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Solid waste management awareness and adoption of sustainable practices in South Delhi

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Abstract

The purpose of this study was to assess the level of solid waste management awareness, practices and willingness to participate in various solid waste management activities at the local level. Overall awareness and practice level among the residents was found significantly high and around 95% people thinks it is the responsibility of the individual to segregate and manage the waste properly. Only 11% of the respondents are satisfied with current waste management infrastructure in their community and suggested for establishment of more Government owned waste collecting and recycling units. The current waste management systems in south Delhi is incapable of dealing with the high volume of waste generated by the expanding population. An effective solid waste management system is required for the maintenance of environmental and public health. So, some awareness campaign through social media and training programmes are suggested to be conducted for proper collection, segregation, treatment and disposal of solid waste.

Keywords: Solid waste, awareness, practices, assessment, management

Introduction

Tonnes of solid waste is disposed of at numerous dump sites every day. This waste is generated from a number of sources. The primary source of municipal solid waste is the residential sector contributing over half of the total waste generated. It includes many food scraps, packaging materials, paper, glass bottle and metal scrapes etc. (Suresh and Anbalagan, 2023). Some other sources generating the waste includes institutions, metropolitan areas, wastewater treatment facilities, agricultural fields, commercial areas, Industries, construction and demolition sites, Biomedical wastes from hospitals and clinical laboratories etc**.** Solid waste management poses a significant challenge in India especially due to high population density and now-a-days the current average per capita waste generation is about 0.6 kg/day per person. Most of the waste generated remains untreated and even unaccounted (Sruti and Bhargavi, 2022). In April 2022, the Delhi city released an alarming amount of methane into the atmosphere that reached a staggering rate of 434 tonnes per hour equivalent to the pollution generated by 68 million petrol cars. It poses a serious impact on both the environment and public health (Gu et al., 2024; Sharma et al., 2024).

The national capital is home to 20 million people, and produces about 11,000 tons of municipal solid waste per day, highest among all Indian cities. The Indian Central Pollution Control Board (CPCB) recently projected that annual waste generation in India will increase to 165 MT by 2030. Hazardous, plastic, e-waste, and bio-medical waste generated is expected to increase proportionately as well. The main reason of solid waste problem includes the population growth, increase in disposable items, purchases of luxury goods and an increase in the number of people who live in houses with yards (Waranasinghe and Yapa, 2016). One of the biggest challenges facing the city's waste management system is the lack of infrastructure. Inadequate waste collection, transport, treatment, and disposal have become major causes for environmental and public health concerns in

the country (Solano and Ranjithan, 2002). Lack of public awareness for proper waste management practices and regular waste collection services in certain areas are contributing to littering and improper disposal habits. Illegal dumping in open areas and water bodies has become the breeding grounds for disease vectors such as mosquitoes and rodents leading to increasing risk of the vector-borne diseases like dengue and malaria.

A clean environment facilitates good health and improves the quality of life. Therefore, solid waste management needs to be reshaped by adopting a holistic approach and inculcating the culture of accountability. This transformation requires the shifting from the reliance on landfills/open dumps to a circular economy model where waste is viewed as a valuable resource. It is crucial to explore and implement feasible and viable business models for waste treatment such as composting and waste to energy facilities and engaging the private sector to boost funding for solid waste management projects. So, the government should workout for managing waste in a scientific and sustainable manner (Awino and Apitz, 2024). These measures can enhance the financial sustainability of solid waste management initiatives and contribute to better waste management practices across the country (Khaidan and Sukhala, 2024). Awareness of various aspects of waste management can help to reduce waste generation and improve the waste management process. So, it is crucial to encourage the public to practice solid waste management and make sustainable choices. It would be beneficial for upcoming generations and lead to a cleaner and safer environment.

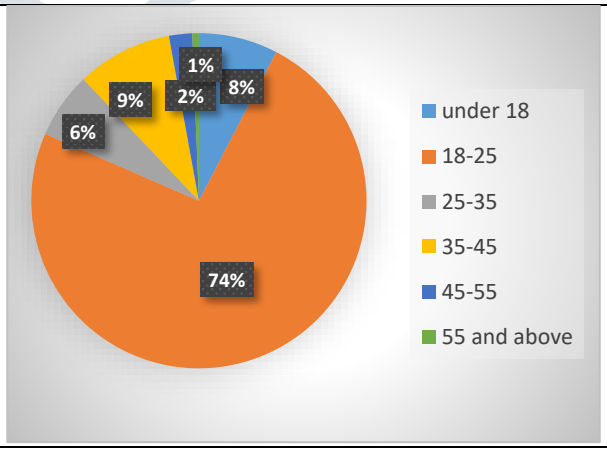
Methodology

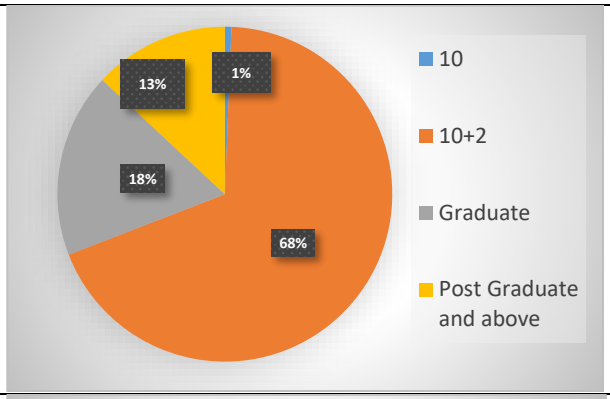
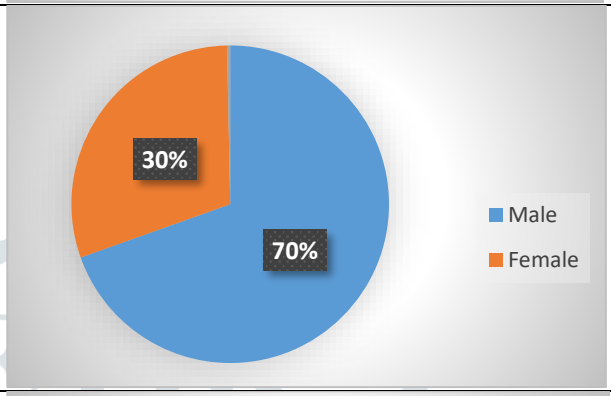
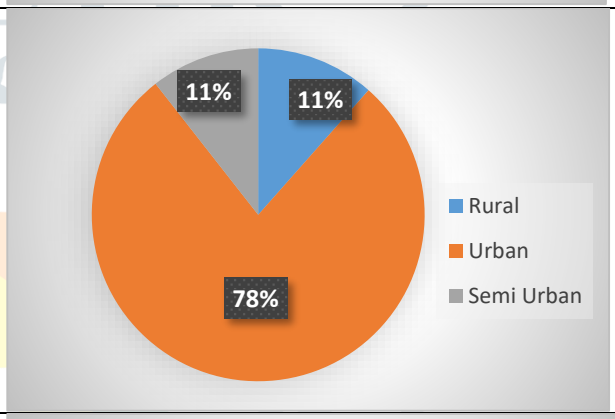
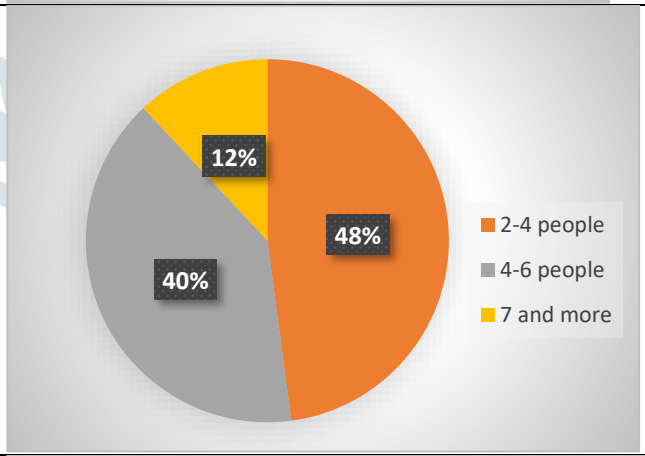
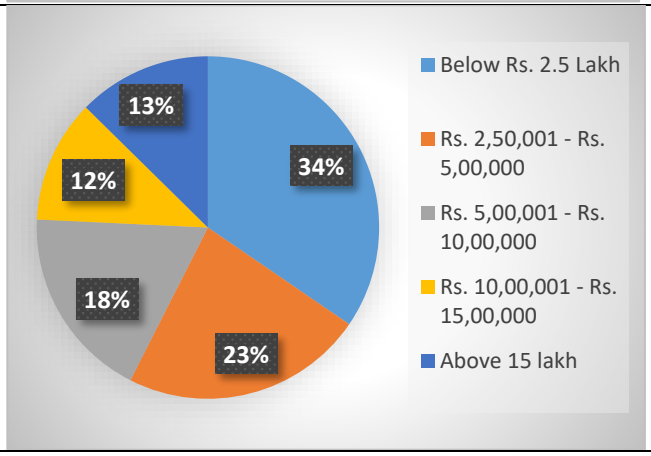
This study was carried out to gather data regarding solid waste management awareness and practices in urban, semi-urban and rural areas of South Delhi. It has utilized a descriptive-quantitative approach through the use of solid waste management awareness, people belief, actions and suggestions based questionnaire method. The questionnaire was comprised of following sections.

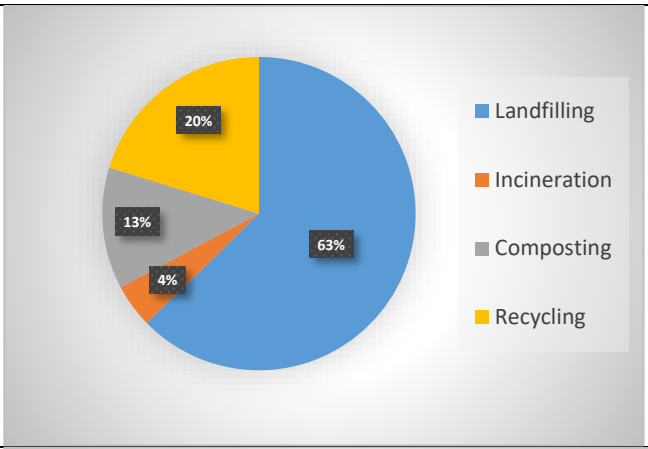
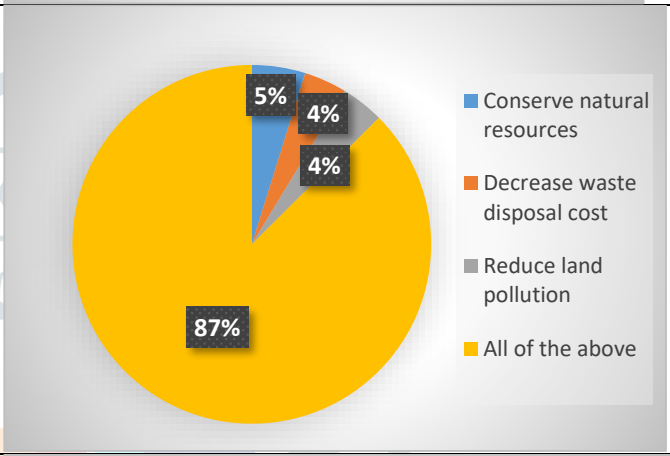
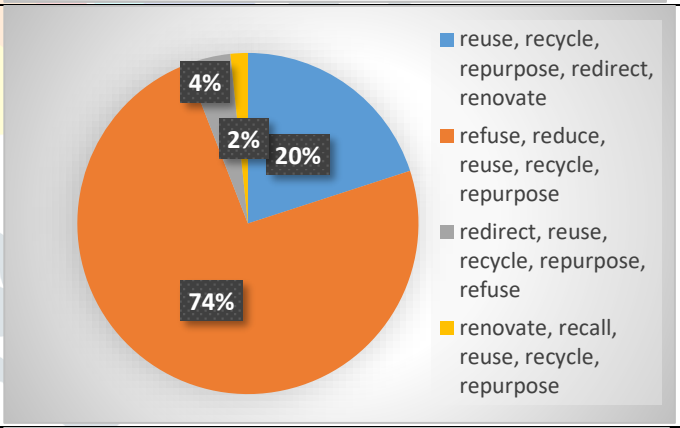
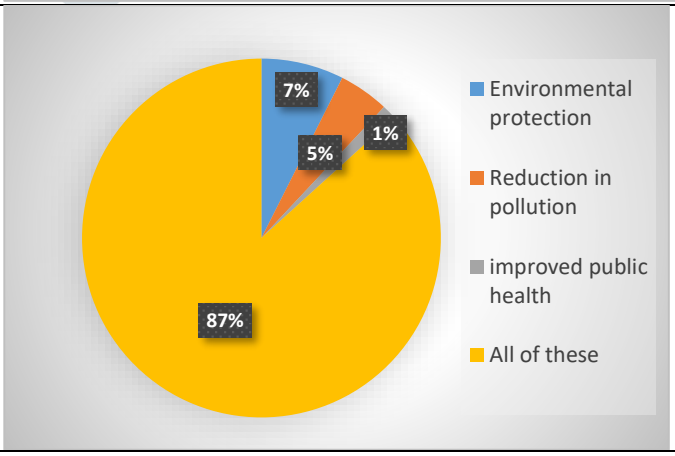
1) Demographics
2) General awareness regarding SWM
3) Attitude and belief
4) Knowledge and understanding
5) Behaviour and Action
6) Awareness of Government initiatives
7) Suggestive measures

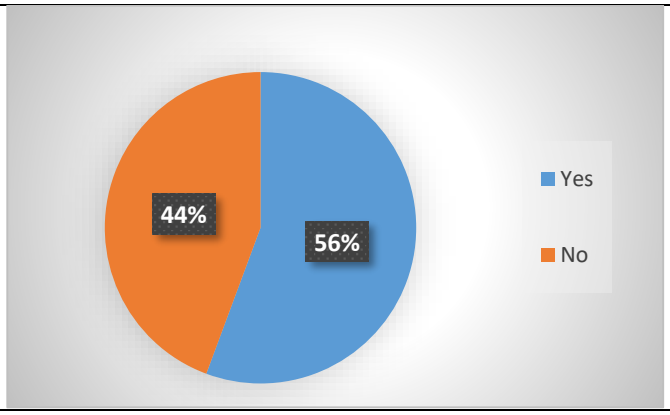
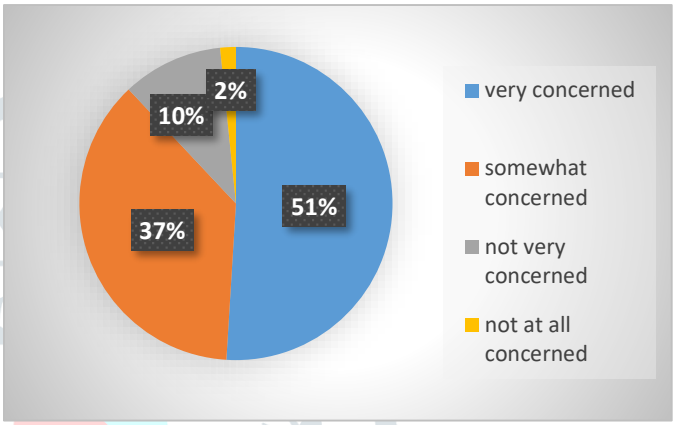
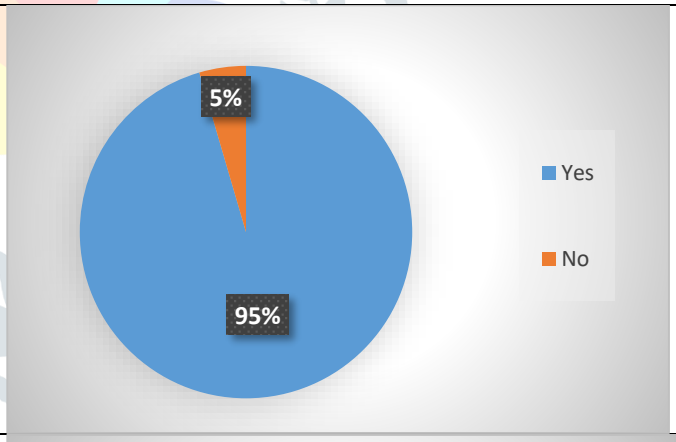
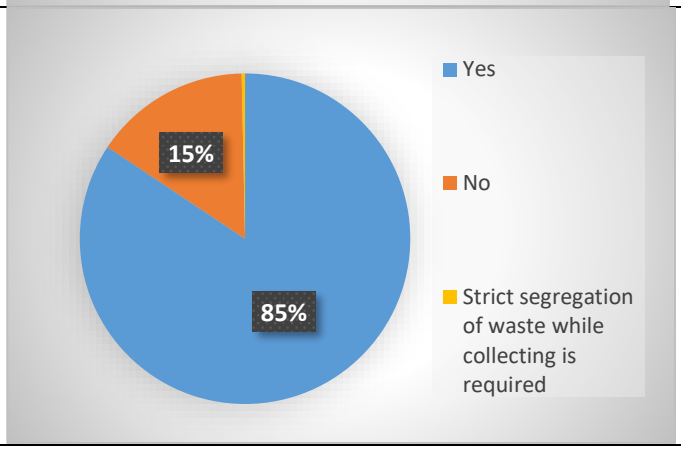
The total number of respondents were 315.

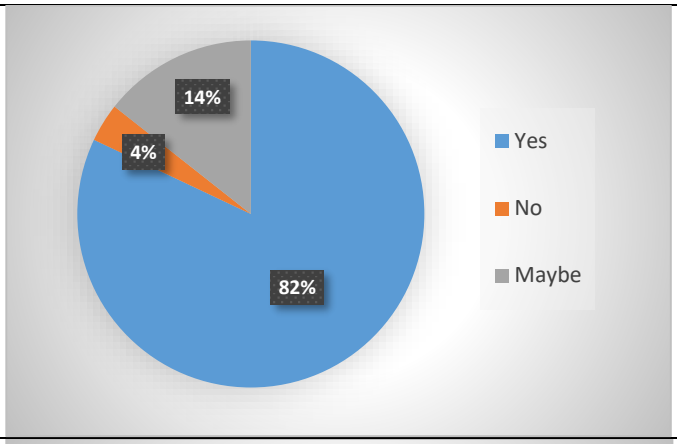
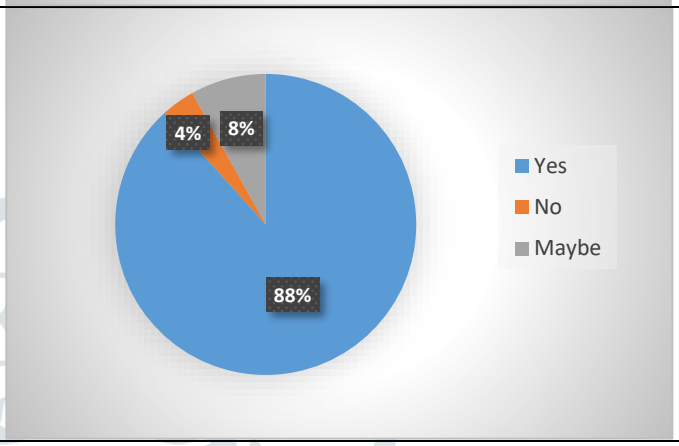
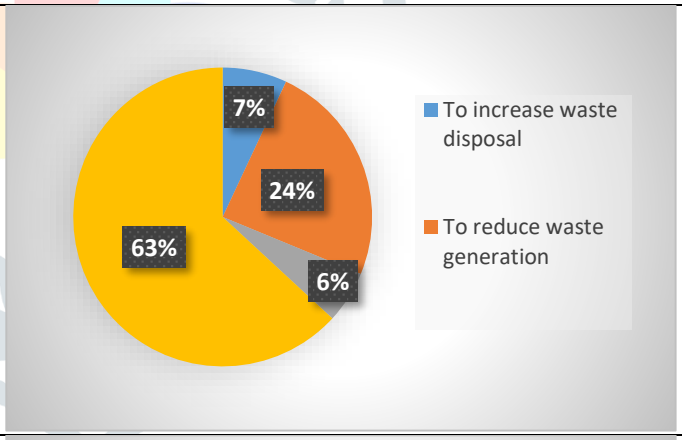
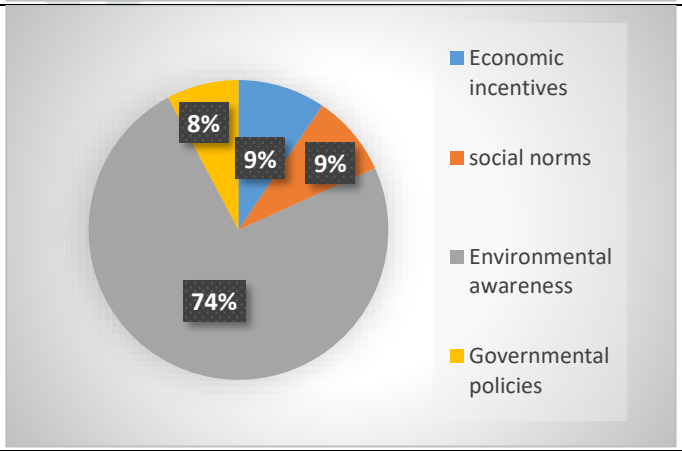
Results

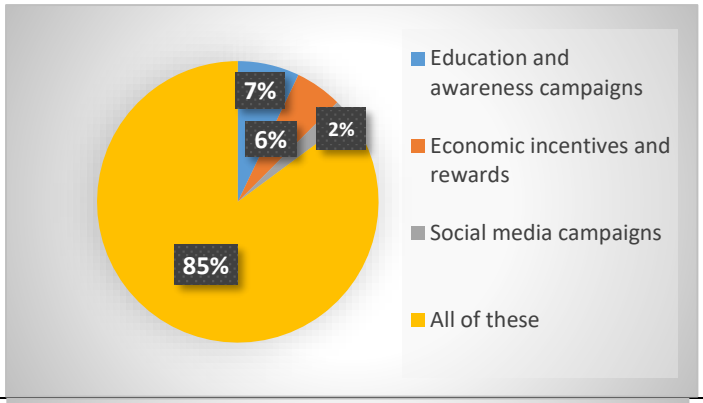
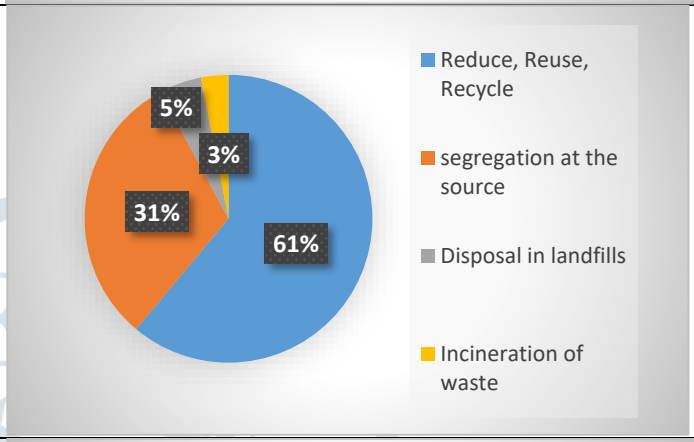
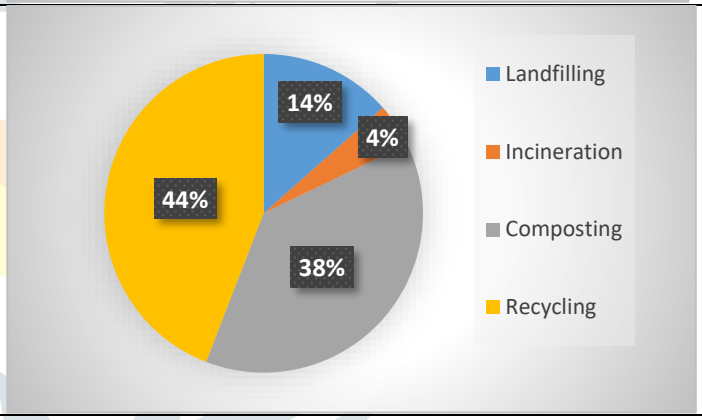
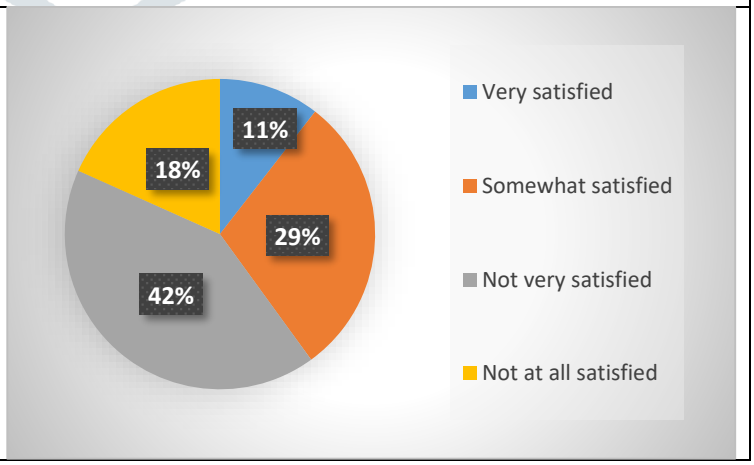
Section-1) DEMOGRAPHICS		
1.	Age	

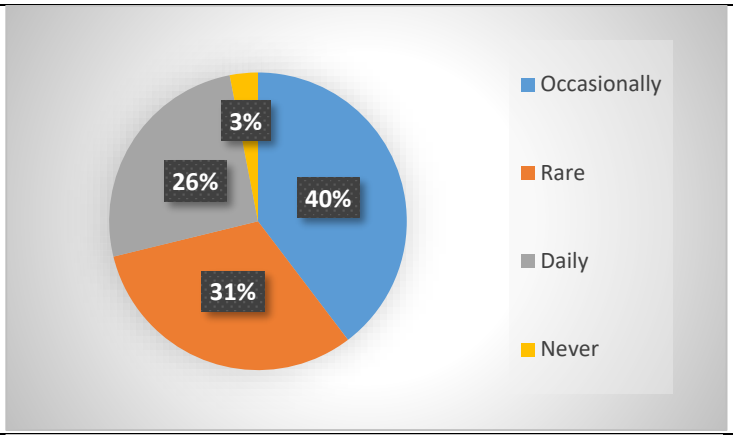
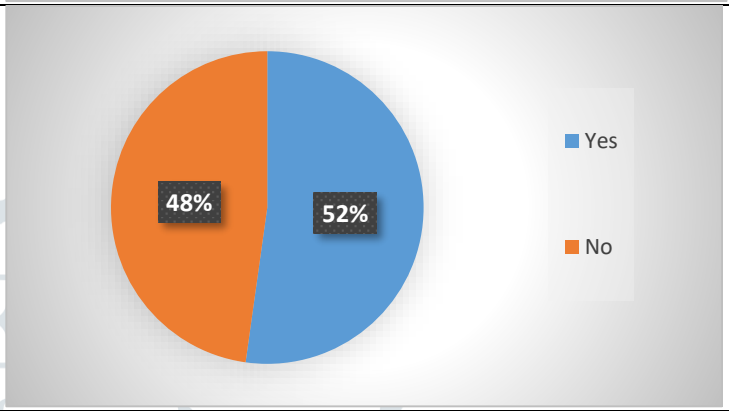
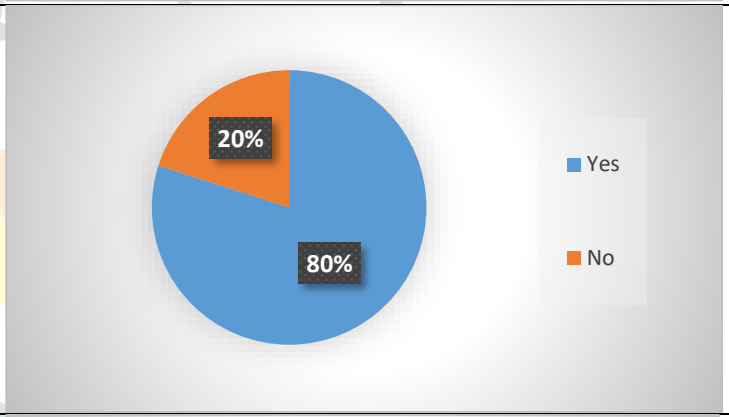
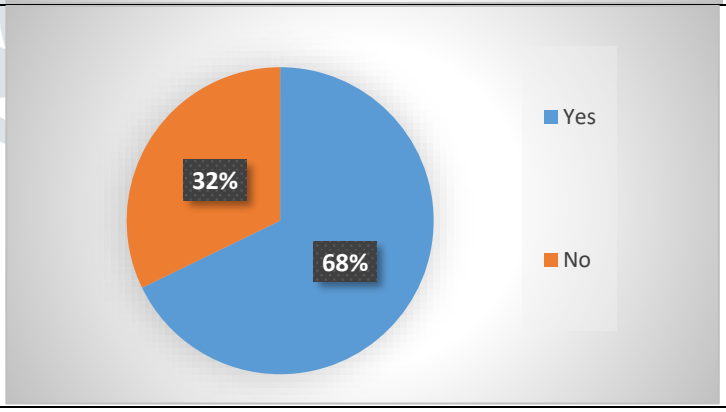
2.	Qualification	
3.	Gender	
4.	Locality	
5.	Family Size	
6.	Annual Income	

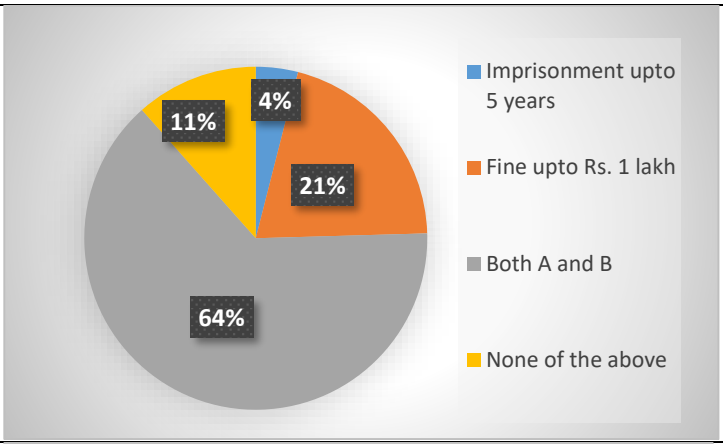
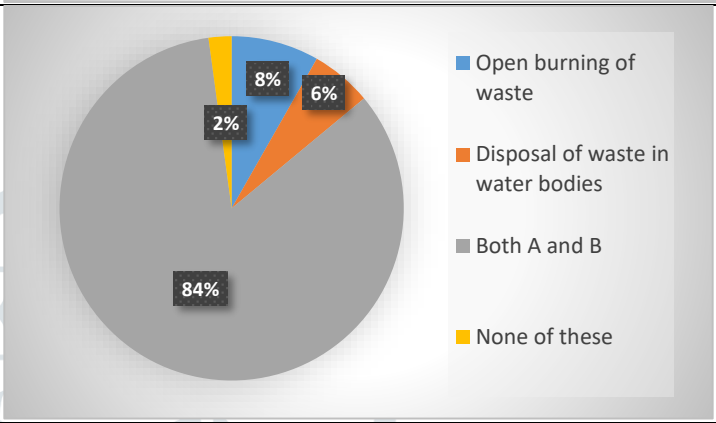
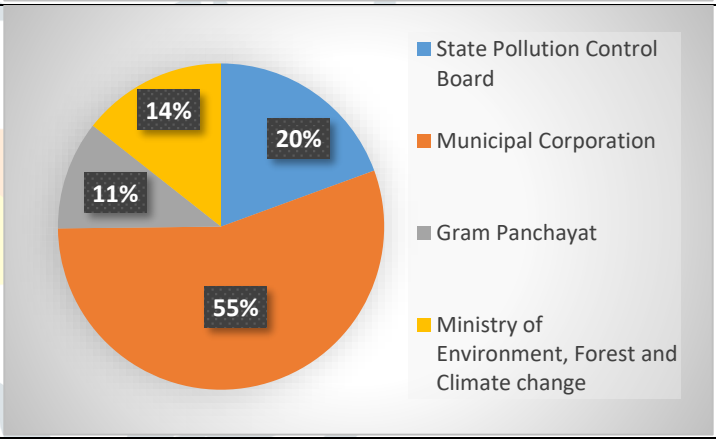
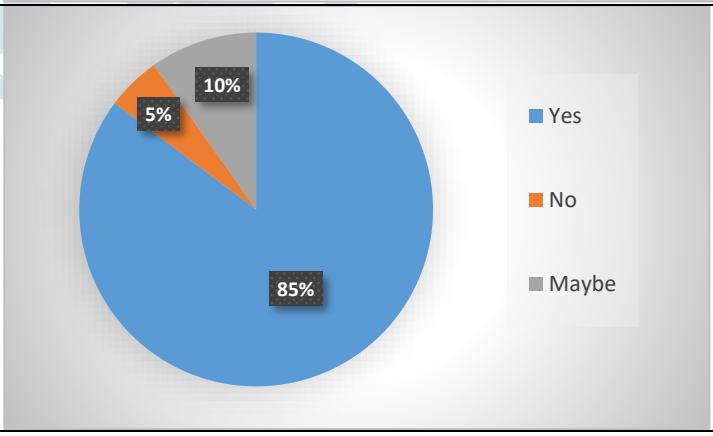
Section-2) General Awareness		
1.	Which is the most common method of solid waste disposal in India?	
2.	Which of the following is a benefit of recycling in solid waste management?	
3.	What are 5R's in solid waste management?	
4.	Which of the following is the benefit of proper solid waste management?	

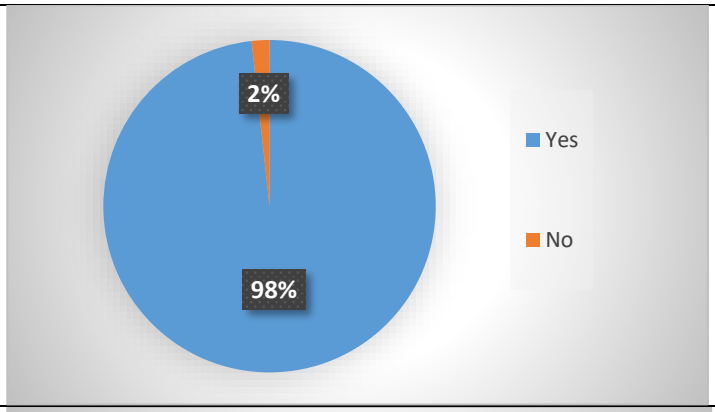
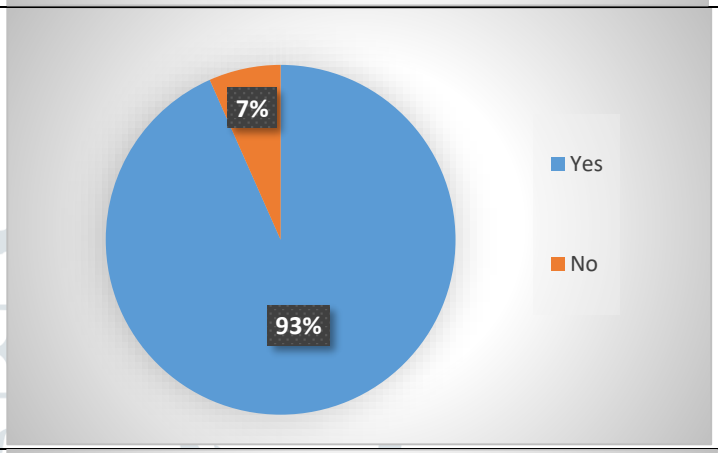
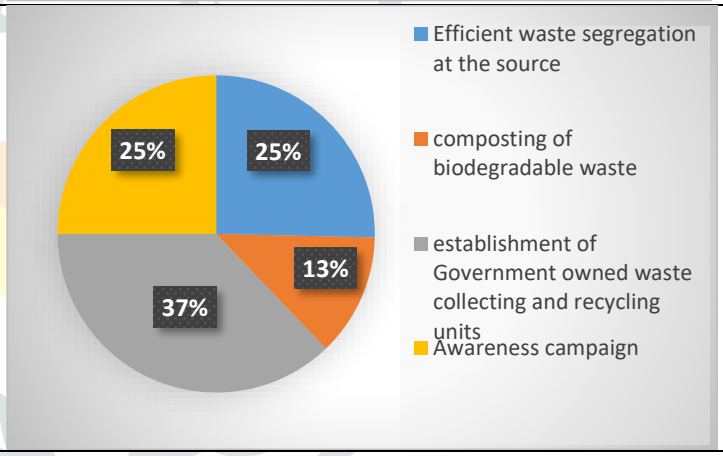
5.	Are there recycling facilities or drop-off Centre in your area?	
Section-3) Attitude and Belief		
1.	How concerned are you about soil pollution in your community?	
2.	Do you think individuals have a responsibility to manage their waste properly?	
3.	Do you need more frequent access to municipal waste collection service?	

4.	Will you support a door to door plastic waste collection system in your community?	
5.	Are you ready to make changes in your daily life to reduce your contribution to solid waste?	
Section-4) Knowledge and Understanding		
1.	What is the primary goal of solid waste management?	
2.	What is the primary factor influencing an individual's decision to adopt sustainable waste management practices?	

3.	Which of the following strategies can encourage individuals to adopt sustainable waste management practices?	
4.	Which of the following is a key principle of solid waste management according to the Solid Waste Management Rules, 2016?	
5.	Which of the following is the most environmental friendly method of waste disposal?	
Section-5) Behaviour and Action		
1.	How satisfied are you with the current waste management infrastructure in your community?	

2.	How often do you use single-use plastics (polybags, plastic straw, water bottles etc.)?	
3.	Have you received any education or training on sustainable waste management practices?	
4.	Have you ever purchased sustainable products like energy efficient of eco-friendly goods?	
5.	Do you segregate waste at your home?	
Section-6) Awareness of Government initiatives		

1.	What is the penalty for non-compliance with the Solid Waste Management, Rules, 2016?	
2.	Which of the following is prohibited under the Solid Waste Management Rules, 2016?	
3.	Who is responsible for implementing the Solid Waste Management Rules, 2016 at the local level?	
4.	Do you think the Indian Government should implement stricter policies to reduce plastic waste?	
Section-7) Suggestive Measures		

1.	Do you think there should be more emphasis on recycling and composting in South Delhi?	
2.	Do you think individuals can make a significant impact in addressing these issues?	
3.	What will you suggest for better management of solid waste?	

Discussion

The data was collected from different regions of South Delhi including Urban (78%), semi- urban (11.5%) and Rural (10.5%). Majority of the families had medium size including only 2-4 people (48%), followed by 4-6 people (39.5) and large size families with 7 and more people were only 12.2%. Out of the total responses 69.8% were male and 29.2% were females.

Out of the total responses around 62.2% of the people believed that landfilling and open dumping is the most common method of solid waste disposal in Delhi where waste is being collected and left exposed to the environment without proper management which causes the contamination of air, ground water and land. 74.2% people are very well aware of 5R's i.e., reduce, refuse, reuse, recycle and repurpose and benefits of proper solid waste management. Around 91.1% of the residents supports the composting of food waste rather than dumping it and 86.8% people believed solid waste management is necessary for reduction in pollution, improved public health and environmental protection. Individuals as a part of the environment have a great responsibility to manage their solid waste properly. 84.3% people are not satisfied with municipal waste collection service as they feel it should be more frequent. People are well aware of the consequence of plastic waste disposal so 81.9% people are ready to support door to door plastic waste collection system in their community so that it can be sent to recycling unit and properly managed. 44.7% people are not having recycling facilities or drop off center in their area. So, they are worried of soil pollution in their community and 88% of people are ready to make changes in their daily lifestyle so that they could reduce their contribution to solid waste. The results has

revealed that the people have enough knowledge in terms of solid waste management services, impact of improper management, necessity of solid waste management and their responsibilities as an individual. They are very well aware of the goals of solid waste management and 62.6% people think that solid waste management should be done to promote sustainable waste management practices. Most of the people supported the community participation along with the Government efforts for prevention of soil pollution and, resource conservation. Environmental Education and awareness campaigns are the tools to motivate public for participation in solid waste management and adopting sustainable choices. Segregation at the source is the key principle of solid waste management according to solid waste management Rules, 2016. But, only 30.8% people are aware of it. Most of the people (44.4%) think recycling is the most eco-friendly method of waste disposal. Only 10.7% families are satisfied with the current waste management infrastructure in their community, rest are either somewhat satisfied or not at all satisfied. Around 25.8% people are using single use plastic on daily basis. Although only 52.6% people have received education or training on solid waste management practices still 80% people prefer the purchase of sustainable products and 68% people are segregating waste at their home.

The data has shown although people are aware of solid waste management services and practices but they little knowledge of laws and rules and regulations related to solid waste management. 37.9% people are not aware of solid waste management rules and only 22.6% people knew about the Environment protection Act, 1986 and less than 30% people are aware of penalty for non-compliance with the solid waste management Rules, 2016. Only 55.5% people are aware of the duties of Municipal Corporation for solid waste management however rest of the people believed it is the responsibility of State Pollution Control Board, Gram panchayat and Ministry of Environment and forest and climate change to manage the solid waste. Around 85.3% people are demanding that the Indian Government should implement stricter policies to reduce plastic waste and give more emphasis on recycling and composting practices in Delhi. As individuals can make significant impact in addressing the issue of solid waste Management, they are ready to take their responsibility and they also suggested that Government should establish more waste collecting and recycling units in their localities and awareness campaign for solid waste management should be conducted time to time for efficient waste segregation at the source and adoption of sustainable practices.

CONCLUSION

These findings has reflected that the people have high level of awareness about the necessity of solid waste management and various initiatives taken by local and/or Government bodies but their knowledge on different laws related to solid waste management is not up to the mark. So, the Government should utilize the social platforms like e-media and printed media to disseminate the relevant information regarding solid waste management rules and regulations. As the people are ready to participate and co-operate in different waste management schemes at the local level so they should be encouraged to opt for 5R's (Reduce, reuse, recycle, repurpose and refuse). Moreover, municipalities should work hard and for long hour to achieve effective solid waste management in this region.

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