CHAPTER-2

REVIEW OF LITERATURE

2.1 Introduction

Health of a population is considered as one of the most prominent indicators of development. A region cannot be counted as developed without a healthy population. Less developed regions therefore, in general, have an unhealthy population, emanating from poverty and other institutional, social and cultural circumstances. Kamara's (1998) study indicates the relationship between health performance and economic growth in India. For the purpose, Kumara has evaluated the Capability Poverty Measure (CPM) and Human Poverty Index (HPI) with reference to Bihar, Rajasthan and Odisha and established the relation between low income and poor health conditions. Singh et. al. (1997) have associated the nutrition deficiency diseases with poverty and low income. Although the study of human health and its various dimensions is very old, associations of human health with different aspects are being established by researchers from different disciplinary backgrounds in increasing number in the recent decades. Particularly the spatial dimension of human health is being given importance by the geographers recently. An attempt is made in this chapter to bring out the gist of the available literatures produced by scholars of various disciplinary backgrounds.

2.2 Communicable Diseases

Although both communicable as well as non-communicable diseases are problems for developed and developing countries, communicable diseases are more prevalent in the developing countries. Mukherjee and Nayak (1998) have studied the different communicable diseases of Meghalaya and found that communicable diseases are related to undulating topography and tropical climate. According to Roy and Mukhopadyay (1998), water borne diseases like cholera and enteric diseases in Bholpur district are more during summer and pre-monsoon seasons due to contamination of water. On the other side, in Shantiniketan area, air borne disease is prevalent, not due to industrial pollution, but due to atmospheric pollen and fungal spores. Sinha's (1994) study on the distribution of leprosy in Vadodara city reveals

that diseases are more prevalent in population engaged in agriculture, because infection occurs through soil, in which basilla live. India has attained eradication of leprosy in 2005, but still there are hidden and invisible leprosy in parts of the country. A study on rural areas of Vadodara district by Shukla et.al. (2015) revealed that there are undetected cases of leprosy.

Analysis of the changing patterns of morbidity in India by Sinha and Srivastava (2001) reveals that there are very high morbidity prevalence rates of communicable diseases like tuberculosis, diarrhea, respiratory disease anemia, skin disease and child birth related diseases. The study however, indicates a declining rate in the incidence of such diseases during 1961 and 1981, ascribing it to the development in medical research and facilities. Hazara (2004) has traced out the diffusion of Severe, Acute Respiratory Syndrome (SARS) and its implication on social and economic conditions.

Malaria: Gunaselvam (1998) has studied the incidence of malaria in Chennai city and reports its endemic nature in the city is due to extremely polluted and untreated waste discharged at several areas which form the breeding site of mosquitoes particularly during the monsoon season. Bhatt et. al (2013) studied the application of GIS on spatial organization of PHC existing in tribal areas of Vadodara district. Another study of Bhatt et.al (2014) has made application of GIS to determine malaria risk zones in Vadodara district and has associated it with the impact of climate and physical factors (rainfall, hydro geomorphology: drainage and elevation) and land cover.

Kessler et.al (2018) has done systematic literature review of malaria epidemiology, transmission and control in Meghalaya and came to the conclusion that there is complexity of malaria transmission. Tokraz (2018) has studied spatial-temporal distribution of *Anophles* larval habitats in Uganda using GIS/remote sensing techniques and correlated proliferation of larval habitat counts with rainfall and agriculture productivity (paddy based agriculture).

Srivastava et. al. (2000) studied Malaria in Nadiad *taluka* of Kheda district of Gujarat and concluded that the outbreak of the disease was due to high water table, soil type and irrigation. The introduction of HYV seeds, fertilizers, insecticides and irrigation has also increased the incidence of the disease. A study on Meghalaya by Srivastava et. al. (2013) suggests that changes and modification of land cover, unplanned urbanization and deforestation generates the habitat for anopheline.

Malaria Transmission in dense forest is highly complex and interlinked with different factors like topographical, entomological, parasitological and human factors (Kar et.al. 2014). A similar study by Haque et.al (2014) in Bangladesh reveals that highest prevalence of malaria was seen in the district of Chittagong hill. Singh et. al. (2015) studied the dynamics of malaria transmission in forested and deforested regions of Mandla district (Madhya Pradesh) of central India and found that in both the ecological regions the anopheles' species are different. While malaria infection is caused by the *Plasmodium falciparum* in the forested areas, outside the forested areas it is caused by *Plasmodium vivax.*

Chikungunya and Dengue: Chikungunya and dengue are other communicable diseases. Chikungunya is a viral disease caused by the infected mosquitoes (*Aedes aegypti and Aedes albopictus)* in tropical and subtropical regions of the World (Wenxi et.al., 2017). Chikungunya and dengue are mosquito-borne diseases. Outbreak of dengue in India began in the 1950s and chikungunya in the 1960s.Over time chikungunya and dengue cases are increasing. Dengue affects young adults and is endemic in sixteen administrative divisions of India –Andhra Pradesh, Goa, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal, Chandigarh, Delhi and Puducherry. Chikungunya affects all age groups and is endemic in Karnataka, Kerala, Andhra Pradesh, Goa, Gujarat, Tamil Nadu and Assam (Cecilia, 2014). Barve et.al., (2013) studied the resurgence and epidemiological pattern of chikungunya fever in western India and came to the conclusion that chikungunya is remarkably high in the rural areas than in the urban areas and occurs during the monsoon seasons and post monsoon seasons.

A study by Patil et. al. (2013) revealed that chikungunya prevalence rate is 9.6 per cent in Kasegaon village of Sangli district (Maharashtra). The main symptoms were acute onset of fever, headache, rashes and joint pain. More males were affected than females. Quantitative assessment of chikungunya research publications, 2004-2013 by Shri (2016) reveals that India and France are top ranked in term of number of publications on chikungunya. M. M. Parida of the Defence Research and Development Establishment, India and Alain Michault of La Reunion University France have been found to be the most prolific authors in this context.

Cholera: Cholera is one of the major public health issues. Deepthi et. al. (2013) studied the cholera outbreak in a south Indian village and recorded 17.5 per

cent attack rate. The study found association of the outbreak with the method of purification, place of defecation and washing hand practices. Similar studies on outbreak of cholera in Sankheda village of Chhota Udaipur district (Gujarat) by Patel et.al. (2015) and Bharuch city by Padhiyar and Damore (2011) related cholera with the leakage in the water supply pipes and resultant contamination of water with sewage. Cholera can be controlled through safe drinking water, distribution of chlorine tablets and education of people. Phukanet.al. (2004) studied the environmental factors behind the sporadic cases of acute diarrhea in the rural areas in Sibsagar district of Brahmaputra basin in northeast India and revealed that broken latrines and improper disposal of household waste with unhygienic peridomestic sanitation are responsible for the spread of the disease. Cholera was caused by contamination of water and presence of coliform bacilli in Sankheda village of Chhota Udaipur district, Gujarat (Brave et.al. 2012). Dey et.al (2014) have also reported similarly for the twin cholera outbreak in rural Bijapur district of north Karnataka.

Cholera is a major health problem in India. One-fourth of the districts of the country reported cholera of which, ninety districts were identified as hotspots for cholera. Cholera is endemic in thirteen states of India, such as Assam, Chandigarh, Chhattisgarh, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu and West Bengal. Out of these thirteen states, West Bengal and Karnataka are the hotspots of cholera and impure water and lack of proper sanitation are the major factors(Mohammad,2017). Reporting of cholera in India is incomplete due to improper methods, statistics and, inadequate and poor laboratory facilities for diagnosis of cholera diseases (Kanunga et. al., 2010).

Other Diseases: Mathur and Singh (1998) have studied tuberculosis in Haryana and have found it to be related to industry, mining, thermal power plant, inadequate diet and agriculture. Pawar and Choudhary (1998) have found the association between major diseases in rural areas of Dhule district (Maharashtra), e.g. association of malnutrition and diarrhea, diarrhea and typhoid, malnutrition and anaemia etcetera. According them, incidence of diseases is also correlated with physical, social, and cultural factors. For instance, goiter and iodine deficiency diseases are more common to the high altitudinal and heavy rainfall areas. De and Gollerkeri (1990) studied Vadodara city, where hepatitis is endemic throughout the year and maximum incident is seen in the rainy season (May to October). Bhattacharya (1998) has studied the dynamics of Acquired Immune Deficiency

Syndrome (AIDS) in India and its impact on women, children, health system, socio-economic conditions and migrant population. Similar study on AIDS scenario in India has been studied by Choubey (2005). Dutt et. al. (2005) have shown the diffusion pattern of plague diseases in Surat and its diffusion in other parts of India. Patel et. al. (2018) have studied the outbreak of jaundice cases in Vadodara district and found that the source of infection was leakage and contamination in water distributed to households.

2.3 Non-Communicable Diseases

Non-communicable diseases are also one of the major problems of the developing countries and are more prevalent in the urban areas of these countries. Baria and Vadavi (1998) have studied 600 samples of diabetic patients of Bangalore and found out the main causes of diabetes to be sedentary life, family history of diabetes, retirement from job/service, intake of non-vegetarian food, obesity, smoking, drinking and hypertension. The urban population, all over the world is growing at an unprecedented rate. Increase in urbanization and industrialization has created many health problems in the urban population. According to Dhrvasala (1984), air pollutants in Vadodara city are the major cause of respiratory diseases and morbidity. Devi (2003) has studied Talcher (Odisha) industrial region and found it as one of the spots of industrial pollution and the cause of incidence of cardio-vascular and respiratory diseases among the residents. Bhatt (1995) has studied the health of industrial workers and found a close association between many diseases and the industrial environment. Solid waste is also one of the problems of urban area. According to Kayastha and Kumra (1979), people also play an important role in producing solid wastes. As population increases, the quantity of solid waste also increases and adversely affects the health of urban people. Kanchan (2003 & 2007) has studied the Nandesari industrial estate of Vadodara city and found its impact on human health. Her study on Gujarat Industrial Development Corporation (GIDC) Ankleswar has revealed that increase in the level of air pollution leads to respiratory diseases.

Anaemia: Anaemia is a big problem in Asia in general and India in particular, affecting especially young children under two years of age (Kotecha, 2011). A similar study by Melku et. al. (2018) has found that anaemia is a health problem among male

and undernourished children in Ethiopia. Soundarya et. al. (2015) has presented a review on the types of anaemia, their causes, symptoms and treatments. Uria et. al. (2014) have studied the prevalence of anaemia in Anantapur district of Andhra Pradesh and found the highest prevalence of the disease among children below 10 years, women and the elderly population. Study by Sathya et. al. (2017) in urban area of Coimbatore district revealed that the prevalence of anaemia is high among women in reproductive age group and is one of causes of maternal mortality.

Vitiligo: Singh et.al. (2011) have studied the epidemiological profile of vitiligo disease in northern India and found that vulgaris is the common subtype found in patients. There is regional variation in vitiligo disease. Population residing near equator will have less extensive vitiligo. Silverberg et. al. (2014) found the patients with viltiligo were born outside the United States had lower less extensive vitiligo. Another study by Ghaderi (2018) on 50 patients with vitiligo and 50 healthy people found that there is no association between serum level of HSP70 (Heat Shock Protein 70) and vitiligo.

Cancer: Globally and in India, cancer is one of the public health problems and causes 0.3 million deaths per year. All types of cancers are found in the Indian population. The study by Ali et. al. (2011) on the cancer scenario in India and its future, opines that both internal and external factors cause cancer. Internal factors include the genetic, mutation, hormonal, poor immune conditions, and the external factors include food habits, industrialization, over growth of population and social causes.

Nasopharyngeal cancer occurs in the head and neck areas. This type of cancer is a common form of cancer and geographically restricted to Asia especially to east, south east and south Asia. Heredity, salt preserved fish and history of respiratory disease etcetera are important risk factors (Salehiniya et. al., 2018). Liver cancer is the most common cancer in the world and sixth cancer leading cause of death in eastern Asia (Mongolia). Standard incidence of liver cancer is 10.1 per 100,000 people (15.3 in males and 5.3 in female) as per a count of the year 2012.Main risk factors are infection with Hepatitis B virus(HBV) and Hepatitis C virus (HCV), alfatoxin, alcohol drinking and smoking. Consumption of white meat (fish), vegetables, fruits, cereal, eggs, milk and yoghurt reduces the risk of cancer (Mohammadian et.al., 2018). Mahdavifar et. al. (2018) studied the incidence of pancreatic cancer and found its highest incidence in North America (7.4 per 100,000 people) in 2012 and lowest in

central Africa and south and central Asia. Pancreatic cancer is more seen in ageing population (60-80 ages), 30 per cent more in male and more found in African American race than American race and blood group type A, B, AB than O type. Another Study by Mohammadian et. al. (2018) has found that in 2012, the highest gastric cancer is recorded in Asia especially in China, Japan and Korea and the lowest in North America and Africa.

Mohammadian et. al. (2019) have analysed the World distribution of breast cancer. Comparing the Age Standardized Incidence Rate (ASIR) of breast cancer of 43.1 per 1,00,000 people in the World with different continents, the study finds North America (91.6), Oceania (79.2), Europe (69.9) and Caribbean Islands (47.2) much above this average. ASIR of Africa (36.2), Asia (29.1) and Latin America are below the World Average. The Age Standardized Mortality Rate (ASMR) is 12.9 in the World. The highest ASMR is recorded in the Africa (17.3), Oceania (15.6), North America (14.8), Latin America and Caribbean Islands (13) and Asia (10.2).

Heart diseases: According to World Health Organization (WHO) fact sheet, cardiovascular diseases are the main causes of deaths in the World.17.5 million people died in the year 2012, accounting for about 30 per cent of all deaths in the World. Cardiovascular disease includes hypertensive heart disease, ischemic heart disease, rheumatic heart disease and cerebral vascular disease or strokes. The leading risk factors for the cardiovascular diseases are tobacco use, alcohol use, unhealthy diet, physical inactivity, obesity, high blood pressure, high blood sugar and high blood cholesterol. There are nearly 6.4 crore cases of Cardiovascular Disease(CVD) every year (2015), in which 96 per cent are cases of Coronary Heart Diseases (CHD) (Indrayan, 2005). Study by Yusuf et. al. (2001) on variation in CVD by regions and ethnic groups reveals that the highest CHD is found in the European and South Asian countries, while the lowest is found in China. Prevalence of CVD in the older women from Scotland is the highest (Lawlor et. al., 2003).

People of European origin have variation in CVD. The Eastern European countries (e.g. Ukraine and the Russian Federation) have the highest CVD compared to the Western European countries like, United Kingdom and France. Within the United States also there is great regional variation in the CHD mortality trends. During the years 1999 to 2007, the highest mortality was registered in Ohio and Mississippi states (Gillum et. al. 2012).it is associated with high smoking, alcohol use and consumption saturated fat in the Eastern European countries. CHD mortality rates

are lower in the Western European countries because they consume monounsaturated fat (olive oil).

CVD mortality rates also display great geographical variations in the United States. While the CVD mortality rates are higher among the Asian American subgroups (Indian, Chinese, Japanese, Korean, Filipino and Vietnamese), it is less among the non-Hispanic whites. There are also regional variations in Asian American subgroups in CVD mortality rates because of variation in migration pattern, life style, diet, socio-economic position etcetera (Pu et. al., 2017). There is epidemiological transition shift from infectious diseases to degenerative diseases in India. The age standardized CVD deaths rate is 272 per 100,000 populations, which is more than the global average of 235 per 1000,000 populations. CVD is prevalent in all Indian states, especially among the poor, socio-economically deprived peoples (Prabhakaran et. al., 2016). Rheumatic heart disease studies in India are highly varied (Negi et. al., 2019). Hypertension is associated with CHD (Bodkhe et. al., 2019). A study by Larsson et.al. (2019) suggests that the spatial variation in the physical activity level in adults is closely associated with congenital heart diseases. The study reveals that wherever the physical activity level is high, for example in Norway (53%), Switzerland (47%) and Sweden (46%), there the heart diseases are low.

Asthma: Asthma is associated with indoor pollution. Use of biomass fuels like wood, charcoal and dung cakes produces more indoor pollution (Oluwole et. al., 2017). A study on Kansas City by Ciaccio et. al. (2014) associated asthma in children with secondhand tobacco smoke exposure. Substandard housing harbours the indoor allergen. Houses of low income families, particularly in the urban areas are affected by excess of moisture, cracks in the walls and inadequate ventilation, which are all linked to asthma (Pacheco et. al., 2014).

Obesity: Shukla et. al. (2016) have done systematic review of the prevalence of overweight and obesity in adolescent group in India and found that obesity in male adolescent is higher compared to females in the urban areas of India. The study by Parekh et. al. (2012) on prevalence of overweight and obesity in adolescent male of urban areas of Surat district (Gujarat state) also reveals similar results. Brahmbhatt et. al. (2012) studied obesity in the adolescent of Ahmadabad Municipal Corporation (India). Obesity is related to higher socio-economic status, lack of sleep, consumption of junk food and lack of physical activity. Increase in the prevalence rates of obesity will affect public health in developed countries (Agha et. al. 2017).

Diabetes: According to Global Report on Diabetes-WHO, diabetes is a serious, chronic disease that occurs either when the pancreas does not produce enough insulin (a hormone that regulates blood glucose), or when body cannot effectively use the insulin it produces. The global diabetes prevalence was 8.5 per cent in 2014. The prevalence of diabetes is increasing in low and middle income countries and was found to be the highest in WHO's eastern Mediterranean region (13.7%) in 2014 year. Gujarat ranks second after Tamil Nadu in diabetes patients in India. A cross-sectional study on Ahmadabad (Gujarat) by Prajapati et. al. (2016) revealed that prevalence of diabetes in government employees is high in urban areas and is related to tobacco and alcohol consumption, overweight, less fruit intake and family history. India is known as "Diabetic Capital" of the World. Basic knowledge in the population of Gujarat regarding causes and symptoms of diabetes is very poor (Sandul et. al., 2017).

ICMR-INDIAB collaborative study group (Ranjit et. al., 2017) shows that in India prevalence of diabetes is 7.3 per cent. However, there is great disparity in the prevalence rate across the states. While Bihar (4.3%) records the lowest prevalence of diabetes, Punjab (10.0%) stands at the other end. Study also shows higher prevalence of diabetes in the urban areas than in the rural areas.

2.4 Correlates of Human Health

Scholars from different disciplinary backgrounds have tried to unravel the association of diseases affecting human health with various environmental conditions like urban pollution, socio-economic conditions of the population, way of living including food habits, consumption of intoxicants etcetera. Some of the related literatures have been accessed and reviewed in the following paragraphs.

2.4.1 Urban-Industrial Environment

Desai and Prajapati (1998) have studied the spatio-temporal patterns of water borne diseases like gastrointestinal diseases, viral hepatitis, typhoid and cholera in Ahmadabad city and found their association of with contaminated water. Development of urban areas has both positive and negative consequences. The deteriorating urban environment and its effects on human health of Vadodara city have been studied by De (2007). She has detected higher rates of gastroenteritis and infective hepatitis diseases in the wards of Panigate, Fatehpura and Gajarawadi, where

people live under deteriorated conditions. Singh (1998) has studied the hospital waste management of Ahmadabad city and found that improper waste disposal has been the cause of several diseases such as, hepatitis and malaria etcetera in the city. Sajjid et. al. (2011) have studied the socio-economic condition and health of child labourers from slum areas of Meerut city and concluded that these child labourers are living and working in highly unhygienic environment which leads to many diseases such as malaria, dysentery, jaundice, diarrhea, typhoid, skin diseases, back bone problem and malnourishment. Chandrashekar (2009) has studied Mangalore City and concluded that, southwest part of Mangalore is having higher proportion of malarial cases, because of the open spaces, agricultural land, open tanks, wells and low lying areas near the bank of river, which act as breeding sites for mosquitoes. Ibrahim (2015) has correlated indoor noise pollution with human health. His findings reveal that various diseases like deafness, speech interference, annoyance, work inefficiency, auditory fatigue and physiological changes are caused due to indoor noise pollution. Poor housing condition (Singh and Baba, 2015) and the nature of kitchen fuel used (Singh and Jamal, 2013) have also been found to have strong association with human health. Singh (2014) has studied cancer incidence and correlated it with pesticides and smoking.

Accidents are also big burdens on population. Many people die due to accidents. Khan (2014) has studied the increase in the accidents in Bilwara city and ascribed it to the inadequate road network, nearness of mineral and textile industries and mismanagement of traffic by overloading and overtaking**.**

2.4.2 Occupational Health

Certain occupations have also been found to be the cause of specific ailments. Saber et. al. (2012) have reported several cases of orthopedical and psychiatric problems, and diseases like tuberculosis and influenza among the coal mine workers of Rajouri district of Jammu Kashmir. There are also many unorganized occupations in India like rag picking, which are found to be directly linked with the health. Mohd (2014) has found that rag pickers are exposed by various types of wastes, medical wastes and animals, and get injuries by cut and bruise, allergic disorders, tuberculosis, scabies etcetera. Different land use patterns also play important role in the spreading of different types of disease. The study by Rath (2014) on the brick kiln industries

near Kuakhai River has brought out the impact of land use on health of the population living in the vicinity.

2.4.3 Physical Environment

Physical environmental circumstances have been found to play perceptible role in the incidence of certain diseases. Among all physical elements, climate variability is considered to play important role in the distribution of diseases (Amuakwa, et. al., 2017).

A study by Malini (1985) has identified a goiter-prone zone in the north-western part of Vishakhapatnam district, and ascribed the situation to its characteristically iodine deficient hilly topography, soil and climate. Ground water with higher fluoride level tends to cause pain in joint, bones and head, and is considered responsible for curved feet and stiffness in backbone etcetera. This fact has been vindicated in the study of the Dausa district of Rajasthan (Sharma and Khan, 2003). Kalwar et. al. (2008) in their study of the Chaksa *tehsil* of Jaipur district have detected the presence of fluoride in groundwater and analysed its impact on health of the *tehsil* population. Disease ecology study of Ladakh Himalayan region by Mayer and Akhtar (2008) also emphasizes on the effect of the physical environment on human health. Studies are also available on the impact and possible mitigation of floods. The study of the Mumbai monsoon floods of 2005 by Malini et. al. (2009) is an example of this kind. Scholars have investigated the effect of season on the occurrence of diseases and revealed that there is positive correlation between summer season and chickenpox and acute respiratory infection, and rainy season with typhoid, chikungunya and acute diarrheal diseases (Emayavaramban and Sreelakshmi, 2013). Some of the chemicals like fluoride endemic in different parts of India have been found as responsible cause of certain diseases. Rudra and Das (2014) have studied the endemic fluoride and its effect on people. Researchers (Rather et. al. 2012) have also found that deficiency of trace elements like zinc and copper in the soil has caused diabetes mellitus in people of Kashmir Himalayas.

2.4.4 Health in the Tribal Areas

Condition of human health, and availability and utilization of health care facilities in the tribal areas of the country have attracted the attention of researchers of various disciplinary backgrounds. Geo-ecological circumstances of the tribal areas of

south Rajasthan have been ascribed to the wide spread incidence of malaria in the region. Areas with heavy rainfall, waterlogged rice fields and vegetation with thick canopies of south Rajasthan provide favorable growth condition and survival of the mosquitoes (Mathur and Pareek,1998). About 80 percent of the tribal population of India is living in 10 states where, 80 per cent of malaria cases have been reported (Sharma et. al., 2015).

With respect to the utilization of the health services among the tribal females in central India, it is observed that it is lower as compared to the utilization of such services by non-tribal females (Radkar and Parasuraman, 1998). Garud et. al. (2008) have studied the status of tribal health with reference to the availability and efficiency of health service centers in the Dhadgaon *tahsil* of Nandurbar district (Maharashtra). The study has exposed the relationship between the efficiency level of health centers and health condition of the tribal population. The practice of administering folk medicines has been found to be in vogue among some of the tribes of Madhya Pradesh (Choubay, 1998).

2.4.5 Women Health

Health of the female segment of a country's population is considered one of the most important indicators of development. Hazra's study (1998) brings out the importance of women's health with reference to South Asia and reveals the multifarious social and economic problems associated with women as the root causes of their poor health. Singh and Asgher (2007) have formed a strong linkage between women's household work and their health.

Ansari and Somlata (2009) have assessed the impact of social factors on the Health of women. Among various social factors, literacy and education tend to exert significant influence on health of the concerned population. High correspondence between level of education and literacy and condition of health has been observed among the rural communities of Jorhat district of Assam (Hazarika and Barah, 2009). The study on education and health of women of Thane district of Maharashtra by Gadhe and Patil (2013) has also reached a similar conclusion. Back bone and joint problems, ulcer and skin diseases have been reported to be wide spread among rural women workers as reported by Sajjid (2012). The study has also emphasized the role of socio-economic conditions of rural women with respect to such health problems. Singh and Jamal (2013) have studied the indoor air pollution and its effects on

women. The findings of the study indicate that exposure to the indoor pollution from cooking fuel causes diseases like asthma, pulmonary tuberculosis, prenatal mortality, low birth weight, eye irritation and cataract etcetera in women. Lower age at marriage is also one of the influencing factors of women health. Early marriage in females increases the risk of pregnancy complications, high maternal mortality, high infant mortality and high fertility (Chauhan et.al. 2012).

2.4.6 Health Care

Health care is the responsibility of every nation. Quality of health care and its delivery are considered to be the most important aspects of health care system in the recent years. With this understanding scholars have tried to assess the efficacy of the health care provisions in different parts of the country. Singh and Kumara (1995) and Jagdish and Kumara (1995) have analyzed the utilization patterns of health care facilities in rural areas of Varanasi. Babu and Prakasam (1998) have studied the quality of health care delivery in rural Gujarat. They have studied the age of mother, order of birth, religion, caste, and standard of living etcetera and found that 27 per cent of women had not receivedantenatal care (ANC) during pregnancy considering it unnecessary. The study also finds that such facilities are very poor in rural Gujarat. Hazra et. al. (1998) have studied the community wise education and health of women in the Jorhat district of Assam. They find a wide gap between literacy rates of the two genders, particularly among the SC and the ST communities. Sinha and Mukherjee (1998) have concluded that the structure of health care facility and its utilization in urban Delhi is highly unsatisfactory. Tiwari (1998) has studied indigenous health care delivery system of Madhya Pradesh. Kanchan's studies (2001and 2004) have revealed that spatial distribution of health care facilities is uneven in Gujarat. Choubay (2002) has studied the herbal drugs and health care practices among tribal population of Bastar region of Chhattisgarh. The study reveals that tribal people possess indigenous knowledge of vegetative drugs, which is used by them for both preventive and curative purposes. According to Yadav et. al. (2009), health care delivery system in rural Madhya Pradesh is feeble. The authors find the Census of India data pertaining to health care delivery in the State misleading, as at ground level the reality does not match with it. At every level, starting from the PHC to the Sub Centers, the basic infrastructure, equipment etcetera is not only insufficient but also much lower than what has been recorded in the Census of India reports. Saravanabaram et. al. (2006)

have studied the health care utilization patterns of Vadipatti Panchayat and inferred that distance also matters for the better utilization of health care services. Kumari et. al. (2006) have brought out the relationship between social attributes of the population and their relationship with utilization of health services. According to Suryavanshi and Chaudhari (2007), the health care services are inadequate and unevenly distributed in the tribal areas of western Satpura Region. Besides, the number of PHCs and number of patients decrease with increase in the altitude.

Lalmalsawmzauva and Nayak (2009) have studied the hilly state of Mizoram and revealed that there is a wide intra-state variation. There is strong positive relationship between female literacy, urbanization and accessibility with institutional child deliveries. Barsod and Lingaraju (2009) have studied the health care utilization in Karnataka state. The study focuses on the level and status of public and private health care facilities and utilization, and concludes that the public health care facilities are used more effectively by the young and literate women in comparison to the elderly and illiterate women. It is also observed that the in rural areas Government health care facilities are used more frequently than in the urban areas. Particularly in the urban areas, people having higher standards of living prefer to use private health care facilities. Lalmalsawmzauva et. al. (2009) in their study on Champhai district of Mizoram, have clearly exposed the impact of geographical factors on the use of antenatal care facilities. In another study Lalmalsawmzauva (2013) has analyzed the availability of the healthcare facility in Mizoram. Similarly, Minnutha and Sannsiddhnnanvar (2013) have undertaken an investigation of the PHCs of Krishnaraja Nagar *taluka* of Mysore district in Karnataka and based on that they have proposed the location of the PHCs in the *taluka* by 2021. Singh (2004) has studied the spatial variations in the location of medical centers in Haryana. He has tried to correlate health care facilities and socio-economic development in this study. Child care is one of the most prime factors of the health care sector and has attracted the attention of scholars too. Hiremath (2015) studied the spatial aspects of child care centers in Canacona *taluka* South Goa district. Adoption of modern technology, particularly GIS in locating disease affected areas is becoming common among researchers. The work of Banerjee et. al. (2009) is an example in this regard.

2.5 Health Reports

According to the India, Human Development Report (HDR) 2011, the Health Index is defined in terms of "life expectancy at birth since a higher life expectancy at birth reflects better health outcomes for an individual". Among all the states in the country, Kerala has the highest and Bihar has the lowest life expectancy at birth. According to the report, over the last decades, India has achieved remarkable improvements in terms of different health parameters. There is gradual decline in the death rates, Infant Mortality Rates (IMR), Under Five Mortality Rates (U5MR) and fertility rates. India's condition in terms of child mortality and health care of the mothers emerges out to be better than that of the sub-Saharan African and other South-Asian countries. But, if we compare India with countries like Brazil, Russia and China, it lags behind with the highest child mortality and the lowest ratio of women receiving antenatal care. Besides, India has a relatively higher IMR and Maternal Mortality Rate (MMR), a distorted sex-ratio, less than 50 per cent women having institutional deliveries, less than half of the children undergoing all vaccinations, less number of pregnant women taking three or more antenatal care visits and less than half of the population in the reproductive age using contraception. About half the population of the country has access to sanitation facilities. Despite improvement in the human resources, the Nation does not have the required number of doctors and nurses and has a shortage of PHCs, CHCs and sub centers. Expenditure on health care is much lower than the International standard. Apart from all these, the Nation reports great variations in terms of health parameters between its rural and urban areas, and among its communities. The health condition of the population in the states of Uttar Pradesh, Bihar, Chhattisgarh, Madhya Pradesh and Odisha is precariously poor. The rural areas of the country in particular, display a dilapidated picture.

Gujarat is one of the industrialized states of India. The State earns about 84.5 per cent of its income from non-primary sources and with almost half (47.8%) of the work force employed in these sectors. The remaining 15.5 per cent of income is generated by the primary sector, which employs the rest (52.2%) of the work force. The State population is not only socially diverse but also accommodates a significant proportion the underprivileged sections. Both the scheduled populations taken together account for around a fifth (21.49%) of the State total population, of which

two-thirds (14.75%) belong to the ST segment, and the Muslim population in the State accounts for around 4 per cent of the country's Muslim population. Gujarat's Total Fertility Rate (TFR)of 2.5 is close to the National average TFR of 2.6. However, the State displays a poor picture in terms of sex ratio (919 females per 1,000 males) in comparison to the Nation (940 females per 1,000 males). Overall poverty level in Gujarat is relatively lower than the National poverty level. However, in the rural areas of Gujarat, especially in the predominantly tribal areas, high level poverty exists.

Although general average literacy rate (78.03%) in the State is higher than its corresponding National average (72.99%), the tribes of the State with 56.44 per cent literacy rate lag behind the all India tribal literacy rate of 58.96 per cent. The basic amenities in the households in the State are better than the National average. Around 93 per cent of households in the State have improved drinking water facility which is two per cent less at the National level (91 per cent). Similarly, access to the toilet facilities and improved sanitation is better in the State as compared to the Nation as a whole.

The WHO has divided the whole World into six WHO Geographical Regions viz. African Region (AFR), Regions of Americas (AMR), South-East Asia Region (SEAR), European Region (EUR), Eastern Mediterranean Region (EMR), and Western Pacific Region (WPR). According to the World Health Statistics (2011) estimates, global life expectancy at birth is 68 years. Among all the WHO regions, life expectancy is the highest in Regions of Americas (76 years) followed by Western Pacific Region (75 years) and the lowest in the African Region (54 years). It is found that in the African Region, health condition of infants, children and women is the worst, followed by the Eastern Mediterranean Region and South-East Asia Region. The Global IMR is 42 per 1,000 live births. The African Region has registered the highest IMR of 80 per 1,000 live births, while for the South-East Asia Region, it is 45 per 1,000 live births and the lowest in the Regions of Americas and European Region with 15 and 12 per 1,000 live births respectively. With respect to U5MR, the African Region again ranks first with the highest rate of 127 per 1,000 live births. The global U5MR is 60 per 1,000 live births. Performance of the Eastern Mediterranean Region (72), South-East Asia Region (59), Regions of Americas (18) and European Region (13) in terms of U5MR, has been relatively much better than the African Regions. The African Region also has the highest IMR with 620 per 1,000 live births. Minimum IMR is in the Regions of Americas, European Region and Western Pacific Region.

Death rates due to HIV/AIDS (117 per 1,00,000 persons), malaria (94 per 1,00,000 persons) and tuberculosis (94 per 1,00,000 persons) are also the highest in the Africa Region. As compared to the Africa Region, the other regions, including South-East Asia Region and Eastern Mediterranean Region, are far better. According to estimates of age-standardized mortality rates by cause, the African Region has the highest mortality rate by communicable diseases (798 per 1,00,000 population), non-communicable diseases (779 per 1,00,000 population) and injuries (174 per 1,00,000 population). The region is followed by the South-East Asia Region and Eastern Mediterranean Regions. These regions are facing the dual burden of communicable and non-communicable diseases. Condition of the other regions in terms of mortality from communicable diseases is as low as 74, 72, and 51 per 1, 00,000 populations, respectively in Western Pacific Region, Regions of Americas and European Region. On an average, mortality from injuries has not much of gap. Overall, among all the WHO regions, health conditions are relatively better in Regions of Americas, European Region and Western Pacific Region. The poor health condition in African Region, South-East Asia Region and Eastern Mediterranean Region has been ascribed to their size of population, very low urban share in the total population, low adult literacy, and extremely lower than International standard per capita gross national income and total expenditure on health by Governments.

2.6 Conclusion

It is clearly revealed by majority of the studies that the physical environmental circumstances have been playing perceptible role in the incidence of certain diseases. The studies also make significant revelations pertaining to discrete aspects of health. The issue of health however, cannot be understood and analysed in a piecemeal manner. Rather a holistic perspective needs to be developed to comprehend the issue. An attempt would be made in the present research to address the issue of health in its totality involving both the physical and social parameters. For the purpose, it is intended to undertake an in-depth investigation of the related physical and social parameters at micro level selecting a few representative villages of Vadodara district.