

Health Status of Assam: A District Level Analysis

Bhargab Das

MPhil Research Scholar, Dibrugarh University, Assam

ABSTRACT

Health is a productive asset that influences economic development significantly and also a part of the basis of human capabilities and integral part of welfare. Health enhances the economic development by improving the human capital and reducing economic cost of illness. Good health augments labor productivity and helps in boosting economic growth. In this regard the present study attempts to analyze the scenario of health status across the districts of Assam. The scenario of health condition is shown in terms of ranking and group of districts with the help of composite health status index constructed by using Principal Component Analysis. The results of the study reveal that there is high degree of disparity among the different districts of Assam in terms of health status. In terms of health status Dibrugarh district tops the list followed by Sivsagar, Jorhat and Tinisukia districts. On the other hand, Dhubri and Kokrajhar districts got the bottom position in the list followed by Darrang, Goalpara, Barpeta and Karimganj districts.

Keywords: *Health Status, PCA, Assam.*

Introduction

Health has an important role in the development of an economy, good health deals with good income. As defined by WHO, it is “a state of complete physical mental, and social wellbeing, and not merely the absence of disease or infirmity.” Health may be defined as the ability to adopt and manage physical, mental and social challenges throughout life. In 1984, WHO revised the definition of health and define it as the extent to which an individual or group is able to realize aspirations and satisfy needs and to change or cope with the environment. Health is a resource for everyday life, not the objective of living; it is a positive concept emphasizing social and personal resources, as well as physical capacities¹.

In this 21st century, the concept of health is an ability that opened the door for self assessments to become the main indicators to judge the performance of efforts aimed at improving human health. There are certain key factors that have been found to be influencing the health status of the people². According to the WHO, the main determinants of health include the socio and economic

environment, the physical environment and the person’s individual characteristics and behaviors.

According to WHO, health care facilities are hospitals, primary health care centers, isolation camps, burn patients units, feeding centers and others. In emergency situations health care facilities are often faced with an exceptionally high numbers of patients some of whom may require specific medical care. Therefore it includes health care centers, medical, nursing home, pharmacies and drug stores, medical laboratory research, hospitals and specialized care centers.

Good health augments labor productivity and helps in boosting economic growth. As per the World Development Report 1993, it identifies four channels through which health helps in boosting economic growth

- It reduces production losses caused by worker illness.
- It permits the use of natural resources that had been totally or nearly inaccessible because of disease.
- It increases the enrollment of children in school and makes them better able to learn.
- It frees for alternative uses resources that would otherwise have to be spent on treating illness (World Bank, 1993).

Corresponding Author:

Bhargab Das

MPhil Research Scholar, Dibrugarh University, Assam

Email: bhargabdias.sorbhog@gmail.com

Status of Health in India: The concept of health services was emerged and was evolved during the colonial rule. With expansion of colonial rule, the health services too expanded, getting organized into the Indian Medical Services by 1764. During the time of Government of India Act 1919, health became an provincial subject and health services have different character. In the year 1910 state finance most of the medical institutions which were around 75% and it moved to 92% in the year 1940 and it keeps on increasing. However, during the time of independence some of the health indicators were quite poor in India. Sir Joseph Bhore submitted the report on health survey and development in 1946, which was a landmark in the evolution of health services in India. The committee focuses on the medium and long term perspective for the development of the medical services. According to the committee, health services should be placed as close as possible to the people in order to ensure maximum benefit; and consciousness on health should be stimulated around the people with help of education.

In the post independence era, from the mid-1950s to early 1970s, effort to improve the human health, were treated at best. Many committees had been formed with the intention of providing health services to the people. The improving access to the essential health care services for the poor is a major issue to be looked on. The health status of the country has been increasing by time. Health status is a multidimensional concept, requiring multiple indicators and multiple methodologies for adequate measurements³. For the country as a whole, latest available data indicates the following progress under NRHM in terms of key measurable health outcomes:

The Total Fertility Rate (TFR) has been reduced from 2.9 in 2005 to 2.5 in 2011, IMR from 58 in 2005 to 44 in 2011, Crude Birth Rate(1.9) (CBR) and the MMR was estimated at 178 during 2010-12 from 254 in 2005.

Table 1: Health Indicators in India

Health Indicators	2005	2017
MMR	254	174
IMR	58	39.1
CBR	22.32	1.9
TFR	2.9	2.43

Source: Periodic Bulletin of Office of the Registrar General of India.

So, it is observed that there have been steady improvements in the core maternal and child health indicators at all India level. However, India being a diverse country, the pattern of progress of various State/Uts are different, which is something really interesting to explore.

Even though India has been achieved accelerated economic growth over the last two decades, it has rated poorly in human development indicators and health indicators ⁴. India compares scantily with developing countries like China, Sri Lanka and Bangladesh in many health indicators such as life expectancy at birth, infant and under-five mortality levels, etc. (GOI, 2005, 2008, 2010). In 2010, life expectancy at birth in India (65.13 years) is lower than that of China (73.27 years), Sri Lanka (74.72 years), Thailand (73.93 years), Nepal (68.39 years) and Bhutan (68.39 years). India's position is even poor compared to these countries in terms of infant mortality rate, which is 48.6 in India as against 13.7 in China, 10.8 in Sri Lanka, 11.0 in Thailand, 38.6 in Bangladesh, 40.6 in Nepal and 43.6 in Bhutan for the year 2010 (World Bank Online Database). A similar picture is discernable if we compare India's position with these developing countries in terms of other health indicators like maternal mortality rate, total fertility rate, birth rate, death rate, immunization, etc. The poor health condition is one of the major reasons for India's poor rank in the UNDP Human Development Index. Out of the 187 countries, India ranked 134th in the latest UNDP Human Development Index for the year 2011, which is below the rank of the countries like Sri Lanka (97th), China (101st) and Thailand (103rd) ⁵.

Status of Health in Assam: With the increasing health indicators there is an improving in the economic growth as a whole. For looking on the status of health in Assam there is a wide range of indicators. We will mainly look at the few health indicators namely crude birth rate, crude death rate, infant mortality rate, ante natal care, and Immunization. For Assam CBR and CDR condition is better in urban areas but it is below the national average in rural areas. Whereas the condition in IMR is below the nation average in both the rural and urban areas.

Table 2: Birth rates, Death Rates and Infant Mortality rates in Assam, 2011

	CBR			CDR			IMR		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Assam	22.8	24.0	15.5	8.0	8.4	5.6	55	58	34
India	21.8	23.3	17.6	7.1	7.6	5.7	44	48	29

Source: Bulletin on Rural Health Statistics in India, 2011.

The fact evident from the table that the country as a whole and the state, the health condition of the rural areas is in miserable condition compare to the urban areas. With this view rural health care should be an area of special priority of any government in a country or state.

Objective

To analyze the scenario of health status across the districts of Assam.

Methodology

Data Source: The present study is entirely based on secondary sources data which are collected from the following sources—

1. Statistical Handbook of Assam.
2. Annual Health Survey (AHS),
3. National Family Health Survey (2015-16, NFHS-4),
4. Sample registration system,
5. Census of India, 2011.

Method: The study has taken only undivided 23 districts of Assam instead of 33 districts due to the unavailability of data on health status for the newly formed districts of Assam. In this study the development of the health sector is measured through health status. Here development of health sector is measured in terms of improvement in various health status indicators such as Infant Mortality Rate, Institutional Delivery, Morbidity Rate, Immunization Rate and Ante Natal Care.

To construct the health status index, the variables that are used as a percentage are

1. Infant Mortality Rate (the Infant Mortality Rate is the number of children dying before their first birthday per 1000 live births) (Y_1),
2. Morbidity Rate (Percentage of persons suffering from any type of acute illness) (Y_2),

3. Ante Natal Care (Percentage of mothers who had get ante natal check up in the first trimester) (Y_3)
4. Institutional Delivery (Percentage of delivery at institutions) (Y_4),
5. Immunization (Percentage of children aged 12-23 months fully immunized with BCG, Measles, three doses of polio and DPT) (Y_5),

Here the reciprocal of Infant Mortality Rate and Morbidity Rate are considered for calculation to make the variable unidirectional.

The scenario of health condition is shown in terms of ranking and group of districts with the help of composite health status index constructed by using Principal Component Analysis.

PCA is a useful technique for transforming a large number of variables in a data set into a smaller and more coherent set of uncorrelated factors, the Principal Components⁶. PCA is a multivariate statistical technique used to reduce the number of variables in a data set into a smaller number of ‘dimensions’⁷. The PCA is a more sophisticated tool than the HDI which can tackle the linear aggregation problem faced in the UNDP’s HDI⁸. In mathematical terms, from an initial set of n correlated variables, PCA creates uncorrelated indices or components, where each component is a linear weighted combination of the initial variables. For example, from a set of variables X_1 through to X_n .

$$\begin{aligned} PC_1 = & a_{11}X_1 + a_{12}X_2 + \dots + a_{1n}X_n \\ & \dots \\ & \dots \\ PC_m = & a_{m1}X_1 + a_{m2}X_2 + \dots + a_{mn}X_n \end{aligned}$$

Where a_{mn} represents the weight for the m th principal component and the n th variable.

The variance (λ) for each principal component is given by the Eigen value of the corresponding eigenvector (Huang, 1974). The components are ordered

so that the first component (PC1) explains the largest possible amount of variation in the original data, subject to the constraint that the sum of the squared weights ($a_{11}^2 + a_{21}^2 + \dots + a_{n1}^2$) is equal to one. The second component (PC2) is completely uncorrelated with the first component, and explains additional but less variation than the first component, subject to the same constraint. Subsequently, components are uncorrelated with previous components; therefore, each component captures an additional dimension in the data, while explaining smaller and smaller proportions of the variation of the original variables. The higher the degree of correlation among the original variables in the data, the fewer components required to capture common information⁷.

After the construction of the health status indices, the districts were categorized on the basis of the average value criteria. On the basis of average value criteria districts were divided into two categories—

1. Sound Group: This group includes the district having index values higher than the state average.
2. Lagging Group: This group includes the districts having index value lower than the state average.

Results and Discussion

Health Status Index and Status of the Districts: The composite index of the health status is prepared through the econometric tool Principal Component Analysis (PCA) by using the variables like Infant Mortality Rate, Morbidity Rate, Immunization, Institutional Delivery and Ante natal care for the year 2011-12. The first component is serving as the principal component because its Eigen value is more than 1 and it explains 47.40 5% of the total variances. The equation of the health status index is constructed by statistical method of linear aggregation of the original indicators such that

$$Z = W_1 X_1 + W_2 X_2 + W_3 X_3 + \dots + W_n X_n$$

The status of the district is shown through their comparative position in health status by ranking with the help of the values of the composite indices.

Table 3: Relative position of Districts in Health Status

Districts	PCA	Rank
Kokrajhar	-1.3381	22
Darrang	-1.15842	21

Conted...

Dhubri	-2.35181	23
Karimganj	-0.724	18
Marigaon	-0.20433	13
Sonitpur	-0.06188	11
Nagaon	-0.23716	14
Nalbari	0.51228	8
Golaghat	0.90301	5
Karbi Anglong	-0.36818	16
Goalpara	-1.0805	20
Sibsagar	1.51802	2
North Chachar hill	-0.28275	15
Jorhat	1.51564	3
Cachar	0.24619	9
Hailakandi	-0.13083	12
Lakhimpur	0.21408	10
Dibrugarh	1.5338	1
Tinsukia	1.34836	4
Bongaigaon	-0.46243	17
Barpeta	-0.97127	19
Kamrup	0.86856	6
Dhemaji	0.66338	7
Assam	0.04833	

Source: Calculating through using PCA from the data of Annual Health Survey 2011-12

From the above table we can see that there are disparities or inequalities among the different districts of Assam in terms of health status. Dibrugarh district tops the list followed by Sivsagar, Jorhat and Tinsukia districts. On the other hand, Dhubri and Kokrajhar districts got the bottom position in the list followed by Darrang, Goalpara, Barpeta and Karimganj districts. The above table reveals that out of 23 districts 11 districts have index values more than the state average. On the other hand, the remaining 12 districts index values lower than the state average.

Grouping of Districts in Terms of Health Status: There are so many researchers who have used PCA and constructed health status index and grouped the states into sound group and lagging group by using ‘Average Value Criteria’ while they found disparities in health status among the different states of India.

Table 4: Grouping of Districts Based on Index Values

	Sound Group	Lagging Group
Health Status Index	Dibrugarh, Sibsagar, Jorhat, Tinsukia, Golaghat, Kamrup, Dhemaji, Nalbari, Cachar, Lakhimpur and Sonitpur.	Kokrajhar, Darrang, Dhubri, Karimganj, Morigaon, Nagaon, Karbi Anglong, Goalpara, North Cachar Hill, Hailakandi, Bongaigaon and Barpeta.

From the above table we can see that there are huge disparities among the different districts of Assam in terms of health status. Out of 23 districts only 11 districts including Dibrugarh, Sibsagar, Jorhat, Tinsukia, Golaghat, Kamrup, Dhemaji, Nalbari, Cachar, Lakhimpur and Sonitpur have health status index values higher than the state average and fall in the category of sound group. On the other hand, 12 districts including Kokrajhar, Darrang, Dhubri, Karimganj, Morigaon, Nagaon, Karbi Anglong, Goalpara, North Cachar Hill, Hailakandi, Bongaigaon and Barpeta have health status index values lower than the state average and fall in the category of lagging group.

Conclusion

Health is a productive asset that influences economic development significantly and also a part of the basis of human capabilities and integral part of welfare. Health enhances the economic development by improving the human capital and reducing economic cost of illness. The above study reveals that there is high degree of disparity among the different districts of Assam in terms of health status. In terms of health status Dibrugarh district tops the list followed by Sivsagar, Jorhat and Tinisukia districts. On the other hand, Dhubri and Kokrajhar districts got the bottom position in the list followed by Darrang, Goalpara, Barpeta and Karimganj districts. Out of 23 districts only 11 districts have health status index values higher than the state average and fall in the category of sound group. On the other hand, 12 districts have health status index values lower than the state average and fall in the category of lagging group.

Ethical Clearance: It is a review article.

Source of Funding: Self.

Conflict of Interest: Nil.

REFERENCES

1. Huber M, Knottnerus JA, Green L, van der Horst H, Jadad AR, Kromhout D, Leonard B, Lorig K, Loureiro MI, van der Meer JW, Schnabel P. How should we define health?. *Bmj*. 2011 Jul 26;343:d4163.
2. Housman J, Dorman S. The Alameda County study: a systematic, chronological review. *Journal of Health Education*. 2005 Oct 1;36(5):302-8.
3. Vlassoff C, Tanner M, Weiss M, Rao S. Putting people first: A primary health care success in rural India. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*. 2010 Apr;35(2):326.
4. Nair H, Panda R. Quality of maternal healthcare in India: Has the National Rural Health Mission made a difference?. *Journal of global health*. 2011 Jun;1(1):79.
5. UNDP (2011), Human Development Report 2011, New York: Oxford University Press.
6. Krishnan V. Constructing an area-based socioeconomic index: A principal components analysis approach. Edmonton, Alberta: Early Child Development Mapping Project. 2010 May.
7. Vyas S, Kumaranayake L. Constructing socio-economic status indices: how to use principal components analysis. *Health policy and planning*. 2006 Nov 1;21(6):459-68.
8. Buragohain, P. P. (2012), "Human Development Among the Tai Ahoms – A Case Study of Upper Assam", unpublished doctoral thesis, Dibrugarh University.