CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION
The most important and integral part of the study is review of literature. Both past and the present environment of the study are represented from it. It focuses on the present study associated to the subject of the research. This study is aimed at the process of urbanization in Ahmedabad as well as industrialization and health issues related to industrialization. In urban area, explosion of population is a major problem. The growth of population is very fast beyond imagination. It is necessary to know urbanization along with its consequences. Three related topics are discussed in this study, 1) urbanization, 2) industrialization and 3) health related issues in industrial areas and surrounding areas. The above mentioned issues are thoroughly studied by scholars.

2.2 PROCESS OF URBANIZATION
There are various scholars who have extensively worked on the growth process of urbanization. The review on this subject is presented here in chronological order. Review captures the traces of work carried out on the process of urbanization at macro, meso and micro level. All the studies reviewed in this study have described the growth and pattern of urbanization as well as issues related to urban growth.

The book entitled “the History of Ahmedabad” written by Sheth, M.V. (1977) has elaborated the process of urbanization in the city of Ahmedabad. It is related to the ancient history of Ahmedabad and is divided into three sections. In the first section, description of Ahmedabad is presented. The book has described various events such as arrival of the Muslims in Ahmedabad, how dwellings were constructed by Ahmadshah Badshah in the city of Ahmedabad, and the different periods ruled by Muslim kings. The description of such events reflects the process of urbanization which took place. The process also described how the 'gates of Ahmedabad’ in those period were constructed, how their names were given, how suburbs areas developed in the vicinity of the city, and how such areas converted into today’s current parts of Ahmedabad. In fact, the author has also described the characteristics of population
and crops grown in Ahmedabad. Wheat and sugar cane were grown in winter and fruits and vegetables were grown in summer at that time in Ahmedabad. Vatva, Nicol and Saijpur were mango growing suburbs.

In the second section, modern history is presented which represents Ahmedabad in the period of the Gayakwad and the Peshawas. Later, Ahmedabad during the British region is presented. In the third section, Ahmedabad in that period is presented when Ahmedabad was an important city. 36 suburbs were emerged nearby Ahmedabad. Higher class Hindus resided around Manek Chawk, Bandhnigara, Bhavsar, Kanabi and Muslims were residing in South part of Ahmedabad. The Muslims weavers were residing in Kalupur, the Parsees were residing in posh area of Ahmedabad. At that time its population was 90,000. There were 32 schools, having Guajarati and English medium schools. The houses were of two to three storeys. Industries were also described in this section. Industries were running on credit (Hundi) and cotton business was in full swing in those days. Silk was brought from Bombay. Golden and Silver kasab were famous. Panch Patta, dhoti, thapada, saris, turbans, cotton carpets and shawls were made. Along with all these, utensils of copper and brass, zinc and bronze were produced. Bengals with gold foil, silver and ivory were made in Ahmedabad. The specific caste of people residing in particular pole was one of the important feature described in this book. The school of Ahmedabad vernacular society, leading people in those days and their descendents are also well presented in this book. In short, the book has described how Ahmedabad has gradually been urbanised with changes in specific features.

**Verma, L. N.(2006),** in his book *World Urbanization,* defined the urbanization as the growth of urban centers, and growth of population. Urbanization involves an increase in population. There is difference between "Rate of Urbanization" and "Growth rate of urban population." The author also discussed the importance of urbanization. True urban revolution occurred in the 19th century, when the factories were run by machinery and fossil fuel. After the 2nd world war urban growth was faster in tropical lands than in Western Europe and North America. Political awakening play vital role in urbanization. Break up of USSR is a major factor for huge flow of refugees. People migrated from developed to developing countries. Metro cities are known for density of population all over the world.
In India, after independence, urban population raised. In 1941 urban population was 13.9% and in post independence it reached 40%. It grew by 3.4% to 3.8% every year. Rural population is sometimes compelled to shift to urban areas in search of employment. They are forced for migration. Africa, Asia and India are facing the problem of "pseudo-urbanization." In India it is reality that unemployment rate has increased, earning has reduced and working condition is on dangerous level. This book has discussed growth and Pattern of urbanization as well as issues related to the process of urbanization in detail.

Urbanization is the outcome of industrialization. Urbanization is influenced by social, cultural and political forces. In India, there are various patterns of urbanization. It depends on economic status. In Mizoram, Goa, Maharashtra, Karnataka, Tamil Nadu and Gujarat 30-45% urbanization rate is observed. The rate of urbanization is 20-30% in West Bengal, Rajasthan, Punjab, Madhya Pradesh, and Himachal Pradesh. In Arunachal Pradesh, Assam, Bihar, Orissa, Sikkim, Tripura medium level of urbanization is observed, because of very poor and slow transport facility development.

Vaidya, C. (2009) in his paper entitled “Urban Issues, Reforms and Way forward in India” has examined that India has to improve its urban areas to achieve objectives of economic development. However, urban governance and management of the services is far from satisfactory. In this context, the Government has launched a reform programme to link urban investment - JNNURM. The paper has analysed urban trends, projected population, service delivery, institutional arrangements, municipal finances, innovative financing, etc. It has also described status of JNNURM. Level of urbanization would be different in various states as per population projection for 2026. India’s future urban strategy should recognize these differences and plan accordingly. According to him India’s future strategy should focus on: (a) Inter-government transfers with built-in incentives to improve performance; (b) Capacity building of ULBs; (c) Investments on asset creation as well as management; (d) Integrate urban transport with land use planning; (e) Integrate various urban development and related programs at local, state and national levels; (f) Strengthen urban institutions and clarify roles of different organizations; (g) Second generation of urban reforms should further focus on regulation, innovative financing, PPP, and
climate change initiatives; (h) Different approach of supporting reform linked investments needed for different states based on level of urbanization. It has recommended constitutional amendments as well administrative actions to improve India’s urban areas.

**Bhagat, R.B. (2011)**, in his paper “Emerging Pattern of Urbanization in India,” examined that the declining trend in the urban population growth rate observed during the 1980s and 1990s was reversed at the national level, and the level of urbanization increased faster during 2001-2011. In 2001 population was 286 million and in 2011 population was 377 million so there was an increase of 91 million people, which is larger than the rural population i.e. of 90.5 million. Such increase was experienced for the first time since independence. A rapid increase in the urban population is due to a net rural urban classification and rural-to-urban migration. A huge number of new towns emerged during the last decade, contributing significantly to the speeding up of urbanization. On the other hand, although the contribution of the natural increase in urban growth has declined in terms of proportions, its share in absolute numbers (about 40 million) continues to be huge due to the large base of the urban population. This has implications not only for providing urban infrastructure and civic amenities, but also for reproductive and child health services in urban areas.

**Rully Damayanti (2011)**, in her paper "Industrialization and Informal Sector in Shaping the City: Case study Ahmedabad -India" stated that industrial activity mostly shapes the size of the city and growth opportunities mainly in developing country. The aim of the researchers was to know the urban shape of the city caused by industrial activities in this paper. The researcher desired to analyse the causes. Business activities occupy public areas and streets. The research dealt with mainly data collection, document/literature study. The research is conducted on the basis of qualitative approach which includes the survey of land use and interviews.

The developed Ahmedabad city has three Eastern industrial estates like Odhav, Naroda and Vatva. In these three industrial areas agricultural land is converted into developed land. The use of land has been changed for economic development. Agricultural land is changed for housing, housing to commercial use and public land is changed for private or commercial use. In developing countries urban land is used
for illegal housing and illegal commercial activities. As a result, city develops in size and population. Growth of the cities cannot ignore informal sectors. Their existence is the responsibility of the government, and municipal authority. They should be provided separate space for their business activities. Some regulations must also be formed for informal sectors.

Mahapatro, S. Rani (2012) in her paper ‘the changing pattern of internal migration in India, issues and challenges' studied that the migrants are attracted towards urban areas due to globalization and urbanization. Consequently, their socio-economic condition gets changed. Author deals with the emerging pattern of migration in India and issues underlying it. The objective of the paper is to provide new view point on prevalent pattern of internal migration in India. The paper also discusses the changes in population mobility in post reform era.

Author briefly discusses various problems related to migration such as trends of pull factors (attraction for migration), causes of migration, declining male migration, types of migration, inter-state migration, push factors responsible for migration (poverty and unemployment), industrial classification of migrants etc. (NIC-2004) Migration revealed very dull picture. There was considerable fall in male migrants. Interstate mobility was increasing in urban areas. There was steady increase in migrants in economically lower class of society.

Idown, O. O. (Jan-Dec-2013) examined challenges of urbanization and urban growth in Nigeria. Migration is one of the main causes of urbanization. The main reason of migration is safety of life, arable land for farming, education opportunities and access to health facilities. This has resulted into congestion in city traffic and inaccessibility to the facility of water and sanitation. Problems like unemployment increased resulting into increased crime rate and housing problems. Three main factors discussed are

1) Rural Nigeria is backward and depressed homogenous economy.
2) Insufficient social amenities, facilities and infrastructure.
3) People migrate from rural areas and their knowledge, attitude and perception have changed.
In this volume major challenges of urbanization in Nigeria are mentioned. Developing countries face problems like overcrowding houses, change in social life, inadequate sanitation, inadequate basic facilities, crime, poverty, unemployment and issues related to environment.

Major problems of developing countries are pollution and pollution related disease. Imbalance in the proportion of resources, rapid explosion of population, unemployment, poverty, crimes, fake currency printing, kidnapping, car snatching, marriage with the same sex, sudden change in climate related diseases etc are the challenges of future urbanization.

Author suggested providing basic infrastructural facilities and service and social amenities in rural areas. There should not be disparity between urban areas and rural areas. The author emphasized "Ideal Governance" for equal development in the urban as well as rural areas. It is recommended by the author that the government should provide encouragement to promote agriculture, to plant more and more trees. The Government should reform various laws related to environment, demolish all slums in urban areas and create green zone by planting trees, Government should make efforts to reduce poverty and unemployment in the urban as well as rural areas. Government should welcome public participation in development of cities and rural areas. The suggestions in this study were general and not specific.

Hidefumi, I. (2014), in their paper 'Analysis of Industrialization, Urbanization and Lands use Change in East Asia According to the DPSER Framework' discussed interaction between human beings and environment in the cities of East Asia, Japan, Korea and China. Increasing environmental load and excessive use of energy and resources adversely affect human health and ecosystem. To understand the process of urbanization, industrialization and environment and the change in the land use, the author has used in this paper analytical system of driving force pressure state effect response (DPSER) model. Economic, social and environmental changes result into change in land use pattern. For this research, remote sensing and GIS techniques are used.

The analysis describeinge the changes in environment occurred by human activities shows that land usage plays a key role. In China, agricultural land is being converted into urban land. It has resulted into industrialization and urbanization. Urban climatic
change is influenced by change in the use of land in Japan. The size and intensity of heat in the urban areas are growing at rapid pace. In the cities of China, the similar changes are taking place.

Goswami, M. & Khire, M.V. (2016) in their research 'Land use and Land cover changes detection for urban sprawl analysis of Ahmedabad city using multitemporal land sat data' focused on urban growth and expansion. Land use and land cover is the important factor for the urban expansion and the growth of the city. Land cover change directly affects the environment because of loss of green area as well as agricultural land and due to this the water body also declines. In this paper authors discuss the expansion and growth of urban area in relation to land use and land cover change by using multi-temporal land sat data. City is expanding everywhere. So many social - economic and environment factors are involved for the vicissitude in land use and land cover in urban magnification. The rapid speed of the merger of residential and commercial land to rural areas at the periphery of metropolitan areas has long been considered a major factor of regional economic vitality.

GIS and Remote Sensing are established information technologies. Applications of such technologies in land and natural resources management are widely appreciated.

The study analysed the land use pattern and change of land cover in Ahmedabad between 1999 to 2011. This was the objective of the study.

Methodologically, ARC GIS 10.1 software was used for land use and land cover maps. Land sat images processing and supervised classification were used in this study.

The author has used classification method with visual and digital analysis techniques, land use and land cover maps were prepared for all regions of the city.

Author observed 22.51% increase in built up area, vegetation was declined by 28.19%. Barren area was reduced by 24.26% and 28% decrease was observed in water body. The period of study was from 1999 to 2011 in Ahmedabad city.

Urban area has increased due to so many reasons. The north area of the city is growing rapidly because of Gandhinager is in the near by area. All government and I.T industries have grown there. On the west side of Ahmedabad there are so many large numbers of manufacturing industries. Tata nano plant in Sanand is one of them. In the south east side, there are many industrial units in Vatva and Odhav.
2.3 URBANIZATION AND HEALTH PROBLEM

Chandler, T. J. (1976) analysed the impact of weather on settlement in their research paper on 'Human settlements and the atmospheric environment.' Urban environment provides the life framework for majority population of the world. People in the urban area spend majority of portion of their life in man-made climate. Almost everywhere in the developed and developing world, bricks, stone and concrete, etc are replacing field forest and farm, as new towns are established. Author said that "Man made town and God made country." Man has modified climate according to his needs. Human bioclimatology is studied for proper design of building and cities. Author has used natural elements like wind speed, wind direction, airflow, visibility, radiation, sunshine, temperature, humidity, dryness, dew in the early morning, cool effect at late night and rainfall etc.

Author has discussed that all these meteorological elements have changed. Strong winds are decelerated and light winds are accelerated, in towns. Humidity is reduced, chemical composition of air is changed, fogs are made thicker and Rainfall is sometimes increased.

Human activities have modified rural environment too. Rural environment is disturbed by their activities. Comparison between city and rural environment is comparison between 'artificial' and 'natural' environment. Today it is hard to find 'natural' climate even in the remote rural area of the world because of the spread of pollutants from other areas. Professional people like architects, engineer, urban climatologists, planners, health experts exchange ideas and information to take maximum advantages and minimize the disadvantages of urban climate.

Thangavel, C. (1981), in their paper 'spatial patterns of some infectious diseases: A, case study of Ahmedabad city' studied the positive and negative aspects of urbanization and industrialization. On the one hand they bring various advantages to the society in the form of agglomeration economies, and on the other hand, they have far reaching negative effects such as overcrowding, high density of housing and various social problems. In this paper author discussed about how urbanization affects human health especially in large urban centre. Higher proportion of residents lives in
the area of traumatic environmental condition and they have poor knowledge of health care. They are susceptible to communicable diseases.

Author used monthly data of some diseases from different wards of Ahmedabad city. In this study it is found that the cases of jaundice were found throughout the year. During monsoon, gastroenteritis and diphtheria were very common. During summer Chicken pox was prevalent widely.

**Prajapati, A. (1998)** in her Ph.D work entitled "Water borne disease in an urban environment case of Ahmedabad" discussed various socio-economic, indoor, outdoor environment and behavioural factors affecting water borne diseases by using statistical method and GIS. The author has shown the types of water borne diseases found in Ahmedabad and their distribution in all over Ahmedabad. The author concluded that there was a difference in types of diseases seen in the western Ahmedabad and eastern Ahmedabad. In eastern Ahmedabad there are slums and industrial areas and due to this in vatva and Odhav the quality of environment is bed while in western side the environment quality is good but still water borne diseases are seen due to eating habits. The author concluded that in Ahmedabad maximum diseases are gastro-intestinal, followed by viral hepatitis disease, typhoid and cholera. Author noted that during that period there was a decline in cholera patients.

**Mahadevia, D. (2000)** in her paper on "Health for all in Gujarat. It is achievable"? focused on health status in Gujarat State. Performance regarding health is improved but it is far behind that of Kerala, though it has lower per capita income than that of Gujarat. Urbanization has brought many health problems in the urban areas. The following factors affect human health.

1. Poverty, lack of food, food price, malnutrition.
2. Environmental pollution and degradation.
3. Health problem related to occupation
4. Reproductive health problem
5. Wages and Household economy
6. Economic development
7. Social development, especially literacy rates
8. Privet health care system-its price.

Secondary data reveals that Gujarat is average in health area. Tripura and Sikkim are performing better than Gujarat in CBR and CDR. It is surprising that north-eastern states of India are not economically so much developed yet they too are performing
much better than Gujarat in child health. Malnourishment is higher among the girls than the boys. Scarcity of vegetables and iron rich food, malnourishment, water borne infection and iodine deficiency are very common in Gujarat. It was observed that high mortality rate is seen between 0 to 1 year; Male child dies more than female child in the age group between 0 and 1 year. Female child died more than male child in age group between 1 to 4 year.

Healthcare system is also discussed in thereport. Private sector is more involved than public sector in health care in Asian countries. Author discussed the status of health facilities in Gujarat. Urban area offer better health facilities than rural areas. The number of doctors and nurses per lakh population are higher in Gujarat compared to the other states. Medical treatment is very much expensive in private hospitals. Patients turn to private hospitals for timely treatment. In government hospitals sometimes medical staff is not quickly available and patients have to wait for hours and hours. This discourages patients.

Disease like leprosy, scabies and fluorosis are very common in Gujarat due to excessive salinity, excessive fluoride and excessive nitrite. In rural areas untreated drinking water is supplied which causes water borne diseases such as dysentery, amoebic etc.

It is assumed that industrialization, urbanization and economic growth improve health but the real picture of Gujarat is different. Kerala is far behind Gujarat regarding above mentioned three dimensions of development but it is far ahead of Gujarat regarding health.

Sally, M. (2002), shows his strong opinion that ‘place’ does affect human health especially in industrial countries but infrastructure and collective social functioning do influence health.

Here major methodological issues are necessary for meeting different needs. Level of data on local material infrastructure and social context in area is collected by author. Aggregation information is actually available, and what might be the appropriate time interval between environmental exposure and any effect of health, epidemiology and medical geography uses administrative or postal delivery areas such as census tracts electoral ward /district, countries or post code sectors.
Author conclude that size of the area also affect health. Human health is affected by risk factors population, subgroups socio economic and cultural environment etc.

Chandramauli, C. (2003) noted that the living conditions have a direct impact on public health in his study entitled "Slums in Chennai: A Profile.” One of the biggest challenges that are faced by the urban planners worldwide is the proliferation of slums in urban areas and the host of health hazards that they bring along in their wake. This study emphasized health related problems and living condition of slum dwellers. It focuses on how does living condition affect public health. Slums of Chennai were focused and the data was taken from census 2001.

It is known from the data that total slum population of Tamil Nadu is 28, 28,366 which is almost 20.2% of the total population of towns undertaken for study. 63 municipal towns were selected. Number of males were 5, 48, 817 and females are 5, 30,897. The proportion of females was 968 per 1000 males. Literacy rate was high even in slum population. Slum dwellers could not afford essential commodities of life. Only 26% slum population had facility of drinking water in their premises. 19% had to fetch drinking water from 500 meters distance. Electricity facility had reached to 79% slums. More than 34% had no latrine facility, 30% of households of slums did not have drainage facility, 24% slums did not have separate kitchen, 87% households in slum used kerosene as fuel. Less availability of basic facilities and very poor living condition were reason for diseases.

Basic amenities and its quality are focused in the book. No proper explanation is mentioned in the book regarding its impact on slum dwellers. Health issues like medical facilities, expenditure, immunity of population, child health, infant mortality rate and mother mortality rate etc. should have been covered in the research to make the research more profound.

Government of India's focus has been on development of rural health system. In 9th five year plan Government has started giving priority to urban health as well, but hardly any progress has been achieved. In the paper entitled "Urban health status in Ahmedabad city." written by Ramani, K. V. (2005) selected three wards Baherampura, Kubernagar and Vasana of Ahmedabad city to analyse health issues.
To understand the nature, size and complexity of urban health management issues, GIS based analysis is used in this paper.

The objective of study was to know socio-economic status, quality of public health facilities and health care services, especially for slum population, non-slum population living in LIG, MIG and HIG Flats.

The conclusion of the paper showed that in poor location health facilities were quite poor and inadequate which affects health services. There were no government facilities for medical treatment in Baherampura and Kubernagar. There were 40 private health care centres and trust hospitals. Even in Vasna; no health care facility was available. 75% patients had to travel 3 km to 11 km for health care. 50% patients had to travel 1 to 2 km to have an access to health care facility.

Tayfun, M., Tarun, & Asli, B. (2008) in their work on 'Impact of Urbanization process on Mental Health' studied the main causes of urbanization. Effects of urbanization may cause problems such as stressful life, poor social network, and rapid growth of cities because of immigration. All of these factors may negatively affect mental health with rapid economic development in short period. Urban population has increased beyond the capacity of any city. In this paper author mentioned that the rapid growth of urbanization has created negative social, economic and psychological impact in the people living in big and busy cities. Suicide, Homicide, Drug addiction, violence, health disease and traffic accidents, problems of living in slums, hutments, problem of unemployment, one meal a day, improper food habit etc. are the negative effect of urbanization.

It is concluded after various demonstrations that rapid urbanization and urban life adversely affect individual's mental health. Negative effects before us are unemployment, not following traditions, estrangement, slum life, uncertainty of future, lack of social support etc. For social view point, rapid migration from rural areas to urban centers should be restricted. Heavy migration creates problems for domestic people in the urban area. Efforts should be made to prevent mental diseases occurred due to rapid urbanization

Development programme (UNDP) explained the cause and impact of urbanization. His analytical study focused on level, pattern and trend of urbanization and migration of entire Asia. It covered main countries of Asia viz. China and India, and has given entire scenario of urbanization and migration process. At macro level analysis, it also revealed that the formation of major countries of Asia was not because of their level of economic growth but it was a composition and labour intensity of rapidly growing informal sectors. The data also emphasize that several government of these countries have some intended programme for improving governance and infrastructural facilities in major cities for attracting private local investors and outside investors. It showed that level of income and quality of basic amenities in these cities were growing. But furthermore, the author opined: “Nonetheless, there is no strong evidence that urbanization is associated with destabilization agrarian economy, poverty, measure of globalization resulting in regional imbalance.” The analysis showed the share of Asian urban population during 2000 to 2030, it's to the global urban population would grow up from 48 to 54 per cent. Moreover, the study explained some facts and figures of overall population of Asia and urban population in Asia. The urban population was 32% in 1950 which increased up to 44 per cent in 1970. The study also distinguished and compared the urbanization level between the countries of West Asia and East Asia which showed that urbanization was very high in the proportion in West Asia even in the context of international migration also. All the western countries of Asia like Iraq, Turkey, and Yemen have very high percentage of immigrants and similarly UAE, Qatar, Kuwait and other Gulf countries have immigrants for employment. Thus, the study showed the population growth and urban population growth by inter – intra continent and country base migration. The report stated that the urbanization level was becoming rapid in the Asian countries and many factors were responsible for it. Migration was one of the major factors. Even cities and metropolis in different Asian countries were also developing and expanding due to some causes which were explained in this study. The development of urban areas was also a cause behind increasing per capita income, GDP and entire economic development. Moreover, the study pointed out that urbanization was leading to rapid reduction in unemployment, poverty and increased access of people to basic amenities. According to the scholar, several countries were giving importance to urban development and urbanization for economic growth and development.
Robaa, S. M (2011), in his study on 'Atmospheric and Climate Science' revealed that urbanization and industrialization processes have resulted in the distinct modification of human comforts. Author analyzed "Effect of urbanization and industrialization processes on outdoor thermal human comfort in greater Cairo region of Egypt." The author has selected four different districts in greater Cairo region. They have been selected to represent rural, suburban, typical suburban and industrial area.

The data of non-urbanized (1947-56) and urbanized (1990-2009) periods have been used and dry-wet bulb temperatures and wind speed is taken. Three weather effects are observed minutely: dry air temperature, humidity and wind speed, which create discomfort on human beings. The author has concluded that urbanization and industrialization in any part of the world creates uncomfortable feeling while rural area leads to weather comfort for human being. In rural area seasonal weather is experienced while in industrial area no seasonal cycle is experienced and only hot weather is experienced. Weather in rural areas allows human beings to perform more activities.

Carsten, B. et al. (2012) in their paper on 'Urban health in India', discussed urbanization process in India, various diseases found in developing countries, various socio-economic reasons responsible for diseases, various factors affecting health and area-affected health system. He has also discussed how the environment changes due to human activities. He considered Delhi as the 'Asthma capital of the world'. He has also discussed various types of diseases caused by pollution such as air, water and waste water. He considered water pollution as the major factor. He showed that industrial waste and domestic waste from class-I cities and waste water from sewerage can become a serious health threat. According to CPCB report there has been an increase in industrial pollution, waste water and water logging which are major factors for mosquito borne diseases. Non infectious diseases have increased because of various socio economic reasons such as modern nutrition. The author has also discussed various hygiene related problems and diseases in slum areas as well as the government policies. Author concluded that Indian urban health is closely connected with urban environment, social structure, urban health system, over population and change in life style etc. Health itself is an influencing factor in a complex and interrelated urban system. He suggested that specific regulations should
be formed, there should be special health services for the poor in private health centres, positive change should be brought in urban environment and effective knowledge based health governance should be implemented in planning and politics so that poor urban health and health inequalities can be overcome.

**Somani, A. (Aug-2012)** in her paper focused on the slum area and incidence of diseases in Ahmedabad. Comparison of the wards of Ahmedabad with each other in terms of two health indicators: Disease trend rate and MMR was the main objective of the study. Second objective was to study the problem reasons for higher incidence of disease in wards of certain zone. The disease trend rate was studied during 2008-2011 for four major diseases namely gastroenteritis, typhoid, jaundice and malaria. Author concluded with analysis of the incident rate of disease in various zones that it is observed that the most affected zones are the east zone, south zone and the north zone. West, new west followed by central zone tends to be far better. East zone has the highest slum population. Poor living conditions which make them more prone to various water borne and vector borne diseases because of inadequate water supply and sewerage network facilities in this zone. Poor sewerage conditions, lack of medical facilities and high number of slums in east zone make it the most vulnerable zone in Ahmedabad.

**Zaidi, S. (2012)**, examined level of Cr VI in drinking water from industrial and non-industrial areas of Ahmedabad. Cr VI either by natural or anthropogenic source is emerging as a global health problem, in view of elevated cancer mortality. In this paper level of Cr VI in drinking water from industrial and non-industrial areas of Ahmedabad,' author collected data from five zones of Ahmedabad to compare the levels of Cr VI in water sample of non-industrial and industrial area. AMC supply and bore water sample were processed and analysed. Wide difference was found in the level of Cr VI in drinking water collected from bore wells. There was considerable high level of Cr VI in bore water of all the five zones than AMC supply. This level was higher in the water of industrial area than non-industrial areas. Waste generated from chrome plating, dye work, stainless steel welding is usually discharged in drainage line or dumped in local garbage pit. People lack awareness for proper disposal of wastes.
Urbanization is widely recognized as a process with several socio-economic, political and environmental impacts. The paper "Urbanization process in developing countries: A review on urban ecosystem degradation and public health effect" by Mikias, B. Molla (2015) dealt with the urbanization process, its type and its effect on environment, ecosystem and public health related issues.

Number of articles from different parts of the world was included in the review of this paper to examine wide literature of various research areas in the paper. Each article carried different concept and ideas on urbanization and its impact on environment and ultimately on human health.

Conclusion of the paper indicated that half of the world's total population is living in urban areas. The level of urbanization depends closely on industrialization and economic development. Degradation of ecosystem, environmental and health related issues occur due to rapid industrialization. Urgent and effective policy should be framed to reduce the adverse effect of industrialization and rapid economic development. Author suggested that developed healthy green cities are the need of the hour.

2.4 INDUSTRIALIZATION AND HEALTH PROBLEM

Chrodie, S. (1992) stated that urban industrial areas were facing serious pollution problems arising due to small scale and service based industries. Wet process industries create more hazardous problems. In these industries water was used as raw material. It was used in process for cooling also. Only small quantity of water was absorbed and the remaining water was discharged anywhere in river, tank, and lake or even on land. Chemicals such as free acid, toxic metals cyanides; dyes, oils; detergents and rubber etc were thrown that polluted environment. These pollutants affected the quality of land and its productivity. It affected cattle; it caused their death due to toxic chemical.

Emission of toxic gases spoiled atmosphere and affected human health. Air borne particles affected the health of labours. Acid and alcalis caused hypertension, metabolic problems, bloody diarrheal, vomit of blood and gastric problems. Reactions on skin, headache, vertigo, burning sensation in mouth etc. were also caused by
chemical and dye manufacturing small scale industries. Heavy metals induced red blood cells and caused abdominal pain, hyper tension and lung cancer.

**Bhatt, B. (1995)** in her PhD work entitled "Health of Industrial Workers: A geographical perspective" focused on various areas of Baroda city such as Nandesari, Makarpura and Pratapnagar industrial area. The author has analysed various types of industries and various diseases caused by those industries. Author has used different variables such as socio economic, environmental factors, health facilities and health problem etc. The author has not identified the exact occupational diseases but discussed the nature of health problems that are encountered. The author has concluded that heavy physical labour related diseases are seen in chemical factory and glass industries while in textile industry diseases related to respiratory system and Asthma were seen. Skin diseases were seen in chemical and paint industries. Author also noted that the workers who work for the long time were badly affected as well as the people residing nearby were also affected. The author has noticed that people used to go to private hospitals when there was no government hospital in nearby areas. The author has noted that there was lack of awareness in most of the respondents. The author concluded that there should be sustainable human progress and well being in society.

**Abbasi, S.A. et al. (1997)** in their paper analysed rapid growth of industrialization in the last one and a half decade in Pondicherry. It has positive impact as economic benefit and has brought environmental stress as adverse effect. It has adversely affected quality of the life of its citizens. The study conducted an EIA (Environmental impact assessment). The area in Pondicherry once known as "Brand Basket of Pondicherry" once known for pure ground water and surface water and good quality agriculture, good quality crop, is now changed due to small scale industries. On the basis of objective, the air quality of the study area is examined and observed in extensive manner. Human colonies, agricultural land and mono culture etc. are described. Air pollution was measured through the measurement of elements like various gases SO$_2$, NO$_2$, Cl$_2$ and in water samples; Acidity, BOD, COD, Chloride, ph, Sulphate and heavy metals were observed.
Author concluded that in industrial estate, the level of pollution is between 40-50% and at night in residential area, it is up to 80%. Air, water, land and biotic environment of Pillyarappam and Kirumampakkam were already grossly polluted. Regulatory agencies have recommended acceptable level of pollutants but the level of pollution of air and water was repeatedly exceeded and consequently it created drastic adverse impact on biotic environment.

Changhua Wu et al. (1999), in their analytical study about "water pollution and Human Health in China" explained the environmental health perspectives. Extraordinary economic growth, industrialization and urbanization have caused water pollution in China. It is severe problem that China has been facing. Waste water volume has doubled in a decade which brings consequences on human health. Near rural residential areas; major pollutants were found in water. It increased the risk of infection and parasitic disease. Adverse health effect was found in number of studies (TVIEs) since 1970. Liver and stomach cancer deaths have doubled and pollutants are the leading cause of cancer mortality in rural China.

Inadequate treatment of municipal sewage was another major problem for China. Low level of sewage caused wide spread illness, poor waste water treatment was equally responsible for widespread illness. Tones of urban garbage were discharged into lake, river and sea. Untreated sewage water and fertilizer was used for rapid expansion of new agriculture land. Pesticides were used to raise productivity with improved hybrid seeds. Untreated pesticides water was discharged from the farm. In conclusion, the author said that the priorities should be to elevate public health. National law for water and law of water pollution prevention should be established.

The urban residents staying near the industrial area face air pollutants which are hazardous to health. Their effects on health were assessed in the study carried out by Saiyed, H. N. et al. (2003). They studied about three areas such as residential, commercial and industrial of Ahmedabad. Their Objectives of the study were to measure lung function - among the people residing near industrial, commercial and residential areas. The author has used lung function test (LFT) by using computerized spirometer. There were, in all, 544. About 268 male and 276 female were selected in sample from the following three different areas.
(1) Residential area near L.D. Engineering College.
(2) Commercial area near Nehru Bridge.
(3) Industrial area near Naroda.

Prevalence of LFT abnormalities was determined using some criteria. Significant impairment in lung function was observed in 45 year age group. R type of abnormality was found in 20-44 year age group. Respiratory system bronchitis was related to high or low levels of pollutants. Female were exposed to indoor air pollution due to cooking and males were exposed to ambient air pollutants. They were surrounded by air pollutants for longer period. Lung capacity of the residents of Naroda area was found quite low, significantly lower than L. D. area. The level of SPM, So2 and No2 levels were higher at Naroda. Male residents working in the nearby industries suffered from toxic pollutants at work place. Smoker showed effect on FEV 1% which indicated air way hindrance. Nutrition also affected the respiratory system. Under nutrition has adverse effect on lung function and lung defence mechanisms. Gradual deterioration was seen in lung function among residents of Ahmedabad especially in male residence of Naroda area.

Patel, A.B. et al. (2007-08), reported that in the developing country like India, the chemical industry is growing rapidly and is highly concentrated in some part of the country including Gujarat. In their research entitled 'Blood methemoglobin level in the Dye- stuff workers in Gujarat'; large number of dye and dye intermediate factories were observed. 75% of them were chemical factories. Chemical industry is growing rapidly. The study was undertaken on 865 workers working in 500 factories such as manufacturing chemical products, dyes and dye intermediates, bulk drugs; cresol and epoxy hardeners in Gujarat. The workers were working in different departments. Their blood and urine samples were analysed by using one way ANOVA. The study Concluded that the workers suffered from urinary tract infection, kidney stone, enlarged prostate, cancer of kidney and prostate.

Kuman, S. et al. (2007-2008) said that women are exposed to toxic environment, chemicals during their daily activities without having knowledge about it. General public, pregnant women and even children are exposed to hazardous toxic atmosphere. In number of ways metals are present in environment. Metals are
released from various sources. Metals enter into food chain by the way of bio-concentration. Metals like lead, cadmium and mercury have toxic effects on reproduction. Certain chemicals and metals affect reproductive system and leads to infertility.

Aim of the entire study was to find out the effect of toxic metal on environment, pregnant women and new born babies and the role of heavy metals in reproductive system. 164 pregnant women in their first trimester of pregnancy were randomly enrolled in Gynaecology department. Every minute detail was recorded such as name, age, habits, addiction, income, education, organic solvents in the area of their residence and reproductive history. In this study, 89 respondents were from urban area, 21 respondents were from rural area and 54 respondents from industrial areas were interviewed. The analysis of their socio-economic status, haematological profile, data on birth, weight, body and length of new born were carried out in the study. It was observed that some of the pregnant women carried higher blood lead level and its adverse effect in Ahmedabad.

Prasad, P. N. et al. (2010), in their book 'Environmental pollution, Causes, Effects and Control' studied the industrial status of developed and developing countries and discussed about the contribution of South Asian countries in the process of industrialization. Author also talked about impact of large scale industries on environment.

It was surprising to know that pollution occurred only 4% by large scale industries and 20% by small and medium scale industries. Impact of industrial (large, medium and small scale) pollution of air, pollution of ground water, discharge of chemicals waste in the river, sea and lakes creating unacceptable pollution of water, discharge of toxic substances etc. are major issues for developing countries. Heavy metallurgical, chemical coal industries adversely affect human health.

One third employees of SMES didn't mention any problem. The others complained of ailments such as headaches, respiratory and skin problems.

As per the report, disposal of hazardous waste is extremely costly. However average disposal cost of hazardous waste is lower than in the U.S. It indicates that environmental laws are not very strict.
In this book author discussed about toxic pollutants, water pollution, air pollution, impact of tourism, eco-tourism, urbanization and infrastructure in urban area, natural resources and environmental regulation. Self-imposed regulatory methods ISO(14000) certificate is thoroughly discussed in this book. In 1990s small scale industries and common treatment plants started in India and then after it became widely accepted in South Asian countries.

**Peter, M. R. et al. (2011)** in their paper discussed about worker's condition in industrial area. Occupational noise-induced hearing loss is one of the most prevalent occupational conditions. Author examined 'Effect of daily noise exposure monitoring on annual rates of hearing loss in industrial workers'. In this paper, objective of the study was to know hearing loss due to occupational noise. Effectiveness of preventive invention was lacking. The author analysed daily ear-noise exposure of workers. Annual hearing loss was compared age wise, gender wise at high frequency hearing level.

Methodologically, author daily monitored and took regular feedback of ear noise exposure from supervisor. The annual rate of change in high frequency hearing was compared before and after intervention was determined. Annual rates of loss were compared between intervention subject and other company smelters matched for age, gender and high frequency hearing threshold level. This paper presented effectiveness of intervention to prevent occupational hearing loss using new technology of noise exposure.

The author concluded that monitoring could be effective in preventing occupational hearing loss because there were number of reasons for daily noise exposure. Some of them are lacking of hearing protection devices. Non-occupational noise was similar to intervention subject in age and work tenure.

**Patel, P. et al. (2012)**, in their study 'Educational interventional study of chemical industrial hazards and its prevention among the workers of dye industry' discussed that the occupational health is related to maintaining physical fitness and mental well-being and social well-being of workers in all occupations. Workers spend eight hours a day in the work place. Work place should be safe, healthy and pollution free. Safety measures are important in reducing health hazards.
In this paper, objective of the study was to assess workers’ knowledge regarding chemical hazard and personal protective equipment. Pre and post intervention knowledge was assessed by using same pre designed Performa.

The author has discussed literacy rate which was found to be 90.6%. Half of worker per capita had income less than Rs. 1500. 78% were addicted to one or more things. Majority of them were unaware of the adverse effect of dyes. They had no knowledge of personal protective equipment. 45% had basic knowledge of PPM. They concluded that protection against chemical hazards should be given frequently. Posters regarding health hazards should be kept in the factory.

Syed, S. et al. (2013) investigated the health risks in workers working in cement factories located at Kashmir in India. Workers were given questionnaire followed by personal interview. Mostly the workers were suffering from skin, respiratory problems and irritation in eye. No safety device was given during work. Cement and dust particles reach lungs and lead to occupational lung diseases. There are harmful substances in the environment of cement mills. Dust and various gaseous pollutants affect human health. Allergy, chronic bronchitis, asthma, lung cancer, pneumonia, tuberculosis, shortness of breath, cough and stroke etc. were very common diseases caught by workers of cement factories. They suffered from chest pain, irregular heart beat when cardiac vascular system got affected. Health related problem increased during summer, when company was not using pollution control equipment or mostly they were not in working condition.

Halder Joshua, N. et al. (2015) in their paper entitled ‘Water pollution and its impact on the Human Health’ stated that river pollution is a major environmental issue in urban Dhaka. This study is regarding the health related issues on the pollution of nearby areas of Turan River. Study showed variation in water quality of the river as untreated industrial waste was discharged into it. Seasonal change also affected water quality and created health problems.

In this research, primary data was collected from field observation. Secondary data is collected from various departments. Surface water quality, DOE and test sample were analysed. Focus group discussion and detailed interviews with members of
community with their historical health problems were carried out. Water quality was analysed by Microsoft excel software.

It was concluded that the water of Turan River was not advisable to use for domestic purpose. It could not sustain aquatic life. Turbidity, BOD, Hardness, TDS, and COD levels were very high- much above permissible level. Local community was suffering from skin disease, diarrheal, dysentery, respiratory discomfort, anaemia, complication in child- birth, cholera, jaundice, dengue, malaria and other water borne diseases.

A sustainable monitoring of groundwater quality becomes essential for minimizing groundwater contamination and for having control over pollution causing materials. (Jain, N. et al., 2015) Modification in ground water quality was carried out through natural and anthropogenic process. In this paper; researcher assessed ground water quality of industrial zone, Kota in Rajashthan in winter. Change in quality of natural water disturbs equilibrium between different forms of life. Ground water quality was degraded by rapid industrialization and agricultural activities in the surrounding areas. Objective of the study was to examine the quality of ground water in industrial zone. Different water samples were collected from DCM industrial area. Focus was on the quality assessment in winter season. Stiff plot and scattered plot have been used to highlight pollution of the study area and variation in ground water quality of industrial zone. Quality was assessed by different physical and chemical parameters. Paper analysed the significant cations and anions by Mat-lab R2008b (software). Author observed that cations values are more compared to anions in winter. Stiff plot indicated that patterns of cations and anions were irregular. Each pattern indicated different quality of water in study area and adjoining area. Calcium, Sodium and Chloride were not distributed evenly as they possess different compositions at different place. This was shown by scatter plot. Fluoride value was found higher in the adjoining area. A-2 and A-3 is permissible limit prescribed by WHO. It was concluded that pollution levels was not alarming today but is going to influence human health in future.

Maheshwari, R. (2016), studied the effect of industrialization on water resources. Industrialization helped people in getting employment but one cannot underestimate the pollution generated by these industries. It adversely affects our so called "health"
environment. Gujarat was known for textile industry. Gradually other industries developed. Kharicut canal passes through all the three industrial areas and provides water for agriculture to 42 villages. With the development of industries the water got polluted. The author has discussed the effects of industries on environment. As a result people living in the villages filed PIL in 1995 as a part of which the provision of effluent treatment plant (CETP) was installed in each estate. CETP were installed along with the establishment of mega pipe line in 2000. This pipe line brings waste water from Naroda, Vatva and Odhav, and discharges it in to Sabarmati river at Gyaspur. Till today the same condition prevails. Legal and illegal system is discussed in the paper. This paper discussed on various issues such as legal system during different years, mal practices carried out by the defaulters, GPCB report from 2004 to 2014, illegal system focusing on mal practices on Kharicut canal etc. The qualities of water are assessed by studying major parameters like pH, BOD, COD and DO from different locations. It was found that DO and pH are decreasing in water of Sabarmati flowing from upstream to downstream. It shows high BOD and COD value, water is found much polluted. Its main reason is untreated waste water pipeline connected illegally with the mega pipeline. Authorities mix this untreated waste water directly into the river through tankers at night. Due to illegal sewage connection mega pipeline overflows. The author mentions that the water of Naroda and Odhav in Kharicut canal is less polluted than the water of Vatva. High level of metal and chemical is observed in the water of phase 2 and 4. It affects adversely the human and animal life living beyond this area. These components of environment indirectly hamper the social and economic development because of calling of many diseases, loss of aesthetic value, and loss of reduction areas, stretches emanating bad smell, reduction in marriage proposals in girl families. This may lead to death of human and animals.

Legal actions were taken. As a result; many units were closed down. Finally the author talked about a project in which it is recommended making one wetland near Gyaspur in which specific treatment is given to industrial waste water and water is made clean with less expense. After giving the treatment the water is released into river. This would bring many economic and social benefits.

Rapid industrialization, unplanned urbanization, population and vehicular growth etc have created serious environmental issues in developing and developed countries. In this paper, Prasad, D. et al. (2016) dealt with air quality and its effect on health. The
study was confined with the health impact of deteriorating air quality in Lucknow city. Author selected three different categories for assessment (1) Industrial (2) Commercial (3) Residential for air quality in city during pre and post monsoon period. RSPM 24 hours mean concentration in residential and commercial areas was observed.

Author concluded that concentration pollutants showed wide variation within the city. Pollution level was high in centre part of the city because of high density of population and large number of vehicles. After monsoon period; pollution was high in commercial and residential area due to automobiles, population overcrowding, building and road construction, transportation and communication. 52% respondents agreed that automobile was the main source of air pollution along with pollution caused by industries and indoor air household pollution.

Air pollution causes suffocation, eye irritation, skin problems, asthma, bronchitis, T.B lung cancer etc. Especially 31-60 age group people travelling by over crowded bus which was also affected by air pollution so they suffered from chronic health problem. Due to heavy use of pesticides and urea, agricultural labours faced skin problems. Air quality and air borne diseases were closely related. They concluded that remedial steps should be taken to control air quality through public health, environmental and social policy.

**Conclusion**

Thus, in this chapter scholar has done reviews of literature related to this study. Scholar has included some studies and research papers, articles and books for the review. The reviews done by scholar are mainly related to the subjects like urbanization, industrialization and Health. The reviewed studies are national as well as international. Through review of literature; scholar has tried to see the current situation of health related problems of industrial area as well as near industrial area. This study has considered the inferences from the reviewed studies and has focused on health related issues in three GIDC areas of Ahmedabad city.