# SPATIAL FACETS OF HEALTH CARE AMENITIES AND ITS IMPACT ON HEALTH STATUS IN WESTERN UTTAR PRADESH, INDIA

**Dr. S. Waseem Ahmad Ashraf, Associate Professor,**
Department of Geography, Aligarh Muslim University
Aligarh, (U.P.)
**Ms. Surendra Kaur Rawal and Mr. Sabbir Ahmed**
Department of Geography, Aligarh Muslim University
Aligarh, (U.P.)

## ABSTRACT
Health plays a vital role in human life. It is one of the most important factors of development. Despite the tremendous effort of the government towards ensuring equality of Health care opportunities, inequality still prevails. The present paper aims at examining the close relationship between Health Care Amenities and Health Status in Western Uttar Pradesh. The data for the analysis have been obtained from the secondary sources .The paper suggest that enhancement of Health Care Amenities shall reduce the disparities in Health Status in Western Uttar Pradesh.
**Keywords:** Health Care Amenities, Health Status, Mortality Rate and Morbidity Rate.

## INTRODUCTION
Health is considered as wealth of a community, which undoubtedly determines economic, social, cultural and political development of a region. Development is not just economic and material but also includes development of an individual's personality, skills and efficiency so as to contribute benefits to the society and the nation (Kothari, S., Jhala, L.S., 2007). Good health is not just indication of quality of life but key to economic growth and sustainable development. Health is generally defined as "a state of complete physical, mental and social well being and not merely the absence of disease or infirmity" (WHO, 1946 and 2006). Basically its main determinants are mortality rate, morbidity rate, life expectancy and body mass index (S, Hussain Ansari, 2008) but at district level data of life expectancy and body mass index is not available, therefore to show the status of health at district level we have to depend upon mortality and morbidity rates. The availability of health services is only one of many contributions to health development (United Nations Report, 1984). Not only the availability of health facility is important for measuring the status of health, but more important is the fact that how these amenities are distributed whether these are well accessible by the people living in an area or not. Thus accessibility and availability of health care amenities reflects the direct impact on mortality and morbidity rates (S, Hussain Ansari, 2008). Health development considered as a viable strategy for development planning to pursuit as part of the effort to improve the quality of life of all people (Misra, O.P., 1991)

### Objectives
The major objectives of the present paper are:
To analyses the spatial pattern of health care amenities and health status.
To identify the relationship between the indicators of health care amenities and health status.
To advise suggestive remarks for the problem and problematic areas.

### Hypotheses
The following hypotheses have been formulated:
Better availability and accessibility of health care amenities have positive impact on health status of the people.
Where the availability and accessibility of health care amenities are better their mortality and morbidity rates are also less.

### Study Area
Western Uttar Pradesh lies approximately between 26˚ 20' N and 30˚ 31' N latitudes and 77˚ 45' to 80˚ 22' E longitudes. It covers an area of 80,076 sq. kms. and holds a population of about 61.60 millions. It contains twenty seven district, namely Saharanpur, Muzaffarnagar, Meerut, Baghpat, Bulandshahar, Ghaziabad, Gautam Budh Nagar, Aligarh, Mahamaya Nagar, Mathura, Agra, Firozabad, Mainpuri, Kanshiram Nagar, Etah, Bareilly, Badaun, Shahjahanpur, Pilibhit, Bijnor, Moradabad, Jyotiba Phule Nagar, Rampur, Farrukhabad, Kannauj, Etawah and Auraiya [Census of India, 2011](Fig1). Western Uttar Pradesh which occupies the fertile north-western portion in Upper Ganga Plain, is the most developed and prosperous region of the state Uttar Pradesh. Nearly 71.30% population live in rural areas. Green revolution had a tremendous impact on agricultural development. Industrial distribution is uneven in the region. Literacy level is 70.17% as a whole and 79.15% male literacy and 59.92% female literacy. The analysis of regional disparities provide base for formulation of policies and plans aimed at developing a suitable operational strategy for minimizing and eliminating regional disparity. Such type of studies helps administrator policy makers and planners to identify regions of relative level of development in order to know the needs of varied regions.

## DATA BASE AND METHODOLOGY

The present work is essentially based on secondary data collected from different published and unpublished sources at district level such as, office of the Statistical Offices, Lucknow; office of the Registrar General and Census Commissioner of India, New Delhi and Statistical site Sankhiyaki Patirka. All the statistics are meant for the year 2011.

Use of Indicators is highly common and important in statistical analysis of problem of almost all the major disciplines of knowledge. Health care amenities have been computed using indicators on the basis of areal spread and population of each district.

### Health Care Amenities

No. of Hospitals and Dispensaries per 100 sq. km. ($X_1$).
No. of Hospitals and Dispensaries per lakh of population ($X_2$).
No. of Public and Primary Health Centre per 100 sq. km. ($X_3$).
No. of Public and Primary Health Centre per lakh of population ($X_4$).
No. of Family & Mother Child Welfare Centre and Sub Centre per 100 sq. km. ($X_5$).
No. of Family & Mother Child Welfare Centre and Sub Centre per lakh of population ($X_6$).
No. of Special Hospitals per 100 sq. km. ($X_7$).
No. of Special Hospitals per lakh of population ($X_8$).
No. of Beds per lakh of population ($X_9$).
No. of Doctors per lakh of population ($X_{10}$).

Health status has been computed using following indicators on the basis of population of each district:

Mortality rate

Crude Death Rate ($Y_1$).
Infant Mortality Rate ($Y_2$).
Maternal Mortality Rate ($Y_3$).

Morbidity Rate

Persons suffering from Diarrhoea/ Dysentery per lakh of population ($Y_4$).
Persons suffering from Acute Respiratory Infection per lakh population ($Y_5$).
Persons suffering from fever per lakh population ($Y_6$).
Persons suffering from any type of acute illness per lakh population ($Y_7$).
Persons suffering from Diabetes per lakh population ($Y_8$).
Persons suffering from Hypertension per lakh population ($Y_9$).
Persons suffering from Tuberculosis per lakh population ($Y_{10}$).
Persons suffering from Asthma per lakh population ($Y_{11}$).
Persons suffering from Arthritis per lakh population ($Y_{12}$).
Persons suffering from any type of chronic illness per lakh population ($Y_{13}$).

Spatial dimensions of the health care amenities and health status have been examined using z-score and composite z-score technique. Correlation matrix has been applied to bring out the casual relationship among the independent variables of health care amenities (X) and dependent variables of health status (Y). Lastly to test the hypotheses formulated above, the choropleth map has been prepared of Health Care Amenities and Health Status, Health Care Amenities and Mortality Rate and Health Care Amenities and Morbidity Rate and correlation matrix have also been applied among the composite z-score values of indicators of health care amenities and health status. Correlation matrix is also applied among the composite z-score values of health care amenities, mortality, morbidity and health status. A careful section of the class intervals to divide the categories drawn on the maps are based on the mean and standard deviation technique.

## DISCUSSION

Health Care Amenities

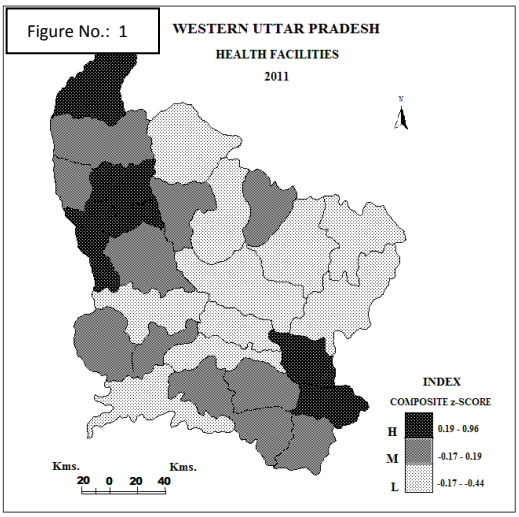
Health is seen as part of the basic human capabilities and an integral part of welfare. It is an essential input for the development of human resources and the quality of life, so we can say that improved health is a part of total socio-economic development and is regarded as an index of social development. Thus planning for more equitable health-care services has become the growing concern of most of the states and nation.

Table 1
Z- SCORE OF INDICATORS

| Districts | Z-SCORE | | | | | | | | | | Composite Z-Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | $X_7$ | $X_8$ | $X_9$ | $X_{10}$ | |
| **Saharanpur** | -0.58 | -0.77 | -0.32 | -0.47 | -0.06 | 0.01 | 3.74 | 3.49 | -0.35 | 0.82 | 0.55 |
| **MUN** | -0.45 | -0.77 | 0.85 | 1.31 | 0.08 | -0.09 | -0.06 | -0.19 | -0.52 | -0.89 | -0.07 |
| **GBN** | 0.09 | -0.37 | -0.29 | -1.06 | 2.73 | 3.88 | 0.73 | 0.33 | -1.04 | 2.23 | 0.72 |
| **Ghaziabad** | 3.22 | -0.89 | 3.99 | -1.03 | 3.56 | -1.31 | 0.09 | -0.76 | -0.82 | -1.58 | 0.45 |
| **Baghpat** | -0.44 | -0.67 | 0.39 | 0.69 | 1.03 | 1.94 | -1.00 | -1.00 | -0.97 | 0.47 | 0.04 |
| **Meerut** | 2.88 | 1.99 | 0.84 | 0.16 | 0.45 | -0.41 | 0.45 | -0.03 | 2.33 | 0.92 | 0.96 |
| **Mathura** | 0.22 | 0.94 | -0.74 | -0.71 | -0.77 | -0.87 | 0.12 | 0.31 | 1.67 | 0.28 | 0.05 |
| **Aligarh** | -0.55 | -0.84 | -0.46 | -0.94 | -0.25 | -0.63 | -0.66 | -0.70 | 2.72 | -1.49 | -0.38 |
| **Bulandshahar** | -0.28 | -0.01 | -0.01 | 0.78 | -0.31 | 0.07 | -1.00 | -1.00 | -0.17 | 0.38 | -0.16 |
| **Badaun** | -0.87 | -0.76 | -0.35 | 0.46 | -0.62 | -0.29 | -0.27 | -0.10 | -0.47 | -1.17 | -0.44 |
| **Agra** | -0.27 | -0.64 | -0.02 | -0.42 | -0.07 | -0.55 | -0.38 | -0.49 | 2.03 | -1.28 | -0.21 |
| **M N** | 0.02 | -1.02 | 0.02 | 0.58 | -0.24 | 0.02 | -0.38 | -0.33 | -0.40 | -0.16 | -0.19 |
| **Rampur** | 0.02 | -0.09 | 0.07 | 0.10 | -0.43 | -0.90 | 0.06 | -0.05 | -0.43 | 0.19 | -0.14 |
| **JPN** | -0.85 | -0.93 | 0.03 | 0.79 | -0.29 | 0.06 | 0.67 | 0.81 | 0.06 | 0.08 | 0.04 |
| **Moradabad** | -0.49 | -1.13 | 0.76 | 0.20 | 0.22 | -0.63 | 0.01 | -0.30 | -0.34 | -1.66 | -0.34 |
| **Bijnor** | -0.76 | -0.77 | -0.38 | -0.08 | -0.44 | -0.25 | -0.18 | -0.10 | -0.64 | -0.56 | -0.42 |
| **Pilibhit** | -0.25 | 0.97 | -1.02 | -0.69 | -0.88 | -0.28 | -0.29 | 0.09 | -0.10 | 0.64 | -0.18 |
| **Bareilly** | 0.17 | -0.13 | -0.13 | -0.58 | -0.14 | -0.66 | -0.39 | -0.50 | 0.08 | -0.06 | -0.23 |
| **Etawah** | 0.80 | 2.40 | -1.38 | -2.11 | -0.56 | 0.08 | 1.16 | 1.81 | 0.04 | -0.61 | 0.16 |
| **Etah** | -0.61 | -0.31 | -0.28 | 0.63 | -0.54 | -0.06 | 0.53 | 0.89 | -0.50 | 0.21 | 0.00 |
| **K N** | -0.72 | -0.50 | -0.18 | 0.86 | -0.34 | 0.44 | -1.00 | -1.00 | -0.43 | -0.56 | -0.34 |
| **Farrukhabad** | 1.03 | 1.71 | -0.23 | 0.00 | -0.27 | -0.12 | -0.43 | -0.41 | 0.48 | 1.40 | 0.32 |
| **Firozabad** | -0.33 | -0.67 | 0.82 | 1.13 | -0.15 | -0.59 | 0.06 | -0.11 | -0.43 | -0.58 | -0.08 |
| **Mainpuri** | -0.33 | 0.38 | -0.09 | 1.46 | -0.60 | 0.06 | -1.00 | -1.00 | -0.04 | 0.92 | -0.02 |
| **Shahjahanpur** | -0.18 | 0.71 | -0.57 | 0.25 | -0.81 | -0.49 | -0.73 | -0.63 | -0.50 | -0.23 | -0.32 |
| **Kannauj** | 0.12 | 0.65 | 0.40 | 1.79 | -0.32 | 0.11 | -0.40 | -0.33 | -0.34 | 1.70 | 0.34 |
| **Auraiya** | 0.23 | 1.36 | -1.47 | -2.33 | -0.41 | 0.50 | 0.86 | 1.43 | -0.89 | 0.52 | -0.02 |

Source: Calculated by the authors from Sankhiyaki Patrika 2010-2011.
Note: MUN- Muzaffarnagar, GBN- Gautam Budh Nagar, MN- Mahamaya Nagar, JPN- Jyotiba Bhule Nagar, KN- Kanshiram Nagar.

To show the spatial dimension of Health Care Amenities, indicators selected are: No. of Hospitals and Dispensaries comprises: Hospitals and Dispensaries of Allopathic, Ayurvedic, Homeopathic and Unani; No. of Primary and Public Health Care Centre; No. of Family & Mother Child Welfare Centre and Sub Centre; No. of Special Hospitals comprises: Hospitals and Clinics of Tuberculosis, Leprosy and Communicable Diseases; No. of Beds comprises; Total No. of Beds in Allopathic, Ayurvedic, Homeopathic and Unani and Lastly No. of Doctors comprises: Total No. of Doctors in Allopathic, Ayurvedic, Homeopathic and Unani. Graphical representation of same is made in figure no: 1.




The district wise distribution of Health Care Amenities (Table 1) shows that highest score is registered in Meerut and Lowest in Badaun i.e., 0.96 and -0.44 respectively. For identification of above mentioned regions the composite z-score values of districts have been arranged in three categories of high (above 0.19), medium (-0.17 to -0.19) and low (below -0.17) computed by mean and standard deviation. From Fig. 2 it is clear that concentration of Health Care Amenities is higher in Northern region than Southern region and North Western region than North Eastern region. High grade score is found in four districts of North Western Region and two districts of Southern region i.e. Saharanpur, Meerut, Gautam Budh Nagar and Ghaziabad of North Western region while Farrukhabad and Kannauj of Southern region. Eleven districts with Medium level of Health Care

Amenities are found in North and North Western region and South and South Western region. Out of these eleven districts four districts namely Muzaffarnagar, Baghpat, Jyotiba Phule Nagar and Bulandshahar are found in North and North Western region while six districts namely Mathura, Mahamaya Nagar, Firozabad, Mainpuri, Etawah and Auraiya are found in South and South Western region and one district i.e. Rampur in Eastern region also fall under the category of Medium grade score. A notable region of Low grade score is found in six districts stretching from North to East i.e. Bijnor, Moradabad, Badaun, Bareilly, Pilibhit and Shahjahanpur while Aligarh, Kanshiram Nagar and Agra of Southern region also fall under the category of Low grade score.

HEALTH STATUS

Health is the most important and essential aspect of social concern. It is the basic needs of the social well being, because a sound body and sound mind are the basic requisites of society. Basically its main determinants are mortality, morbidity, life expectancy and Body Mass Index but as mentioned earlier that at district level, data of life expectancy and Body Mass Index are not available so health status is shown by comprising mortality and morbidity rate of the region.

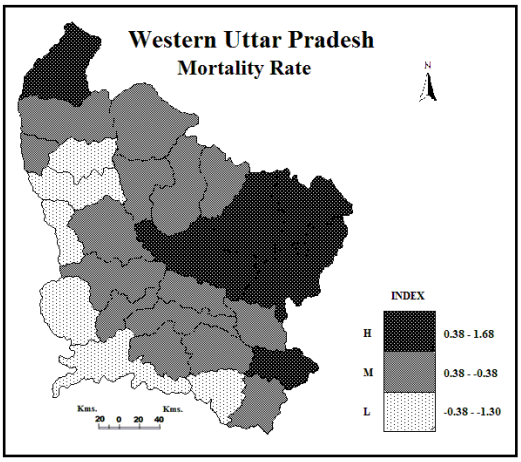
**Table 2**

| Districts | Composite Z-Score | | |
|---|---|---|---|
| | Mortality Rate | Morbidity Rate | Health Status |
| **Saharanpur** | 0.63 | 0.07 | 0.20 |
| **Muzaffarnagar** | -0.11 | -0.01 | -0.03 |
| **Gautam Budh Nagar** | -1.30 | 0.03 | -0.27 |
| **Ghaziabad** | -1.08 | 0.23 | -0.07 |
| **Baghpat** | -0.29 | 0.33 | 0.18 |
| **Meerut** | -0.53 | -1.00 | -0.89 |
| **Mathura** | -0.89 | -0.39 | -0.51 |
| **Aligarh** | 0.06 | -0.17 | -0.12 |
| **Bulandshahar** | 0.08 | 0.30 | 0.25 |
| **Badaun** | 1.68 | 0.96 | 1.13 |
| **Agra** | -0.95 | -0.07 | -0.28 |
| **Mahamaya Nagar** | 0.18 | -0.36 | -0.23 |
| **Rampur** | 0.27 | 0.04 | 0.09 |
| **Jyotiba Phule Nagar** | -0.08 | -0.72 | -0.57 |
| **Moradabad** | -0.10 | -0.55 | -0.45 |
| **Bijnor** | -0.22 | 0.18 | 0.09 |
| **Pilibhit** | 1.00 | 1.51 | 1.40 |
| **Bareilly** | 1.24 | 0.83 | 0.92 |
| **Etawah** | -1.23 | -0.39 | -0.81 |
| **Etah** | 0.30 | 0.94 | 0.79 |
| **Kanshiram Nagar** | 0.30 | 0.94 | 0.79 |
| **Farrukhabad** | -0.12 | -0.59 | -0.48 |
| **Firozabad** | 0.09 | -0.85 | -0.63 |
| **Mainpuri** | 0.14 | -0.65 | -0.47 |
| **Shahjahanpur** | 1.13 | 0.43 | 0.59 |
| **Kannauj** | 0.39 | -0.39 | -0.21 |
| **Auraiya** | -0.31 | -0.40 | -0.38 |

Source: Calculated by the authors from Annual Health Survey Fact Sheet, 2010-2011.

Mortality Rate

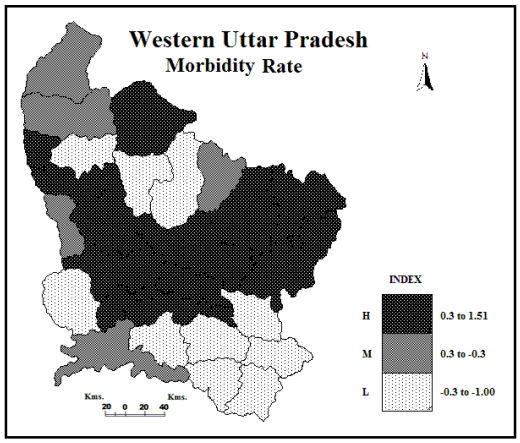
Mortality is the rate at which people are dying. It is the number of deaths per 1000 population per year in a given community. A decrease death rate can provide a good tool for assessing overall health improvement in a population. (S., Hussain Ansari. 2008). For assessing mortality rate: the crude death rate, infant mortality rate maternal mortality rate has been worked out (AHS 2010-2011). Graphical representation of same is made in figure no: 2.




From table (2) it is obvious that the highest mortality rate is registered in Badaun i.e. 1.68 while lowest in Gautam Budh Nagar i.e. -1.30. For identification of above mentioned regions the composite z-score values of districts have been arranged in three categories high (above 0.38), medium (0.38 to -0.38) and low (below -0.38) computed by mean standard deviation. From Fig. 3 it is clear that higher mortality rate is recorded in districts of eastern region i.e. Bareilly (1.24), Pilibhit (1.00), Badaun (1.68) and Shahjahanpur (1.13). Sharanpur of northern region and Kannauj of southern region also recorded higher mortality rate i.e. 0.63 and 0.39 respectively. Almost all the central districts in a row except Saharanpur, Meerut, Ghaziabad, Etawah and Kannauj from north to south registered medium mortality rate namely Muzaffarnagar (-0.11), Baghpat (-0.29), Bijnor (-0.22), Jyotiba Phule Nagar (-0.08), Moradabad (-0.10) and Rampur (0.27) of northern region while Bulandshahar (0.08), Aligarh (0.06), Mahamaya Nagar (0.18) and Kanshiram Nagar (0.30) of central region whereas Etah (0.30), Firozabad (0.09), Mainpuri (0.14), Farrukhabad (-0.12) and Auraiya (-0.31) of southern region recorded medium grade score. Low mortality rate is recorded in six districts of border region i.e. north west to south west direction. These districts are Meerut (-1.23), Ghaziabad (-1.08) and Gautam Budh Nagar (-0.30) of north west region while Mathura (-0.89), Agra (-0.95) and Etawah (-0.53) of south west region.

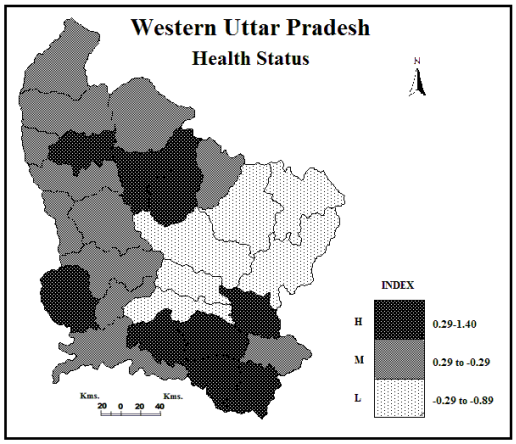
Morbidity Rate

Morbidity rate is used for assessing ill health (S., Hussain Ansari. 2008). For assessing morbidity rate Acute and chronic illness has been worked out. For acute illness persons suffering from any type of acute illness per lakh of population are taken for investigation. Diseases included in acute illness are Diarrhoea/Dysentery, Acute Respiratory Infection (ARI), Fever and any other type of acute illness. For chronic illness diseases considered are Diabetes, Hypertension, Tuberculosis, Asthma, Arthritis and any other type of chronic illness. (AHS, 2010-2011). Graphical representation of same is made in figure no: 3.




From table (2) it is obvious that the highest mortality rate is registered in Pilibhit i.e. 1.51 while lowest in Mathura i.e. -1.00. For identification of above mentioned regions the composite z-score values of districts have been arranged in three categories high (above 0.3), medium (0.3 to -0.3) and low (below -0.3) computed by mean and standard deviation. From Fig. 4 it is clear that northern region is having higher morbidity rate than the southern region. As in northern region there are eight districts namely Bijnor (0.18), Baghpat (0.33), Ghaziabad (0.23), Bulandshahar (0.30), Badaun (0,96), Shahjahanpur (0.43), Bareilly (0.83) and Pilibhit (1.51) where higher morbidity rate is recorded while in southern region there are only three districts where higher morbidity rate is recorded namely Mahamaya Nagar (-0.36), Kanshiram Nagar (0.94) and Etah (0.94). Further we can see that, there are four districts namely Saharanpur (0.07), Muzaffarnagar (-0.01), Gautam Budh Nagar (0.03) and Rampur (0.04) in northern region where medium morbidity rate is recorded while there is only one district in southern region where medium morbidity rate is recoded i.e. Agra (-0.07).

Three notable regions in study area where low morbidity rate is registered i.e. one in northern region consisting of three districts namely Etawah (-0.39), Jyotiba Phule Nagar (-0.72) and Moradabad (0.18) while second is in southern region consisting of Mathura (-0.39) and Aligarh (-0.17) districts where as last one is in extreme southern region consisting of six districts namely Firozabad (-0.85), Mainpuri (-0.65), Farrukhabad (-0.59), Etawah (-1.00), Auraiya (-0.40) and Kannauj (-0.39) having low morbidity rate.




Health Status

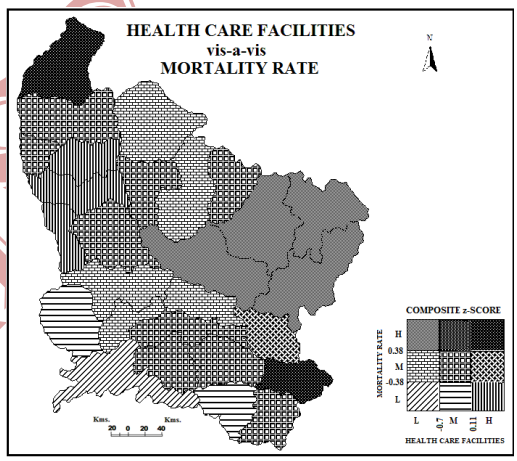
The scores of health status is, in fact an aggregate of composite scores of mortality and morbidity rate. For identification of regions the composite z-score values of districts, have been arranged in

three categories high (above 0.29), medium (0.29 to -0.29) and low (below -0.29) computed by mean and standard deviation. From table (2) it is obvious that the highest status of health is registered in Meerut i.e. -0.89 while lowest status of health is registered in Pilibhit i.e. 1.40. From Fig. 5 it is clear that highest status of health is recorded in three districts namely Meerut (-0.89), Jyotiba Phule Nagar (-0.57) and Moradabad (-0.45) of northern region and five districts namely Firozabad (-0.63), Mainpuri (-0.47) Farrukhabad (0.48), Etawah (-0.81) and Auraiya (-0.38) of southern region. Highest status of health is also registered in north western and south western districts namely Saharanpur (0.20), Muzaffarnagar (-0.03) and Bijnor (0.09) of northern region, Bahgpat (0.18), Ghaziabad (-0.07), Gautam Budh Nagar (-0.27), Bulandshahar (0.25) and Aligarh (-0.12) of north-western region, Mahamaya Nagar and Agra (-0.28) of south-western region and Kannauj (-0.21) of southern region. Low level of health status is registered in eastern districts of study area namely Pilibhit (1.40), Bareilly (0.92), Badaun (1.13) Shajahanpur (0.59) and Etah (0.79). Graphical representation of same is made in figure no: 4.

HEALTH CARE FACILITES AND HEALTH STATUS

Health Care Amenities and Mortality Rate

To assess the spatial relation between health care amenities and mortality rate choropleth map of health care amenities vis-a-vis mortality rate has been prepared. Fig (6) reveals that there are twelve districts having same grade scores while fifteen districts are having different grade scores for health care amenities and mortality rate. From map it is obvious that there are two districts namely Saharanpur in extreme northern region and Kannuaj in extreme southern region where both the variables recorded higher grade score while there is only one district i.e. Farrukhabad where score for heath care amenities is higher and score of mortality rate is medium whereas there are three districts namely Gautam Budh Nagar, Ghaziabad and Meerut in north-western region where mortality rate is low due to high and better quality of health care amenities.




In case of medium grade score of health care amenities there is not a single district where mortality rate is high where as there are five districts namely Muzaffarnagar, Baghpat, Jyotiba Phule Nagar, Bulandshahar and Rampur of northern region and Etah, Firozabad, Mainpuri and Auraiya of southern region where both the variables recorded medium grade score while there are two districts namely Mathura and Etawah where health care amenities recorded medium grade score and mortality recorded low grade score. Further we can see that there are four districts namely Badaun, Bareilly, Pilibhit and Shahjahanpur where due to low health care amenities the mortality rate is higher. In figure we can see that there are total five districts namely Bijnor, Moradabad, Aligarh, Mahamaya Nagar and Kanshiram Nagar where health care amenities recorded low grade score but mortality recorded medium grade score while there is only one district i.e. Agra where both the variables recorded low grade score.

Health Care Amenities and Morbidity Rate

To assess the spatial relationship between health care amenities and morbidity rate choropleth map on the basis of composite index has been prepared. Fig (7) reveals that there are only four districts having same grade score while rest twenty three districts are having different grade scores. From figure it is obvious that there is only one district i.e. Ghaziabad where both the variables recorded high grade scores while there are two districts namely Saharanpur and Gautam Budh Nagar where health care amenities recorded high grade score and morbidity recorded medium grade score whereas there are three districts namely Meerut, Farrukhabad and Kannauj recorded high grade score and because of that morbidity recorded low grade score.

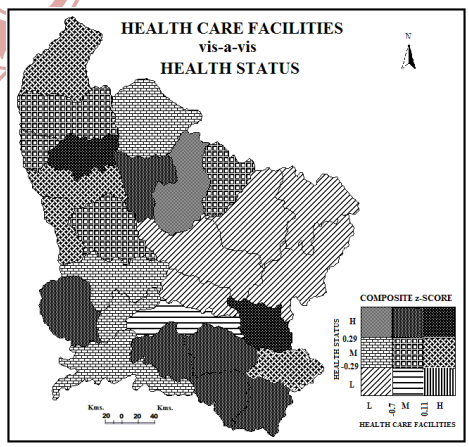
In case of medium grade score there are three districts namely Baghpat, Bulandshahar and Etah where health care amenities recorded medium grade score and morbidity recorded high grade score while there are six districts namely Mathura, Jyotiba Phule Nagar, Etawah, Firozabad, Mainpuri and Auraiya where health care amenities recorded medium grade score because of which morbidity recorded low grade score. Further we can see that there are total seven districts namely Badaun, Mahamaya Nagar, Bijnor, Pilibhit, Bareilly, Kanshiram Nagar and Shahajahanpur where health care amenities recorded low grade score and because of that morbidity recorded high grade score, while there are two districts namely Rampur and Agra in study area where health care amenities recorded low grade score and morbidity recorded medium grade score and there are two districts namely Aligarh and Moradabad where both the variables recorded low grade score.

Health Care Amenities and Health Status

Health care amenities in Western Uttar Pradesh have been calculated on the basis of ten indicators and have been interrelated with thirteen indicators of health status. To assess the overall scenario of health care amenities and health status, choropleth map has been prepared on the basis of categories computed by the mean and Standard Deviation technique. The composite index of health care amenities and health status has been worked out to find out a more meaningful comparison. Fig (8) reveals that high and medium grade score in spatial distribution of health care amenities and health status is observed in more than 70% districts stretching north to south along north to west and west to south boundary of study area while low and medium grade score is observed in about 30% districts stretching from north to east along the north east boundary of the study area, whereas there are eleven districts having same grade score and sixteen districts having different grade score of health care amenities and health status. From map it is obvious that there are only two districts namely Meerut and Farrukhabad having better health care amenities and thus having high status of health. On the other hand there are four districts namely Saharanpur, Ghaziabad and Gautam Budh Nagar in northern region and Kannauj in southern region recording high grade score for health care amenities but medium grade score for health status while there is not a single district in which grade of health care amenities is high and grade of health status is low.

From figure 8 it is obvious that there are six districts namely Jyotiba Phule Nagar, Mathura, Firozabad, Mainpuri, Etawah and Auraiya recording medium grade score for health care amenities and high grade score for health status. There are four districts namely Muzaffarnagar, Baghpat, Bulandshahar and Rampur recording medium grade score for both health care amenities and health status while there is only one district i.e. Etah recording medium grade score for health care amenities but low grade score for health status. Further we can see that there is only one district i.e. Moradabad recording low grade score for health care amenities but high grade score for health status and at last we can say that there are five districts namely Bareilly, Pilibhit, Badaun, Shahjahanpur and Kanshiram Nagar in eastern region of study area recording low grade score for both health care amenities and health status.

Fig. 8: Relationship between Indicators of Health Care Amenities and Health Status




A correlation matrix has been prepared taking ten indicators of health care amenities from $X_1$ to $X_{10}$ and thirteen indicators of health status from $Y_1$ to $Y_{13}$. Correlation between health care amenities and health status has been tested at 1 per cent and 5 per cent significance level. The inter correlation matrix discloses the relationship between the ten indicators of health care amenities (X) and thirteen indicators of health status (Y). From Table (3) it is obvious that health care amenities $X_1$ is almost negatively correlated with the indicators of health status. $X_1$ (Hospitals/Dispensaries per 100 sq km) is negatively correlated with all the indicators of health status or we can say that all the indicators of mortality and morbidity which means that where the hospitals and dispensaries per lakh 100 sq km is higher there the mortality and morbidity rates are lower. $X_1$ (Hospitals/Dispensaries per 100 sq km) is negatively and significantly correlated with $Y_1$ (Crude Death Rate), $Y_3$ (Maternal Mortality Rate) and $Y_8$ (Diabetic persons per lakh of population) at 5 per cent significance level. $X_2$ (Hospitals/Dispensaries per lakh of population) is also negatively correlated with the indicators of mortality and morbidity except $Y_5$ (Acute Respiratory Infections per lakh of population), $Y_9$ ( Hypertension per lakh of population) and $Y_{12}$ ( Arthritis per lakh of population). This may be because mostly older people suffer from Asthma, Arthritis and Hypertension so they are less bother about their health and thus have less interest in treatment from any Hospitals and Dispensaries. $X_2$ is negatively and significantly correlated with $Y_6$ (Fever per lakh of population). $X_3$ (Public and Primary Health Centres per 100 sq km) is negatively and significantly correlated with mortality and morbidity except $Y_6$ (Fever per lakh of population), $Y_7$ (any type of Acute Illness per lakh of population) and $Y_9$ (Hypertension per lakh of population). Here also people suffering from fever prefer to have treatment from nearby any Private Practitioner rather than the government Primary Health Centres. $X_3$ is negatively and significantly correlated with $Y_8$ (Diabetic persons per lakh of population) at 5 per cent significance level. Now $X_4$ is positively correlated with mortality and morbidity rate indicators except $Y_8$ (Diabetic persons per lakh of population), $Y_9$ (Hypertension per lakh of population), $Y_{11}$ (Asthma patients per lakh of population) and $Y_{13}$ (any type of Chronic Illness per lakh of population).

TABLE 3
RELATIONSHIP BETWEEN INDICATORS OF HEALTH CARE AMENITIES AND HEALTH STATUS

| | $Y_1$ | $Y_2$ | $Y_3$ | $Y_4$ | $Y_5$ | $Y_6$ | $Y_7$ | $Y_8$ | $Y_9$ | $Y_{10}$ | $Y_{11}$ | $Y_{12}$ | $Y_{13}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $X_1$ | -.429* | -0.313 | -.415* | -0.174 | 0.06 | -0.159 | -0.158 | .424* | 0.319 | -0.259 | -0.065 | -0.228 | -0.232 |
| $X_2$ | -0.083 | -0.019 | -0.234 | -0.154 | 0.167 | -.383* | -0.321 | -0.077 | 0.094 | -0.046 | 0.03 | 0.01 | -0.14 |
| $X_3$ | -0.167 | -0.238 | -0.275 | -0.094 | -0.038 | 0.244 | 0.175 | .415* | 0.149 | -0.228 | -0.204 | -0.265 | -0.231 |
| $X_4$ | 0.374 | 0.21 | 0.071 | 0.136 | 0.006 | 0.313 | 0.295 | -0.156 | -0.327 | 0.135 | -0.087 | -0.035 | -0.094 |
| $X_5$ | -.450* | -0.371 | -.420* | -0.168 | -0.14 | 0.295 | 0.164 | .509** | 0.186 | -0.326 | -0.116 | -0.207 | -0.163 |
| $X_6$ | -0.147 | -0.133 | -0.279 | -0.08 | -0.246 | 0.31 | 0.154 | 0.049 | -0.164 | -0.119 | 0.08 | 0.072 | 0.001 |
| $X_7$ | -0.092 | -0.003 | -0.172 | -0.201 | -0.24 | -0.211 | -0.3 | 0.245 | 0.217 | -0.186 | -0.289 | -0.144 | 0.041 |
| $X_8$ | 0.02 | 0.054 | -0.091 | -0.182 | -0.223 | -0.288 | -0.357 | 0.078 | 0.174 | -0.132 | -0.208 | -0.019 | 0.085 |
| $X_9$ | -.402* | -0.186 | -0.045 | 0.186 | 0.07 | -0.339 | -0.186 | -0.055 | 0.078 | -0.188 | -0.151 | -0.122 | -0.075 |
| $X_{10}$ | 0.041 | 0.071 | -0.304 | -0.226 | 0.01 | 0.116 | 0.036 | 0.163 | -0.144 | -0.012 | 0.011 | -0.071 | -0.037 |

Source: Calculated by the authors from Annual Health Survey Fact Sheet 2010-2011
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

$X_1$ -No. of Hospitals and Dispensaries per 100 sq. Km, $X_2$ -No. of Hospitals and Dispensaries per lakh of population, $X_3$ -No. of Public and Primary Health Centre per 100 sq. km., $X_4$ -No. of Public and Primary Health Centre per lakh of population, $X_5$ -No. of Family & Mother Child Welfare Centre and Sub Centre per 100 sq. Km, $X_6$ -No. of Family & Mother Child Welfare Centre and Sub Centre per lakh of population, $X_7$ -No. of Special Hospitals per 100 sq. Km, $X_8$ -No. of Special Hospitals per lakh of population, $X_9$ -No. of Beds per lakh of population, $X_{10}$ -No. of Doctors per lakh of population; $Y_1$ -Crude Death Rate, $Y_2$ -Infant Mortality Rate, $Y_3$ -Maternal Mortality Rate, $Y_4$ -Persons suffering from Diarrhoea/ Dysentary per lakh of population, $Y_5$ -Persons suffering from Acute Respiratory Infection per lakh population, $Y_6$ -Persons suffering from fever per lakh population, $Y_7$ -Persons suffering from any type of acute illness per lakh population, $Y_8$ -Persons suffering from Diabetes per lakh population, $Y_9$ -Persons suffering from Hypertension per lakh population, $Y_{10}$ -Persons suffering from Tuberculosis per lakh population, $Y_{11}$ -Persons suffering from Asthma per lakh population, $Y_{12}$ -Persons suffering from Arthritis per lakh population and $Y_{13}$ -Persons suffering from any type of chronic illness per lakh population.

$X_5$ (Family and mother Child Welfare Centre per 100 sq km) is negatively and significantly correlated with $Y_2$ (Infant Mortality Rate) and (Maternal Mortality Rate) at 5 per cent significance level while $X_5$ is positively and significantly correlated with $Y_8$ (Diabetic persons per lakh of population) at 1 per cent significance level this may be because male population is more affected by diabetes and there is no relation or family and mother child welfare centre with male adult population. $X_6$ (Family and mother Child Welfare Centre per lakh of population) is negatively and significantly correlated with mortality indicators while positively correlated with $Y_6$ (Fever per lakh of population), $Y_7$ (any type of Acute Illness per lakh of population), $Y_8$ (Diabetic persons per lakh of population), $Y_{11}$ (Asthma patients per lakh of population), $Y_{12}$ (Arthritis per lakh of population) and $Y_{13}$ (any type of Chronic Illness per lakh of population). $X_7$ (Special Hospitals 100 sq km) is negatively correlated with mortality and morbidity indicators except $Y_8$ (Diabetic persons per lakh of population), $Y_9$ (Hypertension per lakh of population) and $Y_{13}$ (any type of Chronic Illness per lakh of population). $X_8$ (Special Hospitals per lakh of population) is negatively correlated with mortality and morbidity except $Y_1$ (Crude Death Rate), $Y_2$ (Infant Mortality Rate), $Y_8$ (Diabetic persons per lakh of population), $Y_9$ (Hypertension per lakh of population) and $Y_{13}$ (any type of Chronic Illness per lakh of population) this maybe because of their specialization for a particular diseases. $X_9$ (Beds per lakh of population) is negatively correlated with mortality and morbidity indicators except $Y_4$ (Diarrhoea/Dysentery), $Y_5$ (Acute Respiratory Infection) and $Y_9$ (Hypertension per lakh of population) and at last $X_{10}$ (Doctors per lakh

population) is more or less having similar correlation with the indicator of mortality and morbidity as that of $X_9$ indicator of health care amenities.

Relationship between overall Health Care Amenities, Mortality, Morbidity and Health Status

To test the hypothesis formulated above, a correlation matrix has been prepared taking the composite z-score values of overall indicators of health care amenities, mortality, morbidity and health status. This correlation is tested at 1 per cent and 5 per cent significance level. From Table (4) it is clear that health care amenities are negatively and significantly correlated with mortality, morbidity and health status means where the health care amenities are less there the mortality and morbidity rates are high while health status which comprised of mortality and morbidity indicators is high and vice-versa. The first hypothesis states that better availability and accessibility of health care amenities have positive impact on health status of the people which proves to be valid as: we can see from above table that health care amenities are negatively and significantly correlated with health status at 5 per cent significance level.

**TABLE 4**
**RELATIONSHIP BETWEEN OVERALL HEALTH CARE AMENITIES, MORTALITY, MORBIDITY AND HEALTH STATUS**

| Correlations | | | | |
|---|---|---|---|---|
| | **Health Care Amenities** | **Mortality Rate** | **Morbidity Rate** | **Health Status** |
| Health Care Amenities | 1 | -.470* | -.392* | -.454* |
| Mortality Rate | -.470* | 1 | .515** | .724** |
| Morbidity Rate | -.392* | .515** | 1 | .961** |
| Health Status | -.454* | .724** | .961** | 1 |

Source: Calculated by the authors from Annual Health Survey Fact Sheet 2010-2011
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

This states that where health care amenities are less there mortality and morbidity rates are higher means there health status is low and where health care amenities are more there mortality and morbidity rates are low means there health status is higher. This is also clear from figure (8) that among the districts of eastern region namely Kanshiram Nagar, Badaun, Bareilly, Pilibhit and Shahjahnpur the grade score is low for both health care amenities and health status while there are two districts namely Meerut and Farrukhabad whose grade scores are high for both health care amenities and health status whereas there is not a single district with high score for health care amenities and low score for health status. It means that where availability and accessibility of health care amenities are better there the health status is also good. The second hypothesis status that where the availability and accessibility of health care amenities are better there the mortality and morbidity rates are low which also proves its validity as: we can see from table (4) health care amenities are negatively and significantly correlated with mortality and morbidity rate at 5 per cent significance level which states that where health care amenities are less there mortality and morbidity rates are higher and where health care amenities are more there mortality and morbidity rates are low. This is also clear from Fig.(6) and (7) that the districts where grade score for health care amenities are high and medium there mortality and morbidity grade scores are low.

## CONCLUSION

After going through the detailed discussion the conclusion which is drawn is that the impact of health care amenities is clearly seen on the health status of the study region. As from Fig (2), (5) and (8) it is clear that the grade score is lower for eastern districts of study region for health care amenities while higher for north-western and southern district of study area and so is the spatial distribution of health status as eastern districts are having low grade score for health status and higher in southern districts of study area.

Hypothesis formulated proves their validity as Table (4) shows the negative and significant correlation between health care amenities and mortality and morbidity rate which mean where availability and accessibility of health care amenities are less there the mortality and morbidity rates are higher and so is the health status i.e. low and where the availability and accessibility of health care amenities are better there health status is also good.

So at last we could conclude that the aim of development cannot be achieved until the people are not healthy enough to think and act in a positive way and this will be possible when people are educated and having easy availability and accessibility to good quality health care amenities. Therefore there is an urgent need for total reform to boost the good quality of health care amenities for ensuring healthy environment.

**Suggestions**

Some suggestions can be made for removing such disparity and they are:

Increasing awareness for good health among the people will result in optimum distribution of Health Care Amenities.

Disparities prevail not merely because of geographical or natural reasons but planning process is also one of the important factors so rational thinking should drive the policy maker and administration to make a proportional allocation of Health Care Amenities along with other socio-economic amenities.

A diagnostic planning should be prepared on quantitative and qualitative analysis towards the goal of attaining healthy environment from healthy generations.

So at last we can say that if one of the most essential factor of human development i.e. health, if increases then the economic condition and standard of life of the people will also increase.

**REFERENCE:**

A.H.S., 2010-2011, Fact Sheet, U.P. published by ORGI and census commission ,India, New Delhi, pp.183-196.

A.H.S., 2010-2011, Fact Sheet, U.P. published by ORGI and census commission ,India, New Delhi, pp.42-73.

Census of India (2011) "Provisional Population Totals for Uttar Pradesh" Retrieved on 18 January, 2011.

Kothari, S., Jhala, L.S., (2007), "Spatial Disparity in the Status of Education and Health Amenities: A Case Study of Banswara and Dungarpur Districts", *The Geographer*, Vol.54, No.2, July 2007, p.9.

Misra,O.P., (1991), Planning for Social Infrastructure: A Case Study of Tehsil Colonel Ganj, Disst. Gonda, U.P., *Geographical Review of India*, Vol.53, No.3, September, p.40.

Sankhyakiya Patrika (2001) http://updes.up.nic.in/spatrika/spatrika.htm Retrieved on 27th September, 2011.

S. Hussain Ansari, 2008, "Socio-economic Factors and Health of women in Sample Town- A Geographic Analysis", *The Geographer*, Vol.55, No.2, July. Published by Geographical Society A.M.U. Aligarh. p.114.

S. Hussain Ansari, 2008, "Socio-economic Factors and Health of women in Sample Town- A Geographic Analysis", *The Geographer*, Vol.55, No.2, July. Published by Geographical Society A.M.U. Aligarh. p.114.

S. Hussain Ansari, 2008, "Socio-economic Factors and Health of women in Sample Town- A Geographic Analysis", *The Geographer*, Vol.55, No.2, July. Published by Geographical Society A.M.U. Aligarh. p.114.

United Nations, (1984), Population, Resources, Environment and Development.

World Health Organisation, Preamble to the Constitution of World Health Organisation as adopted by the International Health Conference, New York, June 1946; and Constitution of World Health Organisation, Basic Documents, 45th Edition, Supplement, October 2006.