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## LEVELS OF INFRASTRUCTURAL DEVELOPMENT IN HARYANA: A SPATIO-TEMPORAL ANALYSIS

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### Abstract

*Infrastructure lays the foundation for economic development of a region. The investment in infrastructural sectors is imperative for sustaining the process of economic development as well as reducing the regional disparities in levels of development. The present study analyses the spatial and temporal variations in levels of infrastructural development in Haryana over the period of 2005-06 to 2015-16. The study is based on secondary data collected for 28 indicators associated with eight sectors of infrastructural development. Composite index has been worked out to highlight inter-district variations in levels of infrastructural development. Panchkula and Ambala are found to be most developed districts in terms of availability of infrastructure, whereas, Palwal and Mewat districts of southern Haryana are most backward in infrastructural development. Inter-district disparity has been accentuated with time as percentage of districts recording low and very low level of infrastructural development increased from 21 per cent in 2005-06 to 38 per cent in 2015-16. Creation of infrastructure in these backward areas shall induce the developmental processes leading to reduction in socio-economic disparities in the state.*

**Keywords:** Infrastructure, Development, Disparities, Education, Health.

### Introduction

Infrastructure provides the base for social and economic development of societies. Economic growth largely depends on the development of infrastructure of a country, its availability and accessibility. There are two types of infrastructures, economic and social. Both are supportive to each other and are necessary for the overall development of a region. Various facets of infrastructure together contribute in improving living standards of people and ushering higher rates

of economic growth and poverty reduction. The transportation systems induce economic development in a region both directly and indirectly (Rodrigue et al., 2013). There exists a substantial and significant positive relationship between the levels of development and levels of infrastructure (Agarwalla, 2011). Absence of good infra-structure may lead to negative effects on the growth of economy (Srinivasu and Rao, 2013). Substantial progress of a country in all the spheres of life cannot be visualized without a well-

conceived and well built-up socio-economic infrastructure.

A wide range of disparities have been observed in India at the level of poverty, unemployment, income attainment, agriculture and industry (Ponmuthusaravanan and Ravi, 2016). Numerous planning measures have been adopted in the last four decades to achieve balanced regional development in terms of economic growth, education, health service, status of women, level of nutrition, distribution of goods and services. The balanced economic development has also been the objective of successive Five-Year Plans of India. Central and State governments have periodically set up several commissions and committees to identify backward areas and formulate appropriate policies for reducing regional imbalances. But after over a period of six decades of planning, the problem still persists at the state and local levels. The developmental goals can be achieved through growth of the economic sector, which shall be oriented towards over all development of regions (Mahanty, 1999).

Development of infrastructure is a key factor in balanced socio-economic development of any region. In a country like India, where private sector hesitates to invest in infrastructure, public investment in various sectors of socio-economic infrastructure determines overall development of the economy. Regional variations in infrastructural development are responsible for inter-state and intrastate variations in levels of socio-economic development in India. There exists a significant inter-district variation in levels of infrastructural development in Haryana (IDC 2014). There is a need for enhancement of public utilities such as electricity, roads, communication, banking and social infrastructure like education and

health facilities. The present study therefore, examines the regional disparity in level of infrastructural development in Haryana and its changing spatial pattern over the period 2005-06 to 2015-16.

### **Objectives of the Study**

Major objectives of the study are:

- to study the spatial pattern of social and economic infrastructure and
- to evaluate the spatio-temporal pattern of overall infrastructural development between 2005-06 and 2015-16 in the study area.

### **Research Questions**

- How different sectors of infrastructure have performed over the decade and which areas have been benefited or remained deprived?
- How do the dynamics and spatial pattern of infrastructural development have changed over the study period?

### **Study Area**

The state of Haryana extends between latitudes of 27° 39' 0" to 30° 55' 5" north and longitudes of 74° 27' 8" to 77° 36' 5" east. It covers an area of 44212 km<sup>2</sup>, which constitutes 1.44 per cent of the total geo-graphical area of the country. According to 2011 census, 65.21 per cent of total population of the state resides in rural areas. There has been fast development of roads, electricity and canal infrastructure which provided foundation for the growth of agro-based economy of the state. The development of tube well irrigation and establishment of agricultural markets and storage facilities have provided further boost to agricultural development. With the restructuring of economy since 1990s, the infrastructural development concentrated around

Delhi and in the belts along the national highways radiating from the national capital. This has created regional imbalance in the level of economic development as most of industrial-business activities have got concentrated in eastern parts having better infrastructural facilities.

### **Database and Methodology**

The present study is based on secondary data. The data pertaining to eight sectors of infrastructure i.e. education, health, roads, electricity, agricultural marketing and storage, veterinary services and banking services have been obtained from the Statistical Abstracts of Haryana for the years 2005-06 and 2015-16. The data on the drinking water and toilet facilities have been obtained from Censuses of India, Haryana, 2001 and 2011. A set of 28 indicators spreading across eight sectors of infrastructure has been selected for working out composite index of infrastructural development (Table 1). Index of an indicator has been calculated by dividing the district values with the state values of that indicator, following the index devised by Kundu (1992). Composite index of a sector of infrastructural development has been calculated by summing up the indices of all the indicators in a sector and dividing by the number of indicators in that sector. Composite index of infrastructural development has been calculated by summing up the composite indices of various sectors of development and dividing with the number of sectors.

## **Results and Discussion**

### **Levels of Educational Infrastructure**

Education plays a crucial role in social transformation of the society. It is taken as a sensitive barometric indicator of the level of societal development. Poor and insufficient

educational infrastructure has a negative impact on student-learning and schooling outcomes. Education also has a significant impact on poverty reduction and improvement in standard of living. It is the basis of socio-economic progress, which is the main factor of quality of human resources and life style (Jayanti, 2003). Table 2 shows sector-wise composite index of infrastructural development in 2005-06 and 2015-16. In 2005-06, Yamunanagar district has the highest level of development in terms of educational infrastructure. Five districts Hisar, Rohtak, Jhajjar, Gurgaon and Panchkula have high level of educational infrastructure in 2005-06 (Table 3). Further, the districts of Sirsa, Fatehabad, Bhiwani, Mahendergarh and Rewari have moderate educational infrastructure. Surprisingly Ambala district is at the bottom in terms of educational infrastructure in 2005-06. In 2015-16, Mahendergarh and Rewari districts have very high level of educational infrastructure. Another four districts Ambala, Yamunanagar, Hisar and Jhajjar have high educational infrastructure. There are as many as 9 districts having moderate level of educational infrastructure. As many as 6 districts have low educational infrastructure which surprisingly include industrial districts of Gurgaon and Faridabad. Overall, there has been a little improvement in educational infrastructure in lowly placed districts over the decade.

### **Levels of Health Infrastructure**

Health is another important component of social infrastructure after the education. Health conditions constitute a formidable indicator of quality of life and level of social development. Availability of hospitals and doctors has a direct positive contribution to health outcomes in a region (Garg, 2013).

**Table 1**  
**Haryana: Indicators of various Sectors of Infrastructural Development**

| Sectors                          | Indicators   |
|----------------------------------|--|
| Education                        | <ul style="list-style-type: none"> <li>• No. of high and senior secondary schools per thousand students</li> <li>• No. of middle schools per thousand students</li> <li>• No. of primary schools per thousand students</li> <li>• No. of school teachers per thousand students</li> </ul>  |
| Health                           | <ul style="list-style-type: none"> <li>• No. of government health institutions per lakh persons</li> <li>• No. of health institutions per hundred km<sup>2</sup> of area</li> <li>• No. of beds in health institutions per lakh persons</li> <li>• No. of government doctors per lakh persons</li> <li>• No. of government nurses, matron sisters and ANMs per lakh persons</li> </ul>                                   |
| Roads                            | <ul style="list-style-type: none"> <li>• Road length, km per lakh persons</li> <li>• Road length, km per hundred km<sup>2</sup> of area</li> <li>• Length of national highway, km per lakh persons</li> <li>• Length of national highways, km per hundred km<sup>2</sup> of area</li> <li>• State road length, km per lakh persons</li> <li>• State road length, km per hundred square km<sup>2</sup> of area</li> </ul> |
| Electricity                      | <ul style="list-style-type: none"> <li>• Length of L. T and 11 KV lines (circuit kilometer) per thousand persons</li> <li>• No. of transformers per thousand persons</li> <li>• No. of domestic connections per thousand persons</li> <li>• No. of industrial connections per thousand persons</li> <li>• No. of agriculture connections per thousand ha net sown area</li> </ul>  |
| Agricultural Markets and Storage | <ul style="list-style-type: none"> <li>• No. of agricultural markets per 50000 ha net sown area</li> <li>• Storage capacity, hundred tones per thousand ha net sown area</li> </ul>  |
| Veterinary Services              | <ul style="list-style-type: none"> <li>• No. of community veterinary hospitals (C. V.H) per 50,000 bovines</li> <li>• No. of veterinary surgeons per 50,000 bovines</li> </ul>   |
| Banking Facilities               | <ul style="list-style-type: none"> <li>• No. of commercial bank branches per lakh persons</li> <li>• No. of commercial bank branches per hundred km<sup>2</sup> of area</li> </ul>   |
| Household Amenities              | <ul style="list-style-type: none"> <li>• Percentage of households having access to drinking water facility</li> <li>• Percentage of households having access to toilet facility</li> </ul>   |

Source: Compiled by Authors

**Table 2**  
**Haryana: Index of Infrastructural Development (2005-06 and 2015-16)**

| Districts    | Education |         | Health  |         | Roads   |         | Electricity |         | Agricultural Markets and Storage |         | Banking Services |         | Veterinary Services |         | Households Amenities |         | Composite Index |         |
|--------------|-----------|---------|---------|---------|---------|---------|-------------|---------|----------------------------------|---------|------------------|---------|---------------------|---------|----------------------|---------|-----------------|---------|
|              | 2005-06   | 2015-16 | 2005-06 | 2015-16 | 2005-06 | 2015-16 | 2005-06     | 2015-16 | 2005-06                          | 2015-16 | 2005-06          | 2015-16 | 2005-06             | 2015-16 | 2005-06              | 2015-16 | 2005-06         | 2015-16 |
| Ambala       | 0.65      | 1.28    | 1.21    | 1.06    | 1.40    | 1.37    | 0.83        | 0.75    | 1.14                             | 1.41    | 1.62             | 1.44    | 0.96                | 0.95    | 1.20                 | 1.17    | 1.13            | 1.18    |
| Panchkula    | 1.24      | 1.08    | 1.63    | 1.46    | 1.80    | 1.17    | 0.84        | 0.73    | 2.17                             | 2.40    | 2.08             | 2.29    | 1.31                | 4.91    | 1.47                 | 1.26    | 1.57            | 1.91    |
| Yamunanagar  | 1.57      | 1.22    | 1.08    | 0.88    | 1.20    | 0.95    | 1.52        | 1.45    | 1.38                             | 1.24    | 1.27             | 1.05    | 0.81                | 0.56    | 0.97                 | 1.07    | 1.23            | 1.05    |
| Kurukshetra  | 0.92      | 1.06    | 0.82    | 0.99    | 1.09    | 1.10    | 1.30        | 1.39    | 2.21                             | 1.67    | 1.03             | 1.28    | 0.98                | 1.16    | 1.15                 | 1.20    | 1.19            | 1.23    |
| Kaithal      | 0.99      | 0.82    | 1.02    | 0.97    | 1.05    | 1.09    | 1.31        | 1.29    | 1.64                             | 1.36    | 0.72             | 0.76    | 0.64                | 0.52    | 0.72                 | 0.81    | 1.01            | 0.95    |
| Kamal        | 1.00      | 0.96    | 0.78    | 0.89    | 0.60    | 1.03    | 1.43        | 1.57    | 1.98                             | 1.83    | 1.06             | 1.14    | 0.84                | 0.77    | 0.95                 | 1.18    | 1.08            | 1.17    |
| Panipat      | 0.89      | 0.84    | 0.90    | 0.88    | 1.02    | 0.82    | 1.44        | 1.23    | 1.73                             | 1.66    | 1.46             | 1.36    | 0.80                | 0.88    | 0.98                 | 1.04    | 1.15            | 1.08    |
| Sonipat      | 1.00      | 0.95    | 0.99    | 1.12    | 0.79    | 1.12    | 0.88        | 0.99    | 0.74                             | 0.85    | 0.94             | 1.10    | 0.93                | 0.86    | 0.87                 | 0.87    | 0.89            | 0.98    |
| Rohtak       | 1.14      | 0.91    | 1.68    | 1.27    | 1.55    | 1.18    | 0.63        | 0.67    | 0.64                             | 0.74    | 1.37             | 1.10    | 1.13                | 1.60    | 0.92                 | 1.13    | 1.13            | 1.08    |
| Jhajjar      | 1.17      | 1.22    | 1.00    | 1.43    | 1.17    | 1.15    | 0.68        | 0.73    | 0.24                             | 0.40    | 0.75             | 0.86    | 1.26                | 2.30    | 0.84                 | 0.95    | 0.89            | 1.13    |
| Faridabad    | 0.98      | 0.73    | 0.85    | 0.71    | 0.59    | 0.69    | 1.08        | 1.41    | 1.60                             | 2.70    | 1.34             | 2.39    | 0.74                | 1.02    | 1.06                 | 1.05    | 1.03            | 1.34    |
| Gurgaon      | 0.99      | 0.89    | 0.71    | 0.77    | 0.86    | 0.75    | 1.33        | 0.61    | 1.75                             | 0.95    | 1.30             | 3.62    | 0.94                | 0.97    | 0.98                 | 1.15    | 1.11            | 1.21    |
| Rewari       | 1.06      | 1.35    | 0.99    | 1.14    | 1.27    | 1.19    | 1.18        | 1.14    | 0.20                             | 0.56    | 1.03             | 1.00    | 0.97                | 1.64    | 1.03                 | 0.86    | 0.96            | 1.11    |
| Mahendragadh | 1.10      | 1.45    | 0.86    | 1.19    | 1.00    | 0.99    | 1.09        | 1.02    | 0.68                             | 1.49    | 0.69             | 0.67    | 1.16                | 1.36    | 0.84                 | 0.61    | 0.93            | 1.10    |
| Bhiwani      | 1.06      | 1.01    | 1.16    | 1.18    | 0.85    | 1.28    | 0.83        | 0.84    | 0.91                             | 0.73    | 0.69             | 0.53    | 1.12                | 1.01    | 1.05                 | 0.89    | 0.96            | 0.93    |
| Jind         | 0.97      | 0.83    | 0.97    | 1.04    | 1.11    | 0.98    | 0.84        | 0.90    | 0.61                             | 1.18    | 0.62             | 0.62    | 0.84                | 0.74    | 0.70                 | 0.79    | 0.83            | 0.89    |
| Hisar        | 1.17      | 1.14    | 1.12    | 0.97    | 1.24    | 1.12    | 0.53        | 1.24    | 1.06                             | 1.15    | 0.79             | 0.70    | 1.42                | 1.21    | 1.08                 | 1.07    | 1.05            | 0.92    |
| Fatehabad    | 1.05      | 0.96    | 0.89    | 0.95    | 1.17    | 0.99    | 1.05        | 0.59    | 0.92                             | 0.74    | 0.67             | 0.73    | 1.13                | 1.04    | 1.01                 | 1.11    | 0.99            | 0.89    |
| Sirsa        | 1.06      | 1.04    | 0.71    | 0.87    | 1.09    | 0.99    | 0.91        | 0.62    | 0.81                             | 0.25    | 0.78             | 0.63    | 1.17                | 0.89    | 1.30                 | 1.34    | 0.98            | 0.83    |
| Palwal       | -         | 0.70    | -       | 0.75    | -       | 0.77    | -           | 1.21    | -                                | 0.69    | -                | 0.65    | -                   | 0.46    | -                    | 0.68    | -               | 0.74    |
| Mewat        | -         | 0.92    | -       | 0.78    | -       | 0.93    | -           | 0.60    | -                                | 0.71    | -                | 0.39    | -                   | 0.49    | -                    | 0.37    | -               | 0.65    |

Source: Compiled by Authors

**Table 3**  
**Haryana: Distribution of Districts by Sector-wise Levels of Infrastructural Development (2005-06 and 2015-16)**

| Infrastructure Sectors           | Number of Districts with Level of Development (Composite Index of Sector) |  |   |   |   |   |   |  |  |  |               |         |
|----------------------------------|---|--|---|---|---|---|---|--|--|--|---------------|---------|
|                                  | Very Low (Below 0.70)   |  | Low (0.70-0.90)   |   | Moderate (0.91-1.10)  |   | High (1.11-1.30)                                |  | Very High (Above 1.30)   |  | All Districts |         |
|                                  | 2005-06   | 2015-16                                  | 2005-06   | 2015-16   | 2005-06   | 2015-16   | 2005-06   | 2015-16  | 2005-06  | 2015-16  | 2005-06       | 2015-16 |
| Education                        | Ambala  | Nil                                      | Kurukshetra, Jind, Kaithal, Karnal, Panipat, Faridabad, Sonapat | Kaithal, Panipat, Palwal, Jind, Gurgaon, Faridabad                    | Sirsa, Fatehabad, Bhiwani, Rewari, Mahendragarh                             | Panchkula, Karnal, Sirsa, Fatehabad, Sonapat, Rohtak, Kurukshetra, Mewat, Bhiwani | Panchkula, Hisar, Rohtak, Jhajjar, Gurgaon      | Ambala, Yamunanagar, Jhajjar, Hisar                                | Yamunanagar  | Mahendragarh, Rewari   | 19            | 21      |
| Health                           | Karnal, Sirsa, Gurgaon  | Gurgaon, Palwal, Faridabad, Mewat        | Kurukshetra, Panipat, Fatehabad, Mahendragarh, Faridabad        | Yamunanagar, Karnal, Panipat, Sirsa                                   | Yamunanagar, Kaithal, Jind, Sonapat, Rewari                                 | Ambala, Hisar, Bhiwani  | Ambala, Hisar, Bhiwani                          | Sonapat, Rohtak, Bhiwani, Mahendragarh, Rewari                     | Panchkula, Rohtak  | Panchkula, Jhajjar   | 19            | 21      |
| Roads                            | Karnal, Faridabad   | Panipat, Palwal, Gurgaon, Faridabad      | Sonapat, Bhiwani, Gurgaon                                       | Yamunanagar, Jind, Karnal, Sirsa, Fatehabad, Mewat, Mahendragarh      | Kurukshetra, Kaithal, Jind, Panipat, Sirsa, Mahendragarh                    | Kurukshetra, Kaithal, Hisar, Sonapat  | Yamunanagar, Fatehabad, Hisar, Jhajjar, Rewari  | Panchkula, Rohtak, Jhajjar, Rewari, Bhiwani                        | Panchkula, Ambala, Rohtak  | Ambala   | 19            | 21      |
| Electricity                      | Hisar, Rohtak, Jhajjar  | Sirsa, Fatehabad, Rohtak, Gurgaon, Mewat | Panchkula, Ambala, Sirsa, Jind, Sonapat, Bhiwani                | Panchkula, Ambala, Sirsa, Jind, Sonapat, Bhiwani                      | Fatehabad, Faridabad, Rewari, Mahendragarh                                  | Mahendragarh, Jind, Sonapat   | Kurukshetra, Kaithal                            | Kaithal, Panipat, Hisar, Rewari, Palwal                            | Yamunanagar, Karnal, Panipat, Gurgaon  | Yamunanagar, Karnal, Kurukshetra, Faridabad                              | 19            | 21      |
| Banking Services                 | Fatehabad, Jind, Bhiwani, Mahendragarh                                    | Bhiwani, Mewat                           | Sirsa, Hisar, Kaithal, Jhajjar                                  | Hisar, Sirsa, Jind, Palwal, Fatehabad, Kaithal, Jhajjar, Mahendragarh | Kurukshetra, Karnal, Sonapat, Rewari  | Yamunanagar, Karnal, Sonapat, Rohtak, Rewari                                      | Yamunanagar, Gurgaon                            | Kurukshetra  | Ambala, Panchkula, Panipat, Rohtak, Faridabad  | Ambala, Panchkula, Panipat, Gurgaon, Faridabad                           | 19            | 21      |
| Agricultural Markets and Storage | Jhajjar, Rewari   | Sirsa, Jhajjar, Rewari, Palwal           | Sirsa, Sonapat, Rohtak, Jind, Mahendragarh                      | Sonapat, Rohtak, Mewat, Bhiwani, Fatehabad                            | Ambala, Hisar, Bhiwani, Fatehabad   | Gurgaon   | Nil   | Yamunanagar, Jind, Hisar   | Panchkula, Yamunanagar, Kurukshetra, Kaithal, Karnal, Panipat, Gurgaon, n Faridabad, | Panchkula, Ambala, Kurukshetra, Panipat, Karnal, Faridabad, Mahendragarh | 19            | 21      |
| Veterinary Services              | Kaithal, Faridabad  | Yamunanagar, Kaithal, Palwal, Mewat      | Yamunanagar, Jind, Karnal, Panipat                              | Karnal, Panipat, Sonapat, Jind, Sirsa                                 | Ambala, Kurukshetra, Sonapat, Rewari, Gurgaon                               | Ambala, Gurgaon, Fatehabad, Bhiwani, Mahendragarh, Faridabad                      | Sirsa, Rohtak, Fatehabad, Bhiwani, Mahendragarh | Hisar, Kurukshetra   | Panchkula, Hisar, Jhajjar  | Panchkula, Rohtak, Jhajjar, Rewari, Mahendragarh                         | 19            | 21      |
| Household Amenities              | Kaithal, Jind   | Mahendragarh, Mewat, Palwal              | Sonapat, Jhajjar, Mahendragarh                                  | Kaithal, Jind, Sonapat, Bhiwani, Rewari                               | Yamunanagar, Karnal, Panipat, Rohtak, Gurgaon, Faridabad, Rewari, Fatehabad | Yamunanagar, Panipat, Hisar, Jhajjar, Faridabad                                   | Ambala, Kurukshetra                             | Panchkula, Ambala, Kurukshetra, Karnal, Rohtak, Fatehabad, Gurgaon | Panchkula, Sirsa   | Sirsa  | 19            | 21      |

Source: Compiled by Authors

Health centres, dispensaries, hospitals, beds in institutes, hospital staffs, etc. are main components of health infrastructure. Haryana ranks among the states having better health infrastructure but with significant inter-district variations (Devi and Rajeshwari, 2016). In 2005-06, two districts namely Panchkula and Rohtak have very high level of health infrastructure. While Ambala, Bhiwani and Hisar districts fall in the category of high level of health infrastructure. Six out of nineteen districts of the state have moderate level of health infrastructure (Table 3). Five districts namely Kurukshetra, Panipat, Fatehabad, Mahendergarh and Faridabad have low level of health infrastructure. Three districts namely Karnal, Sirsa and Gurgaon have very low level of health infrastructure. While in 2015-16 Panchkula and Jhajjar districts have very high level of health infrastructure. Jhajjar has displaced Rohtak district from the top rank in 2005-06. Another five districts namely Sonipat, Rohtak, Bhiwani, Mahendergarh and Rewari have high health infrastructure. Six districts Ambala, Kurukshetra, Kaithal, Jind, Fatehabad, and Hisar have moderate level of health infrastructure. However, Yamunanagar, Karnal, Panipat and Sirsa districts have low level of health infrastructure. Remaining 4 districts have very low level of health infrastructure. Table 2 shows no discernible improvement in health infrastructure in different districts over the decade.

### **Levels of Road Infrastructure**

Roads play a vital role in economic development and regional integration. A good road system also helps in movement of people and goods from one place to another, spreading education, exchange of views and expansion of markets. Haryana ranks below the national average in terms of road length

per unit area (Mangat and Gill, 2015). In 2005-06, there are three districts namely Panchkula, Ambala and Rohtak which fall in the category of very high level of road infrastructure. The districts of Yamunanagar, Fatehabad, Hisar, Jhajjar and Rewari have high level of road infrastructure. Table 3 reveals that Kaithal, Jind, Kurukshetra, Panipat, Sirsa and Mahendergarh districts have moderate level of road infrastructure. On the other hand, Sonipat, Karnal, Gurgaon, Bhiwani and Faridabad districts have low and very low levels of road infrastructure. In 2015-16, Ambala district has very high composite index (1.30) of road infrastructure. Panchkula, Rohtak, Jhajjar, Rewari and Bhiwani districts have high composite index of road infrastructural development. Kurukshetra, Kaithal, Sonipat and Hisar districts have moderate level of road infrastructure. As many as 11 out of 21 districts in the state have low to very low level of road infrastructure (Table 3). Increasing number of districts having poor road infrastructure is a cause of concern.

### **Levels of Electricity Infrastructure**

Electricity and power supply play an important role in socio-economic development. It is the cheapest source of energy and a fundamental human need. It is a vital input for small and large industries, agricultural operations, water supply, transport, communication, health and domestic use. Haryana emerged the first state in India to supply electricity to every village of the state in November 1970, just four years after its formation. In 2005-06 Yamunanagar, Karnal, Panipat and Gurgaon districts have very high level of electricity infrastructure (Table 3). Two districts Kurukshetra and Kaithal fall in high infrastructure category. While



Fatehabad, Mahendergarh, Faridabad and Rewari districts lie in moderate category. Six districts have poor conditions but three out of these namely Hisar, Rohtak, and Jhajjar have very low electricity infrastructure. In 2015-16, Yamunanagar, Kurukshetra, Karnal and Faridabad districts have very high electricity infrastructure. Over the study period 2005-06 to 2015-16 Yamunanagar and Karnal districts have maintained their top position. Another five districts have high electricity infrastructure. Jind, Sonipat and Mahendergarh districts have moderate electricity infrastructure. The districts of Panchkula, Ambala, Jhajjar and Bhiwani fall in low and remaining five districts fall in very low category of electricity infrastructure. Overall, there has been no significant change in the development of electricity infrastructure over the decade.

#### **Levels of Banking Infrastructure**

Adequate availability of banking facility is very essential for the economic development of any area. It is a financial institution that accepts deposits and channelizes it in the lending activities either directly or through capital markets (Thangapandi and Gobinath 2016). Banks provide financial support to farmers, businessmen, service men and common men in terms of debit and credit facilities. In 2005-06 Ambala, Panchkula, Panipat, Rohtak and Faridabad districts have very high level of banking infrastructure. Yamunanagar and Gurgaon districts fall in the category of areas with high composite index. The districts of Kurukshetra, Karnal, Sonipat and Rewari, have moderate level of banking infrastructure. There are as many as eight districts falling in the categories of low and very low level of banking infrastructure (Table 3). While in 2015-16, two districts namely Bhiwani and

Mewat have very low banking infrastructure. Ambala, Panchkula, Panipat, Gurgaon and Faridabad districts have very high levels of banking infrastructure. While Kurukshetra is the only district that falls in the category of high availability of banking services. Yamunanagar, Karnal, Rohtak, Sonipat and Rewari districts have moderate banking facilities. As many as eight districts (Jind, Kaithal, Jhajjar, Mahendergarh, Hisar, Sirsa, Palwal and Fatehabad) fall in the category of low banking infrastructure. There has been a huge inter-district difference in banking services which accentuated over the decade.

#### **Levels of Agricultural Marketing and Storage Infrastructure**

In an agriculture based economy, like that of Haryana, marketing and storage network boosts agricultural development and encourages the farmers for raising a variety of agricultural products. Warehousing or storage refers to safeguarding and holding of goods until they are dispatched to the consumers. Large variety of commodities such as food grains, food products, pulses, spices, food stuffs, oil, oilseeds, sugar, fibers, seeds, feed/fodder perishable commodities (such as vegetables and fruits), dairy products and miscellaneous items (such as pharmaceutical products) need suitable storage facilities during post-harvest or post production period (Singhal and Saksena 2017). In Haryana, the districts having better marketing infrastructure also have higher storage capacity. In 2005-06, as many as eight districts namely Panchkula, Yamunanagar, Kurukshetra, Kaithal, Panipat, Karnal, Gurgaon and Faridabad have very high marketing and storage infrastructure. Four districts have moderately developed infrastructure of marketing and storage facilities. Sirsa,

Sonipat, Rohtak, Jind and Mahendergarh districts have low agricultural marketing and warehousing facilities. Jhajjar and Rewari districts have very poor marketing and warehousing facilities. In 2015-16 also eight districts namely Panchkula, Ambala, Kurukshetra, Kaithal, Karnal, Panipat, Faridabad and Mahendergarh have very high level of marketing and storage facilities. Furthermore, the districts namely Yamunanagar, Jind and Hisar also have high availability of marketing and storage facilities. Only Gurgaon district has moderate level of such infrastructure. But there is a huge inter-district gap in availability of marketing and storage facilities. As many as nine out of twenty one districts of the state have low to very low level of availability of these facilities.

#### **Levels of Veterinary Infrastructure**

In Haryana, dairy farming has made significant contribution in the livelihood of farmers. It can be effectively used as an instrument of social justice, like bridging the gap between rural-urban disparities and other imbalances (Yadav et al., 2014). Livestock is an important supporting activity in rural economy of Haryana. Bovines dominate the livestock. Hence, the availability of veterinary services plays an important role in rural development in Haryana. In 2005-06 Panchkula, Hisar and Jhajjar districts have very high level of veterinary infrastructure. Similarly, Rohtak, Sirsa, Fatehabad, Bhiwani and Mahendergarh districts have recorded high composite index of veterinary infrastructure. Five districts have moderate level of veterinary infrastructure. Yamunanagar, Karnal, Panipat and Jind districts have low veterinary infrastructure level, whereas Kaithal and Faridabad districts have very low veterinary infrastructure. In 2015-16, there

are five districts namely Panchkula, Rohtak, Jhajjar, Rewari and Mahendergarh having very high level of veterinary infrastructure. Two districts of Hisar and Kurukshetra have high composite index of veterinary infrastructure. Ambala, Fatehabad, Bhiwani, Gurgaon and Faridabad districts have moderate veterinary infrastructure. As many as 9 districts of the state have low and very low level of veterinary infrastructure (Table 3). It reveals that inter-district difference in veterinary infrastructure has remained the same over the decade.

#### **Levels of Household Amenities**

Providing basic household amenities such as toilet and piped water supply amounts to improvement in health of people. Adequate sanitation is critical not only for societal health, but also for economic development. Availability and accessibility of clean drinking water and toilet facilities is a basic human need. Access of safe drinking water and toilet facilities is not only an important measure of the socio-economic status of the households, but also fundamental to the health and life style. Lack of drinking water and toilet facilities reflects the poor socio-economic development and status of people. There has been a sharp inter-district disparity in drinking water and toilet facilities in Haryana in 2005-06. Panchkula and Sirsa districts have very high development of safe drinking water and toilet facilities. Other districts having higher availability of these facilities include Ambala and Kurukshetra. In fact, majority of districts (10) have moderate level of availability of water and toilet facilities. The districts of Jhajjar, Mahendergarh and Sonipat fall in low availability category, whereas Kaithal and Jind have very low level of water and toilet facilities. In 2015-16, only Sirsa falls in the

category of very high availability of drinking water and toilet facilities. In contrast, Mahendergarh, Palwal and Mewat districts are placed in very low category of drinking water and toilet facilities. As many as seven districts, Panch-kula, Ambala, Kurukshetra, Karnal, Rohtak, Fatehabad and Gurgaon have high level of drinking water and toilet facilities. Five districts have moderate level, whereas another five districts have low level of drinking water and toilet facilities (Table 3). Overall a majority of the districts have experienced improvement in the availability of drinking water and toilet facilities during the study period.

### **Levels of Overall Infrastructural Development**

Fig.1 reveals that in 2005-06, only one district, Panchkula has very high infrastructural development. Three districts in northeastern parts of the state namely Ambala, Kurukshetra and Yamunanagar also have high level of infrastructural development. Besides these, Panipat, Rohtak, and Gurgaon districts also have recorded high infrastructural development in 2005-06 but these do not form a discernible geographical pattern. However, there is not a single district in the state falling in the category of very low level of infrastructural development. Four districts namely Mahendergarh, Sonipat, Jhajjar and Jind are having low level of infrastructural development. As many as eight districts have recorded moderate level infrastructure, four of which Hisar, Bhiwani, Sirsa and Fatehabad are forming a contiguous belt in north-western part of the state. Two southern districts of Faridabad and Rewari, also fall in the category of moderate level of infrastructural development. Two districts of Karnal and Kaithal located in north-eastern part of the

state, also fall in moderate category of infrastructural development.

Comparison of maps in Fig. 1 indicates that there is eastward shift in the spatial pattern of infrastructural development in Haryana. In 2015-16, there are two districts, Panchkula and Faridabad having very high infrastructural development. There are 6 districts having high infrastructural development. In this category, three districts Ambala, Kurukshetra and Karnal form a contiguous belt in north-eastern Haryana. The remaining three districts of this category, Gurgaon, Rewari and Jhajjar form a cluster in National Capital Region (NCR). Overall, the districts with very high and high levels of infrastructure cluster in north-eastern region of the state and south-west of Delhi. The number of districts having moderate level of infrastructure has declined to 5 from 8 in 2005-06 and three of these are located in eastern region close to Delhi. Incidentally, two newly formed districts Mewat and Palwal, fall in the category of very low level of infrastructural development. While a vast geographical area in north, central and north-western parts of the state, comprising of 6 districts has low infrastructural development in 2015-16. The changing geographical pattern of infrastructural development suggests that most of new infrastructure that come up during the decade 2005-06 to 2015-16 is concentrated in eastern Haryana particularly in the districts close to Delhi and Chandigarh. Consequently, most parts of central and western Haryana and extreme south-eastern districts are deprived of infrastructural development.

### **Conclusions**

The present study explores the spatio-temporal pattern of infrastructural develop-

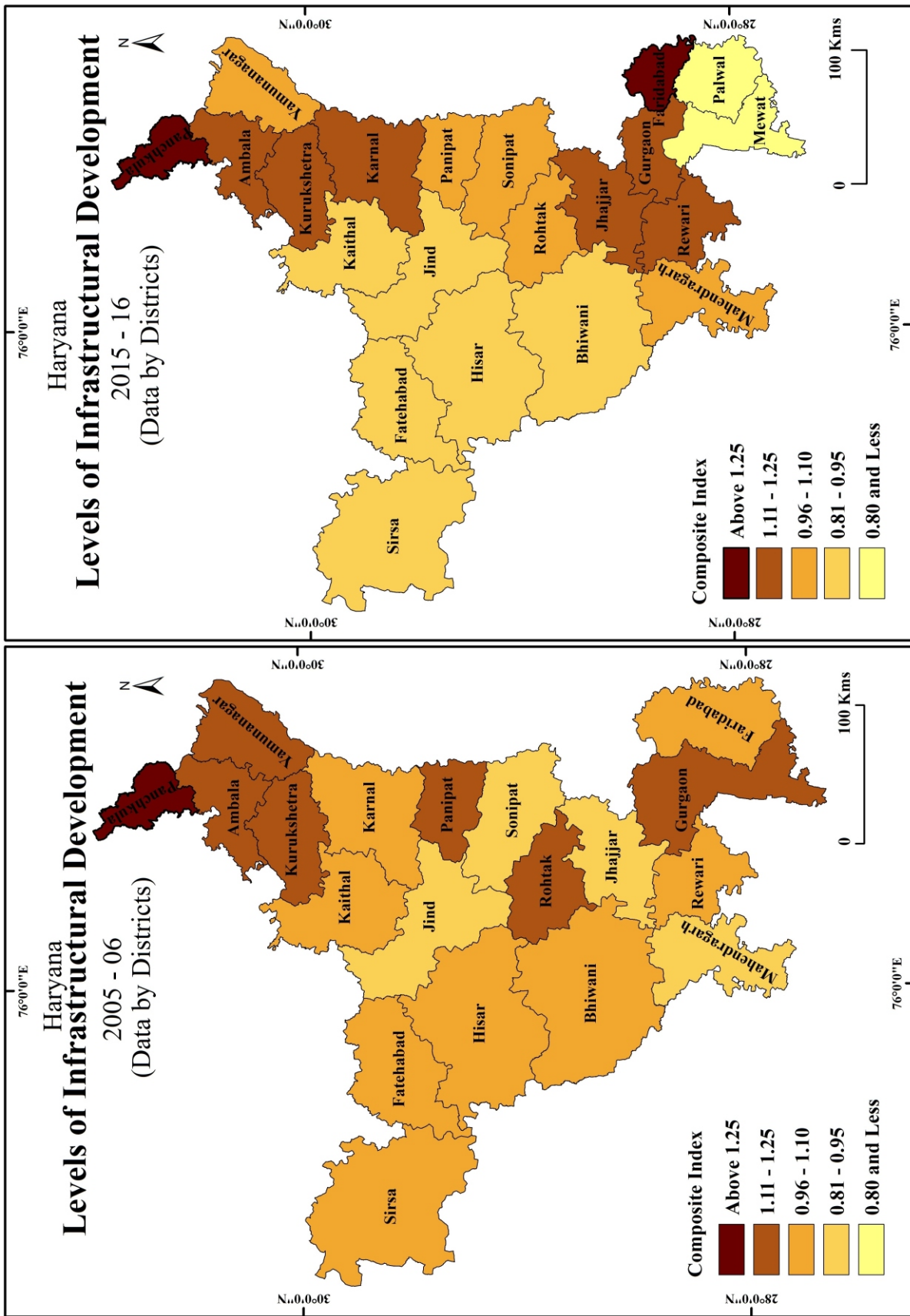


Fig. 1

ment in Haryana during the period 2005 to 2015. It assesses the performance of different sectors of infrastructure over the decade and dynamics and spatial pattern of overall infrastructural development. The study brought out that there has been distinct improvement in drinking water and toilet facilities across the districts but marked by inter-district variations. There have also been improvements in the electricity infrastructure and banking services but these have been largely confined to Panchkula and industrial districts like Yamunanagar, Panipat, Faridabad and Gurgaon. Except for few districts, there has been no significant improvement in veterinary services and agricultural marketing and storage. Similarly, there has been no improvement in educational infrastructure, government health facilities and road infrastructure during the study period.

Overall, in 2015-16 there have been two pockets of high infrastructural development in Haryana, one is located in the north-east, while another is confined to the southern region in the vicinity of Delhi. In between these two pockets, there is a zone of moderate level of infrastructure. Then there has been a pocket of very low infrastructural development in extreme south-east and a vast contiguous belt of low infrastructure in north-central and north-western Haryana. The changing geographical pattern of infrastructural development suggests that most of new infrastructure, that has come up during the decade 2005-06 to 2015-16, is concentrated in eastern parts particularly in the districts close to national and state capitals of Delhi and Chandigarh. Consequently, most of the central, western and extreme south-eastern districts have remained deprived of infrastructural development. Incidentally, Palwal and Mewat districts carved out of industrially developed districts

of Faridabad and Gurgaon have emerged to be most backward areas in infrastructural development. The inter-district disparity in the levels of infrastructural development has increased over the decade. There is an urgent need to bridge this widening inter-district gap in infrastructural development to reduce disparity in socio-economic development.

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