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Mapping and Assessing Socio-Economic Wellbeing and Food Wellbeing in India

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Abstract: ***Wellbeing is a multifaceted concept. Its definition has evolved to become more holistic over the years. The paper attempts to build up the understanding of the concept wellbeing and various methods to measure it. The paper also elaborates and analyses various indicators of socio-economic wellbeing and food wellbeing in India at state level. Standard score and ranking method has been applied to assess the situation of each state in context to the variable selected. Food wellbeing is a very broad concept that deals with availability, accessibility, stability, consumption and happiness linked to consumption of food. Due to lack of relevant data, the paper takes into consideration calorie consumption and nutrition deficiency challenges like overweight and underweight population. Over weight and underweight reflects various health challenges linked to it. The data shows that the socio-economic wellbeing level is higher in states of Himachal Pradesh, Punjab, Uttrakhand, Uttar Pradesh, Tamil Nadu, Bihar, Jammu and Kashmir and Lakshadweep. The level of wellbeing is very low in states of Rajasthan, Madhya Pradesh, Telengana, Andhra Pradesh, Odisha, Assam, Arunachal Pradesh and Tripura. Food wellbeing indicators perform well in states of Tamil Nadu, Nagaland, Kerela, Andhara Pradesh, Sikkim and Goa. In states of Uttrakhand, Uttar Pradesh, Rajasthan and Madhya Pradesh are at the lowest of food wellbeing indicators. The data links various socio economic and health indicators with calorie consumption and nutrition deficiency indicators with the help of correlation matrix.***

Keywords: Well-being index, India, Health, Mapping, Food security, Food wellbeing, Geographical Information System

1. Introduction

Wellbeing is a multifaceted and a holistic concept. Wellbeing is a positive word and all individuals and nations are striving towards attaining wellbeing but interestingly the definition and measuring indicators vary from one to another. This means wellbeing is state of mind which is attained through growth and contentment. For nations, growth is linked to economic progress and contentment is linked to social and psychological achievements. Health is an integrated concept and cannot be ignored while measuring wellbeing. The concept of wellbeing has its roots in the word "Eudaimonia" which was a central concept in Aristotelian ethics and political philosophy. Wellbeing means "happiness and human flourishing". The concept of Eudoimonia means the good composed of all goods, which is also the basis of Eudoimanic tradition or school of thought. The school focuses upon positive psychological functioning and human development (Rogers, 1961; Riff 1989; Waterman 1993). Another school of thought is Hedonic School focuses upon persons' evaluation of their own life both emotionally and cognitively. It deals with the frequent pleasant feelings and infrequent unpleasant feelings. It is in fact based on overall judgement that life is satisfactory.

Social wellbeing is closely linked to social health. It includes social acceptance, social behaviour, social involvement and physical and mental health. Social wellbeing is also closely linked to social security. The social wellbeing has been identified by the World Health Organization as a central component of individual's overall health. Research within social sciences has operationalized social wellbeing in terms of behaviours that reflect community and organizational participation, community or group membership or social capital and social cohesion (Andrew and Whitney, 1976; Coleman, 1998; Putnam, 2000). Keyes (1998), and later Keyes & Lopez (2002), argued, wellbeing consists of five social dimensions, namely a) Social acceptance (accepting others as they are) b) Social actualisation (positive comfort level with society) c) Social contribution (a feeling that one has a contribution to make to society) d) Social coherence (understanding the social world as predictable comprehensible) e) Social integration (feeling as a part of the community) (Cited in Carruthers and Hood, 2004).

Economic activities lead to individual's capacity to have access to resources available. For many years it was considered that in nations GDP reflects the economic progress and overall development. GDP is still a major parameter to analyse Human Development index. Some researchers (Headey and Wearing, 1992; Diener and Biswas-Diener, 2002) found that economic variables, such as income and employment status, appear to have little effect on wellbeing. By contrast, others found that 'inequality of income can severely effect well-being' (Hamilton, 2003:145). Yet, others find that there is a weak relationship between a country's economic fortunes (such as its GDP) and the general happiness of its population over time (Amárach Consulting, 2002). Economic wellbeing now incorporates income security, poverty, unemployment, access to resources etc. Economic well being should ultimately lead to better standard of living.

The objective wellbeing is an important concept from the perspective of policy makers. It is in coordination with the OECD's 'eight dimensions of life', which can be 'measured' through statistical methods and thus help in comparative analysis. These dimensions include health, education and learning, employment and the quality of working life, time and leisure, command over goods and services, physical environment, social environment and personal safety.

Access to all eight dimensions is crucial to wellbeing (Cristchurch City Council, 2005: online).

Human health and environment is closely linked to each other. World Health Organization defines health as "the full physical, mental and social wellbeing". Nowadays, many diseases are linked to unhealthy and deteriorating environment. Though the concept of wellbeing is more linked to individual state than with environment yet ecological and biological integrity cannot be ignored while understanding the concept of wellbeing. Unwell environment is one that is degraded and unwell human being is one who is suffering or having symptoms of mental or physical illness. So wellbeing is a juxtaposed between the bio physical environment and socio economic environment of a human being (Fig: 1).

Food security is closely linked to food wellbeing. It one of the important components to build the understanding of happiness or satisfaction linked to food well being. The Food and Agriculture Organization defines food security as a "situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". Food security is an important element in the multi-factorial systems analysis of health and well being. The interaction between food supply and other important factors making up the system can shed light on individual and population health (Jaron and Galal, 2009). The State of Food Security and Nutrition in the World (SOFI) report shows that India retains the dubious distinction of being the country with the largest population of food insecure people. About 27.8% of India's population suffered from moderate or severe food insecurity in 2014-16, the proportion rose to 31.6% in 2017-19. The number of food insecure people grew from 42.65 crore in 2014-16 to 48.86 crore in 2017-19. India accounted for 22% of the global burden of food insecurity; the highest for any country, in 2017-19(SOFI report, 2019) In 2018, India was ranked 103 out of 119 countries. In 2000, the country was ranked 83 out of 113 countries. India is ranked 102 of 117 countries in the Global Hunger Index 2019, behind its neighbours Nepal, Pakistan and Bangladesh. (GHI, 2018) . India had also been witnessing a pre-pandemic slowdown, the current pandemic has "magnified pre-existing risks to India's economic outlook" (World Bank, 2020).

Food wellbeing is not only about the calorie consumption it is rather about nutrition intake through indigenous easily available and affordable food. From individual to society, food is an integral part of the system. Despite public sensitivity and the availability of enough food and scientific knowledge on nutrition and health, it is not clear that we are eating better. On the contrary, new disorders such as childhood obesity have appeared, and we find ourselves before a profusion of alternatives about what a balanced diet really is, placing us at a crossroads where it is difficult to make correct decisions about what we ought to eat (Bendez and menito, 2021). The studies suggest excess of calories lead to obesity and linked health problems on contrary less calorie consumption is linked to underweight , low Body Mass Index and related health problems.

The aim of the paper is to prepare a wellbeing index of India at state level. The objectives are:

1) To prepare wellbeing index by taking selected socio-economic, health and environmental variables into consideration.
2) To assess the food wellbeing situation by taking calorie consumption, overweight, underweight, stunted and wasted population, anaemic population into consideration.
3) To understand the relationship between the indicators of food wellbeing and socio- economic wellbeing.

2. Measuring Socio-economic Well-being

Being a complicated and multifaceted concept, wellbeing is difficult to measure based on few indicators. However, if society is composed of diverse individuals living in an uncertain world who typically "live in the present, anticipating the future," each individual's estimate of national economic well-being will depend on the net accumulation of productive resources, broadly defined—which Dasgupta (2001) has called "genuine investment." GDP is a market income flow measure, which does not reveal the proportion of national income saved for the future. As well, consideration of the aggregate savings rate of market goods omits trends in many crucially important assets—such as the environment, research and development or human capital (Osberg, et.al, 2010).

Wellbeing has been measured by different parameters and methodology over the period of time in the form of Human Development Index (HDI), Quality of Life, Happy Planet Index etc. All these indexes are based on varied indicators but focus on one goal, i.e. measuring Wellbeing. To scroll the different indexes and their indicators, HDI measures a nation's achievement in three dimensions of human development: long and healthy life (indicated by life expectancy at birth), knowledge (indicated by literacy and school enrolment rates), and decent standard of living (indicated by GDP per capita). Happy Planet Index (Source: New Economics Foundation) HPI measures the ecological efficiency with which human wellbeing is delivered. It is calculated by multiplying indices of life satisfaction (estimated by compiling responses to international surveys) and life expectancy and dividing that product by ecological footprint. India sands 133 out of 156 countries on United Nation 2018 World Happiness Report. The wellbeing study disclosed that "The life satisfaction of individual correlates with income, health, employment, education as well as positive moods freedom and beliefs about the benefits of the work" (as reported in executive summary of Happiness Report 2018). Sustainable living is a lifestyle that attempts to reduce an individual's or society's use of the Earth's natural resources and personal resources. Quality of life: an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment. Ecological Footprint (Source: Global Footprint Network) The Ecological Footprint measures how much land and water area a human population

requires to produce the resources it consumes and to absorb its wastes under prevailing technology.

3. Data base and Methodology

The present paper is based on secondary data acquired from various published sources and official websites like Statistical Abstract of India 2017, Statistical Year Book, 2017, Desertification and Land degradation Atlas of India, Report of Crime in India (2016), http://mospi.gov.in/publication/envistats-india-2019, Health Report of India 2019; India: Health of the Nation's States, ICMR, 2018, Ministry of Health and Family Welfare.

The data is obtained for all 29 states and 7 Union territories (taking Jammu and Kashmir as state as data for all the indicators for 2019/2020 is not available). The variables are standardized by calculating z scores. Then the ranking method has been used to form a composite index. The composite index method is used to do final assessment for each state and the results are illustrated through method of thematic maps.

Selection of indicators: The performance of indicators of well- being is divided into two broad categories: 1. Socio economic Wellbeing and 2. Health and Environmental wellbeing. The indicators are also selected on the basis of availability of data for all the states and Union Territories.

To measure socio economic wellbeing, nine indicators have been taken into consideration namely, Gross Enrolment Ratio, Crime rate, recognizable Crime against women, suicide mortality rate, unemployment ratio, family owning houses, homeless population, per cent of people below poverty line, NSDP (Net State Domestic Product) per capita, registered vehicles.

Health and Environmental well- being is measured by eleven indicators, namely, Infant Mortality Rate, Life expectancy, Vaccination coverage of population, Stunted, wasted and underweight population, Death rate, per cent of women with hypertension, per cent of men with hypertension, per cent of women reported asthma, per cent of men reporting asthma, percentage of forest area, percentage of land degradation. First rank is given to the best performer for each indicator. The ranks are then aggregated and analysed for socio-economic well-being and health and environmental wellbeing, respectively. The ranks are added and divided by number of indicators and again ranked in the same manner i.e first rank to the best performer. MS Excel has been used to rank the indicators. Finally, a composite index has been formed to create a wellbeing index from all twenty indicators. At places where the states were performing equally on dense ranking system has been adopted. The states with equal performance share the same rank and the next gets the next i.e. +1 rank. Finally, the class intervals have been formed and states are clubbed for their performance in high, medium, low and extremely low level of wellbeing.

To understand food wellbeing situation in India various indicators have been examined like calorie consumption, underweight and overweight population and anaemic population. The data has been analysed and depicted through maps. The correlation analysis has been done by taking into consideration various variables of food wellbeing and socio economic factors.

The limitations of the study are lack of comparable data for some indicators, therefore they are not considered for evaluation. At very few places where data is not available for a particular year or indicator for a particular state thus the data span taken is from 2015-19.

1) Socio- Economic Wellbeing

Various social and economic factors that determine the wellbeing level of all states are assessed and compared for better understanding. The Gross enrolment ratio refers to the total number of students enrolled in each level of education A high GER indicates that the state can reach out and involve all its school age population. GER to some extent reflects the progress in education, where education is one of the best indicators of enabling population to grab knowledge and ensuring their future to some extent. The data shows that Lakshadweep, Himachal Pradesh, Chandigarh, Tamil Nadu, Kerala and Delhi have extremely high i.e above 78. Meghalya, Assam, Nagaland, Daman and Diu and Bihar have lowest enrolment ratio i.e below 45 GER.

Criminal activities reflect the mental and physical condition of an individual. Crime is any activity which is punishable by law. The data shows that cognizable crime rate is very high in Delhi, Assam, Haryana, Karnataka, Telangana and Kerela. While the crime rae is low in union territories of Lakshadweep, Dadar Nagar Haveli and Daman and Diu. The states of Uttrakhand, Jharkhand, Meghalaya, Nagaland, Manipur and Tripura also experience lower rate of crime. Crime against women is one of the most important indicators to reflect gender biased society and partial and imbalanced development in different sections of society. According to Crime in India 2016, recognizable crime against women is high in states of Delhi, Rajasthan, Haryana, Telengana, Odisha and Assam and low in states of Nagaland, Manipur, Tamil Nadu, and Union territories of Puducherry and Dadar Nagar Haveli. Another important factor to analyse is suicide mortality rate, it is high in Kerela, Chattisgarh, Sikkim, Puducherry, Dadar Nagar and Haveli and Anadam and Nicobar islands.

Suicide is an unnatural death in which the intent to die originated within the person; reason may be specified or unspecified by the person (ADSI, 2012). India accounts for a large proportion of all suicide deaths globally. According to Global Burden of disease study 2018, Suicide was the most common cause of death in age group of 15-39 years. Suicide rate can in way reflect mental health and social wellness. The states of Sikkim, Chattisgarh, Telengana, Tamil Nadu and Union territories of Chandigarh, Puducherry and Dadar Nagar Haveli have high suicide mortality rate. It is lower in Mizoram, Manipur, Nagaland, Bihar, Uttar Pradesh and Jammu and Kashmir, Jharkhand (refer fig 2).

Unemployment is a very relevant indicator of wellbeing. It shows the economic and social status of people. It also reflects their affordability level and it is also related to income, housing, food, social acceptance etc. High

unemployment rate means low wellbeing level. Observing at the data of unemployment rate, it is high in states of Goa, Manipur, Nagaland, Tripura, Andaman and Nicobar islands. It is low in states of Meghalaya, Sikkim, Chattisgarh, Dadar Nagar and Haveli and Gujarat. Unemployment rate is low in Gujarat, Meghalaya, Sikkim, Dadar Nagar Haveli and Daman and Diu. Owning a house is a symbol of security and protection. It also gives a feeling of satisfaction and thus can be considered as an important indicator of wellbeing. Percentage of family owning house is high in Bihar, Jammu and Kashmir, Uttar Pradesh, Rajasthan, Manipur whereas it is low in Andaman and Nicobar Islands, Puducherry, Chandigarh, Sikkim, Mizoram and Dadar Nagar and Haveli. Census of India consider homeless population to be those people who stay in pavements, roadside, railway platform, staircase, temples, streets, pipes and other open spaces. The homeless population in any state shows that people are insecure and uncertain about present and future. It is understood, more the homeless population lesser the level of wellbeing. People are either is high in Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, and Goa. It is low in Puducherry, Dadar nagar and Haveli, Lakshadweep, Anadaman and Nicobar Islands, Mizoram and Delhi.

According to Brooking report India's 5.5 per cent of population lives under extreme poverty. As per Suresh Tendulkar Committee report, the population below poverty line in India was 21.9 percent in 2011-12. According to estimation of The Asian development Bank, 2018, about 6.8 percent of population in India lives below national poverty line and and three percent in extreme poverty. India's official threshold of poverty line is Rs. 26 per day in rural areas and Rs. 32 per day in urban areas. Percentage of people below Poverty line is high in Odisha, Chhatisgarh, Jharkhand, Bihar, Arunachal Pradesh, Dadar Nagar Haveli. It is low in Sikkim, Kerala, Goa, Andaman and Nicobar Islands, Lakshadweep and Himachal Pradesh. More the population living below poverty line lesser is the wellbeing level (refer fig 3).

National State Domestic Product (NSDP) is a good measure of economic development. It is calculated by deducting the consumption of fixed capitals from the Gross Domestic product. According to Reserve Bank of India, NSDP 2018, is high in Goa, Delhi, Sikkim, Chandigarh, Haryana, Puducherry and Karnataka. It is low in states of Bihar, Uttar Pradesh, Madhya Pradesh, Jharkhand, Manipur, Assam and Meghalaya (refer fig 4).

Number of registered vehicles per total population shows affordability level and mobility factor in the state that is important for development. Registered vehicle is high in in Goa, Delhi, Chandigarh, Puducherry, Dadar Nagar Haveli, Daman and Diu. The value is low in Meghalya, Assam, Tripura, Jharkhand, West Bengal and Bihar.

The overall social wellbeing has been worked out by creating index on the basis of the performance of each state and union territory on each parameter. It has been found that high socio-economic wellbeing can be identified in states of northern India mainly, Jammu and Kashmir, Himachal Pradesh, Punjab, Uttrakhand, Uttar Pradesh, Kerala, Tamil Nadu, Bihar and Lakshadweep. Medium level of socio-economic wellbeing is in Gujarat, Goa, Sikkim, Meghalaya, Nagaland, Puducherry, Manipur, Delhi and Chandigarh. The states of Rajasthan, Maharashtra, Andhara Pradesh, Jharkhand, West Bengal and Mizoram have low level of socio-economic wellbeing. The states that are performing worst on these indicators are Haryana, Madhya Pradesh, Karnataka, Telengana, Odisha, Chattisgarh, Assam, Arunachal Pradesh and Tripura (refer fig 5).

2) Health and Environmental Wellbeing

Forests are the lungs of a region. They are considered as one of the major factors of controlling floods, droughts and maintaining climate of an area. They are store house of resources and especially useful for development of an area. Considering the forested area, states and UT of Lakshadweep, Andaman and Nicobar, Mizoram, Manipur, Arunachal and Meghalaya have very high forest cover. Very low forested area is in Punjab, Haryana, Uttar Pradesh, Rajasthan, Gujarat and Bihar. Land degradation is another important environmental factor that effects the agricultural production and availability of soil for various purposes. Land degradation is low in Punjab, Uttar Pradesh, Arunachal Pradesh, Bihar, Lakshadweep an Andaman and Nicobar islands. It is high in states of Jharkhand, Rajasthan, Maharashtra, Goa, and Nagaland.

Infant Mortality Rate is considered to be an important indicator of Human Development Index. It reflects the health facilities as well as the nutrition level of a region. IMR is low in Kerala, Goa, Puducherry, Manipur, Puducherry, Sikkim, Nagaland and Tamil Nadu. IMR is high in Assam, Meghalaya, Odisha, Madhya Pradesh, Rajasthan and Uttar Pradesh. Life expectancy i.e number of years a person is expected to live. It is high in Kerala, Delhi, Uttrakhand, Himachal Pradesh, Punjab and Maharashtra. It stands low in North eastern states of Meghalaya, Assam, Arunachal Pradesh, Tripura, Mizoram and Nagaland. Death Rate is high in Kerala, Odisha, Chattisgarh and Madhya Pradesh. It is low in Delhi, Dadar Nagar and Haveli, Mizoram, Nagaland, Manipur and Sikkim. High life expectancy and low Infant Mortality Rate depicts higher wellbeing.

Vaccination strengthens our immune system and prevents us from various diseases. Therefore, it's important that vaccinations are put to all section of people irrespective of income, gender, religion, caste etc. Vaccination coverage is high in Puducherry, Lakshadweep, Punjab, Goa, West Bengal and Sikkim. It is low in Assam, Arunachal Pradesh, Nagaland, Uttar Pradesh, Gujarat and Dadar Nagar Haveli (refer fig 6).

Stunted, wasted and underweight population is high in Madhya Pradesh, Jharkhand, Delhi, Gujarat and Rajasthan. It is low in Manipur, Mizoram, Kerala, Sikkim, Jammu and Kashmir, Daman and Diu, Lakshadweep, Andaman and Nicobar Island. This section of people highlights the undernourishment, inadequate food consumption and unhygienic conditions in the society. Such factors lead to low body weight or improper growth in children and adults. This is one of the major challenges to wellbeing.

Hypertension is a lifestyle disease, which is prevalent in both males and females. It is caused due to faulty food habits, sedentary lifestyle or stress. Percentage of women in hypertension is high in Uttrakhand, Uttar Pradesh, Rajasthan, Kerala, Tamil Nadu, Arunachal Pradesh, and Nagaland. It is low in Delhi, Odisha, Daman and Diu, Dadar Nagar Haveli, Puducherry, Meghalaya, Assam and Lakshadweep, Chandigarh. Percentage of men in hypertension is high in Andaman and Nicobar, Uttar Pradesh, Uttarakhand, Kerala, Arunachal Pradesh and Nagaland. It is low in Delhi, Assam, Meghalaya, Daman and Diu, Odisha, Madhya Pradesh and Gujarat.

Asthma or breathlessness is caused due to several factors. One of the major factors is polluted air or poor ventilation in houses or working places. The greater number of asthma patients reflect poor working conditions, poor ventilation or poor air quality. As proven by various research stress can be both a cause and effect of asthma. Women reporting Asthma is high in Kerala, Tamil Nadu, Telengana, Andhra Pradesh, West Bengal. It is low in Daman and Diu, Lakshadweep, Andaman and Nicobar island, Assam, Jharkhand and Chattisgarh, Jammu and Kashmir, Rajasthan. Men reporting Asthma is high in Tamil Nadu, Andhra Pradesh, Odisha, West Bengal, Delhi and Chandigarh. It is low in Goa, Chattisgarh, Arunachal Pradesh, Tripura, Manipur, Lakshadweep and Andaman and Nicobar islands.

The overall Health and Environmental indicators show that Jammu and Kashmir, Punjab, Goa, Sikkim, Puducherry, Dadar Nagar Haveli and Lakshadweep have high level of HEW. It is followed by Himachal Pradesh, Haryana, Kerala, Manipur, Mizoram, Assam, Delhi, and Chandigarh. States and Union Territory of Uttarakhand, Maharashtra, Karnatka, Tripura, Meghalaya, Tamil Nadu, West Bengal, Bihar and Arunachal Pradesh have low level of HEW. The lowest level of hew ies in Uttar Pradesh, rajasthan, Gujarat, Madhya Pradesh, Telangana, Nagaland, Andhra Pradesh, Odisha, Jharkhand (refer fig 7).

3) Wellbeing Composite index

Wellbeing is a vast concept and need multiple indicators to depict the real status of a region or state. A composite index has been formulated by taking multiple factors into consideration. These factors are ranked and then analysed all together for their performance. The overall performance is ranked again to find a composite rank for each state. The states are then categorized based on their performance from high to very low level. Overall, the Wellbeing level is high in states of Jammu and Kashmir, Himachal Pradesh, Punjab, Goa, Kerala, Sikkim, Manipur, Puducherry, Daman and Diu and Lakshadweep. These states are followed by Uttrakhand, Tamil Nadu, Bihar, Meghalaya, Delhi, Chandigarh, Dadar Nagar Haveli and Andaman and Nicobar islands. The states of Haryana, Uttar Pradesh, Gujarat, Maharashtra, Karnataka, Chattisgarh, Jharkhand, West Bengal, Nagaland and Mizoram have low level of wellbeing. Very low level of well being can be observed in Rajasthan, Madhya Pradesh, Odisha, Assam, Arunachal Pradesh and Tripura (refer fig 8).

4) Food Wellbeing

The assessment of food wellbeing of the country has been understood by taking 4 broad parameters under consideration namely food availability, food affordability, stability and food consumption.

Food Availability: agricultural production; Food affordability: people below poverty line and per capita NSDP, percentage of agricultural household indebted; Food stability: Crop area insured under all insurance schemes; Food Consumption: Daily calorie intake per head per day, Underweight population and overweight population. Since data linked to satisfaction and happiness in context to food is not available, therefore, under weight and over population has been taken into consideration with the understanding that people with under or over weight are mostly unhealthy. Many psychological parameters like happiness level or satisfaction level is also linked to such conditions.

Food availability is one of the major parameters of assessing food security. The per capita net availability of food grains in India is around 180 kg/year or 494 gm/day. The net availability of food grains is estimated to be Gross Production (-) seed, feed & wastage (-) export (+) import (+/-) change in stocks. The net availability of food grains divided by the population estimates for a particular year indicates per capita availability of food grains in terms of kg / year. Net availability, thus, worked out further divided by the number of days in a year i.e. 365 days, which is taken as net availability of food grains in terms of gram/day. Figures in respect of per capita net availability given above are not strictly representative of actual level of consumption in the country especially as they do not take into account any change in stocks in possession of traders, producers and consumers. Cereals include rice, wheat and other cereals, Pulses include all kharif and rabi pulses. Here, food grains include rice, wheat, other cereals and all pulses (Pocket book of agricultural statistics of India 2018).

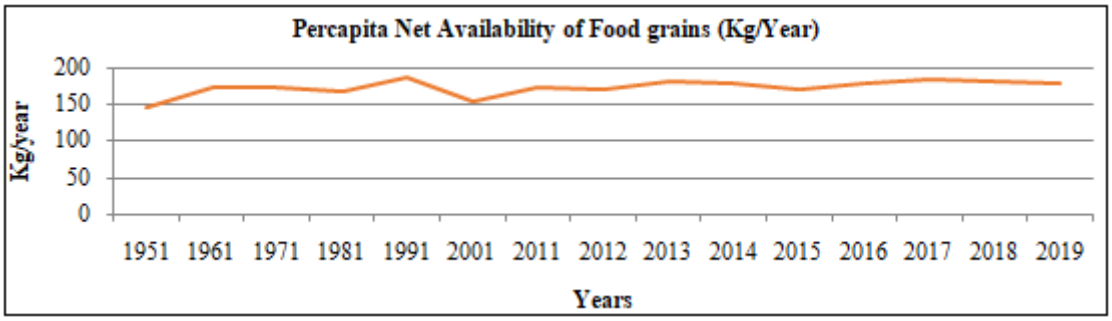


Figure 9: Per capita Net Availability of Food Grains
Source: Pocket book of agricultural statistics of India 2018

India is self-sufficient in food crops especially rice and wheat. Both are considered to be staple diet. India is the world's largest producer of milk, pulses and millets, and the second-largest producer of rice, wheat, sugarcane, groundnuts, vegetables, fruit and cotton. Figure 10 show that India has self sufficiency in milk production. The per capita availability of milk has increased from 178 gm/day in 1991 to 375 gm/day to 2021.

Despite remarkable improvement in food availability, millions suffer from moderate to severe food insecurity. So though availability is an important indicator but there are many more indicators to be assessed in order to understand the extent of food insecurity.

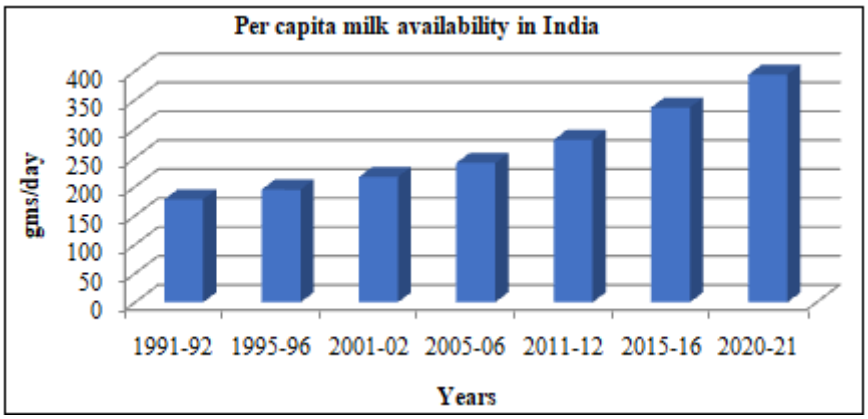


Figure 10: Per capita milk availability in India
Source: National Dairy Development Board 2020

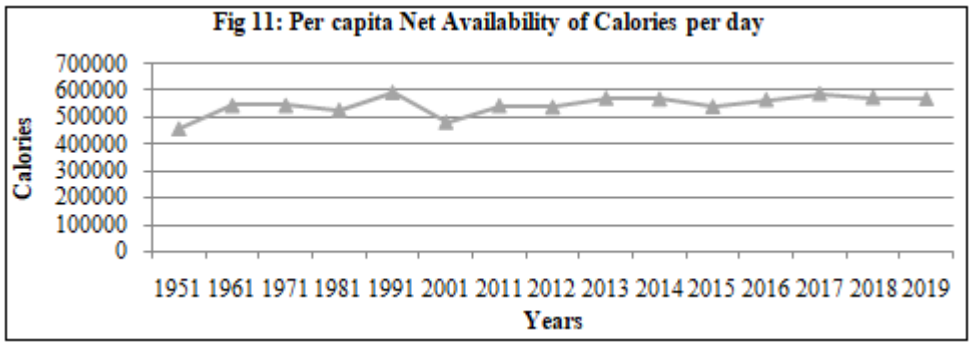


Figure 11: Percapita Net Availability of Calories per Day
Source: Ministry of Health and Family Welfare, 2018

On assessing the per capita net availability of calories per day we find that it remained stable from 2011 onwards. From 1263 calories per day in 1951 it rose to 1573 in 2013 and then it got stabilised it is 1569 calories per day in 2019. Therefore, just food availability is not showing a true scenario of food security in India.

Food wellbeing could also be understood by the type of economic activity a person is involved in, as it shows ones affordability level. Regular wager has more stable income than casual labour. A regular wager is more likely to have a fixed income and stability that ensures fixed amount of food consumption for him and his household members.

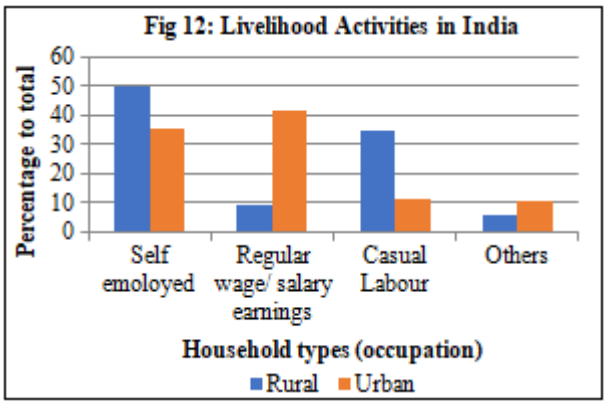


Figure 12: Livelihood activities in India
Data source: Pocket book of agricultural statistics of India 2018

Fig 12 shows that in rural areas more people are self employed and casual labourers. Regular wagers are more in urban areas of India. Therefore, urban areas assure much more stability of income than rural areas and that can be the probable reason of migration of rural to urban. This reflects the affordability factor in rural and urban India. But urban unemployment is worse than rural as people have higher

cost of living on one side and lack of income on other side. But educated skilled worker compromises with underemployment and unskilled and uneducated workers are being exploited by getting below Minimum wage payment limit set by the government.

The state level distribution of percentage of people below poverty line shows that as one moves from west to east the people below poverty line increases. In states of Arunachal Pradesh, Assam, Bihar, Chattisgarh, Manipur, Odisha and Madhya Pradesh have very high percentage i.e more than 30 per cent people below poverty line. In states like Goa, Kerala, Punjab, Sikkim, Delhi, Lakshadweep and Chandigarh it is less than 10 per cent.

Per capita per day NSDP (Net State Domestic Product) data shows that some states have fairly higher levels of NSDP are namely, Goa, Delhi, Sikkim, Himachal Pradesh, Haryana and Gujarat, where it is more than Rs. 2000. In states of Bihar, Uttar Pradesh, Jharkhand and Assam it is less than Rs. 1000 per head per day.

Percentage of Agricultural household indebted data reflects that the states where farmers are under debt and therefore can be considered to be under financial burden. The percentage of household under debt is high in Andhara Pradesh, Sikkim, Rajasthan, Jharkhand and Jammu and Kashmir, where it is more than 75 percent. Maharashtra, Manipur and Meghalaya has less than 10 percent.

To understand the surety and stability of production, the data has been analysed for crop area insured under all insurance schemes. The percentage of area is high in states of West Bengal Chhattisgarh and Goa. The farmers in these areas are aware and do crop insurance so that they are financially secure even if their crop fails. The area under crops insured is almost zero or negligible in Assam, Bihar, Gujarat, Himachal, Jammu and Kashmir, Kerela, Madhya Pradesh, Sikkim and Tamil Nadu.

In relation to consumption of calories, the data shows that the calorie consumption is comparatively lower in states of Meghalaya, Arunachal Pradesh, Assam, Chattisgarh and Manipur. The states with high calorie consumption i.e more than 2500 calories per day per head Goa, Uttrakhand, Himachal Pradesh, Jammu and Kashmir, Kerela, Punjab and Rajasthan

5) Relationship of various variables

Food wellbeing cannot be examined in isolation. It has to be integrated with concept of socio-economic wellbeing and Health indicators. Various socio economic conditions help in food accessibility and affordability factor. Income enables people and reflects their purchasing power. The present Indian society is divided between haves and have-nots. The job security or income security can lead to food security. The study examines the correlation between per head per day NSDP, people below poverty line and unemployment level, to average calorie intake per head per day. The matrix shows that there is a positive correlation between unemployment rate and percent of people below poverty line. The table also shows that as the percent below poverty line increases the stunted, wasted and underweight population increase and daily calorie intake decreases. Similarly as the unemployment rate and percent of people below poverty line increases the daily per head per day calorie intake decreases.

The correlation matrix shows there is a positive relation between NSDP per capita and daily calorie intake. Household food security is a function not only of availability of food but also of the purchasing power available with each household. It has now been well established that at the global level availability of food is not a problem. Even at our national level, availability of foodgrains is not the real problem; it is prevailing poverty amongst a large number of household that comes in the way of achieving households' food security. There may be abundance of food but it is no help to the poor households if it has no access to that (FAO, 2019).

Table 1: Socio- Economic indicators and Food wellbeing indicators

	under weight population	*over weight population*	*family owning houses*	*NSDP percapita*	*Daily calories intake per head per day*	*Percent of Hypertension*	*crime rate*	*Suicide rate*
Under weight population	1							
Over weight population	-0.01119	1						
family owning houses	0.190761	-0.47058	1					
NSDP percapita	-0.0837	0.682226	-0.63932	1				
Daily calories intake per head per day	-0.00822	0.16746	0.29378	0.088479	1			
Percent of Hypertension	0.108835	-0.25515	-0.06401	-0.01734	0.019411	1		
crime rate	0.039851	0.65718	-0.17517	0.357007	0.031333	-0.43819	1	
Suicide rate	0.093217	0.130906	-0.28281	0.447684	-0.19052	0.024667	0.184952	1

There is a positive relation between enrolment in school and daily calorie intake. India runs many schemes like Mid -day meal scheme in which students get free food in school. This was done to encourage school enrolment ratio and nutrition security to all. There is a positive relationship between calorie intake and family owning houses. Hypertension is linked positively to under weight population, family owning houses. It is negatively correlated with over weight population and NSDP per capita (Table 1)

Table 2: Health indicators and Food wellbeing indicators

	IMR	*Vaccination coverage*	*stunted, wasted and underweight*	*life expectancy*	*death rate*	*Daily calories intake per head per day*	*iron deficiency*
IMR	1						
Vaccination coverage	-0.36188	1					
stunted, wasted and underweight	0.411076	-0.176881932	1				
life expectancy	-0.34617	0.586285576	0.127817	1			
death rate	0.468426	0.179653665	0.108213	0.133913784	1		
Daily calories intake per head per day	0.026328	0.253408086	-0.06586	0.534018926	0.188892048	1	
iron deficiency	0.728504	-0.136521074	0.692959	-0.065887121	0.316597182	-0.051290783	1

Iron deficiency has a positive correlation Infant mortality rate, death rate and calorie intake. The data analysis shows that if iron deficiency is high life expectancy is low. The vaccination coverage increases Infant mortality rate decreases. Most of the vaccinations are administered in early period of birth of a child. India has the largest vaccination programmes and its successful implementation leads to fall in Infant Mortality Rate. The positive relationship is observed between daily calorie intake and Life expectancy. There is a negative correlation between calorie intake and death rate too (Table :2). States with higher calorie intake have lower death rates in Indian states.

4. Conclusion

Wellbeing index has helped to compare the positions or ranks of all states on different variables. This kind of exercise helps the policy makers to identify and work on the real challenges of the states. The three states i.e Rajasthan, Madhya Pradesh and Odisha, that are large in size as well as population but lowest in wellbeing level. Rajasthan lies in category of very low wellbeing index. Rajasthan has highest homeless population in India. It has high land degradation, crime rate, crime rate against women, hypertension among men and women. Rajasthan is also among low vaccination coverage states. Similarly Odisha has one of the highest percentages of population under poverty line. Recognisable crime against women is also very high in Odisha. Hypertension among population is not very high but people suffering from asthma are higher. Death rate and Infant Mortality Rate is comparatively much higher than other states. State of Madhya Pradesh has lower school enrolment ratio, lower NSDP per capita, high homeless population and crime against women.

Infant Mortality Rate is highest in Madhya Pradesh. Stunted, wasted and underweight population is highest in Jharkhand followed by Madhya Pradesh (refer table 3)

High wellbeing is generally associated with happiness and longevity of life. Food being the integral part of individual, social or economic system, therefore, other variables of wellbeing cannot be separated from food wellbeing. Healthy body reflects the quantity and quality of food consumed. The body with ideal weight generally lacks diseases and reflect mental and physical fitness. Wellbeing index and food variables presented in this paper can be beneficial to policy measures and strategising resource management in the states. The holistic development and wellbeing of society has to be achieved by considering food security or nutrition wellbeing into consideration.

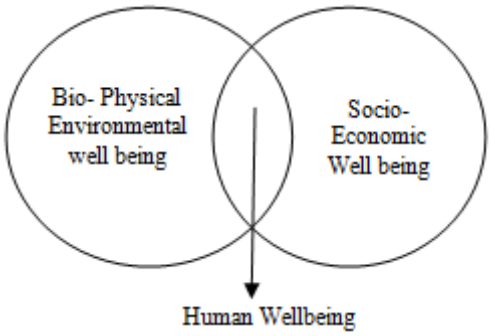
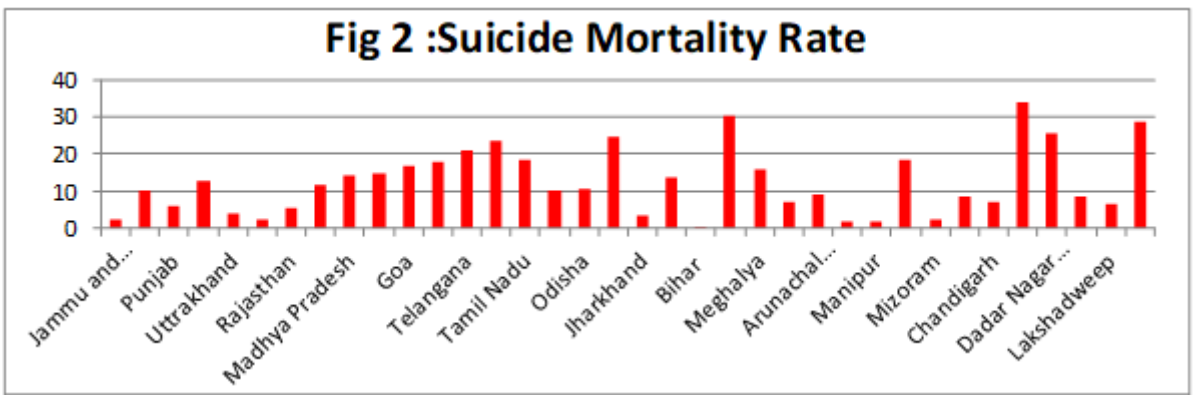


Figure 1: Wellbeing: An association of bio-physical environment and Socio-Economic wellbeing



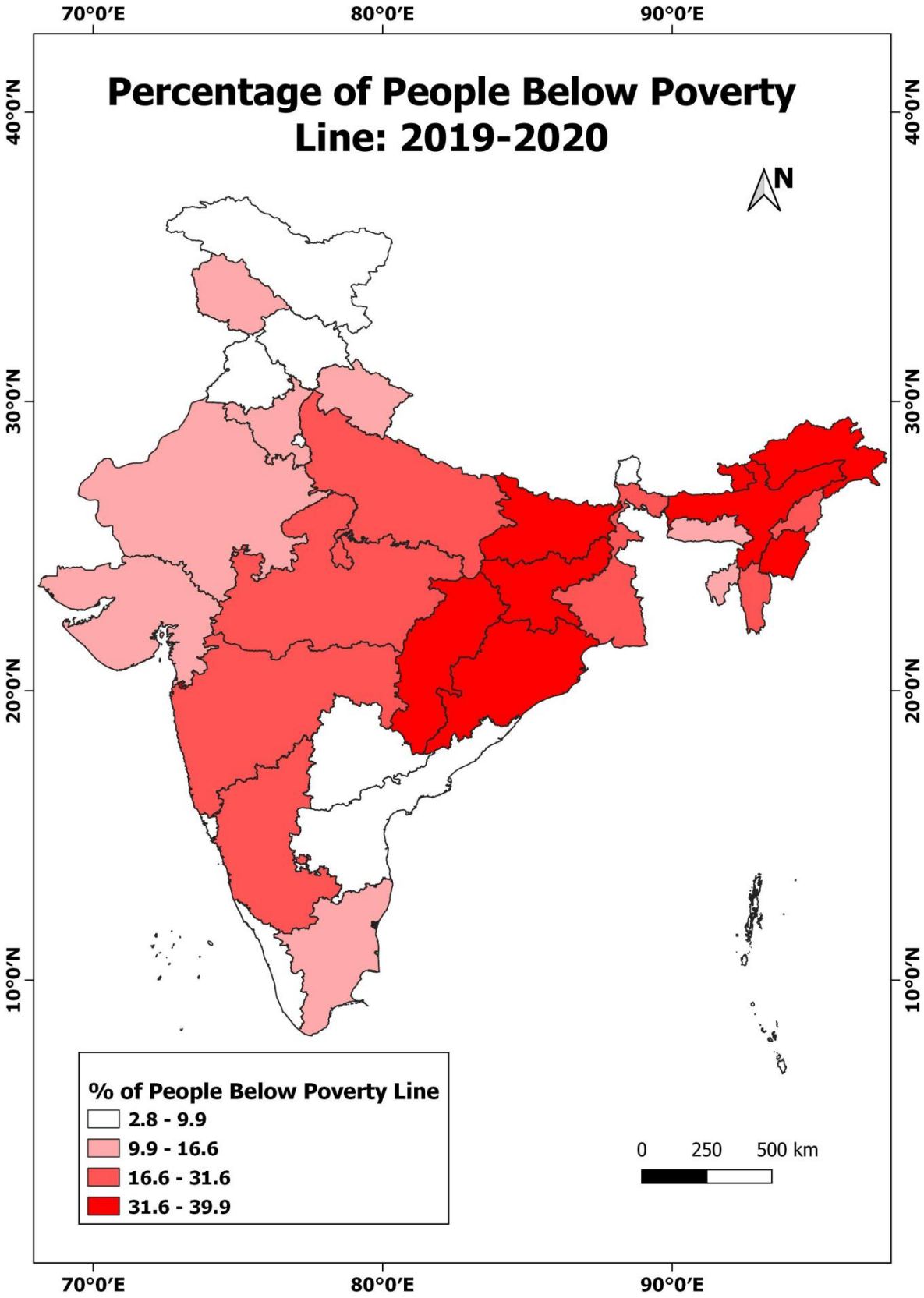


Figure 3: Percentage of Population below poverty line

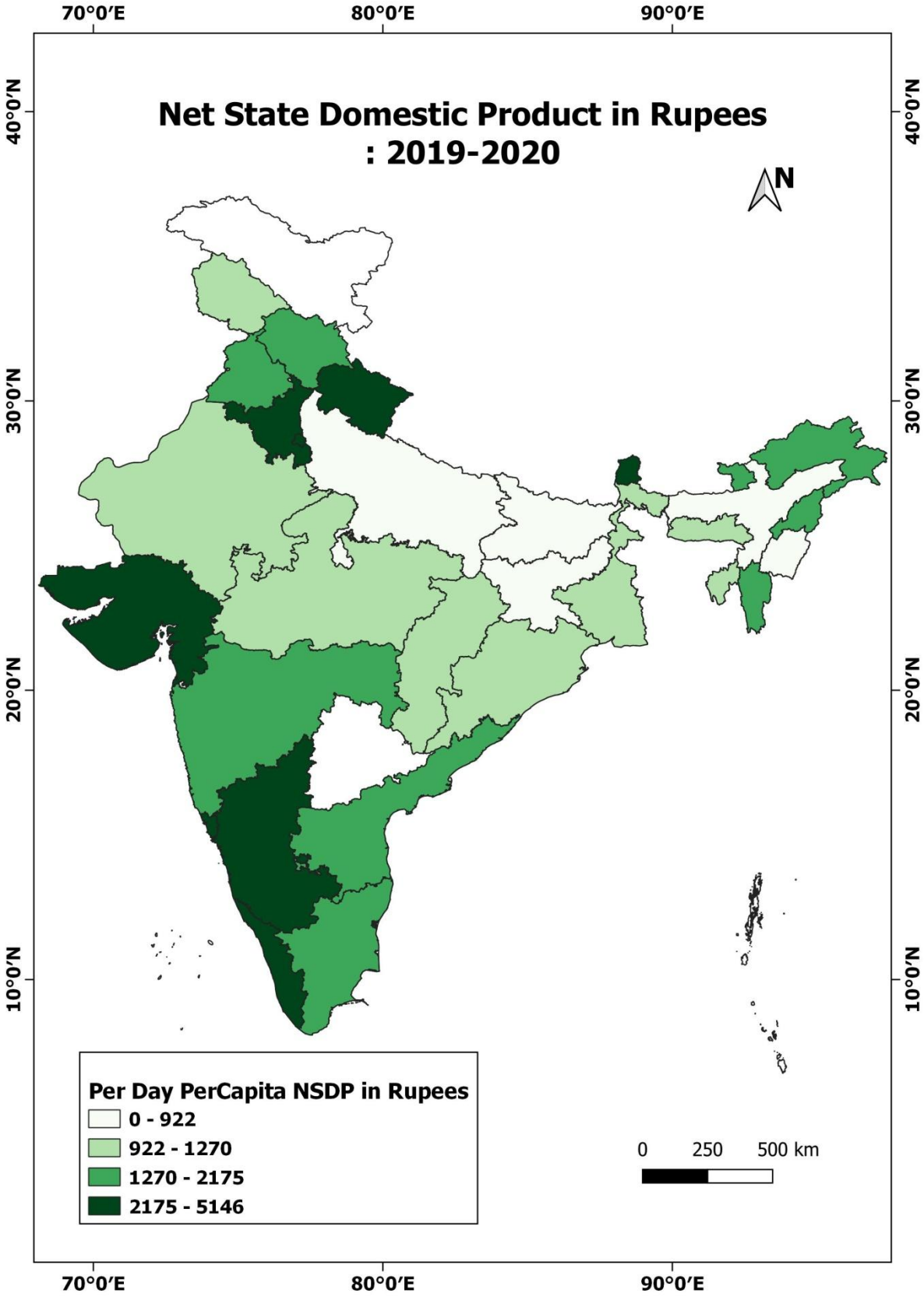


Figure 4: Distribution of Net State Domestic Product

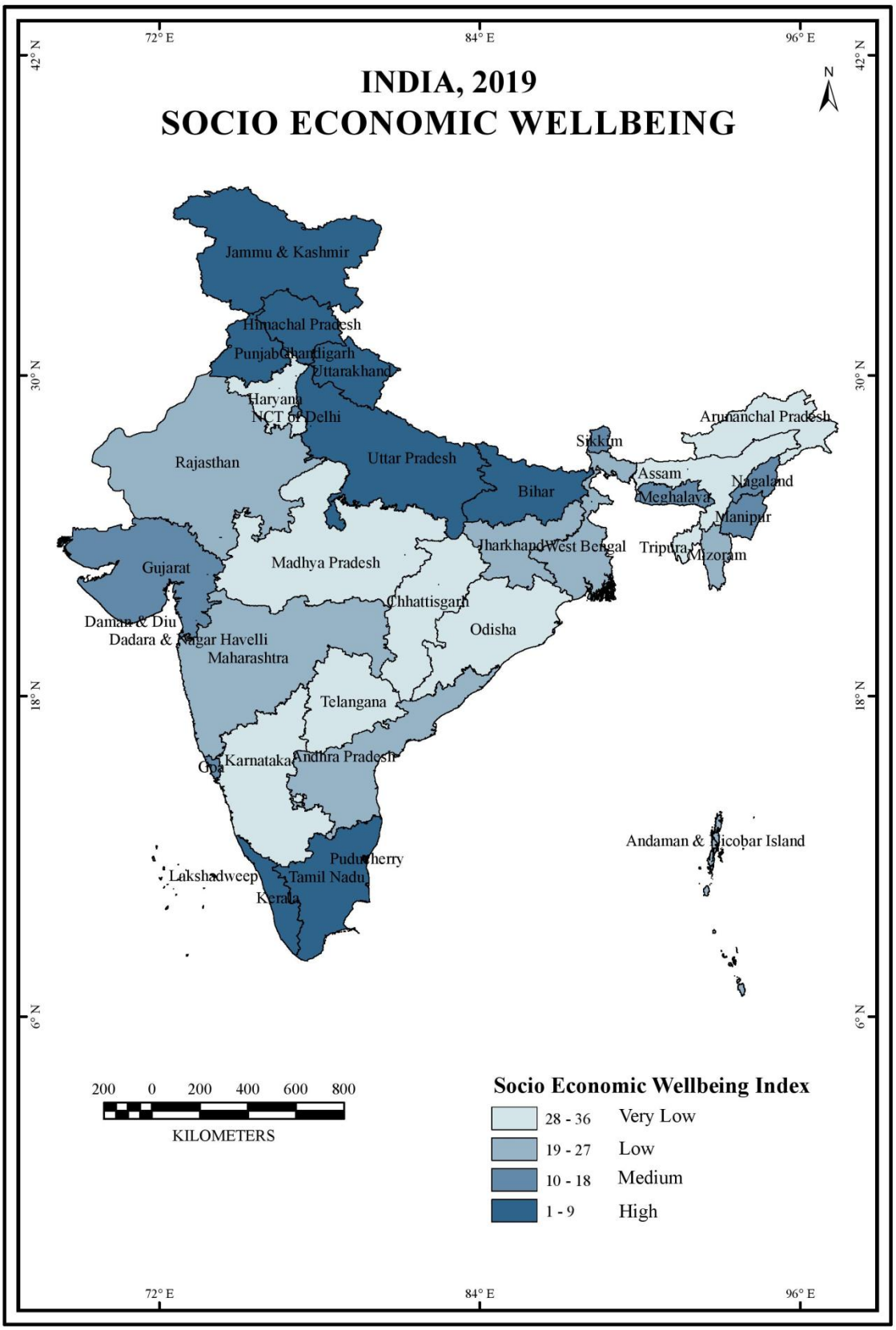
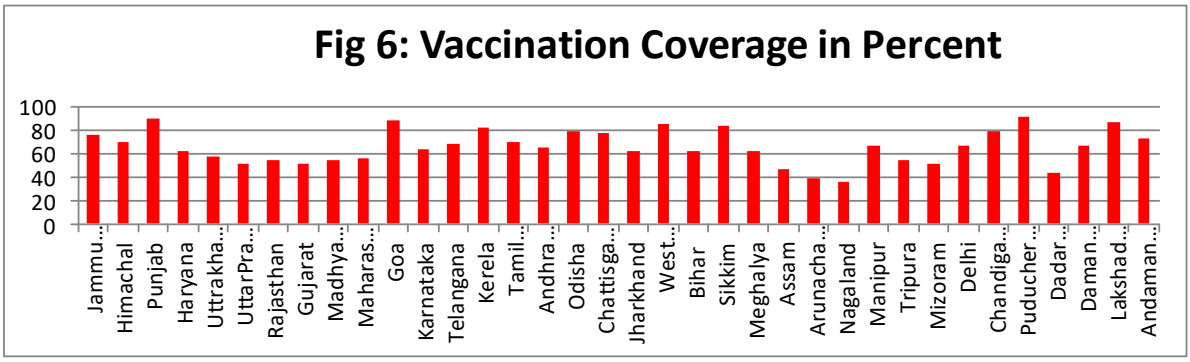


Figure 5: Socio Economic Wellbeing Index



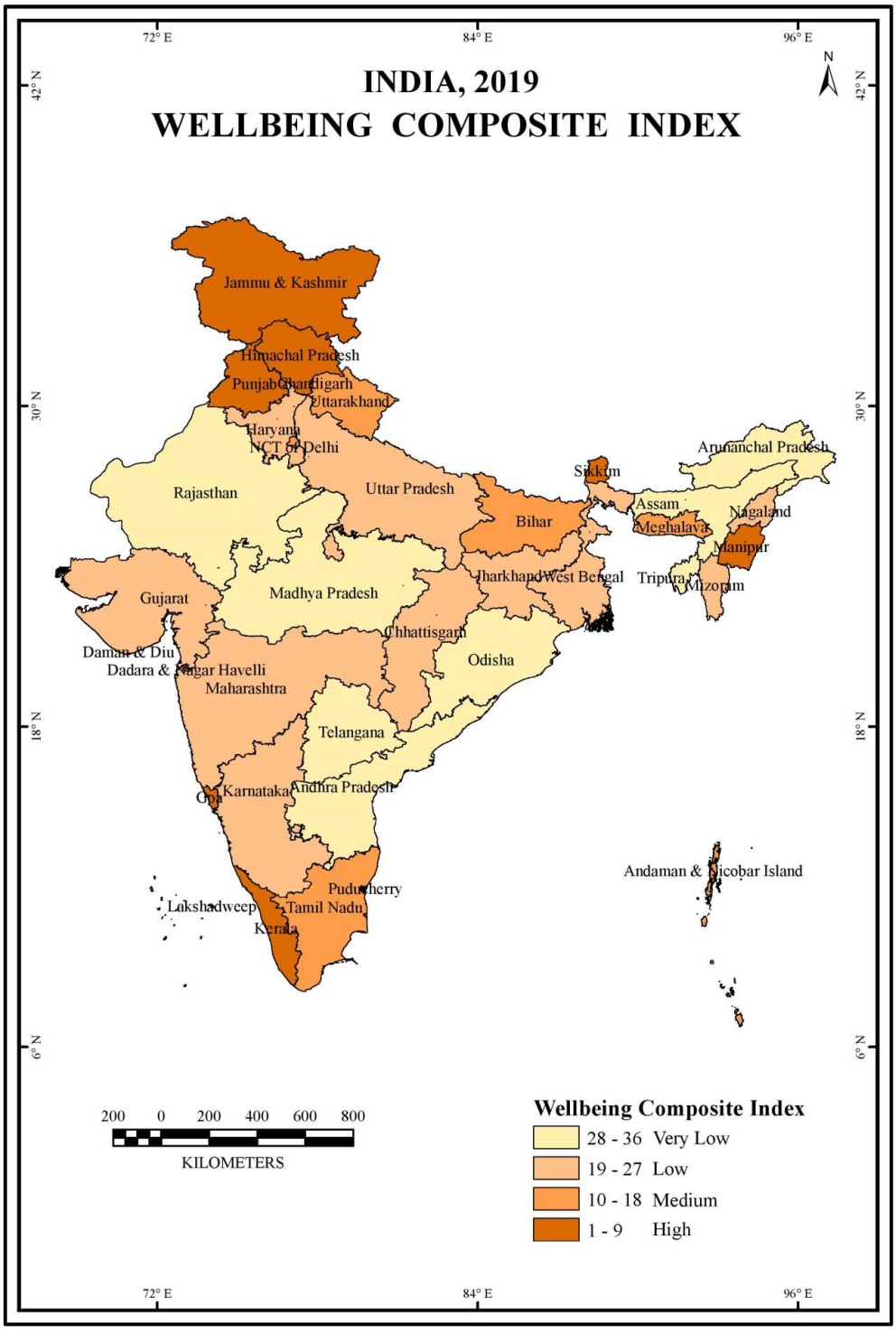


Figure 8: Wellbeing Composite Index

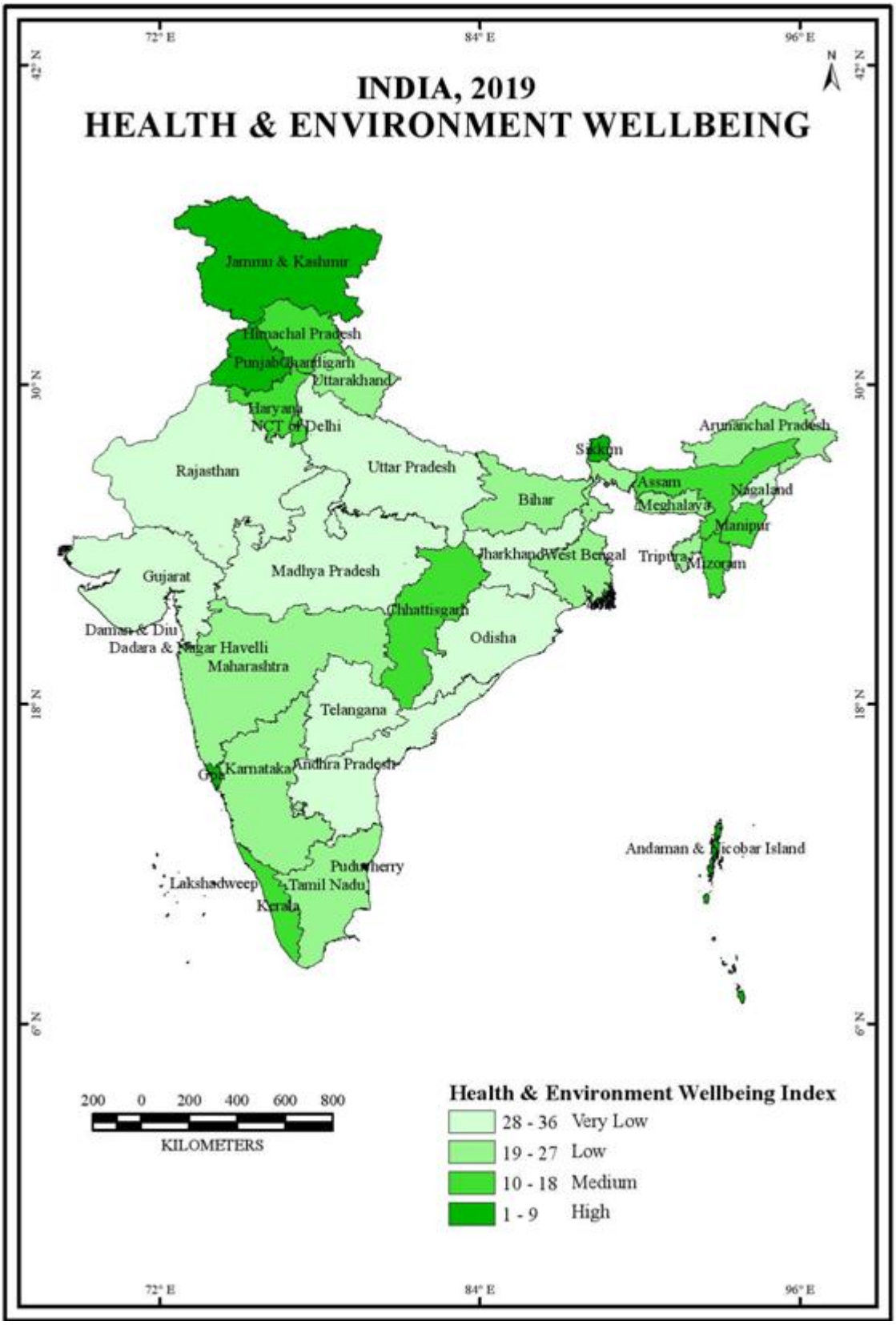


Figure 7: Health and Environmental Wellbeing Index

Table 3: Performance of States

S.No	Variable	Best performance 1st Rank (high wellbeing)	Worst performance 36 Rank (Very low wellbeing)
1.	Gross Enrolment Ratio	Himachal Pradesh	Bihar
2.	Crime rate	Nagaland	Delhi
3.	Recognizable Crime against women	Nagaland	Delhi
4	Suicide mortality rate	Bihar	Puducherry
5	Unemployment ratio	Gujarat	Tripura

6	Family owning houses	Bihar	Daman and Diu
7	Homeless population	Delhi all UTs	Rajasthan
8	Per cent of people below poverty line	Kerala	Chhattisgarh
9	NSDP (Net State Domestic Product) per capita	Goa	Bihar
10	Registered vehicles percapita	Goa	Bihar
11	Infant Mortality Rate	Goa	Madhya Pradesh
12	Vaccination coverage of population	Punjab	Nagaland
13	Underweight population Stunted, wasted	Manipur	Jharkhand
14	Life expectancy	Kerala	Assam
15	Death Rate	Delhi	Odisha
16	per cent of women with hypertension	Delhi	Uttrakhand
17	per cent of men with hypertension	Delhi	Arunachal Pradesh, Uttrakhand
18	Per cent of women with asthma	Lakshadweep, Andaman and Nicobar	Tamil Nadu
19	Per cent of men with asthma	Andaman and Nicobar	Tamil Nadu
20	Percentage of forest area	Lakshadweep	Haryana
21	Percentage of land degradation	Arunachal Pradesh	Rajasthan
22	Per head per day calorie consumption	Himachal Pradesh	Assam
23	Underweight Population	Tripura, Bihar	Punjab
24	Overweight Population	Delhi, Punjab	Tripura
25	Anaemic Population	Chhattisgarh	Jammu and Kashmir

5. Acknowledgement

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