resources but also growth in human resources. In this context, in 1970's concept of development was redefined in terms of reduction of poverty, inequality and unemployment in a growing economy (Todaro 1977). According to him the main objective of any economy should be "to compile a comprehensive collection of problem that curb growth and focussed on the policy-oriented readings for those instructors who do not use main text".

Development is the ultimate objective for any economy. Imparting a long and healthy life with the freedom of choice to its people is the key objective of every economy. Whether it is quality growth or quantity growth the word development includes the both. If quantity is concerned, economists talk about investment in productive infrastructure. Quality aspect includes investment in human resources. Growth aspect of development has already been talked about in the above paragraphs.

Human development is not a new concept. The inclusion of social values for "human good" dates back to the time of Aristotle. According to him any social arrangement made should be a key to human welfare. He argued that human beings do not seek wealth. It is not a good which we are seeking for. It is just a commodity. Further on Immanuel Kant suggested that "human beings are the real end of all human activities". According to them all the activities that are undertaken should just focus on the welfare of human beings, possession of wealth will not help the economies to reach their goal of welfare. Adam smith also said that investment in human development will help the citizen to stand in public rather than getting ashamed by just owing wealth. After them serious studies relating to socio economic and cultural

values were undertaken. The simplest definition of human development was given by Morris and Alpin (1982). They defined human development as the process of enhancing people's capabilities and improving quality of life. Though many scholars define the concept in their own manner, the actual credit of operationalizing this concept goes to late Dr Mehboob- Ul- Haq (1991). He was the one who gave recognition to human needs and their existence in strengthening development policies. The concept is a complete framework of the aspects that would centre around one main objective of enhancing the capacities of people and widening the needs and choices of people. Human development concept includes all the aspects of life whether it is economic, political, social or cultural. Apart from these, the new paradigm focussed more upon the needs of poor people. Human development, apart freedom of human rights and choices to the people. It serves the purpose of not just being constitutive to the primary needs of people but also as an end means of attaining development. According to the prominent scholars' values of people have taken a front seat and has somewhat weaken the concept of wealth.

Evidences from the past suggest that the concept of development is a multidimensional process that includes both quantity as well as quality growth. Hence the concept of economic growth cannot be neglected at all. Income and its growth play a very crucial role in attaining the level of human well-being. Literature also shows that both the concepts are interlinked to each other. None of the concept can be left behind. It is seen that human development without economic growth is useless and growth without development is fruitless. Hence, it can be said that there is a strong linkage between both these components.

1.3. Interlinkage between Economic Growth and Human Development

Two theoretical strands which explain the concept are often regarded in this context. According to the Washington consensus economic growth should be encouraged and human development should be postponed till the time it is not possible to expand resources affordably (Williamson, 1993; World Bank, 1995; Ravallion, 1997). The first strand focuses on improving economic growth for the purpose of development. Neoliberalism defines wellbeing in terms of utility maximization. They often regarded development in terms of growth. The other strand, was explored by Ramirez et al. (1998), White (1999), Ranis et al. (2000), Boozer et al. (2003) and advanced by Ranis

and Stewart (2005) and Mabsout (2006). Their study explores the relationship between the economic growth and human development. They viewed that virtuous cycle can be achieved only when there is a consistent strategy which would promote both objectives simultaneously. The study also focuses on strengthening the relationship between the two concepts.

This linkage was first explored by Ranis, Stewart and Ramirez (1998). They define the relationship in terms of chain concept. Empirical evidences of the existence of this relationship were found with the help of data collected from cross-country statistics. This framework was further advanced by Ranis and Stewart (2000) and Boozer et al. (2003). Their study includes data collected from 69 developing countries. There are two aspects to define this relationship, one is the chain leading from economic growth to human development, second is the chain leading from human development to economic growth. Human development is all about people and their welfare by the means of improvement in social sectors such as life expectancy, infant mortality rate, and education or adult literacy, poverty, government spending priorities of the economies. While economic growth is all about improvement in material growth and the way the resources can be utilised effectively. As the basic objective of development of a nation is to improve the welfare of the people, every nation strives hard to increase its wealth and productive resources. With this objective it also ensures better standard of living of its citizens by providing them with adequate food, clothing, house, medical facilities, education, etc.

1.3.1. Chain A: Economic Growth to Human Development

Gross National Product (GNP) is the main component that contributes to HD in form of household and government activity. Income component of growth also include community organizations and Non-Governmental Organizations (NGOs). Economic growth is effective in a way as it provides material resources to improve human development. One question that comes into mind after reviewing literature is how the economies with same level of GNP can lead to very different HD performances in human development index. These performances are based on the allocation of GNP to various groups and to distribution within each category. Chain A is all about the propensity of households, the manner in which they spend their income which lead to improvement in human development indicators. Spending on those items which

would help them to improve their standard of living will only lead to human development. But the level of spending also depends on who controls the allocation of expenditure within households. It is usually seen in general that as the incomes of the poor rise, they tend to spend more proportion of income on human development (Behrman, 1993, 1996). The casual analysis depends on the aggregate levels which further depend on the income of households which they spend on human development. Secondly, the impact of public policy on the distribution of income and the way it improves the societal poverty by the way of generating employment sensitive techniques which will ultimately determine the level of human development generated. Thus, Chain A determines impact of economic growth on human development.

1.3.2. Chain B: Human Development to Economic Growth

Human development in a simple way can be defined as the one that is designed to include all measures of development whether it is social or economic aspect. Literature suggests that higher levels of human development will improve economy's condition by enhancing people's capacities. It involves all those aspects of development that would enhance the creativity and productivity of the people. According to Barro and Lee (2000), the foremost factor necessary for economic progress in any economy is education which is a major component of human capital. The greater the level of education the greater the number of skilled and productive worker. Improvement in this sector will increase the economic output of goods and services in the economy as well as help in the effective utilization of advanced technology. This will lead to an improvement in social sector and bring about equality in income distribution. It suggests that healthier, nourished and well-educated people contribute more to economic growth through higher labour productivity, improved technology, attracting more foreign capital, and higher exports. According to Mehta (1976) human capital formation is as much important as physical capital formation in the process of development and it is now a universally accepted phenomenon. Schultz in his paper suggested that statistical measures of growth can be explained by the way of changes in the quantity of factors of production. But over the period of time,

residual growth [4]cannot just be explained by the changes in quantity of factors rather it is changes in the quality of labour force which is necessary. For this, development of human capital resources is prerequisite. Even if we look at the importance of human resource development for overall growth, human development approach is used clearly in East Asia, one of the newly developed countries. Examples can be traced from developing countries like Sri Lanka that have started spreading education among labour force and have been able to manage a long and sustained economic development. Hence, both the components are necessary for the purpose of attaining economic development.

Dichotomous relationship exists between the two. This linkage can be best explained by defining the impact of human development and economic growth on each other. Improvement in human development indicators will enhance economic growth. Investment in quality education will help the economy to enhance their choices. Enhancement in choices will grant them freedom to work freely and hence increase their income which will further lead to growth of the economy. Same is the case with investment in other indicators of human development such as improvement in health condition attainment of better standard of living will help the individuals to utilize their rights effectively. On the other hand, increase in growth of the economy will help to enhance human development in terms of increased per capita income that will increase the choices and capabilities by the households and the government. This dependency of both the variables on each other defines the linkage between each other. From the literature review, it can be said that neither human development nor economic growth can be analysed in isolation of other. If growth is jobless, ruthless, voiceless, rootless and futureless then it will not favour human development. For the purpose of quality job improvement in indicators of human development is needed. According to Human Development Report, human development concept does not deny the importance of economic growth and wealth accumulation for the welfare of society, but it claims that economic growth is necessary but not a sufficient condition for human well-being (UNDP 1990). Thirlwall (2003) asserted that development without growth is hardly conceivable, but growth is possible without development. UNDP (1994) stated that development means broad HD that includes health and

[4]Relates to Solow's growth theory which state that the portion of economy's output cannot be attributed to the accumulation of output and labour productivity

education variables in a weighted welfare measure and not just higher income alone. Hence, HD is "a process of enlarging people's choices".

The main reason for the need of growth in developing economies is the presence of social evils such as poverty and unemployment. For the purpose of reducing poverty, attaining better standard of living, quality jobs and economic growth is necessary for building of basic capabilities and choices in the people and also generating the resources required for human development. If empirical evidences are analysed then it can be said that a very strong linkage is there between the two. Neither human development nor economic growth can be achieved without the effective dependence on each other. It is usually perceived that in high-income countries utilize their capabilities in a more productive manner than people in developing countries. From this, it is clear that there exists a strong relationship between economic growth and human development. Sustained improvement in economic growth can be achieved with the improvement in the quality of labour force on one hand, and the resources provided by growth helps in improving human development. Countries that have focussed on investing in both the areas have witnessed a strong overall chain and are termed as "virtuous cycle[5]." Opposite of the virtuous cycle is vicious cycle [6]in which the example of undeveloped countries can be taken because of the low investment in economic growth as well as human development. There are also some countries which have either strong Chain A or strong Chain B are either 'Human Development lopsided', or 'economic growth' lopsided.

1.4. Linkage in context of Indian Economy

In the context of Indian economy, the two-way relationship works quite effectively. Indian Economy as a whole has shown a quite remarkable growth in the last two decades, with average national per capita income growing as rapidly as ever before. The past figures about growth in Indian economy have seen a rising trend. Not only has this developing economy shown improvement in growth there has been worthy improvements in human development components like that of life expectancy, literacy rate, and other measures of well-being. But one thing that draws the attention of every economist towards analysing the economy of India is the extreme

[5]Refers to positive results which in turn relates to development of an economy
[6]Refers to the presence of social evils such as poverty

heterogeneous character of the Indian society. The failures and success of Indian economy are very difficult to understand. The reason being the vast diversifying area. The internal diversities in India offer a great opportunity to learn from each other (Dreze and Sen, 2001). If the inner conditions of economy are seen, then we will find that – the state is being divided into four sets of division. The four type of cycles which Gustav, Ranis and Ramirez have explored are best described in Indian States. One group of Indian states has been at the forefront of national growth. Their economies are growing at much faster rate than that of national average. These states are not performing well only in economic indicators but also in terms of non-economic indicators. But if the other side of economy is looked upon then the results are quite disappointing. These states are backward not only in terms of economic growth but also in terms of human development. The reason being the presence of social evils such as increasing population, unemployment, poverty, low standard of living etc. As a result, they are being continually left behind, and moving further away economically from the former group of forward states in the country.

With such wide diversification, it is very essential that proper public policies should be implemented. As said by Fukuda- Parr (2003) in his article that for the purpose of achieving growth and development economies have to improve the role of human agents that can help to define public policy. According to Dreze and Sen (2001), what are needed first is the radical changes that would help the economy to achieve its goals that were unambiguously outlined at the times of Independence. For long-term sustainable development of a nation it is arguably important that all regions should grow at a reasonably similar speed.

1.5. Human Development in India

Human development is the need of an hour for every economy. We all know through the literature that it is people centric. In India also human development has taken a forward seat. The implementation of policies is in accordance with human development. Even if the progress of Indian economy is looked then according to the Human Development Report there is a vast improvement in the growth process of human development indicators. Human Development Index has risen gradually from 0.406 in 1975 to 0.510 in 1990 to 0.640 in 2017. In terms of quantity there is a

considerable growth in all sectors but this growth is uneven. Disparities among the states are the major failure of Indian states.

Advent of LPG'S reform gave a significance importance to human development. Indian Economy has also worked hard to achieve an amendable improvement in human development indicators. Though India lags behind many economies but it is expected that soon the economy would come in the race of developed economies. India holds the rank of 130 in the HDI. There are some states which have shown a large improvement in both the indicators. Kerala is one of the states that have achieved a high level of human development and it is said that the state's performance is far much better than many developed economies. Despite the good performance of Indian Economy there is a need for implementation of good public policies. As said by Manmohan Singh in 1986 in his article "Development, Justice and Modernization", that there is "to recapture something of the spirit of idealism, adventure, enterprise and endurance and a clear vision of future which characterised our freedom struggle". Pant (1997) also stated that though India has progressed a lot but this progress is just like failure in achievement. The condition of Indian Economy is like we have achieved a lot but we are not at that position where we should be.

Indian performance in the last four decades is classified into vicious cycle mode with a slight inclination towards economic development-lopsided reality during 1980s. India remains in the weak links quadrant with low human development and low growth during the 1960s and 1970s. It moves to lopsided development in 1980-92 as growth accelerates while progress in human development remains slow'. (HDR, 1996)

Kerala, Tamil Nadu and Himachal Pradesh are the states which have achieved highest ranking in human development index despite relatively modest level of income, while Punjab and Haryana have substantially high income but have lower ranking than Kerala and Tamil Nadu in terms of human development. On the other hand, Maharashtra, Gujarat and Karnataka have differences in their economic and human development. They are not too large in terms of income and their achievements from the point of view of human development are somewhat moderate (NHDR, 2002). In the Indian context, Kurien (2000) observed that forward states are characterised by better demographic and social development, higher per capita incomes and more

developed economies, lower poverty, higher resource flows, private investments and better infrastructural facilities

Coming across the famous debate on Kerala and Gujarat's model by Sen and Bhagwati which completely proves that human development is a necessary condition of economic development. If an economy wants to ensure long–run growth, investment in human development is very much necessary. Jagdish Bhagwati supported Gujarat model of development which followed the path of the metaphor for a primarily growth and private entrepreneurship driven development. On the other hand, if talk about Sen.'s view he supported Kerala model in which according to him experience of high social spending resulting in growth as a role model for other states to follow. According to Sen, Gujarat model was considered as weak because it suffered from social side and could not be considered as success. Bhagwati criticised Sen on the grounds of offering lip service by promoting the government's views towards economic development. Sen's point of view was on building social infrastructure to boost the productivity of the people and thereby raising growth. On the other hand, Bhagwati focused, only on growth that can yield enough resources in social sector schemes. Summarizing the debate, we reach to the conclusion that Sen focused on investment in health and education sector as investment in these sectors would further promote stability and adequacy.

1.6. Review of Literature

1.6.1. Human Capital

As it is known that human capital is not a new concept at all. Adam Smith in his famous book "An Enquiry into the Nature and Causes of the Wealth of Nations" studied the importance of human capital in development which states that development should be such which enables the people of an economy to mix freely in the society. Human capital has been given a lot of importance in growth theories. The pioneer work that gave a lot more importance to human capital was of T.W Schultz in 1961. Following him many growth theories like that of Kenneth Arrow, Romer, Lucas also gave importance to human capital in the process of development. Various researchers have utilized different proxies for human capital, e.g. Mankiw(1992) utilize secondary education enrolments. Barro and Lee (1993) and Bosworth (1995) have used average years of schooling. Macroeconomists express human capital solely

in the form of education whereas micro economists consider health as another important component of human capital beside education. They believe that health plays significant role in the formation of human resources because in order to ensure growth in productivity, people need to be healthy or protected from sickness. It means health and education both are primary ingredients of human capital formation. (Nabila Asghar 2012)

1.6.2. Human Development and its Measurement

The need for accumulation in human capital was felt by each and every economy. Human development encompasses a much broader spectrum than human capital. Implementation of proper public policies which would satisfy the needs of people are also incorporated in it. Several attempts were made to measure this component like that of physical quality life index [7]by Morris and Morris (1970). But these indexes cover only non- income economic indicators. UNDP in its first human development report culminated all the dimensions of human development. Enlarging people's choice was the foremost objective of this concept. The focus was on the development of idea that was much more than an increase in per capita income. With this idea, a new measure of development was introduced which came to be known as HDI. Human Development Index is the measure that included indicators such as education and health. It was found that the classification of countries on the human development scale differed significantly from that on the per capita income scale. The report also introduced the idea that the political, economic and social freedoms are important for the sustainability of development.

Pal and Pant (1993) in their paper "An Alternative Human Development Index" made new alternative measures of human development index with regard to Ranking of Indian States. The index focussed on one additional variable apart from three variables. Poverty was the new variable and the results showed that the inclusion of poverty alleviation is one of the most important social goal.

Mahbub ul Haq (1997) in "Reflection on Human Development" measured human development in terms of welfare of people. According to him per capita income is one of the measures of welfare, but it is not the sum total of human endeavour. Investment

[7]PQLI includes indicators such as Life expectancy, Infant Mortality rate and Literacy rate specially related to women's status

in these choices brings many opportunities in life which until now was inaccessible. In addition to this Amartya Sen in the capability approach said that granting freedom of choice to people is the best measure of human well-being.

Planning Commission (2002) presented a report in which they departed significantly from the conventional UNDP methodology. The report included indicator like that of – inflation and inequality adjusted per capita consumption expenditure. Looking at the condition of developing economies these two indicators are very much important.

1.6.3. Linkage between Human Development and Economic Growth

UNDP (1996) in their Global Human Development Report 1996 discussed the link between economic growth and human development. It opened up with the central message that the linkage between economic growth and human development is not direct. But growth without development is not possible and human development without growth is not possible. So, for the purpose of strengthening the link mechanism between them there is a need for proper public policy and their implementation in a right way. It is only when the links are forged with policy, commitment and determination, they can be mutually reinforcing with the help of government actions and policies.

Ramirez (1998) explore the link between economic growth and human development, identifying two chains, one from economic growth to human development, and the other, from human development to economic growth. According to the study, investment in human development indicators and proper distribution of income will only strengthen the link. Sengupta (2003) studied the impact of economic growth and human development on one another. He computed HDI for 15 major states of Indian economy for the period of 1991-93 using UNDP methodology. But apart from the indicators used in UNDP methodology, the author used some other indicators such as Clean Drinking Water, Sanitation facilities, Good Housing Facilities access to electricity, TV and News Papers. His opinion was apart from the traditional indicator used, improvement in these basic accessibilities can ensure development.

Ranis (2004) described in comparison to economic growth which is generally used as a measure of human welfare, human development is the ultimate objective of the development and economic growth act as a means towards enhancing the end

objective of development. The greater freedom and capabilities improve economic performance and hence will have a significant outcome on growth. Similarly, increased incomes will increase the range of choices and capabilities enjoyed by households and governments, which enhance human development

Ranis and Steward (2005) empirically confirm the significance of various links in each of the two ways chain overtime, from economic growth to human development including human development along with the investment ratio. The economic growth which is an important input into human development improvement is either prior or simultaneous. Therefore, traditional policy advice, which argues that human development improvements must wait until economic expansion makes it affordable, is likely to be in error. Chakraborty and Mukherjee (2010) confirm that there is need for further investigation to determine the underlying factors (other than per capita income) which influence human development achievements of a state.

Mazumdar (2003) in his paper "Measuring Human Wellbeing of the Countries: Achievement and Improvement Indices" made an attempt to provide an overview of the changing pattern of human well-being of the countries over the period 1960 to 1994. A comparison of the relative position of a country is attempted on the basis of the overall achievement index and other composite indices used to measure human well-being such as weighted index, physical quality of life index and human development index. Subramanian (2003) in his paper identified the important determinants of human development to estimate their relative effects on the economic growth and suggest measures to augment human development in the countries with high, medium and low human development indexes.

Mehrotra (2007) opinions that, human development profile of SAARC[8] countries poses a daunting task for the policy makers of the region considering the enormous problems confronting the countries of the region. It is highlighted that the region might find it difficult to achieve United Nations Millennium Development Goals. However, human development success in Srilanka may serve as a guide for the countries of the region for achieving a high rate of human development with moderate income but focusing more on equal distribution of growth benefits.

[8]South Asian Association for regional cooperation

Stewart et (2001) concludes that an increase in economic growth automatically leads to advances in human development. This study infers that human development has to occur prior to or simultaneously with improvement in economic growth, if a country is to reach a virtuous cycle. The policy implication is policies that emphasise economic growth alone is futile in sustaining high level of human development.

Aloysius (2002) in his paper emphasised on the role of institutions which were neglected by Sen in his development approach. According to him institutions plays a very important role in defining the constraints and incentives. These structures determine the performances of the economy. He also highlighted the importance of growth factor in the development process of economies.

Foster and Rosenzweig (1995) demonstrated that Green Revolution in India helped to associate education with technology. The central implication of this paper is neither that investment in schooling is more important than investment in technical change nor the other way around. Instead, the evidence suggests that policies resulting in greater technical change are complementary with those increasing investment in schooling: the returns to investment in technical change will in general be higher when primary schooling is accessible and the returns to investment in schooling will be higher when technical change is more rapid. This impact can be witnessed for Sri Lankan economy where higher education levels have led to increase innovation in businesses. Through this the impact of human development can also be assessed in Uzawa-Lucas type endogenous growth model where it acts as a factor which affects growth rate through a way of technological change. Schultz (1971) and Becker (1962) both have developed and analysed growth models augmented with human capital and find significant positive association between economic growth and human capital formation.

According to Pritchett (1996), empirical results of cross-country macro studies are controversial and inconsistent whereas results of micro studies are consistent and both have shown positive impact of education and health (proxies for human capital) on individual's productivity and income. Rosenzweig (1990) points out that major determinant of high growth of developed countries and poor growth of under developed countries is difference in the human capital growth. Developed countries are characterized by high standards of living whereas developing countries are not.

Prabhu and Chatterjee (1993) examined the social sector expenditures and human development in India for 15 major states for the period of 1974-75 to 1991-92. This work focused on size and composition of state government expenditures on health, education and nutrition. The study analysed the trends and assessed the impact of such expenditures on the level of health, education and nutrition attainment.

Mehrotra (1998) concluded that social sector expenditures play an important role in supporting economic growth and reducing poverty. They are not only more efficient in terms of providing human capital but they are also more equitable. Nevertheless, there is little information about what developing country governments spend on these basic services.

Kumar (1993) examined the relationship between human development and economic growth of sixteen states in India for the period of 1960-61 to 1986-87. The paper also focused on trickle-down effects whether human development leads to economic growth and vice-versa. He concluded that human development improved much faster than growth of income in all the states. The gaps in human development between states have been considerably narrowed down during this period.

Thirlwall (2003) asserted that development without growth is hardly conceivable, but growth is possible without development. UNDP (1994) stated that development means broad human development that includes health and education variables in a weighted welfare measure and not just higher income alone. Hence, human development is a process by which people enhance their capabilities. In other words, human development is all about sustained freedom. Sustained freedom not only gives economic freedom but also guarantees social, economic and political freedom. It helps people to link themselves with the problems of economy and allows them to become an important constituent of society. Freedom and choices are important part to help the economy to develop, this relates to two-way linkages between economic growth and human development. This linkage relates to formation of two-way chains between economic growth and human development. From the literature review it can be clearly stated that there exists a strong linkage between EG (Economic Growth) and HD (Human Development). On one hand, EG by increasing the per capita income of the economy helps resources to be utilised for human development. On the other, HD improvements helps the overall development of economic agents who make the

critical contributions to EG. Each of these relationships has often been acknowledged separately for example, the way in which EG influence HD forms part of the basic literature in the form of improvement in gross national product, while the impact of improved labour quality on economic growth has been widely explored in the human capital literature. Yet, the two strands have seldom been combined within one dynamic analytical framework. It is important to understand the full implications of this two-way linkage in terms of both analysis and policy.

Experiences of scholars suggest that economic growth could take place together with unequal distribution of income, persistence of poverty, and homelessness but this type of growth is neither desirable nor sustainable in long-run. Social problems cannot be left aside until economic development has taken place because development is never ending process and cannot be sustained in the long run while social ills are increasing. Hence, for the desirable long run growth investment on human development is very necessary.

Another very interesting finding about the importance of human development on economic development was stated by James Gustave Speth, UNDP administrator (1997). According to him, "sustainable human development is development that not only generates economic growth but distributes its benefits equitably, that regenerates the environment rather than destroying it, that empowers people rather than marginalizing them. It gives priority to the poor enlarging the choices and opportunities and providing for their participation in decision affecting them. It is development i.e. pro-poor, pro-nature, pro-jobs, pro-women and pro- children". He further emphasised that human development approach is one that calls for a simultaneous treatment of social and economic aspects of development. So, it can be said that human development will not only impact economic development but also others aspects of economic development like social development.

1.7. Present Study

Present study explores the relationship between human development indicators, physical infrastructure and economic growth in Indian states as well as UP and Kerala districts. The study is confined to the major states of the Indian economy with special emphasis on the linkages among the variable in Uttar Pradesh and Kerala districts. Education and Health are considered to be the two most important indicators for the

development of any economy. Uttar Pradesh remains one of the most backward states in India, in spite of the fact that the state has a large manpower population. Now the question is why Uttar Pradesh has not been able to succeed well and why it has failed badly in terms of human development indicators. The study also focusses on answering this question by establishing a link mechanism between human development and economic growth. What can be learnt from Kerala model and what are the apt policies measures that are need to be taken to uplift Uttar Pradesh economy

1.8. Objectives of the study

1. To examine the theoretical perspective of inter- linkages between human development and economic growth
2. To examine the trends in expenditure on social sectors such as health and education and differences in the priorities given by different states to human development
3. To explore the inter - linkages between human development and economic growth with special reference to Indian states
4. To analyse the relation between Human Development indicators and Economic Growth indicators in Uttar Pradesh and Kerala.
5. To suggest different policies measures which will strengthen the linkages between economic growth and human development indicators so as to accelerate economic development

1.9. Hypotheses

1. There exists a regional variation in public expenditure on social sector across Indian states
2. There exists a positive and significant relationship between human development indicators and economic growth across Indian states.
3. There is insignificant impact of state policies on economic growth and human development indicators in UP.

1.10. Methodology

A research design is prepared according to observation made and data assembled. It provides the empirical as well as the theoretical basis for drawing conclusions and finding the solution to research questions. The study is entirely based on secondary data. Both time series and cross section data has been used. The study is confined to 22 states of India. The study also tries to explore the relationship between Human Development and Economic Growth in districts of Uttar Pradesh and Kerala. Sources of secondary data includes: Census of India, Central Statistical Organization (CSO), Ministry of Human Resources Development (MHRD), Planning Commission of India, Registrar General of India and RBI Handbook of Statistics, Statistical Abstract UP, District wise Indicators UP, Statistical Abstract Kerala and Infrastructure Volume Statistics. The relationship between economic growth and human development indicators has been examined statistically using state and district level data on per capita income, indicators of human development and physical infrastructure. Composite index has been generated for the variables with the use of multivariate analysis. Principal component analysis has been applied to construct composite index. Addendum variables have been used for the construction of education index, health index and physical infrastructure index. Spearman ranking correlation technique has been applied. Simple regression and multiple regression analysis have been used to examine the relationship between these components. Step wise regression model has been used to further explore the relationship among different components.

1.11. Significance of the study

With regards to Indian economy's development pattern certain unavoidable questions need to be answered. This study presents a development pattern where achievements of the states in terms of economic growth and human development are documented empirically. The study aims to measure the disparities between Indian states and districts of Uttar Pradesh and Kerala both quantitatively as well as qualitatively. The study is undertaken with one more objective of exploring the dynamic link between the two components. This study would be helpful not only to explore the national and state-wise failures in translating the achieved economic prosperity into parallel expansion of HD but also would be helpful in prioritizing the policies to achieve a balanced level of sustainable development. Further, the study of dynamic links

between them across the states would motivate the policymakers to draw long-term strategy to strengthen development effects. The study will examine the link mechanisms between human development and economic growth of the 22 states of India and districts of Uttar Pradesh and Kerala. The states having higher economic growth as well as higher human development will be termed as 'virtuous cycle', while the states having low economic growth and low human development will be termed as 'vicious cycle'. The policy needed to be implemented for the purpose of improving the economic condition of the states. The study focuses on different policy measures to accelerate the process of economic growth and development in states like Uttar Pradesh.

1.12. Chapter Plan

Chapter 1. Introduction

Chapter 2. Role of Human Capital and Human Development in Economic Growth: A Theoretical Perspective

Chapter 3. Trends in social sector expenditure: A state wise analysis

Chapter 4. Interlinkage between Human Development and Economic Growth: An Inter-State Analysis

Chapter 5. Interlinkage between Human Development Indicators, Physical Infrastructure Indicators and Economic Growth in Indian states: A Multivariate Approach

Chapter 6. Interlinkage between Human development, Physical Infrastructure indicators and Economic growth: A study analysis of Uttar Pradesh and Kerala economy.

Chapter 7. `Major Findings and Conclusion.

Chapter 2

ROLE OF HUMAN CAPITAL AND HUMAN DEVELOPMENT IN ECONOMIC GROWTH: A THEORETICAL PERSPECTIVE

2.1. Introduction

In the earlier times 'capital' was defined in terms of tangible assets such as physical capital or the productive capacities of industries, that empowers the business entities to apprehend a flow of future income. A near paradigmatic shift took place in the concept of 'development' in the nineteen eighties. Considered almost synonymous with 'economic growth', the shift put 'human resource' at the core of the concept (Pant, 1997). This led to the broadening of the concept of capital and thereby including human capital which included human beings as a means of development (K. Seeta Prabhu, 1998). Holistic development can only be guaranteed if the choices are not separated by the actions and choices of human beings (Anand &Sen 1998). "This transition induced a profound bearing on human productive capabilities that determined the sustainability of development" (Jacobs & Slaus, 2011). Therefore, this study focuses upon an evolutionary perspective of social development by the means of human capital and its linkage with economic growth.

2.2. Human capital: Definition and Concept

Human capital has been defined as the amount of work done by the individuals and the value market places on them for investing in themselves (Carnoy, 1995). According to OECD (1998) human capital is that economic activity which requires knowledge, skills, competences and other attributes embodied in individuals. In this sense human capital can be best described as the type of capital which enhances individual's capabilities and the way these capabilities reward them satisfaction and freedom. In a much simpler manner "The skills the labour force possesses which is regarded as a resource or asset" is what human capital consist of (Oxford Dictionary). "It comprehends the conception that the investments in people in terms of education, training, health etc.in turn these investments increases an individual's productivity" (Claudia Goldin, 2014). In comparison too physical labour 'human capital' refers to the various dimensions of the human being that yields services or income over time and tends to refer to the various qualitative dimensions of human beings. More inclusively the concept of human capital can be sometimes defined as social capital as

it includes knowledge and institutional arrangements. Saikia & Dutta (2012) included the dimensions of human capital in their approach, as these dimensions are engrained in the human agent and in the case of institutional arrangements, govern the way individuals in the society relate to each other. Hence according to their study human capital is a must for developing economies like India as it helps in reducing interpersonal and interregional disparities. Investment in human capital indicators helps the developing economies to develop both in quality as well as quantity aspects. According to the World Development Report (W.D.R., 1995) human capital considers the, "the skills and capabilities embodied in an individual through health, nutrition, education and training," All these human welfare measures are required for human capital formation. More recently J. Kendrick (1974, 1976) considered human capital as a production factor comprising the overall value of that portion of a nation's population involved in the production process. He treated 'Intangible Resources' [1]as capital and has divided the capital into four main groups. These investments can be further subdivided into three main groups: expenditure due to education and vocational training, medical and health-related expenses, and expenditure for sector and territorial labour mobility".

2.3. Theoretical literature on Human Capital

The first estimate of a nation's stock of human capital was probably made around 1676 by **Sir William Petty** for his Political Arithmetick (published posthumously in 1690). He was the first economist to place a value on labourers. This value was first time demonstrated in England to estimate the cost of life lost in war and other deaths. He examined the issue of human capital measurement for fiscal problems. For the purpose of estimating the economic value of working population, each worker's value was based on the labour generated income. After measuring values of the labourers, he came to conclusion that his income corresponds to the yield[2] of human capital. He believed that human capital coincided with labour-generated income. On the other hand, income was taken as the perpetual yield which is generated by human capital stock. According to him this income is capitalized in perpetuity at a certain interest

[1]Resources that lack physical form
[2]Productivity of labour forces

rate. In his theory importance of human capital can be generated by the means of income that labour generates.

W. Farr in 1853 capitalized 'net income approach' in 1853 in respect to Petty's macro-economic approach. He adopted a more scientific approach of measuring human capital. For this purpose, he calculated individual's net future income. Lifetime expected income of an individual were calculated for the purpose of determining the role that humans play in the process of earning future income. In continuation with these two approaches '**Ernst Engel'** in 1883 formulated a completely different approach. He determined a person's value based on the costs of growth of an individual. Cost of production was used as a measurement unit from the time of birth.

2.3.1. Classical theories on Human Capital

Classical economist like that of J.B Say, J.S Mill, Von Thunen, Irving Fisher conceptualised capital in terms of skills and abilities that raises labour productivity. As these are acquired at a cost and increases the growth of an economy their inclusion in the human capital framework is a must so that it can eliminate social injustices (Kiker 1966). However, all scholars agree in assigning the greatest role in human capital measurement to **Adam Smith**. In the second half of the 18th century he wrote "The Wealth of Nations" (1776) in which the human capital concept proposed an analogy between man and machines:

"...When any expensive machine is erected, the extraordinary work to be performed by it before it is worn out, it must be expected, will replace the capital laid out upon it, with at least the ordinary profits. A man educated at the expense of much labour and time to any of those employments which require extraordinary dexterity and skill, may be compared to one of those expensive machines. The work which he learns to perform, it must be expected, over and above the usual wages of common labour, will replace to him the whole expense of his education, with at least the ordinary profits of an equally valuable capital. It must do this, too, in a reasonable time, regard being had to the very uncertain duration of human life, in the same manner as to the more certain duration of the machine" (Smith 1776, p. 93)."

In his theory Smith discussed about nation's "stock" which remark on most people's preconception about capital stock as always being something physical such as factories, machines or tools. But according to him one of the most important part of capital stock is the raised productivity of human being. He was in favour of specialization and division of labour. For the purpose of increasing division of labour and specialization '**education'** was considered as one of the effective ways. He also emphasised the development of skills through training. According to him training and higher specialization will pay labour high wages. Human capital is a form of capital that enhances quality growth which is a necessity for a developed economy.

Over 100 years after Smith**, Alfred Marshall (1890)** defined human capital as all those dynamisms, aptitudes, and behaviours which directly bestow for making people technically efficient. Such production capabilities are also capabilities whose value can be measured only indirectly. He distinguished "personal" capital from "material" capital; and considered personal capital as being chiefly formed through investment by parents paying and caring for the education of their children.

Frank Knight (1944) stated that the traditional concept of capital needs to be extended to make room for some human development. He elaborated on the "role of the society's productive knowledge in compensating the law of diminishing returns [3]and the way it is realized in developing economies". He concluded that it is reasonable to assume that this knowledge is carried forward in the new objects whose creation causes the old to become obsolete. Knowledge is in general cumulative, which means that what is possessed at any time is instrumental and necessary to new discoveries which will supersede it.

Classical theories paid a great emphasis on physical capital. According to them, investment in capital equipment's was largely supposed to be the leading factor of output. Exploitation of labour by capital was given a much greater focus by them (Marimuthu, Arokiasamy and Ismail, 2009). Some modern economists shifted the focus of classical economists towards people centric approach. Inclusion of education and health indicators as the key factor in human capital provided a way for understanding development from a different perspective(Kern, 2009).

[3]Refers to a situation where as one input variable increases after a point of time marginal increase in output starts to decrease, holding all other inputs constant.

2.3.2. Neo-classical theories

The Nobel Prize winning economist **Theodore W. Schultz** in his article in American Economic Review (1961) first time used the term '**human capital'**. According to him the basis for any economy should be investments in human capital and this investment should be accounted in the same manner as investments in physical capital. He stated that a man's knowledge and skills are the result of planned venture which is also a type of capital. Schultz highlighted his theory on the experience of Western countries. The success of these economies in the development process goes to the long-term investment in human capital. Not only he explained the link between increase in national output and human capital but also establishes a direct link between an increase in investment in human capital, and the overall increase in worker's earnings. He argues that education, training, and investments in health open up opportunities and choices that otherwise would be unavailable to many individuals. Schultz compares the acquisition of knowledge and skills to acquiring the "means of production." Workers no longer have to be at the mercy of others; instead they can be in control of increasing their own productivity and earnings. His theory was divided in four sections. Each section gives insight knowledge about his idea on human capital

"Consider all human abilities to be either innate or acquired. Every person is born with a particular set of genes, which determines his innate ability. Attributes of acquired population quality, which are valuable and can be augmented by appropriate investment, will be treated as human capital."

On the other hand, one of the other human capital economists **Spence (1973)** acknowledged education as a market indication for the probable productivity of workers. It also helps in screening[4] the probable workers that are prolific and needs some tiniest training with a very low cost. **Mankiw, Romer, and Weil** in the year 1992 revised the model acknowledged by Spence. Cobb -Douglas production function was used by the eminent scholars to re-examine the Solow growth model. Neoclassical growth theories focussed upon the long-term economic growth whose assumptions are based entirely on the accumulation of factor inputs such as physical

[4]Refers to the selection of skill labour.

capital and labour. Exogenous factor includes technical progress which contributed significantly to the neo-classical growth theories (Solow (1957) and Cass (1965). To signify the importance of technology eight convergence theorems were proposed. According to Aghion and Howitt (1998) neo-classical theories focussed upon the importance of technological knowledge. According to them if technological knowledge remains in the way of new innovation there will be a sustained positive growth of output per capita in the long run. Weil (2009) defined neo-classical growth theories in terms of diminishing returns to scale. If this law follows then as capital per worker increases, growth of the economy will become sluggish until the steady state is reached. However, neo-classical theories themselves treated human capital in a narrow fashion. They explained human capital in terms of one-way relationship in which labour is considered as the factor which contributes to production. Technology is considered as an exogenous factor [5](K. Seeta Prabhu, 1998)

2.3.3. Endogenous growth theories

Endogenous growth theory is a new theory which explains the long run growth rate of the economy on the basis of endogenous factor as against the exogenous factors of the neo-classical growth theory. Technology is measured by the way of a non-rival component and this component is an individual entity separate from individuals. This component can grow without any bound which in turn, leads to increasing returns to scale. Outlay in Research and Development (R & D) raises the level of technology and hence leads to the efficient and productive growth the economy. Two branches have developed pioneered by Romer (1990) and Lucas (1988). The former views economic growth as being driven by technological growth, facilitated by human capital as an input in the R&D sector, and the second sees human capital as a factor of production.

Romer (1986) in the Endogenous Growth Theory presented a variant on the Arrow's model which is known as 'learning by investment'. His theory highlighted that 'intentional actions[6]' taken by the people results in the technological progress. Technological progress is not an exogenous factor but a result of the outcomes of the people which respond to market incentives. He assumed the creation of knowledge as

[5]Originating externally
[6]Relates to decisions made by the people who respond to the market

a side product of investment. He takes knowledge as an input in the production function in the following form

$$Y = A(R)F(Ri, Ki, Li)$$

Where,

Y is aggregate output; A is the public stock of knowledge from research and development R; Ri is the stock of results from expenditure on research and developments by the firm i; and Ki and Li are capital stock and labour stock of the firm i respectively. He assumed that F is homogeneous of degree one in all the inputs and treat R as a rival good[7].

Romer took three key elements in his model, namely externalities, increasing returns in the production of output and diminishing returns in the production of new knowledge. He stated that it is the spill overs from research efforts by a firm that leads to the creation of new knowledge by other firms. In other words, new research technology by a firm spill over instantly across the entire economy. In the model, new knowledge is the ultimate determinant of long run growth which is determined by investment in research technology. Research technology exhibits diminishing returns which means that investments in research technology will not double knowledge. Moreover, the firm investing in research technology will not be exclusive beneficiary of the increase in knowledge. The other firms also make use of the new knowledge due to the inadequacy of patent production and increase their production. Thus, the production of goods from increased knowledge displays increasing returns and competitive equilibrium is consistent with increasing aggregate returns owing to externalities. Thus, he takes investment in research technology as endogenous factors in terms of the acquisition of new knowledge by rational profit maximisation firms.

Lucas (1988) was another endogenous growth theorist who emphasised that investment in human capital is linked with long-term rates of economic growth. These human capital theories specify how outlay in education through the way of positive externalities helps the whole production process. Literate people utilize the technology more efficiently. Innovation and the way its benefits are spread to co-workers helps in increasing the efficiency of all factors of production. The human

[7] States that human capital is fully excludable.

capital theories attribute the lack of convergence between the growth rates in developed and developing countries to the fact that the poorer countries do not make adequate investments in human

He made a distinction between the internal effects of human capital where the individual worker undergoing training becomes more productive and external effects which spill over and increases the productivity of the capital and of the other workers in the economy. it is investment in human capital rather than physical capital that has a spill over effects that increase the level of technology. Thus, the output for firm i take the form

$$Yi = A(Ki).(Hi).He$$

where, A is the technical coefficient, $Ki\ and\ Hi$ are the inputs of physical and human capital used by the firms to produce goods Yi. The variable H is the economy's average level of human capital. The parameter e represents the strength of the external effects from human capital to each firm's efficiency.

Endogenous theories concluded that labour would not necessarily lead to increase growth but investment in stock of human capital and research and development will boost growth. Bestowing to these models, they argued that returns on physical and human capital would not diminish through time, hence they rejected the assumption of law of diminishing returns to scale which neo-classical considered. Wilson and Briscoe (2004) cited that endogenous models also justified the assumption of increasing returns to scale. This assumption shows the possibility of the spill over effect of knowledge and peripheral benefits from investment in human capital stock.

Endogenous growth models though new have provided many perilous perceptions regarding the importance of investment in human capital stock and research and development in development of economies. However, the theory does not pay an adequate attention towards the necessary situations that would translate the distinct skills into improved productivity (K. Seeta Prabhu, 1998). Abramovitz 1995 defined these 'attitudinal and recognized' appearances as social competence which is a critical factor in the development of an economy. In fact, there is a dichotomous relationship between economic development and social capability both influence and interact each

other in accretion manner. Any inadequacy in the social capability components would frustrate growth and development.

Stiglitz (1995) also pointed towards the investment in social capability factor. According to him the externalities and scale effects which are linked with human capital are the result of both number of educated individuals and number of years of schooling each. In order to explain these externalities, he cited the example of India and Hong-Kong where India have far more college graduates than Hong- Kong but still ranks below due to the low investment in human capital stocks. The externalities arise due to the difference in the patterns of specialization and interactions. (K. Seeta Prabhu, 1998)

Human beings are considered as the primary ends and means of development. Sustainable development process focusses on the fact which place emphasis on the fact 'what people get from development, not only what they put into' (Sen & Anand, 2007). However, human capital concept and endogenous growth theories are based directly or indirectly on the individual capabilities and considered human beings as the means to development. A serious problem with these approaches is that they do not take cognisance of the inescapable and tenacious poverty that is a major hurdle in the development of the developing economies especially in the countries like India and South Africa. Unequal distribution of income limits the individual capabilities to invest in them. Hence these approaches only satisfy the need of just one- fourth population leaving behind a mass population with low income. Another reason for broadening the concept of human capital was the inefficiency of the indicators to promote economic growth. For example, if the expansion of educational facilities or of health care has the effect of increasing productivity and thus the income level, the approach of 'human capital' would give it an immediate and elevated status. But, if these changes in educational and health facilities directly make our lives longer and more fulfilled, and add to our ability to avoid preventable diseases and miseries, without necessarily changing labour productivity or increasing commodity production, then that achievement would simply not get the recognition it deserves in the accounting of 'human capital'. Something serious is thus missed even in the perspective of development that emphasizes 'human capital'. To rectify what is missed in the perspective of 'human capital', we need a broader conception of

development that concentrates on the enhancement of human lives and freedoms, no matter whether that enhancement is — or is not — intermediated through an expansion of commodity production (Anand &Sen, 2007). This broader concept came to be known as 'Human Development'. The object of the particular focus chosen by the Human Development Reports was to examine the progress of the conditions of human living — the ability of people to lead the kind of life they have reason to value. It is the enhancement of the capability to live better and richer lives, through more freedom and opportunity that became the central concern of these Reports (Haq, 1995). Though the two approaches represent different role of social sectors in the economic development of an economy. The broad concept of human development enables the human resources to be utilised effectively as to guarantee economic growth. (K. Seeta Prabhu, 1998). Anand and Ravallion (1993) cited that the main difference between the human capital and human development approach is that the former emphasised on the minimum requirements while the latter focusses more on the functioning's which guarantee freedom of choice.

2.4. Human Development Approach

"*Human development, as an approach, is concerned with the basic development idea: namely, advancing the richness of human life, rather than the richness of the economy in which human beings live, which is only a part of it*"

Prof. Amartya Sen (1998)

Human development approach arose in part as a result of growing criticism to the leading development approach of 1980's, which presumed a close link between national economic growth and expansion of individual human choices. Many economists such as Mahbub ul Haq recognize the need for formulating a paradigm that will take into accordance the other needs of the individuals. Many of the key principles of human development can be traced back in the writings of scholars and philosophers from past eras and across many societies. Martha Nussbaum (2000) was the economist who draws our attention towards the capability approach [8]which gave an insight of the conceptual framework of human development. Though her approach does not offer any consensus between the human development and capability

[8]Refers to the real opportunities that are available to the people and the reason to value them.

approach. While the capability approach spans philosophy to practice, human development takes into consideration the real-world applications, identifying and advocating policies that advance capabilities and draws a broader perspective towards a people centric approach. The capability approach was further expanded by the Noble Laurate Amartya Sen in his capability approach. Both the scholars defined the approach in the 'narrow' sense as identifying the space in which development is to be evaluated. While in the broader sense, the capability approach provides a more extensive framework for evaluation, which includes attention to process freedoms as well as to principles such as equity and sustainability (Puthenkalam and George, 2012).

However, the writings of Amartya Sen gave rise to the capability approach in 1980 in his lecture, 'Equality of What?'. He defined capabilities in terms of standard of living rather than in terms of per capita income. Capabilities as cited by him refer to a set of feasible options and the freedom to choose among them. This freedom forms an integral perception of capabilities. He argues that the standard of living of a society should be defined in terms of functioning's and should be judged not by the average level of income but by people's capabilities to lead the life they value. Functioning's, which refer to the 'doings and beings' constitute the nature of an individual's existence in society. Feasible options in terms of commodities should not be valued in their own right but as ways of enhancing capabilities such as health, knowledge, self-respect and ability to participate actively in common life. "Capabilities refer to what a person can (not) do or can (not) be. Freedom from hunger, being free to participate in the political process, being adequately sheltered, and access to health and education etc., can be quoted as different manifestations of capabilities". Sen has argued that development ought to be viewed as capability expansion and freedom, rather than being viewed as purely economic phenomenon (Sen, 1989).

In continuation of Sen's capability approach UNDP (1990) also came up with the concept of human development. Human development was defined as a concept which enlarges people's choice and focuses on the measures which encompasses empowerment, capabilities and opportunities, equity, cooperation and sustainability. UNDP since 1990 have been publishing Human Development Reports which concentrate on a particular dimension of human development along with the strategies

to achieve the same. For the purpose of measuring the overall development of an economy UNDP along with other eminent scholars came up with the device called HDI. Human Development Index (HDI) puts people in the centre and also rank the economies on the basis of their human development attainments on the three basic indicators viz… literacy rate, life expectancy and standard of living. According to Dreze and Sen (1995) this approach concentrates on the attainments of these indicators as ends in themselves. The "instrumental, personal, social and process role of education are stressed more rather than the contribution of education as a means of raising incomes and productivity".

Mahbub Ul Haq (1997) one of the prominent economists defined human development paradigm as "the process of enlarging people's choices". In principle, these choices can be infinite and change over time. But at all levels of development, the most critical and essential ones are for people which can enhance the capabilities of the people by a way of healthy life, by being educated and by having access to all the resources which would lead towards decent standard of living. If these choices are not available, many other opportunities remain inaccessible. He advocated four important aspects of human development-

1. People must be in the centre of development and each activity should be analysed to see how much each person participates and benefits from this.

2. Human development is analysed in two ways – formation of human capabilities and making use of their acquired capabilities.

3. Importance of human development lies in distinction between ends and means of development.

4. The idea of human development paradigm embraces all aspects of society – not only in economic terms but also social, political, psychological and cultural.

2.5. Indicators of Human Development

2.5.1. Education

Earlier economist argues that the prime reason for the rapid development of the American economy was the increased outlay on education which is one of the essential components of human capital. (Schultz 1961, Harbison 1968, Becker 1966). According to Prof. Schultz, (1961) there are six ways of improving the quality of population -(1) Health facilities and services, (2) Job training, (3) Formally organized education at the elementary, secondary and the higher levels, (4) Study programmes for adults, (5) Migration of individual by changing jobs and (6) Social and economic equity. Charles and Berger (1988) cited that outlay in human Capital can be done by way of proper schooling, practical training, job market information, improved health and cleanliness and migration. Human capital formation is one in which a person proves himself to be more beneficial and productive. Schultz (1961) stated that human capital formation is a process in which humans are an asset. Gary Becker the other eminent economist who developed his theory on human capital taking investment of education as a key indicator of human capital. His theory basically evolved around the concept of computing the rate of return from the investment made by the individuals by self-improvement. In1964, he published his monograph *Human Capital*, which largely extended those papers he had published in 1960 and 1962, with the latter including most of the theoretical framework and providing an extensive picture of what was already becoming known as human capital theory. He defined human capital as "activities that influence future monetary and psychic income by increasing resources in people" (Becker 1994, 11), and its main forms were schooling and on-the-job training, although he also considered medical care, migration, and searching for information about prices and incomes. His approach had the advantage of providing a unified explanation for an array of behaviour related to human capital. Firstly, his work helped to analyse the needs of younger generation. He explained the advantage of long periods of schooling. Secondly his theory also gave an insight reason for the high rate of migration within economies. According to him imparting specific training is much more beneficial than general training. The investment in this training will help individual's especially female labours to earn well. Moreover, it will help economies to grow in terms of income. Thirdly spill over effect of education has

been much talked about. Becker's view on education was largely due to the inducement of technology. If the demand for skilled workers rises, then the return on this demand will create a positive effect on income of individuals. Lastly, he gave a perspective of lifetime financing in human capital investment. Becker (1967) and some other economists considered allocation of investment in human capital must be concentrated at the younger ages. This is due to the simultaneous operation of two forces (a) Human beings have a finite working life. (b) Opportunity cost of investing increases as human capital is acquired. Human capital raises an individual's marginal product and consequently opportunity costs of time spent on human investment. Modern economists seem to concur that education and health care are the key to improving human capital and ultimately increasing the economic outputs of the nation. (Becker 1993).

Dennison (1967) states that investment in human capital stock results in improving labour productivity. This investment further results in increase welfare of society through a way of increase in educational output. He provided a direct link between educational attainment and the economic and social welfare of countries. In the modern era, the conventional inputs such as labour and capital could explain only 60% of the total growth of United States. The remaining 40% growth in real national income could be attributed to improvements in human capital. Harbison (1970) divided his capital theory in terms of active and passive factors. Physical capital and natural resources like that of land and capital the passive or inactive agents of society. While the active agents are human beings who accumulate the inactive agents, exploits the passive agents and utilize them for the economic development. He stated that a country which invest less in human capital resources and is not able to develop skilled and efficient labour will not be able to develop in any way. Human Resource constitutes the ultimate basis for wealth of nations.

Nancy Stocky (1990) her model 'Human capital, product quality and growth' explains heterogeneous labour, differentiated by level of human capital, determines a country's comparative advantage. The growth phenomena experienced by some successful new industrialized countries in East Asia, where rapid economic growth was accompanied by higher volume of exports, rapid growth in education and rapid changes in the composition of output. In this process she highlighted that

1. The labour is heterogeneous and differentiated by the level of human capital.
2. The technology for human capital accumulation used in the model is one that distinguishes between the private human capital of individuals and the stock of knowledge of the society as a whole.
3. An individual accumulates human capital by investing, in his education. His level of human capital determines the quality of labour force.

Tinbergen (1975) based his analysis by defining the relationship between human capital and inequality. According to him the reason behind the presence of inequality is the opposing effects of technology and education. This opposing effect has its major impact on relative wage. He stipulated that the relationship between growth and inequality was determined by the race between technological development and education.

He suggested five areas of human qualities, which are conducive to economic development –

1. an interest in material well-being.
2. an interest in techniques and innovation.
3. an ability to look ahead and a willingness to take risks.
4. Perseverance and
5. an ability to collaborate with other people and to observe certain rules.

Mincer (1974) also found that schooling and training as the basic cause of labour income ones on the job. "Future productivity can be improved only at a cost; otherwise, there would be unlimited demand for schooling and training". K. Seeta Prabhu cited that the available evidence from the developing economies points to the fact that the social returns to investment in primary education are more than twice the 10 per cent norm applied to the opportunity cost of capital. According to Psacharopoulos (1993) in developing economies the social returns to primary education in 1990s were more than 18 per cent per annum whereas the private rate of return were over 29 percent per annum.

2.5.2. Health

Another indicator apart from education is health which also affects the human capital level of individuals. Howitt (2005) define that health also impart growth through the way of prolific efficiency, life expectancy, knowledge capacity, creativity, etc. Worker with sound health become robust, active, imaginative, observant so forth that makes them more operative in the manufacture process. This means that better health helps in enhancing effective and continual usage of the knowledge and skills which the individual has acquired through education. Through investment in the prevention and treatment of illness the quantity and quality of the human-capital stock can be increased as with investment in education and training (Gardner and Gardner, 2001). Health determines the total working hour that an individual wants to spent to generate income (Basov, 2002). Barro (2013) argues that depreciation of education capital can be reduced through better health.

2.5.3. Income

Income is clearly only one option that people would like to have. Income is also a means, with human development as an end. The first Report, Human Development Report 1990, identified three key aspects of the quality of life of people, to be enhanced by the process of development: longevity, education and "command over resources to enjoy a decent standard of living" (Human Development Report 1990, p. 1). The first two components of human development clearly depict the importance of capabilities to do other things. As Sen depicted that 'command over resources' is only an important instrument for other means and end towards reaching them. Income is one way that can be used as a way to command over resources for enjoying a decent standard of living. For the purpose of enhancing capabilities income is one indicator in which capabilities depend. This component can provide crucial information on the unpremeditated credentials of basic human capabilities.

This component is used as an indirect component in human development for the purpose of measuring one's capabilities. In other words, income component is used as a proxy for achieving a good quality of life that cannot be measured from the other two components of human development. Though indirect but the ability to command over resources has a positive effect on the individual's performance in different fields.

It gives us an indirect account of many significant aspects of human development. in an indirect way — both as a proxy and as a causal antecedent — the income of a person can tell us a good deal about her ability to do things that she has reason to value (Anand &Sen ,2007).

2.6. Key determinants of Human Development

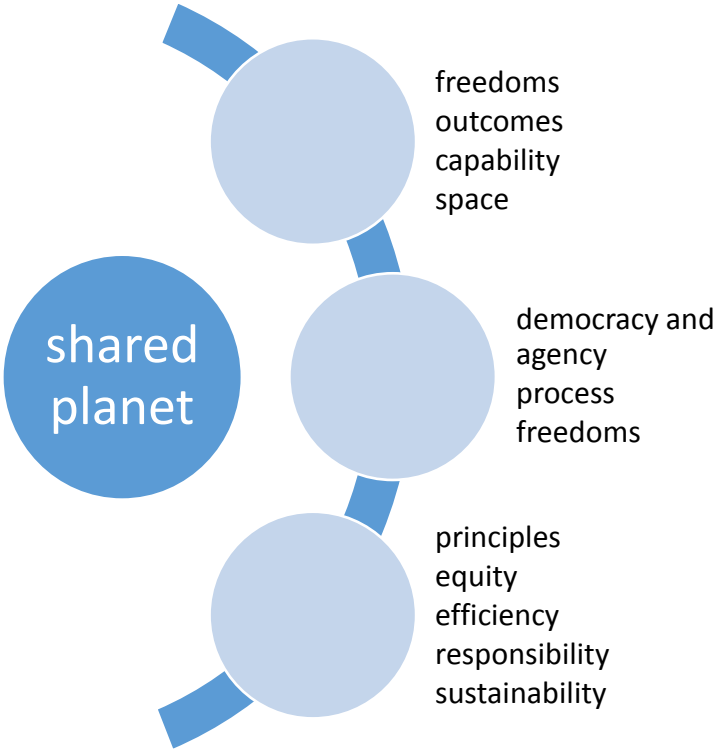


Figure. 1 Major factor influencing Human Development

Source: Puthenkalam & George,2012

The key determinants of human development as defined by Mahbub-ul-Haq **for the growth to be strong, democratic, participatory and durable people need to exercise their choices in the political, social and economic spheres.** Dev in his paper cited that if development has to be viewed in terms of capabilities then equity related opportunities must be enhanced. Human development approach provides a planet which has all the collection of those opportunities which enhance capabilities

and grant freedom to individuals. This approach helps to access those opportunities which are essential for the favourable and progressive development.

2.7. Issues related to Human Development

Human development has always been flexible and 'open-ended' process. There are many dimensions of human development that enlarges individual's choices. Although, there are some issues which are most central to the concept of human development. These issues can be classified into seven categories.

1. Social progress
2. Income inequalities
3. Efficiency
4. Equity
5. Participation and freedom
6. Sustainability and
7. Human security.

The inclusion of these issues in the human development concept enhances the quality as well as quantity growth which in turn leads to the holistic development of the economy. Failure of the developing economies can be traced by the fact that these issues of human development concept are not tackled properly. Implementation of proper public policies by the government can only enhance the development.

2.8. Role of Human Capital in India

From the theoretical perspective of human capital, we may conclude that for economic development, human capital is must but along with economic growth. If human capital does not raise labour productivity which further leads to increase in growth, then it is useless to invest in its components. If talked about India many studies have included the importance of human capital in development of the economy. As quoted by Bergheim, Stefan (2005) in their introductory study on "Global Growth Centres 2020" human capital is the most important factor of production in today's development. For the purpose of achieving progressive success in growth investment in human capital is a must. They themselves owe success of their article to solid gains in human capital especially in economies like India, China,

Thailand, Spain. According to them the available proxy for human capital is investment in education. Their research highlighted the positive effects of investment in human capital in India. They analysed that the development in 'India was the most dynamic development between 2005 and 2020'. Their trend analysis showed a 40% rise in the average years of education in India. Although this will still be the lowest level among our 33 countries (which helps explain why per-capita income in 2020 will still be very low), it is the strongest percentage gain (which helps explain why per-capita GDP is expected to rise so quickly going forward). India's secondary enrolment rate of 50% today significantly exceeds the 30% rate of the early 1980s. Public education spending has risen to 4% of GDP, and the government plans further increases. In addition, our trend analysis points to several developments that favour the accumulation of human capital. The trend cluster "opening of work and society" is set to accelerate and more members of the lower castes should gain excess to higher education. Likewise, the more intensive "global networking in business and politics" will boost returns to human capital and therefore the incentives to get more education. As Adam Smith quoted "facilitating the commerce of the society" and institutions providing education will generate a skilled worker. Equal educational opportunity is a more sustainable vehicle towards social peace than transfer payments from rich to poor. This article depicts the positive linkage between human capital and economic growth. Neeraj Kumar Singh in his article 'Developing human capital through education: challenges and solutions' also reflect that the only way forward in the 21st century is to convert India into a knowledge society which is capable of utilizing its human potential to its fullest. This requires reinforcing the education sector by addressing the issues of expansion, excellence and inclusion as mentioned above. It is only then that links can be developed between various areas of the society which will work towards improving the social and economic indicators of the country. The investment in human capital, through quality education, holds the key to inclusive development in the burgeoning Indian economy. Converting India into a knowledge society shall require, inter alia, addressing the issue of expansion, excellence and inclusion in education while formulating policies for achieving the same. (Developing human capital through education: Challenges and Solutions)

Mathur (1993) has also shown that at higher levels of education a positive association exists between stocks of human capital and economic development. Mathur and Mamgain (2002) in their paper found that the influence of technical education[9] on per capita is more powerful than that of general education and both have positive association with income component.

As Tilak (2006) said that investment in human capital is like recognising the flower-and-seed relationships. This relationship can be best explained in terms of economics of education and economic development. The methodologically research results on the relationship between education and development can be compared to the calculations of Denison and Schultz theoretical and empirical calculations on human capital. The coefficient of education in the production function remained no more a 'coefficient of ignorance'.

2. 9. Concluding Remarks

To conclude we would like to draw attention to a Chinese proverb, which beautifully sums up the importance of education in development: "If you are planning for a year, grow rice and vegetables; If you are planning for decades, grow trees. But, if you are planning for centuries, educate children. "To add to the proverb, if you are planning for sustained and all-round development for centuries, don't merely educate children but mould them into men of character and faith (Barro and Lee, 1991). In the context of Indian economy, it can be said that investment in human capital is necessary for development. A World Bank study of 192 countries has revealed that while physical and natural capitals respectively account for 16 and 20 per cent of the productivity growth, the human and social capital is responsible for 64 percent of this growth – i.e. a large chunk of the growth - far exceeding the growth resulting from physical capital and the natural capital put together

The utmost reason to study the theoretical perspective of human capital is to better understand the concept of investment in its components. The idea that the concept explores a more viable and strategically tool in the economic development focusses our attention towards it. Economic development depends on a number of factors which can occur individually or, more often, jointly. Improvement in human capital in

[9]Refers to the skills and knowledge a person has

the sense of "being able to" enhances labour productivity which leads to growth and increase of knowledge bases available within the knowledge dissemination There is a positive correlation between growth rate and the following: school participation rate, indicators of the population's health mirrored in life expectancy at birth, and openness to trade. (IMF, 2000).

Chapter 3

TRENDS IN SOCIAL SECTOR EXPENDITURE: A STATE WISE ANALYSIS

3.1. Introduction

Enhancing the capabilities of human beings and transforming them into productive opportunities is one of the major objectives of every economy. Dichotomous relationship between human development and economic growth requires the quality investment in their respective indicators viz education, health and decent standard of living etc. The combined investment in these indicators is termed as 'social sector development'. For the purpose of achieving higher economic growth, expenditure in social sector indicators is necessary as it makes the labour force more productive, healthy, competitive and efficient, which in turn contributes to the development of the economy. According to Prabhu (2005) in his paper entitled 'Social sector in India' define social sectors as all those sectors which contribute to an enhancement of human capital, that is, the skills and productive knowledge embodied in people. Since the inception of the term 'Social sector' development initiatives by the planners in terms of investment has gained significant importance. The reflection of this can be seen since the origin of planning era. Special provisions have been assigned by both the central and state government in terms of 'plan and non- plan expenditure'. Public sector outlays on social services (both projected and actual realization) have been on a sturdy rise since the inception of Sixth Five Year (FY) Plan. From the RBI statistics it is observed that the outlay of public sector on social services as a percentage of total expenditure has been more than doubled (14.4 to 30.2 per cent) (Kaur et.al.2013).

In line with the objective of achieving sustained growth, a greater emphasis on investment in human capital has been much focussed upon. WDR 2013 observed that for economies like India which are suffering from low human development base investing in key services like health and education will help in generating the accurate jobs and hence through this it will help to contribute better standards of living and also inclusive growth[1]. Relevance of use of policies which focus upon strengthening the human resource base is considered extremely important. As compared to international standards total public sector expenditure on important social sector heads

[1]Refers to the economic growth that create employment opportunities and help in reducing poverty.

has remained low though there has been a steady increase in the share of social sector expenditure in total plan expenditure (Bijnoy Goswani 2014). As per RBI Bulletins combined expenditure of the central and state governments in India on human development indicators i.e. education and health are just about 3.3 and 1.3 per cent of GDP respectively. If the outlay is compared with the developed countries of the world then European Union [2]spends 5.5 and 7.5 per cent of GDP (from their general government account) on education and health respectively. Public expenditure of Canada is quite high in terms of other countries as it spends 11 per cent alone on health sector of its GDP and that on education is approximately 5 per cent on education sector. To one side the low public sector outlay levels (as compared to international standards) and the presence of substantial discrepancies that persists across states in relation to the outlay of state governments on social services in India are the reasons behind the backwardness of the economy being backward. Prevailing data designates that the states lying behind the outlay in terms of social sector are not making significant attempt to catch up with the so-called developed states. Even the outlay on per capita and real per capita social sector expenditure in the dawdler states remained significantly low which in turn leads to persistence of higher disparities among human development indicators (RBI 2013).

Increasing momentousness of social sector outlay especially in relation to Indian economy, it is not only relevant to examine the drifts in social sector outlays but also to observe their reciprocation to circumstances of economic instability. The two reasons behind this are that for any public sector outlay a counter-cyclical instrument [3]is needed for social sector outlay as per conventional Keynesian dispute. Secondly upsurge in social spending will help to foster aggregate demand and economic retrieval at the times of economic recession. The public sector outlay helps in formulating adequate polices in terms of improvement in human development indicators. As said by Prabhu (2005) that the difference in treating human beings as means or ends defines the scope of public policy under the two approaches of development. The human development approach contends that enhancement of the ability to lead a happy and healthy life should be viewed as an end in itself and hence there should be a greater public supply of services like healthcare and education,

[2]EU is an international economic organization of 28 European countries.
[3] Any instrument that could magnify any economic and financial fluctuations.

irrespective of whether or not such investments generate any conventionally measured economic returns or not. In the light of the above theoretical understanding, this chapter makes an attempt to assess the impacts of expenditures made in the social sector on human development in India. Secondly a fair review of literature has been done for the purpose of understanding the need of in these indicators.

3.2. Review of literature

For the purpose of achieving the goal of development social expenditure plays a major role in building societies that are socially comprehensive, thriftily strong, and fairly affixed. To measure the quality of life of society numerous attempts have been fairly assessed by HDR. The foremost reason behind the unsatisfactory human development among countries as well as states is the arising inequalities in terms of social sector allocations. The existing review of literature suggests that outlay in social sector indicators is an imperative determinant of economic growth. According to Arora (2001) expenditure in social sector augment efficiency through improvement in infrastructure, education and health. Mundle (1998); Kannan and Pillai (2007) are some other economist that have explained the importance of social sector expenditure by the way of investment in these sectors. For India though planned apportionment of resources wasn't able to rectify inter-regional discrepancies and inequities in development but the need of investment was planned long time ago (Roy and Bhattacharjee, 2009; Rao, Govinda et al, 1999; Chakravarty, 2009; etc.). Devarajan et al (1996) in their study observes that the intertwining concept of social sector outlay and economic growth helps economies in evolution in form of better public. According to Lopez and Torero, 2007 the increase in public outlay on social sectors indicators like education, health and family welfare can help in altering the insignificant impact of fiscal deficit [4]on growth. This quantum impacts in long run through pro-equity effect[5]. It has been contended by policymakers that social sector outlay plays an imperative role [6]in escalating the progression of economic development of a nation through transmitting social justice. Budget allocations play a vital role in enlisting socioeconomic priorities and this policy affects the long-term growth rate (Muktdair-Al-Mukit Dewan, 2012). According to Sen (2000) social sector

[4]When the government expenditure is more than its revenue
[5] Refers to the situation where disadvantaged groups are better off than the advantaged group after the competition of the particular project or implementation of the policy
[6]Social sector plays an effective and important role

outlay not only helps in expanding the access of well- being through improvement in its major heads but it is also related to improvement in human development of the country. With the improvement in human development indicators capability and capacity of people will be better determined through better choices and hence this would transform itself into good growth numbers. From the study of Sen, it can be assessed that there exists an indirect relationship between the social sector outlay and growth hence human development of an economy. The nexus between human development and social sector infrastructure is same as that of physical infrastructure to growth (IGIDR, 2002). Hence it becomes of utmost importance to empirically show the nexus between social sector outlay and growth and the way spending transforms into human development. Several economic theories show that there exists a positive relationship between government spending and growth, then also there exist a wide variation in the empirical studies. Mixed result is observed in various empirical studies.

Hobbes in 1650s was the first person who argued about the vivacity of government outlay on public goods that is infrastructure, defence and education for the economic development. Following him were the economist Wagner (1883) and Keynes (1936). Though, Keynes explained the momentousness of public spending for growth, Wagner projected that public spending is directly related to national output or GDP. Barro (1990) endogenous growth theory deduced that surge in government outlay on development activities nurtures growth whereas outlay on non-productive activities obstructs growth. Studies of Baffes and Shah (1993) also observed the same relationship. Chemingui (2005) in his study observed the significant impact of disbursement on education, health and agriculture through surge in Total Factor Productivity [7](TFP). Lopez and Torero (2007) also deduced positive bearing of social public goods expenditure on mean income level of households, specifically for developing and underdeveloped economies. Diamond (1989), Landau (1983, 1986), Grier and Tullock (1989) observed opposite result between social outlay and economic growth. Baum and Lin (1993) explored mixed effects of the relationship in their cross-sectional study for developed and developing countries (1975-85). Similarly, Fan and Rao (2003) showed varied effects across continents. For Africa nations it was health expenditure which significantly affected growth while for Asian

[7]Refers to the growth in real output which is in excess of the growth in inputs such as labour or capital.

countries, outlay on education, agriculture and defence notably affected growth. The spending on human development indicators are of promotional nature and their transformation into growth process is not immediate. Kevin (2000) observed that the direct influence of education outlay on growth is negative whereas the influence of the same on forthcoming economic growth is positive. The study based on national level data sets conducted in Bangladesh by Muktdair-Al-Mukit Dewan (2012) conducted his study on national level data sets in Bangladesh empirically observed that public outlay on education has a positive and significant impact on economic growth in long run. He claimed that the outlay on education is not direct and it comes with a lag hence it becomes necessary to establish long term relation between the two variables. Chandra (2010) observed the relationship in context of Indian economy implying time series data for the period 1950-2009 recognized that outlay in education transforms itself into growth only after some time. The development outlay sustained by government conveys large "trickledown reimbursements to poor as compared to outlay on social sector expansion (Fan, Hazzell and Thorat). The outlay on social sector helps in aiding those sectors where private sector is inefficient in (Harsha 2004). Houqi and Sadiq (2009) in their paper "Social Sector Expenditure and its Disparities" examined the positive and significant relationship in context to Indian economy using panel data for 14 Indian states for the period 1990-2002.they suggested that those reallocation policies which give more importance to development expenditure like education, health and infrastructure should be much focussed upon. Goswami and Bezbaruah (2011), Mittal (2016) observed the positive and significant relationship between social sector outlay and human development.

From the review of the empirical literature, it can be observed that the relationship of government spending in social sector as a whole with economic growth in India calls for further analysis. Therefore, due to the assorted reviews on the impact on social sector expenditure on growth. This chapter tries to examine the trend level analysis on the social sector expenditure and its impact on growth with emphases to state level.

3.3. Quantum of Social Sector Expenditure

Investment on social sector indicators benefits the poor and it is of utmost importance as it plausibly impact the human capital of the economy. Social sector assumes importance on three accounts in context of India economy as well as many developing

economies. The first being market forces alone will not be able to tackle scale of deficit in the country. Secondly, the Government services are employed by underprivileged households which are enormous in contrast to the richer households and last to achieve the goals of Sustainable development

3.4. Cross Country Social Sector Expenditure

As per the latest World Bank data, India spends 3.8 and 1.4 percent of GDP on education and health respectively. The outlay is very low as compared to the world average of 4.4 % and 6%, respectively. Also, as per the, UNDP, India's Human Development Rank is 130 as per the Human Development Report (2015). The table below shows the cross-country public expenditure on Social Sectors. Though the funds are assisted by Union Government to States through different Centrally Sponsored Schemes (CSS) [8]& Central Sector Schemes, [9]but the utmost responsibility lies with the state to prioritize as well as make best allocation of their resources available (UNDP, Human Development Report,2015).

Table 3.1: Public Expenditure as % of GDP

Country	**Education (%) (latest available period 2011-12)**	**Health (%) (2014)**	**HDI Ranking**
India	3.8	1.4	130
Singapore	3.1	2.1	11
Sri Lanka	1.5	2	73
China	1.9	3.1	90
Brazil	5.9	3.8	75
United States	5.2	8.3	8
Japan	3.8	8.6	20
Sweden	7.7	10	14
Canada	5.3	7.4	9
World	**4.4**	**6**	**--**

Source: World Bank data, Human Development Report, UNDP (2015)

[8]Schemes where both the state and Centre participate in financial assistance
[9] In which 100% funding is sponsored by the central government

3. 5. Expenditure Pattern in India

Central and state budgets classify expenditures of the governments, in terms of three extensive groups, namely, non-developmental expenditures, developmental expenditure, and loans and advances. Non-developmental expenditures [10]consists of : defence services, border roads, interest payments, fiscal and administrative services, organs of states, pension and other retirement benefits, relief on account of natural calamities (non-Plan expenditure), technical and economic cooperation with other countries, compensations and assignment to local bodies, food subsidy, and social security and welfare (non-Plan expenditure).While developmental expenditures[11] comprises of investment made on railways, posts and communications, social and community services, general economic services, industries and minerals less departmental commercial undertakings, fertilizer subsidy, power, irrigation and flood control, transport and communications, and public works. From the above development expenditure social sectors comprises of money spent on 'social and community services' and 'rural development' (Dev and Mooij, 2002).

Social and community services are sub-divided into i) education, art and culture; ii) scientific services and research; iii) medical, public heath, water supply and sanitation; iv) family welfare; v) housing; vi) urban development; vii) broadcasting; viii) labour and employment; ix) relief on account of natural calamities; (Plan expenditure); x) social security and welfare (plan expenditure) and xi) others. Anti-poverty programmes related to expenditures on rural development fall under economic services (Mooij and Dev, 2004).

[10]Expenditure that is not directly related to the economic development of the economy
[11]Expenditure that relates to the improvement in the economic development of the economy

Table 3.2: Composition of Expenditure on Social services as a % of Total expenditure (Revenue and capital composition)

Components	**2004-05**	**2011-12**	**2014-15**
Development Expenditure	46.36	50.60	51.62
Social & Community Services	21.44	23.58	24.35
a) Education, art & culture	11.12	11.89	11.39
b) Scientific services & research	1.03	0.75	0.63
c) Medical & public health and water supply & sanitation	4.49	3.99	4.51
d) Family welfare	0.62	0.73	0.54
e) Housing	0.79	0.92	0.84
f) Urban development	0.91	1.43	1.76
g) Broadcasting	0.13	0.07	0.07
h) Labour & employment	0.35	0.32	0.37
i) Relief on account of natural	0.03	0.01	0.06
calamities (P) j) Social security & welfare(P)	1.50	3.08	3.54
k) Others	0.47	0.39	0.65

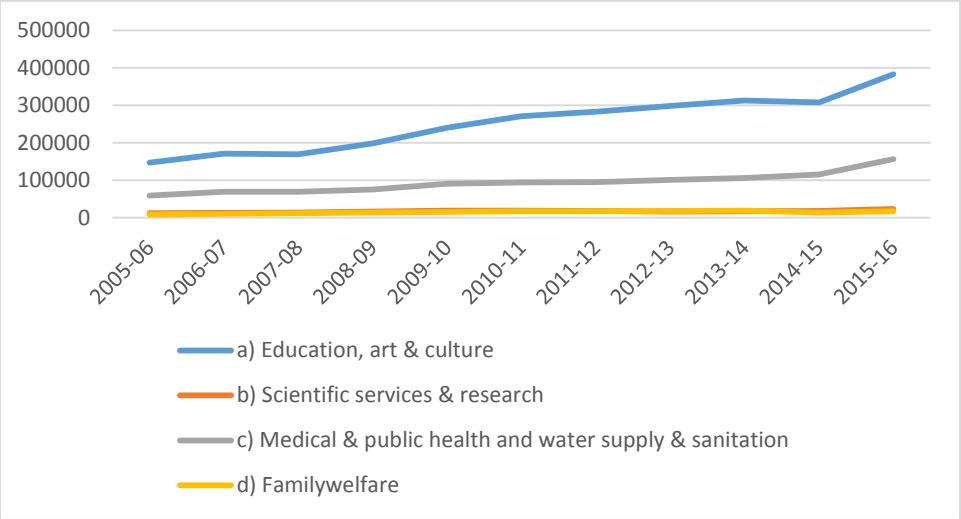
Source: RBI Bulletins *State Finances: A Study of Budgets,* (various issues)

In India, large financial support is received from the central government under centrally sponsored schemes as they provide for the provision of social services which is primarily the responsibility of state governments. Available data indicates that state governments incur about 80 per cent of collective (centre and states) government outlay on social services. Education and Health services (including medical, public health and family welfare) are the two major components which form around 60 per cent of the total social sector expenditure of state governments (Table 3.2).

From the above table 3.2 it is clearly depicted that expenditure on the major heads has shown a miniature growth in almost all the essential components of social sector expenditure from 2004 to 2015.Though overall development expenditure has shown an upward trend with a minimal increase from 2004 to 2015. Social sector expenditure on other hand was not able to catch up that faster as that of overall development expenditure. A mere increase of 3% was witnessed during the period of 2004-14. Social sector expenditure is divided into six components in which

investment in education and health sector is considered to be of utmost importance. There was a minimal increase of just 0.77% in investment on education from the year 2004 to 2011 and then again, the share of revenue expenditure[12]and capital expenditure [13]on education has declined approximately 0.4% from 2011 to the current year. Same is the trend with health expenditure also, percentage share in total social expenditure has comparatively declined at an approx. of 0.53% from the year 2011 to 2015. Though the expenditure in health sector has taken a sharp rise from the period 2004 to 2011 but after it a sharp fall is also been witnessed. Except expenditure on social securities and welfare schemes which has tremendously increased that too due to the implementation of various programmes, all other sectors have shown a declining trend. In one of the papers by Dev & Mooji (2003) specified that investment in major heads of development expenditure has been declining since post reform period. States contribute the lions share in the combined expenditure. The share of States in 1990-91 was about 85 per cent of the total social sector expenditure. However, the share in the total social sector declined to 82 per cent in the course of the 1990s and since then it has been on continual decline. This suggests that the commitment of the States to social development has declined during the reform period (Dev, 2003)

Graph 3.1: Social Sector Expenditure

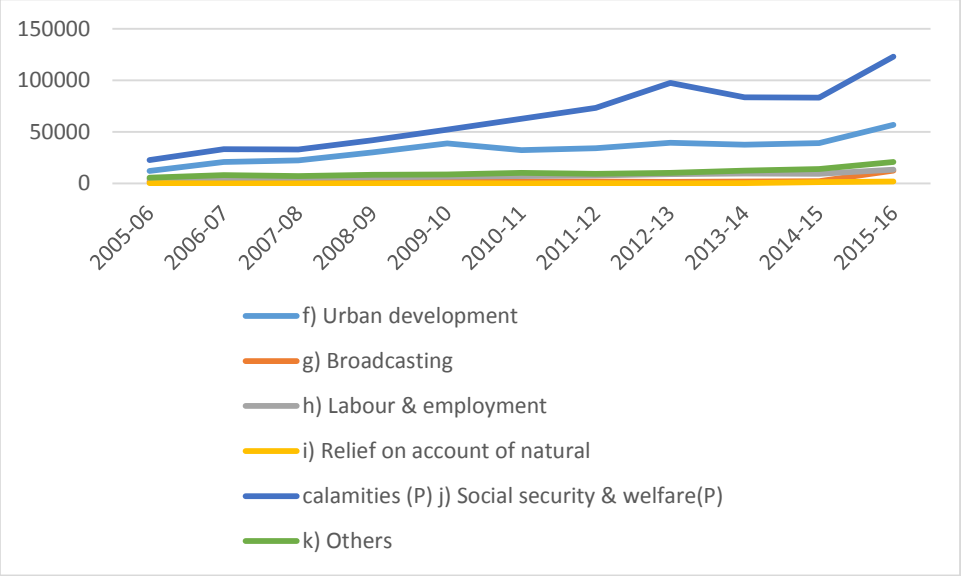


Source: Public Finance Statistics, Ministry of Finance, Government of India (various issues).

[12]Relates to the specific revenue transaction
[13]Refers to the fixed assets of the economy which are going to be productive for a long period of time

Graph 3.1 (Appendix 3.1 A) signifies the overall composition of social sector expenditure for the period ranging from 2005-06 to 2015-16. The figures of the chart have been deflated as per the 2011 base year. The above figures show that investment in education expenditure has been on a sharp rise from the year 2005 to the current year. Though during the 10th plan investment in education sector saw a decline in expenditure but after that there was a sharp increase in education expenditure. Health expenditure which include components like water supply and sanitation, family welfare and medical and public health got their pace from the year 2005 but are far less than that of education sector. Though revenue and capital expenditure of social sector indicators took a slow pace but apart from investment in family welfare and scientific research each other component has seen a rising trend.

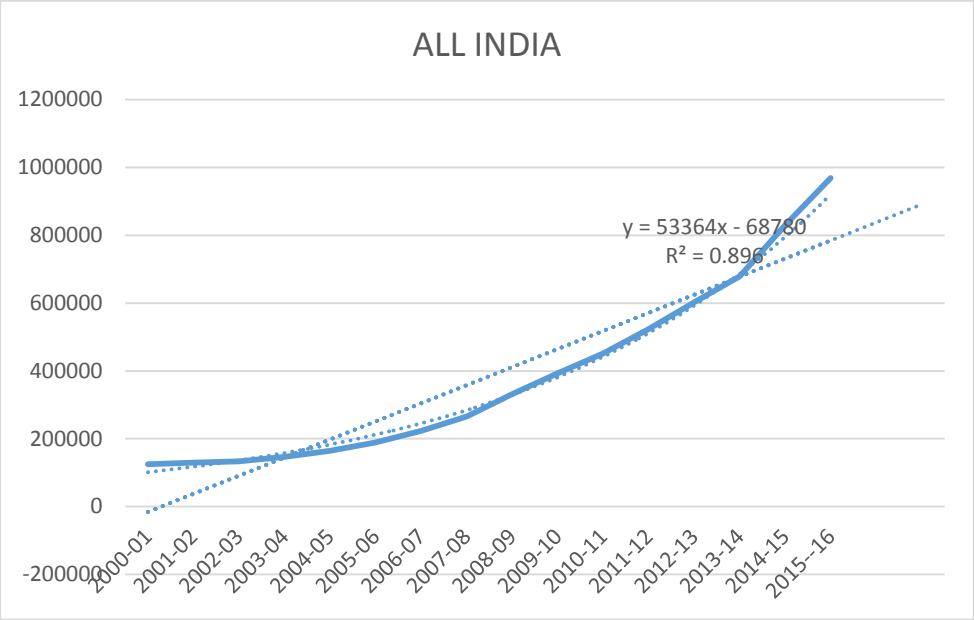
Graph 3.2: Other Components of Social Sector Expenditure



Source: Public Finance Statistics, Ministry of Finance, Government of India (various issues)

Graph 3.2(Appendix 3.2 A) takes into consideration other essential components of social sector apart from the core indicators of social sector (education and health). The trend above shows that social security and welfare have seen an upward trend in terms of expenditure. Urban development has been slow and stagnant. Very meagre amount of expenditure is incurred on the other indicators of social sector.

Graph 3.3: Trends in Social Sector Expenditure

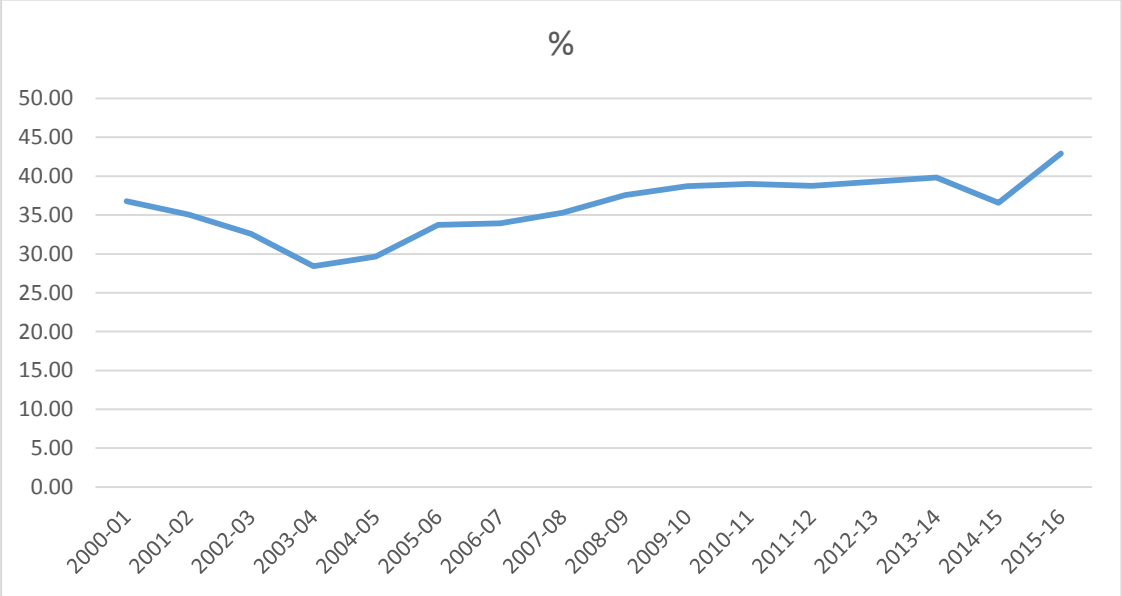


Source: Public Finance Statistics, Ministry of Finance, Government of India (various issues

The above chart 3.3 depicts the trends in social sector expenditure at all India level. Expenditure in social sector is incurred both by Centre and states. Though states contribute a lion's share in total social sector expenditure almost about 80% but Centre also occupies an important place in contribution. Trends have been estimated for the period ranging from 2001-16. In 2001 an approx. of 13 crores were invested in social sector expenditure. From then onwards understanding the importance of social sector, investment has seen an upward trend which in the current year has risen to an approximately. of 85 crores.

3.6. Social Sector Expenditure as a % of Total Expenditure

Graph 3.4: Social Sector Expenditure as percent of Total Expenditure



Data Sources: State Finances: A Study of Budgets, Reserve Bank of India, 2016

The above graph 3.4 calculates the % of social sector expenditure on total expenditure as a whole. After the second reform period the momentum in expenditure took a sharp rise. From 36.76% (2000-01) to 42.9 (2015-16). A continuous upward and downward momentum can be witnessed for the respective 16 years. After 2000-01, there was a sharp decline in the percentage in the year 2003-04 (28.42) and 2004-05 (29.65). Although after this year only upward momentum can be observed except for the year 2014-15 which again saw a declining trend.

3.6.1. Social Sector Expenditure: A State Level Analysis

Table 3.3: Social Sector Expenditure: A state level Analysis (in crores)

State	AP	Bihar	Chha	Guj	Har	HP	J & K	Jhar	Karn	Ker	MP	Maha	Odi	Pun	Raja	TN	UP	Utta	WB	AS	MEAN	SD	CV
2000-01	10010	7410	970	9680	3390	1960	2040	3730	7540	5240	7150	15430	4060	3890	7220	9620	12130	350	9620	124920	12318	26796.61	2.18
2001-02	10880	5780	2430	9030	3680	1910	2320	3730	7640	4930	6010	15450	4120	3730	7730	9190	12280	1320	9580	129250	12549.5	27728.37	2.21
2002-03	11180	6470	2820	8180	2810	1970	2520	4900	7570	6340	7160	15700	4210	2990	8030	9660	13100	1710	8460	133650	12971.5	28660.26	2.21
2003-04	13370	7020	3240	8990	2820	2350	2490	4320	8320	5920	6790	18880	4360	3530	9230	11590	13000	2030	9010	146160	14171	31385.73	2.21
2004-05	13820	6120	3630	10130	3500	2330	3100	5130	9760	7340	7270	20430	4600	3750	9840	13620	16930	2330	9730	164080	15872	35247.50	2.22
2005-06	14900	8660	4300	10990	4740	2800	4030	6160	11680	7520	9430	24270	5390	4050	10920	14300	20140	2780	11440	189430	18396.5	40665.65	2.21
2006-07	18650	11130	5710	13100	5600	3330	4350	7390	14410	7190	10660	28280	6130	4710	12580	16920	24030	3230	13140	222990	21676.5	47879.56	2.21
2007-08	24470	13820	6950	14890	7340	3740	5110	7980	17640	9010	12600	29720	8200	4990	14680	19990	30010	3730	16190	265470	25826.5	56971.77	2.21
2008-09	31440	16340	8870	18180	9810	4570	5610	9870	20440	10860	14690	36500	11090	6860	19430	26890	39510	4190	19470	331540	32308	71180.05	2.20
2009-10	30280	17870	11680	23170	13360	4910	6900	10040	25100	12030	17630	47360	12520	7110	21580	29350	47250	5620	27700	392940	38220	84399.22	2.21
2010-11	39130	19370	11820	28590	13640	6020	7430	12300	28690	13620	23450	53830	15240	8350	22790	36490	50670	5950	30560	451940	43994	97056.25	2.21
2011-12	45400	24050	14810	30350	16270	6000	8740	10720	32370	18740	27130	61130	18050	9970	27850	41900	59720	7380	35610	523570	50988	112418.26	2.20
2012-13	49440	30740	16970	38060	18990	7100	9120	12030	37830	21650	33370	70030	19660	12560	33700	46750	67440	7970	40100	602940	58822.5	129391.78	2.20
2013-14	53740	34920	21050	41880	18100	7890	9810	11710	41590	23950	35740	78200	24810	13080	41900	55120	76560	9380	45580	679200	66210.5	145794.92	2.20
2014-15	54920	42420	23680	47260	22040	9070	11560	17740	51510	28510	44380	88320	29250	15510	54820	62760	86320	12990	57260	830060	79519	178197.90	2.24
2015-16	57520	52710	27500	53460	25500	9970	15720	21900	59430	33090	55550	93320	36250	16280	62260	70060	108200	13400	67840	968940	92445	208045.39	2.25
mean	29947	19052	10402	22871	10724	4745	6303	9353.1	23845	13496	19938.1	43553.1	12996	7585	22785	29638	42331	5272.5	25706	384817.5			
SD	17678	14332	8282.1	15210	7617.4	2665	3900	5124.8	16653	8964.3	15269.1	27273.2	10107	4536.2	17236	20279	30149	4003.6	18868	268399.9			
CV	0.59	0.75	0.80	0.67	0.71	0.56	0.62	0.55	0.70	0.66	0.77	0.63	0.78	0.60	0.76	0.68	0.71	0.76	0.73	0.70			

Source: Computed using data from (i)Reserve Bank of India Bulletin (various issues)

(ii) Handbook of Statistics on State Government Finances, Reserve Bank of India, (various issues)

The efforts made by the states in the social sector are relative to the sizes of their economies or budgets. Kerala is one state that has shown a declining trend. However, the case of Kerala is different and cannot be compared with others. Through appropriate state interventions, the state spent more in earlier times and attained a higher level of human development. The indicators of human development in Kerala exceeded those of the other Indian states' way back in the 1950s and 1960s (Veron, 2001). Hence, the state may not need to spend more on the state now. There are also certain other states like Andhra Pradesh, Orissa and Karnataka which have been spending more on the social sector though they had spent more on this sector during the period 1985-95 than they are spending now.

The above table 3.3 depicts the overall social sector expenditure incurred by the states from 2000-01 to 2015-16. There has been a tremendous increase in the expenditure trends of social sector almost in all the states. If on an average of the states is calculated, then Maharashtra has made an average expenditure of Rs. 435crores following it is Uttar Pradesh which made a significant investment of 420 crores. While on the other hand, states like that of Himachal Pradesh (47crores) and Uttarakhand (53 crores) has incurred the least expenditure. For backward states an overall increasing trend in terms of investment has been witnessed.

To analyse the inter-state disparity Coefficient of variation [14]has been calculated. Inter- state variations observed that for the year after 2001-02 till 2013-14 disparity was almost stagnant at 2.21 while it was lowest for the year 2000-01 (2.18) and highest for the year 2015-16 at 2.25 If disparities within the states are examined then Chhattisgarh has the highest variation (80%) while Jharkhand (55%) has the lowest variation. Disparities for backward states can be observed at 71% for which the lowest variation can be observed for Uttar Pradesh while highest can be observed for MP.

[14]Is the ratio of standard deviation to that of mean

3.6.2.Social Sector Expenditure as a % of Total Expenditure: A State Wise Analysis

Table.3.4: Social Sector Expenditure as a % of Total Expenditure: A State Wise Analysis

State	AP	Bihar	Chha	Guj	Har	H P	J &K	Jhar	Karn	Ker	MP	Maha	Odi	Pun	Raja	TN	UP	Utta	WB	MEAN	SDEV	CV
2000-01	35.6	43.73	50.6	35.62	37.01	36.88	26.06	0	38.34	39.85	42.25	36.56	36.75	27.57	41.27	39.37	33.07	31.53	35.97	35.16	10.15	0.29
2001-02	35.01	38.87	43.21	35.2	34.3	33.69	28.82	47.01	34.83	37.54	35.44	36.37	34.15	23.77	40.69	37.03	32.23	40.02	34.12	35.91	5.04	0.14
2002-03	32.53	36.45	41.34	30.39	26.55	29.78	28.84	49.95	31.44	37.37	37.71	33.25	31.73	17.25	37.28	32.03	31.13	35.27	30.52	33.20	6.55	0.20
2003-04	33.33	36.69	36.2	27.25	18.65	29.03	28.24	44.36	28.43	29.95	28.38	30.93	28.01	17.36	35.68	34.33	18.72	32.71	23.45	29.56	6.81	0.23
2004-05	29.31	30.52	37.63	29.03	24.23	29	27.86	44.09	28.5	36.2	24.72	28.11	28.96	17.86	34.04	32.6	28.63	36.6	29.05	30.37	5.70	0.19
2005-06	30.85	38.37	44.22	32.1	31.96	32.61	29.93	45.91	33.4	35.61	32.55	35.34	34.23	19.8	40.12	36.91	33.66	36.27	28.19	34.32	5.74	0.17
2006-07	32.92	41.02	47.62	33.42	28.52	33	31.36	46.99	32.69	31.05	35.28	37.29	31.69	17.91	39.49	33.08	32.05	37.93	31.89	34.48	6.58	0.19
2007-08	32.68	43.77	46.24	34.89	33.24	35.24	29.98	43.46	36.73	31.4	35.73	37.04	35.9	18.82	38.88	35.86	34.37	37.39	34.71	35.60	5.81	0.16
2008-09	38.91	43.95	50.07	35.03	37.2	36.58	29.92	47.82	37.82	33.36	36.7	36.84	36.9	23.83	45.22	39.71	37.85	38.48	31.95	37.80	6.11	0.16
2009-10	35.59	41.76	54.18	38.4	41.03	34.99	30.64	44.2	39.86	33.57	35.24	40.33	40.99	22.71	44.27	40.35	39.01	42.27	40.66	38.95	6.35	0.16
2010-11	38.88	38.2	50.16	39.93	39.61	37.32	29.06	46.41	39.88	33.41	39.05	41.36	42.27	22.53	42.44	40.15	37.65	42.47	41.88	39.09	5.95	0.15
2011-12	39.18	39.96	51.57	38.22	40.93	34.62	29.27	41.22	37.75	34.84	33.64	41.1	42.87	27.09	42.6	38.28	38.85	45.47	42.48	38.94	5.57	0.14
2012-13	38.2	44.42	48.74	38.73	40.83	34.27	28.7	39.57	39.16	34.9	39.97	42.65	41.6	28.22	41.47	38.51	38.82	41.48	42.05	39.07	4.90	0.13
2013-14	39.33	43.43	53.37	39.99	36.99	37.09	30.74	38.95	37.59	34.53	39.82	41.86	44.2	27.45	44.53	41.08	38.14	43.58	42	39.72	5.53	0.14
2014-15	49.45	32.09	42.30	37.66	34.56	36.43	27.22	34.89	38.78	34.37	35.97	38.75	38.42	27.48	43.57	38.88	32.91	41.30	44.17	37.33	5.54	0.15
2015-16	51.33	43.68	41.79	38.87	35.58	35.18	34.23	39.46	42.29	33.33	40.85	38.88	42.91	26.34	45.21	38.42	36.97	42.01	49.03	39.81	5.74	0.14
MEAN	37.07	39.81	46.20	35.30	33.82	34.11	29.43	40.89	36.09	34.46	35.83	37.29	36.97	22.87	41.05	37.29	34.00	39.05	36.38			
SD	6.07	4.28	5.46	3.95	6.47	2.78	1.87	11.59	4.13	2.55	4.54	4.01	5.21	4.18	3.35	2.91	5.20	3.95	7.02			
CV	0.16	0.11	0.12	0.11	0.19	0.08	0.06	0.28	0.11	0.07	0.13	0.11	0.14	0.18	0.08	0.08	0.15	0.10	0.19			

Source: Computed using data from (i)Reserve Bank of India Bulletin (various issues)
(ii) Handbook of Statistics on State Government Finances, Reserve Bank of India, 2017

The above table 3.4 depicts the percentage of social expenditure states incurred of their total expenditure. In total India incurs an approximately. of 44% of its total expenditure towards social sector. Though this investment is significant in terms of the recommendations of UNDP which states that a country should incur an approx. of 40% yet this is not significant. India lacks behind many developed as well as developing nations as specified above. A state level analysis shows that BIMARU[15] states are doing quite well in terms of allocations. Uttar Pradesh has seen a tremendous increase from 33% in 2000-01 to 37% for the year 2015-16. Kerala is only the state which has shown a declining trend otherwise all the states have performed well in terms of social- allocation ratio.

State-wise disparities also witnessed a declining trend from 0.29% (2000-01) to 0.15% (2015-16). Disparities within the states are also calculated. State that witnessed lowest disparity is HP while the state having highest level of disparity is Haryana and West Bengal.

[15]Acronyms used for backward states i.e. Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh

1.6.3. Social Sector Expenditure as a percentage of NSDP: A State Wise Analysis

Table. 3.5: Social Sector Expenditure as a percentage of NSDP: A State Wise Analysis

States	AP	Bihar	Chhatt	Guj	Hary	HP	J&K	Jhar	Karna	Kerala	MP	Maha	. Od	Pu	Ra	TN	UP	.Ut	WB	MEAN	SD	CV
2001-02	8.26	11.43	9.53	9.66	6.7	13.7	16.36	13.09	8.23	7.46	8.4	7.09	10.38	5.83	9.67	7.42	7.54	10.02	6.89	9.3	2.59	0.28
2002-03	8.3	11.36	11.25	8.05	4.81	13.48	16.9	16.72	7.74	8.94	10.56	6.74	10.62	4.59	11.42	7.76	7.79	11.86	5.88	9.65	3.33	0.34
2003-04	9.04	13.17	10.88	7.58	4.39	15.07	15.89	13.71	8.35	7.84	9.01	7.52	9.62	5.1	9.96	8.76	7.34	13.05	5.91	9.56	3.11	0.33
2004-05	6.87	8.72	8.77	5.88	4.06	11	13.31	9.67	6.56	7.01	7.27	5.52	6.77	4.35	8.74	7.03	7.33	10.45	5.12	7.57	2.24	0.3
2005-06	6.75	12.66	10.22	5.57	5.04	12.17	16.54	12.16	7.12	6.51	8.98	5.73	7.59	4.48	9.08	6.45	8.24	10.92	5.66	8.43	3.06	0.36
2006-07	7.63	13.87	11.41	6.12	5.35	13.42	16.86	14.34	7.96	5.77	9.31	5.87	7.68	4.71	9.36	6.6	9.1	11.33	6.03	9.02	3.36	0.37
2007-08	8.97	16.37	12.84	6.22	6.5	14.19	18.66	12.67	8.66	6.64	10.5	5.52	9.46	4.59	10.45	7.34	10.69	11.13	6.9	9.86	3.59	0.36
2008-09	10.8	16.8	15.38	7.29	8.07	16.53	19.28	16.32	9.36	7.54	10.87	6.68	11.9	5.98	12.76	9.38	13.07	11.3	7.97	11.4	3.73	0.33
2009-10	9.97	17.53	19.71	8.14	9.77	16.84	22.61	15.11	11.49	7.66	11.92	7.9	13.33	5.82	13.39	9.27	14.72	12.95	10.52	12.43	4.22	0.34
2010-11	11.6	16.48	18.19	9.05	9.34	19.06	23.03	16.16	11.91	8.15	15.06	8.06	15.26	6.42	12.29	10.14	14.62	12.4	10.95	12.99	4.11	0.32
2011-12	12.5	18.57	21.38	8.88	10.26	17.67	25.68	13.37	13.05	10.36	15.88	8.76	17.7	7.28	14.31	10.84	16.38	13.99	12.3	14.08	4.43	0.31
2012-13	12.9	21.45	23.8	10.32	11.34	19.69	25.65	13.85	14.58	11.04	17.7	9.48	18.08	8.81	16.58	11.76	17.58	14.39	13.03	15.25	4.6	0.3
2013-14	13.3	22.08	28.26	-	10.14	20.56	26.12	12.44	15.15	-	17.03	9.64	22.1	8.72	19.72	12.9	18.97	16.02	13.62	16.67	5.45	0.33
MEAN	9.65	15.14	15.08	7.88	7.32	15.51	19.52	13.76	9.89	7.88	11.49	7.26	12.21	5.89	11.96	8.79	11.49	12.13	8.41			
SD	2.06	3.71	5.75	1.47	2.3	2.73	3.97	1.76	2.62	1.38	3.24	1.29	4.23	1.38	2.97	1.87	3.97	1.65	2.81			
CV	0.21	0.24	0.38	0.19	0.31	0.18	0.2	0.13	0.27	0.17	0.28	0.18	0.35	0.23	0.25	0.21	0.35	0.14	0.33			

Source: Computed using data from (i)Reserve Bank of India Bulletin (various issues)

(ii) Handbook of Statistics on State Government Finances, Reserve Bank of India, 2017

The above table 3.5 shows the state wise analysis of a social sector expenditure as a % of NSDP from the year 2001-14. Above table demonstrates the percentage of social sector expenditure states incur as a percentage of NSDP. The data has been calculated for the period of 14 years. The trend shows that in 2001 the average of the states was around 9.30 % but then the trend took a U-turn shape from rising to constant and then backward trend in 2004-05. In 2004-05 almost all the states have shown declining trend. Afterwards the trends have seen a sharp rise in their % share in NSDP. CV of the states have also been calculated for the purpose of witnessing the inter-state disparities. The highest inter-sectoral disparity was witnessed in Chhattisgarh and lowest was observed in Jharkhand. It is important to note that out of the eight States with comparatively lower percentage, four - Gujarat, Maharashtra, Punjab and Haryana - were the richest States of the country. This indicates that the resource allocation within the high-income States have been given less importance. As compared with all India figures then almost all states have incurred expenditure more than national figures.

3.6.4. Per capita and Real Per capita Social Sector Expenditure

Table 3.6:
Per capita Social Sector Expenditure: A State Wise Analysis

States	2004-05	2011-12	2015-16	GR (2004-12)	GR (2011-16)
Andhra Pradesh	1730.70	5357.88	6509.659	2.10	0.21
Bihar	685.61	2461.11	5072.757	2.59	1.06
Chhattisgarh	1631.39	6105.20	10626.38	2.74	0.74
Gujarat	1871.08	5142.33	8509.351	1.75	0.65
Haryana	1529.52	6395.69	9280.489	3.18	0.45
Himachal Pradesh	3650.32	8832.62	14052.15	1.42	0.59
Jammu & Kashmir	2874.90	7458.61	12658.02	1.59	0.70
Jharkhand	1778.41	3406.20	6507.786	0.92	0.91
Karnataka	1755.49	5447.75	9528.008	2.10	0.75
Kerala	2224.98	5421.98	9274.883	1.44	0.71
Madhya Pradesh	1115.00	3757.62	7133.226	2.37	0.90
Maharashtra	1979.31	5426.06	7771.745	1.74	0.43
Odisha	1195.12	4429.45	8533.628	2.71	0.93
Punjab	1457.78	3602.14	5592.196	1.47	0.55
Rajasthan	1609.53	4105.85	8534.847	1.55	1.08
Tamil Nadu	2107.61	6212.56	10095.68	1.95	0.63
Uttar Pradesh	941.48	2974.64	4961.3	2.16	0.67
Uttarakhand	2568.06	7422.31	12603.46	1.89	0.70
West Bengal	1154.53	3978.82	7251.737	2.45	0.82
AS	1497.46	4390.50	7635.696	1.93	0.74

Source: RBI Bulletin, Handbook on Public Finance & Statistics (various issues)

Table 3.7: Real Per Capita Social Sector Expenditure

States	2004-05	2011-12	2015-16	GR (2004-12)	GR (2011-16)
Andhra Pradesh	1730.70	3432.34	3684.02	0.98	0.07
Bihar	685.61	1576.63	2870.83	1.30	0.82
Chhattisgarh	1631.39	3911.08	6013.80	1.40	0.54
Gujarat	1871.08	3294.25	4815.71	0.76	0.46
Haryana	1529.52	4097.18	5252.12	1.68	0.28
Himachal Pradesh	3650.32	5658.31	7952.55	0.55	0.41
Jammu & Kashmir	2874.90	4778.10	7163.57	0.66	0.50
Jharkhand	1778.41	2182.06	3682.96	0.23	0.69
Karnataka	1755.49	3489.91	5392.19	0.99	0.55
Kerala	2224.98	3473.40	5248.94	0.56	0.51
Madhya Pradesh	1115.00	2407.19	4036.91	1.16	0.68
Maharashtra	1979.31	3476.02	4398.27	0.76	0.27
Odisha	1195.12	2837.57	4829.44	1.37	0.70
Punjab	1457.78	2307.58	3164.80	0.58	0.37
Rajasthan	1609.53	2630.27	4830.13	0.63	0.84
Tamil Nadu	2107.61	3979.86	5713.46	0.89	0.44
Uttar Pradesh	941.48	1905.60	2807.75	1.02	0.47
Uttarakhand	2568.06	4754.84	7132.69	0.85	0.50
West Bengal	1154.53	2548.89	4103.98	1.21	0.61
AS	1497.46	2812.62	4321.28	0.88	0.54
MEAN	1767.91	3277.68	4870.77		
STDEV	672.51	1021.01	1382.89		
CV	0.38	0.31	0.28		

Source: RBI Bulletin, Handbook on Public Finance & Statistics (various issues)

Per capita social sector expenditure has been calculated by using mid-year population for three periods i.e. 2004,2011 and 2015 for 19 major states of India. The above table demonstrates that per capita social sector expenditure has been doubled from 2004 to 2014 for both the higher and lower income states. The growth rates show that higher growth rate has been witnessed for the period ranging from 2004-05 to 2011-12.

Real Per capita social sector expenditure has been calculated using year wise deflator[16]. The table above shows that in absolute terms also expenditure has been increased. The coeff. of variation shows that disparity has lower down from the year 2004-05 to 2015-16.

[16]Is a measure of Price inflation. Formula:(Nominal GDP/ Real GDP) *100.
Nominal GDP is the market value of goods and services produced in an economy which is unadjusted for inflation.

3.7. Expenditure on Education and Health

Education and health services being the two crucial segments that attract significant share of public expenditure on social sector, the trends in expenditure on these sectors are worth examining. Education and health expenditures are examined in terms of percentage to total expenditure and also as a percentage of NSDP.

3.7.1. Education Expenditure

Table 3.8.Education Expenditure as a % of Total Expenditure (000')

States	AP	Bihar	Chha	Guj	Har	HP	J & K	Jhar	Karn	Ker	MP	Maha	Odi	Pun	Raja	TN	UP	Utta	WB	AS	MEAN	SD	CV
2004-05	13.94	19.09	29.73	18.73	16.61	19.08	9.50	16.62	19.11	23.04	19.44	22.61	17.70	13.59	20.72	18.89	18.64	22.10	18.42	18.99	18.83	4.07	0.22
2005-06	19.65	25.42	22.36	18.71	16.96	19.54	8.75	18.69	19.02	21.69	19.09	24.27	18.79	13.66	22.61	18.27	21.49	22.59	18.52	20.02	19.51	3.66	0.19
2006-07	19.01	25.20	20.48	18.60	16.16	19.13	9.51	12.41	18.52	21.52	19.40	23.77	17.52	13.62	20.78	18.38	21.25	44.66	18.35	19.88	19.91	6.86	0.34
2007-08	14.59	24.68	22.47	17.09	18.56	19.77	11.55	19.90	20.00	21.09	18.26	25.07	19.23	13.03	19.71	16.83	20.96	28.23	17.98	19.38	19.42	3.94	0.20
2008-09	14.29	23.23	21.90	17.49	20.39	20.35	12.20	21.66	22.87	21.72	20.27	24.48	21.20	13.98	23.26	19.52	18.93	44.62	15.04	20.07	20.87	6.54	0.31
2009-10	17.52	23.61	24.17	19.36	24.77	20.21	16.19	18.83	20.23	21.69	19.04	27.52	23.41	14.53	24.11	20.14	20.68	30.37	21.22	21.47	21.45	3.73	0.17
2010-11	20.90	22.75	23.04	21.89	24.13	22.11	13.21	20.85	22.26	22.96	17.34	28.53	23.89	13.70	23.71	21.70	19.86	30.60	23.05	22.19	21.93	4.02	0.18
2011-12	22.89	23.14	23.56	23.12	22.54	21.19	13.70	21.91	21.75	23.90	22.77	25.87	23.86	17.58	22.49	20.57	22.54	28.90	21.87	22.19	22.32	2.96	0.13
2012-13	22.57	28.65	21.42	23.16	21.94	21.63	14.79	18.20	22.09	22.88	15.34	26.71	20.26	19.02	21.32	21.05	21.60	29.74	22.21	18.99	21.68	3.70	0.17
2013-14	22.46	26.48	21.20	27.00	20.31	23.68	14.06	18.88	21.90	18.88	19.00	27.80	19.13	19.04	21.66	21.28	22.07	26.88	19.32	22.37	21.67	3.43	0.16
2014-15	16.14	19.11	18.34	27.57	20.42	22.23	12.67	18.56	21.55	20.97	20.00	27.19	22.51	19.36	22.02	25.27	23.92	21.68	24.78	22.20	21.32	3.56	0.17
2015-16	23.11	19.44	17.29	25.61	18.50	21.13	16.52	37.35	21.18	20.00	18.96	26.09	21.87	19.88	21.56	24.76	22.17	22.42	21.15	22.03	22.05	4.39	0.20
MEAN	18.92	23.40	22.16	21.53	20.11	20.84	12.72	20.32	20.87	21.69	19.08	25.83	20.78	15.92	22.00	20.56	21.18	29.40	20.16	20.82			
STDEV	3.55	3.00	3.12	3.74	2.86	1.41	2.56	5.92	1.45	1.39	1.75	1.81	2.33	2.77	1.30	2.52	1.51	7.88	2.69	1.38			
CV	0.19	0.13	0.14	0.17	0.14	0.07	0.20	0.29	0.07	0.06	0.09	0.07	0.11	0.17	0.06	0.12	0.07	0.27	0.13	0.07			

Source: MHRD, Analysis of Budgeted Expenditure, Government of India (various issues)

State wise figures of share of education in total expenditure are presented in Table3.8. Average of the states was calculated for the period ranging 2004-16. There was a continuous rise and fall in the trends. Average of the states was around 19% which increased to 22% in 2011 and again it saw a downward turn to 21% in the year 2014-15. Even though the average expenditure for all States taken together was more or less stable, individual States showed some inter temporal variations. 2006-07 saw the highest level of variation at 34% while year 2011-12 saw the least. The state having the highest variation was Uttarakhand (0.27) and the state having the lowest variation is Kerala (0.07). Apart from Kerala, Maharashtra, Rajasthan, TN, HP and UP saw the least variation.

Table 3.9: Education Expenditure as a % of constant NSDP

State	AP	Bihar	Chha	Guj	Har	HP	J & K	Jhar	Karn	Ker	MP	Maha	Odi	Pun	Raja	TN	UP	Utta	WB	AS	MEAN	SD	CV
2004-05	2.17	3.98	5.10	2.64	2.20	5.22	3.34	2.64	3.20	3.78	3.51	3.12	3.22	2.72	3.66	2.84	3.60	4.99	2.73	2.88	3.38	0.89	0.26
2005-06	3.11	6.60	3.96	2.42	2.28	5.49	3.49	3.60	3.25	3.46	3.74	2.99	3.60	2.75	4.04	2.64	4.10	4.98	2.85	3.02	3.62	1.06	0.29
2006-07	3.22	6.46	3.60	2.54	2.53	5.89	3.71	2.71	3.42	3.60	3.79	3.03	3.46	2.52	3.86	2.74	4.49	10.14	2.88	3.16	3.89	1.80	0.46
2007-08	2.89	6.89	4.50	2.40	2.88	6.22	4.93	4.14	3.67	3.87	3.90	3.02	3.93	2.76	4.09	2.66	4.87	6.11	2.93	3.24	4.00	1.27	0.32
2008-09	3.02	6.81	5.24	2.72	3.44	6.95	5.22	5.54	4.36	4.26	4.43	3.39	4.82	2.99	5.24	3.65	4.76	10.11	3.18	3.71	4.69	1.75	0.37
2009-10	3.66	7.55	7.04	3.31	4.57	7.73	8.01	4.88	4.40	4.30	4.62	4.36	6.30	3.26	6.00	3.78	5.76	7.46	4.71	4.30	5.30	1.56	0.29
2010-11	4.85	7.40	6.86	3.98	4.68	9.27	7.56	5.54	4.99	4.76	5.01	4.55	7.02	3.47	5.74	4.40	6.17	7.41	5.33	4.76	5.69	1.47	0.26
2011-12	5.70	8.31	7.70	4.04	4.55	8.67	9.13	5.74	5.71	6.09	7.02	4.58	8.11	4.24	6.20	4.46	7.66	7.11	5.54	5.25	6.29	1.58	0.25
2012-13	6.06	10.89	8.11	4.37	4.99	9.70	10.44	4.90	6.49	6.24	5.13	5.01	7.12	5.27	6.66	5.14	7.92	7.50	5.93	5.69	6.68	1.90	0.28
2013-14	6.87	13.04	11.54	4.37	5.84	11.17	12.51	5.11	7.68	6.24	5.90	5.33	8.67	6.01	8.24	5.60	7.89	8.64	5.60	6.19	7.62	2.59	0.34
MEAN	4.16	7.79	6.37	3.28	3.80	7.63	6.83	4.48	4.72	4.66	4.71	3.94	5.63	3.60	5.37	3.79	5.72	7.45	4.17	4.22			
STDEV	1.60	2.52	2.41	0.83	1.29	2.01	3.19	1.15	1.51	1.12	1.10	0.92	2.06	1.20	1.48	1.08	1.63	1.82	1.36	1.20			
CV	0.38	0.32	0.38	0.25	0.34	0.26	0.47	0.26	0.32	0.24	0.23	0.23	0.37	0.33	0.28	0.29	0.28	0.24	0.33	0.28			

Source: MHRD, Analysis of Budgeted Expenditure, GOI (various issues).
Dept. of Economic Affairs, Indian Public Finance & Statistics, GOI (various issues)

The priority assigned to education in resource allocation is reflected in the proportion of national income devoted to education. The recommendation of the Education commission committee (1966) to invest 6 per cent of national income in education may be considered as the target level of education expenditures of States governments. Table 3.9 presents education expenditure of the States as a percentage of their domestic products. Bihar, Himachal Pradesh, Chhattisgarh and Uttarakhand are the states which have achieved the target expenditure which was set up by the committee. The averages of the state expenditure were calculated which range from 3.38 (2004) to 7.62% (2014). A continuous increase was witnessed during this period. The inter temporal variations have also been calculated for this period. CV was highest for the period 2006-07(0.46) and was lowest in the period 2010-11 and 2011-12 (0.25). AP have observed the highest variation of 0.38 while Uttarakhand (0.24), MP and Maharashtra (0.23) have observed the lowest variation.

Table 3.10:
Per capita Education Expenditure

States	2004-05	2011-12	2015-16	GR (2004-12)	GR (2011-16)
Andhra Pradesh	546.72	2441.94	2445.56	3.47	0.00
Bihar	313.02	1100.96	1901.65	2.52	0.73
Chhattisgarh	948.99	2198.04	3666.32	1.32	0.67
Gujarat	840.78	2340.33	4105.74	1.78	0.75
Haryana	827.90	2836.09	4367.89	2.43	0.54
Himachal Pradesh	1731.43	4334.80	7374.75	1.50	0.70
Jammu & Kashmir	721.00	2652.30	4878.05	2.68	0.84
Jharkhand	485.05	1461.41	4804.97	2.01	2.29
Karnataka	856.91	2383.64	3963.23	1.78	0.66
Kerala	1199.34	3184.34	4586.43	1.66	0.44
Madhya Pradesh	537.33	1662.04	2695.30	2.09	0.62
Maharashtra	1118.19	2837.12	4510.81	1.54	0.59
Odisha	568.81	2029.38	3332.89	2.57	0.64
Punjab	908.90	2099.43	3629.72	1.31	0.73
Rajasthan	674.52	1778.58	3310.83	1.64	0.86
Tamil Nadu	852.16	2556.48	5273.66	2.00	1.06
Uttar Pradesh	462.31	1391.16	2331.77	2.01	0.68
Uttarakhand	1226.35	3771.86	5425.31	2.08	0.44
West Bengal	615.19	1791.70	2697.01	1.91	0.51
AS	697.78	2032.32	3453.01	1.91	0.70

Source: MHRD, Analysis of Budgeted Expenditure, GOI (various issues)
CSO (2001, 2011)

Table 3.11: Real Per Capita Education Expenditure

States	2004-05	2011-12	2015-16	GR (2004-12)	GR (2011-16)
Andhra Pradesh	546.72	1564.34	1384.02	1.86	-0.12
Bihar	313.02	705.29	1076.20	1.25	0.53
Chhattisgarh	948.99	1408.10	2074.88	0.48	0.47
Gujarat	840.78	1499.25	2323.56	0.78	0.55
Haryana	827.90	1816.84	2471.92	1.19	0.36
Himachal Pradesh	1731.43	2776.94	4173.60	0.60	0.50
Jammu & Kashmir	721.00	1699.10	2760.64	1.36	0.62
Jharkhand	485.05	936.20	2719.28	0.93	1.90
Karnataka	856.91	1527.00	2242.92	0.78	0.47
Kerala	1199.34	2039.94	2595.60	0.70	0.27
Madhya Pradesh	537.33	1064.73	1525.35	0.98	0.43
Maharashtra	1118.19	1817.50	2552.81	0.63	0.40
Odisha	568.81	1300.05	1886.19	1.29	0.45
Punjab	908.90	1344.93	2054.17	0.48	0.53
Rajasthan	674.52	1139.39	1873.70	0.69	0.64
Tamil Nadu	852.16	1637.72	2984.53	0.92	0.82
Uttar Pradesh	462.31	891.20	1319.62	0.93	0.48
Uttarakhand	1226.35	2416.31	3070.35	0.97	0.27
West Bengal	615.19	1147.79	1526.32	0.87	0.33
AS	697.78	1301.94	1954.16	0.87	0.50
MEAN	806.63	1501.73	2228.49		
STDEV	328.89	507.92	729.92		
CV	0.41	0.34	0.33		

Source: Estimated from MHRD, Analysis of Budgeted Expenditure, GOI (various issues); CSO (2001, 2011)

Real per capita education expenditure has been calculated on the basis of price year index deflator in the above table. Per capita education expenditure has been calculated for three years i.e. 2004, 2011 and 2015. It can be seen that all the states have almost doubled their expenditure from 2004 to 2015. Though the growth rate observed a higher rate for the period 2004-05 to 2011-12, a lower rate was observed for the second period.

3.7.2. Health Expenditure

Table 3.12: Health Expenditure as a % of Total Expenditure: A State Wise Analysis

States	AP	Bihar	Chha	Guj	Har	HP	J & K	Jhar	Karn	Ker	MP	Maha	Odi	Pun	Raja	TN	UP	Utta	WB	AS	MEAN	SD	CV
2004-05	4.83	5.74	2.59	4.22	7.89	2.03	3.09	3.33	8.20	13.84	5.28	6.70	6.82	29.64	11.59	8.24	5.95	2.53	9.41	6.56	7.42	6.06	0.82
2005-06	4.88	7.38	2.89	5.23	4.94	2.29	4.57	6.32	4.08	8.40	6.60	6.97	5.26	12.38	22.95	11.17	1.78	49.14	9.25	8.87	9.27	10.47	1.13
2006-07	4.74	7.99	2.26	3.06	1.09	2.16	2.53	7.77	3.50	13.98	6.60	7.09	19.81	13.94	6.86	4.93	0.21	18.58	6.41	5.30	6.94	5.54	0.80
2007-08	4.02	5.18	2.67	2.28	4.91	2.01	4.60	4.74	3.08	16.45	7.77	5.73	7.39	26.44	4.97	4.65	0.42	17.48	5.85	5.76	6.82	6.26	0.92
2008-09	3.18	14.49	3.14	1.92	4.13	5.00	5.51	3.02	2.84	14.89	7.95	4.76	6.93	21.89	5.53	4.36	0.33	34.00	5.32	5.59	7.74	8.03	1.04
2009-10	3.26	11.98	1.87	1.93	4.16	6.17	2.62	4.37	2.80	12.77	6.12	5.12	7.86	69.84	7.09	3.26	3.62	3.46	5.89	3.70	8.39	14.76	1.76
2010-11	3.14	9.36	2.10	1.73	3.52	6.51	2.76	3.16	2.57	12.05	5.81	6.01	7.50	15.47	5.69	3.18	4.30	2.72	8.01	3.59	5.46	3.58	0.66
2011-12	3.79	5.48	1.42	1.53	2.44	5.48	3.54	2.75	2.58	6.96	3.94	3.70	5.31	5.83	5.17	4.18	7.25	1.90	4.66	3.00	4.05	1.70	0.42
2012-13	6.06	3.88	3.89	5.09	3.88	5.90	3.96	3.58	4.35	5.48	4.18	4.08	4.11	4.92	5.15	4.71	5.31	5.44	4.67	4.90	4.68	0.73	0.16
2013-14	4.17	2.65	3.56	5.06	3.54	5.59	3.97	3.13	4.14	5.33	3.78	3.99	3.36	4.24	5.00	4.45	4.78	4.38	4.76	0.44	4.02	1.13	0.28
2014-15	3.34	2.87	4.32	5.37	3.92	6.03	3.55	3.34	4.69	5.30	4.06	4.11	4.43	4.84	5.39	4.78	4.83	5.03	5.38	4.53	4.51	0.82	0.18
2015-16	5.01	3.62	4.18	5.68	3.18	5.40	3.96	3.64	4.34	5.36	4.16	4.24	4.58	4.83	4.45	4.98	4.41	4.86	5.87	5.28	4.60	0.72	0.16
MEAN	4.20	6.72	2.91	3.59	3.97	4.55	3.72	4.10	3.93	10.07	5.52	5.21	6.95	17.86	7.48	5.24	3.60	12.46	6.29	4.79			
SDEV	0.92	3.70	0.93	1.66	1.62	1.83	0.90	1.52	1.55	4.32	1.51	1.25	4.32	18.63	5.23	2.25	2.36	15.03	1.69	2.06			
CV	0.22	0.55	0.32	0.46	0.41	0.40	0.24	0.37	0.39	0.43	0.27	0.24	0.62	1.04	0.70	0.43	0.66	1.21	0.27	0.43			

Source: Ministry of Health and Family welfare, National Health Profile, GOI (various issues)

Above table 3.12 depicts the % of health expenditure state incurs as a result of total expenditure. As per the data observe a very a small portion of total outlay is incurred by states towards health sector. Trends in health sector show a continuous upward and downward trend with an average fluctuating from lowest 4.02 in 2013-14 to highest (9.27) in 2005-06. State which incur highest amount of expenditure in health sector is Uttarakhand, Punjab, Kerala and lowest is Chhattisgarh and Gujarat. The inter temporal variation is quite high in health sector as compare to other sectors. Uttarakhand (1.21) and Punjab (1.04) is the state which has the highest inter temporal variation while AP (0.22) has the lowest inter temporal variation. Year which has the highest variation during the period 2004 -16 is 2009-10 (1.76) and the year 2013-14 (0.16) and 2015-16 (0.16) shows the lowest variations among the states.

Table 3.13: Health Expenditure as a % of NSDP: A State Wise Analysis

States	AP	Bihar	Chha	Guj	Har	HP	J & K	Jhar	Karn	Ker	MP	Maha	Odi	Pun	Raja	TN	UP	Utta	WB	AS	MEAN	SD	CV
2004-05	0.75	1.18	0.78	0.62	0.53	1.89	2.36	0.84	0.87	0.90	0.94	0.56	1.03	0.73	1.00	0.74	0.99	1.13	0.76	0.99	0.98	0.43	0.44
2005-06	0.77	1.76	0.83	0.57	0.54	1.89	2.58	1.87	0.72	0.87	0.97	0.55	0.69	0.82	1.04	0.80	1.27	1.38	0.85	1.19	1.10	0.55	0.50
2006-07	0.76	1.76	0.85	0.55	0.50	1.97	2.98	1.98	0.77	0.91	1.03	0.49	0.79	0.77	1.01	0.79	1.64	1.44	0.79	1.26	1.15	0.63	0.55
2007-08	0.98	1.58	1.20	0.55	0.52	1.71	3.33	1.46	0.93	1.07	1.10	0.56	1.01	0.79	1.13	0.77	1.65	1.86	0.79	1.38	1.22	0.63	0.52
2008-09	1.16	1.68	1.54	0.62	0.56	2.12	3.30	1.65	1.11	1.07	1.21	0.55	1.13	0.84	1.23	0.95	1.86	1.63	0.94	1.57	1.34	0.63	0.47
2009-10	1.42	1.65	1.36	0.81	0.85	2.43	2.65	1.09	1.04	1.10	1.14	0.65	1.34	0.89	1.51	1.14	0.16	14.03	1.27	1.16	1.88	2.91	1.55
2010-11	1.48	1.53	1.33	0.96	0.80	2.78	2.95	1.15	1.17	1.23	1.40	0.70	1.31	1.04	1.41	1.27	0.20	13.66	1.38	1.24	1.95	2.82	1.45
2011-12	1.79	1.76	1.71	0.98	0.85	2.65	3.46	1.30	1.36	1.60	1.52	0.78	1.36	1.26	1.76	1.19	0.22	12.94	1.41	1.35	2.06	2.65	1.28
2012-13	1.93	1.79	1.84	1.27	1.03	3.04	3.39	1.16	1.56	1.65	1.77	0.87	1.66	1.44	1.94	1.38	0.25	15.89	1.33	1.52	2.34	3.26	1.40
2013-14	1.57	1.68	2.12	1.39	1.06	3.06	3.63	1.22	1.70	1.86	1.66	0.91	1.79	1.40	2.26	1.45	0.27	16.20	1.47	1.60	2.42	3.32	1.38
mean	1.26	1.64	1.36	0.83	0.72	2.36	3.06	1.37	1.12	1.23	1.27	0.66	1.21	1.00	1.43	1.05	0.85	8.02	1.10	1.33			
sd	0.44	0.18	0.46	0.31	0.22	0.50	0.43	0.36	0.33	0.35	0.30	0.15	0.35	0.27	0.43	0.27	0.70	6.95	0.29	0.20			
cv	0.35	0.11	0.34	0.37	0.30	0.21	0.14	0.27	0.29	0.29	0.23	0.22	0.29	0.27	0.30	0.26	0.83	0.87	0.27	0.15			

Source: Ministry of Health and Family Welfare, National Health Profile, GOI (various issues)

Compared to education, health sector could claim only lower percentage of NSDP in all the States. Trends show very fluctuating figures with an average of 0.98 % in 2004-05 to the lowest and then rising to 2.42% in 2013-14. Inter temporal variation has been calculated for the purpose of observing the dispersion among the states. The highest variation can be observed in the year 2009-10 (1.55) and the lowest can be observed in the year 2004-05 (0.44). The state with highest variation is Uttarakhand (0.87) and the one with lowest is Bihar (0.11). As compared to the national average (1.33) almost all the major states are performing well

Table 3.14:

Per capita Health Expenditure

States	2004-05	2011-12	2015-16	GR (2004-12)	GR (2011-16)
Andhra Pradesh	3935.75	20214.61	12068.45	4.14	-0.40
Bihar	1612.05	4264.02	12386.53	1.65	1.90
Chhattisgarh	5600.88	34437.71	25463.89	5.15	-0.26
Gujarat	4671.96	37194.93	20186.39	6.96	-0.46
Haryana	2553.76	21668.95	30948.43	7.49	0.43
Himachal Pradesh	30916.92	24204.33	39990.13	-0.22	0.65
Jammu & Kashmir	16459.96	28444.37	39692.41	0.73	0.40
Jharkhand	4635.51	12074.22	17828.06	1.60	0.48
Karnataka	2829.56	21911.68	22239.23	6.74	0.01
Kerala	2065.50	12054.80	24934.83	4.84	1.07
Madhya Pradesh	2724.45	9153.05	17033.32	2.36	0.86
Maharashtra	3021.96	13063.36	19764.73	3.32	0.51
Odisha	2671.19	6413.50	19242.68	1.40	2.00
Punjab	829.31	10686.00	19910.35	11.89	0.86
Rajasthan	1592.62	9782.32	24070.43	5.14	1.46
Tamil Nadu	2692.94	16280.91	24691.48	5.05	0.52
Uttar Pradesh	2132.80	4687.54	14343.34	1.20	2.06
Uttarakhand	10998.30	42618.50	28968.21	2.88	-0.32
West Bengal	1826.37	9763.74	14530.09	4.35	0.49
AS	3658.56	17404.12	17452.01	3.76	0.00
MEAN	5371.52	17816.13	22287.25		
STDEV	7025.10	10980.12	7895.16		
CV	1.31	0.62	0.35		

Source: Ministry of Health and Family Welfare, GOI (various issues).
CSO (various issues).

Table 3.15: Real Per Capita Health Expenditure

States	2004-05	2011-12	2015-16	GR (2004-12)	GR (2011-16)
Andhra Pradesh	3935.75	12949.78	6829.91	2.29	-0.47
Bihar	1612.05	2731.59	7009.92	0.69	1.57
Chhattisgarh	5600.88	22061.31	14410.80	2.94	-0.35
Gujarat	4671.96	23827.63	11424.10	4.10	-0.52
Haryana	2553.76	13881.45	17514.67	4.44	0.26
Himachal Pradesh	30916.92	15505.66	22631.65	-0.50	0.46
Jammu & Kashmir	16459.96	18221.89	22463.16	0.11	0.23
Jharkhand	4635.51	7734.93	10089.45	0.67	0.30
Karnataka	2829.56	14036.95	12585.87	3.96	-0.10
Kerala	2065.50	7722.48	14111.39	2.74	0.83
Madhya Pradesh	2724.45	5863.58	9639.68	1.15	0.64
Maharashtra	3021.96	8368.59	11185.47	1.77	0.34
Odisha	2671.19	4108.58	10890.03	0.54	1.65
Punjab	829.31	6845.61	11267.88	7.25	0.65
Rajasthan	1592.62	6266.70	13622.20	2.93	1.17
Tamil Nadu	2692.94	10429.80	13973.67	2.87	0.34
Uttar Pradesh	2132.80	3002.91	8117.34	0.41	1.70
Uttarakhand	10998.30	27302.05	16394.01	1.48	-0.40
West Bengal	1826.37	6254.80	8223.03	2.42	0.31
AS	3658.56	11149.34	9876.63	2.05	-0.11
MEAN	5371.52	11413.28	12613.04		
STDEV	7025.10	7034.03	4468.11		
CV	1.31	0.62	0.35		

Source: Estimated from Ministry of Health and Family Welfare, GOI (various issues). CSO (various issues).

The above table analyses the per capita and real per capita heath expenditure incurred by the states in the year 2004, 2011 and 2015. The per capita health expenditure of the states and percentage of growth rate during the period 2004-05/2011-12 and 2011-12/2015-16 for almost all the states have doubled their per capita health expenditure for the period ranging (2004-05 to 2011-12).The data has been deflated as per the price index for the following years for the purpose of calculating real per capita expenditure. Though the investment in health has remained low as compared to other sector but then also a very sharp increase can be witnessed. States have almost doubled their absolute expenditure in the simultaneous years. The increasing trend shows the importance of health sector in the current era. Growth rate of the states have been on an average more than that of national average for the period ranging from 2004-05 to 2011-12 though a negative growth rate can be witnessed for some states for the second period. Period from 2011-12 to 2015-16 has not seen such a level

of tremendous growth. Even a negative growth rate is witnessed for the second period.

3.8. Ranking of the States

The states are ranked according to their per capita expenditure for the year 2014. The per capita expenditure has been calculated by dividing the expenditure by the population of the year 2014. The results of the ranking are shown in the table below-:

Table 3.16:

Per capita Expenditure Ranking: A state wise analysis

States	PCNSDP	SE	EE	HE
Andhra Pradesh	10	15	17	19
Bihar	19	18	19	18
Chhattisgarh	12	4	11	5
Gujarat	4	11	9	10
Haryana	1	7	8	3
Himachal Pradesh	8	1	1	1
Jammu and Kashmir	13	2	4	2
Jharkhand	17	16	5	14
Karnataka	6	6	10	9
Kerala	5	8	6	6
Madhya Pradesh	16	14	16	15
Maharashtra	3	12	7	12
Odisha	14	10	13	13
Punjab	9	17	12	11
Rajasthan	11	9	14	8
Tamil Nadu	7	5	3	7
Uttar Pradesh	18	19	18	17
Uttarakhand	2	3	2	4
West Bengal	15	13	15	16

Source: Computed from various sources mentioned above

Some of the salient features of the ranking of States according to real per capita expenditures are as follows-:

1. Kerala the most progressive state in terms of HDI Rankings which has done well in almost all the indicators of expenditure i.e. education, health and PCNSDP but if social sector expenditure ranking as whole is taken into consideration then the state has quite a low ranking.

2. During the mid-1980s famous economic analyst Ashish Bose has coined the term known as BIMARU in a study submitted to the then Prime Minister (Som et al. 2014). The word BIMARU strongly resembles the Hindi word 'Bimar' which means sick. This term was used to denote the state of backwardness of some of the major Indian States including undivided Bihar, undivided Madhya Pradesh, Rajasthan and Uttar Pradesh. The income disparity between BIMARU and other Indian States were sharp and these States were characterized by high fertility rate along with high maternal and child mortality rates. These States with low human development along with two other major eastern States of Odisha and Assam were together identified as EAG States by the Registrar General of India in the later years. BIMARU states have not performed well. The expenditure trends show that all the BIMARU states lie in low category.

3. Gujarat the other state has shown a great improvement in terms of education expenditure and PCNSDP.

3.9. Results of Spearman Ranking Correlation

Table 3.17 Spearman's Ranking Correlation Matrix

Social expenditure	Education expenditure	Health expenditure
Number of obs = 19	Number of obs = 19	Number of obs = 19
Spearman's rho = 0.5316	Spearman's rho = 0.5912	Spearman's rho = 0.5947
Test of Ho: var3 and var4 are independent	Test of Ho: var3 and var5 are independent	Test of Ho: pcnsdp and he are independent
Prob > |t| = 0.0192	Prob > |t| = 0.0077	Prob > |t| = 0.0072

Source: Author's calculation

For the above ranking spearman ranking correlation [17]has been calculated. The results show that investment in all the expenditure trends is necessary. The correlation results show that all the variables are positively correlated with PCNSDP. The spearman's rho for education expenditure is 0.5912 with p value satisfied at 1% level of significance.

[17]It is a non-parametric test to measure the association among the variables on an ordinal scale.

Results for health and social sector expenditure are also somewhat similar. Positive ranking correlation suggest that investment in social sector expenditure will directly or indirectly lead to good growth numbers.

3.10. Conclusion

In this chapter, an attempt has been made to assess the impacts of expenditures made in the social sector indicators by Indian states. A recent reversal in the declining trend of the combined social sector expenditures of the Central and state governments has been observed. The recent revamp in public expenditure may partly be due to the fiscal stimulus given to the economy to enable it to emerge out of the global economic recession or a manifestation of the attempts made to realize the objective of inclusive growth (Ahluwalia, 2010). Within the social sector, education and healthcare have remained as the major heads of expenditure. At the state level, the per capita social sector expenditure has increased in all the states over time. There is, however, a high degree of variations among the states in this respect. Although the per capita expenditure has increased over time, by international standards, India's social sector spending in crucial areas like healthcare and education is far below that of even many developing countries. This makes a strong case for the deepening and broadening of a growth-promoting policy not just for strengthening India's position as an emerging economic power in the world but also for contributing to the enhancement of human development in the country. The fact that the contribution of social sector expenditure has not been found to be significant does not allow us to recommend growth promotion as an alternative policy option to aggressive public intervention in the provision of social services

Chapter 4

INTERLINKAGE BETWEEN HUMAN DEVELOPMENT AND ECONOMIC GROWTH: AN INTER-STATE ANALYSIS

4.1. Introduction

Development being the major concern for economies is commonly underpinning two concepts i.e. human development and economic growth. An economy always works towards attaining an upward spiral with decent level of human development as well as high level of economic growth. According to Ranis & Stewart (2004) an economy always focusses on attaining high level of economic growth which leads to an advancement in human development indicators (Chain-A) or by working towards human capabilities which in turn would lead to a decent standard of living (Chain-B). According to them, if any of the chain is not worked upon it will lead to low levels of development in the economy. Hence, it can be concluded that both Human Development and Economic Growth are end as well as key ingredient for the purpose of attaining development objective.

Human capabilities and their subsistence can only be ensured if the policies are framed in a manner that specify the dynamic link between Human development and Economic growth. In a country like India where there exist huge disparities in terms of both growth and human capabilities, a disaggregated examination is necessary for exploring the link and framing policies accordingly. Furthermore, the economic opulence of the country as a whole in terms of income development has been striking at least for the last two decades. This accomplishment has never been even across the regions and this has often elevated interrogation on the sustainability of recent growth. On the other hand, the achievements in human development at the national level remained uninspiring for decades.

For a maintainable move of the nation from present vicious cycle to virtuous one, a uniform and regular progress in both economic and social facades across the regions remnants only option for the policy makers. For this, the prevailing dynamic links between them needs to be explored. The examination of Indian states how they modify their quadrants over time has strong inference for framing of policies at the state level; which in turn would improve the situation at the national level.

Dichotomous relationship between Human development and Economic growth motivates to head towards exploring the casual relationship between them.

According to Ranis et al., (2000) countries are often categorised into having a virtuous cycle which have both high EG and HD scenario (e.g. the Scandinavian countries), or a vicious cycle with low EG and HD scenario (e.g. several African states, Mexico). The dichotomous causality between EG and HD are affected by several factors. Ramirez *et al*., (1998) in their study found that the strength of HD and EG relationship depends upon public expenditure on social services and female education. Furthermore, governing mechanisms plays a significant role in establishing a stronger relationship between HD and EG (Costantini and Salvatore, 2008).

Economic growth has been on a significant increase since the adoption of economic liberalization in India. The average annual GDP growth rate increased from 5.57 percent during 1991-2000 to 6.6 percent during 2001-17 (calculations based on World Development Indicator database). The good numbers of growth have not been able to transform themselves into corresponding enhancement in the HD situation at the macro level. Position of India has been low since the origin of Human Development Report (HDR) though it has managed to graduate one step ahead to medium category now. Composite HDI score of India was 0.439 in 1990 which has increased to 0.624 in 2017. Global HDI ranking of India is 131 (2017) as compared to 132 in 1990 (UNDP, 2017). Low association among EG-HD inter-relationship at the macro level provokes one to explore the same at a more disaggregated level. From the literature, presence of vicious cycles is indicated in terms of Indian economy (Ghosh, 2006). The evidence of presence of extreme poverty in rural areas of northern States and incidence of dynamic income growth in southern States and urban areas also indicate the EG-HD nexus (Antony and Laxmaiah, 2008). In this situation, the rising importance of investment in human capital indicators particularly that of secondary education motivates one to heed forward with the objective of exploring the relationship (Ojha and Pradhan, 2006). There is a need to explore how HD achievements across Indian States have changed and whether economic growth which is measured in terms of growing per capita income has influenced HD achievement over time.

4.2. Objectives and Methodology

This chapter is an attempt to explore the linkage between human development and economic growth in Indian states. The first section of the chapter sets the background of the study while the second section through data analysis (constructing various indexes) examines the strength of the links between EG and HD in all major Indian states for 2001-02 and 2011- 12.

Considering the data constraints, the present study focuses its attention on 22 states of the country which are commonly referred as *major Indian states*. These states constituted almost all the population in the country. We have excluded north-eastern states of Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura, and Union Territories. The focused period of the present study is 2000-01 and 2011-12

In this chapter, we have tried to measure the HDI of Indian states with the help of old and new methodology as specified by UNDP. Rank order ratification has been performed for the purpose of assessing the association between Per capita NSDP rankings and HDI rankings of the states. Further, a simple regression analysis has been done.

Section II

4.3. Construction of Index using Old and New Methodology

The three dimensions used in the construction of HDI are same for both the old and new methodology. Health, Knowledge and Income are the variables which holds the key place in the dimensions of development. No change has been made in the existing dimensions in the revised HDI. Dimensions are same but the variables and their limits have changed in the revised edition. HDI methodology saw a minor modification, as for old methodology arithmetic mean was considered while new methodology used geometric mean. The difference between these two indicators is that geometric mean captures the inequality while the arithmetic mean just takes into consideration the average sum of the variables (UNDP 2011)

Methodology and the variables specified in old and new methodology are presented in tabular form.

Table 4.1: Old and New Methodology of HDI Calculation

Dimensions/ HDI	Indicator (Old HDI, 1990-2009)	Methodology (Old HDI, 1990-2009)	Indicators (New HDI, 2010)	Methodology (New HDI, 2010)
Health	Life expectancy at birth (e^0_0)	[1] Health= 0.i - [25/] ([85]-[25])	Life expectancy at birth (e^0_0)	[1] Health= ^. i -[20/] ([82 5]-[20])
Income	GDP Per capita in purchasing power parity (US $)	Dimension index of income =		Dimension index of income =
		Log (GDP.) - log (100)	GNI per Capita	ln (GNI.) - ln (163)
		Log (40,000) - Log (100)	(PPPUS$)	ln (108,211) - ln (163)
Knowledge	1. Adult Literacy Rate	Step 1:	1. Mean years of schooling	i) [I]Knowledge[1] = [Mean Years of]
	2. Gross Enrolment Ratio (GER)	i) Adult literacy Index= (ALR^0)	2. Expected years of schooling	schooling - 0 / (13.2-0)
		/100		ii) [I]Knowledge[2] = [(E]xpe[cted] year[s] o[f] schooling* - 0) / (20.6-0)
		ii) GER index= (GER_i-0) /100 Step 2:		in school-year t
		Index of knowledge (I „ , „ , =		[I] Knowledge =
		Knowledge)		V [I]Knowledge[1] * knowledge[2] - [0]0.951-0
		2/3 (Adult literacy index) + 1/3 (GER index)		
HDI	$\frac{1}{3} * IE + IH + II$		*J* %Health * ^Knowledge * ^Income	
	' Health Knowledge Income'			

Source: Human Development Indices: Old and New by Sanjay K. Mohanty and Bidyadhar Dehury

4.3.1. Dimensional Index of Health:

Life expectancy at birth is the key dimension of health used in both the old and new HDI methodology. Life expectancy at birth is essential in representing the health dimension as it is related to the intrinsic value of longevity, association of long life with adequate nutrition, good health and education and its linkages with other valued goals (UNDP 1990). It takes the lower bound of life expectancy to 20 years which has reduced from 25 years and the upper- bound has reduced from 85 to 82.5 years in new methodology in relation to the old methodology. The changes in the methodology are based upon long run historical trends in case of lower bounds and the change for the upper limit was based on the observed values of Japan (2010). No changes have been made in the methodology in terms of construction of dimensional index of health. SRS provides the data for life expectancy at birth at the state level in the Indian context

4.3.2. Dimensional Index of Income:

Income domain of HDI has transformed itself from old methodology to new methodology. Before the new methodology adopted by UNDP, old HDI used the GDP per capita, while the new HDI used GNI per capita. Though, the differences in income component are small in terms of Indian economy (2753 Vs. 2870US$ in 2007). The methodology to enumerate the component did not change. Log of income was used, which gives lower weightage to a higher value and vice- versa. The transformation was done on a basic premise that sum total of income does not add to human existence hence a minimum income is needed for a decent standard of living. However, due to the paucity of data there are some problems in estimating the State National Product Per capita in India. Lower and upper limits have changed, the lower limit in the income domain increased from $100 to $163 (Zimbabwe 2008), while the upper limit has increased from $40,000 to $108,211 (UAE, 1980). Just a use of GNIPCI has been used in case of old, GDPPCI.

4.3.3. Dimensional Index of Knowledge

Knowledge index has undergone many fundamental changes with respect to the methodology. Gross Enrolment Ratio and Adult Literacy rate were assigned for

creating the index. One – third weight was assigned for GER and two- third weight was assigned to adult literacy in the old HDI methodology for constructing the knowledge index. Both the variables in the new methodology were replaced and two new variables "mean years of schooling" and "expected years of schooling" are used for constructing knowledge index. Mean years of schooling relates to the people of age 25 years or above which have received some kind of education in their life. Expected year of schooling refers to number of schooling years a child is expected to receive if main patterns of age-specific enrolment rates were to stay identical throughout the child's life. The specified age of calculating expected year of schooling is 6 years to 18 years of children who are currently enrolled in the school. According to UNESCO (2009) the foremost objective of considering this indicator is to assess the overall development status of an educational system. The indicator will help to know the average number of years of schooling being offered to the population of the country.

Life expectancy at birth for the major states of India has been computed using the secondary data from Handbook of Statistics, RBI (2018) for the purpose of comparing the development of states through the adoption of old and new methodology of HDI. The life expectancy data is calculated by taking the averages of data for both the old and new methodology. The estimated life expectancy at birth was maximum in Kerala (74 years) followed by Delhi (73 years) and lowest in the state of Assam (61 years) followed by Chhattisgarh (65 years). No significant changes among the index value is witnessed after the changes in the lower and upper limits of life expectancy

Table 4.2: State wise Health Index of India (2001, 2011)

States	2001 (OLD METHODOLOGY)	2011 (NEW METHODOLOGY)	RANK 2001	RANK 2011
	LEI	LEI		
Andhra Pradesh	0.67	0.78	11	10
Assam	0.57	0.70	23	23
Bihar	0.65	0.77	19	14
Chhattisgarh	0.66	0.72	12	20
Goa	0.66	0.77	12	14
Gujarat	0.68	0.78	10	10
Haryana	0.69	0.78	8	10
Himachal Pradesh	0.74	0.83	2	4
Jammu and Kashmir	0.72	0.84	4	3
Jharkhand	0.66	0.75	12	18
Karnataka	0.69	0.78	8	10
Kerala	0.81	0.88	1	1
Madhya Pradesh	0.58	0.71	22	21
Maharashtra	0.72	0.83	4	4
Odisha	0.6	0.73	20	19
Punjab	0.73	0.83	3	4
Rajasthan	0.66	0.76	12	17
Tamil Nadu	0.7	0.81	6	8
Uttar Pradesh	0.6	0.71	20	21
Uttarakhand	0.66	0.83	12	4
West Bengal	0.7	0.8	6	9
Delhi	0.66	0.85	12	2
ALL INDIA	0.66	0.77	12	14

Source: RBI, Handbook of Indian Statistics (2001, 2011)

Table 4.2 calculates the health index which takes into consideration life expectancy as its key variable. Index value of health has increased marginally in most of the states in India after the implementation of revised methodology. Almost majority of states have the value of index greater than that of national average except backward states.

For the purpose of attaining the dimensional index of income for the states of India, we have obtained the data from Economic survey for both the variables viz. Per capita GDP and Per capita GNP. For the purpose of constructing the index log of Per capita

GDP has been done and then same prescribed methodology is applied. According to the old methodology India has an HDI of 0.55 while the new methodology HDI shows a lower value of 0.35. The methodologies consider the US$ per capita but in our data, we have taken the values in the exact form. No changes have been made.

Table 4.3: State wise Income Index of India (2001 and 2011)

States	2001	2011	Rank 2001	RANK 2011
Andhra Pradesh	0.52	0.39	12	11
Assam	0.44	0.21	19	19
Bihar	0.32	0.14	23	23
Chhattisgarh	0.49	0.27	15	15
Goa	0.7	1.04	1	2
Gujarat	0.56	0.49	5	6
Haryana	0.6	0.58	3	3
Himachal Pradesh	0.54	0.46	9	8
Jammu and Kashmir	0.45	0.27	17	15
Jharkhand	0.42	0.21	20	19
Karnataka	0.53	0.38	11	12
Kerala	0.55	0.49	7	6
Madhya Pradesh	0.42	0.21	20	19
Maharashtra	0.57	0.58	4	3
Odisha	0.47	0.25	16	17
Punjab	0.56	0.43	5	10
Rajasthan	0.45	0.24	17	18
Tamil Nadu	0.54	0.52	9	5
Uttar Pradesh	0.39	0.17	22	22
Uttarakhand	0.51	0.44	13	9
West Bengal	0.5	0.32	14	14
Delhi	0.65	1.1	2	1
ALL INDIA	0.55	0.35	7	13

Source: RBI, Handbook of Indian Statistics (2001, 2011)

The above table 4.3 shows that for the revised methodology the value of the index has gone down in comparison to the old methodology. Goa and Delhi are the states which are far ahead than other states as well as national average. Though majority of states have index value better than the national average but the same cannot be observed in case of backward states.

To compute the dimensional index of knowledge, data has been taken from IIPS working paper by Mohanty and Dehury (2012). As specified above the geometric mean [1]for both the variables is applied. Education dimension index value has reduced from 0.66 to 0.42 for the country after the adoption of revised methodology. A decline in the index value in the range of 0.10-0.16 across the major states of India is observed after comparing the old and new methodologies.

Table 4.4: State wise Knowledge Index of India (2001 and 2011)

States	2001	2011	RANK 2001	RANK 2011
Andhra Pradesh	0.61	0.38	19	18
Assam	0.65	0.46	15	9
Bihar	0.46	0.32	23	23
Chhattisgarh	0.69	0.37	9	20
Goa	0.82	0.57	3	3
Gujarat	0.7	0.45	8	12
Haryana	0.64	0.45	16	11
Himachal Pradesh	0.87	0.55	2	4
Jammu and Kashmir	0.55	0.46	21	10
Jharkhand	0.52	0.36	22	21
Karnataka	0.68	0.44	12	13
Kerala	0.88	0.6	1	2
Madhya Pradesh	0.69	0.38	9	16
Maharashtra	0.78	0.5	5	7
Odisha	0.69	0.37	9	19
Punjab	0.64	0.47	16	8
Rajasthan	0.63	0.36	18	22
Tamil Nadu	0.78	0.5	5	6
Uttar Pradesh	0.58	0.38	20	17
Uttarakhand	0.75	0.52	7	5
West Bengal	0.68	0.42	12	15
Delhi	0.79	0.61	4	1
ALL INDIA	0.66	0.42	14	14

Source: IIPS working paper by Mohanty and Dehury (2012)

The above table 4.4 calculates the knowledge index. Geometric mean better captures the inequalities among the variables hence the result of the above shows the lower

[1]Special type of average where we multiply two numbers and take the square root for two numbers.

value than the values calculated under the new methodology. Delhi, Goa and Kerala have secured far better values than the national average while backward states have shown far below values than the national average.

4.4. HDI and Rankings of the States

Using the above dimensions, HDI is constructed as per the old and revised methodology of UNDP. Ranking of the states are done accordingly to the scores calculated under the prescribed methodology.

Table 4.5: Ranking of the States on the basis of HDI Scores (2001 and 2011)

States	HDI 2011	HDI 2001	RANK 2011	RANK 2001
Andhra Pradesh	0.48	0.60	12	15
Assam	0.41	0.55	16	20
Bihar	0.32	0.48	23	23
Chhattisgarh	0.41	0.61	17	14
Goa	0.76	0.73	2	2
Gujarat	0.54	0.65	9	7
Haryana	0.58	0.65	7	8
Himachal Pradesh	0.58	0.72	6	3
Jammu and Kashmir	0.46	0.57	15	18
Jharkhand	0.38	0.53	20	21
Karnataka	0.5	0.63	11	11
Kerala	0.63	0.75	3	1
Madhya Pradesh	0.38	0.56	21	19
Maharashtra	0.61	0.69	4	5
Odisha	0.4	0.59	18	16
Punjab	0.54	0.64	10	9
Rajasthan	0.4	0.58	19	17
Tamil Nadu	0.59	0.68	5	6
Uttar Pradesh	0.35	0.52	22	22
Uttarakhand	0.56	0.64	8	10
West Bengal	0.46	0.63	14	12
Delhi	0.82	0.7	1	4
ALL INDIA	0.48	0.62	13	13
Mean	0.51	0.62		
SD	0.12	0.07		
CV	0.24	0.11		

Source: RBI, Handbook of Indian Statistics (2001,2011)
IIPS working paper by Mohanty and Dehury (2012)

If the above table 4.5 is taken into consideration then changes in the rankings of the states can be noticed after the adoption of the revised methodology. In 2001 Kerala secured the first position in the HDI while in the year 2011 Kerala has moved to 3rd place whereas Delhi secured 1st in 2011 which was in 4th position in 2001. Goa has been stable in its position at number 2. BIMARU states have shown some improvement, though Uttar Pradesh has remained constant in its ranking. Major developing states have remained almost stable in their rankings.

For the purpose of analysing the level of inequalities in the HDI, coefficient of variation has also been calculated. According to Neumayer (2003) coefficient of variation helps us to normalize the comparison of the same variable at different means. Variation increased from 0.11 (2001) to 0.24 (2011) in case of revised methodology. The upward spiral shows that inequalities have increased during the two periods.

4.5. Per Capita Net State Domestic Product Ranking of Indian States

Economic growth is one of the essential indicators of development. For the purpose of examining the relationship between human development and economic growth ranking of the states according to their per capita becomes a necessity. In the table below ranking of the states are done according to their Per capita NSDP. Goa has secured the first rank for both the years, which is followed by Delhi. The BIMARU states have become worst in terms of income indicator. Uttar Pradesh which remains stagnant at 22nd position followed by Bihar which has also remained stagnant. Major states have shown improvement like that of Kerala, Karnataka, Haryana. Punjab has shown a declining drift in terms of per capita as it moved to 11th position (2011) from being to 3rd position (2001).

Table 4.6: Ranking of the States on the basis of Per Capita NSDP (2001 and 2011)

States	RANK (2001)	RANK (2011)
Andhra Pradesh	10	12
Assam	17	20
Bihar	23	23
Chhattisgarh	19	15
Goa	1	1
Gujarat	9	10
Haryana	4	3
Himachal Pradesh	5	9
Jammu and Kashmir	15	17
Jharkhand	21	19
Karnataka	11	8
Kerala	7	6
Madhya Pradesh	18	21
Maharashtra	6	5
Odisha	20	18
Punjab	3	11
Rajasthan	16	14
Tamil Nadu	8	7
Uttar Pradesh	22	22
Uttarakhand	14	4
West Bengal	12	16
Delhi	2	2
ALL INDIA	13	13

Source: CSO (2001, 2011)

4.6. Rank Order Ratification

For further examination of the issue of convergence of HD indices we next shift our focus on the mobility of individual states within the overall distribution by computing Spearman's rank order correlation coefficients of HDI and Per capita NSDP rankings of the states for the consecutive two decades.

Table 4.7. Spearman's Ranking Correlation

Number of obs = 23 Spearman's rho = 0.9397 Test of Ho: hdirank2011 and rankpercapitans~2011 are independent Prob > |t| = 0.0000	Number of obs = 23 Spearman's rho = 0.8972 Test of Ho: hdirank2001 and rankpercapitans~2001 are independent Prob > |t| = 0.0000

Source: Estimated from CSO (2001, 2011)
RBI, Handbook of Indian Statistics (2001, 2011)
IIPS working paper by Mohanty and Dehury (2012**)**

The results of non – parametric test show that both the variables are highly associated. The above test shows a positive and stable relationship between HDI and EG.

4.7. Regression Analysis

A simple regression has been performed for the purpose of exploring the link between Human development indicators and Economic growth.

Chain concept given by Ranis, Ramirez and Stewart (2000) helps us better to explore the relationship between human development indicators and economic growth. The concept also helps us to understand the impact of variables on each other and which indicator has a more profound impact in terms of Indian states.

Firstly, the relationship has been explored taking human development indicators as a dependant variable and Per capita NSDP as an independent variable. The values for all variables have been transformed into log.

CHAIN A: Economy to Human Development

$$log\ education\ score = \partial + \beta\ (\log PCNSDP) + ei$$

$$log\ education\ score\ (2011) = -3.76168 + .2643128 + ei$$

$$log\ education\ score\ (2001) = -2.720982 + .2383095 + ei$$

The above equation considers education score computed above as dependent variable and per capita NSDP at constant prices as an independent variable. The above equation shows a positive and significant relationship among both the variables. The results show that if per capita net state domestic product increases by a unit then education score will rise by 0.26 units in the year 2011 and will increase by 0.23 units as per year 2001. The values are significant at 1% level of significance.

Apart from education, health also forms an integral part of human development. To explore the relationship between human development indicator and economic growth it is very much essential to consider both the indicator of human development.

$$log\ health\ score = \partial + \beta\ (\log PCNSDP) + ei$$

$$log\ health\ score\ (2011) = -.9623005 + .0642045 + ei$$

$$log\ health\ score\ (2001) = -1.199096 + .0817655 + ei$$

The above equation considers health index computed above as dependent variable and per capita NSDP at constant prices as an independent variable. The above equation shows a positive and significant relationship among both the variables. If 1 unit of PCNSDP increases then it will lead to .064 units increase in health scores (2011) while for the year 2001, a unit rise in PCNSDP health score increases by 0.08 units. The values are significant at 1% level of significance.

Chain A explores the transformation of economic growth variables to human development. From the above analysis it clearly shows that both education and health indicators are positively and significantly related to growth.

Chain B: HD to EG

This chain explores the relationship taking PCNSDP as dependent variable and human development indicators as an independent variable.

$$log\ PCNSDP\ = \alpha + \beta Education\ score\ + ei$$

$$\log PCNSDP\ (2011) = 13.23739\ +\ 2.562799 + \mu i$$

$$\log PCNSDP\ (2001) = 10.55296\ +\ 1.984793\ + \mu i$$

For the year 2011 the results of Chain B which explores the transformation of human capabilities to economic growth has been positive. If there is a unit rise in education score then PCNSDP will rise by 2. 56 units for the year 2011 while for the year 2001 PCNSDP would surge by 1.98 units. P statistics also show a significant value which indicates that there exists a highly positive and significant relationship among the two.

$$log\ PCNSDP\ = \alpha + \beta\ health\ score\ + ei$$

$$\log PCNSDP\ (2011) = 12.37247\ +\ 4.963071 + ei$$

$$\log PCNSDP\ (2001) = 10.83333 +\ 2.643547 + ei$$

Health indicator has been regressed with PCNSDP. The results of regression analysis show that with a unit rise in health score, PCNSDP will rise by 4.96 units for the year 2011 while for the year 2001 if 1 unit of health score is increased then growth would rise by 2.64 units. P statistics also show a significant value which indicates that there exists a highly positive and significant relationship among the two.

4.8. Concluding Remarks

This chapter finds a positive and significant relationship between economic opportunity and human capability across Indian states. The rank order correlation of the states in their relative positions on per capita income and levels of human development over the decades strongly indicates that these two aspects of human well-being are, in general, related to each other. The relationship is then scrutinized under the recent framework of two-way links. Applying the simple regression technique, it is observed that both chains of transformation are supposedly operational in Indian context, which establish that economic prosperity influences the expansion of human development (Chain-A) and enhanced human capability on the other hand accelerates economic growth (Chain-B). In both cases, a relatively weak association, however, has been obtained between income and educational indicator (index). Classification of states on the yardstick of average performance of entire developing world indicates that many Indian states lag behind seriously in both the aspects of human well-being which results in an unimpressive national achievement.

As a weak association is analysed from the above analysis it becomes necessary to include some quality variables. Education and health both are main contributors of HDI. The strong association of these variables with income is essential for development. Hence, the study includes some addendum variables.

Chapter 5

INTERLINKAGE BETWEEN HUMAN DEVELOPMENT INDICATORS, PHYSICAL INFRASTRUCTURE INDICATORS AND ECONOMIC GROWTH IN INDIAN STATES: A MULTIVARIATE APPROACH

5.1. Introduction

In the last chapter we explored the relationship between HDI and EG in context of Indian economy. Chain B (EG to HD) was found to be more significant. UNDP in its reports has been mentioning the need of adding quality variables in the existing HDI methodology. Section I of this chapter has discussed the importance of other addendum variables which will strengthen the linkages between human development and economic growth in Indian states. With the objective of examining the relative importance of these indicators this chapter has been specially designed to observe whether the levels of economic growth tend to correlate with different dimensions of human capability by employing a state level data from India. In the present chapter we tend to examine the impact of particular dimensions of human development on economic prosperity of Indian states. For the purpose of making appropriate public policies individual dimensions of human capabilities are meaningfully constructed. The purpose behind adopting a disaggregated approach is that the deficiency can be distinctly evaluated for each of the individual dimensions. The basic purpose of computing a composite index for education, health and infrastructure is to know position of a state vis-à-vis other states. The Indexes are computed using the indicators mentioned in the Section 5.2. The weights in the computation of an indexes are determined by using Factor Loadings and *Eigen Values* from Principal Component Analysis (PCA). This chapter is intended to accomplish the third objective of the thesis i.e. to examine the relationship between human development and economic growth indicators of Indian states: A Multivariate Approach. The chapter includes description about addendum variables applied, methodology, computation of the education, health and infrastructure indexes for the years 2004-05, 2011-12 and 2015-16 respectively, classification of the states on the basis of respective composite scores, methods of exploring the interlinkage between the indicators through the use of simple econometric techniques i.e. Spearman's ranking

correlation and simple regression analysis and the concluding remarks from the analysis.

5.2. Variables included in the Analysis

To further assess the association between the variables study includes other additional variables that can impact both the means and ends component of development. This section considers the importance of addendum variables and why have they been included in the study.

5.2.1. Dimensions of Knowledge

For the purpose of calculating knowledge index indicators like that of Literacy rate, Gross Enrolment rates both at school level and higher education level has been used. Apart from the traditional indicators used by the UNDP two quality indicators have been used for examining the index that are PTR at school and higher education level. Literacy rate can be defined as total percentage of people who are able to read and write. Literacy rate of India is 74.04% as per Census 2011. The second most essential indicator used is the enrolment rate at school level and at higher educational level. GER can be defined as the number of students enrolled in the school level at distinct stages such as primary, secondary and higher secondary level. In other words, it refers to the total enrolment regardless of age getting enrolled in a specific level of education and are expressed as a percentage of eligible official school-age population corresponding to the same level of education in the given school year. GER at higher education level refers to the enrolment of students in the age group of (18-23 years).

Pupil -Teacher ratio refers to the average number of pupils per teacher at specific level of education in given school year. A high pupil-teacher ratio suggests that each teacher has to be responsible for a large number of pupils. In other words, the higher the pupil- teacher ratio, the lower the relative access of pupils to teachers. It is generally assumed that a low pupil-teacher ratio signifies smaller classes, which enables the teacher to pay more attention to individual students, which may in the long run result in a better performance of the pupils. To measure the level of human resources input in terms of the number of teachers in relation to the size of the pupil population. The results can be compared with established national norms on the

number of pupils per teacher for each level or type of education (UNESCO). The Right of Children to Free and Compulsory Education (RTE) Act, 2009 [1]in its Schedule lays down PTR for both primary and upper primary schools. At primary level the PTR should be 30:1 and at the upper primary level it should be 35:1

5.2.2. Dimensions of Health

Life expectancy is being regarded as one of the most important indicator in the computation of health index. We have tried to include some other important indicators which will have impact on the health dimension of HDI. Apart from life expectancy study undertakes other indicators of health which have impact on the growth indicator of development.

IMR-: The infant mortality rate (IMR) can be defined as number of infant deaths per 1000 live births in mid reference period. It is basically regarded as a negative indicator of health though the reverse of it changes it into positive one. Infant mortality rate is used more broadly as a measure of crude indicator for assessing community health status of the poor, socio economic status of the community, quality of health services and level of medical technology. Institutional delivery is another indicator which has a profound impact on the growth indicator as it is related to maternal health care. Delivery by skill and trained person will ensure better results and would lead to proper health care. Apart from the above indicators health index also includes the basic health infrastructure facilities which will improve the quality of growth in the economy. Primary Health Centre's and Community Health Centre's are another important indicators related to the infrastructure. The importance of PHC's was stressed to consolidate the maintenance phase of the communicable disease programme. Larger the number of health centres the better will be health status of the economy. Centres are needed for better assistance to rural people so that special care can be given. PHC'S and CHC'S play a significant role in improving the health standards of an economy. Using this indicator as one of the sub component of health index we can explore its linkage with growth. Another indicator which assess the level of quality infrastructure in the health dimension is Number of Doctors per

[1] Act that describes the necessity for compulsory and free education for children age between 6 to 14 years in India.

lakh population. It is also as an important indicator as it helps us to know about the actual strength of human manpower available. Low number of doctors will indicate lack of infrastructure facilities in the states. As per the recommendation of Bhore committee there must be approx. 63 doctors per lakh population (1942). In the year 1942 there were 16 doctors per lakh population. In 2011 there are 8.33 doctors per lakh population. The declining trend shows the poor health status in the Indian economy.

5.2.3. Dimensions of Physical Infrastructure

Capital not only comprises of social and human capital. Apart from social capital it is physical capital that plays a significant role in promoting economic development. Literature gives a well-documented reference in terms of importance of physical capital in economic development (Estache 2006; Sahoo and Dash 2008, 2009). Physical infrastructure helps to realize the potential ability of human capital and generate situations in which the potential of human capital can be fully realized. Investment in the physical capital infrastructure helps to improve the quality and also provide safety to the people of the nation. Within the scope of infrastructure, roads, railways, air transportation, seaports, electric power, and telecommunications and information technology (IT) are often used as services and intermediate goods. In India though some improvement has been made in terms of investment in the components of physical infrastructure still it ranks 58 in basic infrastructure as per the Global Competition Report [2]2018-19.

Physical infrastructure is also essential as that of human development. In our chapter we have constructed physical infrastructure index by taking some infrastructure variables. The association of variables with growth will help us to explore better the linkage between human development and economic growth. The following indicators are included in the composite index of physical infrastructure. Road density is the ratio of the length of the country's total road network to the country's land area. The road network includes all roads in the country: motorways, highways, main or national roads, secondary or regional roads, and other urban and rural roads. Rail

[2]Assesses the ability of the countries in providing high levels of prosperity to its citizen

density measures the total route per 100sq km of land area. It is the ratio between the length of railway rote available for train service, irrespective of the number of parallel tracks (rail lines, total route in km) with the area of the country. Toilet facility and water is again an important indicator of development. The indicator gives the picture of sanitation facilities available in the economy. Availability of power, number of consumers using LPG, storage capacity, net irrigated area and Number of hospitals and schools are some other important indicator that form an integral part of physical infrastructure.

5.3. Methodology

As mentioned above composite indexes for education, health and infrastructure have been constructed by using Multivariate Analysis which includes Principle Component Analysis [3]for the generation of weights. PCA technique helps in finding weights to each of the concerned dimensions. These weights help in maximizing the sum of the squares of correlation of the dimension through the outcome of composite index.

Suppose that y1 is a principal component of x1, x2, x3, . . ., xp, such that: y1 = a11x1 + a12x2 + . . . + a1pxp. After this the variance of y1 principal component is maximized with the assumption that the sum of the squared weights of x1, x2, x3, . . . xp is equal to one. Once the variance has been maximized PCA determines the weight vector (a11, a12, . . . a1p) by choosing higher weights for those series which vary a lot and comparatively have more influence on the composite index.

As soon as the weights are selected, the first principle component would designate the leading pattern of variance in the indicators. Then after the first component designate the weights second principal component (y2) likewise finds out a weight vector for second variable (a21, a22, . . . a2p). Second principal component designate the weight when the variance is maximized with the assumption that it is uncorrelated with the first principal component. The second principal component signifies that y2 has the next largest sum of squared correlations with the original variables. Though the variances of the subsequent principal components would be smaller. PCA produces an

[3]The technique helps to reduce the dimensionality of a data set consisting of many variables correlated with each other.

outcome where an estimate of how much variance in the x's is explained by each principal component.

Though there is limitation in using PCA as it involves indexing and deciding about the number of components to retain. In the literature review it can be noticed that researchers use first principal component and that has remained the standard practice in recent times. Though for capturing the variability of the original variables of the total system, we could use all the components. However, the dominant component in the underlying variable will be the one in which the first components account for a large proportion of the variability (around 70-80%).

In the present analysis we use the first principal component since it explains about 90% of the variance in the data in most cases. Pair of Eigen-value [4]and Eigen-vector [5]describe principal component in which each Eigen-value explains the amount of variance through each principal component and the factor-loadings generated are the coordinates of the eigenvector. Factor loadings[6] which coordinates Eigen vector measure the significance of each dimension which account for the variability in the particular principal component. Weights are provided by the Eigen-vectors for computing the uncorrelated principal components. Afterwards the linear combinations of normalized original variables of principal component scores are worked out as linear combinations of normalized original variables. Then weights are assigned as factor loadings (NUEPA, 2009)

5.4. Steps of Composite Index

- First step includes converting the raw values into normalized values. First the Best and Worst values in an indicator are identified. The BEST and the WORST values will depend upon the nature of a particular indicator. In case of a positive indicator, the HIGHEST value will be treated as the BEST value and the LOWEST, will be considered as the WORST value. Similarly, if the indicator is NEGATIVE in nature, then the LOWEST value will be considered

[4]Determine the magnitude of the principal components
[5] Represent the core components of PCA that determine the directions of new feature space
[6] They are the part of the outcome of factor analysis which serve as a data reduction method while explaining the correlation between observed variables

as the BEST value and the HIGHEST, the WORST value Once the Best and Worst values are identified, the normalize values should be obtained in case of all the variables. Normalized Values always lies between 0 and 1. The normalized values are calculated by using the formula (Best values – Observed values / Best values – Minimum value). The normalized values for the respective indicators are shown in the Appendix.

- Once the Normalized Values are obtained for all the indicators across states have been calculated, the next step relates to assigning FACTOR LOADINGS and WEIGHTS to each variable. Best technique to assign weights is using Principal Component Analysis (PCA).

- The objective behind applying PCA is to reduce the dimensionality (number of indicators) of the data set but retain most of the original variability in the data. It accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible

The normalized values and the PCA Eigen vectors for the respective indicators are shown in appendix. After the construction of the composite index ranks are assigned to each state according to their composite scores for each respective indicator. The index has been generated for three consecutive years viz. 2004- 05, 2011-12, and 2015-16. One more exercise is performed after the ranking of the states. States have been classified as highly developed, developed, moderately developed and backward states from the scores computed. The methodology for classification of the states has been specified in the latter part of the chapter.

To examine the interlinkage between human development, physical development and economic growth spearman's ranking correlation has been calculated for each year separately. For examining the chain link simple regression analysis has been used to study the impact of each indicator on economic growth through Chain A and Chain B concept by Ranis & Stewart (2001).

5.5. Human Development and Physical Infrastructure Index Computation

5.5.1. Education Index

Education index has been constructed for three consecutive years viz… 2004-05, 2011-12 & 2015-16. Composite index consists of the education indicators such as literacy rates, Gross enrollment ratio in general education and higher education and pupil teacher ratio for school as well as higher education. The first three indicators have positive impact on the education status while the last two indicators are negative indicators. Composite index has been calculated by applying the above methodology. The basic purpose of computing an Educational Development Index (EDI) is to know position of a state vis-à-vis other states. The EDI can be computed at different levels of education, such as, primary, upper primary, elementary and other levels of education. By using EDI's of one or more levels of education, a composite indicator can also be worked out. The weights in the computation of an EDI are determined by using Factor Loadings and *Eigen Values* from Principal Component Analysis (PCA). After the construction of the index states are ranked accordingly to their composite scores.

Table 5.1: State wise Education Scores and Ranking

States	Education scores 2004-05	Rank	Education scores 2011-12	Rank	Education scores 2015-16	Rank
Andhra Pradesh	0.388965342	13	0.524887183	12	0.590337286	13
Assam	0.346596239	19	0.352165755	20	0.560083181	14
Bihar	0.018637665	22	0.180105059	22	0.103602812	22
Chhattisgarh	0.427968688	10	0.449056264	15	0.537673853	16
Goa	0.547697641	5	0.91983952	1	0.737360026	3
Gujarat	0.459418134	9	0.520571742	13	0.601218708	12
Haryana	0.399924081	11	0.592259022	9	0.718449174	6
Himachal Pradesh	0.656338644	2	0.761867785	4	0.792004888	1
Jammu and Kashmir	0.363715496	16	0.444604551	16	0.329336587	20
Jharkhand	0.171998678	21	0.251267135	21	0.316186967	21
Karnataka	0.365309909	15	0.616332975	8	0.721093167	4
Kerala	0.560615918	4	0.779990841	3	0.756243524	2
Madhya Pradesh	0.517716467	6	0.546801718	11	0.514489963	17
Maharashtra	0.492820834	7	0.668274287	6	0.66706506	7
Odisha	0.361570489	17	0.467376665	14	0.621967283	9
Punjab	0.392139286	12	0.5900247	10	0.719925646	5
Rajasthan	0.386016098	14	0.430243485	17	0.543868674	15
Tamil Nadu	0.489615417	8	0.816391226	2	0.624180126	8
Uttar Pradesh	0.353452342	18	0.388602717	18	0.495411271	18
Uttarakhand	0.609706504	3	0.63989704	7	0.601560584	11
West Bengal	0.320537023	20	0.353289485	19	0.457904148	19
Delhi	0.776385547	1	0.751917273	5	0.607627278	10
Mean	0.427597566		0.547534838		0.573526828	
Sd	0.155235307		0.184630271		0.159660595	
CV	0.36304067		0.337202783		0.27838383	
MEAN +SD	0.582832872		0.732165109		0.733187423	
MEAN- SD	0.272362259		0.362904567		0.413866233	

Source: AISHE (2004-05;2011-2012;2015-16)
U-DISE (2004-05;2011-2012;2015-16)

The above table 5.1(Appendix 5.1 A) signifies the education scores of Indian states for the three consecutive periods viz. 2005, 2012, 2016. Education scores have been calculated by using PCA technique as already mentioned. As observed from the table states like Kerala, Goa, Himachal Pradesh and Tamil Nadu have retained top spots with high scores and rankings for respective years. While states like Bihar, Rajasthan, Jammu & Kashmir, Madhya Pradesh, Jharkhand and Uttar Pradesh have either stagnant or declining scores or ranks for the respective years. NUEPA (2013) constructed EDI using data on education for primary and upper primary levels using indicators related to access, infrastructure, teachers and outcomes. Similar findings were witnessed where Punjab has seen a major improvement among the North Indian states whereas BIMARU states are as usual backward except Bihar which has shown some improvement. Though a major improvement in the scores as well ranking can be observed in the following five states viz. Punjab, West Bengal, Assam, Odisha and Karnataka which have focused upon the education indicators in the respective years. West Bengal is one state which was on 20^{th} position in 2004 but has reached to 19^{th} spot in 2016. From above table it can be analysed that backward states have not improved a bit in terms of education indicators. Bhandari (2012) also observed same findings in his study. He constructed education health and infrastructure index using somewhat similar variables. among the developed states among all three variables are Kerala, Goa, Himachal, Punjab, Tamil Nadu, Maharashtra and Haryana are the best performers. Though for the states Maharashtra in terms of infrastructure index and that of Haryana in health is markedly poor. States which have performed well from the past times are Uttarakhand, Karnataka, Andhra, Gujarat, J&K and Orissa which are among the medium performers. Odisha has been an exception in terms of education index.

5.5.2. Health Index

Health index has been calculated using variables IMR, Life expectancy, institutional deliveries, PHC'S & CHC'S per lakh population and no of doctors per lakh population

Table 5.2: State wise Health Scores and Ranking

States	Health scores 2004-05	Rank 2004-05	Health scores 2011-12	Rank 2011-12	Health scores 2015-16	Rank 2015-16
Andhra Pradesh	0.32781084	12	2.1706	9	0.385425051	12
Assam	0.105249876	20	0.9272	19	0.163687258	19
Bihar	0.176658708	18	1.4492	16	0.18341702	18
Chhattisgarh	0.22158136	17	0.6142	21	0.161242059	20
Goa	0.733617919	2	2.9574	4	0.616451971	4
Gujarat	0.34992563	11	2.1632	10	0.444734271	10
Haryana	0.271897734	14	1.7379	13	0.351118374	13
Himachal Pradesh	0.488718998	5	2.2994	8	0.584090567	6
Jammu and Kashmir	0.537664277	4	2.3951	7	0.652470966	3
Jharkhand	0.22581321	15	0.8471	20	0.206690702	17
Karnataka	0.392979101	10	2.5121	6	0.492364467	9
Kerala	0.790568467	1	3.7392	1	0.777768696	1
Madhya Pradesh	0.080679784	21	1.0179	18	0.13828495	21
Maharashtra	0.460304424	6	2.8076	5	0.52924936	8
Odisha	0.171564237	19	1.2755	17	0.271354996	16
Punjab	0.451715269	7	2.1422	11	0.554788124	7
Rajasthan	0.223028676	16	1.7783	12	0.320101597	15
Tamil Nadu	0.556283418	3	2.9613	3	0.599495253	5
Uttar Pradesh	0.079367941	22	0.1512	22	0.089204366	22
Uttarakhand	0.317054038	13	1.5007	15	0.339701901	14
West Bengal	0.411886703	9	1.7019	14	0.397505031	11
Delhi	0.414977657	8	3.0061	2	0.7122009	2
MEAN	0.354061285		1.91615		0.40778854	
SDEV	0.189928677		0.879737828		0.198369895	
CV	0.53642882		0.459117412		0.486452845	
MEAN+SDEV	0.543989962		2.795887828		0.606158435	
MEAN-SDEV	0.164132608		1.036412172		0.209418645	

Sources: MOHFW, NHP (2004-05;2011-2012;2015-16)

The above table 5.2 (Appendix 5.2 A) signifies the state wise health scores and rankings for the corresponding years viz. 2005, 2011, 2016. As observed from the table Kerala, Delhi, Goa, Tamil Nadu and Jammu & Kashmir have attained top scores and ranking. Though it can be observed from the table that scores have depicted a declining trend for the year 2015-16 from 2011-12 and an upward trend is observed from the year 2004-05 to 2011-12. As no improvement was revealed in education indicators same is the case for health indicators for backward states. They have either remained stagnant or have shown a declining trend in scores and ranking. West Bengal, Uttarakhand, Punjab, Odisha, Himachal Pradesh and Jharkhand have shown an upward trend in 2015-16 from the year 2011-12 One more important conclusion one can make from the above table that for the year 2015- 16 is that the scores have gone down for all the states irrespective of their ranking. Sinha, Sahay and Koul (2019) constructed health index using input- output matrix [7]and observed that Maharashtra and Tamil Nadu were found amongst the best performers while Assam, Uttaranchal and Uttar Pradesh were lowest performers. States like Kerala, Himachal Pradesh, Delhi and J&K performed well. Deb (2017) applied PCA technique to examine the level of disparities among 29 states of India for the periods 2002 and 2012-13. For the health dimension it was observed that Kerala, Goa, Sikkim, Mizoram and Tamil Nadu remained at the top of the ranking, while Chhattisgarh, Jharkhand, Bihar and Uttar Pradesh were placed at the bottom.

5.5.3. Physical Infrastructure Index

Physical infrastructure index has been computed using variables like that of rail density, road density, water facilities, toilet facilities, power, government hospitals, number of institutions, net irrigated area, storage facilities, and energy.

[7]A matrix that explains the input needed for the production of a specific output

Table5.3 State wise Physical Infrastructure Scores and Ranking

States	Infrastructure scores 2004-05	Rank	Infrastructure scores 2011-12	Rank	Infrastructure scores 2015-16	Rank
Andhra Pradesh	0.297266132	21	0.291264049	8	0.22725332	20
Assam	0.760562143	17	0.220195377	16	0.242115375	18
Bihar	0.773752053	16	0.10043843	22	0.198453659	21
Chhattisgarh	1.787661826	4	0.185580611	19	0.285188052	14
Goa	1.494448127	5	0.491228549	3	0.510169156	3
Gujarat	0.731083446	18	0.268800784	12	0.346342743	10
Haryana	1.121516069	9	0.358673687	6	0.495028069	4
Himachal Pradesh	0.986941481	11	0.417105052	5	0.460273833	5
Jammu and Kashmir	0.804879187	13	0.259324039	13	0.390646748	9
Jharkhand	0.238328297	22	0.12191069	21	0.116225921	22
Karnataka	4.104925551	1	0.273708421	10	0.335921931	11
Kerala	0.998491567	10	0.316555387	7	0.425558859	7
Madhya Pradesh	0.786977723	14	0.187560575	18	0.25880016	17
Maharashtra	1.272369955	7	0.273173416	11	0.302049182	12
Odisha	0.684739829	19	0.251255258	14	0.239672417	19
Punjab	2.422193287	3	0.480145129	4	0.661339071	1
Rajasthan	0.492380779	20	0.218313809	17	0.27373335	16
Tamil Nadu	1.390959964	6	0.280354277	9	0.411634402	8
Uttar Pradesh	0.778420847	15	0.155155819	20	0.280771486	15
Uttarakhand	1.204779602	8	0.716931477	1	0.443595332	6
West Bengal	0.904409643	12	0.22733519	15	0.298356736	13
Delhi	2.631673981	2	0.582900766	2	0.601192868	2
MEAN	1.212216431		0.3035414		0.35474194	
SDEV	0.859099223		0.148246311		0.131961199	
CV	0.708701186		0.4883891		0.3719921	
MEAN+SDV	2.071315654		0.451787711		0.486703139	
MEAN-SDEV	0.353117208		0.155295089		0.22278074	

Source: INFRASTRUCTURE VOLUME STATISTICS VOL II (2014)

Authors, economists, and urban planners have classified infrastructure mainly into two broad parts i.e. physical infrastructure and social infrastructure (Dash & Sahoo, 2010; Kumari & Sharma, 2016). Economic infrastructure assists in production functions by lowering production cost and raising the productivity of labour and capital while social infrastructure helps to improve the efficiency and skills of manpower. The investment strategies along with reform policies during eleventh plan period have improved the status of infrastructure in India. The sector showing tremendous increase is the telecom sector with internet and wireless subscribers increasing manifold with CAGR [8]of 44% during 2006-07 to 2011-12. The road transport in India has expanded significantly after independence, both in terms of spread (total road length & road density) and capacity (number of registered vehicles on road and the volume of passengers and freight traffic handled). The CAGR of road length during 2006-07 to 2011-12 is 3.3% with a steady annual growth of more than 2 % every year. The railways have not shown much increase in terms of rail track length as indicated by less than 1% CAGR during the above period. In aviation sector passenger air traffic and total cargo carried by air has shown significant growth with CAGR of 15.4% and 8.5% respectively. Accessibility of irrigation resources has increased in terms of irrigation potential created over the plan periods; the maximum percentage growth registered was during 2010-11, with a CAGR of 2.5% during 2008-09 to 2011-12. Electrical power is of great importance due to country's climate and industrial base. Even a temporary loss of electricity can cause not only minor and major inconveniences, but also significant losses to our economy. Electricity generation has shown a CAGR of 7.2% during 2006-07 to 2011-12. In India coal is the critical input for major infrastructure industries like power, steel and cement. Coal production has increased over the years but its percentage growth declined to 0.12% in 2010-11 after constant growth rate of about 7.8% from 2008 to 2010 **(MOSPI 2015).** The above table 5.3(Appendix 5.3 A) signifies the scores and ranking of the states for the infrastructure index for the consecutive years 2005, 2012 and 2016. A vast disparity in the scores and rankings can be observed from the above table. Except Delhi no other states have a stable ranking. In 2004-05 Karnataka has attained the number 1 position but a sharp decline in its ranking for the year 2011-12 and 2015-16

[8]Compound Annual Growth rate = {(Ending balance/ beginning balance)1/n}-1

can be observed. Punjab is one state that has attained top spot in all the years. Backward states have hardly shown all improvement in their rankings and scores. Kerala which has attained top spots in the education and health index has not been able to fix it top spots in infrastructure index. Though it has jumped to 7^{th} spot from 10^{th} spot in 2004-05 but couldn't attained top spot as in case of another index.

5.6. State Wise Classification

Classification of the states has been done in accordance with their development status in the respective years. The states are classified under four dimensions that are backward, moderately developed, developed and highly developed category. States which have scores exceeding mean plus standard deviation are categorize as highly developed States(HD) while the States whose scores lie between mean and mean plus standard deviation are grouped as developed states (DEV). for the other categories states whose scores are less than mean minus standard deviation are grouped as backward (BACK) while the States with scores between mean minus standard deviation and mean are grouped as moderately developed (MDEV).

Table 5.4: Education Index Classification

States	2004-05	2011-12	2015-16
Andhra Pradesh	MDEV	MDEV	MDEV
Assam	MDEV	BACK	MDEV
Bihar	BACK	BACK	BACK
Chhattisgarh	DEV	MDEV	MDEV
Goa	DEV	HD	HD
Gujarat	DEV	MDEV	MDEV
Haryana	MDEV	DEV	DEV
Himachal Pradesh	HD	HD	HD
Jammu and Kashmir	MDEV	MDEV	BACK
Jharkhand	BACK	BACK	BACK
Karnataka	MDEV	DEV	DEV
Kerala	DEV	HD	HD
Madhya Pradesh	DEV	DEV	MDEV
Maharashtra	DEV	DEV	DEV
Odisha	MDEV	MDEV	MDEV
Punjab	MDEV	DEV	DEV
Rajasthan	MDEV	MDEV	MDEV
Tamil Nadu	DEV	HD	DEV
Uttar Pradesh	MDEV	MDEV	MDEV
Uttarakhand	HD	DEV	DEV
West Bengal	MDEV	BACK	MDEV
Delhi	HD	HD	DEV

SOURCE: Calculated from the AISHE (2004-05;2011-2012;2015-16)
U-DISE (2004-05;2011-2012;2015-16)

The above table 5.4 signifies the classification of states as per their development status. According to the score's states are classified as highly developed, developed, moderately developed and backward. From the table above, it can be observed that there are lot of variations among states in these years. In 2004-05 only 3 states were classified as highly developed states viz. (HP, Delhi, Uttarakhand) while in 2011-12 two states were added giving a total of 5 states under the highly developed category

viz. (Goa, HP, Kerala, TN, Delhi). The year of 2015-16 saw a reduction of states in the highly developed category. Only 4 states were classified under highly developed states. It can be analysed that most of the states fall under the category of moderately developed.

Table 5.5: Health Index Classification

States	**2004-05**	**2011-12**	**2015-16**
Andhra Pradesh	MDEV	DEV	MDEV
Assam	BACK	BACK	BACK
Bihar	MDEV	MDEV	BACK
Chhattisgarh	MDEV	BACK	BACK
Goa	HD	HD	HD
Gujarat	MDEV	DEV	DEV
Haryana	MDEV	MDEV	MDEV
Himachal Pradesh	DEV	DEV	DEV
Jammu and Kashmir	DEV	DEV	HD
Jharkhand	MDEV	BACK	MDEV
Karnataka	DEV	DEV	DEV
Kerala	HD	HD	HD
Madhya Pradesh	BACK	BACK	BACK
Maharashtra	DEV	HD	DEV
Odisha	MDEV	MDEV	MDEV
Punjab	DEV	DEV	DEV
Rajasthan	DEV	MDEV	MDEV
Tamil Nadu	HD	HD	DEV
Uttar Pradesh	BACK	BACK	BACK
Uttarakhand	MDEV	MDEV	MDEV
West Bengal	DEV	MDEV	MDEV
Delhi	DEV	HD	HD

Source: Calculated from the MOHFW, NHP (2004-05;2011-2012;2015-16)

The above table 5.5 classifies the states according to their composite scores in terms of their development status. It can be analysed that for the year 2011-12 improvement

for most states can be witnessed. The states lying in the category of developed have moved upwards to highly developed. But for the backward states like MP and UP no improvement can be witnessed even for the year 2015-16. The data for 2015-16 analyses the declining scores for almost all the states. No significant improvement can be witnessed in the development status of any state.

Table 5.6: Infrastructure Index classification

States	2004-05	2011-12	2015-16
Andhra Pradesh	BACK	MDEV	MDEV
Assam	MDEV	MDEV	MDEV
Bihar	MDEV	BACK	BACK
Chhattisgarh	DEV	MDEV	MDEV
Goa	DEV	HD	HD
Gujarat	MDEV	MDEV	MDEV
Haryana	MDEV	DEV	HD
Himachal Pradesh	MDEV	DEV	DEV
Jammu and Kashmir	MDEV	MDEV	DEV
Jharkhand	BACK	BACK	BACK
Karnataka	HD	MDEV	MDEV
Kerala	MDEV	DEV	DEV
Madhya Pradesh	MDEV	MDEV	MDEV
Maharashtra	DEV	MDEV	MDEV
Odisha	MDEV	MDEV	MDEV
Punjab	HD	HD	HD
Rajasthan	MDEV	MDEV	MDEV
Tamil Nadu	DEV	MDEV	DEV
Uttar Pradesh	MDEV	BACK	MDEV
Uttarakhand	MDEV	HD	DEV
West Bengal	MDEV	MDEV	MDEV
Delhi	HD	HD	HD

Source: Calculated from the Infrastructure Volume Statistics II (2014); MOHFW, NHP (2004-05;2011-2012;2015-16); AISHE (2004-05;2011-2012;2015-16)

The above table 5.6 classifies the states as per their development status. Physical capital is considered as one of the important indicators of development. Punjab is one state that has focused on the infrastructure indicators almost in all the consecutive years and has attained the high developed status. While it can be analysed that Karnataka has slipped from its highly developed status to that of moderately developed status though other south Indian states have shown improvement. Backward states like that of Uttar Pradesh, Madhya Pradesh, Rajasthan and West Bengal have remained constant with moderately developed status in all the three consecutive years. Bihar is one state that has shown a declining trend from the year 2004-05 and has remained backward with very little improvement.

5.7. Rank Order Ratification

For the purpose of exploring the relationship between human development and infrastructure indicators with economic growth **Spearman's ranking correlation** has been computed for respective three years.

Table 5.7: Spearman's Ranking Correlation Matrix (2004-05)

	PCNSDP rank	**Health rank**	**Education rank**	**Physical Infrastructure rank**
PCNSDP rank	1			
	22			
Health rank	0.7809	1		
	22	22		
	0			
Education rank	0.6793	0.502	1	
	22	22	22	
	0.0005	0.0173		
Physical Infrastructure rank	0.5878	0.5008	0.528	1
	22	22	22	22
	0.004	0.0176	0.0116	

Source: Author's calculation

The table above 5.7 shows the ranking correlation between PCNSDP (2004-05) as dependent variable and education, health and infrastructure scores as independent variables. The non- parametric test explains the linkage between variables. Health indicator has the highest impact on the economic growth with significance level of 0.000. Education and Infrastructure scores are also highly significant.

Table 5.8: Spearman's Ranking Correlation Matrix (2011-12)

	PCNSDP rank	**Health rank**	**Education rank**	**Physical Infrastructure rank**
PCNSDP rank	1			
	22			
Health rank	0.7775	1		
	22	22		
	0			
Education rank	0.825	0.7617	1	
	22	22	22	
	0	0		
Physical Infrastructure rank	0.8261	0.6849	0.8216	1
	22	22	22	22
	0	0.0004	0	

Source: Author's calculation

The table above 5.8 shows that all the three indicators are highly significant at 0.000 significance level. Spearman's rho explains the statistical depending of rankings of dependent variables on independent variables. The above ranking correlation explains about 78% of dependency of health on growth while 82% for both education and infrastructure variables.

Table 5.9 Spearman's Ranking Correlation Matrix (2015-16)

	PCNSDP rank	**Health rank**	**Education rank**	**Physical Infrastructure rank**
PCNSDP rank	1			
	22			
Health rank	0.6748	1		
	22	22		
	0.0006			
Education rank	0.7403	0.6002	1	
	22	22	22	
	0.0001	0.0031		
Physical Infrastructure rank	0.7832	0.7233	0.7459	1
	22	22	22	22
	0	0.0001	0.0001	

Source: Author's calculation

The above table 5.9 explains the dependency of variables on growth indicator of development. Though all three variables show a significant value of interlinkage between these variables but the coefficient shows that in the year 2015-16 have declined from 2011-12. Health indicator has shown the lowest impact from the previous two years. The above table shows the ignorance towards the main sector of growth.

5.8. Simple Regression Analysis

For the purpose of analysing numerical relationship between variables simple regression analysis has been performed. To assess the effectiveness of indicators regression analysis has been calculated for each individual indicator for each year respectively. Variable and year wise analysis has been performed as to analyse the association among variables among Indian states. For all the years dependent variable is Per capita NSDP at constant prices while independent indicator are education scores, health scores and infrastructure scores.

5.8.1. Numerical variability of indicators

CHAIN A: EG to HD

This chain explores the dependency of human development indicators on economic growth. The equation below takes human development indicators as dependent variables whereas PCNSDP at constant prices as an independent variable for the three consecutive years

$$logeducation\ scores\ 05 = \beta 0 + \beta 1 \log(PCNSDP05) + ei$$

$$logeducation\ scores\ 05 = (-10.82) + .97 + ei$$

Positive association among variables can be evaluated from the above equation i.e. education variable has a positive relationship with economic growth. A major role of economic growth can be assessed in improving the education sector. The scores generated after constructing education index implies that if the growth component of an economy is increased then human development indicators will improve. From the above equation it is observed that if government focusses upon improving the growth then education can be increased by .97 units with just 1% increase in PCNSDP. Even the relationship is significant as p values indicate a 1 % level of significance among them. R- square specifies that there is almost 44% variance between the indicators.

$$loghealth\ scores\ 05 = \beta 0 + \beta 1 \log(PCNSDP05) + ei$$

$$loghealth\ scores\ 05 = -10.65 + .93 + ei$$

Positive relationship between the health scores and growth can be observed from the equation above. As per the scores generated after constructing health index, it can be assessed that growth variable of the economy plays a key role in refining the health sector of an economy. If government emphases upon improving the growth sector of an economy then health variable of human development can be improved by .93 units with just 1% surge in PCNSDP. The above equation postulates the relationship with p values substantial at 1 % level of significance. R- square specifies that there is almost 52% variance between the indicators.

$$loginfrastructure\ score\ 05\ =\ \beta 0 +\ \beta 1 \log(PCNSDP05) + ei$$

$$loginfrastructure\ score\ =\ -5.88 +\ .58 + ei$$

The equation above stipulates the positive association between the infrastructure scores and growth. In relation to the scores generated of the infrastructure index, it can be weighed that growth variable of the economy plays a key role in improving health sector If government concentrates upon improving the growth variable of development then infrastructure indicator can be augmented by .58units with just 1% rise in PCNSDP. The above equation specifies the relationship with p values significant at 5% level of significance. R- square specifies that there is almost 20% variance between the indicators.

Regression analysis for the year 2011-12

$$logeducation\ scores\ 12\ =\ \beta 0 +\ \beta 1 \log(PCNSDP12) + ei$$

$$logeducation\ scores\ 12\ = (-6.930) +\ .59 + ei$$

The equation above postulates the positive association between the education scores and growth. In accordance to the scores generated, it can be evaluated that growth component of the economy plays has a significant role in improving education sector. Education can be increased by .59 units with just 1% increase in PCNSDP if government focusses upon improving the growth component. Result of the above equation shows that relationship is significant at 1 % level of significance. R- square specifies that there is almost 70% variance between the indicators.

$$loghealth\ scores\ 12\ =\ \beta 0 +\ \ \beta 1 \log(PCNSDP12) + ei$$

$$loghealth\ scores\ 12\ =\ \ -8.32 +\ .83 + ei$$

The results of the above equation specify that positive relationship exists among the health scores and growth variable of an economy. If policies focus upon improving the growth then health variable of human development can be increased by .83 units with just a unit increase in PCNSDP. The relationship specifies that variables are significant at 1 % level of significance. R- Square specifies that there is almost 43% variance between the indicators.

$$loginfrastructure\ score\ 12\ =\ \beta 0 +\ \beta 1 \log(PCNSDP12) + ei$$

$$loginfrastructure\ score\ =\ -8.74 +\ .70 + ei$$

The above equation stipulates that there exists a positive relationship among the infrastructure scores and growth. In relation to the scores engendered after the construction of infrastructure index, it can be analysed that growth variable of the economy is very essential for improving health sector. The implementation of the policies with much focus upon improving the growth variable of development then infrastructure indicator can be improved by .70units with a unit increase in economic growth (PCNSDP). Equation above specifies the relationship is significant with p values significant at 1% level of significance. R- Square specifies that there is almost 66% variance between the indicators.

Regression analysis for the year 2015-16

$$logeducation\ scores\ 16\ =\ \beta 0 +\ \beta 1 \log(PCNSDP16) + ei$$

$$logeducation\ scores\ 16\ = (-6.64) +\ .53 + ei$$

The education scores and growth variables are positively related to each other as specified in the above equation. According to the scores generated after constructing education index, it can be evaluated that growth variable of the economy acta as a catalyst in improving education sector. If government concentrates upon improving the growth then education can be increased by .53 units with just 1% increase in PCNSDP. The above equation specifies the relationship with p values significant at 1 % level of significance. R- square specifies that there is almost 51% variance between the indicators.

$$loghealth\ scores\ 16\ =\ \beta 0 +\ \beta 1 \log(PCNSDP16) + ei$$

$$loghealth\ scores\ 16\ =\ -9.89 +\ .78 + ei$$

The positive relationship is specified between the health scores and growth in the above equation. In accordance to the scores generated after constructing health index, it can be weighed that growth variable of the economy plays a prominent role in improving health sector. If the focus of government is upon improving the growth then health variable of human development can be increased by .78 units with just 1%

increase in PCNSDP. The above equation specifies the relationship with p values significant at 1 % level of significance. R- Square specifies that there is almost 57% variance between the indicators.

$$loginfrastructure\ score\ 16\ =\ \beta 0 +\ \beta 1 \log(PCNSDP16) + ei$$

$$loginfrastructure\ score 16\ =\ \ -6.86 +\ .50 + ei$$

There exists a positive relationship between the infrastructure scores and growth as specified in the equation above. In relation to the scores generated after constructing infrastructure index, it can be evaluated that growth variable of the economy plays a major role in refining health sector. If government emphases upon improving the growth variable of development then infrastructure indicator can be increased by .50units with just 1% increase in growth component. The equation above postulates that the relationship is significant with p values significant at 1% level of significance. R- square specifies that there is almost 55% variance between the indicators.

Chain B: HD to EG

After observing the results of Chain A our analysis explores the relationship by taking PCNSDP at constant prices is taken as dependent variable whereas human development indicators as an independent variable for the three (2004-05, 2011-12 and 2015 -16) years Simple regression analysis has been performed in order to analyse the relationship among the variables.

$$logPCNSDP05\ =\ \beta 0 +\ \beta 1 \log(education\ scores 05) + ei$$

$$logPCNSDP\ =\ 10.58 +\ 0.457 + ei$$

Chain B is the opposite of Chain A. This chain explains the transformation of human development variables into economic growth variables. The equation above specifies that there exists a positive relationship between the education scores and growth component of development. Conferring upon the scores generated after constructing education index, it can be assessed that education plays a key role in improving the growth variable of the economy. If government focuses upon improving the education indicator of human development then growth can be improved by .45 units with a unit rise in investment in education sector. The above relationship is substantial with p

values significant at 1 % level of significance. R- Square specifies that there is almost 44% variance between the indicators.

$$logPCNSDP05 = \beta 0 + \beta 1\log(health\ scores05) + ei$$

$$logPCNSDP = 10.81 + 0.566 + ei$$

The equation above stipulates that there exists a positive association between the health scores and growth component of an economy. According to the scores calculated, it can be observed that health indicators play an important role in improving the growth variable of the economy. If focus of the government is upon improving the health indicator of human development then growth can be increased by .56 units with a unit rise in investment in health sector. The relationship specifies that the association among the variables are significant with p values significant at 1 % level of significance. R- square specifies that there is almost 52% variance between the indicators.

$$logPCNSDP05 = \beta 0 + \beta 1\log(infrastructurescores\ 05) + ei$$

$$logPCNSDP = 10.13 + 0.344 + ei$$

The association between the infrastructure scores and growth component is strong and positive as specified in the equation above. As per the scores generated after constructing infrastructure index, it can be assessed that infrastructure plays a major role in improving the growth variable of the economy. If government focusses upon improving the infrastructure indicator of human development then growth can be increased by .34 units with just 1unit investment in infrastructure sector. The relationship is significant with p values significant at 5% level of significance. R-square specifies that there is almost 20% variance between the indicators.

Above equations explains the numerical variability of dependent variable on independent variables. In the year 2004-05 health variable of human development plays a viable role in improving growth of Indian states.

Regression analysis for the year 2011-12

$$logPCNSDP12 = \beta 0 + \beta 1\log(educationscores12) + ei$$

$$logPCNSDP = 11.36 + 1.185 + ei$$

The equation postulates that there exists a positive relationship between the education scores and growth component of development. From the scores generated after constructing education index, it can be weighed that education plays a major role in improving the growth variable of the economy. If government focuses upon improving the education indicator of human development then growth can be augmented by 1.18 units with just 1unit investment in education sector. The association above specifies the relationship is significant with p values significant at 1 % level of significance. R- square specifies that there is almost 70% variance between the indicators.

$$logPCNSDP12 = \beta 0 + \beta 1\log(health\ scores12) + ei$$

$$log\ PCNSDP = 10.32 + 0.523 + ei$$

A positive relationship is observed between the health scores and growth component of development. According to the scores generated after constructing health index, it can be observed that health plays a major role in improving the growth variable of the economy. If government focuses upon improving the health indicator of human development then growth can be improved by .52 units with just 1unit outlay in health sector. The above equation specifies the relationship with p values significant at 1 % level of significance. R- Square specifies that there is almost 42% variance between the indicators.

$$logPCNSDP12 = \beta 0 + \beta 1\log(infrastructurescores\ 12) + ei$$

$$logPCNSDP = 11.81 + 0.950 + ei$$

The equation specifies that there exists a positive relationship between the infrastructure scores and growth component of development. As per the scores calculated after constructing infrastructure index, it can be evaluated that infrastructure plays an important role in improving the growth variable of the economy. If government focuses upon improving the infrastructure indicator of human development then growth can be amplified by .95 units with just 1unit outlay

in infrastructure sector. The above equation specifies the relationship with p values significant at 1 % level of significance. R- Square specifies that there is almost 66% variance between the indicators.

Above equations explains the numerical variability of dependent variable on independent variables. In the year 2011-12 education variable of human development plays a viable role in improving growth of Indian states.

Regression analysis for the year 2015-16

$$logPCNSDP16 = \beta 0 + \beta 1\log(educationscores16) + ei$$

$$logPCNSDP = 11.93 + .96 + ei$$

Positive association exists among the education scores and growth component of development as specified from the above equation. From the scores generated after constructing education index, it can be assessed that education plays a major role in improving the growth variable of the economy. If government focuses upon improving the education indicator of human development then growth can be improved by .96 units with just 1unit investment in education sector. The above equation postulates the relationship with p values substantial at 1 % level of significance. R- Square specifies that there is almost 51% variance between the indicators.

$$logPCNSDP16 = \beta 0 + \beta 1\log(health\ scores16) + ei$$

$$logPCNSDP = 12.11 + 0.742 + ei$$

The equation specifies the positive relationship exists between the health index and growth component of development. In accordance to the scores generated after constructing health index, it can be assessed that health plays a major role in improving the growth variable of the economy. If government focuses upon improving the health indicator of human development then growth can be improved by .74 units with just 1unit investment in health sector. The above equation specifies the relationship with p values significant at 1 % level of significance. R- Square specifies that there is almost 57% variance between the indicators.

$$logPCNSDP16 = \beta 0 + \beta 1 \log(infrastructurescores\ 16) + ei$$

$$logPCNSDP = 12.55 + 1.094 + ei$$

The above equation specifies the positive association between the infrastructure scores and growth. Conferring to the scores generated after constructing infrastructure index, it can be assessed that infrastructure plays a major role in improving the growth variable of the economy. If government focuses upon improving the infrastructure indicator of human development then growth can be increased by 1.09units with just 1-unit investment in infrastructure sector. The above equation specifies the relationship with p values significant at 1 % level of significance. R- square specifies that there is almost 55% variance between the indicators.

Above equations explains the numerical variability of dependent variable on independent variables. In the year 2015-16 infrastructure variable of human development plays a viable role in improving growth of Indian states.

For Indian states it can analysed that for the year 2004-05 Chain A works more profoundly which means growth transformation has a much larger impact then human development indicators. For the year 2011-12 and 2015-16 except for health indicator Chain B works more profoundly then Chain A. From various literature review it can be observed that for Indian states it is Chain B that works more profoundly then Chain A.

5.9. Step wise Regression Analysis

For exploring further, the association among the variables we have applied step wise regression analysis technique. Combination of both forward and backward selection techniques is used in step wise regression technique. After each step a variable is added in the model and it is checked that whether their significance level has been reduced below the specified tolerance level in step wise regression technique. If the variable is significant then the variable is added but if it is non-significant it is removed. It considers two categories of significance levels in which first type categorize variables which are significant and the second category includes removal of insignificant variables. Stepwise regression requires two significance levels: one for adding variables and other for removing variables. This technique has one

assumption is that cut off probability for variables to be added should be less than the probability for removing variables so that the procedure does not get into an infinite loop.

Table 5.10: Analysis for the year 2004-05

	logpcnsdp05	**Constant**	**Observations**	**R-square**
Logedu05	0.337*** -0.0832	11.01***	22	0.746
loghea05	0.449*** -0.0945			

Source: Author's calculation

The table 5.10 observes the outcome of the step wise regression technique. The analysis preserved each variable as an individual entity and hence human development indicators were found to be substantial. Even when both the forward and backward techniques were applied then also infrastructure variable was found to be insignificant. Human development indicators were found to be significant at 1% level of significance.

Table 5.11 Analysis for the year 2011-12

	Logpcnsdp12	**Constant**	**Observations**	**R-square**
Logedu12	0.623** -0.256	11.39***	22	0.802
Loghea12	0.197* -0.101			
loginf12	0.381* -0.212			

Source: Author's calculation

The above table 5.11 gives the product of the step wise regression technique. Human development indicators as well as physical infrastructure variable were found to be significant when the analysis treated each variable as a separate entity. Even when both the techniques i.e. forward and backward were applied all three indicators were found to be significant. Education indicator was found to be significant at 5% level of

significance whereas health and infrastructure indicator were found to be significant at 10% level of significance.

Table 5.12 Analysis for the year 2015-16

	Logpcnsdp15	**Constant**	**Observations**	**R-square**
Logedu15	.650*** .160	12.32***	22	0.77
Loghea15	0.549*** 0.116			

Source: Author's calculation

The step wise regression technique for the year 2015-16 is analysed in the above table 5.12. Human development indicators were found to be significant. The analysis treated each variable as a separate entity and hence physical infrastructure variables were found to be insignificant. Even when both the forward and backward techniques were applied all physical infrastructure indicator was found to be insignificant. Human development indicators were found to be significant at 1% level of significance.

5.10. Concluding Remarks

The chapter takes into consideration the roles of addendum variables in the development of the economy. From the data above it can be analysed that not only education and health play a major role in development of the economy but the role of physical infrastructure cannot be ignored. Cross sectional analysis of the data reveals that education that has played a major role in encompassing the growth of an economy. However, we cannot ignore the role of health and infrastructure indicator. Step wise regression observed that infrastructure indicator has not been significant except for the year 2011-12 hence for encompassing development all the three indicators and their growth is necessary. From the correlation and regression analysis it can be assessed that without the simultaneous linkage between human development as well as physical development and economic growth one cannot assure development. In the end it is feasible to say that there exists an interlinkage between human development and economic growth.

Chapter 6

INTERLINKAGE BETWEEN HUMAN DEVELOPMENT, PHYSICAL INFRASTRUCTURE INDICATORS AND ECONOMIC GROWTH: A STUDY ANALYSIS OF UTTAR PRADESH AND KERALA ECONOMY.

6.1. Introduction

In the last two chapters, it has been analysed that development cannot be attained if human development doesn't presuppose economic growth and vice- versa. The interlinkages between these two ends and means of development are very necessary for attaining development. State wise analysis explains the disparities existing among the states in terms of human, physical infrastructure and growth component of development. States like that of Kerala, Uttarakhand, Delhi etc. have performed well in terms all types of indexes while that of Uttar Pradesh, Bihar and West Bengal remain among the least Developing state from decades.

This chapter is prepared to accomplish the second last objective of the thesis i.e. to analyse the relationship between Human development and physical infrastructure indicators and Economic Growth indicators in Uttar Pradesh and Kerala districts. Keeping this objective into consideration separate human development and physical infrastructure indexes have been prepared for both the states separately. A detailed analysis has been performed to study the interdependence of human development indicators and economic growth indicators on each other. The methodology is same as described in the last chapter.

6.2. Uttar Pradesh

Often the term "Hindi – speaking Heartland" is used to describe the most populous state of the nation. U.P. is located in northern India and is the fourth largest state, in terms of area, in the country after Rajasthan, Madhya Pradesh and Maharashtra. Geographically, the state is located in the Ganga and Yamuna basin which is one of the most fertile tracts of the country. Its geographical area is 2, 40,928 square kilometres which is about 7.3% of the country's area. The borders of the state consist of Bihar to the East, Rajasthan to the West, Uttarakhand and Nepal to the North, Chhattisgarh to the South, Haryana and Delhi to the Northwest, Jharkhand to the

Southeast, and Madhya Pradesh to the Southwest. It is the most populous state having 16.45% of the country's population. Administrative set up of U.P. presently consists of 18 divisions, 75 districts, 307 *tehsils* and 821 development blocks and more than 1 lakh inhabited villages

In terms of number of districts within the jurisdiction, largest divisions are Kanpur, Lucknow and Meerut (each having six districts); and smallest divisions are Azamgarh, Basti, Jhansi, Mirzapur and Saharanpur (each having three districts). In terms of number of *tehsils* within the jurisdiction, largest districts are Allahabad, Azamgarh, Gorakhpur and Bulandshahr (each having seven *tehsils*); and smallest districts are Chitrakoot, Shravasti, Auraiya, Ghaziabad, Shamli and Varanasi (each having two *tehsils*). In terms of number of development blocks within the jurisdiction, largest district is Azamgarh (having twenty-two blocks); and smallest districts are Mahoba, Ghaziabad, Gautam Budh Nagar and Hapur (each having four blocks). U.P. is divided into following four economic regions:

Western region: Western region has districts Saharanpur, Muzaffarnagar, Bijnor, Moradabad, Rampur, Amroha, Meerut, Baghpat, Ghaziabad, Gautam Budh Nagar, Bulandshahr, Aligarh, Hathras, Mathura, Agra, Firozabad, Etah, Mainpuri, Budaun, Bareilly, Pilibhit, Shahjahanpur, Farrukhabad, Kannauj, Etawah, and Auraiya.

Eastern region: Eastern region has districts Pratapgarh, Kaushambi, Allahabad, Faizabad, Ambedkar Nagar, Sultanpur, Bahraich, Shravasti, Balrampur, Gonda, Siddharth Nagar, Basti, Sant Kabir Nagar, Maharajganj, Gorakhpur, Kushinagar, Deoria, Azamgarh, Mau, Ballia, Jaunpur, Ghazipur, Chandauli, Varanasi, Sant Ravidas Nagar, Mirzapur, and Sonbhadra.

Central region: Central region has Lakhimpur Kheri, Sitapur, Hardoi, Unnao, Lucknow, Rae Bareli, Kanpur Nagar, Kanpur Dehat, Fatehpur, and Barabanki.

Bundelkhand region: Bundelkhand region has Jalaun, Jhansi, Lalitpur, Hamirpur, Mahoba, Banda, and Chitrakoot.

6.3. Socio-Economic Profile of Uttar Pradesh

Having the largest number of people, UP is one of the most populous as well as most populous country subdivision in the world. Almost 200 million people or nearly one-sixth of the population of the country are living in U.P. The combined population of U.P. and Maharashtra (the second most populous state) is about 7.27 crore which is considerably greater than the population of the United States of America, the third most populous country of the world. Vast diversity among the ethnic, religious and social groups can be seen within the state. Other religious groups are Muslims, Sikhs, Buddhists, Jains and Christians. As per Census 2011, Hindus constitute 80.6% of the population; Muslims 18.5% of the population; and Sikhs, Buddhists, Jains and Christians remaining 0.9% of the population. As per 2001 Census, Uttar Pradesh, the most populous state in India, is home to the highest numbers of both Hindus and Muslims. By religion, the population in 2011 was Hindus 79.73%, Muslims 19.26%, Sikhs 0.32%, Christians 0.18%, Jains 0.11%, Buddhists 0.10%, and Others 0.30%.

Economically, U.P. is among the most backward states of India. U.P. is one of the states in *"Empowered Action Group"* (a group of most backward states). Other states in this group are Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Odisha, Rajasthan, Uttarakhand and Assam. U.P.'s economy is characterized by slow economic growth, pre-dominance of the agriculture sector with heavy reliance on monsoon, high percentage of small and marginal land holdings, high population pressure, small manufacturing sector, deficiencies in basic infrastructure, and glaring regional imbalances.

Eastern region has highest population in the state and also maximum share in the geographical area of the state. Bundelkhand region has lowest population and minimum share in the geographical area. As per provisional data of census 2011, the population of U.P. in absolute terms increased by more than 3.3 crore during 2001-2011. However, the *decadal growth rate of population* [1](2001-2011) decreased by 5.76% points to 20.09% points in 2011. Region wise, the decadal growth rate of population was highest in western region and lowest in Bundelkhand region. In the

[1]Overview of the total population growth in a particular decade

central region there was greatest decline in the decadal growth rate of population. The decline was of 7.2% point from 26.37% in 1991-2001 to 19.17% in 2001-2011. As per provisional data of census 2011, the *density of population* in U.P. is 828 persons per square kilometre.

6.4. Human development status of Uttar Pradesh

U.P. presents a dismal scenario with regard to economic growth and human development. A vicious circle is operating in the state. There is low level of human development due to low level of income and slow economic growth. Low level of human development, in turn, acts as a constraint on rapid economic progress and restricts the participation of large number of masses in the process of development.

High income alone is not a sufficient measure for ensuring human development of population. Much greater attention has to be paid to other factors like public provision of primary healthcare, sanitation, education, water and food security. Apart from this, high growth rates do not necessarily translate automatically into improvements of human development indicators.

U.P. is a bigger and a politically crucial state from the national perspective and has a unique socio-cultural identity but the state lags behind in good governance. U.P. is witnessing a sluggish growth rate, high poverty, deprivation, exclusion, and poor status of human development.

Though there has been an improvement in the status of human development in U.P. over the years but still it is not satisfactory even after more than five decades of development planning meant for social and economic upliftment of the people.

6.5. Components of human development

6.5.1. Education

Education is a major determinant for the well-being of individuals as it is a key indicator of development in any society. Education level and literacy rates significantly affect the quality of life and demographic indicators like that of fertility rate, mortality rate and migration. There has been a significant improvement in the

proportion of literates since independence. Even though considerable improvement has taken place in the education sector since independence yet India is suffering from largest number of illiterate people in the world.

As per census 2011 provisional data, total number of literates (persons) in U.P. are 11,84,23,805. Of these 8,83,96,557 (74.64%) belong to rural areas and 3,00,27,248 (25.36%) to urban areas. U.P. has highest number of rural literates (88.4 million) and lowest male literacy rate in urban areas (81.75%).

As per census 2011 provisional data literacy rate in U.P. has increased from 56.27% in 2001 to 69.72% in 2011. During the corresponding period literacy rate in rural areas has increased from 52.53% to 67.55% whereas in urban areas it has increased from 69.75% to 77.01%. Urban-rural gap in literacy rate is 9.46% which is lower than all-India urban-rural gap. Decadal change (2001-2011) in total literacy rate is 13.45%, in rural literacy rate 15.02% and in urban literacy.

As per census 2011 provisional data among empowered action group states total literacy rate is highest in Uttarakhand (79.63%) and lowest in Bihar (63.82%). U.P.'s position is sixth in the group. Literacy rate in urban areas is highest in Assam (88.88%) and lowest in U.P. (77.01%). Literacy rate in rural areas is highest in Uttarakhand (77.11%) and lowest in Bihar (61.83%). U.P.'s position in rural areas is fourth in the group. Urban-rural gap in literacy rate is highest in Jharkhand (20.90%) and lowest in Uttarakhand (8.09%). U.P. has second lowest urban-rural gap in literacy rate in the group. Decadal decline (2001-2011) in urban-rural gap in literacy rate was highest in Jharkhand (12.50%) and lowest in Chhattisgarh (2.07%). In U.P. it was 7.76%. As per census 2011 provisional data among empowered action group states, literacy rate of females is highest in Uttarakhand (70.70%) and lowest in Rajasthan (52.66%). U.P.'s position is sixth in the group. Literacy rate of females in urban areas is highest in Assam (85.71%) and lowest in Rajasthan (71.53%). U.P. has second lowest position in urban areas in the group. Literacy rate of females in rural areas is highest in Uttarakhand (66.79%) and lowest in Rajasthan (46.25%). U.P.'s position in rural areas is fourth in the group. There is considerable urban-rural gap in literacy rate of females which indicates the highly unsatisfactory situation of literacy rate of females in rural areas. Urban-rural gap in literacy rate of females is highest in

Jharkhand (26.42%) and lowest in Uttarakhand (13.23%). U.P. has second lowest urban-rural gap in literacy rate of females in the group. Decadal decline (2001-2011) in urban-rural gap in literacy rate of females was highest in Jharkhand (13.65%) and lowest in Chhattisgarh (1.87%). In U.P. it was 8.76%.

Education is not only about quantity aspects but also about quality. District wise index has been computed by using both the aspects of education for the years 2011-12 & 2015-16. Indicators used here to compute index are literacy rate, gross enrolment ratio at both school and higher educational level and pupil- teacher ratio at both school as well as higher educational level. For higher educational level enrolment and pupil teacher ratio has been taken for degree colleges as a proxy.

Gross Enrolment Ratio and *Net Enrolment Ratio* are the two most important indicators of enrolment. Gross enrolment ratio is improving over the years but it declines at higher levels of education. In U.P. gross enrolment ratio in 2007-08 decreased with the level of education, that is, highest in primary level and lowest in secondary and higher secondary level. Percentage increase in gross enrolment ratio from 2004-05 to 2007-08 improved with level of education, that is lowest percentage increase was in primary level and highest percentage increase was in secondary and higher secondary level. After 2007-08, as per *District Elementary Education Report Card 2011-12* of *District Information System for Education* there are inter-district variations in elementary education indicators. There are *two broad aspects* of school education – *access to education* and *educational progress*. Attainment of universal elementary education is a constitutional directive in India. With the enactment of the *Right of Children to Free and Compulsory Education Act, 2009*, which came into force on 1 April 2010, elementary education has become a fundamental right. Act provides for the right of children of 6-14 years to free and compulsory education till completion of elementary education in a neighbourhood school. It is the obligation of appropriate government to provide free elementary education to children. *Sarva Shiksha Abhiyan* is the main programme for universalizing elementary education. States have notified their right to education rules. U.P. Government notified the *Uttar Pradesh Right of Children to Free and Compulsory Education Rules* on *July 27, 2011*.

One of the guiding parameters of universalization of elementary education is *universal enrolment* Total primary enrolment, total upper primary enrolment, retention rate at primary level and transition rate from primary to upper primary are highest in Lucknow and lowest in Bulandshahr. Pupil-teacher ratio is highest in Lucknow and lowest in Bulandshahr.

Table 6.1: District wise Education Scores and Ranking

States	Education Scores 2011-12	Rank	Education Scores 2015-16	Rank 2015-16
Agra	0.619270665	16	0.700075544	9
Aligarh	0.591876297	25	0.665049392	14
Allahabad	0.585795627	27	0.658889853	15
Ambedkar Nagar	0.550625002	36	0.540550828	41
Auraiya	0.902794644	1	0.879312	1
Azamgarh	0.60140943	24	0.556035664	38
Budaun	0.415813989	63	0.420362931	59
Baghpat	0.571803073	31	0.604591225	24
Bahraich	0.309383825	68	0.247763793	69
Ballia	0.56424631	33	0.608196746	22
Balrampur	0.368869757	66	0.271391485	68
Banda	0.579932678	28	0.589556549	32
Barabanki	0.466047697	58	0.421565611	57
Bareilly	0.531353408	40	0.576614297	34
Basti	0.525535249	41	0.446815217	53
Bijnor	0.586189212	26	0.596366055	26
Bulandshahar	0.53265992	39	0.595343259	27
Chandauli	0.490822693	48	0.459138965	51
Chitrakoot	0.484241653	54	0.568402646	35
Deoria	0.645407092	14	0.602362472	25
Etah	0.514864112	42	0.610902657	21
Etawah	0.730857335	4	0.796674236	2

Faizabad	0.56652543	32	0.533289717	42
Farrukhabad	0.692795114	5	0.695918719	10
Fatehpur	0.651883448	10	0.665626898	13
Firozabad	0.540029533	37	0.604734681	23
G B Nagar	0.579641704	29	0.613833074	20
Ghaziabad	0.504257158	44	0.552082231	39
Ghazipur	0.610517066	21	0.593635199	29
Gonda	0.408497028	65	0.354203613	65
Gorakhpur	0.606550276	22	0.593744051	28
Hamirpur	0.613540001	20	0.648656711	16
Hardoi	0.514594602	43	0.460664165	50
Hathras	0.64730165	13	0.66668879	12
Jalaun	0.692432268	6	0.73972566	5
Jaunpur	0.617660248	18	0.544948641	40
Jhansi	0.603077192	23	0.681946926	11
J P Nagar	0.65003334	12	0.63723161	17
Kannauj	0.66940133	8	0.700565028	8
Kanpur Dehat	0.782044557	2	0.736080635	6
KanpurNagar	0.745753017	3	0.756007836	4
Kaushambi	0.502633917	47	0.592964521	30
Kheri	0.357136641	67	0.213331345	70
Kushinagar	0.441249817	61	0.41555599	60
Lalitpur	0.456272979	60	0.430156555	56
Lucknow	0.673320198	7	0.567856712	36
Mahoba	0.50344637	46	0.346118086	66
Maharajganj	0.534212059	38	0.626854169	19
Mainpuri	0.654874378	9	0.775747634	3
Mathura	0.642094942	15	0.700937626	7
Mau	0.618653118	17	0.502477583	46
Meerut	0.573071101	30	0.631070626	18
Mirzapur	0.485355726	52	0.474127589	49

Moradabad	0.48429334	53	0.517119047	44
Muzaffarnagar	0.468752518	56	0.433491782	55
Pilibhit	0.462486851	59	0.454611069	52
Pratapgarh	0.650565419	11	0.51301334	45
Rae Bareli	0.438534538	62	0.442894352	54
Rampur	0.410323318	64	0.420961476	58
Saharanpur	0.558978685	35	0.590070761	31
Sant Kabir Nagar	0.473284188	55	0.373086587	63
S R Nagar (Bhadohi)	0.561340645	34	0.577933909	33
Shahjahanpur	0.48956302	50	0.528940005	43
Shravasti	0.248641222	70	0.308276323	67
Siddharthnagar	0.273411657	69	0.37551285	62
Sitapur	0.48775451	51	0.36020981	64
Sonbhadra	0.468264774	57	0.478305257	48
Sultanpur	0.489617304	49	0.40251016	61
Unnao	0.50373392	45	0.487032566	47
Varanasi	0.61530276	19	0.557754985	37
MEAN	0.548478636	35.5	0.547063833	35.5
SD	0.112775501	20.205197	0.134188541	20.20519735
CV	0.205615121	0.5691605	0.245288635	0.569160489
MEAN +SD	0.661254137	55.705197	0.681252374	55.70519735
MEAN -SD	0.435703135	15.294803	0.412875292	15.29480265

Source: Statistical Abstract, Uttar Pradesh 2016,2011
District Wise Development Indicators, Uttar Pradesh 2016,2011

The table above 6.1(Appendix 6.1 A) depicts the education status of the Uttar Pradesh districts at two point of time i.e. 2011 -12 and 2015-16. Education can be measured with many indicators such as literacy rate, gross enrolment rate, pupil- teacher ratio etc. In this chapter for the purpose of constructing the index both the quantity as well as quality indicators have been used. The indicators used to construct the index are literacy rate, gross enrolment ratio at school level, gross enrolment ratio at higher education, pupil- teacher ratio at school level and pupil teacher ratio at higher

education level. The aforesaid methodology has been applied for constructing the index for districts.

The table above 6.1 depicts that Western Uttar Pradesh districts are far ahead from other zones of UP. Auraiya district has attained the topmost position in both the years consecutively; following it is again the Western UP district Etawah with 4th position in 2011 jumping to 2nd spot in 2015-16. Though for the year 2011 the second and third position was attained by the districts of Central UP i.e. Kanpur Dehat and Kanpur Nagar but a shift in their position to 6th and 4th position in 2015-16 can be witnessed. Jalaun district of Bundelkhand region has shown an improvement in the raking from 2011-12 (6th) to 2015-16 (5th). The above table formalizes a clear picture that Western region and the central region are most developed regions of the state while Eastern region is the least developed region.

To anatomize the inter district disparities within the state coeff. of variation has been calculated. For the year 2011-12 the coefficient of variation was 0.20 among districts while it has increased to 0.24 in 2015-16. This shows that one of the reasons for the backward districts is the presence of disparities and inequalities existing among the districts.

6.5.2. Health

Health is a vital pre-requisite and an essential consideration for good quality of life. Investment in health is a developmental imperative as socio-economic development of any nation is highly dependent upon the health of its workforce. *World Health Organization's Ottawa Charter for Health Promotion (1986)* mentions that health is seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Investment on health is investment on man and on improving the quality of his/her life. Health has to be viewed in its totality as a part of the strategy of human resource development.

There are wide variations in India in terms of health and access to health care services. These variations are between states, rural and urban areas, social groups and religious communities. Heath indicators are far better in southern states as compared

to northern and eastern states. The situation is much worse in empowered action group states, rural areas and urban slums.

There has been some progress over the years in U.P. in health indicators like that life expectancy, crude birth rate, crude death rate, total fertility rate, infant mortality rate, and maternal mortality ratio but the situation is not satisfactory. There are wide variations across regions and income groups in health-related parameters. The poor and women bear the brunt of high disease and disability burden.

Role of public sector in health service delivery is very pronounced in U.P. It is mostly due to the efforts of the government that mortality rate has reduced. Public sector has a wide mandate to fulfil in health sector but its capacities are limited in terms of human, financial and material resources. Even though priority is given to the health care needs of the people at grass roots level but efforts do not seem to yield much positive outcomes. Public sector is large enough but a large proportion of people do not have access to it for various reasons. The quality of health care being provided by is found to be lacking particularly at the grass roots level. There is a very large number of private health service providers in the state. People have an easy access to them but in the absence of effective regulation a serious issue of the quality of private provider's remains. Due to deficiencies in public health care system people are forced to incur high costs for private health care. For poor people high out-of-pocket expenditure [2]on health services matters most and these further pushes them to abject poverty. Health care in the state is facing the challenges arising out of increasing demand, limited access and lack of quality. Health outcomes of people have to be improved if pro-poor growth and real socio-economic development have to be brought about. This requires addressing the challenges arising out of high mortality and morbidity.

Life expectancy of the population has been increasing consistently but slowly. The gap between life expectancy in rural and urban areas is being gradually bridged. At all-India level, life expectancy of persons at birth has increased to 63.5 years and in U.P. to 60.0 years in 2004. There is inter-state, male-female and rural-urban variations

[2]Expenses paid by the family directly to the health care

in life expectancy at birth. These are due to differences in literacy rate, income level, and socio-economic conditions and beliefs. The indicators used for computing health index are: IMR, institutional delivery, number of PHC'S & CHC's, number of homeopathic doctors per lakh population.

Table 6.2: District wise Health Scores and Ranking

Districts	Health Scores 2011-12	Rank	Health Scores 2015-16	Rank
Agra	0.459283579	33	0.408916575	36
Aligarh	0.381251127	55	0.319722976	59
Allahabad	0.318437279	64	0.325515288	57
Ambedkar Nagar	0.45201046	34	0.457513198	25
Auraiya	0.489578794	24	0.541718911	13
Azamgarh	0.517318152	22	0.392650435	40
Budaun	0.283356989	68	0.264823241	62
Baghpat	0.577343124	16	0.59144481	9
Bahraich	0.269720098	69	0.230859441	68
Ballia	0.705263482	8	0.62870838	5
Balrampur	0.195840413	70	0.254915299	64
Banda	0.800190313	2	0.608285484	6
Barabanki	0.484425442	26	0.377157105	43
Bareilly	0.294709045	67	0.301901806	60
Basti	0.482957617	27	0.432753876	30
Bijnor	0.400124396	48	0.370713844	45
Bulandshahar	0.448477563	37	0.374392295	44
Chandauli	0.496427182	23	0.500840343	18
Chitrakoot	0.745021003	4	0.551040005	10
Deoria	0.57417113	17	0.443022629	27
Etah	0.450566856	35	0.356612874	51
Etawah	0.700603288	9	0.530989455	14
Faizabad	0.405288658	45	0.353440467	53

Farrukhabad	0.368775679	57	0.36491163	48
Fatehpur	0.638375018	12	0.549309023	12
Firozabad	0.475377237	30	0.356071973	52
G B Nagar	0.397265546	49	0.517706825	16
Ghaziabad	0.441541114	38	0.402466974	38
Ghazipur	0.47781182	29	0.343229436	55
Gonda	0.347821722	62	0.298351029	61
Gorakhpur	0.482577336	28	0.467372023	24
Hamirpur	0.912087899	1	0.928847009	1
Hardoi	0.382601416	53	0.342451029	56
Hathras	0.588272465	14	0.123996715	70
Jalaun	0.688336302	10	0.657557518	4
Jaunpur	0.465589375	32	0.38046996	41
Jhansi	0.669309964	11	0.526537618	15
J P Nagar	0.373272924	56	0.45504294	26
Kannauj	0.431606242	43	0.378950494	42
Kanpur Dehat	0.488994477	25	0.432717968	31
KanpurNagar	0.473400974	31	0.469900543	23
Kaushambi	0.40732912	44	0.36644493	47
Kheri	0.366853853	58	0.248369145	66
Kushinagar	0.449243402	36	0.414440379	35
Lalitpur	0.776338966	3	0.786576057	2
Lucknow	0.582190541	15	0.607205377	7
Mahoba	0.728491193	5	0.70205311	3
Maharajganj	0.403158309	46	0.359518505	50
Mainpuri	0.592983381	13	0.479290393	19
Mathura	0.536437554	20	0.433199272	29
Mau	0.53638955	21	0.473916255	20
Meerut	0.366846187	59	0.364047564	49
Mirzapur	0.434392034	42	0.415953787	34
Moradabad	0.300516842	66	0.32023657	58

Muzaffarnagar	0.437625257	41	0.367122841	46
Pilibhit	0.381533488	54	0.395907825	39
Pratapgarh	0.571787568	18	0.47314032	21
Rae Bareli	0.716327423	7	0.60031842	8
Rampur	0.396503249	50	0.420619586	33
Saharanpur	0.329298791	63	0.258540778	63
Sant Kabir Nagar	0.393641381	51	0.470052727	22
S R Nagar (Bhadohi)	0.439583411	40	0.432636016	32
Shahjahanpur	0.305868975	65	0.232697048	67
Shravasti	0.357784541	60	0.252956108	65
Siddharthnagar	0.400840898	47	0.213423902	69
Sitapur	0.386956182	52	0.346755851	54
Sonbhadra	0.440172959	39	0.436263405	28
Sultanpur	0.716847486	6	0.550923697	11
Unnao	0.550986829	19	0.505349951	17
Varanasi	0.356777188	61	0.408351802	37
MEAN	0.481415572	35.5	0.427859158	35.5
SD	0.141890455	20.20519735	0.135478559	20.20519735
CV	0.294735907	0.569160489	0.316642886	0.569160489
MEAN + SD	0.623306028	55.70519735	0.563337717	55.70519735
MEAN- SD	0.339525117	15.29480265	0.2923806	15.29480265

Source: Statistical Abstract, Uttar Pradesh 2016,2011
District Wise Development Indicators, Uttar Pradesh 2016,2011

The above table 6.2(Appendix 6.2 A) culminates the health status of the districts of Uttar Pradesh. The aforesaid methodology has been applied for the purpose of constructing the health index of the districts of Uttar Pradesh. The results of the health index are quite contra distinct from the education index. The tombstone district Hamirpur is from Bundelkhand region which flags off the list for both the year i.e. 2011-12 & 2015-16. Mostly districts from Bundelkhand region have secured the top ten rankings for both the years. Though ups and downs in the rankings can be easily

witnessed. After the Bundelkhand region it is the districts of Eastern region which are at par in terms of health indicator of human developments. Lucknow and Rae Bareilly districts of Central region have made their place among the top 10 ranking. Districts of Central and Western Uttar Pradesh are among the least developed or backward states in terms of health indicator of human development.

6.5.3. Physical Infrastructure

Physical infrastructure is one of the necessary indicators of development. There is a positive effect of physical infrastructure on growth. District wise index has been computed by taking into consideration physical infrastructure indicators such as roads, net irrigated area, number of total government educational institutions, number of hospitals, storage capacity, sanitation facilities, water facilities, number of LPG consumers and power consumption per capita.

Table 6.3 District wise Physical Infrastructure Scores and Ranking

District	Infrastructure scores 2011-12	Rank	Infrastructure Scores 2015-16	Rank
Agra	0.444587064	22	0.391857568	17
Aligarh	0.464939525	15	0.381475577	21
Allahabad	0.367836117	46	0.276541454	58
Ambedkar Nagar	0.430648051	30	0.388928595	18
Auraiya	0.419679623	34	0.350511059	33
Azamgarh	0.422150653	33	0.32188968	46
Budaun	0.390618474	43	0.256124538	64
Baghpat	0.366317532	47	0.420863775	8
Bahraich	0.299802361	66	0.213077036	69
Ballia	0.40979111	39	0.368645482	27
Balrampur	0.300635798	65	0.205542136	70
Banda	0.316993258	61	0.286166749	55
Barabanki	0.436224817	29	0.315825929	47
Bareilly	0.41722386	37	0.363397674	28

Basti	0.471367108	11	0.302124447	50
Bijnor	0.418216398	36	0.373426493	25
Bulandshahar	0.505957614	7	0.516536408	3
Chandauli	0.344411333	55	0.2138928	68
Chitrakoot	0.247378509	68	0.350417356	34
Deoria	0.418977766	35	0.352150886	31
Etah	0.467588555	14	0.350696335	32
Etawah	0.548609103	4	0.421046396	7
Faizabad	0.430129359	31	0.381178458	22
Farrukhabad	0.436305339	28	0.354484895	30
Fatehpur	0.351762407	51	0.332923536	39
Firozabad	0.51329712	6	0.330352496	40
G. B. Nagar	0.899147394	1	0.405682937	11
Ghaziabad	0.5881887	3	0.525463228	2
Ghazipur	0.408153975	40	0.345834806	36
Gonda	0.341318016	56	0.30525677	49
Gorakhpur	0.424804568	32	0.344118624	37
Hamirpur	0.398092322	41	0.394151054	16
Hardoi	0.345346499	54	0.322705678	44
Hathras	0.454725121	18	0.443957535	5
Jalaun	0.444134672	23	0.415068899	9
Jaunpur	0.364332838	49	0.297181559	52
Jhansi	0.378922758	44	0.322380727	45
JP Nagar	0.47845304	10	0.369834567	26
Kannauj	0.44603528	21	0.402876014	12
Kanpur Dehat	0.397511639	42	0.362260767	29
Kanpur Nagar	0.501752441	8	0.437591701	6
Kaushambi	0.310345803	62	0.259591648	63
Kheri	0.349024387	52	0.299197245	51
Kushinagar	0.359476193	50	0.285302338	56
Lalitpur	0.415394907	38	0.305270404	48

Lucknow	0.593644203	2	0.536565678	1
Mahoba	0.274197216	67	0.268714323	60
Maharajganj	0.339990495	57	0.242067211	66
Mainpuri	0.457363991	17	0.401285028	13
Mathura	0.44781496	19	0.336841499	38
Mau	0.438210577	27	0.377601682	23
Meerut	0.541739469	5	0.447798955	4
Mirzapur	0.302314443	64	0.260359522	62
Moradabad	0.440267342	25	0.40664644	10
Muzaffarnagar	0.470328391	12	0.401134877	15
Pilibhit	0.439439378	26	0.401151722	14
Pratapgarh	0.373614931	45	0.346076593	35
Raebareli	0.365028078	48	0.292578517	53
Rampur	0.44637018	20	0.326482044	43
Saharanpur	0.469248755	13	0.381858849	20
Sant Kabir Nagar	0.339219073	58	0.234749867	67
Sant Ravidas Nagar	0.30734138	63	0.276413719	59
Shahjahanpur	0.478702968	9	0.327901022	41
Shravasti	0.243577906	69	0.246592071	65
Siddharthnagar	0.335725917	59	0.292001373	54
Sitapur	0.346940552	53	0.281344349	57
Sonbhadra	0.222732372	70	0.267625864	61
Sultanpur	0.332086603	60	0.37759053	24
Unnao	0.459192126	16	0.327329297	42
Varanasi	0.442942136	24	0.385385502	19
MEAN	0.412209184	35.5	0.344398583	35.5
SD	0.095470138	20.06240265	0.069334289	20.06240265
CV	0.231606042	0.565138103	0.201319902	0.565138103
MEAN +SD	0.507679321	55.56240265	0.413732872	55.56240265
MEAN- SD	0.316739046	15.43759735	0.275064294	15.43759735

Source: Statistical Abstract, Uttar Pradesh 2016,2011
District Wise Development Indicators, Uttar Pradesh 2016,2011

The above table 6.3(Appendix 6.3 A) here portrays district wise physical infrastructure of Uttar Pradesh. Physical infrastructure is considered to be one of the paramount indicators for the growth indicator of development. Divergent results can be noticed for the districts in terms of infrastructure. Widened ups & downs in the rankings among the districts at two points of time can be perceived. Gautam Budh Nagar district of Western Uttar Pradesh flags off the list for the year 2011 but a sharp shift can be seen for the year 2016. The district slips to 11th position in 2016. Ghaziabad district has secured the 3rd and 2nd position consecutively for both the two periods. Western Uttar Pradesh districts have secured the top ten positions for the infrastructure index. Lucknow district of Central U.P has witnessed good development in terms of infrastructure. For the year 2015-16 the district has secured the topmost ranking. Bundelkhand and Central regions have been developed or are moderately developed. But it is Eastern U.P which has witnessed the lowest development in the index. Among four districts the number of educational institutions is highest in Lucknow and lowest in Barabanki. Number of primary schools, senior primary schools and intermediate schools is highest in Lucknow and lowest in Barabanki. Number of optional education sectors is highest in Barabanki. There is no optional education sector in Ballia and Lucknow. Number of degree colleges is highest in Ballia and lowest in Barabanki and Bulandshahr. Number of master degree colleges is highest in Ballia and lowest in Barabanki. Lucknow has highest number of universities. There is no university in Ballia and Bulandshahr. Number of industrial training institutes is highest in Bulandshahr and lowest in Barabanki. Number of polytechnics is highest in Lucknow and lowest in Barabanki. There is no teacher training institute in all 4 districts. Barabanki has highest number of engineering colleges. There is no engineering college in Ballia and Bulandshahr. Lucknow has medical college whereas Ballia, Barabanki and Bulandshahr have no medical college.

6.6. Classification of Districts on the basis of Index scores

Table 6.4: Education Index Classification

Districts	2011-12	2015-16
Agra	DEV	HD
Aligarh	DEV	DEV
Allahabad	DEV	DEV
Ambedkar Nagar	DEV	MDEV
Auraiya	HD	HD
Azamgarh	DEV	DEV
Budaun	BACK	MDEV
Baghpat	DEV	DEV
Bahraich	BACK	BACK
Ballia	DEV	DEV
Balrampur	BACK	BACK
Banda	DEV	DEV
Barabanki	MDEV	MDEV
Bareilly	MDEV	DEV
Basti	MDEV	MDEV
Bijnor	DEV	DEV
Bulandshahar	MDEV	DEV
Chandauli	MDEV	MDEV
Chitrakoot	MDEV	DEV
Deoria	DEV	DEV
Etah	MDEV	DEV
Etawah	HD	HD
Faizabad	DEV	MDEV
Farrukhabad	HD	HD
Fatehpur	DEV	DEV
Firozabad	MDEV	DEV
G B Nagar	DEV	DEV

Ghaziabad	MDEV	DEV
Ghazipur	DEV	DEV
Gonda	BACK	BACK
Gorakhpur	DEV	DEV
Hamirpur	DEV	DEV
Hardoi	MDEV	MDEV
Hathras	DEV	DEV
Jalaun	HD	HD
Jaunpur	DEV	MDEV
Jhansi	DEV	HD
J P Nagar	DEV	DEV
Kannauj	HD	HD
Kanpur Dehat	HD	HD
KanpurNagar	HD	HD
Kaushambi	MDEV	DEV
Kheri	BACK	BACK
Kushinagar	MDEV	BACK
Lalitpur	MDEV	MDEV
Lucknow	HD	DEV
Mahoba	MDEV	BACK
Maharajganj	MDEV	DEV
Mainpuri	DEV	HD
Mathura	DEV	HD
Mau	DEV	MDEV
Meerut	DEV	DEV
Mirzapur	MDEV	MDEV
Moradabad	MDEV	MDEV
Muzaffarnagar	MDEV	MDEV
Pilibhit	MDEV	MDEV
Pratapgarh	DEV	MDEV
Rae Bareli	MDEV	MDEV

Rampur	BACK	MDEV
Saharanpur	DEV	DEV
Sant Kabir Nagar	MDEV	BACK
S R Nagar (Bhadohi)	DEV	DEV
Shahjahanpur	MDEV	MDEV
Shravasti	BACK	BACK
Siddharthnagar	BACK	BACK
Sitapur	MDEV	BACK
Sonbhadra	MDEV	MDEV
Sultanpur	MDEV	BACK
Unnao	MDEV	MDEV
Varanasi	DEV	DEV

Source: Calculated from Statistical Abstract, Uttar Pradesh 2016,2011
District Wise Development Indicators, Uttar Pradesh 2016,2011

Based on the above education scores obtained, the districts are grouped as backward, moderately developed, developed and highly developed districts. The criteria used for the classification are: those districts whose scores are less than mean minus standard deviation are grouped as backward; the districts with scores between mean minus standard deviation and mean are grouped as moderately developed; the districts with scores between mean and mean plus standard deviation are grouped as developed; and those districts whose scores exceed mean plus standard deviation are highly developed districts. The grouping is presented in table above 6.4 exemplify the classification of districts into these groups. As stated above it is Western and Central regions districts that are highly developed. According to *"Niyojan" Atlas* of U.P. Gautam Budh Nagar has highest and Sant Kabir Nagar has lowest value of composite index of development. An analysis of all the five ranges of index shows that majority of districts (66.66%) having very high value of composite index of development belong to western region (Gautam Budh Nagar, Ghaziabad, Meerut, Mathura) and rest (33.33%) belong to central region (Lucknow and Kanpur Nagar). 70% of districts having high value of composite index of development belong to western region; 15% to eastern region; 10% to central region; and 5% to Bundelkhand region. Jalaun is the

only district of Bundelkhand region having high value of composite index of Development.38.46% of districts having medium value of composite index of development belongs to western region; 30.77% to eastern region; 23.08% to Bundelkhand region; and 7.70% to central region. Kanpur Nagar, an industrialized and urbanized district of central region, had highest value of education index in the state. Of ten districts five were from western region, three from central region and one each from Bundelkhand and eastern regions. Varanasi of eastern region is an urbanized district. (HDR UP 2006). Similar findings were observed in the study by Mourya et.al. (2015).

Table 6.5: Health Index Classification

Districts	**2011-12**	**2015-16**
Agra	MDEV	MDEV
Aligarh	MDEV	MDEV
Allahabad	BACK	MDEV
Ambedkar Nagar	MDEV	DEV
Auraiya	DEV	DEV
Azamgarh	DEV	MDEV
Budaun	BACK	BACK
Baghpat	DEV	HD
Bahraich	BACK	BACK
Ballia	HD	HD
Balrampur	BACK	BACK
Banda	HD	HD
Barabanki	DEV	MDEV
Bareilly	BACK	MDEV
Basti	DEV	DEV
Bijnor	MDEV	MDEV
Bulandshahar	MDEV	MDEV
Chandauli	DEV	DEV

Chitrakoot	HD	DEV
Deoria	DEV	DEV
Etah	MDEV	MDEV
Etawah	HD	DEV
Faizabad	MDEV	MDEV
Farrukhabad	MDEV	MDEV
Fatehpur	HD	DEV
Firozabad	MDEV	MDEV
G B Nagar	MDEV	DEV
Ghaziabad	MDEV	MDEV
Ghazipur	MDEV	MDEV
Gonda	MDEV	MDEV
Gorakhpur	DEV	DEV
Hamirpur	HD	HD
Hardoi	MDEV	MDEV
Hathras	DEV	BACK
Jalaun	HD	HD
Jaunpur	MDEV	MDEV
Jhansi	HD	DEV
J P Nagar	MDEV	DEV
Kannauj	MDEV	MDEV
Kanpur Dehat	DEV	DEV
KanpurNagar	MDEV	DEV
Kaushambi	MDEV	MDEV
Kheri	MDEV	BACK
Kushinagar	MDEV	MDEV
Lalitpur	HD	HD
Lucknow	DEV	HD
Mahoba	HD	HD
Maharajganj	MDEV	MDEV
Mainpuri	DEV	DEV

Mathura	DEV	DEV
Mau	DEV	DEV
Meerut	MDEV	MDEV
Mirzapur	MDEV	MDEV
Moradabad	BACK	MDEV
Muzaffarnagar	MDEV	MDEV
Pilibhit	MDEV	MDEV
Pratapgarh	DEV	DEV
Rae Bareli	HD	HD
Rampur	MDEV	MDEV
Saharanpur	BACK	BACK
Sant Kabir Nagar	MDEV	DEV
Sant Ravidas Nagar (Bhadohi)	MDEV	DEV
Shahjahanpur	BACK	BACK
Shravasti	MDEV	BACK
Siddharthnagar	MDEV	BACK
Sitapur	MDEV	MDEV
Sonbhadra	MDEV	DEV
Sultanpur	HD	DEV
Unnao	MDEV	DEV
Varanasi	MDEV	MDEV

Source: Calculated from Statistical Abstract, Uttar Pradesh 2016,2011
District Wise Development Indicators, Uttar Pradesh 2016,2011

Based on the above health scores obtained, the districts are grouped as backward, moderately developed, developed and highly developed districts. The criteria used for the classification are: those districts whose scores are less than mean minus standard deviation are grouped as backward; the districts with scores between mean minus standard deviation and mean are grouped as moderately developed; the districts with scores between mean and mean plus standard deviation are grouped as developed; and those districts whose scores exceed mean plus standard deviation are highly

developed districts. The above table 6.5 exemplify the classification of districts into these groups. As already mentioned above that the results of health index are quite contra distinct from that of education index. In terms of health indicator, it is Bundelkhand and Eastern region of UP that are highly developed. Almost all the districts of Bundelkhand region are highly developed. Though some of the districts from Central region also fall in high developed category. The reason behind the highly developed status of Bundelkhand region can be related to the presence of public infrastructure in these areas whereas other regions have a greater dominance of private infrastructure. Similar findings can be found out in the reports of UPHDR, Niyojan Atlas (2006, 2009).

Table 6.6: Physical Infrastructure Index Classification

Districts	**2011-12**	**2015-16**
Agra	DEV	DEV
Aligarh	DEV	DEV
Allahabad	MDEV	MDEV
Ambedkar Nagar	DEV	DEV
Auraiya	DEV	DEV
Azamgarh	DEV	MDEV
Budaun	MDEV	BACK
Baghpat	MDEV	HD
Bahraich	BACK	BACK
Ballia	MDEV	DEV
Balrampur	BACK	BACK
Banda	MDEV	MDEV
Barabanki	DEV	MDEV
Bareilly	DEV	DEV
Basti	DEV	MDEV
Bijnor	DEV	DEV
Bulandshahar	DEV	HD
Chandauli	MDEV	BACK

Chitrakoot	BACK	DEV
Deoria	DEV	DEV
Etah	DEV	DEV
Etawah	HD	HD
Faizabad	DEV	DEV
Farrukhabad	DEV	DEV
Fatehpur	MDEV	MDEV
Firozabad	HD	MDEV
G. B. Nagar	HD	DEV
Ghaziabad	HD	HD
Ghazipur	MDEV	DEV
Gonda	MDEV	MDEV
Gorakhpur	DEV	DEV
Hamirpur	MDEV	DEV
Hardoi	MDEV	MDEV
Hathras	DEV	HD
Jalaun	DEV	HD
Jaunpur	MDEV	MDEV
Jhansi	MDEV	MDEV
Jyoti Phule Nagar	DEV	DEV
Kannauj	DEV	DEV
Kanpur Dehat	MDEV	DEV
Kanpur Nagar	DEV	HD
Kaushambi	BACK	BACK
Kheri	MDEV	MDEV
Khushi Nagar	MDEV	MDEV
Lalitpur	DEV	MDEV
Lucknow	HD	HD
Mahoba	BACK	BACK
Maharajganj	MDEV	BACK
Mainpuri	DEV	DEV

Mathura	DEV	MDEV
Mau	DEV	DEV
Meerut	HD	HD
Mirzapur	BACK	BACK
Moradabad	DEV	DEV
Muzaffarnagar	DEV	DEV
Pilibhit	DEV	DEV
Pratapgarh	MDEV	DEV
Raebareli	MDEV	MDEV
Rampur	DEV	MDEV
Saharanpur	DEV	DEV
Sant Kabir Nagar	MDEV	BACK
Sant Ravidas Nagar	BACK	MDEV
Shahjahanpur	DEV	MDEV
Shravasti	BACK	BACK
Siddharth Nagar	MDEV	BACK
Sitapur	MDEV	MDEV
Sonbhadra	BACK	BACK
Sultanpur	MDEV	DEV
Unnao	DEV	MDEV
Varanasi	DEV	DEV

Source: Calculated from Statistical Abstract, Uttar Pradesh 2016,2011
District Wise Development Indicators, Uttar Pradesh 2016,2011

Based on the above infrastructure scores obtained, the districts are grouped as backward, moderately developed, developed and highly developed districts. The criteria used for the classification are: those districts whose scores are less than mean minus standard deviation are grouped as backward; the districts with scores between mean minus standard deviation and mean are grouped as moderately developed; the districts with scores between mean and mean plus standard deviation are grouped as developed; and those districts whose scores exceed mean plus standard deviation are highly developed districts. The above table 6.6 exemplify the classification of districts into these groups. Western and Central regions districts fall under the highly

developed. Almost all the districts of Bundelkhand region fall under developed and moderately developed category except one i.e. Mahoba. For Eastern region it can be analysed that some of the districts are developed and moderately developed while most of the districts lie in backward category. So, in conclusion Eastern region is most backward region in terms of infrastructure development.

6.7. Relationship between Human Development Indicators, Physical Infrastructure Indicators and Economic Growth in Uttar Pradesh districts: Rank Order Ratification.

This section tries to explore the relationship between human development and infrastructure indicators with economic growth. For the purpose of exploring the relationship firstly **Spearman's ranking correlation** has been computed for respective two points of time i.e. 2011-12 and 2015-16 for all the respective districts.

Table 6.7: Spearman's Ranking Correlation (2011-12)

	PCNSDP rank	**Education rank**	**Health rank**	**Physical Infrastructure rank**
PCNSDP rank	1			
	70			
Education rank	0.1497	1		
	70	70		
	0.7681			
Health rank	-0.0177	0.3738	1	
	70	70		
	1	0.0086		
Physical Infrastructure rank	0.4524	0.435	-0.0071	1
	70	70	70	70
	0.0005	0.001	1	

Source: Author's calculation

From the above table 6.7 it is clearly visible that in UP districts there hardly exists any relationship between human development indicators and economic growth indicators. Physical infrastructure has a strong relationship with growth indicator of development. Negligence of the human development indicator reflects the poor ranking of UP state in terms of human development indicators.

Table 6.8: Spearman's Ranking Correlation (2015-16)

	PCNSDP rank	**Education rank**	**Health rank**	**Physical Infrastructure rank**
PCNSDP rank	1			
	70			
Edu rank	0.3749	1		
	70	70		
	0.0083			
Health rank	0.0813	0.2448	1	
	70	70	70	
	0.985	0.2228		
Physical Infrastructure rank	0.5586	0.553	0.1834	1
	70	70	70	70
	0	0	0.562	

Source: Author's calculation

The above table 6.8 shows the ranking correlation of UP districts for human development indicators, physical infrastructure indicators and economic growth for the year 2015-16. Education and physical infrastructure indicator have a strong relationship with growth indicator of development. Though the health indicator has shown some improvement as positive relationship can be witnessed though it is not significant.

6.8. Regression Analysis

After analysing the association between variables by performing Spearman's ranking correlation, we extend to perform simple step wise regression analysis to assess the numerical relationship between variables. Regression analysis has been calculated for each individual indicator for each year respectively. This has been done to analyse which variable and in which year the linkage was effective in Indian states. For all the years dependent variable is Per capita NSDP at constant prices while independent indicator are education scores, health scores and infrastructure scores.

6.8.1. Numerical variability of indicators

CHAIN A: EG to HD

This chain explores the relationship taking human development indicators as dependent variables whereas PCNSDP at current prices as an independent variable for the two consecutive years.

Regression analysis for the year 2011-12

$$logeducation\ scores\ 12\ =\ \beta 0 +\ \beta 1 \log(PCNSDP12) + ei$$

$$logeducation\ scores\ 12\ = (-1.79) +\ .11 + ei$$

The above equation specifies the positive relationship between the education scores and growth. According to the scores generated after constructing education index, it cannot be assessed that growth variable of the economy plays a major role in improving education sector for UP economy. If government focusses upon improving the growth then education can be increased by just .11 units with just 1% increase in PCNSDP. The above equation specifies the relationship with p values significant at 10 % level of significance. The value of R-Square is also very low i.e. just (0.04) which represents that a very low level of variance is explained between dependent and independent variable.

$$loghealth\ scores\ 12\ =\ \beta 0 +\ \ \beta 1 \log(PCNSDP12) + ei$$

$$loghealth\ scores\ 12\ =\ \ -.734 +\ \ -.003 + ei$$

The above equation specifies the negative and insignificant relationship between the health scores and growth. There exists an inverse relationship between these two indicators. According to the scores generated after constructing health index, it cannot be assessed that growth variable of the economy plays a major role in improving health sector. The reason behind the inverse relationship can be assessed to the role played by the public sector. The poor quality of health facilities available and over dominating private sector in terms of health indicator. The presence of high level of poverty among the masses of people of UP who are not in position to pay high out pocket health expenditure. The role of public sector plays a very important role in

providing services to the masses yet the negligence of quality services is one of the primarily reason for the backwardness of the economy.

$$loginfrastructure\ score\ 12\ =\ \beta 0 +\ \beta 1 \log(PCNSDP12) + ei$$

$$loginfrastructure\ score\ =\ -3.83 +\ .284 + ei$$

The above equation specifies the positive relationship between the infrastructure scores and growth. According to the scores generated after constructing infrastructure index, it can be assessed that growth variable of the economy plays a major role in improving infrastructure sector If government focuses upon improving the growth variable of development then infrastructure indicator can be increased by .28 units with just 1% increase in per capita NSDP. The above equation specifies the relationship with p values significant at 1% level of significance. 27% points (R-sq.) of variance can be explained between the dependent and independent variable.

Regression analysis for the year 2015-16

$$logeducation\ scores\ 16\ =\ \beta 0 +\ \beta 1 \log(PCNSDP16) + ei$$

$$logeducation\ scores\ 16\ = (-2.78) +\ .20 + ei$$

The above equation specifies the positive relationship between the education scores and growth. According to the scores generated after constructing education index, it can be assessed that growth variable of the economy plays a major role in improving education sector. If government focuses upon improving the growth then education can be increased by .20 units with just 1% increase in PCNSDP. The above equation specifies the relationship with p values significant at 1 % level of significance. 10% points (R-sq.) of variance can be explained between the dependent and independent variable.

$$loghealth\ scores\ 16\ =\ \beta 0 +\ \beta 1 \log(PCNSDP16) + ei$$

$$loghealth\ scores\ 16\ =\ -1.73 +\ .078 + ei$$

The above equation specifies that there exists a positive but an insignificant relationship between the health scores and growth in contrast to the previous analysis

for the year 2011-12. However, a very low association is found between the health indicator and growth indicator of development

$$loginfrastructure\ score\ 16\ =\ \beta 0 +\ \beta 1 \log(PCNSDP16) + ei$$

$$loginfrastructure\ score 16\ =\ \ -3.64 +\ \ .24 + ei$$

The above equation specifies the positive relationship between the infrastructure scores and growth. According to the scores generated after constructing infrastructure index, it can be assessed that growth variable of the economy plays a major role in improving infrastructure sector If government focusses upon improving the growth variable of development then infrastructure indicator can be increased by .24 units with just 1% increase in per capita NSDP. The above equation specifies the relationship with p values significant at 1% level of significance. The value of R-sq explains that 25% points of variance exists among the dependent and independent variable.

Chain B: HD to EG

This chain explores the relationship taking PCNSDP at current prices as dependent variable whereas human development indicators as an independent variable for the two consecutive years. To analyse the association among the variables multiple regression analysis has been performed at both time periods i.e. 2011-12 and 2015-16.

Regression analysis 2011-12

$$log\ PCNSDP = \beta 0 + \beta 1\ logEDU + \beta 2\ logHEA + \beta 3 logInf + ei$$

$$log\ PCNSDP = 11.16 + -.092 + .024 + 1.01 + ei$$

From the above analysis it can be assessed that only physical infrastructure indicators have a significant and positive relationship with growth variable of development. It can be analysed that if 1 unit of investment in physical infrastructure indicators is increased then growth will surge by 1.01 units with p- value significant at 1% level of significance

In case of education indicator there exists an inverse as well as insignificant relationship with growth while for health indicator a positive relationship exists but it is not significant.

Regression analysis 2015-16

$$log\ PCNSDP = \beta 0 + \beta 1\ logEDU + \beta 2\ logHEA + \beta 3 logInf + ei$$

$$log\ PCNSDP = 11.72 + .061 + .013 + 1.01 + ei$$

From the above analysis it can be assessed that only infrastructure indicator has a significant and positive relationship with growth variable of development while human development indicators have positive but insignificant relationship with growth. It can be analysed that if 1 unit of investment in infrastructure is increased then growth will surge by 1.01 units with p- value significant at 1% level of significance. Similar findings can be found out in the studies by Chaturvedi (2018) and Singh (2018).

6.9. Step wise Regression Analysis

To further explore the relationship among the variables we have applied step wise regression analysis technique. Step wise regression is a technique which uses the combination of both forward and backward selection techniques. In step wise regression after each step a variable is added in the model and it is checked that whether their significance level has been reduced below the specified tolerance level. If the variable is significant then the variable is added but if it is non-significant it is removed. The technique involves two types of significance levels in which first type includes variables which are significant and the second type involves removal of insignificant variables. Stepwise regression requires two significance levels: one for adding variables and one for removing variables. One more assumption of this technique is that cut off probability for variables to be added should be less than the probability for removing variables so that the procedure does not get into an infinite loop.

Table 6.9: Analysis for the year 2011-12

	Logpcnsdp11	**Constant**	**Observations**	**R-square**
loginf11	0.973***	11.16***		
	-0.191	-0.179	70	0.277

Source: Author's calculation

The above table 6.9 gives the outcome for step wise regression technique. The analysis treated each variable as a separate entity and hence only physical infrastructure variable were found to be significant. Even when both the forward and backward techniques were applied human development indicators were found to be insignificant while that of physical infrastructure indicator was found to be significant.

Table 6.10: Analysis for the year 2015-16

	Logpcnsdp16	**Constant**	**Observations**	**R-square**
loginf16	1.067***	11.73***		
	-0.219	-0.242	70	0.259

Source: Author's calculation

The above table 6.10 gives the outcome for step wise regression technique. The analysis treated each variable as a separate entity and hence only physical infrastructure variable were found to be significant. Even when both the forward and backward techniques were applied human development indicators were found to be insignificant while that of physical infrastructure indicator was found to be significant.

For UP economy it can be observed that growth is not dependent on human development indictor. Infrastructure forms a most important part for development process. One of the main reasons behind the backwardness of the economy can be its low level of investment in human development indicators.

6.10. Human Development Indicators in Kerala

Etymology of the name 'Kerala' is uncertain with several stories and myths related to its history. Kerala (*Kerlalam* in Malayalam) is linked to the history of Cherā dynasty. The name *Keralam* may be derived from the classical Tamil word *chera-alam* Blessed with rich natural diversity, Kerala is a strip of land between the Arabian Sea and the Western Ghats lying between 8°47' and 12°47' north latitudes and 74°51' and 72°22' east longitudes and is well within the humid equatorial tropics. Geographically,

Kerala can be divided into three climatically distinct regions: the eastern highlands which slope down from the Western Ghats with rugged and cool mountainous terrain, the central midlands of rolling hills, and the western lowlands of coastal plains with river deltas, backwaters and the sea shore of the Arabian Sea. One of the twenty-eight states of the Indian Union, Kerala occupies 1.2 percent of the land area of the country and with a population of 3,33,87,677 has 2.76 percent of the total population (Census of India 2011). With a population density of 859 persons per square kilometre, Kerala is one of the most densely populated regions in the world. The current population distribution of Kerala according to religion is: 56.2 percent Hindu, 24.7 percent Muslim, 19 percent Christian, (Census, 2011).

In 2001, Prof. Amartya Sen — the Nobel Laureate stated, "from Kerala's experience and from objective indicators of what it has achieved in social, economic and political fields through education, which has been spectacular, the rest of India had much to learn". Lauding Kerala's achievements in human development, he had earlier commented — "Kerala, despite its low-income level has achieved more than even some of the most admired high growth economies such as South Korea" (Sen, 1997).

The ancient bedrocks of Kerala's achievements in human development and the courses that moulded it differently for the three erstwhile regions are well recognized (Tharakan, 1998; Jeffrey, 1992; Kabir and Krishnan, 1996; Ramachandran, 1997). The government had introduced several wellbeing measures immediately after the formation of the state, which were primarily focused on health and education supporting both private and public initiatives. These initiatives finally became the keystone of the KMD.

Kerala continues to rank at the top among Indian States in the human development index (as per 1981, 1991 2001 and 2011 estimates of the Census of India), with steady improvement reaching 0.625 in 2010-2011. The state is also ranked at the top in the Gender-related development Index (GDI) among major states in India reaching 0.746 in 2001. Kerala has life expectancy at birth of around 72 for males and 75 for females (64 and 65 respectively for all India), IMR of 12 (50 for India), and a TFR of 1.7 (2.6 for India) (Rajan and James, 2011).

With literacy rate above 90 percent, being considered as complete literacy as per the norms of National Literacy Mission (NLM) and the UNESCO, Kerala became a 'fully literate state', on April 18th, 1991 with a literacy rate of 91 (against India's 66). The literacy rate of the state is comparable to the most advanced regions of the world. According to 2011 Census, Kerala, with 93.91 percent, continues to occupy the top position among the Indian states in literacy. The female literacy rate of 91.98 percent (2011) has directly and indirectly enabled Kerala's several other achievements, most notably the rapid decline in Infant Mortality Rate (IMR) and fertility, as also improvements in general health, nutrition and well-being. As per the UNDP reports Kerala is the only state in India which lies among the very high human development index category.

District wise human development indexes and physical infrastructure index have been constructed for two point of time 2011-12 and 2015-16 to assess the nexus between Human development, Physical infrastructure and economic growth.

6.11. Components of Human Development

6.11.1. Education

For the development and growth of the economy education is considered as a fundamental objective. The comparatively higher female ratio to that of male ratio in terms of literacy rate and low infant mortality rate itself explains the policies of Kerala economy towards human development of the country. Though low in terms of population (34.8 million) Keralites are highly advanced, educated and have a healthy living. Gender Vulnerability Index (GVI) has ranked Kerala among the top three states where the situation of girls and women from the following perspective-poverty, education and health are far better than most of the developed nations of the world. Pathanamthitta district of Kerala highest literacy rate (96%) whereas another district Palakkad witnessed low literacy rate (88%) due to majority percentage of Schedule caste, Schedule tribe in the district. The 100% universalization in terms of primary education relates to the successful government policies both at central as well as state level. The launched of the important scheme "Athulyam[3] in 2014 which enables

[3]Providing training and education to the people who have not completed primary education

people to take up five-month extra training for completion of fourth equivalency examination has been a successful effort for achieving good literacy rate (Fayaz 2018) District wise education index has been calculated to assess the educational development of Kerala economy. Indicators that have been castoff to construct index are literacy rate, gross enrolment ratio at school level, gross enrolment ratio at higher education level, pupil- teacher ratio at school level and higher education level. Methodology for construction of index is same as used in the above chapter. After the construction of index districts have been ranked accordingly.

Table 6.11: District wise Education Scores and Ranking

Districts	Education Scores 2011-12	Rank	Education Scores 2015-16	Rank
Alappuzha	0.550380349	6	0.550267	6
Ernakulam	0.522944212	9	0.522935	9
Idukki	0.497321874	10	0.497126	10
Kannur	0.52794398	8	0.527971	8
Kasaragod	0.533095089	7	0.531836	7
Kollam	0.589234931	3	0.591029	2
Kottayam	0.591019393	2	0.590738	3
Kozhikode	0.576336305	5	0.576353	5
Malappuram	0.483473795	11	0.483801	11
Palakkad	0.409650321	13	0.409623	13
Pathanamthitta	0.726038989	1	0.725834	1
Thiruvananthapuram	0.475529711	12	0.475379	12
Thrissur	0.582612408	4	0.583113	4
Wayanad	0.330837473	14	0.330412	14
MEAN	0.528315631		0.550267	
SD	0.089189643		0.522935	
CV	0.168818862		0.497126	
MEAN + SD	0.617505274		0.527971	
MEAN-SD	0.439125987		0.531836	

Source: Statistical Handbook of Kerala2017, Statistics for Planning, DES, Kerala2014

The above table 6.11(Appendix 6.11 A) takes into consideration the education index of Kerala districts for the year 2011-12 and 2015-16. Indicators that have been castoff to construct index are literacy rate, gross enrolment ratio at school level, gross enrolment ratio at higher education level, pupil- teacher ratio at school level and higher education level. Methodology for construction of index is same as used in the above chapter. After the construction of index districts have been ranked accordingly. In both the years Pathanamthitta district has secured the topmost rank while Wayanad district is among the least scorer in both the years. Kollam and Kottayam districts have managed to scored 2^{nd} and 3^{rd} rank in both the years. Alappuzha district has managed to secure 6^{th} rank for both the years while an upward increase can be witnessed for the districts like Thiruvananthapuram, Ernakulam, Idukki, Kasaragod and Palakkad. Districts like that of Kannur, Kozhikode, Malappuram and Thrissur have seen fall in their ranking. Similar findings can be assessed from the paper of Fahad Fayaz (2018)

District wise inequalities have also been calculated. Coefficient of variation explains that inequalities within the district have been widened up for the year 2015-16 from the year 2011-12.

6.11.2. Health

Health is considered as a vital component of the human development resources. Kerala from the very beginning has paid much emphasis on the development of health care indicators. The indicators used for computing health index are: IMR, institutional delivery, number of PHC'S & CHC's, number of homeopathic doctors per lakh population.

Table 6.12 District wise Health Scores and Ranking

Districts	Health Scores 2011-12	Rank	Health Scores 2015-16	Rank
Alappuzha	0.693465956	3	0.692473228	3
Ernakulam	0.544342589	9	0.545811585	9
Idukki	0.91160153	1	0.909878095	1
Kannur	0.675947756	5	0.67588811	5
Kasaragod	0.667627035	6	0.664561914	6
Kollam	0.485042167	12	0.479679225	12
Kottayam	0.716146859	2	0.720627994	2
Kozhikode	0.385091232	14	0.394657376	14
Malappuram	0.406646758	13	0.401835131	13
Palakkad	0.605447184	8	0.602020372	8
Pathanamthitta	0.690931114	4	0.686935624	4
Thiruvananthapuram	0.508979956	11	0.515132271	11
Thrissur	0.536397053	10	0.537157581	10
Wayanad	0.652562484	7	0.650938033	7
MEAN	0.605730691		0.60554261	
SD	0.134291378		0.133304339	
CV	0.22170146		0.220140311	
MEAN+SD	0.740022069		0.738846949	
MEAN-SD	0.471439312		0.472238271	

Source: Statistical Handbook of Kerala 2017
Statistics for Planning, DES, Kerala2014

The above table 6.12(Appendix 6.12 A) explains the health index of the Kerala districts for the year 2011-12 and 2015-16. Index has been constructed using the same methodology as in the above chapter. Accordingly, the districts have been ranked corresponding to their health scores. From the above table it can be easily witnessed that Idukki district has secured number one rank in both the years following it is district Pathanamthitta which secured 4th rank in 2016 and 4th rank in 2011-12 while Kottayam district which secured 2nd rank for both the years. Alappuzha district which

secured 3rd rank remained stagnant for both the years. Almost all the district has somewhat seen the same ranking and scores for both the years.

6.11.3. Physical Infrastructure

District wise index has been computed by taking into consideration physical infrastructure indicators such as roads, net irrigated area, number of total government educational institutions, number of hospitals, storage capacity, sanitation facilities, water facilities, number of LPG consumers and power consumption per capita

Table 6.13: District wise Physical Infrastructure Scores and Ranking

Districts	Infrastructure Scores 2011-12	Rank	Infrastructure Scores 2015-16	Rank
Alappuzha	0.654067844	5	0.538181285	5
Ernakulam	0.660485329	4	0.586275579	3
Idukki	0.208792231	14	0.429228167	9
Kannur	0.349841855	11	0.404715056	11
Kasaragod	0.663456206	3	0.660048285	1
Kollam	0.518981229	7	0.422871209	10
Kottayam	0.783139913	1	0.654346512	2
Kozhikode	0.728565823	2	0.547412903	4
Malappuram	0.391855885	10	0.403040593	12
Palakkad	0.472945811	9	0.356886586	13
Pathanamthitta	0.30631089	13	0.445252497	8
Thiruvananthapuram	0.641345518	6	0.482781055	7
Thrissur	0.48763949	8	0.49077674	6
Wayanad	0.347618922	12	0.266085414	14
MEAN	0.515360496		0.477707277	
SD	0.170361232		0.107452393	
CV	0.330567115		0.224933548	
MEAN + SD	0.685721728		0.58515967	
MEAN-SD	0.344999264		0.370254885	

Source: Statistical Handbook of Kerala 2017
Statistics for Planning, DES, Kerala2014

The above table 6.13 (Appendix 6.13 A) gives the brief idea about the ranking and scores of Kerala districts in accordance of physical infrastructure index. From the table it can easily be summarized that Kasaragod and Kottayam districts have secured the top two ranks for both the years while districts like that of Wayanad, Malappuram and Palakkad have secured the lowest ranks for the both the years. Districts like that of Thrissur, Pathanamthitta, Ernakulam and Idukki have seen upward shift in their rankings while districts like Alappuzha and Kannur have remain constant in terms of rankings and scores.

6.12. Classification of Districts of Kerala on the basis of Index scores

Table 6.14: Education Index Classification

Districts	Edu 2011	Edu 2016
Alappuzha	DEV	DEV
Ernakulam	DEV	MDEV
Idukki	MDEV	MDEV
Kannur	DEV	MDEV
Kasaragod	DEV	DEV
Kollam	DEV	DEV
Kottayam	DEV	DEV
Kozhikode	DEV	DEV
Malappuram	MDEV	MDEV
Palakkad	BACK	BACK
Pathanamthitta	HD	HDEV
Thiruvananthapuram	DEV	MDEV
Thrissur	DEV	DEV
Wayanad	BACK	BACK

Source: Calculated from Statistical Handbook of Kerala 2017
Statistics for Planning, DES, Kerala2014

Above table 6.14 classify the districts on the basis of the descriptive statistics already mentioned in the above table. Based on the above education cores obtained from the

multivariate statistics, the districts are grouped as backward, moderately developed, developed and highly developed districts. The criteria used for the classification are: those districts whose scores are less than mean minus standard deviation are grouped as backward; the districts with scores between mean minus standard deviation and mean are grouped as moderately developed; the districts with scores between mean and mean plus standard deviation are grouped as developed; and those districts whose scores exceed mean plus standard deviation are highly developed districts. It can be easily analysed that only one district (Pathanamthitta) falls under high developed category while majority of the districts fall under developed category for both the years. For the other year i.e. 2015-16 many districts have seen a downward shift from the developed status to the moderately developed status. Though majority of districts fall under developed category. Wayanad and Palakkad are districts that remain backward for both the years.

Table 6.15: Health Index Classification

Districts	Health 2011	Health 2016
Alappuzha	DEV	DEV
Ernakulam	MDEV	MDEV
Idukki	HD	HDEV
Kannur	DEV	DEV
Kasaragod	DEV	DEV
Kollam	MDEV	MDEV
Kottayam	DEV	DEV
Kozhikode	BACK	BACK
Malappuram	BACK	BACK
Palakkad	DEV	MDEV
Pathanamthitta	DEV	DEV
Thiruvananthapuram	MDEV	MDEV
Thrissur	MDEV	MDEV
Wayanad	DEV	DEV

Source: Calculated from Statistical Handbook of Kerala 2017

Statistics for Planning, DES, Kerala2014

Above table 6.15 classify the districts on the basis of the descriptive statistics already mentioned in the above table. Based on the above health scores obtained from the multivariate statistics, the districts are grouped as backward, moderately developed, developed and highly developed districts. The criteria used for the classification are: those districts whose scores are less than mean minus standard deviation are grouped as backward; the districts with scores between mean minus standard deviation and mean are grouped as moderately developed; the districts with scores between mean and mean plus standard deviation are grouped as developed; and those districts whose scores exceed mean plus standard deviation are highly developed district. Idukki districts falls under high developed category for both the year while majority of the district fall under the developed category except Kozhikode and Malappuram district which remains backward for both the years.

Table 6.16: Physical Infrastructure Index Classification

Districts	**Inf 2011**	**Inf 2016**
Alappuzha	DEV	DEV
Ernakulam	DEV	HD
Idukki	BACK	MDEV
Kannur	MDEV	MDEV
Kasaragod	DEV	HD
Kollam	DEV	MDEV
Kottayam	HD	HD
Kozhikode	HD	DEV
Malappuram	MDEV	MDEV
Palakkad	MDEV	BACK
Pathanamthitta	BACK	MDEV
Thiruvananthapuram	DEV	DEV
Thrissur	MDEV	DEV
Wayanad	MDEV	BACK

Source: Calculated from Statistical Handbook of Kerala 2017
Statistics for Planning, DES, Kerala2014

Above table 6.16 classify the districts on the basis of the descriptive statistics already mentioned in the above table. Based on the above infrastructure scores obtained from the multivariate statistics, the districts are grouped as backward, moderately developed, developed and highly developed districts. The criteria used for the

classification are: those districts whose scores are less than mean minus standard deviation are grouped as backward; the districts with scores between mean minus standard deviation and mean are grouped as moderately developed; the districts with scores between mean and mean plus standard deviations are grouped as developed; and those districts whose scores exceed mean plus standard deviation are highly developed district. Kottayam is one district that falls under high developed category for both the years while districts like Ernakulam and Kasaragod gained the status of highly developed districts for the year 2015-16. Some districts have seen a forward shift in their category while some of them have witnessed the reverse shift in the category. Those districts which fall under backward category in 2011-12 have gained the status of moderately developed while some have seen a slip in their position from the year 2011-12 to 2015-16.

6.13. Relationship between Human Development Indicators, Physical Infrastructure Indicators and Economic Growth in Kerala districts: Rank Order Ratification.

This section tries to explore the relationship between human development and infrastructure indicators with economic growth. For the purpose of exploring the relationship firstly **Spearman's ranking correlation** has been computed for respective two points of time i.e. 2011-12 and 2015-16 for all the respective districts.

Table 6.17: Spearman's Ranking Correlation (2011-12)

	PCNSDP rank	**Education rank**	**Health rank**	**Physical Infrastructure rank**
PCNSDP rank	1			
	14			
Education rank	0.4593	1		
	14	14		
	0.0985			
Health rank	0.3319	0.1516	1	
	14	14		
	0.2464	0.6048		
Infrastructure	0.2484	0.3187	-0.2264	1
	14	14	14	14
	0.3919	0.2668	0.4364	

Source: Author's calculation

From the above table 6.17 it is clearly visible that in Kerala districts there exists positive but insignificant relationship between health, physical infrastructure and economic growth indicator in Kerala districts. Though education indicator has a positive and significant relationship with economic growth that can be related to the investment done by the Kerala government in human development indicators prior to any state in the country. The insignificant relationship between health and economic growth can be due to the prominent role being played by the private sector and the continuous decline of the public sector in health indicator of the human development.

Table 6.18: Spearman's Ranking Correlation (2015-16)

	PCNSDP Rank	**Education rank**	**Health rank**	**Physical Infrastructure rank**
PCNSDP rank	1			
	14			
Education rank	0.2703	1		
	14	14		
	0.3499			
Health rank	0.2308	0.2088	1	
	14	14		
	0.4273	0.4738		
Infrastructure rank	0.3099	0.5824	0.0374	1
	14	14	14	14
	0.2809	0.0289	0.8991	

Source: Author's calculation

The above table 6.18 shows the ranking correlation of Kerala districts for human development indicators, physical infrastructure indicators and economic growth for the year 2015-16. Education indicator, health indicator and physical infrastructure indicator show a positive relationship but the relationship among the variables is not significant.

6.14. UP & KERALA: Distinctive Paths

The relation between per capita income of a state and its social indicators is not strictly one-to-one, but nevertheless is still positive. Kerala remains the best performer among major states in terms of health and education, despite being ranked seventh in

income among the 22 major states and UP ranks among the lowest in both human development and economic growth. UP provides a great scope for exploring the nexus while Kerala model of development raises question about the low level of the importance given by the state towards quality indicators in respect of both education and health and also about the over dominance of private sector and declining role of public sector. Kerala model of development which is the role model for other economies in consideration of human development is raising a serious question about its adaptability.

Women born in Kerala can expect to live 20 years longer than women in Uttar Pradesh. Uttar Pradesh's infant mortality rate is almost six times higher than Kerala's. Dreze and Sen (2002) suggest that Kerala's success is the result of public action that promoted extensive social opportunities and the widespread equitable provision of schooling, health and other basic services. They argue that Uttar Pradesh's failures can be attributed to the public neglect of these very same opportunities. The early promotion of primary education and female literacy in Kerala was very important for social achievements later on. In Uttar Pradesh, educational Backwardness has imposed high penalties, including a delayed demographic transition and burgeoning population growth. Basic universal services in schooling, health care, child immunization, public food distribution, and social security seem to differ sharply in scope, access, quality, and equitable incidence. In Uttar Pradesh these services appear to have been comprehensively neglected, with no particular efforts to ensure results. There is little accountability, particularly in school.

There is ongoing debate whether human capabilities have been able to transformed themselves into economic growth. The study explores that only education has a significant relationship with growth. Though there are limitations to the data. Quality indicators are found to be missing for Kerala model also. The basis for doing the study among two diversified regions relates to the role of public action. Kerala model of development plays a significant role but still arises a question on its sustainability hence for UP economy can the model of development proves to be successful is of serious concern.

6.15. Concluding Remarks

The chapter focuses upon exploring the linkages between human development indicators and economic growth. For U.P it can be seen that the reason behind its low development is the negligence towards the human development sector. The study finds that there is no association of human development indicators with economic growth. Though for physical infrastructure one can analyse that for the state districts show a positive association with that of economic growth.

Chapter also studies the interlinkage between human development indicators and economic growth in Kerala districts. The results of the correlation show that there exists a positive relationship between education and economic growth indicators. The positive and a strong association among the indicators show that for the economy to be develop the state needs to focus upon the investment in human development indicators. Kerala is known for its good numbers in human development indicators even before any state could achieve. The strong association can be related to the strong rules played by the public policies over strengthening the human development indicators.

Hence the chapter concludes that the low level of development in UP districts can be attributed to the poor public policies undertaken by the states while Kerala model's achievement can be attributed to the strong and apt public policies undertaken by the states towards strengthening the relationship.

Chapter 7

MAJOR FINDINGS AND CONCLUSION

7.1. Introduction

The process of development should ideally be viewed and assessed in terms of what it does for an average individual. It has to be perceived in terms of the reimbursements and opportunities that it engenders for people and how these are disseminated between the well off and deprived, between men and women and across regions. A development framework to be eloquent and effective in framing public policies and programme, it has to be anchored in a social context. A relevant approach to social development becomes necessary for the purpose of developing appropriate public policy. In this context an attempt is being made to understand India's development experience and achievements in regards to human development, physical infrastructure indicators and economic growth. The backwardness of Indian economy has a long-lasting history. The backwardness can be related to inadequate educational and health facilities and lack of social security measures, poor technological and scientific capabilities, rampant poverty, low general standard of living and hence low level of economic growth. Exploring the linkage between these indicators provide a great scope for evolving appropriate policy. India has made significant progress in several areas of economic and social development since the time of Independence. The incidence of poverty has declined, literacy rate has upsurge from less than 20 per cent in 1951 to 65 per cent in 2001, female literacy has come up from 18.9 per cent to 54.3 per cent in 2001 and enrolments in educational institutions have increased. With 10.199 lakh schools and &bout 10495 colleges and 389 universities education system in India has achieved the status of second largest education system in the world. According to the draft of Tenth Five Year Plan Schooling facilities at Primary level are accessible to the population living in 83 per cent of the habitations within a distance of l km.

Some noteworthy successes over time have been achieved by the Government in the public health sector. A major public health achievement in India is the successful eradication of communicable disease. Almost all the basic health status indicators have been able to achieve the target set as per the National Health Policy. A substantial drop in crude death rate and infant mortality rate is witnessed and Life expectancy at birth has enhanced significantly. As reflected in the human

development index, over all human development indicators have improved significantly. Planned efforts for the purpose of achieving development objective helped India to jump from the group of low development countries to medium human development group. Regardless of substantial improvements, India's performance with regard to both education and health component of Human Development becomes insignificant when compared with that of other developing countries. In regards to the education sectors many developing economies like that of Thailand, Philippines, Kenya, Sri Lanka and China started off at the same level as that of Indian economy yet these nations are far ahead of the Indian economy. China and Sri Lanka initiated their development process at the same heights of health as that of India. Yet these countries are far ahead of India in terms of health attainment. Apart from the generally low level of social development, there is the persistence of acute interstate disparity among the states. To reckoned with. Kerala has achieved a literacy rate of 90.9 per cent and infant mortality rate of l1 per thousand in 2001 and has a level of human development comparable to that of Sri Lanka and Malaysia. In sheer contrast, the infant mortality levels in Madhya Pradesh and Orissa were around 86 and 91 per thousand. Furthermore, considerable intra state disparities exist in the levels of social attainment according to region, sex and community which people belong to.

The study has been designed to explore the linkages between human development, physical infrastructure indicators and economic growth in Indian states as well as districts of UP and Kerala. The study is entirely based upon the secondary data. The analysis has been done using secondary data sources in relation to all the indicators. One key point of the study is that it not only takes into consideration quantity indicators but quality indicators have been much focussed upon. For the purpose of exploring the association time series data has been analysed in terms of social sector expenditure and the percentage of expenditure states incur in respect of their total expenditure and NSDP. Secondly, along with human development physical infrastructure indicators have also been analysed. Indexes constructed in respect of human development and physical infrastructure indicators give a fair view about the status and the development of the states. The last and final chapter of the study gives a broad view about the interlinkage between human development indicators and economic growth in the context of Indian states as well as districts of UP and Kerala.

The culminating chapter reviews the key findings of the aforementioned chapters and infer possible suggestions and policy measures.

The study from its preluding chapter to its culmination chapter tries to explore the interlinkage between human development indicators and economic growth among Indian states. One more objective of the study was to explore the linkages among UP and Kerala districts.

7.2. Summary of Findings

The study tries to justify the title by providing step by step explanations. These section overviews major findings of the study. Firstly, an overview has been made in terms of review of literature, secondly a brief view on the importance of investment in social sector indicators. Thirdly the findings related to human development index, physical infrastructure index has been briefly explained.

Chapter *one* of the study titled "**Introduction**" basically tries to highlight the importance of the relationship between Human Development Indicators and Economic growth. The linkage between the means and end component of development is of utmost importance for any economy to achieve the objective of development. The chapter studies the basis of the study and the conceptual framework related to two strands of development.

Firstly, the chapter gives a brief review about the history related to the growth component of development and why the economies decided to dismantle the concept. The reason behind the emergence of new paradigm 'human development'. Secondly brief review has been studied about the importance of linkage between growth and human development indicators and why both means and ends component are necessary to achieve the objective of development.

Thirdly, the chapter concentrates upon studying the two strands related to development objective i.e. Washington Consensus and concept by Ranis, Ramirez and Stewart. Importance of new paradigm and the way it presupposes the growth component of development is highlighted in the study. The concept related to the transformation of how Economic Growth presupposes Human development and how Human development presupposes Economic growth has been much focussed upon. The chapter also reviews the work of scholars in relation to the association among

human development and growth component of development in relation to developed nations as well as Indian economy. Apart from these objectives, hypothesis, methodology, significance and the focus of present study in relation to UP and Kerala have also been entailed in the study.

Chapter *two* titled "**Role of Human Capital and Human Development in Economic Growth: A Theoretical Perspective**" is set to analyse the importance of human capital and human development indicators on economic growth. Theories related to human capital and how human capital impacts growth have been briefly reviewed. An elaborative review of literature has been done in this chapter and it suggests that human capital and human development have implication upon the economic growth of the economy.

Firstly, the chapter reviews how the term human capital initiated and the concept associated to the term. Starting from classical theories to the new endogenous theories have been fairly reviewed in the chapter. Much efforts have been done to understand the theoretical background behind the concept of human capital. Secondly, a fair review of literature has been done to understand the concept of human development approach and why UNDP paid much emphasis on HDI. The chapter fairly reviews the ideas of Noble Laureate Amartya Sen and Nabassum on capability approach and why there is an urgent need to focus upon the human development indicators. Indicators of human development and their implication on growth is reasonably studied. Key determinants which forms the basis of studying the linkage and the issues related to the concept of human development have been analysed in the later part of this chapter. Lastly the chapter relates how human capital and human development indicators play an important role in improving growth component of development in Indian economy. The chapter as a whole describes the importance of human development and the why developing economies need to focus upon investing in this paradigm.

Chapter three titled **"Trends in social sector expenditure: A State Wise Analysis"** presents the scenario of the expenditure trends incurred by the states on social sector as a whole as well as on education and health indicator of human development.

In the constitutional division of responsibilities between Centre and States, social sector planning and development are primarily the responsibility of State

Governments. It is true that the states have been earmarking sizeable proportion of their resources for social development, though supplemented by the Centre. But the accomplishment appears to be widely at variance across the states. This raises a number of issues. Are the States allocating adequate resources for social development? What is the structural composition of social sector allocation of resources? What is the degree of interstate discrepancy in apportionment? What is the advancement in the level of social sector development across the states? Are they comparable with the state's efforts? If not, what are the reasons for variations across States? This study attempted to focus on these issues

In the foregoing chapter, attempts were made to analyse inter- state disparities in terms of social expenditure as well as to identify the factors that influence social development. Since education and health sectors form major constituents of the social sector, these two sectors were given special focus in this study. Trends in social expenditure and the disparity among states in terms of real per capita expenditure have also been analysed in this chapter. Trends in expenditure on each category namely education, health and overall social sector were analysed in terms of (i) percentage of expenditure as a percent of net state domestic product (NSDP), (ii) percentage of expenditure as a percent of total expenditure and (iii) per capita expenditure and real per capita expenditure. In the case of education and health sectors, an analysis of the shares of these sectors in total social expenditure was also analysed.

The study explores the trends in the social sector expenditures of Indian states. Analysis of time series data has been done to evaluate state wise social sector expenditure. From the literature review, it can be assessed that investment in social sector indicators will enhance economic growth in the economy and hence development. Secondary data analysis shows that India spends a very low percentage of its GDP on education (3.8) and health (1.4) sector while developed nations spends more than 5% on education and 8% on health sector. The low level of spending by India can be related to the poor ranking in HDI.

Expenditure on main heads has shown a meagre growth in nearly all the vital components of social sector expenditure for the period ranging from 2004 to 2015.Though in overall total development expenditure has shown an upward trend but

the outlay in social sector expenditure components have not able to catch up that faster as the overall development expenditure. A mere surge of 3% was observed during the period of 2004-14. Education and health sector are considered to be of utmost importance among all the six components in which social sector is alienated into. A minimal surge of just 0.77% in outlay is witnessed on education sector from the year 2004 to 2011 and then again, the share of revenue and capital expenditure on education has declined to an approx. of 0.4% from the year 2011 to the current year. A similar trend is witnessed with perspective of health expenditure also as a percentage of share in total social expenditure has comparatively deteriorated at an approx. of 0.53% from the year 2011 to 2015. Expenditure on social securities and welfare schemes has witnessed a tremendous improvement due to the implementation of various programme.

Study observes the overall social sector outlay incurred by the states for a period of 16 years i.e. 2000-01 to 2016-17. All the states have witnessed a tremendous upsurge in the expenditure trends of social sector. In terms of average outlay incurred by the states in social sector expenditure, Almost all the states have improved their development expenditure on the social sector indicators except Kerala whose outlay has seen a minimal increase in terms of social sector but Kerala has already achieved the desired objectives in terms of expenditure in human development. Interstate variations during the period from 2000-01 to 2016-17 have also been analysed through the computation of coefficient of variation. Inter- state variations show a stagnant trend in terms of social sector outlay. Disparities were lowest for the year 2000-01 (2.18) and highest for the year 2015-16 at 2.25. In relation to the BIMARU states then discrepancies for backward states can be observed at 71% for which the lowermost discrepancy can be observed for Uttar Pradesh while highest can be observed for MP.

If talked about percentage of social expenditure sustained by the states as a percentage of their total expenditure then in total India incurs an approx. of 44% of its total outlay towards social sector. As per the recommendations of UNDP an approx. of 40 % of outlay should be incurred by the country in its social sector. BIMARU states are doing quite well in terms of apportionments as observed through the data. A tremendous upsurge in the outlay of social sector can be witnessed for Uttar Pradesh state from 33% in 2000-01 to 37% in 2015. Social sector expenditure sustained by

the states as a percentage of NSDP demonstrates that the average of the states was around 9% in 2001. After this period a U-turn shape was witnessed till 2004-05. A declining trend was witnessed for the year 2004-05. A sharp rise was witnessed after this period in the percentage share of states in NSDP. Inter-state disparities have been computed with the help of CV. The inter-sectoral disparity was highest in Chhattisgarh and lowest was witnessed in Kerala. The richest States of the country (Gujarat, Maharashtra, Punjab and Haryana) have comparatively lower percentage of share in there NSDP. Less importance to social sector outlay in their resource allocation have been given by high-income States. In accordance to the outlay in education expenditure an unceasing rise and fall in trends as a percentage of total expenditure can be witnessed. States average was about 19% which enhanced to 22% in 2011 and then again, a descendant trend was witnessed for the year 2014-15. Inter temporal variations was more or less stable for almost all the states. The highest inter temporal variations was witnessed in the year 2006-07 and 2011-12 saw the least which was around 34% and 13%.

The significance allocated to education in resource apportionment is reflected in the percentage of national income the states devote to education. According to Education commission (1966) an investment of 6 per cent of national income by States governments in education may be regarded as the recommended expenditure. Bihar, Himachal Pradesh Chhattisgarh and Uttarakhand are the states which have accomplished the target expenditure as recommended by the committee. State expenditure averages on education expenditure range from 3.38 (2004) to 7.62% (2014). An upward spiral was witnessed during this period. Highest variation was observed for the period 2006-07 (0.46) and was lowest for the period 2010-11(0.25).

Highest variation of 0.38 was observed for CChhattisgarh state while lowest variation of 0.24 was witnessed for Uttarakhand. An upsurge is witnessed in Real per capita education expenditure and Per capita education expenditure. Health expenditure incurred as a percentage of total expenditure observed that a very minor portion of total expenditure is sustained by states towards health sector. Continuous upward and downward trend is witnessed in health sector fluctuating from lowest 4.02 in 2013-14 to highest (9.27) in 2005-06. Highest outlay in health sector is incurred by Uttarakhand, Punjab and Kerala and lowest is incurred by Chhattisgarh and Gujarat. Discrepancy is quite high in health sector as compare to other sectors. Highest amount

of expenditure in health sector is incurred by BIMARU states. The inter temporal variation is quite high in health sector is quite high as compare to other sectors. Highest variation was witnessed during the period 2004 -16 is 2009-10 (1.76) while the year 2013-14 (0.16) and 2015-16 (0.16) witness the lowest variations among the states.

A very lower percentage of NSDP as a percentage of total expenditure was incurred on health sector by all the States. Instability in the trends can be witnessed. A continuous upsurge and downward trend can be witnessed for all the states. The highest discrepancy can be witnessed for the year 2009-10 (1.55) and the lowest can be observed for the year 2004-05 (0.44). Uttarakhand (0.87) has highest variation while Bihar (0.11) has the lowest. In relation to the national average (1.33) almost all the developed states are performing well. Dispersion among the states has been calculated for the purpose of observing inter temporal variation. The uppermost difference can be observed for the year 2006-07 (2.43) and the least was observed for the year 2011-12. Punjab has highest variation and Himachal Pradesh has lowest.

Per capita and real per capita expenditure observes that though the investment in health has remained low as compared to other sector but then also a very sharp increase can be witnessed. States have almost doubled their per capita social expenditure in the simultaneous years. The increasing trend shows the importance of health sector in the current era. The second period (2011-12/2015-16) saw a negative growth rate for some states in comparison to the national average.

To explore the associations between economic growth and social sector expenditure spearman ranking correlation was conducted. The results show that investment in all the expenditure trends is necessary and must for an economy to develop. Variables are positively correlated with PCNSDP as observed through the computation of Spearman's correlation technique. The correlation results for education expenditure shows the value of rho at 0.5912 with p value satisfied at 0.0077 level while similar findings are observed for health and social sector expenditure.

Chapter *four* titled ***"Interlinkage between Human Development Indicators and economic growth: An Interstate analysis".***

The chapter tries to explore the relationship between human development indicators and economic growth in Indian states as per UNDP methodology. UNDP in 1991 made an attempt to assess the status of human development through various indicators for the developed as well as developing nations. A prescribed methodology has been adapted by UNDP to assess this status for all the countries of world. The study tends to assess the same status on sub- national basis. Adapting to the same methodology as prescribed by UNDP Human Development Index has been computed for the states for two years i.e. 2001 and 2011.

To validate the 3rd objective of the study i.e. to explore the linkage between human development and economic growth spearman's ranking correlation and regression analysis has been computed. Indicators wise indexes show that there exist a wide range of disparities within states. UNDP revised its methodology in the year 2010. HDI has been calculated through both the methodologies and for Indian states revised methodology has not worked well as from the data it can be observed that scores as well as ranks have shown a declining trend for the year 2011 from the previous year. Indicators wise index has been calculated. For the health index we can observe that Himachal Pradesh holds 2nd rank for the year 2001 while it slips to 4th position while for states like that of Bihar, Delhi and Uttarakhand scores as well rank have improved well. In conclusion we can observe that for health index revised methodology works well for backward states but not for all the states.

In contrast to health scores, an opposite result can be witnessed for education index. Though ranking of the states has improved but the scores for the index have shown a downward trend. Kerala and Delhi have gained top most spots for both the years while UP has come to 17th place from 20th in the year 2011 and Bihar has remained stagnant in terms of ranking.

Apart from health and education index HDI also includes income index as a proxy of standard of living index. Log of per capita income has been computed. Again, a very contrasting result can be witnessed in terms for revised methodology as a downward trend can be witnessed in the scores of the states. For ranking no much changes can be witnessed. Hence from the data computed one can conclude that revised methodology has not been productive and efficient for Indian states.

From the indexes calculated one can easily compute HDI. A profound shift in the ranking of some of the states can be observed while some states witnessed a fall in their ranking. Kerala shifted to 3rd place from 1st position in 2011 while Delhi gained the top spot for 2011. For backward states hardly any changes can be observed. UP, Bihar, West Bengal and Odisha saw a stagnant or downfall in their ranking.

To explore the relationship and to take in depth analysis spearman ranking correlation and simple regression analysis has been performed. The result show that growth as well as human development are highly correlated and associated. Hence it can be easily summarized that one precedes other in a significant manner. As it is observed that there are limitations to each and every methodology been adopted. Same is true for the methodology used for construction of HDI. From time to time UNDP itself has stated the inclusion of other addendum variables in the HDI computation. Need for assessing the importance of quality variables the study includes various other variables in addition to variables been stated in UNDP methodology. Apart from the inclusion of another variables role of physical infrastructure has also been studied. Capital includes both human capital and physical capital. Hence the role of physical capital cannot be ignored in consideration with economic growth of an economy. Physical infrastructure index has been calculated using those variables which forms an integral part of development of the economy.

Chapter *five* titled "***Interlinkage between Human Development, Physical Infrastructure Indicators and economic growth: A Multivariate Approach"***

Given the limitations of UNDP methodology study tries to explore the linkages between human development and economic growth through the inclusion of other quality and quantity variables which will the further strengthen the linkages. Keeping the indicators same as that of UNDP there is addition in the sub indicators within the variables. Education index has been computed using variables like that of literacy rate, gross enrolment rate at primary as well as higher education levels and pupil teacher ratio at primary as well as higher education level. Health index has been computed using variables like that of life expectancy, infant mortality rate, PHC'S & CHC'S per lakh population, institutional deliveries and number of doctors per lakh population. Physical infrastructure index has been computed using variables like that of rail density, road density, water facilities, toilet facilities, power, government

hospitals, number of institutions, net irrigated area, storage facilities, and energy. Composite index has been calculated through the use of Principal component analysis. Weights have been generated through the PCA methodology and accordingly the scores and ranks are calculated for the states for three years i.e. 2004-05, 2011-12 and 2015-16.

A vast difference in the ranks and scores can be observed when addendum variables are included and a more applied econometric technique has been used. For the education scores it can be observed that from 2004-05 scores have improved in the year 2011-12 but again a downward trend is observed for the year 2015-16. For the year 2004-05 it was Delhi that has secured the 1st spot while it slipped to 5th spot for the year 2011-12 and back to 3rd spot for the year 2015-16. Himachal Pradesh secured the 2nd rank for the year 2004-05 it slips to 4th position in the year 2011-12 and for the year 2015-16 it does far better by securing 1st rank. If looked upon the ranks of backward states then Bihar, MP and UP has remained stagnant in their position while West Bengal and Odisha have seen an upward shift in its ranking.

For health index it can be observed that Kerala, Delhi, Goa, Tamil Nadu and Jammu & Kashmir have attained top scores and ranking. A declining trend for the year 2015-16 can be observed through the scores computed. Analysis observe an upward trend for the year 2004-05 to 2011-12. Health indicators have shown no improvement for the backward states. They have either persisted stagnant or a deteriorating trend in scores as well as ranking. An upward trend in 2015-16 from the year 2011-12 was witnessed for states like West Bengal, Uttarakhand, Punjab, Odisha, Himachal Pradesh and Jharkhand have shown

For physical infrastructure index vast discrepancy in the scores as well as rankings can be observed. Delhi is one state that was able to attain a stable ranking. A sharp decline has been witnessed in the ranking of Karnataka from the year 2004-05 to 2015-16. Punjab has been able to attain one of top spot for all the years for which index has been computed. Improvement in the rankings and scores of backward states is hardly visible.

To further analyse the categorization of states according to their score's states are classified as highly developed states, developed states, moderately developed states and backward states. Simple descriptive analysis has been used to classify the states.

A lot of variations among states can be observed for education index in these years. Himachal Pradesh, Delhi, Uttarakhand are the only states that were classified as highly developed states for the year 2004-05 while in 2011-12 two more states (Goa and Kerala) were added under the highly developed category. A reduction of states in the highly developed category was witnessed for the year 2015-16 saw. Only four states were classified under highly developed states. Majority of the states fall under the category of moderately developed. For health indicator improvement for most of the states can be witnessed for the year 2011-12. The states in the group of developed have move upwards to highly developed. No improvement can be witnessed for the backward states like MP and UP even for the year 2015-16. The figures for 2015-16 examines the declining scores for majority of states. For physical infrastructure it can be observed that only Punjab is one state that has focused on the infrastructure indicators almost in all the consecutive years and has attained the high developed status. While it can be analysed that Karnataka has slipped from its highly developed status to that of moderately developed status though other south Indian states have shown improvement. Backward states like that of Uttar Pradesh, Madhya Pradesh, Rajasthan and West Bengal have remained constant with moderately developed status in all the three consecutive years. Bihar is one state that has shown a declining trend from the year 2004-05 and has remained backward with very little improvement.

Spearman ranking correlation and step wise regression analysis has been computed. The results show that Health indicator has the highest impact on the economic growth with 1% significance level for the year 2004-05. For the year 2011-12, all the three indicators are highly significant at 1% significance level. Spearman's rho explains the statistical depending of rankings of dependent variables on independent variables. Coefficients for the year 2015-16 have declined from the previous years while all three indicators are highly significant. Step wise regression analysis and simple regression analysis observes that Chain B works more profoundly than Chain A in context of Indian states.

Chapter ***sixth*** titled ***"Interlinkage between Human Development, Physical Infrastructure Indicators and economic growth: a study analysis of UP and Kerala***

The study further explores the relationship between human development and physical infrastructure indicators and economic growth among the UP and Kerala districts. Indexes have been computed using the PCA methodology.

Education index depicts that Western Uttar Pradesh districts are far ahead from other zones of UP. Though for the year 2011 the second and third position was attained by the districts of Central UP i.e. Kanpur Dehat and Kanpur Nagar but a change in their position to 6^{th} and 4^{th} position is witnessed for the year 2015-16. Jalaun district of Bundelkhand region has shown an enhancement in the raking from 2011-12 (6^{th}) to 2015-16 (5^{th}). The Western region and the central region are most developed regions of the state while the least developed region is Eastern region. To examine the inter district discrepancies within the state coeff. of variation has been computed. Year 2011-12 saw 0.20 disparities among districts while it has increased to 0.24 in 2015-16. This shows that one of the reasons for the low level of human development among backward districts is the presence of disparities and inequalities.

Health index concludes the health status of the districts of Uttar Pradesh. The results of the health index are quite opposite from that of the education index. Hamirpur district of Bundelkhand region which flags off the list for both the year i.e. 2011-12 & 2015-16. Top ten rankings for both the years have been secured by the districts from Bundelkhand region. Following the Bundelkhand region is the districts from Eastern region. Among the top 10 ranking Lucknow and Rae Bareilly districts of Central region have also made their place. Least developed or backward states in terms of health indicator of human development are districts of Central and Western Uttar Pradesh are among the. Physical infrastructure is regarded to be one of the dominant indicators for the growth indicator of development. Deviating results can be observed for the districts in terms of infrastructure. Districts for the two years have witnessed widened ups & downs in the rankings. Western Uttar Pradesh district Gautam Budh Nagar flags off the list for the year 2011 but a sharp shift can be seen for the year 2016 (11^{th}). Consecutively, for the two years Ghaziabad district has secured 3^{rd} and 2^{nd} position. Top ten positions for the infrastructure index have been secured by Western Uttar Pradesh districts. Lucknow district of Central U.P has observed good progress in terms of infrastructure. The district has secured the topmost ranking for the year 2015-16. Developed or are moderately developed rankings are secured by

Bundelkhand and Central regions. But it is Eastern U.P which has perceived the lowest development in the index.

Analysis of correlation technique for UP districts portrays that there exists hardly any relationship between human development indicators and economic growth. A profound relationship is being observed among Physical infrastructure and growth indicator of development. Poor ranking of UP state in terms of human development indicators is due to the negligence of the human development indicator. Education and physical infrastructure indicator have a strong relationship with growth indicator of development for the year 2015-16. Health indicator observes some improvement as positive relationship can be observed though it is not significant. Analysis of Step wise regression technique shows that education and infrastructure have a positive relationship with growth indicator while for health indicator a weak association among the variables is observed. For the year 2015-16 reverse results were observed. Infrastructure indicator was found to be substantial with growth indicator. Human development indicators do not witness a positive relation with growth indicator.

The chapter also tries to analyse the linkage among Kerala districts. For both the years Pathanamthitta district has secured the topmost rank while Wayanad district has secured the lowest rank in terms of education index. An upward surge can be observed for the districts like Thiruvananthapuram, Ernakulam, Idukki, Kasaragod and Palakkad. Districts like that of Kannur, Kozhikode, Malappuram and Thrissur have seen reduction in their ranking. District wise disparity have also been calculated. Coefficient of variation explains that inequalities within the district have broadened up for the year 2015-16 from the year 2011-12. Idukki district has shown the highest growth for both the years following it is the Pathanamthitta district which secured 2nd rank in 2016 and 4th rank in 2011-12. Majority of the districts have seen an upward trend in terms of their growth of health sector. Minute instabilities in the ranking and scores are observed. Kasaragod and Kottayam districts have secured the top two ranks for both the years while districts like that of Wayanad, Malappuram and Palakkad have secured the lowest ranks for the both the years for physical infrastructure. Thrissur, Pathanamthitta, Ernakulam and Idukki districts have seen an upward shift in their rankings for the year 2015-16 while Alappuzha and Kannur districts have remained persistent in terms of rankings and scores. Regression analysis examines that all the indicators have positive relationship with growth.

Human development and economic growth are two facets of one coin called development. The study tends to explore the linkage between these two facets of development. Findings of the study observes that both human development and economic growth presupposes each other. Investment in human capital indicators lead to good growth numbers and hence development. A strong association among human development indicators, physical infrastructure indicators and economic growth is very much necessary.

For Indian economy it is observed that human development transformation to Economic growth is more profound than Economic growth transformation. Hence for backward states it becomes very important to invest in human development indicators. Negligence towards human development indicators will only lead towards increasing disparities and development.

Indian states backwardness in various development indexes is due to the increasing interstate discrepancies. For a nation to be development both developed and underdeveloped states show grow together there should be an equal apportionment of resources. Hence, focus should be on investing in quality indicators of human development which can lead to sustainable growth. Planning Commission (2006) correctly prioritizes the national strategies by setting the target of *Bridging Divides: Including the Excluded*.

A consistent strategy of promoting both objectives simultaneously, and supporting key issues such as social justice, female literacy, equity in income distribution and investment in education and heath sectors should be much focussed upon. A deliberate initiative is needed to improve both aspects of development i.e. human well-being and sustainable growth. Study observes that there is an utmost need to channelize further strengthen the linkage of both chains of transformation especially in case of educational aspect of human development. Educational policies in the country should focus more upon the investment in improving quality indicators of education which can have a profound impact between economic choices and educational achievements. Bihar, Orissa, Uttar Pradesh, Assam, Madhya Pradesh and Rajasthan are chronically placed in backward category for successive decades. A planned initiative will be needed for uplifting the development status of these states. An inclusive central policy for uplifting these states will be needed. Policy makers of

backward as well as moderately states should examine the fact that their places in global scale are not only uninspiring but it also relates a story of long journey of tough commitments.

7.3. Suggestions

1. For achieving the goal of sustainable and inclusive development investment in the indicators like higher education and pupil- teacher ratio and various other indicators already been specified in the study should be focused upon.

2. All regions of the country should have similar expansions in economic attainment and human capability hence, an equitable distribution of resources specially among the backward regions of the nation should be the foremost objective of policy makers. An extraordinary effort is needed to halve the alarming level of regional discrepancies in both income and non-income dimensions of human development.

3. Educational policies in the country need to be redesigned on the quality basis so that a responsive effect between economic choices and educational achievements can be restored. Same is the case for health indicator, government policies should focus more on emphasing the role of public sector which is more affordable by the poor people.

4. Development cannot be attained without the bi- directional relationship between these two concepts hence both the indicators are necessary for attaining the goal of development.

Bibliography

BIBLIOGRAPHY

Abramovitz, M. (1995). Convergence and Deferred Catch-up Productivity Leadership and the Waning of American Exceptionalism, first draft, In Growth and Development: The Economics of the 21st Century. (eds.) Landau, R. Taylor, T. and Wright, G. Stanford CA: Stanford University Pressghion,

Aghion, P. and Howitt, P. (1998). *Endogenous Growth Theory*, Cambridge MA: MIT Press

Aghion, P. and Howitt, P. (2005). Growth with qualityimproving innovations: an integrated framework. *Handbook of economic growth 1*. 67110.

Ahluwalia, I. J. (2010). Social Sector Development: A Perspective from Punjab, In Acharya Sankar and Rakesh Mohan (eds.) *India's Economy: Performance and Challenges*, New Delhi: Oxford University Press, 285-327.

Ahmed, S. (2007). More and Better Growth in India: Role of Fiscal Policy. Background paper for More and Better Growth project, IEG and World Bank.

AISHE 2004-05P_1.pdf 2004-05 (Provisional). New Delhi: Ministry of Human Resource Development.

AISHE 2011-12P_1.pdf 2011–12 (Provisional). New Delhi: Ministry of Human Resource Development.

AISHE 2015-16P_1.pdf 2015–16 (Provisional). New Delhi: Ministry of Human Resource Development.

Alkire, Sabina (2002). Dimensions of Human Development, *World Development, Vol. 30, No. 2*, pp. 181-205

Amin, A. A. (2003). Economic Growth and Human Development with Capabilities Expansion.

Anand, S and Ravallion, M. (1993). Human Development in Poor Countries: On the Role of Private Incomes and Public Services, *Journal of Economic Perspectives*.7(1), 133-50.

Annual health survey (AHS) factsheet 2010–11. New Delhi: Office of Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India; 2010–2011.

http://www.censusindia.gov.in/vital_statistics/AHSBulletins/Factsheets.html [cited 2014 Dec 18].

Annual health survey bulletin 2010–11. New Delhi: Office of Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India; 2011. Available from: http://www.censusindia.gov.in/vital_statistics/AHSBulletins/files/AHS%20bulletinppt.pdf [cited 2014 Dec 18].

Annual health survey (AHS) factsheet 2011–12. New Delhi: Office of Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India; 2010–2011. Available from: http://www.censusindia.gov.in/vital_statistics/AHSBulletins/AHS_Factsheets_2011_12.html [cited 2014 Dec 18].

Annual health survey (AHS) factsheet 2012–13. New Delhi: Office of Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India; 2010–2011. Available from: http://www.censusindia.gov.in/vital_statistics/AHSBulletins/AHS_Factsheets_2012_13.html [cited 2014 Dec 18].

Antony, G.M. and A. Laxmaiah. (2008). Human Development, Poverty, Health and Nutrition Situation in India. *Indian Journal of Medical Research*, 128(2),198-205

Arora, S. (2001). Health Human Productivity and Long-Term Economic Growth. Journal of Economic History, 61(3)

Arrow, K. (1962). The Economic Implications of Learning by Doing. *Review of Economic Studies.*

Asghar, N. & Nasreen, S. & Hafeez, R. (2012). Relationship between FDI and Economic Growth in Selected Asian Countries: A Panel Data Analysis. *Review of Economics & Finance. 2.*

Baffes, J. and Shah, A. (1993). Productivity of Public Spending, Sectoral Allocation Choices, and Economic Growth. Policy Research Working Papers, No. 1178. The World Bank, Washington, D.C.

Barro, R.J. (1990), Government spending in a Simple Model of Economic Growth. *Journal of Political Economy*,103-126.

Barro, R. J. (1991). Economic Growth in a Cross Section of Countries, *Quarterly Journal of Economics*,106(2),407–443. Available at: https://www.econ.nyu.edu/user/debraj/Courses/Readings/BarroGrowth.pdf

Barro, R.J. and Lee, J.W. (1993). International Comparisons of Educational Attainment. *Journal of Monetary Economics*. 32,363-94.

Barro, R.J. and Lee, J.W. (1996). International Measures of Schooling Years and Schooling Quality. *American Economic Review*. 86,218-223.

Barro, R. J. (1997). *Determinants of Economic Growth: A Cross-Country Empirical Study*, Cambridge, MIT Press. (Available at: faculty.haas.berkeley.edu/ross_levine/papers/1998_Review_JCE_Barro.pdf)

Barro, R. J. (2001). Human Capital and Growth. *American Economic Review*.91(2),12- 17.

Barro, R.J. and Lee, J.W. (2001). International Data on Educational Attainment: Updates and Implications. *Oxford Economic Papers*. 53(3).

Barro, R.J. and Lee, J.W. (2010). A New Data Set of Educational Attainment in the World, 1950–2010. NBER Working Paper Series No. 15902.

Barro, R.J. and X., Martin, S. (1995). *Economic Growth*. New York: McGraw-Hill.

Barro, R. and Martin, S. (1999). *Economic Growth*, Cambridge, Massachusetts: MIT Press.

Basov, S. (2002). Heterogenous human capital: life cycle investment in health and education.

Baum, N.D. and Lin, S. (1993). The Differential Effects on Economic Growth of Government Expenditures on Education, Welfare, and Défense. *Journal of Economic Development*, 18,175-185.

Becker, G.S. (1962). Investment in human capital. *Journal of Political Economy.70*,11-30

Becker, G. S. (1964). Human Capital, New York: Columbia University Press. Available at: www.nber.org/chapters/c3730.pdf

Becker, G. (1964). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*, New York: Columbia University Press.

Becker, G. and Chiswick, B. (1966). Education and the Distribution of Earnings. *American Economic Review*.56,358-369.

Becker, G.S. (1967) Human capital and Personal Distribution of Income, Woytinsky Lecture University of Michigan

Becker, G. (1967). Human Capital and the Personal Distribution of Income: An Analytical Approach. Woytinsky Lecture, University of Michigan; Reprinted as an Addendum to Chapter 3, in G. Becker, Human Capital,2nd edition, New York: Columbia University Press for the National Bureau of Economics Research, 94-144.

Becker, G. (1974). The Theory of Marriage-Part 2. *Journal of Political Economy.* 82,11-26.

Becker, G. (1975). *Human Capital*, 2nd Edition. New York: Columbia University Press

Becker, G. S. (1993). *Human Capital: A theoretical and Empirical Analysis with Special Reference to Education*, Chicago: The University of Chicago Press. Available at: www.nber.org/chapters/c3730.pdf

Becker, G. S. and Murphy, K.M. (2007). The Upside of Income Inequality. The American, http://www.american.com/archive/2007/may-june-magazine-contents/theupside-of-income-inequality/.

Behrman, J. R. (1990a). Human Resource Led Development: Review of Issues and Development. New Delhi, India: ARTEP/ILO.

Behrman, J. R. (1990b). The Action of Human Resources and Poverty on One Another: What We Have Yet to Learn. *LSMS Working Paper 74, Washington: World Bank.*

Behrman, J. R. (1990c). Women's Schooling and Nonmarket Productivity: A Survey and A Reappraisal,' Philadelphia. *PA: University of Pennsylvania, mimeo.*

Behrman, J. R. (1993). The Economic Rationale for Investing in Nutrition in Developing Countries. World Development, 21.

Behrman, J. R. (1994). Intrafamily Distribution in Developing Countries. *Pakistan Development Review, 33*.

Behrman, J. R. (1995a). The Impact of Distributive Policies, Governmental Expenditure Patterns and Decentralization on Human Resources. *Philadelphia, PA: University of Pennsylvania, mimeo.*

Behrman, JR. (1995). The Impact of Distributive Policies, Governmental Expenditure Patterns and Decentralization on Human Resources. Processed. University of Pennsylvania. Philadelphia

Bhandari, P. (2012). *Refining State Level Comparisons in India*. Planning Commission, Government of India.

Bergheim, S. (2005). Human Capital is the Key to Growth - Success Stories and Policies for 2020. *SSRN Electronic Journal, 10.2139/ssrn.774825*.

Bergheim, S. (2008). Long-Run Growth Forecasting. 10.1007/978-3-540-77680-2.

Bhatt, A.S. (2010). Does Social Expenditures Promote Economic Growth? A Multivariate Panel Co-Integration Analysis for Asian Countries. *European Journal of Social Sciences*. 14(1)

Bhattacharya, G. (2009). Intra-State Disparity in Government Expenditure: An Analysis. *Economic and Political Weekly*, 45(26).

Bhullar, A. S. & Sidhu, R. S. (2006). Integrated land and water use–A case study of Punjab. *Economic and Political Weekly*, Dec. 30.

Boozer, M., Ranis, G., Stewart, F. and Suri, T. (2003). Paths to Success: The Relationship between Human Development and Economic Growth. Discussion Paper No. 874, Economic Growth Centre, Yale University.

Bosworth, B., Collins, S.M. and Virmani, A. (2007). Sources of Growth in the Indian Economy. *NBER Working Paper No. 12901*.

Carnoy, M. (1995). The Economics of Education: Then and Now. *In International Encyclopaedia of Education.* Cambridge: Cambridge University Press. Available at: portal.unesco.org/education/en/files/36491/11005340553Carnoy.doc/Carnoy.doc).

Cashin, P. and Sahay, R. (1996). Internal Migration, Centre-State Grants and Economic Growth in the States of India. *International Monetary Fund Staff Papers, 43(1),* 123-171.

Census of India. (2009). SRS Bulletin. *Sample registration System, Vol 44(1).* Retrieved From: http://censusindia.gov.in 2.

Census of India. (2010). SRS Bulletin. *Sample registration System, Vol 45(1).* Retrieved From: http://www.censusindia.gov.in 3.

Census of India. (2011). SRS Bulletin. *Sample registration System, Vol 46(1)*. Retrieved from: http://www.censusindia.gov.in 4.

Census of India. (2012). SRS Bulletin. *Sample registration System, Vol 47(1).* Retrieved From: http://www.censusindia.gov.in 5.

Census of India. (2013). SRS Bulletin. *Sample registration System, Vol 48(2).* Retrieved From: http://planningcommission.nic.in 6.

Central Statistics Office. (2014). *Infrastructure volume Statistics 1.* MOSPI. GOI.

Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, New Delhi,

National Health Profile of India – 2012, Health Finance Indicators, Health Infrastructure; Health Status Indicators; Human Resources in Health Sector; and Socio-Economic Indicators.

Chakraborty, I. (1997). Living Standard and Economic Growth: A Fresh Look at the Relationship through the Non-parametric Approach. Centre for Development Studies, Thiruvananthapuram.

Chakraborty, B.& Gupta, M.R. (2005). Human Capital, Education policy and Economic Growth. Indian Statistical Institute: Kolkata.

Chakraborty, P. (2009). Intra- Regional Inequality and the Role of Public Policy: Lessons Learnt from Kerala. *Economic and Political Weekly*, 44(26).

Chandra A. (2010). Does Government Expenditure on Education Promote Economic Growth? An Econometric Analysis. *MPRA Paper No. 25480,* Jamia Milia Islamia, New Delhi

Charles, P. and Berger, K. (1988). *Economic Development*.4th Ed. London: McGrawhill Book

Chatterjee, S.K. (2005). Measurement of Human Development: An Alternative Approach. *Journal of Human Development, 6(1),*31-44.

Chaudhri, D. P. (1979). Education, Innovations and Agricultural Development. *London: Croom Helm,* London.

Chemingui, M.A. (2005). Harnessing public spending for poverty reduction in Yemen. Available from www.worldbank.org/poverty/strategies

Costantini, V. and Salvatore, M. (2008). Environment, Human Development and Economic Growth. *Ecological Economics*, 64(4),867-80.

Costantini, V., Monni, S. (2005). Sustainable human development for European countries. *Journal of Human Development, 6 (3),* 329–351

Das, T.K. (2002). Convergence across Indian States: Cross-Sectional and Panel Estimations. *South Asia Economic Journal, 3(2),* 227-239

Dasgupta, D., Maity, P., Mukherjee, P., Sarkar, S. and Chakraborty, S. (2000). Growth and Interstate Disparities in India. *Economic and Political Weekly. 35(27),* 2413-2422.

Dash, R and Sahoo, P. (2010). Economic growth in India: The role of physical and social infrastructure. *Journal of Policy Reform*.13,373-385.

Deb, S. (2017). Impact of Economic Growth on Social Development Dimensions in India: A State-Level Analysis. *Working paper CSD 1/2017*. Centre for Development Studies, Thiruvanthapuram.

Denison, E. F. (1967). Why Growth Rates Differ: Post-War Experience in Nine Western Countries. *Washington, D.C.: Brookings Institution*

Denison, E. (1979). *Accounting for Slower Economic Growth: The United States in the 1970s*, The Brookings Institution, Washington D.C.

Department of Health and Family Welfare, Government of Uttar Pradesh, Lucknow, National Rural Health Mission.

Department of Economics & Statistics. (2017). Gender Statistics (2015-16). Government of Kerala

Department of Economics & Statistics. (2017). Statistical Handbook. Government of Kerala.

Dev, S. M. and Mooij, J. (2002). Social Sector Expenditures in the 1990s: Analysis of Central and State Budgets, *Economic and Political Weekly*. 37(9). 853-66.

Dev, S.M. and Ravi, C. (2007). Poverty and Inequality: All India and States, 1983-2005. *Economic and Political Weekly, Vol. 42 (6)*.

Devarajan, S., Holmes, M., Humphreys, C., Moon, A. & Swaroop, V. (2001). Guidelines for the World Bank's work on public expenditure analysis and supports (including PERs), The World Bank, Washington, DC.

Devarajan, S., Squire, L. & Suthiwart-Narueput, S. (1995). Reviving Project Appraisal at the World Bank. Policy Research Paper No. 1496, The World Bank, Washington, DC.

Devarajan, S., Swaroop, V. & Zou, H. F. (1996). The composition of public expenditure and economic growth. *Journal of Monetary Economics*, 37, 313 –344.

Devarajan, S., Swaroop, V., & Zou, H.F. (1996). The Composition of Public Expenditure and Economic Growth. *Journal of Monetary Economics*, 37(2), 313-344.

Dewan, M.A.M. (2012). Public Expenditure on Education and Economic Growth: The Case of Bangladesh. *IJAR-BAE* 1(4), 10-18

Dholakia, R.H. (2003). Regional Disparity in Economic and Human Development in India. *Economic and Political Weekly, 38(40),* 4116-4172.

Diamond, J. (1998). Fiscal indicators for economic growth: The Government own saving concept re-examined. *Journal of Public Budgeting, Accounting & Financial Management, 9(4),* 627-651.

Directorate of Economics and Statistics. (2014). Statistics for Planning. Government of Kerala.

District Information System for Education, District Elementary Education Report Card 2011-12. NUEPA and Government of India, New Delhi

District Information System for Education, District Elementary Education Report Card 2015-16. NUEPA and Government of India, New Delhi

District level household & facility survey (DLHS-1). Mumbai: International Institute for Population Sciences. Available from: http://www.rchiips.org/ARCH-1.html [cited 2014 Dec 18].

District level household & facility survey (DLHS-2). Mumbai: International Institute for Population Sciences. Available from: http://www.rchiips.org/ARCH-2.html [cited 2014 Dec 18].

District level household & facility survey (DLHS-3). Mumbai: International Institute for Population Sciences. Available from: http://www.rchiips.org/ARCH-3.html [cited 2014 Dec 18].

District level household & facility survey (DLHS-4). Mumbai: International Institute for Population Sciences. Available from: http://www.rchiips.org/DLHS-4.html [cited 2014 Dec 18].

District level household & facility survey (reproductive & child health project). Mumbai: International Institute for Population Sciences. Available from: www.rchiips.org [cited 2014 Dec 18].

Domar, F. (1947). Expansion and Employment. *American Economic Review*.

Dreze, J. and Saran, M. (1995). Primary Education and Economic Development in China and India: Overview and Two Case Studies in K. Basu, P. Pattanaik and K. Suzumura (eds), *Choice, Welfare and Development*. New Delhi: Oxford University Press,182-241.

Dreze, J and Sen, A. (2002). *Development and Participation*, New York: Oxford University Press

Dreze, Jean P. and Sen, A. (1989). *Hunger and Public Action*. Oxford: Clarendon Press, *Economic and Political Weekly Research Foundation*, state finances, retrieved from, http://www.epwrfits.in/StateFinanceTreeview.aspx, accessed on May 2017

Economics and Statistics Division State Planning Institute Planning Department. (2011). District wise Development Indicators Uttar Pradesh.

Economics and Statistics Division State Planning Institute Planning Department. (2012). District wise Development Indicators Uttar Pradesh.

Economics and Statistics Division State Planning Institute Planning Department. (2016). District wise Development Indicators Uttar Pradesh. Retrieved from (http://updes.up.nic.in)

Economics and Statistics Division State Planning Institute Uttar Pradesh, Lucknow (2011). Statistical Abstract Uttar Pradesh. (Retrieved from (http://updes.up.nic.in)

Economics and Statistics Division State Planning Institute Uttar Pradesh, Lucknow (2012). Statistical Abstract Uttar Pradesh. Retrieved from (http://updes.up.nic.in)

Economics and Statistics Division State Planning Institute Uttar Pradesh, Lucknow (2016). Statistical Abstract Uttar Pradesh. Retrieved from (http://updes.up.nic.in)

Education Commission (1966): Education and National Development, Ministry of Education, New Delhi

Engel, E. (1883). *Der Werth des Menschen*. Berlin: Verlag von Leonhard Simion.

Estache, A. (2004). Emerging infrastructure policy issues in developing countries: a survey of the recent economic literature. Background paper for the Berlin meeting of the POVNET infrastructure working group (processed), World Bank, Washington, DC.

Estache, A. (2006). Infrastructure: a survey of recent and upcoming issues, World Bank, Washington, DC.

Fan et al. (2003). Public Spending in Developing Countries: Trends, Determination and Impact. Environment and Production Technology Division, Discussion Paper No. 99, International Food Policy Research Institute.

Farr, W. (1853). Equitable taxation of property. *Journal of Royal Statistics*.

Fayaz.F. (2016). Analysis of Education Sector – Study of Kerala and Jammu & Kashmir. *Journal of Humanities and Social Science (IOSR-JHSS). vol. 23 no. 03*, pp. 44-51.

Foster, A.D. and Rosenzweig, M.R. (1996). Technical Change and Human-Capital Returns and Investment: Evidence from Green Revolution. *American Economic Review, 86(4), 931-953.*

Fukuda, P. S. and Kumar, S.A.K. Readings in Human Development: Concepts, Measures and Policies for a Development Paradigm. Oxford University Press, New Delhi, 2003. Government of Uttar Pradesh, Lucknow,

Fukuda, P. S. (2003). The Human Development Paradigm: Operationalizing Sen's Ideas on Capabilities. *Feminist Economics. 9(2-3), 301-317.*

Ghosh, M (2006) Economic Growth and Human Development in Indian States Economic and Political Weekly, 41(30), 3321-3329

Ghosh, M. (2006). Economic Growth and Human Development in Indian States. *Economic and Political Weekly*, 41(30),3321-29.

GoI. (2001). Census of India. Ministry of Home Affairs, Office of the Registrar General and Census Commissioner, India.

GoI. (2011). Census of India. Ministry of Home Affairs, Office of the Registrar General and Census Commissioner, India.

GoI. (2016). Central Statistics Office. India, Ministry of Statistics and Programme Implementation, India

Goldin, C. (2014). Human Capital. In *Handbook of Cliometrics*, Heidelberg, Germany: Springer Verlag

Goswami, B. (2011). Social Sector Expenditure and Their impact on Human Development*: The Indian Experience. Indian Journal of Human Development,5(2)*

Government of India. (2002). National Human Development Report 2001, Planning Commission, Government of India, New Delhi.

Government of India. (1997). 50 years of Education. Ministry of Human Resource Development.

Government of India. (1997). *Report of the Committee of State Education Ministers on Implementation of the Proposal to Make Elementary Education a Fundamental Right*

Government of India (1998). National Policy on Education 1986. Department of Education Ministry of Human Resource Development, New Delhi

Government of India. (1999). *Expert Group Report on Financial Requirements for Making Elementary Education a Fundamental Right*. Department of Education. Ministry of Human Resource Development, New Delhi

Government of India. (2005). Report of the Central Advisory Board of Education (CABE): Committee on Free and Compulsory Education Bill and Other Issues Related to Elementary Education, Ministry of Human Resource Development, New Delhi,

Government of India. (2006; 2016). National Health Profile, Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health and Family Welfare: New Delhi.

Government of India. (2010). Education in India, National Sample Survey 64th Round, National Sample Survey Office, New Delhi.

Government of India. (2011). Human Development Report: Towards Social Inclusion, Planning Commission: New Delhi.

Government of India. (2014). Report of the Fourteenth Finance Commission. Directorate of Economic affairs, Ministry of Finance. New Delhi, India

Government of India. (2015). *An analysis of Budgetary Expenditure on Education*. Ministry of Human Development, New Delhi

Government of India. (2010). *Economic Survey 2009-10*. Ministry of Finance. New Delhi.

Government of India. (2013). Indian Public Finance Statistics 2012-13. Department of Economic Affairs, Ministry of Finance, New Delhi.

Government of India. (2002). National Health Policy. Ministry of Health and Family Welfare: New Delhi. Retrieved from:https://www.nhp.gov.in/sites/ default / files/pdf/NationaL_Health_Pollicy.pdf

Government of India. (2011). High Level Expert Group Report on Universal Health Coverage for India, Planning Commission: New Delhi, http:// planningcommission.nic.in/reports/genrep/rep_uhc0812.pdf.

Government of India. Annual Report—2007-08, Department of School Education and Literacy, Department of Education, Ministry of Human Resources Development, Government of India, New Delhi.

Government of India. National Health Policy. Ministry of Health and Family Welfare, Government of India, New Delhi: 2005

Government of India. National Health Policy. Ministry of Health and Family Welfare, Government of India, New Delhi: 2012

Government of India. National Health Policy. Ministry of Health and Family Welfare, Government of India, New Delhi: 2016

Grier, K. B., & Tullock, G. (1989). An empirical analysis of cross-national economic growth, 1951-1980. *Journal of Monetary Economics*, 24(2), 259-276.

Guha, A. and Chakraborty,D. (2003). Relative Positions of Human Development Index Across Indian States: Some Exploratory Results. *Artha Vision*,11(4).

Gujarati, D. N. and Sangeetha. (2007). Basic Econometrics. Tata McGrawHill: Delhi, India.

Haq, M.U. (1990-1994). The Human Development Report. United Nations Development Programme (UNDP), Human Development Report Office.

Haq, M.U. (1995). Reactions on Human Development. New York: Oxford University Press

Haq, MU (1995) Reflections on Human Development. Oxford India Paperbacks – Second Impression (2000). New Delhi.

Haq, MU (1997) Human Development in South Asia. Oxford University Press. Calcutta.

Harbison, F.H. (1962). Human resources development planning in modernizing economies. *International Labor Review*,453-458.

Harbison, F. and Myers, A. (1968). Education, Manpower and Economic Growth Strategies of Human Resource Development, New Delhi: Oxford and IBH Publication

Harrod, R.F. (1939). An Essay in Dynamic Theory. *Economic Journal*.

Harrod, R.F. (1948). Towards a Dynamic Economics. *London: Macmillan*.

Gardner, H., Gardner, D. PhD Health as Human Capital: Theory and Implications A New Management Paradigm.

Harsha, A. (2004). Public investment in education: conceptual foundations, In Saman Kelegama (Ed) Economic policy in Sri Lanka -Issues and Debates, Sri Lanka: Vijita Yapa Publications

Hong, H and Sadiq, A. (2009). Government Spending on Public Goods: Evidence on Growth and Poverty", *Economic and Political Weekly*,44(31)

IIR, (2006). India Infrastructure Report, 2006. India: 3i Network

IMF. (2000). How Can the Poorest Countries Catch up? In *IMF World Economic Outlook*

Indiastat.com (2016a). Retrieved from: http://www.indiastat.com

Institute of Applied Manpower Research, Planning Commission, Government of India, New Delhi, India Human Development Report 2011, Towards Social Inclusion, Oxford University Press, New Delhi, 2011.

International Institute for Population Sciences. (2008). State level Reports of National Family Health Survey (NFHS-3), Mumbai.

Jacobs, G. & Slaus, I. (2011). Human Capital and Sustainability, *Journal of Sustainability*, *3*,97-154. Available at: http://www.mdpi.com/journal/ sustainability

Jain, P., J. S. Ravindra., Dholakia, H. (2009). Feasibility of Implementation of Right to Education Act. *Economic and Political Weekly*, 17(25).

Jeffery, R. (1992). Politics, Women and Wellbeing: How Kerala became a Model. London: Macmillan

Joshi, S. (2006). Impact of Economic Reforms on Social Sector Expenditure in India". *Economic and Political Weekly*. 41(4)

Kabir, M. and T. N., Krishnan. (1996). Social Intermediation and Health Change: Lessons from Kerala, in *Health, Poverty and Development in India*, (eds.) Monica Das Gupta, Lincoln C Chen and T N Krishnan, Delhi: Oxford University Press

K P, Kannan, K. P. and Vijayamohanan, P. N. (2007). Social Security in India: The Long Lane Treaded and the Longer Road Ahead Towards Universalization. *MPRA Paper No. 9601*. Centre for Development Studies, Trivandrum, Kerala, India

Karagianni, S., Pempetzoglou, M., & Strikou, S. (2002). Testing Wagner's Law for the European Union Economies. *The Journal of Applied Business Research,*18(4)

Kaur, B. and Misra, S. (2003). *Social sector expenditure and attainments: An Analysis of Indian states*. RBI Occasional Papers, 24,105-143.

Kaur, B., Misra, S. Suresh, A. (2013). Cyclicality of Social Sector Expenditure: Evidence from Indian States, *RBI Occasional Papers,34(192)*

Kelley, A.C. (1991). The Human Development Index: Handle with Care. *Population and Development Review*, 17(2),315-324.

Kendrick, J.K. (1974). The Accounting Treatment of Human Investment and Capital, *The Review of Income and Wealth, Series 20(4).*

Kendrick, J.K. (1976). The Formation and Stock of Total Capital, New York. (Available at: www.avsi.org/wp-content/uploads/2011/07/ HumanCapital. pdf)

Kern, A. (2009). Human Capital Development Theory: Implications for Education-Comparison of Influential Twenty-First Century Economists Samuel Bowles and Gary S. Becker. Retrieved from http://www. personal. psu.edu/afk119/blogs/career_tech_ed/2009/12/human-capital-development-theory.html.

Kevin, S. (2000). Income Inequality, Education Expenditure and Growth, *Journal of Development Economics*, 63,379-398.

Keynes, J.M. (1936). The general theory of employment, interest and money, New York: Harcourt, Brace and Co.

Keynes, J. M. (1971–1989). The Collected Writings of John Maynard Keynes, 30 Volumes, General editors Donald E. Moggridge and Elizabeth S. Johnson, London: Macmillan and New York: Cambridge University Press for the Royal Economic Society. Cited in the text as CW [Vol. no.].

Kiker, B. F. (1966). The historical roots of the concept of human capital, Journal of Political Economy,74(5),.481-499. (Available at: www.journals.uchicago. edu/doi/abs/10.1086/259201)

Kneller, R., Bleaney, M. F., & Kneller, N. (1999). Fiscal Policy and Growth: Evidence from OECD Countries. Journal of Public Economic,74(2),171-190

Knight, F. (1944). Diminishing Returns from Investment. *The Journal of Political Economy. 52*(2),26-47

Kumari, A. & Sharma, A. (2017). Physical & social infrastructure in India & its relationship with economic development. *World Development Perspectives,5,* 30-33. 10.1016/j.wdp.2017.02.005.

Kurian, N.J. (2000) Widening Regional Disparities in India: Some Implications. *Economic and Political Weekly, 35(7),* 538-550.

Kurian, N.J. (2007) Widening Economic and Social Disparities: Implications for India. *Indian Journal of Medical Research, 126(4),* 374-380.

Kuznets, S. (1966). Modern Economic Growth: Rate, Structure, and Spread. Yale University Press, New Haven, Chapter 2 & 4.

Landau, D. (1983). Government Expenditure and Economic Growth: A Cross-Country Study. *Southern Economic Journal*, 49(3), 783-792.

Landau, D. (1986). Government and Economic Growth in the Less Developed Countries: An Empirical Study for 1960-1980. *Economic Development and Cultural Change,* 35(1), 35-75.

Landau, D. L. (1997). Government expenditure, human capital creation and economic growth. *Journal of Public Budgeting, Accounting & Financial Management*, 9(3), 467-467.

Lee, J.W. Barro, R.J. (2001). Schooling Quality in a Cross-section of Countries. *Economica*, 68, 465-488

Lindert, P. (2004). Growing Public: Social Spending and Economic Growth Since 18th century. United Kingdom: Cambridge University Press.

López, R. E. and Torero, M. (2007). How Growth and Fiscal Policies Affect Income Distribution in Developing Countries. Background paper for "*More and Better Growth*" project, IEG, World Bank

Lucas, R. E. (1988) "On the Mechanics of Economic Development. *Journal of Monetary Economics, June, 22:1, 3–42.*

Lucas, R. E. (1990). "Why Doesn't Capital Flow from Rich to Poor Countries." *American Economic Review Papers & Proceedings*, 80:2, 92–96.

Lucas, R. E. (1992). Making a Miracle, *Econometrica*,61(2),251-72.

Mabsout, R. (2006). From Basic Needs to Basic Capabilities: A Review. Human Development and Capability Association - Manuscript.

Mabsout, R. (2007) Rationality in Economics and Capability Approach. (http://www.capabilityapproach.com/pubs/Mabzout07.pdf) visited on 15 June 2008

Mazumdar, K. (2003). A New Approach to the Human Development Index. *Review of Social Economics*, 61(4). Pp, 535-549.

Mazumder, R. (2005). Human Development in India: Regional Pattern and Policy Issues. *Indian Journal of Applied Economics*, 2(1)

Mankiw, N.G., D, Romer., D.N, Weil. (1992). A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics*, 107 (2), pp. 407-37. (Available at: ome.aubg.edu/faculty/didar/ECON%20402/MankiwRomer Weil.pdf)

Maran, M. & Arokiasamy, Lawrence & Ismail, Maimunah. (2009). Human Capital Development and Its Impact on Firm Performance: Evidence from Developmental Economics. *Journal of International Social Research*.

Marshall, A. (1890/1922). *Principles of Economics*, New York: Macmillan. (Available at: eet.pixel-online.org/files/.../original/Marshall, %20Principles %20of%20Economics.pd)

Marshall, A. (1961). *Principles of Economics*, Macmillan for Royal Economic Society, Cambridge.

Mathur, A and Mamgain, R.P. (2002). Technical Skills, Education and Economic Development in India. *The Indian Journal of Labour Economics.45*(4)

Mathur, A. (1993). The Human capital Stock and Regional Economic Development in India In Nuna, S C (ed.) *Regional Disparities in Educational Development*, Delhi: South Asia Publishers

Maurya, N., Singh, S. & Khare, S. (2015). Human Development in Uttar Pradesh: A District Level Analysis. *Social Science Spectrum*, *VOL 1*,262-278.

Mazumder, K. (1995). Classification of Countries: A Socio-Economic Approach. *Social Indicators Research, 34(2).* 261-273.

Mukherjee, S. & Chakraborty, D. (2010). Is there any Relationship between Environment, Human Development, Political and Governance Regimes? Evidences from a Cross-Country Analysis. *MPRA Paper 19968, University Library of Munich, Germany.*

Mehrotra, R. (2007): Human Development Measures: From Advocacy to Policy Monitoring at Country Level. *Indian Journal of Human Development, Vol. 1 (1)*, pp. 103-127.

Mehrotra, S. (2012). The cost and financing of the right to education in India: Can we fill the financing gap? *International Journal of Educational Development,* 32(1),65–71.

Mehta, M.M. (1976). Human Resource Development and Planning with special references to Asia and the Far East. MacMillian Company, New Delhi p.192.

Michael, G., Harttgen, K., Klasen, S and Misselhorn, M. (2006). A Human Development Index by Income Groups. UNDP Occasional Paper.

Mill, J.S. (1909). *Principles of Political Economy with some of Their Application to Social Philosophy*, London.

Mincer, J. (1958). Investment in Human Capital and Personal Income Distribution. *Journal of Political Economy*, 66,281-302.

Mincer, J. (1958). Investment in Human Capital and the Personal Income Distribution. *Journal of Political Economy*.66,281-302.

Mincer, J. (1970). The Distribution of Labor Incomes: A Survey. *Journal of Economic Literature*, *8*, 1-26. (Available at: econpapers.repec.org/RePEc: aea: jeclit: v:**8**: y:**1970**: i:1: p:**1-26)**

Mincer, J. (1970.The Distribution of Labor Incomes: A Survey. *Journal of Economic Literature.* 8(1),1-26.

Mincer, J. (1974). *Schooling, Experience, and Earnings*, New York: Cambridge University Press

Mincer, J. (1978). Family Migration Decisions. *Journal of Political Economy*, 749-773.

Mincer, J. (1993). Human Capital, Technology, and the Wage Structure: What Do Time Series Show? in J. Mincer, ed. *Studies in Human Capital*, Edward Elgar Publishing

Mincer, J. (1993). Job Training: Costs, Returns, and Wage Profiles in J. Mincer, *Studies in Human Capital*, Edward Elgar Publishing, 263-281.

Mincer, J. (1997). Changes in Wage Inequality, 1970-1990 in Research in Labor Economics 16:1-18.

Mincer, J. and Solomon, P. (1974). Family Investments in Human Capital. *Journal of Political Economy*.82,76-108.

Mincer, J. and Solomon, P. (1978). Women's Earnings Re-examined. *Journal of Human Resources*. 13(1),118-34.

Mincer, J. and Boyan, J. (1981). Labor mobility and wages. in *Studies in Labor markets*, Sherwin rosen, ed. Chicago: University of Chicago Press,21-64

Mincer, J. and Haim, O. (1982). Interrupted Work Careers: Depreciation and Restoration of Human Capital. *Journal of Human Resources.*17,3-24.

Ministry of Finance. (2010). "Economic Survey (2009-10)", Government of India",

Ministry of Finance, Government of India, New Delhi, Economic Survey 2012-13 Statistical Appendix.

Ministry of Health and Family Welfare (undated). National Rural Health Mission (2005-2012): Mission Document, Available at: http://www.mohfw.nic.in/ NRHM/Documents/Mission_Document.pdf, Accessed on 10 May 2010.

Ministry of Human Resource Development, Analysis of Budgeted Expenditure on Education, Various Issues, Department of Education, Government of India.

Ministry of Human Resource Development, Government of India, All India survey on higher education New Delhi, January 2013.

Ministry of Statistics and Programme Implementation, Government of India, New Delhi, Employment and Unemployment Situation among Social Groups in India; Employment and Unemployment Situation in India, 2009- 10; India Statistics; Men and Women in India 2012; and Statistical Year Book 2013.

Mittal, P. (2016*).* Social Sector Expenditure and Human Development of Indian States. *MPRA.*

Mohanty, S.K. (2011). Multidimensional Poverty and Child Survival in India. *PLoS ONE* 6(10): e26857. doi: 10.1371/journal.pone.0026857

Mohanty, S.K. and Dehury, B. (2012). Human Development Indices: Old and New", IIPS Working paper No. 6.

Mohanty, S.K. and Ram, F. (2010). Life Expectancy at Birth among Social and Economic Groups in India. IIPS Research Brief No 13.

Mooij, J. and Dev, S. M. (2004). Social Sector Priorities: An Analysis of Budgets and Expenditures in India in the 1990s. *Development Policy Review*.22(1),97-120.

Morris, D. & B. Mc, Alpin. (1982). Measuring the Condition of India's Poor. Promilla & Co., New Delhi

Morris, D.M. (1979). Measuring the Condition of the World's Poor: The Physical Quality of Life Index. Pergamon Press. New York

Mukherjee, S and Chakraborty, D. (2009). Environment, Human Development and Economic Growth: A Contemporary Analysis of Indian States. *International Journal of Global Environ mental Issues*,9(1), 20-49

Mukherjee, S and Chakraborty, D. (2010a). Is There Any Relationship between Environment, Human Development, Political and Governance Regimes? Evidences from a Cross-Country Analysis .*MPRA Paper 19968*, University Library of Munich, Germany.

Mukherjee, S. & Chakraborty, D. (2010). Is There Any Relationship between Environment, Human Development, Political and Governance Regimes? Evidences from a Cross-Country Analysis. *SSRN Electronic Journal. 10.2139/ssrn.1536352.*

Mukherjee, S and Chakraborty, D. (2010b). Is Environmental Sustainability Influenced by Socio-economic and Socio-political Factors? Cross-Country Empirical Evidence", Sustainable Development, DOI: 10.1002/sd.502, Available at: http://onlinelibrary.wiley.com/doi/10.1002/sd.502/abstract

Mukherjee, S., D. Chakraborty and Sikdar, S. (2014). Three Decades of Human Development across Indian States: Inclusive Growth or Perpetual Disparity? Working Paper No. 2014-139, National Institute of Public Finance and Policy, New Delhi

Mundle, S. (1998). Financing Human Development: Some Lessons from Advanced Asian Countries. *World Development*, 26(4)

National family health survey (NFHS-1) 1992–93. Mumbai: International Institute for Population Sciences (IIPS) and Macro International; 2009. Available from: http://www.rchiips.org/nfhs/nfhs1.shtml [cited 2014 Dec 18].

National family health survey (NFHS-2) 1998–99. Mumbai: International Institute for Population Sciences (IIPS) and Macro International; 2009. Available from: http://www.rchiips.org/nfhs/nfhs2.shtml [cited 2014 Dec 18].

National family health survey (NFHS-3) 2005–06. Mumbai: International Institute for Population Sciences (IIPS) and Macro International; 2009. Available from: http://www.rchiips.org/nfhs/nfhs3.shtml [cited 2014 Dec 18].

National family health survey, 2005–06 India. Mumbai, India: International Institute for Population Sciences (IIPS) and Macro International; 2007. pp. 385–409. Available from: http://www.rchiips.org/NFHS/NFHS-3%20Data/VOL-1/Chapter%2012%20-%20HIV%20Prevalence%20%28422K%29.pdf [cited 2015 March 15].

National family health survey (NFHS-4) 2012–14. Mumbai: International Institute for Population Sciences (IIPS) and Macro International; 2009. Available from: http://www.rchiips.org/nfhs/nfhs4.shtml [cited 2014 Dec 18].

National family health survey, India. Mumbai: International Institute for Population Sciences (IIPS) and Macro International; 2009. Available from: http://www.rchiips.org/nfhs/ [cited 2014 Dec 18].

Nayak. (2007). Human Development – Conceptual and Measurement. *MPRA Paper No. 6272*. Posted 13, December

Nayak, P. and Ray, S. (2007). Inter-District Disparities in Meghalaya: A Human Development Approach. *MPRA* paper No. 6274,1-20

Neumayer, E. (2003). Beyond Income: Convergence in Living Standards, BigTime. *Structural Change and Economic Dynamics.* 14(3), 275-296.

NFHS. (2015-16). NHFS-4: Fact Sheets for Key Indicators Based on Final Data. Government of India.

NHDR. (1996). The National Human Development Report. Oxford University: New Delhi

NHDR. (1996). The National Human Development Report. Oxford University Press. New Delhi

NITI Aayog. (2015). Report of the sub-group of chief ministers on rationalization of centrally sponsored schemes. New Delhi.

NITI Aayog. (2018). Healthy States, Progressive India, New Delhi.

NUEPA (2009). Education Development Index: Suggestive Framework. New Delhi: and.- Retrieved from National University for Education Planning and Administration (NUEPA), (2005-06, 2014),

Nussbaum, M.C. (2000). Women and Human Development: The Capabilities Approach, United Kingdom: Cambridge University Press

Nussbaum, Martha A. and Sen, A. (1993). *Quality of Life*, Oxford: Clarendon Press

OECD. (1998). *Human Capital Investment–an international comparison,* Paris: Centre for Educational Research and Innovation, Available at: www.oecd.org/site/worldforum/33703702.pdf)

Ojha, V.P. and Pradhan, B.K. (2006). Human Capital Formation and Economic Growth in India: A CGE Analysis Available at: http://www.isid.ac.in/ ~planning/O%20and%20P.pdf

on 10 march 2012

Pal, S.P.& Pant, D.K. (1993). An Alternative Human Development Index. *Margin: The Journal of Applied Economic Research, 25(2) Part-II Jan-March 8-22*

Pant, K. C. (2001). Towards hunger-free India. Ed. R. Kapila and U. Kapila. Delhi: Academic Foundation.

Pant, D.K. (1995). Human Development, Demographic Transitions & Economic growth Linkage: An Econometric Analysis with Indian Data. Working Paper No.67, NCEAR, New Delhi.

Peacock, A., & Wiseman, J. (1961). The growth of public expenditure in the United Kingdom. Princeton: Princeton University Press.

Peter Howitt Brown University February 9, 2005 HEALTH, HUMAN CAPITAL AND ECONOMIC GROWTH: A SCHUMPETERIAN PERSPECTIVE Paper prepared for the Pan American Health Organization, based on my presentation to the PAHO Senior Policy Seminar on Health, Human Capital and Economic Growth held in Washington, October 4, 2002.

Petty, W. (1899). The Economic Writings of Sir William Petty, Vol. I, Cambridge University Press: UK. Available at: oll.libertyfund.org/titles/1677.

Planning Commission. (2002). National Human Development Report 2001. Government of India.

Planning Commission (2002), Government of India. National Human Development Report 2001.

Planning Commission. (2006). Government of India. The Approach Paper to Eleventh Five Year Plan

Planning Commission, Government of India. (2007). Poverty Estimates for 2004-05. accessed on line: http://planningcommission.nic.in/news/prmar07.pdf accessed

Planning Commission. (2010). Report of the Working Group on Elementary Education Literacy, 12th Five Year Plan, 2012-17. New Delhi

Prabhu, K. S & Chatterjee, S. (1993). Social Sector Expenditure & Human Development: A Study of Indian States. DRG Study No.6, Mumbai, *Reserve Bank of India, Bombay*

Prabhu, K. S. (1998). Social Sectors in Economic Development, *Journal of Social and Economic Development, Vol* 1(2),268-87 Available at: https:// www. google.co.in/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#)

Prabhu, K. S. (2005). "Social Sectors and Economic Development" in R.K. Sen (ed.), *Social Sector Development in India*, New Delhi: Deep and Deep Publications,3- 25.

Prabhu, S. (1994).The Budget and Structural Adjustment with a Human Face. *Economic and Political Weekly*, 29(16/17), 16-23.

Pritchett, L. (1996). Where has all the education gone? World Bank Working Paper No. 1581, Washington, DC.

Psacharapoulos, G. (1994). Return to Education: A Further International Update and Implications. *The Journal of Human Resources*, 20,584-604

Psacharopoulos, G.& Woodhall, M. (1985). Education for development, an analysis of invest and choices. *Washington, DC: Oxford University Press*.

Psacharopoulos G., Arriagada, A.M. (1986). The educational composition of the Labor-force: an international comparison. *International Labor Review, 125* (5),561-574.

Psacharopoulos, G., Arriagada, A.M. (1986). The educational composition of the Labor-force: an international comparison. *International Labor Review*, 125 (5),561-574. (Available at: documents.worldbank.org/curated/en/.../ REP402000The0e0rnational0comparison.pd)

Puthenkalam, J. J. and George, M.K. (2012). *Human Development Strategy of MGNREGA. Jaipur: R*awat Publications

Rajan, S. I, and James, K. S. (2007). Demographic Transition and Economic Development in Kerala: The Role of Emigration. Project Report submitted as part of the MIR Study to the South Asia Network of Economic Initiatives. Can be accessed at http://saneinetwork.net/Files/3.pdf

Ram, R. (1986). Government Size and Economic Growth: A New Framework and Some Evidence form cross-section and Time-Series Data. *American Economic Review*, 191-200.

Ramachandran, V. K. (1997). On Kerala's Development Achievements, In *Indian Development: Selected Regional Perspectives*, (eds.) Jean Dreze and Amartya Sen, New Delhi: Oxford University Press, 205-356.

Ramirez, A., Ranis, G. and Stewart, F. (1998). Economic Growth and Human Development. *QEH Working Paper Series: WP No. 18*

Ramirez, A., Ranis, G and Stewart, F. (1998). *Economic Growth and Human Development. QEH Working Paper Series no.18.*

Ranis, G. and Stewart, F. (2000). Strategies for Successful Human Development. Journal of Human Development. 1(1), 49-69.

Ranis, G and Stewart, F. (2000). Strategies for Successful Human Development. *Journal of Human Development*. 1(1), 49-69.

Ranis, G and Stewart, F. (2005). Dynamic Links between the Economy and Human Development. *DESA Working Paper No. 2005/08.*

Ranis, G and Stewart, F. (2005). *Dynamic Links between the Economy and Human Development*. DESA Working Paper No. 2005/08

Ranis, G., Stewart, F. and Ramirez, A. (2000). Economic Growth and Human Development. *World Development. 28 (2), 197-219.*

Ranis, G., Stewart, F. and Ramirez, A. (2000). Economic Growth and Human Development. *World Development*. 28 (2), 197-219.

Rao, G. M., Shand, R. T. and Kalirajan, K.P. (1999). A Convergence of Income Across Indian States A Divergent Issue. *Economic and Political Weekly*, 34(13)

Rao, G. M., Shand, R. T. and Kalirajan, K. P. (1999). A Convergence of Income Across Indian States A Divergent Issue. *Economic and Political Weekly, Vol. 34*, No. 13

Ravallion, M. and Subba, R.K. (1992). Adjustment and human development in India *Journal of Indian School of Political economy.4*(1), Jan-Mar, P-55-79.

Ravallion, Martin & Anand, Sudhir. (1993). Human Development in Poor Countries: On the Role of Private Incomes and Public Services. *Journal of Economic Perspectives.*

Ravallion, Martin. and Datt, G. (2002). Why has economic growth been more pro-poor in some states in India than others. *Journal of Development Economics. Pg. No* 381-400

Rehman, A.S. (2011). Impact of Government Spending in Social Sectors on Economic Growth: A Case Study of Pakistan. *Journal of Business and Economics*, 3(2), 214-234.

Reserve Bank of India. (2012). Annual Report 2011–12. Government of India.

Reserve Bank of India. (2012). Handbook of Statistics of Indian Economy. Government of India.

Reserve Bank of India. (2013). State Finances A study of Budgets of 2012-13. Government of India.

Reserve Bank of India. (2015). Handbook of Statistics on Indian States. Government of India.

Reserve Bank of India. (2016). Handbook of Statistics on Indian States. Government of India.

Reserve Bank of India. (2011). State Finances: A Study of Budgets of 2010-11, Mumbai. Government of India.

Reserve Bank of India. (2012). Handbook of Statistics on Indian Economy. Government of India.

Reserve Bank of India. (2016). State Finances a Study of Budgets of 2015-16. Government of India.

Reserve Bank of India. (2013). Report on State Finances: Study of Budgets of 2012–13. Government of India.

Romer, P.M. (1990). Endogenous Technological Change. *Journal of Political Economy*.

Romer, P.M (1994). The Origin of Endogenous Growth. *Journal of Economic Perspective. 8(1)*: 3–22. doi:10.1257/jep.8.1.3.

Romer, P. (1986). Increasing Returns and Long Run Growth. *Journal of Political Economy*, 94(5),1002-1037.

Romer, P.M. (1990). Human Capital and Growth: Theory and Evidence. Carnegie-Rochester Conference Series on Public Policy. 251–286. (Available at: www.nber.org/papers/w3173)

Roy, H. and Bhattacharjee, K. (2009). Convergence of Human Development across Indian States: Quantitative Approaches to Public Policy. Fourth Annual International Conference on Public Policy and Management, IIM, Banglore, India

Sahn, D.E; and Stifel, D.C. (2000). Poverty Comparison Over-Time and Across Countries in Africa. *World Development*, 28(12), 2123-2155.

Sahoo, P. and Das, R. (2008). *Economic growth in South Asia: role of infrastructure*. Working paper no.288. Institute of Economic Growth, New Delhi, India.

Saikia, B. & Dutta, B.P. (2012). Human Capital Formation and Economic Development: A Case Study in Lakhimpur District of Assam, *Global Journal of Research in Management*, 2 (1)

Sen, A. (1970). *Collective Choice and Social Welfare*, Oliver and Boyd, Edinburgh and Holden-Day, San Francisco, CA (republished: North-Holland, Amsterdam, 1979).

Sen, A. (1973). *On Economic Inequality*, Oxford: Clarendon Press

Sen, A. (1977). On weights and measures: informational constraints in social welfare analysis. *Econometrica.45* (7), 1539–1572.

Sen, A. (1980). Equality of What? In S. McMurrin (Ed.) *Tanner Lectures on Human Values*, Vol. I, Cambridge: Cambridge University Press

Sen, A. (1984). The Living Standard. *Oxford Economic Papers*, 36, 74-90.

Sen, A. (1985). *Commodities and Capabilities*, North- Holland: Amsterdam.

Sen, A. (1987). *The Standard of Living*, Cambridge: Cambridge University Press.

Sen, A. (1992). *Inequality Re-examined*, Cambridge: Clarendon Press.

Sen, A. (1993). *Life expectancy and inequality: some conceptual issues*. In P.K. Bardhan, M. Datta Chaudhuri and T.N. Krishnan (Eds), Development and Change, Mumbai:Oxford University Press

Sen, A. (1995). Human development and financial conservatism. Keynote Address at the International Conference on Financing Human Resource Development, Asian Development Bank, Manila, 17 November

Sen, A.K. (1985). Well-being, Agency and Freedom. *The Journal of Philosophy, 82(4), 169-221*.

Sen, A.K. (1999). Development as Freedom. Oxford University Press. Oxford Indian Paperbacks; Fifth Impression 2002.

Sen, A.K. (2000). A Decade of Human Development. *Journal of Human Development. 1(1), 17-23.*

Sen, T. K. & Karmakar, K. (2007). Reprioritization of Public Expenditure for Human Development. working paper, NIPFP, New Delhi

Sengupta, A. (2004). The human right to development, *Oxford Development Studies, 32:2, 179-203, DOI:10.1080/1360081040001699948*

Sharma & Kumar. (1993). Regional Disparities in the levels of Socio-Economic Development in India.

Shultz, T. W. (1961). Investment in human capital. American Economic Review, 51(1).1-17(Available at: https://www.jstor.org/stable/1818907).

Singh, A.K. (2018). Priorities of Uttar Pradesh Budget: As Infrastructure Expenditure Rises, Health and Education Face Neglect. *EPW, Vol. 53, Issue No. 16*.

Sinha, P. and Koul, S.A. (2017). Development of a Health Index of Indian States.

Smith, A. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations. London.

Solow, R.M. (1956). A Contribution to the Theory of Economic Growth, *Quarterly Journal of economics*, *70*, 65-94. (Available at: piketty.pse.ens.fr/fichiers/ **Solow1956**.pdf)

Solow, R.M., Arrow K.J., Chenery, B.S., Minhas, B.S. (1961). Capital labor substitution and economic efficiency. *The Review of Economics and Statistics,* 43,56-98 (Available at: https://msuweb.montclair.edu/~ lebelp/ ACMSCapLabSubREAS**1961**.pdf)

Som, K.S. and Mishra, R.P. (2014). BIMARU States: Need a Rethinking, *IOSR Journal of Humanities and Social Science (IOSR-JHSS), 19(7) July*.

Spence, M. (1973).Job Market Signalling. *The Quarterly Journal of Economics, 87*(3), 355-374**.**

Srinivasan, T.N. (1994). Human Development: A New Paradigm or Reinvention of the Wheel? American *Economic Review*, 84 (2),238-243.

Srinivasan, K. and Mohanty, S.K. (2008). Household Deprivation and Its Linkages with Reproductive and Child Health Care and Health Outcome. *Economic Political Weekly*, 43 (48), 67-76.

Srivastava, A. and Mohanty, S.K. (2010). Economic Proxies, Consumption Expenditure and Health Estimates. *Economic Political Weekly*,45 (16),55-63.

Stiglitz. J. E. (1995b). Social Absorption Capability and Innovation. In Bon Ho Koo and D. H. Perkins, eds., *Social Capability and Long-Term Economic Growth*. New York: St. Martin's Press

Stokey, N. (1991). Human Capital, Product Quality, And Growth. *The Quarterly Journal of Economics*.106, 587-616.

Stocky, N. (2000). Asset designation and family welfare: An investigation of individual wellsprings of salary on sustenance utilization, nourishment and

wellbeing in the Philippines. Ph.D. exposition, Institute of Social Studies, The Hague

Streeten, P. (1979). From Growth to Basic Needs, Premises and Promises. Journal of Policy Modeling. 16(3), 136-146.

Subramanian, A. (2003). Determinants of Human Development, edited by Ruddar Dutt, Human Development and Economic Development. *Deep and Deep Publication Private Limited, New Delhi*.

Sudhir, A.& Sen, A. (1994). Human development Index: Methodology and Measurement. Human Development Occasional Papers (1992-2007) HDOCPA-1994-02, Human Development Report Office (HDRO), United Nations Development Programme (UNDP). Available at <https://ideas.repec.org/p/hdr/hdocpa/hdocpa-1994-02.html>

Sundaram, K. (2003). On Identification of Households Below Poverty Line: Some Comments on the Proposed Methodology, *Economic and Political Weekly*, 38(9),896 -902

Suryanarayana, H. M., Agarwal, A. and Prabhu K. S. (2011). Inequality Adjusted Human Development Index for India's States. UNDP, New Delhi: India

Tharakan, P. K. M. (1998). Socio-Religious Reform Movements, the Process of Democratisation and Human Development, In *Democratisation in the Third World: Concrete Cases in Comparative and Theoretical Perspective*, (eds.) Lars Rudebeck, London: Macmillan Ltd.

Tharakan, P. K. M. and Navaneetham, K. (1999). Population Projection and Policy Implications for Education: A Discussion with Reference to Kerala. *Working Paper No. 296, Centre for Development Studies, Thiruvananthapuram.*

The Global Competitiveness Report 2007–2008, World Economic Forum, Geneva, Switzerland, 2007.

Thirlwall, A. P. (1986). A General Model of Growth and Development on Kaldorian Lines. *Oxford Economic Papers*.

Tilak, J. (2006). Economics of Human Capital in India. *Indian Economic Journal 89th Annual Conference of the Indian Economic Association*. Key-note Address.(https://www.researchgate.net/profile/Jandhyala_Tilak/publication/265596267_ECONOMICS_OF_HUMAN_CAPITAL_IN_INDIA/links/5413f12f0cf2bb7347db2a7e.pdf)

Tinbergen, J. 1974. Substitution of Graduate by Other Labour. *Kyklos* 27 (2): 217–26.

Todaro, M. (1971). Income Expectations, Rural-Urban Migration and Employment in Africa. *International Labour Review*.

Todaro, M. (1976). Internal Migration in Developing Countries. ILO Geneva.

Tridico, P. (2007). Institutions, Human Development and Economic Growth in Transition Economies. *The European Journal of Development Research, 19(4),* 569-593

UNDP. (1990). Human Development Report, New York: Oxford University Press.

UNDP. (1991), Human Development Report, New York: Oxford University Press.

UNDP. (1995). Human development Report, New York, Oxford University Press

UNDP. (1997). Human development Report, New York, Oxford University Press.

UNDP. (1999). Human development Report, New York, Oxford University Press. (Available at: hdr.**undp**.org/sites/default/files/**reports**/ 260/hdr_**1999**_en_ nostats.pdf).

UNDP. (2005). Human Development Report, New York: Oxford University Press.

UNDP. (2006). Human Development Report, New York: Oxford University Press.

UNDP (2007) Measuring Human Development: A Premier. UNDP.

UNDP. (2009). Human Development Report 2009, New York: Palgrave Macmillan.

UNDP. (2010). Human Development Report 2010, New York: Palgrave Macmillan.

UNESCO 2009, *Educational Indicators, Technical Guidelines.*

Unique Identification Authority of India (2010). Envisioning a Role for Aadhaar in the Public Distribution System. Available at; *http://uidai.gov.in/ UID_PDF/Working Papers/Circulated_Aadhaar_PDS_Note.pdf*

Veron, R. (2001). The New Kerala Model: Lessons for Sustainable Development. *World Development*, 29(4),601-17.

Wagner, A. W. (1890). *Finanzwissenschaft*, Winter, Leipzig: C. F. [Google Scholar]

Weil, David N. (2009*), Economic Growth*, 2nd. Ed., Boston: Addison Wesley.

Williamson, J.G. (1993). Human Capital Deepening, Income-Inequality and Demographic Events along the Asia-Pacific Rim in N. Ogawa, GW Jones and JG Williamson ed. Human Resource in Development along the Asia-Pacific Rim. Oxford University Press. Singapore

Wilson, A., B., and Briscoe G. (2004). The Impact of Human Capital Growth: A Review. Third Report on Vocational Training Research in Europe: A Background Report.

World Economic Forum. (2013). Human Capital Report. Oxford University Press: Washington,D.C.Available:http://www3.weforum.org/docs/WEF_HumanCapitalReport_2013.pdf.

World Bank report. (2015). Human Development Report. UNDP.

Appendix

APPENDIX

Table 3.1 A: Year wise Social sector Expenditure of India

Items	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Education, art & culture	146735.8	170808.2	169386	198570	240086	271027	283229	298102	313138	343728
Scientific services & research	12463.86	13319.66	13914.2	16174.2	18854.7	19403	17808	16566.8	17332.2	307498
Medical & public health and water supply & sanitation	59215.12	69169.77	69273.9	75644.1	90319.3	94242.3	95073	100912	106135	136067
Family welfare	8762.98	10608.02	12057.5	13748.4	15954.4	16915.9	17446	18207.1	18925.6	16204.1

Source: Public Finance Statistics, Ministry of Finance, Government of India (various issues).

Table 3.2A: Year wise Other components of social sector expenditure of India

Items	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Urban development	11906.4	20751.9	22353.2	30155.6	38679.8	32354.6	34105	39330.6	37535.7	39178.6	56740.4
Broadcasting	1648.59	1692.15	1479.24	1526.36	1761.7	1793.12	1704	1630.04	1900.21	2114.59	12262.7
Labour & employment	4361.27	5264.62	5148.56	5742.44	6556.24	7114.74	7655	8901.89	9685.61	9299.38	13267.6
Relief on account of natural	255.07	76.87	18.74	76.8137	108.614	49.0221	130	53.0928	324.319	1090.04	1768.36
Social security & welfare(P)	22579.9	33010.1	32733.4	41837.4	52204.1	62777.7	73238	97393.6	83331.4	83034.4	122954
Others	5559.94	7936.52	6959.79	8425.97	8642.59	10236.9	9243	10248.8	12390.9	13845.7	20653.8

Source: Public Finance Statistics, Ministry of Finance, Government of India (various issues).

5.1. A: Education Index

Table 5.1.1 A: State wise Normalized values of Education scores (2004-05)

States/Union Territories	LR	GER GEN EDU	GER HIGH EDU	PTR GEN EDU	PTR HIGHER EDU
Andhra Pradesh	0.307113543	0.350045579	0.176112712	0.729281768	0.404761905
Assam	0.370497036	0.338650866	0.029458854	0.883977901	0.047619048
Bihar	0	0	0	0	0.119047619
Chhattisgarh	0.402644779	0.581738074	0.047710535	0.580110497	0.571428571
Goa	0.798221614	0.558189	0.236631444	0.988950276	0
Gujarat	0.504787962	0.45715588	0.148895293	0.657458564	0.547619048
Haryana	0.476744186	0.261774537	0.147614473	0.740331492	0.357142857
Himachal Pradesh	0.672138623	1	0.258725584	0.895027624	0.404761905
Jammu and Kashmir	0.194254446	0.157095108	0.016650656	1	0.523809524
Jharkhand	0.149566803	0.095867517	0.032981108	0.254143646	0.380952381
Karnataka	0.307113543	0.459890611	0.178033942	0.740331492	0.095238095
Kerala	1	0.494530538	0.097982709	0.91160221	0.142857143
Madhya Pradesh	0.381668947	0.590701914	0.160102466	0.779005525	0.761904762
Maharashtra	0.68125855	0.580370708	0.23118796	0.613259669	0.285714286
Odisha	0.366621067	0.553479186	0.082292667	0.61878453	0.142857143
Punjab	0.516415869	0.158766332	0.135126481	0.790055249	0.333333333
Rajasthan	0.305745554	0.463688848	0.00064041	0.70718232	0.5
Tamil Nadu	0.603055176	0.686113643	0.174511687	0.696132597	0.214285714
Uttar Pradesh	0.211354309	0.313886357	0.06756324	0.348066298	1
Uttarakhand	0.561331509	0.603160134	0.222542427	0.950276243	0.761904762
West Bengal	0.493388053	0.351261015	0.066282421	0.281767956	0.404761905
Delhi	0.790469676	0.420996658	1	0.751381215	0.952380952

Source: AISHE (2004-05; 2011-2012;2015-16), U-DISE (2004-05;2011-2012;2015-16)

Table 5. 1.2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.352	47.039	47.039	2.352	47.039	47.039	2.239	44.773	44.773
2	1.260	25.202	72.241	1.260	25.202	72.241	1.373	27.468	72.241
3	.633	12.667	84.909						
4	.520	10.407	95.316						
5	.234	4.684	100.000						

Source: Extracted from Principal Component Analysis

Table 5.1.3 A: State wise Normalized values of Education scores 2011-12

States	LR[1]	GER GEN EDU[2]	GER HEDU[3]	PTR GEN EDU[4]	PTR HEDU[5]
Andhra Pradesh	0.127617149	0.342431762	0.644295302	0.927419355	0.95
Assam	0.3110668	0	0.201342282	1	0.725
Bihar	0	0.312655087	0.157718121	0.553763441	0
Chhattisgarh	0.239946826	0.600496278	0.087248322	0.897849462	0.775
Goa	0.783649053	0.99751861	0.973154362	0.954301075	0.9
Gujarat	0.514788966	0.456575682	0.308724832	0.905913978	0.675
Haryana	0.426055168	0.392059553	0.654362416	0.825268817	0.9
Himachal Pradesh	0.663343303	0.910669975	0.55704698	1.032258065	0.8
Jammu and Kashmir	0.163509472	0.287841191	0.513422819	1.037634409	0.575
Jharkhand	0.12662014	0.46898263	0	0.836021505	0.05
Karnataka	0.39149219	0.540942928	0.523489933	0.935483871	1
Kerala	1	0.660049628	0.493288591	0.951612903	0.95
Madhya Pradesh	0.226321037	0.843672457	0.302013423	0.838709677	0.75
Maharashtra	0.634430043	0.59057072	0.637583893	0.857526882	0.75
Odisha	0.32003988	0.364764268	0.265100671	0.943548387	0.825
Punjab	0.427384513	0.600496278	0.389261745	0.857526882	0.95
Rajasthan	0.107676969	0.473945409	0.322147651	0.88172043	0.7
Tamil Nadu	0.548687272	0.776674938	1	0.865591398	0.975

[1] LR=Literacy Rate

[2] GER GEN EDU=Gross Enrolment ratio General Education (enrolment in Classes I -XII)

[3] GER HEDU= Gross Enrolment ratio Higher education (enrolment of students in the age group of (18-23 years)

[4] PTR GEN EDU= Pupil Teacher ratio General Education (I -XII)

[5] PTR HEDU=Pupil Teacher ratio Higher education (18-23 years)

Uttar Pradesh	0.196078431	0.518610422	0.281879195	0.594086022	0.5
Uttarakhand	0.525423729	0.501240695	0.630872483	0.975806452	0.8
West Bengal	0.440677966	0.583126551	0.147651007	0	0.45
Delhi	0.748421402	1	0.88590604	0.836021505	0.075

Source: AISHE (2004-05;2011-2012;2015-16), U-DISE (2004-05;2011-2012;2015-16)

Table 5.1.4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.439	48.782	48.782	2.439	48.782	48.782	2.098	41.958	41.958
2	1.267	25.341	74.123	1.267	25.341	74.123	1.608	32.165	74.123
3	.577	11.533	85.656						
4	.377	7.542	93.198						
5	.340	6.802	100.000						

Source: Extracted from Principal Component Analysis

Table 5.1.5.A: State wise Normalized value of education score (2015-16)

States/UTs	LR	GER GEN EDU	GER HEDU	PTRGENEDU	PTRHEDU
Andhra Pradesh	0.127617149	0.12927991	0.530546624	0.562130178	0.95
Assam	0.3110668	0.310899412	0.035369775	0.917159763	0.725
Bihar	0	0.423592043	0	0.224852071	0
Chhattisgarh	0.239946826	0.490053236	0.025723473	0.74556213	0.775
Goa	0.783649053	0.676548053	0.427652733	0.75739645	0.9
Gujarat	0.514788966	0.254917344	0.205787781	0.946745562	0.675
Haryana	0.426055168	0.323227795	0.379421222	1	0.9
Himachal Pradesh	0.663343303	0.812328383	0.585209003	0.970414201	0.8
Jammu and Kashmir	0.163509472	0	0.337620579	0.218934911	0.575
Jharkhand	0.12662014	0.44438218	0.038585209	0.857988166	0.05
Karnataka	0.39149219	0.320033623	0.379421222	0.905325444	1
Kerala	1	0.585878397	0.530546624	0.639053254	0.95
Madhya Pradesh	0.226321037	0.262482488	0.170418006	0.680473373	0.75
Maharashtra	0.634430043	0.511852059	0.501607717	0.75147929	0.75
Odisha	0.32003988	0.404931353	0.170418006	0.893491124	0.825
Punjab	0.427384513	0.538358083	0.408360129	0.846153846	0.95
Rajasthan	0.107676969	0.351246848	0.189710611	0.852071006	0.7
Tamil Nadu	0.548687272	0.628243205	0.964630225	0	0.975
Uttar Pradesh	0.196078431	0.113253012	0.327974277	0.869822485	0.5
Uttarakhand	0.525423729	0.451723172	0.610932476	0.443786982	0.8
West Bengal	0.440677966	0.483272625	0.109324759	0.704142012	0.45
Delhi	0.748421402	1	1	0.775147929	0.075

Source: AISHE (2004-05;2011-2012;2015-16), U-DISE (2004-05;2011-2012;2015-16); Note: For Abbreviations refer footnote of table 5.1.2

Table 5.1.6.A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.257	45.145	45.145	2.257	45.145	45.145	2.171	43.412	43.412
2	1.177	23.534	68.679	1.177	23.534	68.679	1.180	23.597	67.008
3	1.075	21.499	90.177	1.075	21.499	90.177	1.158	23.169	90.177
4	.292	5.833	96.010						
5	.199	3.990	100.000						

Source: Extracted from Principal Component Analysis

5.2 A: Health Index

Table 5.2.1 A: State wise Normalized values for Health scores (2004-05)

States/Union Territories	IMR[6]	INST DEL[7]	LIFE EXP[8]	PHC'S&CHC'S[9]	DOCTORS[10]
Andhra Pradesh	0.306451613	0.515544041	0.402777778	0.257016744	0.057161989
Assam	0.129032258	0.089378238	0	0.313572256	0.109994011
Bihar	0.241935484	0.018134715	0.347222222	0.243221439	0.019063909
Chhattisgarh	0.209677419	0	0.354166667	0.714454585	0.042880845
Goa	0.967741935	0.930051813	0.354166667	0.204445146	1
Gujarat	0.35483871	0.5	0.451388889	0.30919751	0.037619962
Haryana	0.258064516	0.160621762	0.506944444	0.26084767	0.120675606
Himachal Pradesh	0.435483871	0.347150259	0.715277778	1	0.124732394
Jammu and Kashmir	0.419354839	0.479274611	0.638888889	0.471057671	0.676174515
Jharkhand	0.419354839	0.031088083	0.354166667	0.262137414	0.015992051
Karnataka	0.419354839	0.471502591	0.479166667	0.436431183	0.112968663
Kerala	1	1	1	0.398418852	0.190512808
Madhya Pradesh	0	0.14507772	0.034722222	0.271269368	0.054660331
Maharashtra	0.64516129	0.531088083	0.611111111	0.260461269	0.034507347
Odisha	0.016129032	0.160621762	0.111111111	0.494545568	0.283190421
Punjab	0.516129032	0.351036269	0.666666667	0.291277885	0.298433485
Rajasthan	0.129032258	0.119170984	0.368055556	0.404845521	0.17664676
Tamil Nadu	0.629032258	0.876943005	0.555555556	0.272574967	0.219227231

[6] IMR= Infant Mortality Rate
[7] INST DEL=Institutional Deliveries
[8] LIFE EXP=Life Expectancy
[9] PHC'S & CHC'S=Primary Health Centre and Community Health Centre
[10] DOCTORS= number of doctors '00000 Population

Uttar Pradesh	0.048387097	0.049222798	0.111111111	0.27232916	0
Uttarakhand	0.548387097	0.07642487	0.354166667	0.365776911	0.231200955
West Bengal	0.612903226	0.392487047	0.555555556	0.185245917	0.105714432
Delhi	0.661290323	0.301813472	0.354166667	0	0.559538657

Source: MOHFW, NHP (2004-05;2011-2012;2015-16)

Table 5.2.2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.647	52.945	52.945	2.647	52.945	52.945	2.588	51.767	51.767
2	1.232	24.634	77.578	1.232	24.634	77.578	1.291	25.811	77.578
3	.719	14.374	91.953						
4	.271	5.421	97.374						
5	.131	2.626	100.000						

Source: Extracted from Principal Component Analysis

Table 5.2.3 A: State wise Normalized values for Health scores (2011-12)

STATES	IMR	LE	INST.DEL	PHC&CHC	DOCTORS
Andhra Pradesh	0.33	0.42	0.88	0.29	0.07
Assam	0.08	0	0.48	0.43	0.13
Bihar	0.31	0.38	0.44	0.24	0.01
Chhattisgarh	0.23	0.08	0.11	0.45	0.02
Goa	1	0.36	1	0.21	0.26
Gujarat	0.38	0.44	0.84	0.3	0
Haryana	0.31	0.43	0.57	0.28	0.1
Himachal Pradesh	0.44	0.7	0.25	1	1
Jammu and Kashmir	0.38	0.79	0.6	0.49	0.23
Jharkhand	0.42	0.25	0.05	0.2	0.03
Karnataka	0.5	0.45	0.93	0.53	0.07
Kerala	0.98	1	1	0.4	0.18
Madhya Pradesh	0	0.03	0.64	0.26	0.02
Maharashtra	0.71	0.7	0.86	0.25	0
Odisha	0.04	0.17	0.61	0.49	0.08
Punjab	0.6	0.7	0.42	0.26	0.14
Rajasthan	0.15	0.35	0.76	0.35	0.11
Tamil Nadu	0.77	0.61	1	0.28	0
Uttar Pradesh	0.04	0.02	0	0.27	0.02
Uttarakhand	0.48	0.71	0.02	0.37	0.11
West Bengal	0.56	0.57	0.27	0.17	0.12
Delhi	0.65	0.85	0.88	0	0.32
Sources: MOHFW, NHP (2004-05;2011-2012;2015-16); Note: For Abbreviations refer footnote of table 5.2A					

Table 5.2.4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.137	42.749	42.749	2.137	42.749	42.749	2.112	42.244	42.244
2	1.719	34.385	77.135	1.719	34.385	77.135	1.745	34.890	77.135
3	.652	13.045	90.180						
4	.264	5.284	95.465						
5	.227	4.535	100.000						

Source: Extracted from Principal Component Analysis.

Table 5.2.5 A: State wise Normalized value of Health scores (2015-16)

states	PHC'S & CHC'C	DOCTORS	LIFE EXP	IMR	INST. DEL
Andhra Pradesh	0.168604045	0.119874896	0.420560748	0.333333333	0.781578947
Assam	0.424867703	0.25264673	0.018691589	0.076923077	0.228947368
Bihar	0.220974089	0	0.364485981	0.230769231	0.05
Chhattisgarh	0.432054202	0.011340188	0.065420561	0.205128205	0.218421053
Goa	0.154100798	0.611620454	0.355140187	1	0.705263158
Gujarat	0.307495533	0.056112224	0.429906542	0.435897436	0.921052632
Haryana	0.250301368	0.150296872	0.429906542	0.358974359	0.489473684
Himachal Pradesh	1	0.43069441	0.700934579	0.564102564	0.381578947
Jammu and Kashmir	0.688784225	0.533597965	0.813084112	0.58974359	0.626315789
Jharkhand	0.179633622	0.033126891	0.252336449	0.461538462	0
Karnataka	0.486254496	0.080313443	0.420560748	0.58974359	0.852631579
Kerala	0.348228934	0.269057622	1	0.948717949	1
Madhya Pradesh	0.227383488	0.042881318	0.028037383	0	0.497368421
Maharashtra	0.212766156	0.001873462	0.700934579	0.717948718	0.747368421
Odisha	0.469415257	0.119164039	0.224299065	0.076923077	0.618421053
Punjab	0.233686945	0.176810195	0.710280374	0.666666667	0.752631579
Rajasthan	0.429848087	0.211625391	0.317757009	0.153846154	0.581578947
Tamil Nadu	0.298882804	0.1369738	0.607476636	0.769230769	0.976315789
Uttar Pradesh	0.233628398	0.035566528	0	0.102564103	0.155263158
Uttarakhand	0.351210616	0.203192863	0.682242991	0.230769231	0.176315789
West Bengal	0.157797545	0.145298266	0.560747664	0.564102564	0.35
Delhi	0	1	0.869158879	0.743589744	0.592105263

Sources: MOHFW, NHP (2004-05;2011-2012;2015-16); Note: For Abbreviations refer footnote of table 5.2A

Table 5.2.6 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.498	49.961	49.961	2.498	49.961	49.961	2.498	49.960	49.960
2	1.032	20.642	70.603	1.032	20.642	70.603	1.032	20.643	70.603
3	.828	16.570	87.172						
4	.416	8.325	95.497						
5	.225	4.503	100.000						

Source: Extracted from Principal Component Analysis

5.3 A: Physical Infrastructure Index

Table 5.3.1A: State wise Normalized values for Physical Infrastructure scores (2004-05)

States / UTs	Total institutions [11]	Toilet facilities	Power	Water	Storage facility	Rail	Govt. hospital	Energy	Net irrigated area	Road density
Andhra Pradesh	0.226581424	0.269197708	0.382263603	0.764150943	0.126262301	0.133488949	0.257323179	0.417987068	0.526342886	0.055627313
Assam	0.310906117	0.722636103	0.037242472	0.477088949	0.01664678	0.228535998	0.114773185	0.135240742	0.0	0.129703804
Bihar	0.072852214	0.071489971	0.0	0.851752022	0.005467994	0.257276242	0.0	0.0	0.678446765	0.059487039
Chhattisgarh	1.0	0.0	0.314646064	0.634770889	0.240595983	0.057991101	0.535279213	0.221822628	0.336039728	0.022099956
Goa	0.189766484	0.636676218	1.0	0.629380054	0.021352256	0.131446495	0.60412996	1.0	0.202337193	0.136221678
Gujarat	0.155840402	0.435530086	0.63556524	0.818059299	0.02195512	0.192136553	0.389306084	0.287292046	0.542604228	0.032050552
Haryana	0.134139804	0.434097421	0.590596936	0.845013477	0.31797761	0.258953972	0.223332333	0.437331279	0.81517172	0.02782757
Himachal Pradesh	0.543707565	0.275501433	0.374075541	0.878706199	7.40528E-4	0.032825151	1.0	0.651248925	0.132287477	0.016347047
Jammu & Kashmir	0.334551494	0.557879656	0.429344955	0.563342318	0.018746815	0.0	0.282304073	0.391924621	0.472737042	0.0
Jharkhand	0.11758695	0.078366762	0.035459588	0.258760108	6.74495E-8	0.173097965	0.023754945	0.03327522	0.030102084	0.006482964
Karnataka	0.220320766	0.333667622	0.369387216	0.824797844	0.024181376	0.108906558	0.566493369	0.272079769	0.35311877	0.050540711
Kerala	0.038036422	1.0	0.208531432	0.0	0.0407529	0.192574221	0.219372474	0.497800002	0.181436644	0.215715142
Madhya Pradesh	0.460613439	0.14025788	0.277799789	0.606469003	0.014673299	0.11153257	0.183109788	0.132968972	0.505235285	0.021939071
Maharashtra	0.261130461	0.299283668	0.504292129	0.760107817	0.037184491	0.12648625	0.486856446	0.382738977	0.210483498	0.031360466
Orissa	0.382662995	0.009885387	0.197437929	0.549865229	0.039439694	0.102268583	0.449304153	0.042159862	0.336828955	0.064938922
Punjab	0.115898229	0.610888252	0.772120972	1.0	1.00000011	0.299292436	0.242784988	0.58894542	0.891213979	0.041738066
Rajasthan	0.301186298	0.212034384	0.287044374	0.603773585	0.037402256	0.11992122	0.344041734	0.152226039	0.466877082	0.017172721
Tamil Nadu	0.11619177	0.300143266	0.451862124	0.838274933	0.026920455	0.229411336	0.259067632	0.430234204	0.792061724	0.063580505
Uttar Pradesh	0.172229304	0.246848138	0.113642367	0.867924528	0.034342363	0.254212561	0.024021659	0.11369572	0.956977209	0.048935906
Uttarakhand	0.486316562	0.444126074	0.296156894	0.85309973	0.059800478	0.042526807	0.135331633	0.538830716	0.444646751	0.028767078
West Bengal	0.1000211	0.42277937	0.136159535	0.877358491	0.029041293	0.312422496	0.309481913	0.123334003	0.58124326	0.106580861
Delhi	0.0	0.913467049	0.947371896	0.994609164	0.06545912	1.0	0.267801083	0.972935967	1.0	1.0

Source: INFRASTRUCTURE VOLUME STATISTICS VOL II (2014)

[11] Total institutions= Total number of Government institutions

Table 5.3.2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.893	38.925	38.925	3.893	38.925	38.925	3.088	30.875	30.875
2	1.993	19.929	58.854	1.993	19.929	58.854	2.342	23.417	54.292
3	1.709	17.091	75.945	1.709	17.091	75.945	2.165	21.653	75.945
4	.991	9.910	85.855						
5	.581	5.810	91.665						
6	.318	3.185	94.850						
7	.262	2.622	97.472						
8	.149	1.486	98.958						
9	.089	.895	99.852						
10	.015	.148	100.000						

Source: Extracted from Principal Component Analysis

Table 5.3.3 A: State wise Normalized values of Infrastructure scores (2011-12)

States	Road Density	Rail Network	Power	Toilet Facilities	Total Institutions	Energy	Net Irrigated Area	Govt. hospitals	Storage faciltities	Water
Andhra Pradesh	0.037420565	0.109756098	0.463310096	0.37704918	0.429213787	0.493792768	0.029284499	0.086277124	0.187750539	0.889235569
Assam	0.168413229	0.182926829	0.03831655	0.586065574	0.587975341	0.139425663	0.002096249	0.068218353	0.018042526	0.567862715
Bihar	0.063637983	0.225609756	0	0.015027322	0.184097847	0	0.031675667	0	0.010585865	0.943837754
Chhattisgarh	0.019307748	0.048780488	0.239452621	0.035519126	0.856312001	0.057767608	0.019421162	0.160183316	0.120235322	0.823712949
Goa	0.137742685	0.109756098	1	0.788251366	0.522597032	1	0.019431981	0.239150299	0.022735583	0.814352574
Gujarat	0.032548362	0.158536585	0.580480248	0.482240437	0.242610983	0.253914188	0.02547414	0.13051777	0.028332324	0.886115445
Haryana	0.038978599	0.207317073	0.667854376	0.636612022	0.293796877	0.426044777	0.037783581	0.097897115	0.359630747	0.940717629
Himachal Pradesh	0.03614435	0.024390244	0.554557191	0.643442623	1	0.621306559	0.008876173	0.497442138	0	0.939157566
Jammu & Kashmir	0	0	0.392047508	0.398907104	0.836997006	0.324228255	0.021492702	0.129840629	0.023312308	0.67550702
Jharkhand	0.008082698	0.152439024	0.03841983	0	0.497018677	0.025529379	0.007678493	0.327927921	0.001598869	0.414976599
Karnataka	0.068966742	0.091463415	0.400309837	0.398907104	0.425299682	0.321836369	0.022339334	0.325018334	0.035450929	0.842433697
Kerala	0.261859751	0.158536585	0.245081332	1	0.052423411	0.579927666	0.011532368	0.282183426	0.043021146	0
Madhya Pradesh	0.023818308	0.091463415	0.23841983	0.092896175	0.803288195	0.152438159	0.027671859	0.103411245	0.018653407	0.694227769
Maharashtra	0.054784786	0.103658537	0.484947069	0.424863388	0.263905243	0.390818603	0.011011698	0.251915791	0.052760408	0.778471139
Odisha	0.071658866	0.091463415	0.223341079	0	0.776077084	0.039325459	0.019737934	1	0.036454039	0.652106084
Punjab	0.082761746	0.256097561	0.760237542	0.782786885	0.34809953	0.581057163	0.041340893	0.138494325	1	1
Rajasthan	0.02739434	0.097560976	0.316395559	0.177595628	0.605194011	0.18754828	0.022775744	0.249233972	0.098443559	0.695787832
Tamil Nadu	0.078188884	0.176829268	0.49305448	0.359289617	0.138283586	0.509099497	0.040223856	0.148001965	0.035462391	0.920436817
Uttar Pradesh	0.073474382	0	0.130544797	0.18579235	0.423902148	0.121295397	0	0.053177648	0.069830818	0.96099844
Uttarakhand	0.039933084	1	0.465014201	0.598360656	0.88371308	0.53348862	1	1.689281256	0.057901972	0.91575663
West Bengal	0.165011935	0.268292683	0.160392461	0.50273224	0.163293646	0.147583697	0.025931226	0.125513293	0.0293558	0.91575663
Delhi	1	0.75	0.766176091	0.922131148	0	0.887442075	0.044355389	0.134131657	0.063278539	0.959438378

Source: INFRASTRUCTURE VOLUME STATISTICS VOL II (2014)

Table 5.3.4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.469	34.687	34.687	3.469	34.687	34.687	2.609	26.086	26.086
2	2.473	24.726	59.412	2.473	24.726	59.412	2.562	25.615	51.701
3	1.462	14.615	74.027	1.462	14.615	74.027	1.821	18.210	69.912
4	1.025	10.249	84.277	1.025	10.249	84.277	1.437	14.365	84.277
5	.767	7.674	91.951						
6	.397	3.972	95.923						
7	.215	2.152	98.074						
8	.122	1.220	99.295						
9	.057	.572	99.866						
10	.013	.134	100.000						

Source: Extracted from Principal Component Analysis

Table 5.3.5 A: Normalized values for Infrastructure scores for the year 2015-16

States	Toilet facilities	Water	Road density	Power	Total institutions	Net irrigated area	Energy	Govt hospitals	Storage capacity	Rail
Andhra Pradesh	0.396200814	0	0.043016931	0.391935484	0.193429669	0.554112444	0.356203384	0.000195956	0.023571771	0.146977124
Assam	0.31614654	0.420454545	0.185887547	0.025806452	0.842499617	0	0.216796904	0.170732221	0.014476671	0.244117647
Bihar	0.010854817	0.965909091	0.09380654	0	0.237385347	0.56969112	0	0.055243817	0.008846177	0.304003268
Chhattisgarh	0.112618725	0.696969697	0.025435933	0.711290323	0.793574838	0.329883207	0.0823361	0.110881993	0.104000964	0.061928105
Goa	0.731343284	0.893939394	0.175985103	1	0.226838333	0.31351797	0.969924584	0.070039799	0.00371633	0.143545752
Gujarat	0.541383989	0.689393939	0.035107681	0.802419355	0.248056272	0.465595702	0.284884482	0.015555902	0.009083799	0.210294118
Haryana	0.743554953	0.71969697	0.04061208	0.676612903	0.238127056	0.687896694	0.617097951	0.013766784	0.482064623	0.275245098
Himachal Pradesh	0.628222524	0.840909091	0.038356771	0.435887097	1	0.090991149	0.947358934	0.103313799	0	0.034068627
J&K	0.381275441	0.625	0	0.393548387	0.910255295	0.37492917	0.515170306	0.999900025	0.015258752	0
Jharkhand	0	0.193181818	0.016775863	0.252419355	0.514143363	0.109173837	-0.015195127	0.068972869	0.000696541	0.193954248
Karnataka	0.453188602	0.628787879	0.070032172	0.396774194	0.413382015	0.396628804	0.544283147	0.024833816	0.047147886	0.121650327
Kerala	1	0.818181818	0.225641684	0.17983871	0.092870012	0.153249943	0.782713948	0.169100219	0.011178044	0.21127451
MP	0.126187246	0.454545455	0.035501273	0.270564516	0.730480186	0.59348795	0.166276356	0.01379187	0.185080906	0.122058824
Maharashtra	0.373134328	0.712121212	0.083946022	0.427419355	0.274963983	0.118148904	0.549034171	0.009076112	0.022475067	0.139297386
Odisha	0.067842605	0.609848485	0.076748717	0.526612903	0.60885005	0.307302343	0.086647897	0.196719645	0.023796852	0.119771242
Punjab	0.774762551	1	0.089349553	0.669758065	0.319214573	0.812160816	0.92411217	0.026509045	0.999999985	0.336764706
Rajasthan	0.279511533	0.484848485	0.025606007	0.365322581	0.533765669	0.454499957	0.284016889	0.206213978	0.028937495	0.128676471
Tamil Nadu	0.377204885	0.678030303	0.085401363	0.576612903	0.246777153	0.68734623	0.858895038	0.025886183	0.020457467	0.245751634
Uttar Pradesh	0.143826323	0.897727273	0.072185662	0.107258065	0.395993068	0.859264256	0.182879536	0.006716872	0.026224622	0.287745098
Uttarakhand	0.544097693	0.765151515	0.046672705	0.472983871	0.874010159	0.41060003	0.776749676	0.207059881	0.03345352	0.043300654
West Bengal	0.359565807	0.829545455	0.147300867	0.162096774	0.33117401	0.445313684	0.256660809	0.070379553	0.012742354	0.353022876
Delhi	0.672998643	0.492424242	1	0.523790323	0	1	1	0.010210536	0.011875342	1

Source: INFRASTRUCTURE VOLUME STATISTICS VOL II (2014)

Table 5.3.6A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	3.495	34.947	34.947	3.495	34.947	34.947	2.498	24.977	24.977
2	2.039	20.391	55.338	2.039	20.391	55.338	2.348	23.477	48.454
3	1.280	12.800	68.138	1.280	12.800	68.138	1.968	19.684	68.138
4	.937	9.371	77.509						
5	.814	8.137	85.646						
6	.576	5.757	91.402						
7	.450	4.495	95.898						
8	.292	2.919	98.817						
9	.093	.934	99.751						
10	.025	.249	100.000						

Source: Extracted from Principal Component Analysis

6.1 A: Education Index of Uttar Pradesh

Table 6.1.1 A: District wise Normalized values of Education scores of Uttar Pradesh (2011-12)

Districts	LR[12]	GER GED[13]	GER DC[14]	PTR GED[15]	PTR DC[16]
Agra	0.894736842	0.350024107	0.244802899	0.640790368	0.949760766
Aligarh	0.681440443	0.466627299	0.233911768	0.747596854	0.863636364
Allahabad	0.584487535	0.561127762	0.546056597	0.368919313	0.832535885
Ambedkar Nagar	0.595567867	0.708786058	0.116916175	0.558258083	0.799043062
Auraiya	0.825484765	0.924933891	1	0.757306535	0.985645933
Azamgarh	0.587257618	0.583977252	0.380178766	0.601951646	0.868421053
Budaun	0.407202216	0.204615209	0.104006506	0.514564521	0.880382775
Baghpat	0.761772853	0.437354333	0.241239528	0.509709681	0.889952153
Bahraich	0.193905817	0.414133422	0.12004138	0.451451597	0.421052632
Ballia	0.637119114	0.557663684	0.409745733	0.548548403	0.66507177
Balrampur	0.04432133	0.481084458	0.141308338	0.271822507	0.947368421
Banda	0.567867036	0.585796168	0.452643668	0.519419361	0.772727273
Barabanki	0.476454294	0.306721698	0.070847789	0.601951646	0.916267943
Bareilly	0.495844875	0.364926453	0.335774859	0.587387125	0.894736842
Basti	0.490304709	0.260639915	0.449627772	0.519419361	0.909090909
Bijnor	0.684210526	0.469331034	0.284675583	0.519419361	0.964114833
Bulandshahr	0.703601108	0.001526181	0.124298436	1	0.90430622
Chandauli	0.612188366	0.514444545	0.297491387	0.174725702	0.796650718
Chitrakoot	0.487534626	0.603742318	0.118430563	0.563112924	0.686602871

[12] LR= Literacy Rate
[13] GER GED= Gross Enrolment ratio General Education (enrolment in Classes I -XII)
[14] GER DC=Gross Enrolment ratio (18-23)
[15] PTR GED= Pupil Teacher Ratio (I -XII)
[16] PTR DC=Pupil Teacher Ratio (18-23)

Deoria	0.578947368	0.58658379	0.710910191	0.660209729	0.696172249
Etah	0.653739612	0.102229487	0.181261736	0.713612972	0.949760766
Etawah	0.825484765	0.478207278	0.708661335	0.839838819	0.803827751
Faizabad	0.601108033	0.576616718	0.253454864	0.694193611	0.744019139
Farrukhabad	0.664819945	0.453967911	0.737739389	0.728177493	0.880382775
Fatehpur	0.609418283	0.264741287	0.687256464	0.888387222	0.844497608
Firozabad	0.786703601	0.308021323	0.281350927	0.451451597	0.83492823
GB nagar	0.914127424	0.199913014	0.111461649	0.694193611	0.973684211
Ghaziabad	0.966759003	0	0.131910929	0.509709681	0.863636364
Gonda	0.673130194	0.712003522	0.497946915	0.480580639	0.667464115
Ghazipur	0.407202216	0.447127773	0.140838033	0.296096708	0.748803828
Gorakhpur	0.63434903	0.323886943	0.505045632	0.689338771	0.889952153
Hamirpur	0.614958449	0.594206392	0.330884568	0.723322653	0.839712919
Hardoi	0.529085873	0.654944009	0.053142061	0.432032236	0.918660287
Hathras	0.736842105	0.732616427	0.349655845	0.451451597	0.940191388
Jalaun	0.664819945	0.693666125	0.584359609	0.645645208	0.875598086
Jaunpur	0.675900277	0.725748132	0.438517167	0.296096708	0.901913876
Jhansi	0.761772853	0.651886241	0.394772987	0.572822604	0.622009569
JP nagar	0.51800554	0.740360437	0.401544485	0.737887174	0.901913876
Kannauj	0.739612188	0.452041356	0.738123907	0.466016118	0.897129187
Kaushambi	0.734072022	0.421296084	0.9457891	0.883483833	0.93062201
KD	1	0.359394013	0.825346296	0.699048451	0.789473684
Kheri	0.349030471	0.727243773	0.694111386	0.587387125	0.184210526
Khushi nagar	0.498614958	0.413213017	0.124448131	0	0.684210526
KN	0.429362881	0.345582553	0.437971567	0.436887076	0.555023923
Lalitpur	0.493074792	0.743345207	0.121352313	0.310661229	0.610047847

Lucknow	0.853185596	1	0.442274479	0.101903097	0.868421053
Maharajganj	0.382271468	0.521560193	0.192795694	0.723322653	0.770334928
Mahoba	0.531855956	0.348762922	0.42444319	0.373774153	0.966507177
Mainpuri	0.842105263	0.625550935	0.250877447	0.713612972	0.851674641
Mathura	0.783933518	0.494422228	0.314088869	0.665064569	0.954545455
Mau	0.650969529	0.31406822	0.52223189	0.752451694	0.870813397
Meerut	0.750692521	0.226773472	0.30129728	0.733032333	0.866028708
Mirzapur	0.56232687	0.611354584	0.326329905	0.281532188	0.612440191
Moradabad	0.504155125	0.336721374	0.275457342	0.480580639	0.830143541
Muzaffarnagar	0.67867036	0.24528128	0.151989919	0.208709583	1
Pilibhit	0.495844875	0.34336891	0.193226555	0.388338674	0.887559809
Pratapgarh	0.545706371	0.744566087	0.604385329	0.446596757	0.894736842
Raebareli	0.545706371	0.074774299	0.159748932	0.631080687	0.80861244
Rampur	0.43767313	0.198369332	0.131903354	0.344645111	0.935406699
Saharanpur	0.781163435	0.283067591	0.195898717	0.718467812	0.830143541
SantKabir	0.443213296	0.184702371	0.716404809	0.519419361	0.492822967
SantRavidas	0.592797784	0.816399494	0.173334703	0.456306438	0.775119617
Shahjahanpur	0.515235457	0.470009445	0.188734018	0.407758035	0.866028708
Saraswathi	0	0.176050324	0	0.480580639	0.672248804
Siddharthnagar	0.227146814	0.404665525	0.393094363	0.359209632	0
Sitapur	0.429362881	0.465327692	0.110522394	0.582532285	0.897129187
Sonbhadra	0.44598338	0.592506292	0.135958666	0.441741917	0.746411483
Sultanpur	0.609418283	0.15342664	0.305884686	0.635935528	0.755980861
Unnao	0.617728532	0.21077882	0.088791898	0.810709778	0.846889952
Varanasi	0.767313019	0.305085124	0.473469373	0.582532285	0.923444976

Source: Statistical Abstract, Uttar Pradesh 2016,2011

District Wise Development Indicators, Uttar Pradesh2016,2011

Table 6.1 .2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.784	35.671	35.671	1.784	35.671	35.671	1.762	35.244	35.244
2	1.341	26.812	62.483	1.341	26.812	62.483	1.362	27.240	62.483
3	.981	19.610	82.094						
4	.483	9.659	91.752						
5	.412	8.248	100.000						

Source: Extracted from Principal Component Analysis

Table 6.1.3 A: District wise Normalized values of Education scores of Uttar Pradesh 2015-16

Districts	LR	GER GED	GER DC	PTR GED	PTR DC
agra	0.894736842	0.388108785	0.683368312	0.666666667	0.806451613
aligarh	0.681440443	0.510267507	0.670358718	0.74829932	0.687344913
allahabad	0.584487535	0.579600386	0.773441882	0.523809524	0.841191067
ambed	0.595567867	0.59573383	0.061484637	0.646258503	0.806451613
auraiya	0.825484765	0.999954556	0.993043928	0.721088435	0.888337469
azamgarh	0.587257618	0.533133307	0.283530596	0.612244898	0.759305211
badaun	0.407202216	0.298373233	0.161086681	0.414965986	0.813895782
baghpat	0.761772853	0.594857182	0.202151107	0.462585034	1
bahraich	0.193905817	0.46726256	0.084622121	0.489795918	0.022332506
balia	0.637119114	0.608857374	0.344939671	0.530612245	0.928039702

balrampur	0.04432133	0.477683485	0.095506015	0.353741497	0.439205955
banda	0.567867036	0.594921019	0.55861502	0.387755102	0.858560794
barabanki	0.476454294	0.349430576	0.040590469	0.639455782	0.578163772
bareilly	0.495844875	0.393951087	0.523201063	0.673469388	0.779156328
basti	0.490304709	0.489060992	0.192112125	0.387755102	0.684863524
Bijnor	0.684210526	0.448623674	0.595782041	0.489795918	0.741935484
bulandshar	0.703601108	0.321158163	0.045309188	0.870748299	0.980148883
Chandauli	0.612188366	0.420089283	0.21916136	0.25170068	0.789081886
Chitrakoot	0.487534626	0.586745723	0.271683719	0.612244898	0.900744417
Deoria	0.578947368	0.581197931	0.472421841	0.714285714	0.660049628
Etah	0.653739612	0.173475962	0.608612769	0.775510204	0.771712159
Etwah	0.825484765	0.787593293	0.705208457	0.768707483	0.895781638
Faizabad	0.601108033	0.614228709	0.125130999	0.693877551	0.630272953
farrukhabad	0.664819945	0.603818987	0.561259227	0.727891156	0.915632754
Fatehpur	0.609418283	0.285983377	0.535367613	1	0.836228288
Firozabad	0.786703601	0.367321072	0.743253546	0.299319728	0.794044665
gb nagar	0.914127424	0.608449774	0.211637357	0.367346939	0.955334988
Ghaziabad	0.966759003	0	0.106413327	0.578231293	0.995037221
Gjhazipur	0.673130194	0.797907081	0.358471407	0.387755102	0.786600496
Gionda	0.407202216	0.576553551	0.076931714	0.292517007	0.449131514
Gorakhpur	0.63434903	0.453154093	0.379951898	0.653061224	0.82630273
Hamirpur	0.614958449	0.580132786	0.33133427	0.775510204	0.935483871
Hardoi	0.529085873	0.624425682	0.030509522	0.448979592	0.692307692
Hathras	0.736842105	0.720377929	0.828625436	0.557823129	0.491315136
Jalaun	0.664819945	0.599654709	0.785793854	0.714285714	0.928039702
Jaunpur	0.675900277	0.570381724	0.304829246	0.37414966	0.803970223

Jhansi	0.761772853	0.590481309	0.397609312	0.707482993	0.935483871
jp nagar	0.51800554	0.541190583	0.547147471	0.850340136	0.719602978
Kannauj	0.739612188	0.645234037	0.719036272	0.496598639	0.905707196
Kd	0.734072022	0.434123749	0.752325024	0.823129252	0.893300248
Kn	1	0.453995595	0.695404744	0.68707483	0.8808933
kaushambi	0.349030471	0.699670995	0.438893126	0.619047619	0.905707196
Kheri	0.498614958	0.39240358	0.086672123	0	0.091811414
khushingar	0.429362881	0.431743752	0.20655382	0.421768707	0.593052109
Lalitpur	0.493074792	0.595966417	0.308113762	0	0.801488834
Lucknow	0.853185596	0.985830071	0.260822063	0.054421769	0.744416873
Mahoba	0.382271468	0.487022053	0.293828997	0.306122449	0.277915633
maharajganj	0.531855956	0.475469655	0.431748772	0.823129252	0.856079404
Mainpuri	0.842105263	0.706013351	1	0.700680272	0.612903226
Mathura	0.783933518	0.702232535	0.737090248	0.517006803	0.76674938
Mau	0.650969529	0.61202901	0.395500447	0.129251701	0.749379653
Meerut	0.750692521	0.366148431	0.407384731	0.619047619	0.970223325
Mirzapur	0.56232687	0.55464624	0.239887371	0.326530612	0.702233251
moradabad	0.504155125	0.155519994	0.384773837	0.653061224	0.838709677
muzzafarnagar	0.67867036	0.148019335	0.072829436	0.326530612	0.890818859
Pillibit	0.495844875	0.363843898	0.25999852	0.408163265	0.736972705
Pratapgarh	0.545706371	0.736666115	0.300657979	0.442176871	0.573200993
Raebareily	0.545706371	0.310299458	0.107391552	0.700680272	0.508684864
Rampur	0.43767313	0.414454969	0.303293905	0.197278912	0.769230769
saharanpur	0.781163435	0.365842487	0.109706922	0.68707483	0.957816377
Santkabir	0.443213296	0.3984351	0.608146012	0.401360544	0
santravidas	0.592797784	0.562038447	0.157049208	0.673469388	0.903225806

shahjahanpur	0.515235457	0.424357017	0.305048679	0.653061224	0.732009926
Shraswati	0	0.236971606	0	0.503401361	0.82630273
siddharthnagar	0.227146814	0.388515422	0.103634826	0.462585034	0.717121588
Sitapur	0.429362881	0.553949848	0.071339631	0.503401361	0.253101737
Sonbhadra	0.44598338	0.531777728	0.153197378	0.517006803	0.759305211
Sultanpur	0.609418283	0.231084168	0.163158237	0.605442177	0.344913151
Unnao	0.617728532	0.325307596	0.056668869	0.74829932	0.640198511
Varanasi	0.767313019	0.334158849	0.319752424	0.653061224	0.657568238

Source: Statistical Abstract, Uttar Pradesh 2016,2011
District Wise Development Indicators, Uttar Pradesh2016,2011; Note: For Abbreviations refer table 6.1.A.

Table 6.1.4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.050	40.993	40.993	2.050	40.993	40.993	1.749	34.976	34.976
2	1.209	24.182	65.175	1.209	24.182	65.175	1.510	30.199	65.175
3	.786	15.711	80.886						
4	.585	11.691	92.578						
5	.371	7.422	100.000						

Source: Extracted from Principal Component Analysis

6.2 A :Health Index of Uttar Pradesh

Table 6.2.1 A: District wise Normalized values of Health scores of Uttar Pradesh (2011-12)

DISTRICTS	No. of PHCs 2011	IMR	INSTITUTIONAL BIRTHS	HOMOEPATHIC DOCTORS
Agra	0.280214084	0.746031746	0.819702602	0.013845231
Aligarh	0.382059319	0.444444444	0.598513011	0.109624577
Allahabad	0.279752037	0.206349206	0.579925651	0.204106056
Ambedkar Nagar	0.285644152	0.523809524	0.691449814	0.311770498
Auraiya	0.58099266	0.666666667	0.488847584	0.23809948
Azamgarh	0.586912155	0.396825397	0.838289963	0.248358366
Budaun	0.486057828	0.19047619	0.379182156	0.080567872
Baghpat	0.608563031	0.73015873	0.769516729	0.217865868
Bahraich	0.240531782	0.555555556	0.102230483	0.196546695
Ballia	0.788125802	0.492063492	0.524163569	1
Balrampur	0.371498519	0.174603175	0	0.237667036
Banda	0.892697489	0.714285714	0.908921933	0.684469383
Barabanki	0.434967162	0.46031746	0.697026022	0.346690307
Bareilly	0.236404416	0.349206349	0.382899628	0.214192316

Basti	0.687225257	0.301587302	0.596654275	0.343216981
Bijnor	0.333035033	0.634920635	0.57063197	0.080526646
Bulandshahar	0.62177627	0.507936508	0.464684015	0.210601131
Chandauli	0.520876925	0.333333333	0.663568773	0.460738513
Chitrakoot	0.985938779	0.492063492	0.802973978	0.690793918
Deoria	0.718117222	0.476190476	0.734200743	0.369973822
Etah	0.521290696	0.46031746	0.394052045	0.428621936
Etawah	0.995927291	0.698412698	0.691449814	0.427104992
Faizabad	0.438937258	0.095238095	0.752788104	0.320731696
Farrukhabad	0.395087583	0.349206349	0.275092937	0.453101655
Fatehpur	0.564920889	0.682539683	0.550185874	0.754359863
Firozabad	0.585182488	0.634920635	0.637546468	0.063282214
G B Nagar	0.07078249	0.682539683	0.57063197	0.277949753
Ghaziabad	0.035532775	0.793650794	0.687732342	0.265726549
Ghazipur	0.573815905	0.301587302	0.730483271	0.301801792
Gonda	0.352276946	0.46031746	0.527881041	0.06333353
Gorakhpur	0.481266844	0.603174603	0.522304833	0.33324494
Hamirpur	0.995923946	0.873015873	0.834572491	0.943283854
Hardoi	0.444499997	0.301587302	0.410780669	0.370535076
Hathras	0.901114593	0.619047619	0.581784387	0.264740299

Jalaun	0.903092174	0.53968254	0.728624535	0.579892198
Jaunpur	0.576123076	0.380952381	0.529739777	0.37488744
Jhansi	0.65012226	0.920634921	1	0.131744497
J P Nagar	0.392331936	0.428571429	0.557620818	0.123542313
Kannauj	0.616850557	0.301587302	0.531598513	0.275983279
Kanpur Dehat	0.557701519	0.555555556	0.546468401	0.304963247
KanpurNagar	0.017922466	1	0.721189591	0.181947604
Kaushambi	0.682105186	0.26984127	0.555762082	0.125058156
Kheri	0.428212327	0.349206349	0.431226766	0.261211639
Kushinagar	0.419867406	0.317460317	0.49070632	0.559175562
Lalitpur	0.714888717	0.444444444	0.951672862	0.971847263
Lucknow	0	0.888888889	0.970260223	0.479552804
Maharajganj	0.545186242	0.253968254	0.403345725	0.404447247
Mahoba	0.731539996	0.841269841	0.856877323	0.495582761
Mainpuri	0.86602943	0.73015873	0.418215613	0.373582416
Mathura	0.42920784	0.873015873	0.641263941	0.225339289
Mau	0.585529603	0.380952381	0.730483271	0.443487466
Meerut	0.136283751	0.761904762	0.514869888	0.078138696
Mirzapur	0.498991184	0.301587302	0.466542751	0.463847657
Moradabad	0.135112818	0.555555556	0.37732342	0.148409263

Muzaffarnagar	0.42305877	0.714285714	0.524163569	0.110673671
Pilibhit	0.398037393	0.412698413	0.276951673	0.438931499
Pratapgarh	0.732539753	0.238095238	0.617100372	0.681961769
Rae Bareli	0.575092707	0.746031746	0.814126394	0.729285667
Rampur	0.305312983	0.571428571	0.511152416	0.210190268
Saharanpur	0.369698053	0.333333333	0.62267658	0
Sant Kabir Nagar	0.403591241	0.603174603	0.475836431	0.109536693
S R Nagar (Bhadohi)	0.395777881	0.301587302	0.591078067	0.461667188
Shahjahanpur	0.495764456	0.285714286	0.23605948	0.209839602
Shrawasti	0.669004817	0	0.092936803	0.648392342
Siddharthnagar	1	0.206349206	0.07063197	0.326598857
Sitapur	0.452963763	0.317460317	0.459107807	0.317292646
Sonbhadra	0.428659665	0.507936508	0.135687732	0.685951623
Sultanpur	0.582924273	0.857142857	0.776951673	0.657088079
Unnao	0.436778759	0.666666667	0.618959108	0.487364824
Varanasi	0.134139823	0.380952381	0.791821561	0.123766398

Source: Statistical Abstract, Uttar Pradesh2016,2011
District Wise Development Indicators, Uttar Pradesh2016,2011

Table 6.2.2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.614	40.362	40.362	1.614	40.362	40.362	1.518	37.946	37.946
2	1.402	35.052	75.414	1.402	35.052	75.414	1.499	37.467	75.414
3	.525	13.116	88.530						
4	.459	11.470	100.000						

Source: Extracted from Principal Component Analysis

Table 6.2.3A: District wise Normalized values of Health score of Uttar Pradesh (2015-16)

DISTRICTS	No. of PHCs 2011	IMR	INSTITUTIONAL BIRTHS	HOMOEPATHIC DOCTORS
Agra	0.137145405	0.746031746	0.836036979	0
Aligarh	0.14993878	0.444444444	0.603523461	0.117324397
Allahabad	0.142973626	0.206349206	0.750566893	0.199596267
Ambedkar nagar	0.15271262	0.523809524	0.877376592	0.303465046
Auraiya	0.592673327	0.666666667	0.671201814	0.273445877
Azamgarh	0.035752861	0.396825397	0.933368219	0.225602205
Badaun	0.307576017	0.19047619	0.491365777	0.073966017
Baghpat	0.642663732	0.73015873	0.791906506	0.246106768
Bahraich	0.072174344	0.555555556	0.114425257	0.228768435
Balia	0.235251902	0.492063492	0.747601605	1
Balrampur	0.560658679	0.174603175	0	0.266410242

Banda	0.242735452	0.714285714	0.7718472	0.717442317
Barabanki	0.169925349	0.46031746	0.554160126	0.342445151
Bareily	0.16647967	0.349206349	0.505494505	0.203360499
Basti	0.329498337	0.301587302	0.749345892	0.342003948
Bijnor	0.106344154	0.634920635	0.738182452	0.068484039
Bulandshahr	0.160390854	0.507936508	0.663875807	0.201470961
Chandauli	0.425310702	0.333333333	0.813012384	0.417076508
chitrakoot	0.358734716	0.492063492	0.755450898	0.590653115
Deoria	0.083820071	0.476190476	0.894645038	0.337513337
Etah	0.282230634	0.46031746	0.540205826	0.173717373
Etawah	0.257007574	0.698412698	0.77463806	0.430133314
Faizabad	0.145776332	0.095238095	0.833943834	0.31123948
Farrukhabad	0.265398355	0.349206349	0.369788941	0.467068369
Fatehpur	0.123465285	0.682539683	0.667189953	0.736009555
Firozabad	0.18367134	0.634920635	0.633001919	0.039068894
gb nagar	0.448162806	0.682539683	0.699808128	0.282658828
Ghaziabad	0	0.793650794	0.655503227	0.235184416
Ghazipur	0.016014194	0.301587302	0.776207919	0.284672457
Gonda	0.270820694	0.46031746	0.436420722	0.066683425
Gorakhpur	0.168278231	0.603174603	0.801500087	0.331723806
Hamirpur	1	0.873015873	0.911739055	0.922140184
Hardoi	0.087841346	0.301587302	0.604395604	0.373144107
Hathras	0.182419702	0.619047619	-0.536368394	0.284327237
Jalaun	0.531192746	0.53968254	0.925867783	0.622765109
Jaunpur	0.042846081	0.380952381	0.742543171	0.363736845

Jhansi	0.216133706	0.920634921	0.938252224	0.122791706
jp nagar	0.665698797	0.428571429	0.635792779	0.109517774
Kannauj	0.349522679	0.301587302	0.552066981	0.308281709
kanpurDehat	0.18760155	0.555555556	0.728937729	0.291550206
kanpur nagar	0.044066733	1	0.796790511	0.144996428
Kaushambi	0.354084993	0.26984127	0.728240014	0.120164539
Kheri	0.052138581	0.349206349	0.386010815	0.225579856
khushi nagar	0.084036284	0.317460317	0.69823827	0.541494048
Lalitpur	0.772741215	0.444444444	0.937903366	0.933422599
Lucknow	0.14804607	0.888888889	1	0.451693987
Maharajaganj	0.086154033	0.253968254	0.538635967	0.536526952
Mahoba	0.613344883	0.841269841	1.026338741	0.373855344
Mainpuri	0.347915318	0.73015873	0.502354788	0.381208252
Mathura	0.039926394	0.873015873	0.695098552	0.210055934
Mau	0.28046756	0.380952381	0.819640677	0.410851357
Meerut	0.106767301	0.761904762	0.601430316	0.068642354
Mirzapur	0.181677281	0.301587302	0.730856445	0.437205507
Moradabad	0.08377108	0.555555556	0.534275249	0.156969887
Muzaffarnagar	0.113081278	0.714285714	0.610675039	0.103539959
Pillibit	0.182221767	0.412698413	0.572649573	0.420699396
Pratapgarh	0.142913364	0.238095238	0.809000523	0.662352738
Raebareily	0.063373788	0.746031746	0.897784755	0.715622006
Rampur	0.410279267	0.571428571	0.544043258	0.195208925
Saharanpur	0.180702673	0.333333333	0.549799407	0.002276475
sqantkabirna	0.213818917	0.603174603	0.662829234	0.427040077

ravi nagar	0.432090343	0.301587302	0.871271586	0.131550545
Shahajahanpur	0.099069275	0.285714286	0.373626374	0.18596508
Shrawasti	0.203128594	0	0.307866736	0.451779496
Siddharthnagr	0.066902611	0.206349206	0.25449154	0.319574023
Sitapur	0.114369588	0.317460317	0.64538636	0.313165761
Sonbhadra	0.14335964	0.507936508	0.465201465	0.629001223
Sultanpur	0.010751192	0.857142857	0.738705739	0.64238832
Unnao	0.253510127	0.666666667	0.664399093	0.466861319
Varanasi	0.255304682	0.380952381	0.900924472	0.118459368

Source: Statistical Abstract, Uttar Pradesh2016,2011
District Wise Development Indicators, Uttar Pradesh2016,2011

Table 6.2.4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.508	37.702	37.702	1.508	37.702	37.702	1.273	31.833	31.833
2	1.031	25.763	63.465	1.031	25.763	63.465	1.265	31.632	63.465
3	.776	19.399	82.864						
4	.685	17.136	100.000						

Source: Extracted from Principal Component Analysis

6.3 A: Infrastructure Index of Uttar Pradesh

Table 6.3.1 A: District wise Normalized value of Infrastructure Scores of Uttar Pradesh (2011-12)

Districts	Net Irrigated Area	Roads	Total institutions	Water	Sanitation	Storage capacity	Power	LPG	Hospitals
Agra	0.884985623	0.455328171	0.546769234	0.592964824	0.538571429	0.2891534	0.120591709	0.546693233	0.028985507
Aligarh	0.992499062	0.295697489	0.654287277	0.969849246	0.43	0.050141979	0.147845517	0.329703827	0.253623188
Allahabad	0.724965621	0.611139433	0.474475581	0.522613065	0.29	0	0.189590375	0.349480969	0.1352657
AmbedkarNagar	0.934991874	0.671529953	0.62538557	0.994974874	0.142857143	0.110944055	0.05372017	0.089993821	0.429951691
Auraiya	0.848731091	0.49648403	1	0.738693467	0.357142857	0	0.129984814	0.236254924	0.031400966
Azamgarh	0.943742968	0.764466455	0.533699042	0.989949749	0.144285714	0.223178299	0.039863168	0.113743725	0.289855072
Badaun	0.679959995	0.254541629	0.462104632	0.974874372	0.801428571	0.034365805	0.033353957	0.142611716	0.147342995
Baghpat	1	0.257867437	0.341853391	0.994974874	0.071428571	0	0.178555906	0.335197478	0.026570048
Bahraich	0.384923115	0.246425364	0.557838677	0.864321608	0.308571429	0.01770666	0.032868195	0.104106306	0.277777778
Ballia	0.751218902	0.366615687	0.54437289	0.969849246	0.072857143	0	0.043299296	0.138241957	0.842995169
Balrampur	0.367420928	0.173840216	0.569979101	0.879396985	0.352857143	0	0.015544386	0.062802349	0.3647343
Banda	0.323665458	0.131211614	0.642097399	0.798994975	0.078571429	0.222445586	0.073968778	0.129715383	0.582125604
Barabanki	0.882485311	0.446912501	0.514663598	0.809045226	0.74	0.088763209	0.030807541	0.171943802	0.27294686
Bareilly	0.944993124	0.304396378	0.506738303	0.994974874	0.057142857	0.050554278	0.076561214	0.461393477	0.316425121
Basti	0.798724841	0.467579443	0.647740163	0.989949749	0.668571429	0	0.039719997	0.135600439	0.543478261
Bijnor	0.918739842	0.260934301	0.73251972	0.989949749	0.385714286	0	0.096216681	0.26820523	0.09178744
Bulandshahar	1	0.283106353	0.541304489	0.984924623	0.544285714	0.377814434	0.127949726	0.354332528	0.369565217
Chandauli	0.886235779	0.677412829	0.463157487	0.371859296	0.18	0	0.098875589	0.126301771	0.330917874
Chitrakoot	0.073634204	0.106385389	0.934143955	0.603015075	0.1	0	0.062617286	0.077152472	0.388888889
Deoria	0.892486561	0.54272166	0.603270322	1	0.225714286	0	0.02772423	0.205610233	0.359903382
Etah	0.974996875	0.305286497	0.769945462	0.929648241	0.135714286	1	0.040824466	0.059188375	0.40821256

Etawah	0.843730466	0.562271907	0.96420627	0.884422111	0.392857143	0	0.085887845	0.246055895	1
Faizabad	0.836229529	0.483860526	0.737627553	0.964824121	0.247142857	0.129590112	0.059912358	0.264450537	0.265700483
Farrukhabad	0.914989374	0.290923215	0.740015546	0.984924623	0.36	0.046650238	0.051189094	0.22970215	0.326086957
Fatehpur	0.624953119	0.252445804	0.726626777	0.577889447	0.26	0	0.089671676	0.14117936	0.487922705
Firozabad	0.942492812	0.843784138	0.697020474	0.989949749	0.321428571	0.736382718	0.125653861	0.215168439	0.164251208
G. B. Nagar	0.998749844	0.212058683	2.706277033	1	0.827142857	0	1	1	0.012077295
Ghaziabad	1	0.904441693	0	0.763819095	1	0	0.43011418	0.774738434	0.183574879
Ghazipur	0.818727341	0.717589558	0.714726823	0.824120603	0.205714286	0.047593004	0.064642147	0.080990106	0.374396135
Gonda	0.769971246	0.392461502	0.563189256	0.984924623	0	0.131217589	0.022651852	0.141141151	0.217391304
Gorakhpur	0.838729841	0.613372822	0.417255679	0.939698492	0.358571429	0	0.104924605	0.292999347	0.29468599
Hamirpur	0.322415302	0.046925448	0.81316219	0.944723618	0.387142857	0	0.147508041	0.142083319	0.77294686
Hardoi	0.861232654	0.303732835	0.603320988	0.577889447	0.188571429	0.041522108	0.026297624	0.134390345	0.376811594
Hathras	0.998749844	0.43991293	0.875646698	0.974874372	0.275714286	0	0.187984803	0.296823468	0.048309179
Jalaun	0.563695462	0.134699261	0.899991606	0.798994975	0.414285714	0.071163358	0.095603086	0.249785426	0.756038647
Jaunpur	0.859982498	0.628067876	0.528573043	0.713567839	0.188571429	0.03422594	0.051137962	0.113196223	0.270531401
Jhansi	0.642455307	0.033994449	0.618561312	0.502512563	0.54	0.08354341	0.145861563	0.452516968	0.234299517
Amroha	0.991248906	0.290550984	0.849756937	0.974874372	0.708571429	0.033931928	0.119701998	0.301179248	0
Kannauj	0.868733592	0.501193568	0.852696079	0.959798995	0.281428571	0.131800013	0.042087447	0.189092471	0.333333333
Kanpur Dehat	0.627453432	0.308312901	0.927264816	0.718592965	0.244285714	0.044569021	0.15108734	0.167535369	0.43236715
Kanpur Nagar	0.751218902	0.350973871	0.555185098	0.944723618	0.901428571	0.098564681	0.214497185	0.584892508	0.014492754
Kaushambi	0.652456557	0.55325743	0.681896813	0.698492462	0.098571429	0	0.071580874	0.145586395	0.026570048
Kheri	0.814976872	0.099321082	0.576510688	0.959798995	0.182857143	0.110118658	0.034335708	0.158849437	0.229468599
KushiNagar	0.686210776	0.527581547	0.576071716	1	0.085714286	0	0.012108258	0.083535637	0.420289855
Lalitpur	0.913739217	0	0.764617022	0.613065327	0.094285714	0	0.061405437	0.181154869	0.971014493
Lucknow	0.907488436	0.693871936	0.481910957	0.914572864	0.764285714	0.102157999	0.341148137	0.725036508	0.292270531
Maharajganj	0.793724216	0.316906594	0.531123857	1	0.18	0	0.02286661	0.050054191	0.243961353

Mahoba	0.284910614	0.112009322	0.554706857	0.43718593	0.335714286	0	0.058521545	0.11240689	0.557971014
Mainpuri	0.98999875	0.501306856	0.932089555	0.984924623	0.174285714	0.077999496	0.048949476	0.190188406	0.338164251
Mathura	0.984998125	0.268759255	0.692423375	0.51758794	0.382857143	0.017959141	0.177932085	0.43963974	0.379227053
Mau	0.943742968	0.460312836	0.675671407	0.989949749	0.224285714	0	0.103145181	0.142897348	0.446859903
Meerut	1	0.315069712	0.46198587	1	0.937142857	0.057452384	0.232695366	0.569713445	0.115942029
Mirzapur	0.506188274	0.483116063	0.509649085	0.150753769	0.235714286	0.050582344	0.069694072	0.164816501	0.574879227
Moradabad	0.972496562	0.362351209	0.123444963	1	0.828571429	0.141875238	0.083448808	0.262191104	0.142512077
Muzaffarnagar	0.966245781	0.312456	0.276678577	0.989949749	0.788571429	0.173607276	0.233784495	0.289105798	0.118357488
Pilibhit	0.978747343	0.126445432	0.578361023	0.994974874	0.45	0.135140555	0.028654848	0.095184133	0.557971014
Pratapgarh	0.861232654	0.488926112	0.607610625	0.477386935	0.042857143	0.206336302	0.039827376	0.114399328	0.628019324
Raebareli	0.841230154	0.177902394	0.436932064	0.703517588	0.137142857	0	0.061548609	0.155041624	0.693236715
Rampur	0.978747343	0.234918554	0.636533849	0.944723618	0.767142857	0	0.066482929	0.171888353	0.15942029
Saharanpur	0.917489686	0.522791089	0.563588985	0.974874372	0.644285714	0.013196825	0.153332072	0.360612251	0.055555556
SantkabirNagar	0.83247906	0.521383083	0.563273042	0.994974874	0.074285714	0	0.034816356	0.068772675	0.106280193
SantravidasNagar	0.753719215	0.806868481	0.657682111	0	0.118571429	0.03623183	0.060377667	0.143127532	0.292270531
Shahjahanpur	0.898737342	0.261597844	0.739604928	0.979899497	0.37	0.410811825	0.036156037	0.301652662	0.437198068
Shrawasti	0.378672334	0.208902807	0.615767395	0.738693467	0.021428571	0	0	0	0.352657005
SiddharthNagar	0.651206401	0.343869104	0.621048051	0.994974874	0.018571429	0.01180587	0.015621085	0.063026009	0.427536232
Sitapur	0.851231404	0.427014299	0.506890275	0.844221106	0.121428571	0.010201899	0.018806662	0.139279181	0.270531401
Sonbhadra	0	0.354825658	0.808604624	0.035175879	0.204285714	0.049120845	0.073979005	0.131470183	0.458937198
Sultanpur	0.792474059	0.744705816	0.295199701	0.492462312	0.055714286	0.08734336	0.053203729	0.096684985	0.492753623
Unnao	0.933741718	0.305068013	0.700240759	0.773869347	0.242857143	0.015452647	0.501118568	0.061318512	0.461352657
Varanasi	0.81247656	1	0.369656398	0.59798995	0.651428571	0	0.248322148	0.184564016	0.188405797

Statistical Abstract, Uttar Pradesh2016,2011
District Wise Development Indicators, Uttar Pradesh2016,2011

Table 6.3.2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.895	32.163	32.163	2.895	32.163	32.163	2.772	30.799	30.799
2	1.628	18.088	50.251	1.628	18.088	50.251	1.493	16.585	47.383
3	1.229	13.654	63.905	1.229	13.654	63.905	1.487	16.522	63.905
4	.962	10.689	74.595						
5	.781	8.680	83.275						
6	.661	7.340	90.615						
7	.387	4.295	94.910						
8	.265	2.942	97.852						
9	.193	2.148	100.000						

Source: Extracted from Principal Component Analysis

Table 6.3.3 A: District wise Normalization of Infrastructure Scores (2015-16)

Districts	Net Irrigated Area	Roads	Total institutions	Water	Sanitation	Storage capacity	Power	LPG	Hospitals
Agra	0.65011652	0.248219801	0.358645689	0.210714286	0.573477337	0.720511446	0.423336611	0.243931696	0.060367454
Aligarh	0.90639565	0.141082311	0.490734147	0.938736264	0.495573654	0	0.144461887	0.182557815	0.286089239
Allahabad	0.307742103	0.286148677	0.2743677	0.784340659	0.395892351	0	0.193050403	0.174442653	0.175853018
AmbedkarNagar	0.89972812	0.302395859	0.509080143	0.997252747	0.166607649	0.296153255	0.062738665	0.074265068	0.482939633
Auraiya	0.513076126	0.138377577	1	0.952197802	0.445998584	0	0.127047154	0.188538447	0.052493438
Azamgarh	0.867167271	0.242897988	0.318289238	0.986538462	0.252832861	0	0.031353037	0.082392231	0.338582677
Badaun	0.524016054	0.076621588	0.222308847	1	0.358356941	0.090523616	0.027854881	0.022393367	0.181102362
Baghpat	1	0.074392687	0.338980893	0.982692308	0.962287535	0.000676066	0.179693314	0.253757096	0.049868766
Bahraich	0.332923356	0.017031889	0.502422324	0.975549451	0.043732295	0.053400934	0.013721028	0.046110816	0.209973753
Ballia	0.699119627	0.140011687	0.432352901	0.957417582	0.242740793	0	0.033889743	0.119515298	0.88976378
Balrampur	0.203197825	0.051256365	0.502394472	0.95989011	0.060375354	0	0	0	0.343832021
Banda	0.180605904	0.033168461	0.64159878	0.940384615	0.302584986	0	0.064150964	0.04185909	0.587926509
Barabanki	0.731809943	0.167641289	0.317036664	0.977747253	0.174929178	0.239442901	0.026448014	0.158154458	0.296587927
Bareilly	0.522591921	0.224547124	0.292912161	0.971153846	0.778328612	0	0.065150437	0.196506133	0.335958005
Basti	0.46938115	0.163673929	0.517132666	0.993956044	0.101805949	0	0.027137868	0.116788732	0.587926509
Bijnor	0.572177628	0.05536564	0.600094315	0.997527473	0.885092068	0	0.096970619	0.155098538	0.139107612
Bulandshahar	1.01864319	0.159794223	0.356175008	0.989285714	0.660056657	0.999999893	0.112223447	0.205203464	0.375328084
Chandauli	0.099171414	0.191616579	0.182553404	0.694230769	0.310552408	0	0.092310032	0.070253357	0.385826772
Chitrakoot	0.223135681	0.013415143	0.717766584	0.785989011	0.09631728	0	0.05446042	1	0.430446194

Deoria	0.873511134	0.202779865	0.389215614	0.986538462	0.254957507	0	0.021885202	0.228793438	0.430446194
Etah	0.931447437	0.141656232	0.114893895	0.975549451	0.227160057	0	0.058925458	0.187755199	0.666666667
Etawah	0.361276541	0.258894732	0.987386027	0.96043956	0.32453966	0.07917401	0.091354014	0.165658116	0.839895013
Faizabad	0.766506991	0.293713999	0.528823902	0.964010989	0.245042493	0.345077614	0.052287653	0.212153489	0.304461942
Farrukhabad	0.845675816	0.104422322	0.640035052	0.996978022	0.353399433	0	0.031380196	0.115448117	0.349081365
Fatehpur	0.552045572	0.090727523	0.6136894	0.932967033	0.286296034	0	0.087127981	0.092236566	0.551181102
Firozabad	0.683195236	0.228677269	0.391746298	0.900824176	0.41111898	0	0.119274078	0.191994391	0.207349081
G. B. Nagar	0.363606939	0.082648802	0.305363416	0	0.781515581	0	1	0.659712286	0.023622047
Ghaziabad	0.870727602	1	-0.157938429	0.58489011	0.963703966	0	0.561633269	0.440129277	0.30183727
Ghazipur	0.664681512	0.273130061	0.581569346	0.974450549	0.154213881	0.20126974	0.060582193	0.072982323	0.419947507
Gonda	0.875323666	0.120256282	0.367894025	1	0.013456091	0.365570829	0.011618875	0.071524901	0.228346457
Gorakhpur	0.670636976	0.262127473	0.201768421	0.978846154	0.423512748	0	0.09889895	0.268694808	0.335958005
Hamirpur	0.203845158	0.000208699	0.685107709	0.976373626	0.614907932	0	0.173750794	0.080225432	0.939632546
Hardoi	0.715950285	0.057185491	0.493567533	0.989285714	0.316395184	0.11367555	0.008783413	0.049698502	0.401574803
Hathras	0.868397204	0.17788004	0.892312789	0.986263736	0.333215297	0	0.008783413	0.137426526	0.870062198
Jalaun	0.135939927	0.050192003	0.924111632	0.948351648	0.66713881	0.205756808	0.087627718	0.129937802	0.797900262
Jaunpur	0.638270326	0.276798982	0.347898355	0.873626374	0.243271955	0.091028947	0.039006611	0.06501277	0.317585302
Jhansi	0.055670637	0.035313883	0.545095794	0.893681319	0.629072238	0.219320105	0.152924817	0.224143288	0.283464567
Amroha	0.682159503	0.148023625	0.773513703	0.997252747	0.679886686	0	0.096481746	0.16692806	0
Kannauj	0.795248576	0.178779531	0.944850286	0.990384615	0.205028329	0.38937707	0.037246669	0.103628195	0.346456693
Kanpur Dehat	0.364513206	0.102053594	0.803760476	0.963736264	0.325070822	0.117428315	0.168291716	0.147112717	0.496062992
Kanpur Nagar	0.484722941	0.389454462	0.243629961	0.976923077	0.970432011	0.294069442	0.244159329	0.339546335	0.06824147
Kaushambi	0.582146556	0.147021872	0.628614796	0.911813187	0.14766289	0	0.044324459	0.124739884	0.020997375

Kheri	0.796672708	0.027875866	0.294193633	0.976373626	0.214766289	0.270899282	0.017213751	0.07374477	0.257217848
KushiNagar	0.460836354	0.207074881	0.347196362	0.934615385	0.206975921	0	0.001439459	0.173083903	0.454068241
Lalitpur	0.141960124	0.068643042	0.636622048	0.838461538	0.168909348	0	0.049023069	0.047074341	1
Lucknow	0.729350078	0.58318307	0.198199937	0.968681319	1	0.264834727	0.363862529	0.410845089	0.330708661
Maharajganj	0.482780943	0.11457342	0.303228478	0.981043956	0.159879603	0	0.006556326	0.089895356	0.270341207
Mahoba	0	0.006359045	0.693052723	0.818131868	0.445467422	0	0.049723787	0.041447598	0.545931759
Mainpuri	0.85085448	0.221155773	0.985017244	0.979945055	0.300106232	0	0.075775271	0.12974739	0.372703412
Mathura	0.433454169	0.048973203	0.613933717	0.564835165	0.57684136	0.046682671	0.175874675	0.238458829	0.388451444
Mau	0.965108752	0.249720344	0.398833305	0.986538462	0.287535411	0	0.100159155	0.10654624	0.503937008
Meerut	0.825479026	0.216080224	0.145455755	0.98489011	1.004249292	0.148808481	0.243670456	0.318090091	0.160104987
Mirzapur	0.059101502	0.134842224	0.377258734	0.673626374	0.229461756	0.230600356	0.071234186	0.072796445	0.648293963
Moradabad	0.421413775	0.569369313	0.092424036	0.99010989	0.72963881	0.39993729	0.134391109	0.167013932	0.309711286
Muzaffarnagar	0.568940963	0.134931964	2.03041E-08	0.989285714	0.780276204	0.333214734	0.359516994	0.158782496	0.288713911
Pilibhit	0.907431383	0.088179314	0.326729807	0.986813187	0.470786119	0.35557131	0.01259662	0.08667756	0.582677165
Pratapgarh	0.430217504	0.25137741	0.46049865	0.794230769	0.095963173	0.547434616	0.028202524	0.095010335	0.682414698
Raebareli	0.481809943	0.018048251	0.235754567	0.957142857	0.141997167	0	0.055036204	0.11932702	0.787401575
Rampur	0.378819265	0.138456883	0.468360664	0.994230769	0.746990085	0	0.063634932	0.107348422	0.199475066
Saharanpur	0.776087519	0.219669839	0.41257887	0.98021978	0.719369688	0.036587309	0.143125635	0.208822885	0.076115486
SantkabirNagar	0.483816675	0.15327448	0.430221673	0.991758242	0.084631728	0	0.020755363	0.092604055	0.125984252
SantravidasNagar	0.578262558	0.307828283	0.319013551	0.625824176	0.181657224	0.100264146	0.0450632	0.149985692	0.343832021
Shahjahanpur	0.41875971	0.131096085	0.55689436	0.995054945	0.407223796	0	0.020603269	0.136297123	0.50656168
Shrawasti	0.42562144	0.121980132	0.216788191	0.944505495	0	0.123554648	0.000798492	0.008377312	0.614173228
SiddharthNagar	0.737118074	0.143067034	0.415622414	0.991483516	0.079143059	0	0.001015769	0.092936609	0.427821522

Sitapur	0.803534438	0.131636614	0.377332939	0.964285714	0.111012748	0.027513507	0.003492724	0.078826147	0.286089239
Sonbhadra	0.067581564	0.126143668	0.676101488	0.655494505	0.234950425	0.296080937	0.057507727	0.01904223	0.496062992
Sultanpur	0.665199379	0.529253277	0.15430907	0.871153846	0.112429178	0.233076659	0.040755689	0.162105899	0.845144357
Unnao	0.592503884	0.087816178	0.481106111	0.936263736	0.317457507	0	0.060761446	0.135694953	0.524934383
Varanasi	0.778676851	0.412217213	0.087713934	0.889285714	0.679886686	0	0.185385965	0.261937062	0.233595801

Statistical Abstract, Uttar Pradesh2016, 2011, District Wise Development Indicators, Uttar Pradesh2016,2011

Table 6.3.4 A: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.978	33.091	33.091	2.978	33.091	33.091	2.204	24.487	24.487
2	1.622	18.026	51.117	1.622	18.026	51.117	1.737	19.300	43.787
3	1.069	11.881	62.998	1.069	11.881	62.998	1.729	19.211	62.998
4	.911	10.119	73.117						
5	.735	8.168	81.285						
6	.671	7.460	88.745						
7	.458	5.094	93.839						
8	.433	4.808	98.648						
9	.122	1.352	100.000						

Source: Extracted from Principal Component Analysis

6.11 A :Education Index of Kerala

Table 6.11 A: District wise Normalization of Education scores of Kerala (2011-12)

Districts	LR[17]	GER GEN[18]	GER DC[19]	PTR GEN[20]	PTR DC[21]
Alappuzha	0.920616	0.247022	0.259891	0.562572	0.803459
Ernakulam	0.851896	0.092002	0.273474	0.514035	0.922559
Idukki	0.439573	0.229647	0.522968	0.589007	0.770449
Kannur	0.819905	0.58982	0.077131	0.47954	0.620803
Kasaragod	0.161137	0.641958	0.354135	1	0.676235
Kollam	0.625592	0.277144	0.894801	0	0.8975
Kottayam	0.937204	0.113161	0.536502	0.672745	0.818062
Kozhikode	0.799763	0.79203	0.204502	0.529345	0.494255
Malappuram	0.599526	1	0	0.326382	0.315768
Palakkad	0	0.766669	0.085204	0.451423	0.635697
Pathanamthitta	1	0	1	0.80634	1
Thiruvananthapuram	0.494076	0.244578	0.327895	0.540887	0.804633
Thrissur	0.809242	0.441056	0.280876	0.396282	0.884091
Wayanad	0.098341	0.834687	0.24365	0.471055	0

Source: Statistical Handbook of Kerala 2017, Statistics for Planning, DES, Kerala2014

[17] LR= Literacy Rate
[18] GERGEN= Gross Enrolment ratio General Education (enrolment in Classes I -XII)
[19] GER DC= Gross Enrolment ratio (18-23)
[20] PTR GEN=Pupil Teacher ratio ((I -XII)
[21] PTR DC=Pupil Teacher ratio (18-23)

Table 6.11.2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.793	55.855	55.855	2.793	55.855	55.855	2.767	55.346	55.346
2	1.017	20.330	76.185	1.017	20.330	76.185	1.042	20.840	76.185
3	.697	13.936	90.121						
4	.361	7.223	97.345						
5	.133	2.655	100.000						

Source: Extracted from Principal Component Analysis

Table 6.11.3 A: Normalization of Education scores Kerala 2015-16

Districts	LR	GER GEN	GER VE	PTR GEN	PTR VE
Alappuzha	0.920616	0.249044	0.230464	0.456028	0.879193
Ernakulam	0.851896	0.149086	0.249094	0.593295	0.872679
Idukki	0.439573	0.246947	0.510707	0.587645	0.469692
Kannur	0.819905	0.270386	0.059895	0.468603	0.354584
Kasaragod	0.161137	1	0.334008	0.64659	0.608354
Kollam	0.625592	0	0.897078	0.564725	0.979304
Kottayam	0.937204	0.220056	0.52464	0.706854	0.828862
Kozhikode	0.799763	0.440697	0.24889	0.364599	0.078256
Malappuram	0.599526	0.459471	0	0	0.044997
Palakkad	0	0.369876	0.077348	0.293583	0.567284
Pathanamthitta	1	0.158484	1	1	1.000447
Thiruvananthapuram	0.494076	0.242813	0.339332	0.431597	0.849962
Thrissur	0.809242	0.214157	0.291922	0.503526	0.818487
Wayanad	0.098341	0.445313	0.320874	0.227069	0.000513

Source: Statistical Handbook of Kerala 2017, Statistics for Planning, DES, Kerala2014; Note: For Abbreviations refer table no.6.11A

Table 6.11.4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.937	58.744	58.744	2.937	58.744	58.744	2.286	45.723	45.723
2	.998	19.954	78.698	.998	19.954	78.698	1.649	32.975	78.698
3	.543	10.865	89.563						
4	.415	8.309	97.873						
5	.106	2.127	100.000						

Source: Extracted from Principal Component Analysis

6.12 A :Health Index of Kerala

Table 6.12 A: District wise Normalization of Health scores of Kerala (2011-12)

DISTRICTS	NO. OF PHCs & CHCs	IMR	INSTITUTIONAL DELIEVRIES	DOCTORS
Alappuzha	0.393385373	0.882392027	1	0.637506936
Ernakulam	0.168695131	0.627906977	1	0.506098726
Idukki	1	0.986046512	0.968354	0.725986715
Kannur	0.484413466	0.773421927	1	0.546246671
Kasaragod	0.54202786	0.910299003	0.898734	0.459087797
Kollam	0.034443845	1	1	0.215532745
Kottayam	0.479899663	0.56013289	1	0.820208737
Kozhikode	0.030572433	0	1	0.473507294
Malappuram	0.054257455	0.868438538	1	0.00042671
Palakkad	0.348611532	0.928903654	1	0.348843339
Pathanamthitta	0.887036498	0.799335548	0	1
Thiruvananthapuram	0	0.368106312	1	0.716686135
Thrissur	0.306880399	0.610631229	1	0.343372754
Wayanad	0.460305221	0.843853821	1	0.44736324

Source: Statistical Handbook of Kerala 2017, Statistics for Planning, DES, Kerala2014

Table 6.12.2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.162	54.050	54.050	2.162	54.050	54.050	2.069	51.737	51.737
2	1.201	30.029	84.080	1.201	30.029	84.080	1.294	32.343	84.080
3	.492	12.289	96.369						
4	.145	3.631	100.000						

Source: Extracted from Principal Component Analysis

Table 6.12 .3 A: District wise Normalization of Health scores of Kerala (2015-16)

DISTRICTS	PHC'S & CHC'S	IMR	INSTITUTIONAL DELIEVERIES	DOCTORS
Alappuzha	0.436174693	0.907504363	1	0.38035352
Ernakulam	0.125049625	0.922338569	1	0.024269006
Idukki	0.998511543	1	1	0.46003656
Kannur	0.440471459	0.772251309	1	0.399905821
Kasaragode	0.438838023	0.916230366	1	0.333104151
Kollam	0.094819219	0.991273997	0	0.160584169
Kottayam	0.548066017	0.436300175	1	1
Kozhikkode	0.00160684	0	1	0.234802285
Malappuram	0.015689091	0.885689354	0.16	0
Palakkad	0.313808175	0.961605585	1	0.953118566
Pathanamthitta	0.861678966	0.826352531	1	0.745375463
Thiruvananthapuram	0.021733088	0.301919721	1	0.3326806
Thrisuur	0.258556466	0.630890052	1	0.243961877
Wayanad	0.559866242	0.818499127	0.5	0.797630158

Source: Statistical Handbook of Kerala 2017 ,Statistics for Planning, DES, Kerala2014

Table 6.12 .4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.842	46.051	46.051	1.842	46.051	46.051	1.841	46.029	46.029
2	1.330	33.247	79.297	1.330	33.247	79.297	1.331	33.268	79.297
3	.589	14.714	94.011						
4	.240	5.989	100.000						

Source: Extracted from Principal Component Analysis

6.13 A: Infrastructure Index of Kerala

Table 6.13.1 A: District wise Normalization of Infrastructure scores of Kerala (2011-12)

Districts	Power	Water	Toilet facilities	Storage facilities	LPG	Roads	Total Institutions	Net Irrigated Area	Hospitals
Alappuzha	0.862068966	0.820754717	0.909090909	0.510968084	0.779092702	0.518352453	0.371935116	0.807627648	0.613006189
Ernakulam	1	0.836477987	0.94214876	0.648110808	0.143984221	0.650282222	0.283322429	0.320738198	0.39737771
Idukki	0	0.698113208	0	0.163399122	1	0.032509997	0.478553457	0.331132316	0.784116866
Kannur	0.689655172	0.72327044	0.909090909	0.569399338	0.17357002	0.004048886	0.589591651	0.173001773	0.172327424
Kasaragod	0.448275862	0.613207547	0.842975207	0.263344655	0.301775148	0.687973343	0.854955301	0.711055268	1
Kollam	0.620689655	0.773584906	0.958677686	0.771474399	0.538461538	0.363128375	0.345027884	0	0.494938226
Kottayam	0.965517241	0.622641509	0.94214876	0.281184572	0.524654832	1	0.775917141	0.147622206	0.660579456
Kozhikode	0.896551724	0.921383648	0.991735537	1	0.175542406	0.793507127	0.493784393	0.018525682	0.422626052
Malappuram	0.689655172	0.893081761	0.991735537	0.088115197	0.112426036	0.250892322	0.192337247	0.329410439	0.211422838
Palakkad	0.931034483	1	0.991735537	0.912367938	0.315581854	0.001832071	0.217667002	0.907803386	0.154730541
Pathanamthitta	0.931034483	0	0.066115702	0	0.550295858	0.269187957	1	0.073827177	0
Thiruvananthapuram	0.724137931	0.805031447	0.958677686	0.76376339	0.573964497	0.651869777	0.298327441	0.079514791	0.52678143
Thrissur	0.827586207	0.849056604	0.950413223	0.684600096	0.652859961	0.180698041	0	1	0.139299823
Wayanad	0.482758621	0.899371069	1	0.221679648	0	0	0.826926294	0.199207804	0.531896221

Source: Statistical Handbook of Kerala 2017, Statistics for Planning, DES, Kerala2014

Table 6.13 .2 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.129	34.766	34.766	3.129	34.766	34.766	2.666	29.618	29.618
2	1.805	20.051	54.818	1.805	20.051	54.818	1.755	19.503	49.121
3	1.574	17.484	72.302	1.574	17.484	72.302	1.671	18.569	67.690
4	1.175	13.054	85.355	1.175	13.054	85.355	1.590	17.666	85.355
5	.759	8.435	93.791						
6	.331	3.677	97.467						
7	.134	1.489	98.956						
8	.076	.840	99.797						
9	.018	.203	100.000						

Source: Extracted from Principal Component Analysis

Table 6.13.3 A: District wise Normalization of Infrastructure scores of Kerala (2015-16)

Districts	Power	Water	Toilet facilities	LPG	Net Irrigated Area	Hospitals	Storage facilities	Roads	Total Institutions
Alappuzha	0.915384615	0.260780287	0.490909091	0.666523236	0.888996943	0.554957117	0.160701187	0.518352453	0.243297755
Eranakulam	1	1	0.957575758	1	0.217354466	0.306984366	0.00415981	0.650282222	0.030912296
Idukki	0.815384615	0.045174538	0	0.300774527	0.329078691	0.751734396	0.756326926	0.032509997	0.490958345
Kannur	0.741025641	0	0.874747475	0.479991394	0.094382898	0.246353076	0	0.004048886	0.724532032
Kasaragode	0.648717949	0.110882957	0.624242424	0.423192771	0.654455137	1	0.79602292	0.687973343	0.455842678
Kollam	0.582051282	0.457905544	0.719191919	0.55055938	0.035278663	0.419178959	0.197276224	0.363128375	0.182103798
Kottayam	0.941025641	0.622176591	0.878787879	0.632960413	0.114469047	0.609666375	0.166126018	1	0.536488025
Kozikhode	0.823076923	0.876796715	0.97979798	0.384681583	0	0.33601996	0.221949657	0.793507127	0.381242624
Malappuram	0.912820513	0.334702259	0.828282828	0.268287435	0.270054441	0.336272527	0.015463395	0.250892322	0.164059543
Palakkad	0.784615385	0.258726899	0.428282828	0.376290878	0.79562666	0.027940122	0.34286962	0.001832071	0.175414381
Pathanamthitta	0.838461538	0.176591376	0.56969697	0.526678141	0.064366506	0.26756722	0.016385036	0.269187957	1
Thiruvananthapuram	0.841025641	0.100616016	0.444444444	0.737951807	0.064373398	0.455798644	0.20652201	0.651869777	0
Thrissur	0.953846154	0.759753593	1	0.413511188	1	0	0.253041489	0.180698041	0.131632168
Wayanad	0	0.252566735	0.141414141	0	0.149841605	0.461680654	1	0	0.314189002

Source: Statistical Handbook of Kerala 2017 ,Statisticsfor Planning, DES, Kerala2014

Table 6.13. 4 A: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.615	40.171	40.171	3.615	40.171	40.171	2.913	32.372	32.372
2	1.624	18.048	58.219	1.624	18.048	58.219	1.832	20.358	52.730
3	1.358	15.091	73.310	1.358	15.091	73.310	1.576	17.516	70.246
4	1.062	11.796	85.106	1.062	11.796	85.106	1.337	14.859	85.106
5	.663	7.362	92.467						
6	.271	3.013	95.481						
7	.232	2.576	98.057						
8	.125	1.384	99.441						
9	.050	.559	100.000						

Source: Extracted from Principal Component Analysis