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Assessment of Public concerns and Behaviours towards Scientific Solid Waste Management in Kanpur City (U.P.), India

Rohit Singh[1], *Saumya Singh[2], Gopal Ji Kushwaha[3] and Darshan Kumar Jha[4]

[1]Department of Geography,
[3]Department of Botany,
S. K. P.G. College,
BASTI - 272001 (U.P.), INDIA
[2]Department of Geography,
K. S. Saket P. G. College,
AYODHYA - 224123 (U.P.), INDIA
[4]Dept. of Geography,
J.T. Girls Degree College,
PRAYAGRAJ - 211002 (U.P.), INDIA
*Corresponding Author
E-mail **:** saumyasingh2k12@gmail.com

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ABSTRACT

The study evaluates household civic amenities, behaviour, and perspective on the management of garbage and trash in different zones of Kanpur city, using primary data collected through interviews with 622 randomly selected households. The study calculates Household Amenities Index, Behaviour Index and Pollution Perception Index, based on variables: toilet facilities, drinking water sources, ways of discarding garbage and readiness to pay for pickup.The study finds that zone 6 residents are more diligent in scientific waste management, and there is high pollution in the city centre due to poor management and lack of civic facilities. The finding would guide effective solid waste management policies.

Figure : 01 References : 44 Tables : 04
KEY WORDS : Behavioural Index, Household Amenities Index, Pollution Perception Index, Solid Waste.

Introduction

Anthropogenic activities coupled with industrial development are producing enormous amounts of solid waste. Inadequate disposal of waste not only compromises people's health, but also negatively impacts the ecosystem. The city of Kanpur, located in Uttar Pradesh, India, is no exception.With a population of three million people, the daily quantity of trash produced by the city is substantial.Stacks of trash are often found by the side of rivers, roads and many other open places in the city, and their improper management poses significant health and environmental problems.[27]Solid waste includes packaging material for goods, debris from the lawn, furniture, garments, bottles, food leftovers, newspapers, gadgets, paint, and batteries, among other materials.[17] Generation of huge quantities of solid wastes and its poor management have imposed a burden on the environment that leads to land, water, and air pollution.[35,43] The generation of solid wastes also harnessed the development process and adversely affected the socio- economic and living conditions, lifestyle, physical, mental and social health of the people in urban areas.[6] In India, the process of collecting, sorting, transporting, and disposing of garbage and trash, tends to be haphazard and unscientific, and Kanpur is not an exception to this tendency. Contamination of soil, groundwater, and air from landfills along with unchecked dumping of trash on the edges of cities, contributes to speedup climate change.[8,10,36] Urban solid waste production is increasing at a pace of 3.2-4.5% per year in developed countries and 2-5% per year in developing countries worldwide.[15]

Indicators such as possession of property, forms of occupation, inhabiting nature, access to drinking water,

TABLE-1: Zones and constituent municipal wards of Kanpur City.

Zones	Ward Number	Municipal wards
Zone 1	101, 100, 102, 109, 59, 106, 103, 40, 97, 85, 84, 50, 21, 99, 105, 2, 92, 104	Maheshwari mohal, Patkapur, Generalganj, Collectorganj,Civil lines, Chowk Sarrafa, Parade, Anwarganj, Harvansh Mohal, Cooperganj, Dalelpurwa, Sisamau (S), Raipurwa, Chammanganj, Danakhori, Laxmipurwa, Chataimohal, Nazirbagh
Zone 2	77, 95, 53, 44, 29, 91, 19, 28, 86, 10, 67, 70, 66, 39, 48, 30, 71, 37	Shyam Nagar, Chandari, DaheliSujanpur, Ompurva, Safipur, Yashoda Nagar(E), Sanigawa, Krishna nagar, Jajmau(N), Chakeri, Yashoda Nagar(W), Tiwaripur, Jajmau(S), Hanspuram, Pashupati Nagar, Naubasta(E), Gandhigram, Harjinder Nagar
Zone 3	54, 31, 12, 96, 75, 108, 24, 79, 83, 58, 55, 90, 81, 36, 80, 88, 23, 25	Babupurwa Colony, Bakarganj Transport Nagar, Babupurwa, Munshipurwa, Begumpurva, Usmanpur, Juhi Kala, Naubasta(W), Basant Vihar, Kidwai Nagar(S), Kidwai Nagar(N), Jarauli, Bingawan, Barra(E), Karrahi, Sabji Mandi-Kidwai Nagar, Juhi Hamirpur Road
Zone 4	76, 41, 65, 22, 13, 78, 49, 110, 107, 11, 5, 15, 6, 94, 1, 51, 4, 43	Sooterganj, Sisamau(N), Gandhi Nagar, Benajhabhar, Khalasi Line, Prem Nagar, Swaroop Nagar, Colonelganj, Talaq Mohal, Jawahar Nagar, Chunniganj, Parmath, Mc Robertganj, Beckanganj, Purana Kanpur, Nehru Nagar, Gwaltoli, Ashok Nagar
Zone 5	3, 35, 47, 98, 38, 33, 64, 74, 69, 52, 17, 73, 62, 7, 60, 56, 72, 89, 93	Govind Nagar, Juhi Parampurwa, Bhannanapurva, Govind Nagar(N), Fazalganj, Gangaganj Panki, Swaraj Nagar Panki, Ravidas Puram, Gujjaini Colony, Dabauli, Saraimeeta, Barra(W), Barragaon, Nirala Nagar, Barra(S), Ratanlal Nagar, Naseemabad, Kaushalpuri, Govind Nagar(S)
Zone 6	45, 16, 57, 8, 9, 18 46, 87, 63, 14, 42, 68, 82, 26, 27, 34, 61, 32, 20	Nawabganj, Khyora, Kakadeo-Navin Nagar, Masvanpur, Vishnupuri, Kalyanpur, Vinayakpur, Kakadeo, Geeta Nagar, Ambedkar Nagar, Awas Vikas, Rawatpur Gaon, Shashtri Nagar, Vijay Nagar, Sarojini Nagar, Sarvodaya Nagar, Lajpat Nagar, Nankari, Naramau

sanitary facilities, drainage systems facilities, accessibility to road, power supply, school enrolment, revenue from civic amenities, savings and borrowing activities, and the presence of social problems, all help to describe the household resources at a given location.[7,21,23,33,40] Having access to basic conveniences like potable water, sanitary facilities, reliable energy, and other contemporary necessities is essential for human comfort.[34] Residential conditions, access to clean water and hygiene facilities, among others, such factors are often cited as potential determinants of both personal health and societal well-being.[30] Key linkages are also identified between holistic development of people and better water and sanitation infrastructure.[17,18]

There is an evident correlation between involvement of the community and efficient management of solid waste.In order to handle garbage and trash in a comprehensive manner, several experts studied factors including the availability of municipal services, the public's perspective, and citizen participation. People who do not have access to basic services often experience increased levels of anxiety, depressive disorders, alterations in personality, suicidal thoughts, and other health issues[29]. Folks who aren't allowed these privileges are left apart of modern society's sophisticated culture and suffer from the shortage of municipal amenities and inadequate infrastructure. A worker[32] correlated people's worries and anxieties with regards to Solid Waste Management (SWM) facilities and their perspectives regarding the facilities in question. Though obvious correlations were not found, it identified a

TABLE-2: Household Amenities Index of different zones of Kanpur City

Zone	Household Amenities Index	Range	Level
Zone 1	0.67	$\bar{X}$to $\bar{X}+\sigma$ (0.64 to 0.69)	Medium
Zone 2	0.59	$\bar{X}-2\sigma$ to $\bar{X}$ (0.54 to 0.59)	Low
Zone 3	0.71	$\bar{X}+\sigma$ to $\bar{X}+2\sigma$ (0.69 to 0.74)	High
Zone 4	0.66	$\bar{X}$to $\bar{X}+\sigma$ (0.64 to 0.69)	Medium
Zone 5	0.59	$\bar{X}-2\sigma$ to $\bar{X}$ (0.54 to 0.59)	Low
Zone 6	0.64	$\bar{X}-\sigma$ to $\bar{X}$ (0.59 to 0.64)	Medium

Source: Computed by Authors, 2022 $\bar{X} = 0.64$, $\sigma = 0.05$

discrepancy between the tangible effects and the perceptions of the general populace. There was conclusively analysed people's attitude towards separation of waste[44]. It was found that by active support and investment of private agencies, the problem of waste management might be rectified to some extent. The extent to which individuals engage in the disposal and reuse of household waste is contingent upon their extent of awareness and comprehension regarding recycling practices.[28,31] In a study a worker[13] examined the relationship between socioeconomic standing, environmental consciousness, understanding, perception, and methods of handling solid waste in the Philippines. The findings revealed an adverse relationship between the monthly earnings of the entire family and their level of environmental consciousness, as well as their engagement in methods for handling solid debris.But there was found a favourable correlation between environmental literacy and waste-reduction strategies.The understanding, perspectives, and behaviours of families about the segregation and disposal of garbage in Uganda's capital city, Kampala, were studied[8]. It was suggested that people's involvement in garbage segregation activities is influenced by factors such as their knowledge of recycling programs in their community, their financial resources, their standard of education,alongwith age and gender. Some investigators[14] surveyed the attitudes and behaviour concerning SWM, among first year students at UKM in Malaysia using a questionnaire and found that nearly sixty percent of the students in the class supported this initiative. Underlying the need of more efforts towards education and awareness on managing solid waste in the campus. A study investigated the attitudes, perceptions, and eagerness of the public towards handling waste materials in Bangalore city[26]. The findings indicate that 63 percent of homeowners expressed willingness to actively participate in efforts aimed at improving waste management. Additionally, a significant majority of 97.8% of people indicated a preference for everyday trash collection, while 82.5% of residents expressed a preference for segregating waste into separate bins. Some workers[25] studied the people living environments and access to contemporary conveniences throughout Madhya Pradesh. Deficiency of certain basic amenities, including housing, electricity, lavatories, and drinking water in fourteen PARI villages of Andhra Pradesh, Uttar Pradesh, Maharashtra, Rajasthan, Madhya Pradesh, and Karnataka was examined[39].

Providing residents with MSW frameworks and promoting the public's understanding regarding the management of solid waste base partition, encourage the initiatives for creating efficient public recycling programs. A group of scientists[5,11] investigated people's solid waste disposal-related consciousness, understanding, outlook, and behavior in Morogoro Municipality in Tanzania. They argued that humans on a daily basis produce solid waste, that must be handled in a manner that poses the least possible threat to both the surroundings and the well-being of humans. Some workers[20] studied knowledge, awareness, and behavior of the Lahore (Pakistan) populace regarding solid refuse management, and found that higher income areas (HIA) produced more garbage and resident felt satisfied than anyone else, but that reutilization of old products and waste collection trends changed from higher towards lower earnings groups, and even that 78.5 percent of

TABLE-3: Zone Wise Behavioural Index of Kanpur City

Name of Zone	Behavioural Index	Range	Level
Zone 1	0.49	$\bar{\bar{X}}$to $\bar{\bar{X}}+\sigma$ (0.48 to 0.53)	Medium
Zone 2	0.39	$\bar{\bar{X}}$ - 2 σ to $\bar{\bar{X}}$ - σ (0.38 to 0.43)	Very Low
Zone 3	0.46	$\bar{\bar{X}}-\sigma$ to $\bar{\bar{X}}$ (0.43 to 0.48)	Low
Zone 4	0.50	$\bar{\bar{X}}$to $\bar{\bar{X}}+\sigma$ (0.48 to 0.53)	Medium
Zone 5	0.49	$\bar{\bar{X}}$to $\bar{\bar{X}}+\sigma$ (0.48 to 0.53)	Medium
Zone 6	0.53	$\bar{\bar{X}}+\sigma$ to $\bar{\bar{X}}+2\sigma$ (0.53 to 0.58)	High

respondents were ready to spend money for recycling.Education levels were shown to have a substantial impact on respondents' opinion towards the risks posed by waste products and environmental consciousness was quite high among the populace of Macau and responds positively towards Willing to Pay, which increases with education level[3,38]. Work on public opinion and monetary valuations for China's source-separated handling of rural solid waste found a strong positive impact of age, lifestyle and education on waste reduction and recycling behaviours in Malaysia[12,42]. Research was done on the needs of urban residents in terms of the facilities and supplies needed in the home[4]. These facilities and services are advantageous in the community itself and essential to its ability to reproduce itself. Workers[9] evaluated disparities in access to services and goods among neighbourhoods in residential areas of Dhaka city. They surveyed 180 respondents from Dhanmondi, Mirpur and Kallayanpur area and reported that indicators of household resources and amenities showed wide ranges of variance, which was not limited to home and dwelling features, sanitation amenities, water, power, and gas supply, *etc.* Although, a vast majority of Chinese citizens support the MSW sorting guidelines, more than fifty percent of them consider negatively about it.[41] The public frustration was mostly prompted by issues related to penalties, MSW sorting laws, costs, scheduling of trash disposal, and inconsistent recycling methods.

The objective of the research herein is to investigate the level of household civic amenities for people in different sanitary zones of Kanpur city. This paper examines the behaviour and attitude of people towards scientific handling of garbage in the study area. Findings of investigation would evaluate the level of prominent types of pollution in different sanitary zones of Kanpur City.The results would provide information concerning public perceptions and behaviours related to SWM techniques and highlight the gaps that require more attention from policymakers and stakeholders to implement effective techniques for rationally handling garbagein the Kanpur City.

Materials and Methods

The paper is based on empirical data, collected from 622 sample households of Kanpur city. The researchers employed the systematic random sampling approach to gather data from the designated study zones.[2]

Study Area

The metropolis of Kanpur, industrial hub of Uttar Pradesh's, is in a strategic location in the northern region of India (26° 282 152 2 N, 80° 232 452 2 E) (Fig. 1). Located on the right bank of the enduring Ganges River, the city of Kanpur is significant in its own historic, religious, and economic significance. The city is in the doab formed by the confluence of the Ganga and the Pandu rivers, which are the sources of drainage for the surrounding region. It occupies around 298.98 km^2 of land space. It includes six distinct administrative regions in entirety, (Table-1) and 110 wards. According to the census 2011, the total citizenry of Kanpur is 27,67,031 (3812000 in 2023 estimated).

Household Amenities Index (H.A.I.): In the first phase of the study, household civic amenities for people in different sanitary zones have been examined, through questionnaires. Five questions had been asked to each respondent regarding their household civic amenities.

TABLE-4: Prominent Pollution Perception Index in different zones of Kanpur City

Pollution Index	Zones					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Water Pollution Index	23.33	23.98	23.48	24.28	25.16	25.20
Air Pollution Index	25.51	25.14	26.78	25.20	25.05	24.06
Soil Pollution Index	20.46	23.19	18.64	21.78	21.03	19.82
Insanitation Index	18.78	20.02	17.76	17.20	19.41	19.11
Miscellaneous Index	17.60	17.89	16.71	17.87	15.35	17.61

The responses for different zones had been summed up using a weighted index.[22] The household amenities *i.e.*, toilet facility, main source of drinking water, drainage condition of locality, housing condition and distance of residence from community bins, were assigned 20% weightage each and categorised from 0 to 1. The Household amenities Index has been calculated as: -

$$H.A.I. = \Sigma[20\%(TF+DWF+DC+HC+DCB)]$$

Where, TF= Toilet Facility

DWF= Drinking Water Facilities

DC = Drainage Condition

HC= Housing Condition

DCB= Distance from Community Bins

The standard deviation method[37] was used to grade different zones of the city into, high, medium, and low level. The higher value indicates a higher level of household amenities and vice versa.

Behavioural Index (B. I.): In the second phase of study, behaviour, and perspective on the management of solid waste among the residents of Kanpur city had been investigated. In a questionnaire, five questions had been asked to each respondent regarding their attitude towards solid waste management. The responses from different sanitary zones have been summed up using weighted index[22], and calculated using following computation methods, where each item was given 20 percent weightage and index value ranged from 0 to 1.

$$B.I. = \Sigma[20\%(COSB+SDRW+WTC+SW+WTP)]$$

Where, B.I.= Behavioural Index

COSB= Carrying Own Shopping Bags

SDRW= Separately Dispose Recyclable Waste

WTC = Willing to Compost

SW= Segregation of Waste (biodegradable &non-biodegradable)

WTP= Willing to pay for door-to-door collection

Standard deviation method was used to classify different zones of the city into high, medium, and low level. The higher value indicates better behaviour and vice versa.

Pollution Perception Index (P.P.I.): In the Third phase of study, levels of prominent pollution in Kanpur city have been examined. During field survey perception preferences of respondents have been recorded regarding prominent pollution caused by improper handling of solid waste. The responses from different sanitary zones have been summed up using weighted index as follows: -

$$P.P.\ I. = \Sigma\ (\text{Weightage} \times \text{Percent of Respondents})$$

Where, Weightage were assigned(1^{st} Rank = 30 %, 2^{nd} Rank = 25 %, 3rd Rank = 20%4^{th} Rank = 15 %, 5^{th} Rank = 10%)

The higher value indicates higher level of prominence of the pollution perceived by residents.

Results

(A) Household civic amenity

The study evaluated the Household Amenities Index (H.A.I.) for six different zones in Kanpur city (Table 2). The study showed that Zone 3 had the highest H.A.I. score of 0.71, indicating a high level of household amenities. Zones 1 and 4 had a medium level of household amenities with H.A.I. scores of 0.67 and 0.66 respectively. Zone 6 had a H.A.I. score of 0.64, which falls under the medium category. Finally, Zones 2 and 5 had the lowest H.A.I. scores of 0.59, which indicates a low level of household amenities.

Overall, the study suggests that there were significant disparities in the availability of household amenities across different zones in Kanpur city. While some zones had high levels of amenities, others had low, indicating a need for targeted interventions in order to improve one's standard of living.

(B) Behaviour and attitude of people towards solid waste management

The behavioural index reflects the attitude and behaviour of the residents towards maintaining cleanliness and sanitation in their respective zones. Zone 6 has the highest behavioural index of 0.53, which falls in the high-level category, indicating that residents in this zone (covering area of Kalyanpur, Panki, Rawatpur, IIT colonies *etc.*) had a positive attitude and behaviour towards cleanliness and sanitation. Zones 1, 4, and 5 have medium level scores ranging from 0.49 to 0.50, while zones 2 and 3 have low and very low scores, respectively (Table-3).

The range of the behavioural index for each zone indicates the degree of variation in the opinions and actions of locals towards cleanliness and sanitation. Greater variation in attitudes and behaviourof residents of Zones 2, indicating people are not very keen to help municipal authorities for controlling improper disposal of solid waste and support solid waste management system.Effective public outreach and behavior-changing initiatives might be greatly enhanced by introducing society with municipal solid waste facilities and increasing citizens' understanding of solid waste source separation and recycling.[30,43]

Overall, the mean behavioural index for the city is 0.48, with a standard deviation of 0.05. The variation in behavioural index across zones may be attributed to factors such as socioeconomic status, education level, cultural norms, and access to sanitation facilities.

(C) Prominent type of pollution due to improper handling of solid waste

The pollution perception is calculated based on various indices like water contamination, air pollution, soil pollution, insanitation, and miscellaneous (Table-4). The presence of pollution in a certain zone is proportional to the value of the index; the greater the value, the more prevalent the pollution.

The water pollution index in the city is found to be the highest in Zone 6 with a value of 25.20 followed by Zone 5 with a value of 25.16. It is perhaps due to most of the city refuse have been dumped in these zones. Heavy traffic load in the core of the city may be behind significantly higher air pollution index of Zone 3 with a value of 26.78. The soil pollution index is found to be the highest in Zone 2 with a value of 23.19 followed by Zone 4 with a value of 21.78. The insanitation index is found to be the highest in Zone 2 with a value of 20.02, followed by Zone 5 with a value of 19.41. The miscellaneous index is found to be the highest in Zone 2 with a value of 17.89.

Overall, the perception of pollution in Zone 2 is found to be the highest, which can be ascribed to the higher levels of soil contamination, insanitation and other miscellaneous indices (Fig. 1). Zone 3 also shows a higher perception of pollution due to the higher air pollution index. On the other hand, Zone 5 and Zone 6 showed higher water pollution indices, which might be due to the presence of the river Ganges in these zones.Community members' knowledge and attitude are significant, since their perspectives on home waste management would eventually play a vital role in offering a remedy to the environmental issue.[28]

Discussion

Rapid urbanization and growth in the major areas of Kanpur generate a huge amount of MSW.[1] The finding of study's showed significant disparities in the availability of household amenities across different zones in Kanpur city as crucial. The zone 2 (Shyam Nagar, Chandari, Daheli Sujanpur, Ompurva, Safipur, Yashoda Nagar(E), Sanigawa, Krishna nagar, Jajmau(N), Chakeri, Yashoda Nagar(W), Tiwaripur, Jajmau(S), Hanspuram, Pashupati Nagar, Naubasta(E), Gandhigram, Harjinder Nagar) and zone 5 (Govind Nagar, Juhi Parampurwa, Bhannanapurva, Govind Nagar(N), Fazalganj, Gangaganj Panki, Swaraj Nagar Panki, Ravidas Puram, Gujjaini Colony, Dabauli, Saraimeeta, Barra(W), Barragaon, Nirala Nagar, Barra(S), Ratanlal Nagar, Naseemabad, Kaushalpuri, Govind Nagar(S)) areas need targeted interventions to improve the standard of residents. The interventions could be Infrastructure Development (investment in the development of essential infrastructure such as water supply, sanitation facilities, electricity, and public transportation). Socioeconomic Support (implementation of social welfare programs, focusing on improving access to education, healthcare, and employment opportunities), Urban Planning and Zoning (adopting sustainable urban planning practices to ensure equitable distribution of amenities and services throughout the city), Public-Private Partnerships (Fostering collaborations between the government, private sector, and community organizations to implement projects that address specific challenges faced by each zone effectively), and Community Participation (Engaging local people in policymaking and giving them authority over their own lives to improve their own situation, Getting locals involved in waste management, cleanliness drives, and other community-led initiatives to enhance the overall

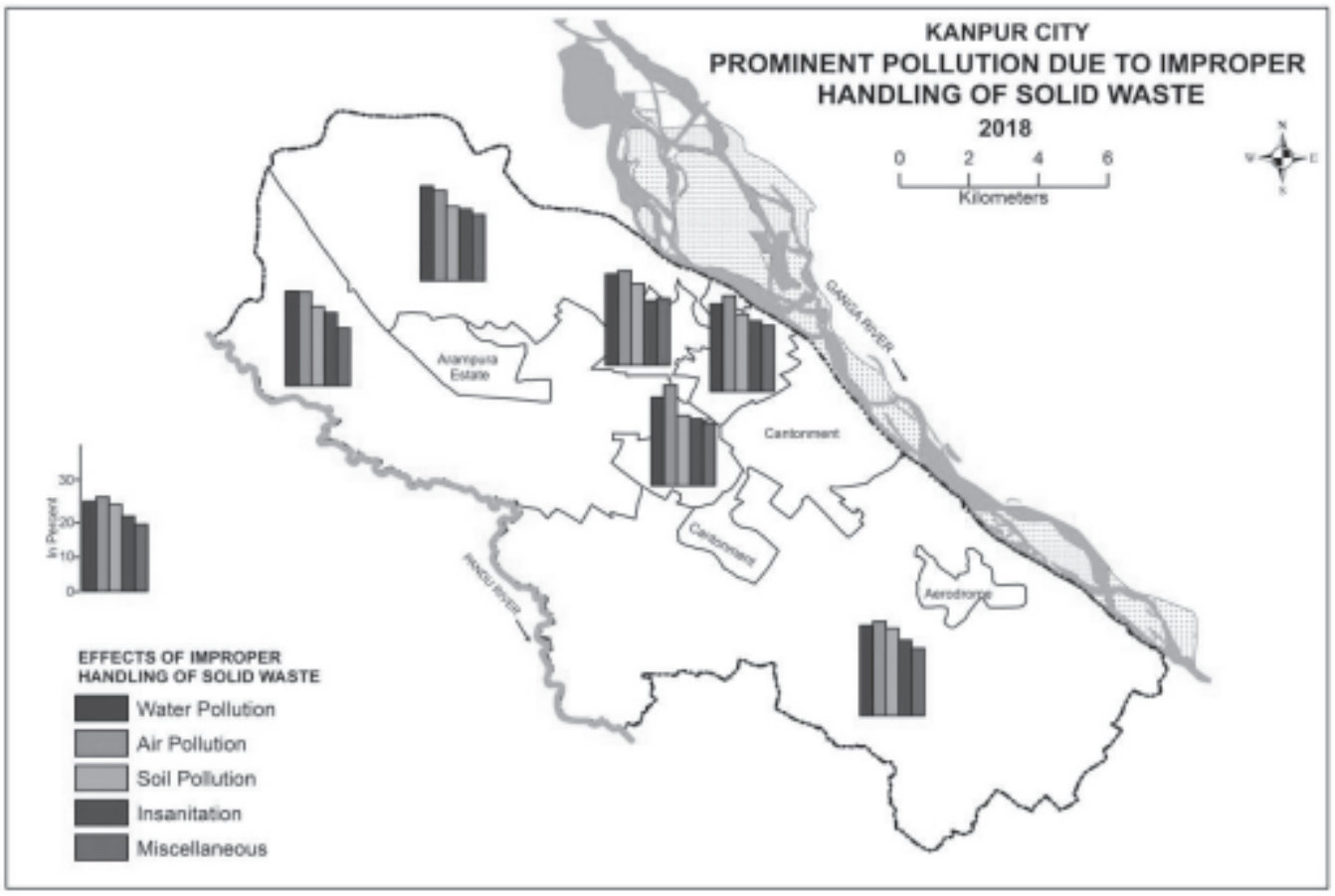

Fig. 1 : Prominent Pollution & level of their impact in Kanpur city

environment).

The behavioural index serves as a critical tool for understanding the attitudes and behaviours of residents towards cleanliness and sanitation practices in their respective zones. In this study, Zone 6 demonstrated the highest behavioural index of 0.53, suggesting that residents in this zone are actively engaged in maintaining a clean and hygienic environment, fostering a sense of responsibility and ownership towards waste management. On the other hand, Zones 2 and 3 exhibited low and very low behavioural index scores, a lack of enthusiasm and participation in supporting the municipal authorities' efforts in controlling improper disposal of solid waste and promoting a comprehensive waste management system. This finding raises concerns about the potential environmental and public health implications in these zones, as inadequate waste management practices can lead to pollution and health hazards. The variations in the behavioural index may be attributed to various factors, including: Socioeconomic Status (residents in zones with higher socioeconomic status might have better access to waste management services and resources, leading to more responsible waste disposal behaviour's), Education Level (education plays a crucial role in shaping individuals' awareness of environmental issues and waste management practices), Cultural Norms (cultural norms and beliefs influences attitudes towards cleanliness and sanitation), Access to Sanitation Facilities (zones with better access to sanitation facilities and waste collection services are more likely to exhibit positive waste management attitudes and behaviours). Effective waste management approaches for each zone require coordination among government agencies, community groups, and stakeholders. By considering socioeconomic factors, education levels, and cultural norms, interventions can be designed to resonate with residents, fostering a sense of ownership and responsibility towards waste management.

The pollution perception in each zone is represented by the corresponding index values, with higher values indicating a greater presence of pollution. The study revealed that Zone 6 had the highest water pollution index (25.20), followed closely by Zone 5 (25.16). The elevated water pollution indices in these zones may be attributed to the improper disposal of city refuse or the presence of the river Ganges which could contribute to water contamination.[1] Zone 3 demonstrated

a significantly higher air pollution index (26.78), possibly due to the heavy traffic load in the core of the city. Zones 2 and 4 had the highest soil pollution indices, with Zone 2 showing the highest value (23.19) and Zone 4 following closely (21.78). Additionally, Zone 2 displayed the highest insanitation and miscellaneous indices (20.02 and 17.89, respectively), suggesting potential issues with waste management and improper disposal in this zone.

The findings highlight that pollution perception varies across zones, indicating the need for targeted interventions to address specific environmental challenges in each area. The factors playing a role in shaping pollution perception might be Waste Management Practices (Improper waste disposal, lack of waste segregation, and inefficient waste management practices) especially in Zones 2 and 4. The traffic congestion (heavy traffic load) might lead to increased vehicular emissions and contribute to higher air pollution levels in Zone 3. The Proximity to Water Bodies (the river Ganges) with higher water pollution, making zones 5 and 6, more vulnerable to water pollution. The socioeconomic disparities may also influence the extent of pollution perception in different zones. Higher-income zones may have better resources to manage waste and pollution, leading to lower pollution perception. Here, engaging communities and fostering awareness about sustainable waste management practices[36] would play a pivotal role in mitigating environmental issues and promoting a healthier living environment for all residents.

Conclusion

The present study reveals meagre civic amenities available in Kanpur city. There is noticeable shift in mentality and behaviour towards scientific refuse administration systems among residents of Kanpur city. It correlates higher Pollution Index in inner city with less civic facilities and improper handling of trash in that area. The findings of the study suggests that interventions are necessary in order to improve standard of living for residents of Kanpur city, with low level of amenities and negative attitudes towards the cleanliness and sanitation. Providing municipal solid waste disposal infrastructure, improving people awareness about solid waste separation and recycling, and developing effective campaign and behaviour changing interventions can help to promote managing solid waste in city.

Moreover, there is a need for policy level interventions to address the pollution issue caused by improper handling of Municipal Solid Waste. The study offers a helpful starting point for decision-makers and urban planners to pinpoint the issues and areas that need immediate attention and to develop evidence-based plans to improve living conditions for Kanpur city's citizens. It also presents an intra-city model analysis that would be useful to examine SWM in other class I cities in India.

Conflict of Interest

The authors declare no conflict of interest.

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