An International Biannual Open Access Peer-Reviewed/Refereed Journal
JOURNAL OF GLOBAL RESOURCES
Published by : ISDESR, Jaipur, India

www.isdesr.org

ISSN: 2395-3160 (Print)
ISSN: 2455-2445 (Online)
January 2022, Volume 08 (01)
DOI Prefix: 10.46587/JGR

04

STATUS OF SANITATION FACILITIES AND ITS IMPACTS ON HEALTH IN MAINPURI CITY OF UTTAR PRADESH, INDIA

Salahuddin Mohd.[1] and **Mohini Saran**[2]

[1]Assistant Professor, [2]Research Scholar
Department of Geography, School of Earth Sciences, Banasthali Vidyapith, Rajasthan, India
Email: salahuddingeog@gmail.com

How to cite this paper:
Salahuddin Mohd. and Saran Mohini (2022) Status of Sanitation Facilities and Its Impacts on Health in Mainpuri City of Uttar Pradesh, India, Journal of Global Resources, Vol. 08 (01)

DOI:
10.46587/JGR.2022.v08i01.004

Received: 11 Oct. 2021
Reviewed: 06 Nov. 2021
Revised: 14 Nov. 2021
Final Accepted: 24 Nov. 2021

OPEN ACCESS
Freely available Online
www.isdesr.org

Abstract: *Nearly 60 million people in urban areas lack access to improved sanitation arrangements, and more than two-thirds of wastewater is let out untreated into the environment, polluting land and water bodies. Urban sanitation in India faces many challenges. To respond to these environmental and public health challenges, urban India will need to address the full cycle of sanitation, i.e., universal access to toilets, with safe collection, conveyance and treatment of human excreta. There has been a significant increase in waste generation because of rapid population growth and economic development. Thus, waste management and sanitation became major environmental and health problem. In rainy season condition gets worse. This paper outlines these concerns, and highlights the need for focusing on access to water and the full cycle of sanitation for the urban poor, as fundamental to addressing the sanitation challenge. In this paper an attempt has been made to identify the sanitation related risk factors and its relationship with associated diseases in Mainpuri city. The study is based on primary sources of data collected through household surveys in Mainpuri city. Households belong to different income groups. The total sample size consists of 1836 households. The result showed that the sanitation condition and associated diseases or living standards and health conditions are related to each other. In this paper typhoid fever, cholera, malaria, etc. diseases were observed. The lower income group households are most vulnerable. They suffer most because of their poor sanitation conditions.*

Key word: Diseases, Disposal, Health, Household, Income Groups, Sanitation, Vulnerability, Waste.

Introduction

According to the father of our nation M.K. Gandhi – "Sanitation in a community is more important than independence". He said "Sanitation is based upon common spiritual effort in a community like ours, and it is also a basic human right". Gandhi was an environmentalist of remarkable foresight and vision. He was aware that toilets are the link between good and bad environment. Sanitation is one of the most neglected sectors in India even today. More people have access to mobile phones than to a toilet according to a UN Study on how to improve sanitation globally. The goal of UNICEF is to halve, by 2015, the proportion of people without sustainable access to safe water - has been achieved globally, but the same target for sanitation is so far off track that it is unlikely to be met by 2015. The WHO/UNICEF joint monitoring programme for water supply and sanitation has said that at its present pace, India would take time till 2054 to meet its millennium development goals 2015 on sanitation.

In our daily life, sanitation and hygiene play an important role. "Sanitation refers to the provision of facilities and services for the safe management of human excreta from the toilet to containment and storage and treatment on site or conveyance, treatment and eventual safe end use or disposal. More broadly sanitation also included the safe management of solid waste and animal waste" (WHO, 2002). Generally, one to two thirds of the municipal solid wastes generated in the cities of the developing countries are not collected (World Resources Institute *et al*., 1996). As a result, the uncollected waste, which is often also mixed with human and animal excreta, is dumped indiscriminately along the streets and in drains, so contributing to flooding, breeding of insect and rodent vectors and the spread of diseases (Cointreau, 1982). In 2017, 45 percent of the global population (3.4 billion people) used a safely managed sanitation service. 31 percent of the global population (2.4 billion people) used private sanitation facilities connected to sewers from which wastewater was treated. 14 percent of the global population (1.0 billion people) used toilets or latrines where excreta were disposed of in site. 74 percent of the world's population (5.5 billion people) used at least a basic sanitation service. 2.0 billion People still do not have basic sanitation facilities such as toilets or latrines. Of these, 673 million still defecate in the open, for example in street gutters, behind bushes or into open bodies of water. At least 10 percent of the world's population is thought to consume food irrigated by wastewater (WHO, 2002).

The World Health Organization and UNICEF are advocating a target of water and sanitation for all by the end of 2025; to meet this target, some 2.9 billion people will need improved water supplies, and an almost unbelievable 4.2 billion people will need improved sanitation. However, in India sanitation is most neglected sector where any kind of waste disposal anywhere without any treatment. Every river that passes through a city or a town today becomes a stinking sewer. These unhygienic habits create lots of problems. These waste blocks the drain and water logging problem arises. Origin of leached that a toxic pollutant. It's a liquid pollutant caused by breaking down contain of waste and it have heavy metals and chemical, etc. which affect ground water, plants and underground animals. The chemicals present in the waste may convey back to men, though flies, water and plants. These waste water help in the breeding of flies and insects; they help in spreading diseases.

In India sanitation remain the most neglected sectors, whereas human sewage poses the biggest threat to our rivers, lakes, ponds and the ground water table. Every river that passes through a city or a town today becomes a stinking sewer; Proper sanitation doesn't mean to make toilets or clean street but it means a healthier environment for all citizens. There is a proper system of treatment and disposal of waste. That's help not to separating microbiological agents causing diseases (Hazarika, M. P., 2015). Sanitation, along with clean water and food security is a primary driver for improving public health. It is hygienic means of promoting health by prevention of human

contact with hazards of waste through services such as excreta management, garbage collection, storm water management, treatment and proper disposal of sewage waste water, etc. apart from this eliminating open defecation, a practice strongly associated with poverty and exclusion is critical to achieving sanitation (National Urban Health Mission, 2013-14). Sanitation also connected with social and economic environment of the area. Lack of adequate sanitation remains a major cause of diseases in small cities due to lack of proper planning, funding, labours, equipment and awareness. About 72.6 percent in urban areas have availability of water closets, 7.1 percent household have pit latrines, 1.7 percent household have other latrine (disposed into open drain, Night soil removed by human) and 18.6 percent do not have latrine facility. Whereas 49.8 percent household in India defecate in open. 44.5 percent households in urban India have connection to closed drainage and 37.3 percent open drainage facility and 18.2 percent have no drainage facility (Census of India, 2011). Large proportions of households in India are not connected to the waste management system and discharge their waste at unauthorized sites. These untreated waste causes pollution and also effects human health. In this paper an attempt has been made to assess the overall sanitation conditions of the study area, to identify the sanitation related risk factors and associated health problems, to analyze relationship between sanitation related risk factors and associated diseases and finally suggest some suitable measures for the problem of sanitation.

Materials and Methods

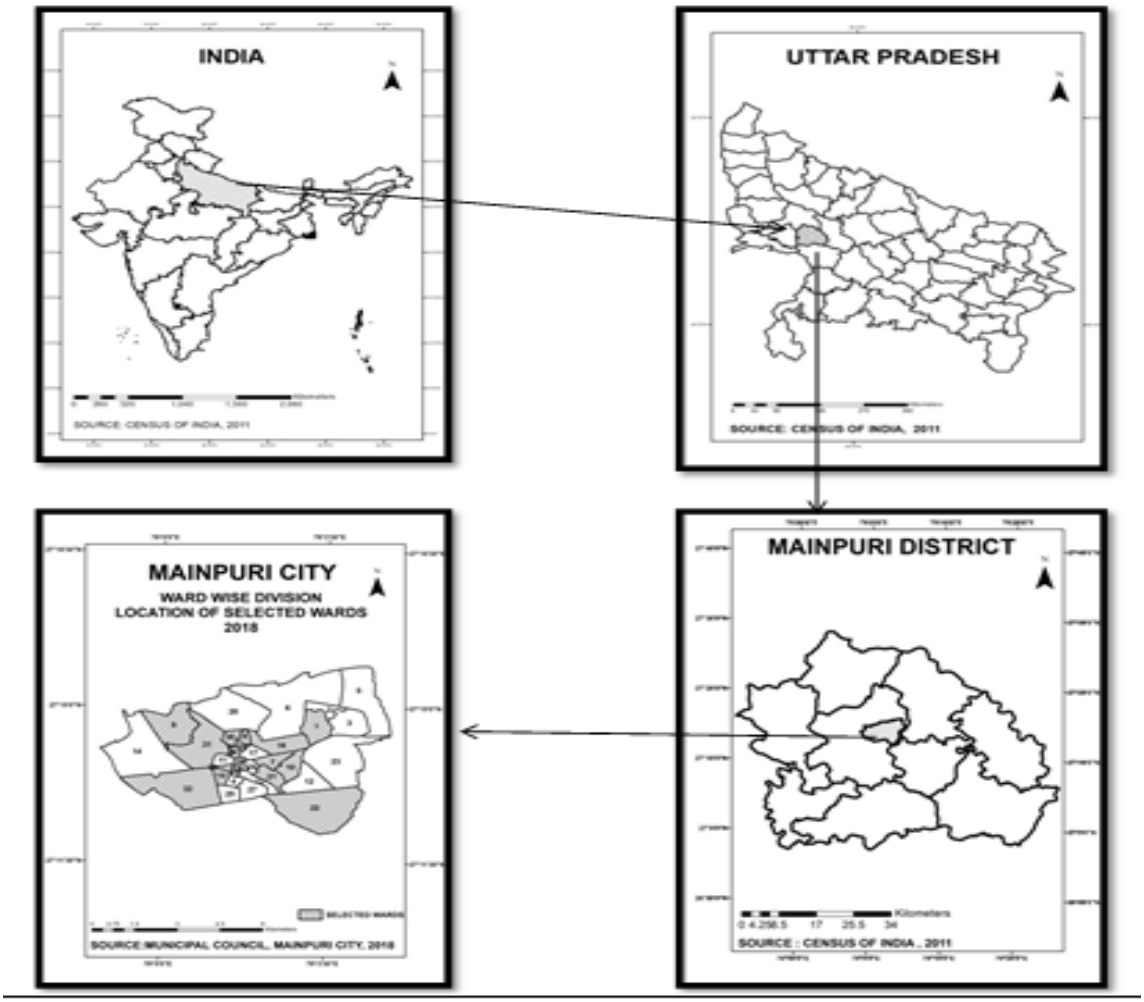
The beautiful city of Mainpuri (27˚ 12' 8" N to27˚ 15' 53.98" N latitudes and 78˚ 58' 42" E to 79˚ 04' 52.11" E longitudes) is the administrative headquarters of the district Mainpuri in Uttar Pradesh. The city is a municipal board and sited to the northeast of Agra; city falls under Agra division. The city is elevated about 153 m that is 502 feet above sea level. Sultanganj is situated north of Mainpuri city, Ghiror in west, Jagri in south and Kuravali development block in east. The district generally presents the appearance of an extensive level plain broken only by the sand ridges on the western border, the rolling sand hills and undulant of the Kali and Isan River and the ravines along the Yamuna to the southwest. The Kali Nadi forms the boundary of this plain on the north and north-east and the Yamuna encloses it on the south-west.

Mainpuri railway station at Lane no 12 was started in 1905. Located in Mainpuri district, the city railway station provides quality train transport facility. The national highway NH 91 runs through the Mainpuri district through Etah and Kannauj passing through Kurawali, Sultanganj, Nabiganj and Bewer cities of the district. Though NH 91 doesn't pass through the district headquarters Mainpuri the major roads from the city connects the national highway. Two main state highways run through the city UP SH 83 Etawah - Mainpuri route and UP SH 84 Firozabad-Shikohabad- Mainpuri. Both the state highways connect city with the NH 91. Cotton ginning, oilseed milling, and lamp and glass manufacture construe the prominent industries. The town is also renowned for its tobacco and wooden sculptures.

The study is based on both primary and secondary sources of data. A primary source of data has been collected through household survey of Mainpuri city with the help of questionnaire interviews. The following methods were used in this study:

For sample selection multistage stratified sampling method was adopted. 16 wards were selected from 32 wards of the city (50 percent wards). From these selected wards 10 per cent households from each ward were selected from different income groups. The total sample size consists of 1836 households (417 households from high income group (>35,000 per month), 631 households from medium income group (35,000- 10,000 per month), and 788 households from low-income group (<10,000 per month).

MAINPURI CITY: LOCTION MAP



Source: Census of India, 2011 and Municipal Council Mainpuri City, 2019.

Secondary data has been collected from various sources i.e., Mainpuri municipal council (2019), district census handbook of Mainpuri (2011) and Sankhiyaki patrika (2018), Census of India (2001 and 2011), Nation Urban Health Mission (2013-14), Uttar Pradesh Jal Nigam (2015), WHO reports etc.

Karl Pearson's correlation co-efficient (r) method was used to examine the relationship between sanitation related risk factors and associated diseases-

$$r = \frac{\sum xy - \frac{\sum x \sum y}{N}}{\sqrt{\sum x^2 - \frac{(\sum x)^2}{N}} \sqrt{\sum y^2 - \frac{(\sum y)^2}{N}}}$$

Here,
r = coefficient of correlation
x, y = the two given variables (sanitation related risk factors and associated diseases)
n= number of observations

Results and Discussion

Sanitation in India is a State subject. Urban local bodies are responsible for planning, design, implementation, operation and maintenance of water supply and as well as sanitation services in cities and towns. The Mainpuri Municipal Council is responsible for water supply and sanitation services in Mainpuri city. The sanitation condition varies according to location, standard of living,

and weather/season. In rainy season condition gets worse in some wards e.g., Agrawal (ward no.4), Sansarpur (ward no.5), Sheetala Dhaam (ward no.6), Dhaarau (ward no.8), Dariba-Mahmud nagar (ward no.11), Nagla Niranjan (ward no.23), Nagariya ward no. (Ward no. 28), Ram Lila Maidaan (ward no. 31), Nagla Rate (ward no. 32). The situation in these wards is much worse because these are located in the low-lying areas of the city, near the pond (Raja ka taal) and near Insan river. Waterlogging is permanent feature in these areas. According to Jal Nigam and on the basis of estimation about 15 MLD of water is supplied to the city people out of whom 75 to 80 percent goes out as waste water (10 to 12 MLD). Mainpuri city has defective and faulty natural drainage which is responsible for the peculiar drainage and sewerage problems faced by the city. The general slope of the district is from north–west to south–east and this is the direction in which the rivers run. The general disposition of the drainage differs somewhat in different portions of the district. According to municipal council presently Mainpuri city generates about 40 million tons of solid waste per day but when the city surveyed it was found that approximately 80 million tons of solid waste per day generated in the city and recycling plant capacity to treat only about 40 million tons per day of solid waste. City survey and data reveals that 50 percent solid waste dumped in low lying areas of city, mainly near Isan River and around recycling plant. Indian rivers will remain filthy because cities plan for water and not for sewage. That is why most of our rivers are today dead, because of domestic sewage load from cities. There is no consensus on how much waste water is generated in the city. The waste management systems of Manipuri city in are very critical situation and dumping of waste on unauthorized site block the drain and drain water flow on road and leached produce.

That does pollute the environment and effect human health. In Mainpuri city only 27.3 percent household using improved sanitation facility. In 2012, a total of Malaria 423 patients, Dengue 0 patient, Infectious fever 0 patient, Diarrhoea and gastroenteritis 432 patients came to the city hospital (National Urban Health Mission, 2013-14). On the basis of water supply report 76.46 percent households in Mainpuri city have water facility in the premises and out of this 45.10 percent households use treated source of water. 17.61 percent households have water facility in the near premises. 41.39 percent of total households use treated source of water (Jal Nigam, Mainpuri, Uttar Pradesh, 2015). 6.8 percent households have pipe sewer system, 66.56 percent households have septic tank latrines, 1.75 percent households have pit latrines, 5.23 households have other type of latrine facility (disposed into open drain, night soil removed by human) and 19.66 percent households don't have latrine facility. 18.35 percent households have closed drainage, 75.78 percent households have open drainage, and 5.87 percent households don't have drainage system (District Census Handbook of Mainpuri, 2011).

1. Sanitation Facilities

Proper and safe disposal of waste water is essential for keeping the household environment clean. In poor neighborhoods, inadequate sullage or grey water disposal leads to health problems giving rise to waterlogging and stagnant pools of water on roads, in low lying areas etc. The disposal of sullage through open drains causes severe waterlogging problem, which provides ideal breeding ground for mosquitoes and other pests.

(a) Bathroom and latrine facility

Perusal of the table 1 shows income wise sanitation facilities in Mainpuri city. As shown in the table 1 out of total sampled households 88.73 per cent has bathroom and latrine facility in their house. Income wise distribution shows that the about 23.23 percent per cent low-income group household does not have bathroom and latrine facilities in their house.

(b) Disposal of household garbage

Unauthorized dumping of waste is very common in low-income group (91.59 per cent), 76.52 per cent medium income group and only 34.18 per cent high income dump their waste on unauthorized sites. The improper methods of disposal lead to the accumulation of waste, since the waste has more of organic components, high densities and moisture causes decaying of waste, increases the risk of attracting disease causing pests such as flies, cockroaches, rats etc. Low-income households are more prone to these problems because of their low standard of living. It is the duty of municipality to collect waste from public bin but it was found during survey that in 86 per cent of low, 35.55 per cent medium, 25.63 per cent high income group areas public bins are not cleaned in 15 days or so.

(c) Disposal of household wastewater

The drainage facilities are not proper in city and most of the low- and medium-income households have the problem of wastewater disposal. Sewerage not cleaned on time, and most affected group is lower income (28.94 per cent). In every city it is the responsibility of municipality to clean city drains regularly about 50.22 per cent of total sampled households reported that drains are not cleaned for more than 15 days and so. Silt from drains is not cleaned properly, mostly thrown roadside and near the houses. When municipal workers clean drains they left silt roadside and around the houses. After that, all silt goes back into the drains. About 36.23 per cent high, 63.20 per cent medium and 82.2 per cent low income sampled households are struggling with this problem. City municipality does not give their services on time. 60.63 Per cent total sampled household, 30.16 per cent high, 71.70 per cent medium and 80.02 per cent low-income group face water logging problem in their areas. It is very clear by the table 1 that the sanitation facilities are not appropriate in city, and the most affected group is low-income group. Due to improper household wastewater disposal practices waterlogging occurs in low lying areas and on roads. The disposal of waste water in the open drains which lacks proper gradient, adequate carrying capacity, it is blocked with garbage and most of the time it is overflowing, this results in stagnant pools of waste water in residential areas, on streets and in low lying areas, and increases the risk of mosquitoes and other insects.

2. Identification of Waste Related Risk Factors and Associate Diseases

If there was sufficient information available to construct a map of Mainpuri city, showing the level of risk from solid waste and wastewater, the area with the highest risk would coincide with the areas with predominance of low-income households. It is generally the lower income households who are exposed to all the waste related risks and bear most of the ill health or premature death and other costs of environmental problems. While the condition in the higher income households was far better. In this paper we examine 8 diseases (scabies (35.77 per cent), malaria (57.03 per cent), typhoid (50.96 per cent), viral fever (70.56 per cent), diarrhea (48.78 per cent), cholera (32.28 per cent), Conjunctivitis (41.11 per cent), and hookworm infection (28.96 per cent)) whose data collected through city/household survey and the city hospital (Maharaj Tej Singh District Hospital Mainpuri) and some private clinics of the Mainpuri city. We try to find the relation between sanitation related risk factors and associated diseases and identified following risk factors by city and household survey of Mainpuri city-

- No latrine and bathroom facility.
- Dispose of garbage around the house.
- Dispose of household waste water around the house.
- Drain was not cleaned more than 15 days.
- Silt from drain thrown on road / around house.
- Public bin not clean by municipality in more than 15 days.
- Wastewater thrown on the road.
- Water logging problem in the neighborhood.

Table 01: Income wise Sanitation Facilities in Mainpuri City, 2019

Income group	Bathroom & latrine facility in the house				Disposal of waste by households					
	Yes	No	Flush	Manual	Municipal waste bins	Municipal waste van	open space	In dumps	In own courtyard	Into the drain
High	100	0	100	0	33.76	25.74	10.13	22.57	6.32	1.48
Medium	94.25	5.75	100	0	14.38	8.31	38.82	32.43	0.79	5.27
Low	76.77	23.23	100	0	6.79	0.81	43.88	32.88	0.81	14.83
Total	**90.34**	**9.66**	**100**	**0**	**16.34**	**9.8**	**33.44**	**30.06**	**2.24**	**8.12**

Income group	Disposal of household wastewater around the house		Drains cleaned by municipality			Silt from drains thrown on rode / around house	
	Yes	No	Alternative	Weekly	More than 15 days	Yes	No
High	14.34	85.66	20.57	61.5	17.93	36.28	63.72
Medium	20.44	79.56	4.8	45.05	50.15	63.2	36.8
Low	28.94	71.06	0	17.4	82.6	82.2	17.8
Total	**21.4**	**78.6**	**8.46**	**41.32**	**50.22**	**60.56**	**39.44**

Income group	Public bin cleans by municipality						Waste water thrown on the rode		Water logging	
	Daily	Alternative	2 time in a week	Weekly	Fortnightly	Monthly	Yes	No	Yes	No
High	9.37	11.88	27.5	25.62	25	0.63	13.34	86.66	30.16	69.84
Medium	0	0	47.78	16.67	33.33	2.22	20.44	79.56	71.7	28.3
Low	0	0	0	14	80	6	33.94	66.06	80.02	19.98
Total	**5**	**6.33**	**29**	**21**	**36.67**	**2**	**21.4**	**78.6**	**60.63**	**39.37**

Source: City and Household Survey of Mainpuri, 2019

3. Vulnerability Assessment

The lower income households are at greatest risk and they are most vulnerable, followed by the medium income households. The reason for this is simply that the lower income households are priced out of safe, well located, well serviced housing and land sites. They are least able to afford homes that provide them with adequate provision of municipal facilities like waste bins, waste collection/disposal systems, sanitation and drainage system etc. they live where housing or land for housing is cheaper e.g., in slums, unauthorized colonies and in squatter settlements usually in the city outskirts or in fringe areas of the city. Due to shortage of funds, they live in illegal or unplanned and un-serviced settlements with unhealthy living conditions and extreme crowding. The number of people living in these settlements is expanding so rapidly that municipal bodies are unable to keep up with the necessary infrastructure development. During field survey it was not unusual to see that their houses were surrounded by waste dumps. There was presence of house flies, cockroaches, rodents, and mosquitoes not only inside their homes but also in neighborhoods resulting in residents being severely affected by waste related diseases.

In this paper an attempt has been made to find out the relationship between 8 identified sanitation related risk factors and the occurrence of associated diseases (scabies, malarial, typhoid, viral fever, diarrhea, cholera, Conjunctivitis, and hookworm infection). To test the relationship Karl Pearson's correlation co-efficient (r) method was applied.

- Scabies is a skin infestation caused by a mite known as the *Sarcoptes scabiei*. Untreated, these microscopic mites can live on your skin for months. This causes an itchy, red rash on skin. These mites are easily passed between people. Direct skin-to-skin contact is the most common way to share the infestation. It can prevent by proper sanitation condition. A perusal of the table 1 shows that of the total sampled households 35.77 per cent reported of occurrence of Scabies diseases. Most of the sufferers of Scabies belong to lower income households were 76.63 per cent. While 21.41 percent from medium and 9.28 per cent very high-income households has reported of this disease. Table.2 is showing that there is strong positive correlation between 8 sanitation related risk factors and occurrence of scabies disease, r = +0.94.

- Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. Rain provides more opportunities for the breeding of mosquitoes and may give rise to epidemics of malaria. A perusal of the table 2 shows that of the total sampled households 57.03 per cent reported of occurrence of Malaria. Most of the sufferers of malaria were belong to lower income households 83.42 per cent. While 58.78 percent were from medium and 28.9 per cent very high-income group of households are reported of this disease. Table.2 is showing that there is strong positive correlation between 8 sanitation related risk factors and occurrence of Malaria disease, r = +0.99.

- Typhoid fever is a systemic infection caused by *Salmonella* Typhi, usually through ingestion of contaminated food or water. Symptoms include prolonged fever, fatigue, headache, nausea, abdominal pain, and constipation. It occurs predominantly in association with poor sanitation and lack of clean drinking water. A perusal of the table 2 shows that of the total sampled households 50.96 per cent reported of occurrence of Typhoid diseases. Most of the sufferers of typhoid were from lower income households 71.6 per cent. While 56.39 percent were from medium and 24.89 per cent very high income of households has reported of this disease. Table.2 is showing that there is strong positive correlation between 6 sanitation related risk factors and occurrence of Typhoid disease, r = +0.97.

Table 02: Household Sanitation Related Risk Factors and Associated Diseases in Mainpuri City (2019)

Income group	No latrine and bathroom facility	Disposal of garbage around the house	Disposal of household waste water around the house	Drains were not cleaned more than 15 days	Silt form drains thrown on rode / around house	Public bin not clean by municipality in more than 15 days	Waste water thrown on the road	Water logging problem in the neighborhood	Total average of 8 risks factors
High	-	13.34	14.34	17.93	36.28	25.63	13.34	30.16	20.70
Medium	5.75	19.44	20.44	50.15	63.20	35.55	20.44	71.70	41.13
Low	23.23	35.94	28.94	82.60	82.20	86	33.94	80.02	63.83
Total average	**9.66**	**21.4**	**21.4**	**50.22**	**60.56**	**48.06**	**21.4**	**60.63**	**41.88**

Associated Diseases

Income group	Scabies	Malaria	Typhoid	Viral fever	Diarrhoea	Cholera	Conjunctivitis	Hookworm infection	Total average 8 diseases
High	9.28	28.9	24.89	48.73	14.34	3.58	11.18	5.69	18.32
Medium	21.41	58.78	56.39	73.16	43.55	36.63	37.42	16.35	42.96
Low	76.63	83.42	71.6	89.80	88.45	56.65	74.72	52.85	74.26
Total average	**35.77**	**57.03**	**50.96**	**70.56**	**48.78**	**32.28**	**41.11**	**29.96**	**45.80**
Correlation co-efficient	**+0.94**	**+0.99**	**+0.97**	**+0.99**	**+0.99**	**+0.98**	**+0.99**	**+0.96**	**+0.97**

Source: City and Household Survey of Mainpuri, 2019

- Most people have a body temperature of about 98.6°F (37°C). Anything a degree above is considered as fever. Fevers are often a sign that your body is fighting off some type of bacterial or viral infection and it's called viral fever. Viral fever is transmitted from one person to another through, when the infected person yawns, sneezes, coughs, or even talks, tiny sprays of fluids are ejected from their bodies which may enter into other persons system. A perusal of the table 2 shows that of the total sampled households 70.56 per cent reported of occurrence of viral fever. Most of the sufferers of viral fever is the lower income households 89.80 per cent. While 73.16 percent were from medium and 48.73 per cent very high-income households reported of this disease. Table.1is showing that there is strong positive correlation between 8 sanitation related risk factors and occurrence of viral fever, r = +0.99
- The term diarrheal diseases are used for a group of diseases (diarrhea, dysentery, gastroenteritis) in which the predominant symptom is diarrhea which is passage of loose liquid or watery stool. Diarrheal disease is the second leading cause of death in children under five years old, and is responsible for killing around 525 000 children every year. A perusal of the table 2 shows that of the total sampled households 48.78 per cent reported of occurrence of diarrheal disease. Most of the sufferers of diarrheal belong to lower income households 88.45 per cent. While 43.55 percent were from medium and 14.34 per cent very high-income households has reported of this disease. Table.2 is showing that there is strong positive correlation between 8 sanitation related risk factors and occurrence of diarrheal, disease, r = +0.99
- Cholera is an acute diarrheal infection caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. Cholera remains a global threat to public health and an indicator of inequity and lack of social development. A perusal of the table 2 shows that of the total sampled households 32.28 per cent reported of occurrence of Cholera. Most of the sufferers of Cholera were from the lower income households are 56.65 per cent. While 63.63 percent were from medium and 3.58 per cent very high-income households has reported of this disease. Table.2 is showing that there is strong positive correlation between 8 sanitation related risk factors and occurrence of Cholera disease, r = +0.98
- Conjunctivitis, also known as pinkeye, is an inflammation of the conjunctiva. The conjunctiva is the thin clear tissue that lies over the white part of the eye and lines the inside of the eyelid. Conjunctivitis is associated with poor quality of life. It may occur by direct or indirect eyes contact. A perusal of the table 2 shows that of the total sampled households 41.11 per cent reported of occurrence of Conjunctivitis. Most of the sufferers of Conjunctivitis belong to the lower income group households are 74.72 per cent. While 37.42 percent were from medium and 11.18 per cent very high-income households has reported of this disease. Table.2 is showing that there is strong positive correlation between 8 sanitation related risk factors and occurrence of Conjunctivitis disease, r = +0.99
- Hookworm is a parasite that causes infection in people of all ages. It enters the body through the skin Hookworm is most likely to occur in a moist, hot climate. Infection defecates in the soil, when a person comes into contact with this soil, hookworm larvae can pass through their skin. People who spend time in areas where there is poor sanitation management and hygiene, especially if walking barefoot or with skin-to-soil contact they get infected. A perusal of the table 2 shows that of the total sampled households 29.96 per cent reported of occurrence of Hookworm infection. Most of the sufferers of Hookworm infection belong to lower income households 52.85 per cent. While 16.35 percent were from medium and 5.69 per cent very high-income households are reported of this disease. Table.2 is showing that there is strong positive correlation between 8 sanitation related risk factors and occurrence of Hookworm infection, r = +0.96.

Conclusions

More than 60 years after Independence, urban India still lacks adequate sanitation because of the continuance of the colonial city legacy of segmented cities, poorly financed and resourced municipal corporations and the lack of capacity within governments to manage rapid growth. In the era of neo-liberalism, the state has been actively reducing its role in the provision of basic services and has failed to address the widening gap between demand and supply. The consequence today is that the Indian state is still relying on crisis intervention to cope with the environmental and public health problems caused by a failure to provide adequate sanitation to all residents in cities. This situation continues to exist because the middle class, who now make up a substantial proportion of any metropolitan population, have been able to monopolize what sanitation and other basic services the state has provided.

In the era of neo-liberalism, the state has been actively reducing its role in the provision of basic services and has failed to address the widening gap between demand and supply. The consequence today is that the Indian state is still relying on crisis intervention to cope with the environmental and public health problems caused by a failure to provide adequate sanitation to all residents in cities. More than 70 years after Independence, urban India still lacks adequate sanitation because of the continuance of the colonial city legacy of segmented cities, poorly financed and resourced municipal corporations and the lack of capacity within governments to manage rapid growth.

After far going discussion, it can be concluded that the lower income group is affected the most by sanitation related risk factor and of associated diseases. 63.83 per cent of total risk factor found in lower income group. They live in unhealthy conditions where the basic necessary infrastructure is not developed. Environmental problems created due to the poor sanitation, water logging, pest/ mosquitoes, due to which bad health and diseases are immediate and most visible in poor households. 74.26 per cent of lower, medium 42.96 per cent and higher income households 18.32 per cent affected by total averages of 8 associated diseases. Condition is better in higher income households and worst in lower income. This is clear from the observations that diseases were directly influenced by sanitation conditions (water logging, latrine and bathroom facility, drainage facility) promoted transmission of the diseases but also helps in breeding of pests, houseflies, cockroaches and other vectors, which are responsible in spreading diseases. The study reveals that areas with poor sanitation conditions are more prone to above discussed diseases.

The sanitation condition and healthy environmental conditions depends on people and municipality. While some sanitation practices make our environment clean and control to spreading diseases.

- We should use close type of container or bin for solid waste collection. We should have separate bins for bio- degradable and non–bio–degradable waste. Thus, the possibility of spreading diseases through flies and mosquitoes are minimized.
- Collection system of solid waste from households and public bins should be quick and regular. So that there should not be any pilferage of waste in to drains and bacteria and fungi cannot grow in it.
- Municipality have to place bins at main disposal sites of city; thus, the unauthorized dumping should stop.
- Municipalities don't leave waste in low lying areas and drains. It should reach to final destination (recycling plant or landfill sites).
- Disposal site should have soil cover. The cover will prevent breeding of disease vectors.
- Drain and sewer should be well maintained and cleaned regularly. With which the problem of water logging will eliminate.

- Leachate collection and treatment should be provided.
- Untreated wastewater doesn't discharge in to river, storm water drains and open channels, and their downstream.
- Sewer line should be clean regularly and in rainy season proper management of drainage system.
- After cleaning drains silt should not be left on the road side /around house, it should be taken to the disposal sites.
- Municipality should have covered broad and deep drains along with proper drainage system.
- Households should dispose their wastewater into covered municipal drains, which should be connected to the main sanitation line of city.
- Provide toilets and latrines that flush into a sewer or safe enclosure.
- The city should have a well-connected network of sewer lines with households and both grey and black water do not mix up.

But the question remains of how all the above-mentioned measures can be achieved for all urban communities in India, in an equitable manner. Based on the poor implementation records of previous schemes, it is difficult to be optimistic that new schemes will be more effectively implemented than previous efforts. This unfortunately leads to the conclusion that urban India's lack of sanitation will only be solved when the poor have sufficient political capacity to demand that such services are supplied by the state, either through its institutions and agencies or by partnerships and private providers. These health hazards can be reduced to minimal levels through public education, re-framing policies according to city, improvement of funding, monitoring and supervision of waste by legal authorities.

References

1. Census of India (2011), Registrar General & Census Commissioner, India.
2. Cointreau, S. J. (1982). Environmental management of urban solid wastes in developing countries: a project guide (No. PB-83-264689). International Bank for Reconstruction and Development, Washington, DC (USA). Urban Development Department.
3. District Census Handbook of Mainpuri (2011), published by Directorate of Census operation, Lucknow, U.P.
4. Hazarika, M. P. (2015). Sanitation and its impact on health: A Study in Jorhat, Assam. International Journal of Scientific and Research Publications, 5(10).
5. Medina, M. (2010). Solid wastes, poverty and the environment in developing country cities: Challenges and opportunities (No. 2010/23). WIDER Working Paper.
6. National Urban Health Mission (2013-14). Project Implementation Plan, District Health Society, Mainpuri
7. Urban sanitation (2015). Nation Instituted of Urban Affair , New Delhi
8. World Health Organization, Global Water Supply and Sanitation Assessment 2000 Report. Geneva, Switzerland: World Health Organization
9. World Health Organization. (2018). Guidelines on sanitation and health.
10. Zurbrugg, C. (2003). Solid Waste Management in Developing Countries. SWM introductory text on www.sanicon.net
11. https://www.who.int/news-room/fact-sheets/detail/cholera.
12. https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disea
13. https://www.who.int/immunization/diseases/typhoid/en/
14. https://www.who.int/news-room/fact-sheets/detail/malaria