

## RURAL ECONOMIC DEVELOPMENT AND THE ROLE OF INFRASTRUCTURE IN THE STATE OF UTTARAKHAND: AN OVERVIEW

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### **Abstract:**

It is universal truth that infrastructure development is a vital component of economic development. Infrastructural development can be identified at various levels of geographical regions such as national levels, zonal levels, state levels and district levels. Today, in the 21st century there is no denying the fact that globally, there is a 'development gap' not only between nations but within them as well as within the sub regions of the nations and that this gap varies among regions. The major cause for this development gap is the inadequate development of infrastructure.

In this paper, we examined the impact of infrastructural development on Economic Growth. Study analyzed these factors with graphical data presentation and regression analysis and explored other factors and issues to affect economic growth of region.

Study explored those variables, took as the dimensions of infrastructure have positive but very less impact on economic growth. To overcome these loopholes, study provided various suggestions and recommendations to the policy makers.

**Key words:** Infrastructure, Rural economy, economic growth

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**Introduction:**

Rural development can be defined as 'structural changes in the social-economic situation to achieve improved living standard of low-income population residing in rural areas and making the process of their development self-sustained'. Development of rural areas is slow due to improper and inadequate provisions of infrastructure as compared to urban areas. Infrastructure is required for social and economic growth and for promoting the quality of life in rural areas.

Throughout history, infrastructure system and services have continuously evolved in both technology and organization. Indeed in many instances, social scientists measure the level of civilization or advancement of a society on the basis of the richness and articulation of the infrastructure systems that society has in place. Another way to gauge the importance of infrastructure is to note that all the progressive movements of the nineteenth and twentieth century's have, in essence, focused on the need to improve one or another infrastructure system in meeting one or another social, humanitarian or economic need. Development implies a passage from a lower to a higher stage. Economic development is a long-term dynamic process, which enables a country to attain high levels of income, output and employment and secure better standards of living. It is associated with progressive changes in the socio-economic structure of a country. There is a close link between economic development and infrastructure facilities. No nation can build the structure of the social and economic well-being of its people on weak foundations. We cannot visualize a country's solid progress in all spheres of life without a well conceived and well built social and economic infrastructure. Given the crucial linkage of infrastructure with economic-growth, poverty alleviation and human development, emphasis on infrastructure is critical in achieving economic development. Infrastructure is quintessence of economic development. It comprises all those activities and facilities which support production functions. Like factors of production, infrastructural facilities are not factor inputs which directly produce. They are facilitative in character and they contribute indirectly but importantly to productivity. Their influence is diffused and pervasive. It is used as an umbrella term for several activities referred to as 'social overhead capital', 'Economic overheads', 'overhead capital', 'Basic Economic Facilities' and so on. We require good hospitals, properly staffed by doctors and paramedical staff and we require schools and colleges with libraries laboratories and sports facilities for the growing children and a good transport and communication system at the local, state, national and international levels.

Rural infrastructure has played a crucial role in the economic growth of China, Taiwan , Sri Lanka and Korea which once were developing countries and started at the same level as India. Though these countries adopted different strategy but investment in infrastructure is common in their success stories. In China the rural economic reform of the late 1970's and early 1990's led to increase in rural labor productivity and large force to enter the manufacturing and service sectors. The open economic policy made it possible for the inflow of FDI mainly to manufacturing sector. Cheap labor and better than adequate infrastructure were both required for an export led growth strategy. It is not investment

saving per say that has been driving the current boom, but the investment in infrastructure which was around 14% of GDP in 2006, has played a significant role in China's sustained high economic growth. With seemingly unlimited supply of cheap labor form rural sector, public investment in infrastructure became the keystone in economic growth.

## OBJECTIVES

- To analyze the need for development of rural infrastructure in economic development of state and its districts
- To analyze the level of development of various infrastructural indicators across different districts so as to understand the disparity in development
- To analyze the relationship between rural infrastructure and economic productivity of the state.
- To study the link between rural infrastructure and employment generation.

## REVIEW OF LITERATURE:

**R.Bandyopadhyay and K.V.Patel (1987)** :This article studies the significant role of banks in micro-finance management. The development of banks in rural areas are the major source of credit for agricultural activities such as tractors, fertilizers, seeds etc. Banks did not only improved agriculture sector but also non- agriculture sector by giving loans for starting business etc. Due to banks , the poor and illiterate rural people stopped getting exploited through moneylenders. This increased the income and employment opportunities in rural areas.

**Adam S Weinberg(2000)**: This article examines theory of rural sustainable economic development. A community without infrastructure is isolated whether, two miles away from a city or in the middle of the barren desert. Rural entrepreneur does not grow due to lack of finance , lack of transport, lack of power and lack of connectivity to the market. To succeed in global economy local mobilization should exist. It leads to chains of development , entrepreneurial social infrastructure to economic capacity which leads to high road industries and finally to sustainable community development.

**Anupam Ghosh(2011)**: The paper analyzes the growth of secondary sector as the availability of infrastructure in six states of India. The first 3 states are industrially developed and well versed in infrastructure, the other three states are least developed in both of them. Physical infrastructure has a positive impact on the output from secondary sector. The three states with increased infrastructure will have greater impact when compared to states having least of it. This study proves that states will respond more to secondary sector output when infrastructure rises. As secondary sector warrants the presences and usability of physical infrastructure.

**Rajarashi Majumder (2005)** : This paper shows the interlink age of infrastructure and regional development. The private decision makers tend to concentrate around centers where facilities and ready market are available. So inequality in infrastructure facilities and market conditions leads to gathering of private players in few regions resulting in widening the gap between rural and urban areas. The availability of physical, financial and social infrastructure is important determinant of both present and future level of development of a region.

**Peter Groote, Jan Jacobs and Jan Egbert Strum (1999)** : The paper examines the growth pattern of Netherland along with infrastructure. It is exogenous variable whereas GDP is an endogenous variable. There is a positive effect but does not have permanent effect but improvement in infrastructure cannot bring GDP to a lifelong higher level. **V.S.Vyas and**

**Sumati Kulkarni (1994)** : This article reports the dependence of rural area in agriculture sector. In 1991 nearly 80% of rural workforce was engaged in agriculture which reflects the excessive concentration of industrialization in urban areas. Due to inadequate infrastructure private sector do not invest in rural regions. This leads to deficiency of non-farm employment in such areas. Not only industries but other infrastructure facilities such as schools, roads etc. leave rural people with no other occupation other than agriculture.

**Shenggen Fan and Peter Hazell (2000)** : This paper examines the impact of government spending in rural areas. Government allocates scarce funds to invest in rural areas for poverty alleviation and agricultural growth. Productivity level in many high potential areas have reached a plateau while at the same time low potential areas productivity can be raised by rural investment in basic infrastructure. As it has much larger impact on poverty reduction and growth of agriculture will leads to higher productivity.

**Muhammad Abdul Latif (2006)** : This paper reports the impact of transportation and trading infrastructure on income, consumption and poverty in Bangladesh. The transportation and trading infrastructure such as roads and market connectivity had positive impact on raise in income as agricultural and non- agricultural sector have better facilities to market approachability which leads to better quality of seeds, fertilizers, helps the farmers to get a fair price for their product, reduced transport cost which leads to increases productivity and generates employment in non-farm sectors in transportation and trading . This results in reduction of poverty and expands the consumption of people due to market accessibility.

**David.K.Cohen and Monica.P.Bhatt (2012)** : The articles examines the importance of infrastructure in rural literacy. Educational infrastructure includes elements such as curriculum framework, teacher's education, inspection system etc. Framework defines quality in students work and provides valid evidence of instructional quality. Mere

existence of infrastructure does not cause excellent or effective education, which depends on how well the infrastructure is designed and used.

### Model Formulation

The model used in this study is Panel Data Regression Model, we used two models

1. To show the effect of infrastructural variables on the GDDP.
2. To show the effect of infrastructural variables on employment generation

The estimating equation is :

$$A) \Delta Y = \beta_0 + \beta_1 \Delta x_1 + \beta_2 \Delta x_2 + \beta_3 \Delta x_3 + \beta_4 \Delta x_5 + \beta_5 \Delta x_7 + \beta_6 \Delta x_8 + \beta_7 \Delta x_9 + \beta_8 \Delta x_{10}$$

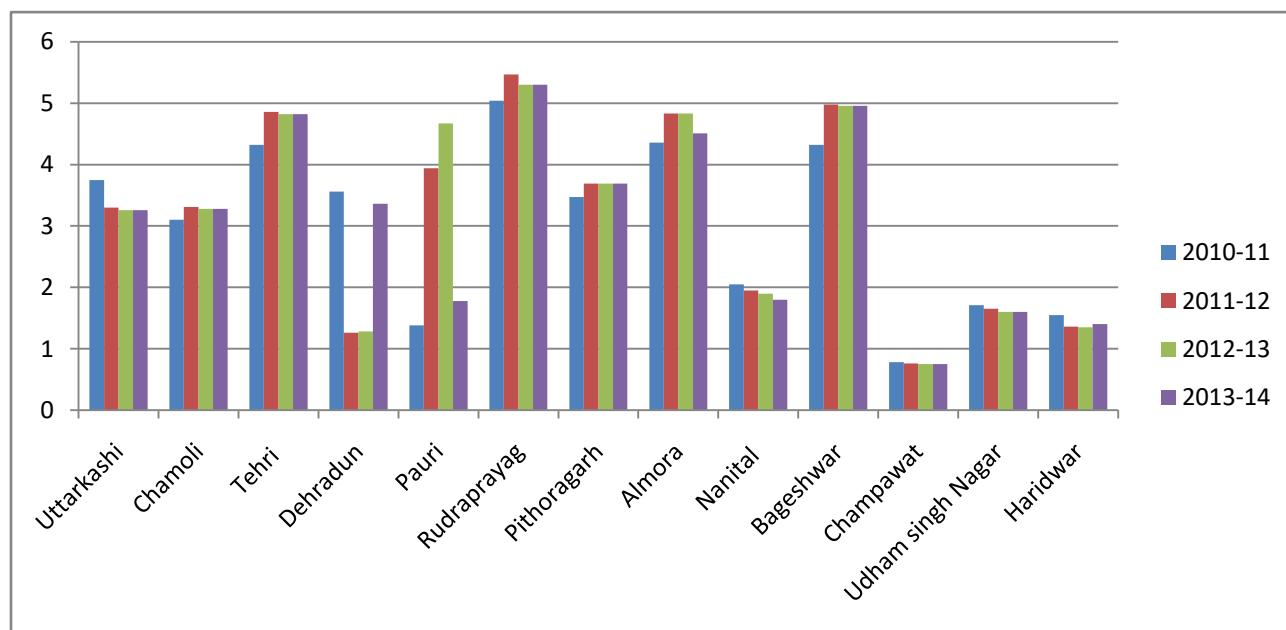
$$B) \Delta x_4 = \beta_0 + \beta_1 \Delta x_1 + \beta_2 \Delta x_2 + \beta_3 \Delta x_3 + \beta_4 \Delta x_5 + \beta_5 \Delta x_7 + \beta_6 \Delta x_8 + \beta_7 \Delta x_9 + \beta_8 \Delta x_{10}$$

Where,  $\Delta Y = \text{GDDP}$  ,  $\Delta x_4 = \text{change in number of people employed}$  ,

#### These are the infrastructural indicators :

$\Delta x_1 = \text{change number of hospital}$  ,  $\Delta x_2 = \text{changes in number of banks}$  ,  $\Delta x_3 = \text{change in number of electrified villages}$  ,  $\Delta x_5 = \text{change in number of gas connection in villages}$  ,  $\Delta x_7 = \text{change in number of senior basic schools}$  ,  $\Delta x_8 = \text{change in number of senior secondary schools}$  ,  $\Delta x_9 = \text{change in length of roads}$  and  $\Delta x_{10} = \text{change in number of MSMEs}$  . The coefficient  $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$  and  $\beta_8$

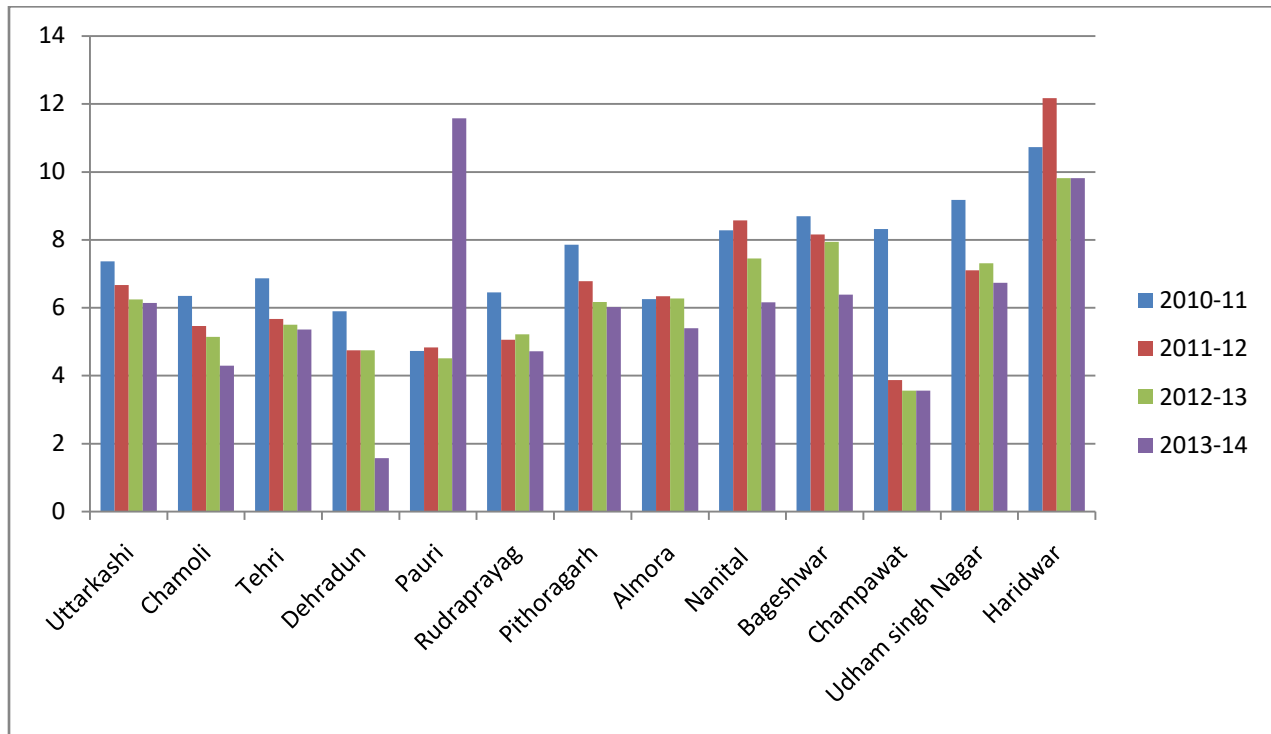
### Data Analysis:



Source : Directorate of Economics & Statistics of Uttarakhand

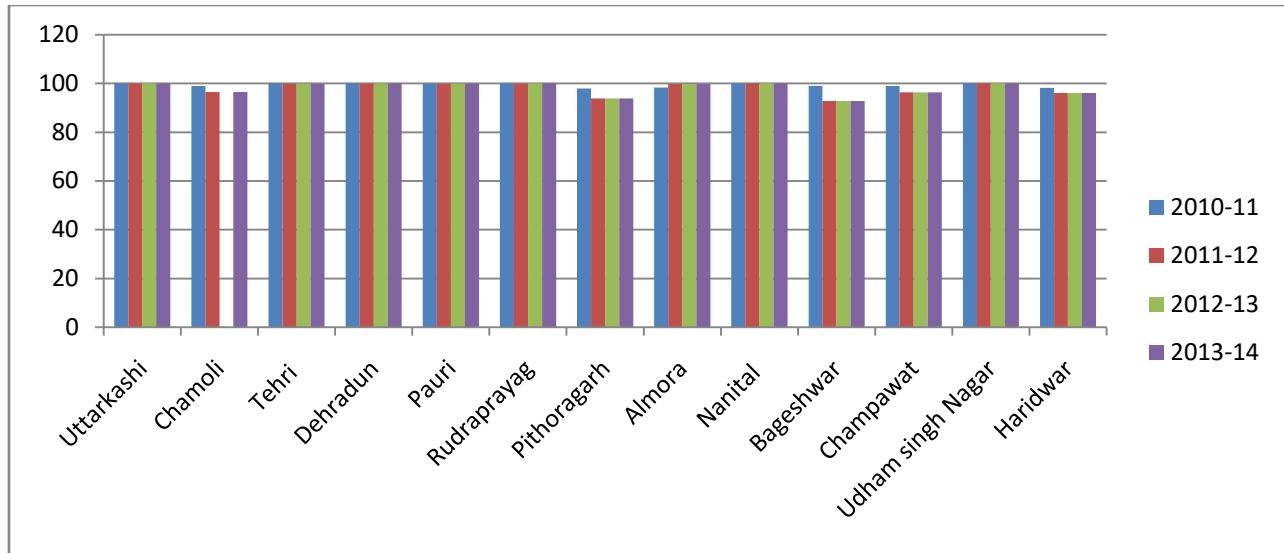
This graph shows the number of primary hospitals per lakh population in rural areas of each district of Uttarakhand. The number of hospital in Uttarkashi, dehradun, nanital, udham Singh nagar, Champawat and haridwar increased during 2010-11 but decreased during the following years. Whereas, the number of hospital increased in Chamoli, Tehri,

Pauri, Almora in 2010-11 and then remained almost constant or had little variation during the following years. But in Dehradun and Pauri district there is a huge amount of variation during this time period. Rudraprayag is the only district having highest number of hospitals and then had a small variation in the upcoming years. The number of hospitals in Bageshwar and Pithoragarh increased during 2011-12 and then remained constant during following years.



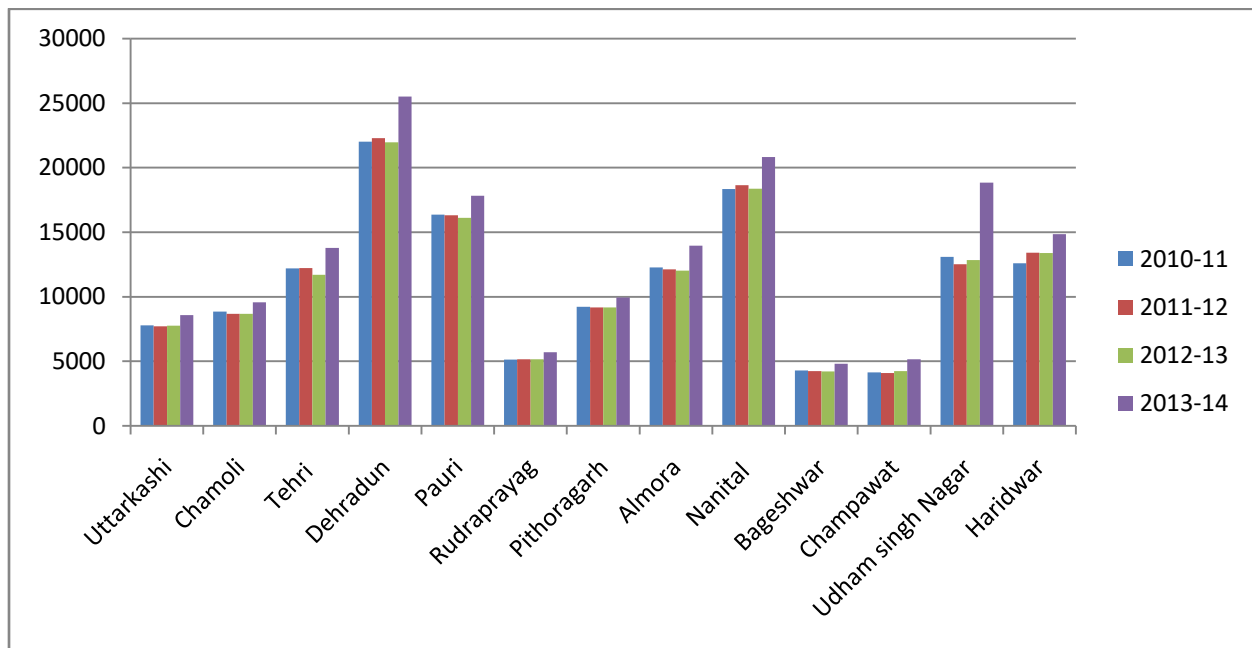
Source : Directorate of Economics & Statistics of Uttarakhand

The graph shows the number of commercial and rural banks per population in Uttarakhand districts. Highest number of banks in rural and hilly area exists in Pauri district. Over time the number of rural banks have drastically decreased in Dehradun, Champawat, Bageshwar, Pithoragarh, Rudraprayag and Nanital districts. Whereas other districts have little variations leading to constant.



Source : Directorate of Economics & Statistics of Uttarakhand

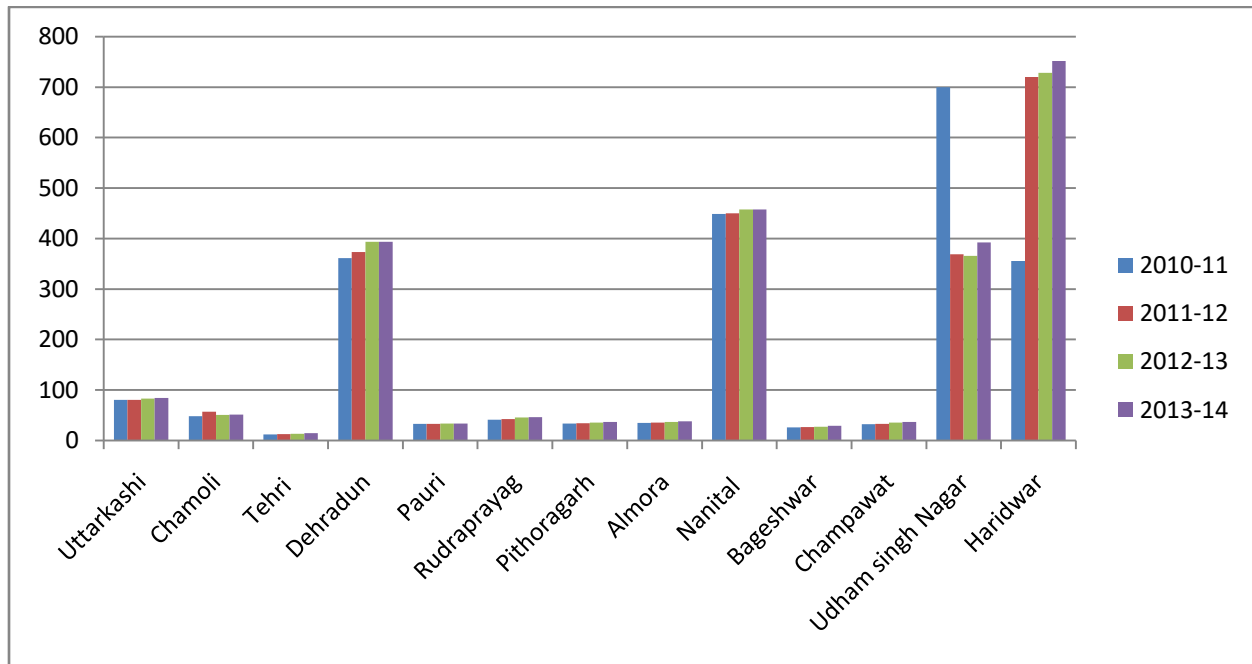
This graph shows the percentage of electrified villages in the districts of Uttarakhand. Uttarkashi , udham singh nagar, nanital, dehradun and Rudraprayag have achieved 100% electrification. Whereas it has been constant in Pauri, Tehri and Almora districts but decreased in Pithoragarh, haridwar, Champawat in 2011 and remained constant in the following years showing no improvement. The percentage of electrified villages in Chamoli and Haridwar increased in the year 2010-11 but then decreased in the following years.



Source : Directorate of Economics & Statistics of Uttarakhand

This graph shows the number of people employed in each district of Uttarakhand. The highest number of people employed are in dehradun followed by Nanital, Udham Singh

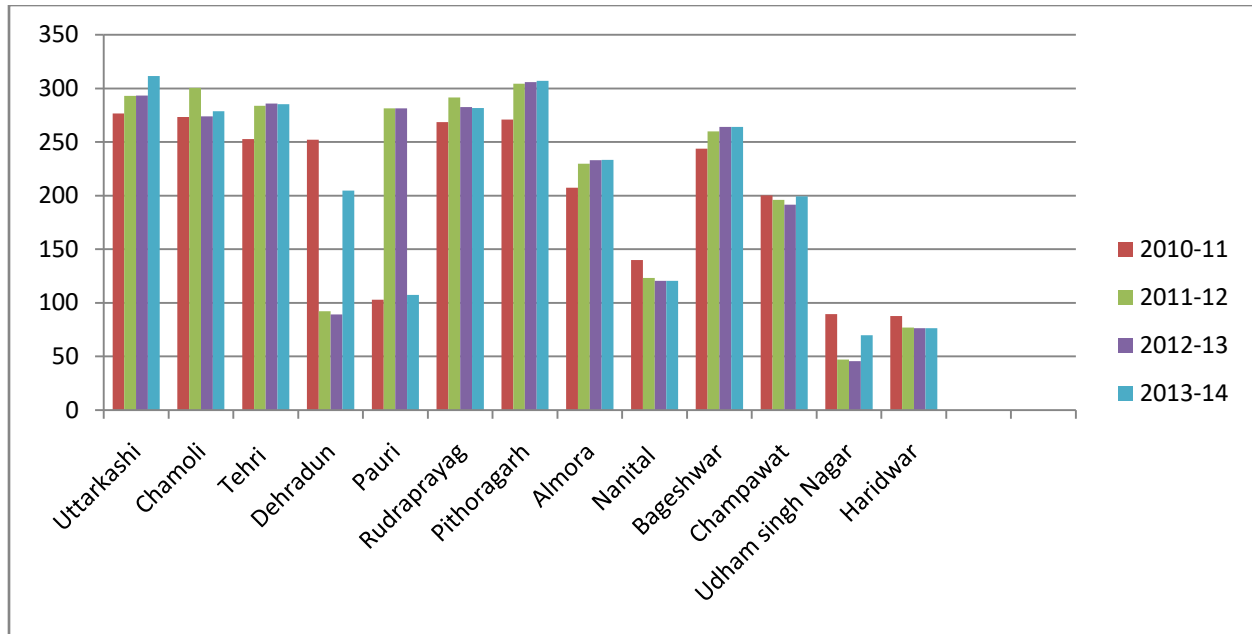
nagar, pauri, haridwar , Tehri and almora. The lowest number of people employed are in Bageshwar followed by other hill districts such as Pithoragarh, champawat, chamoli, uttarkashi and Rudraprayag.



Source : Directorate of Economics & Statistics of Uttarakhand

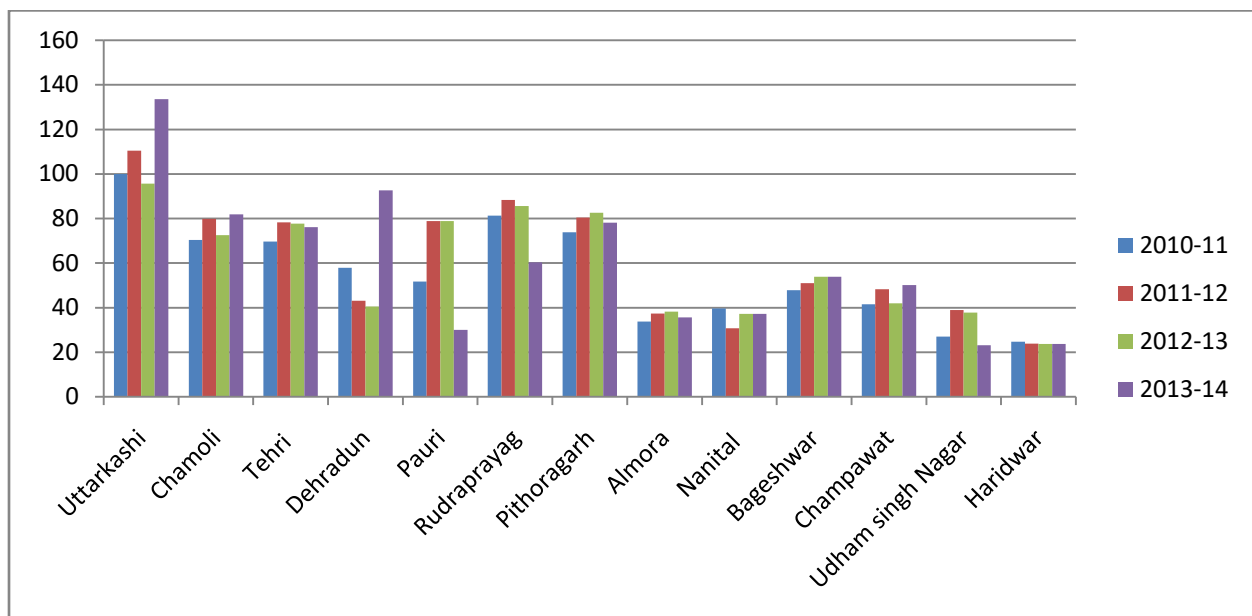
This graph represents the gas connection in rural areas in villages in Uttarakhand. The highest connection is in Dehradun, Nanital and Haridwar whereas it is lowest in Tehri, bageshwar, pauri, champawat, almora, Rudraprayag and pithoragarh whereas it has been constant in Uttarkashi and Chamoli and showing little variations in the upcoming years. Also the graph is Showing a drastic decrease in the district udham singh nagar.





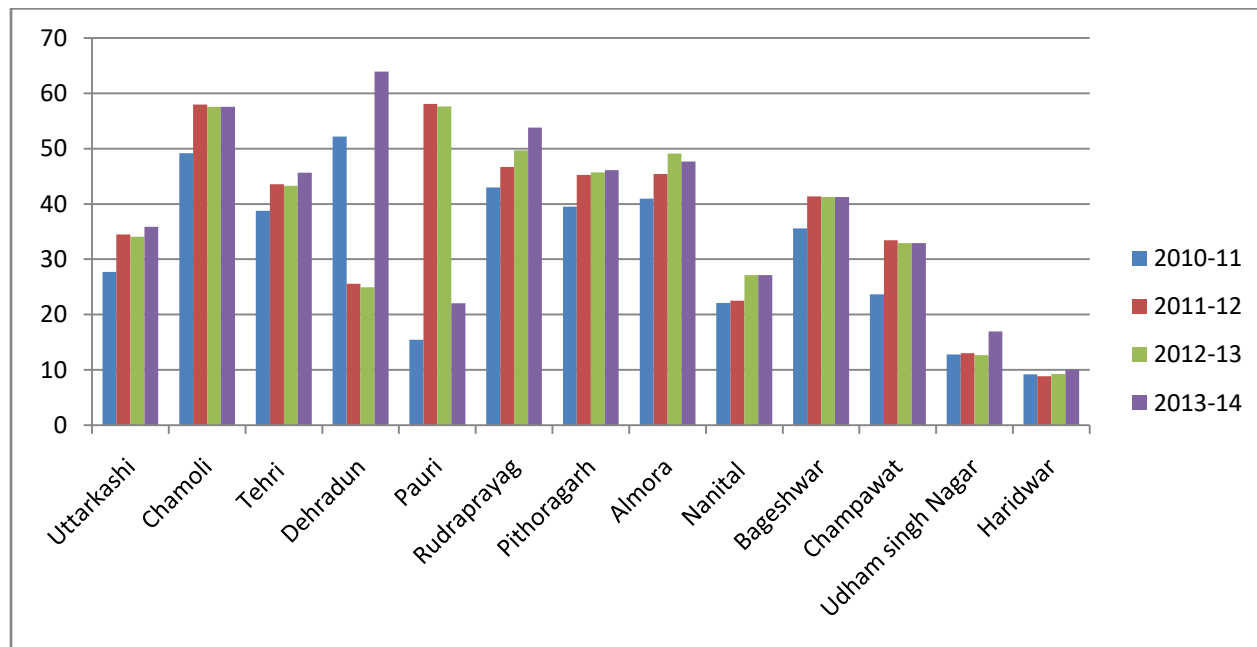
Source : Directorate of Economics & Statistics of Uttarakhand

This graph represents the number of junior schools in the districts of Uttarakhand. Uttarkashi has the highest number of junior schools followed by Pithoragarh, Tehri, Rudraprayag and Chamoli. There is a drastic decrement in Dehradun in 2011-12 but then increased in the year 2013-14 whereas the percentage decreased in Pauri and Nanital in 2013-14. Udham Singh Nagar has the lowest number of junior schools followed by Haridwar. The graph shows the increment in the districts Almora, Bageshwar and Champawat.



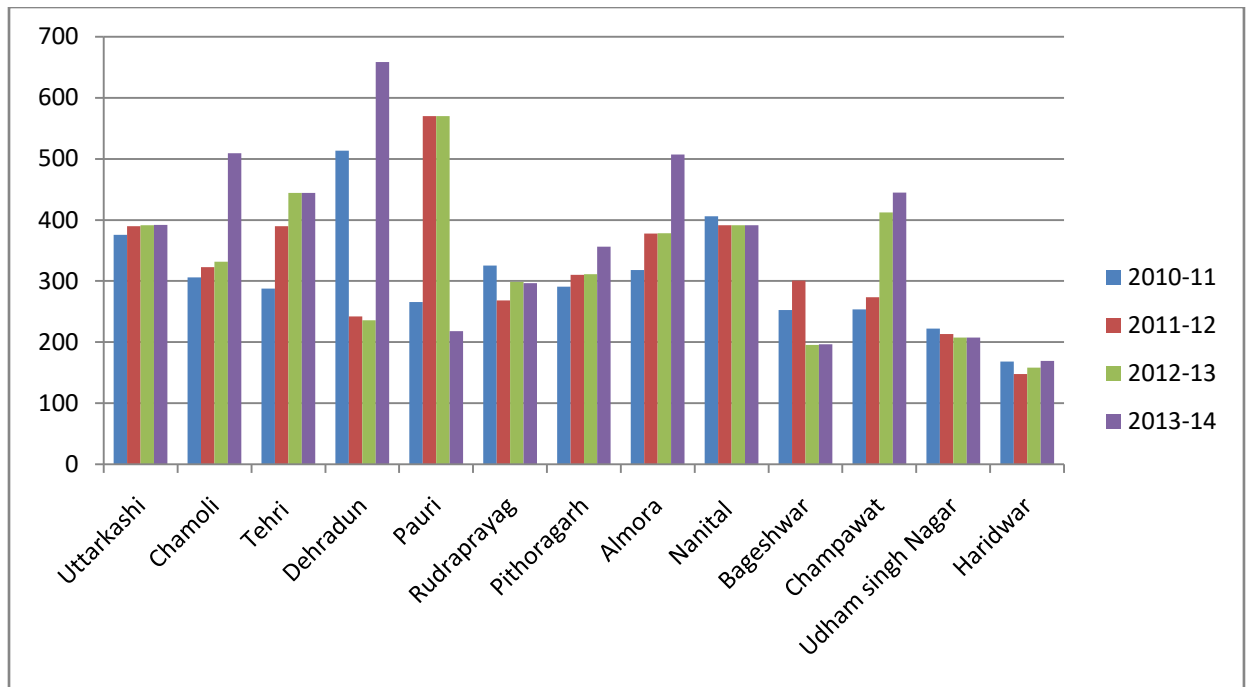
Source : Directorate of Economics & Statistics of Uttarakhand

This graph represents the number of senior basic schools in the districts of Uttarakhand. Uttarkashi has the highest percentage in the year 2013-14 followed by Dehradun, Chamoli, Pithoragarh and Tehri whereas lowest in Udham Singh Nagar, Haridwar, Almora and Nainital. There is a huge decrease in percentage of schools in Pauri and Rudraprayag in 2013-14. The number of schools in rest of the districts increased with a small difference.



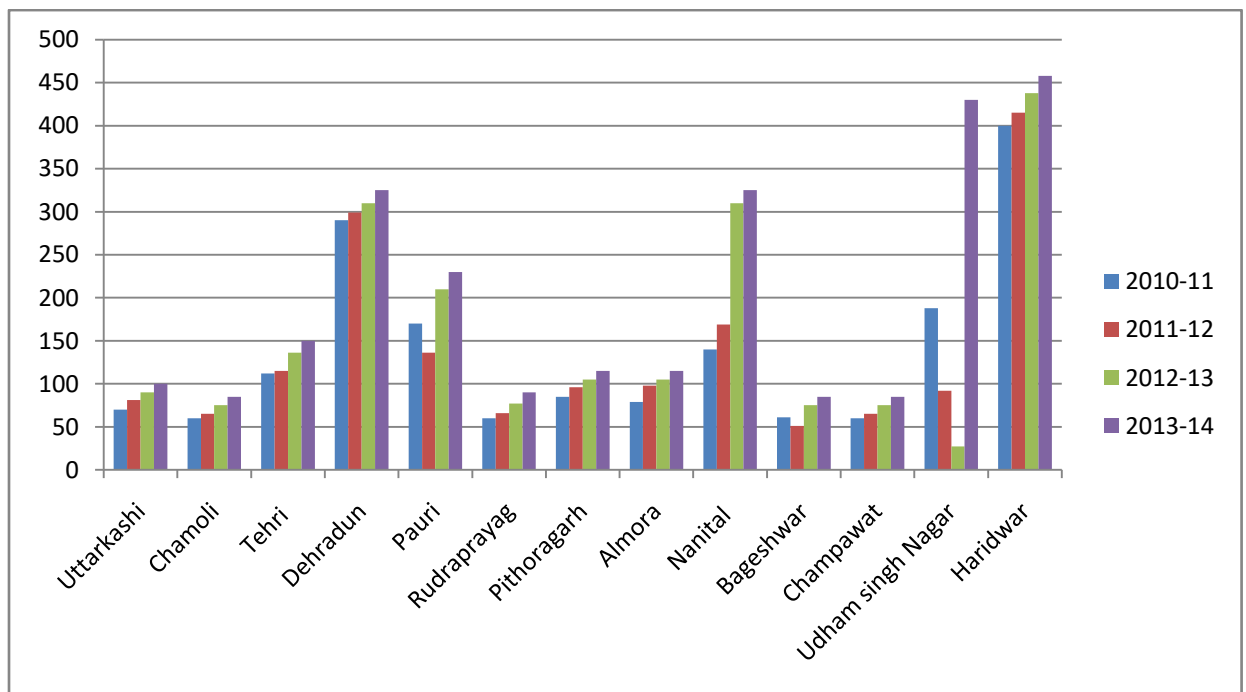
Source : Directorate of Economics & Statistics of Uttarakhand

This graph represents the number of higher secondary schools in the districts of Uttarakhand. In 2013-14 Dehradun has the highest number of secondary schools with 63.91%, which is then followed by Chamoli and Pauri in 2011-12 with 57.58% and 53.85% respectively but fallen to 22.07% in 2011-12 in Pauri. In Tehri growth can be seen at 45.67%. Continuous increment can be seen in Rudraprayag with last to 53.8% in 2013-14. Good efforts are made in Pithoragarh and Almora with increasing scale in every year which settled with 46.13% and 47.67% in 2012-13. Nainital with 27.14% from 2012-14. In Bageshwar there is no increment from 2011-2014. In Champawat the rate fixed with 32.92% for the preceding 3 years. As per the statistical data Udham Singh Nagar and Haridwar has the lowest number of schools which last with 16.94% and 10.08% respectively.



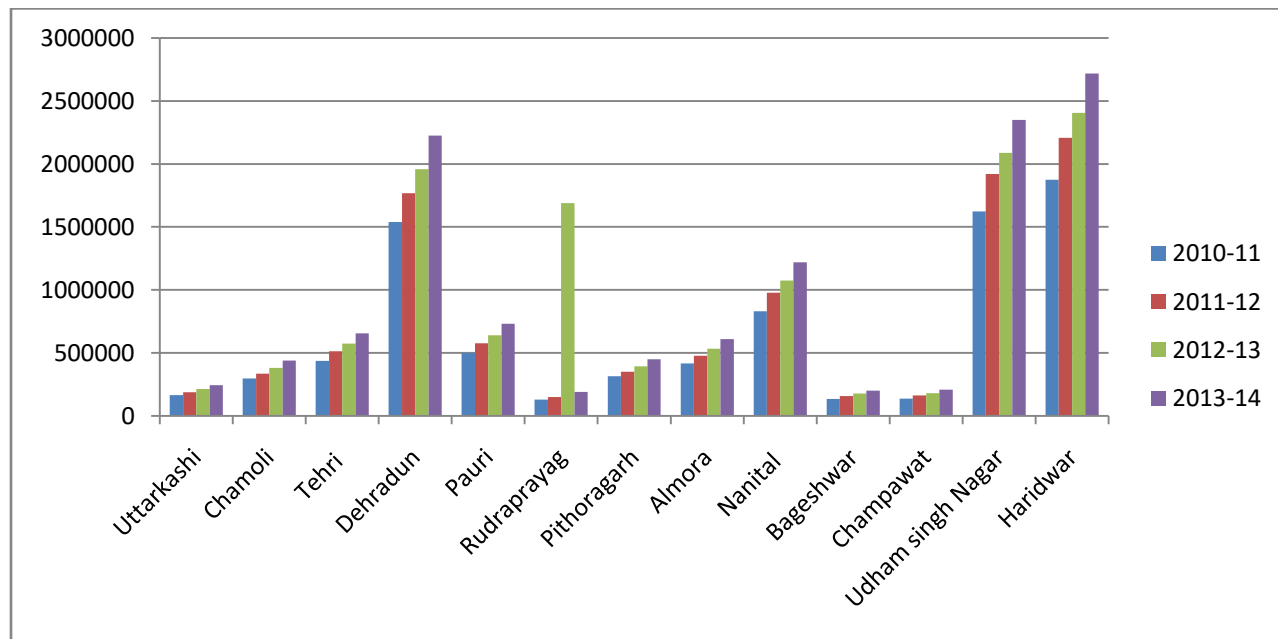
Source : Directorate of Economics & Statistics of Uttarakhand

This graphs shows the length of Pucca road in the districts of Uttarakhand. Dehradun has the record having highest of Pucca road per km in the year 2013-14. There is a great decrease in construction of road in Pauri in 2013-14. The developments in Udham Singh Nagar and Haridwar have not been significant till so far. In Uttarkashi , Chamoli, Tehri, Almora and Champawat there is a good trend of development of Pucca roads.



Source : Directorate of Economics & Statistics of Uttarakhand

The graph shows the developments of MSME in the various districts of Uttarakhand. There have been moderate and not much significant development in Uttarkashi, Chamoli, Rudraprayag, Pithoragarh, Almora, Bageshwar and Champawat. The progress in Haridwar have remained highest till 2014. There is a remarkable progress in Udham Singh Nagar from 2010 to 2014. Increase in MSME has been observed in Nainital also from 2012 to 2014.



Source : Directorate of Economics & Statistics of Uttarakhand

In the above graph it is clearly visible that the three plain districts of Uttarakhand contribute the most in the productivity of the state whereas the hilly districts contribute the least due to their sole occupation of agriculture. Districts of Bageshwar and Champawat contribute the least.

### Analysis and Findings:

Regression Model : Effect of the Infrastructural variables on GDDP or District Productivity:

	coefficient	std. error	t-ratio	p-value	
const	42833.8	10663.5	4.017	0.0003	***
d_x1	55145.1	34858.5	1.582	0.1224	
d_x2	-24505.2	36971.9	-0.6628	0.5117	
d_x3	23747.9	11102.2	2.139	0.0393	**
d_x5	2055.70	653.346	3.146	0.0033	***
d_x7	-3170.14	3515.48	-0.9018	0.3732	
d_x8	-1986.82	7132.96	-0.2785	0.7822	
d_x9	118.001	306.946	0.3844	0.7029	
d_x10	784.617	1770.54	0.4432	0.6603	

The results of regression presented in the above model shows that among eight variables infrastructural variables, the impact of  $\Delta x_1$ ,  $\Delta x_3$ ,  $\Delta x_5$ ,  $\Delta x_9$  and  $\Delta x_{10}$  on the district productivity appears to be stronger than the remaining three variables.  $\Delta x_1$  variable which is change in number of primary hospitals is highly significant with coefficient 55145.1 which indicates increase in GDDP by 55145.1 with change in number of hospitals by one. This shows that state government should invest in this variable to enhance productivity of the districts. Variables  $\Delta x_3$ ,  $\Delta x_5$ ,  $\Delta x_9$  and  $\Delta x_{10}$  which are electrification, gas connection, length of roads and MSMEs are also highly significant and affect the GDDP that indicates more investment requirement on these variables. Whereas,  $\Delta x_2$ ,  $\Delta x_7$  and  $\Delta x_8$  which are banking, number of senior and higher secondary schools shows a negative relationship with the GDDP due to reasons like migration, natural disasters and environmentalist and religious issues.

The result of regression model presented above shows strong linkages between rural infrastructural variables and productivity of the districts. Almost all the significant coefficient infrastructural variables and positive impact of rural infrastructure for increasing the GDDP. Thus we reject the null hypothesis and accept the alternative hypothesis that there is significant dependency between rural infrastructure and economic development.

b- Regression model representing effect of Infrastructural variables on Employment:

	coefficient	std. error	t-ratio	p-value	
const	-839.327	234.821	-3.574	0.0010	***
d_x1	-906.066	270.510	-3.349	0.0019	***
d_x2	259.735	377.424	0.6882	0.4958	
d_x3	456.919	161.205	2.834	0.0075	***
d_x5	8.42073	2.76417	3.046	0.0043	***
d_x7	-37.6128	32.5532	-1.155	0.2555	
d_x8	75.7270	52.5134	1.442	0.1579	
d_x9	2.32355	3.74272	0.6208	0.5386	
d_x10	16.0706	7.71336	2.083	0.0444	**

The results of regression presented in the above model shows that among eight variables infrastructural variables, the impact of  $\Delta x_2$ ,  $\Delta x_3$ ,  $\Delta x_5$ ,  $\Delta x_8$ ,  $\Delta x_9$  and  $\Delta x_{10}$  on the employment generation appears to be stronger than the remaining two variables.  $\Delta x_3$  variable which is change in number of electrified villages and  $\Delta x_2$  change in number of banks are highly significant with coefficient 456.91 and 259.73 which indicates increase in employment by 456.91 and 259.73 with change in number of banks and electrification by one. This shows that state government should invest in these variables to enhance employment of the districts. Variables  $\Delta x_5$ ,  $\Delta x_9$  and  $\Delta x_{10}$  which are gas connection, length of roads and MSMEs are also highly significant and affect the employment positively that indicates more investment requirement on these variables. Whereas,  $\Delta x_1$  and  $\Delta x_7$  which

are number of hospitals and number of senior schools shows a negative relationship with the employment due to the requirement of highly skilled staff in such places.

Thus the regression model presented above shows strong linkages between rural infrastructural variables and employment of the districts. Almost all the significant coefficient of infrastructural variables represents positive impact on the employment generation of the districts and significant effect of rural infrastructure for increasing the employment. Thus reject the null hypothesis and accept the alternative hypothesis that there is significance we differences among the district of uttarakhand in rural infrastructure development.

## **Recommendations**

### **1. Infrastructural Development**

- The number of hospital and banks should be increased in Champawat District.
- Banks should provide more assistance to agriculture sector, as agriculture is the main occupation in hilly districts. Banks should give priority for research and innovation in agriculture sector.
- Adequate number of gas connections should be provided to rural households in all the hilly districts.
- Number of schools should be enhanced in Pauri district.
- More number of MSMEs should be developed in hilly districts.
- Proper irrigation facility should be provided in this area. Channel irrigation should be developed in the district to solve the problem of water.
- The demand for new power connection should be met immediately which will help the people to develop in other areas. Proper street light facilities are to be provided in rural area.
- During rainy season water should be managed properly in the reservoirs to reduce the evils of flood.
- Adequate paramedical staff should be provided to primary health centers. Moreover, in- patient department should be opened in primary health centers in rural area.

### **2. Government Policies**

- Employment generation programme should be improved in Champawat , Rudraprayag and Bageshwar districts.
- Government should focus on allocating more funds towards rural development.
- Government should encourage private sectors to investment in backward and hilly areas.
- There are many villages which do not have road connectivity due to lack of population. Government should take suitable measures to provide road connectivity

to such remote places. All villages in the district should be provided with all weather roads.

Government should give more importance for improving the quality in primary and secondary education. Mere increase in the number of students enrolled is of no use unless they come out with good quality.

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