

## Addressing the Challenges and Potential of Ragpickers in Circular Economy Transitions during a Pandemic: A Case of Varanasi City

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### Abstract

Rag-pickers also referred to as informal garbage collectors, play a vital but often overlooked role in maintaining public health and sanitation, which the COVID-19 pandemic has dramatically spotlighted. This paper is intended to provide an overview of the current status of Municipal Solid Waste Management in Varanasi, India, with particular emphasis on the roles and conditions of rag-pickers within the Integrated Solid Waste Management (ISWM) framework and in the broader context of the circular economy. The study was carried out using a questionnaire and personal interview method. The responses were recorded and analysed critically. The study indicated a high prevalence of rag-picking among adults aged 30-60 years who were uneducated and migrants from other states. These crucial workers, who collect and sort recyclable waste materials, are socially marginalised groups, living in poor conditions without access to government schemes for protection against occupational hazards and limited awareness of the dangers of occupational hazards. This paper looks at rag-pickers contributions to resource recovery and waste recycling. This research emphasises their critical role in advancing circular economy principles. Their contribution is often ignored in the literature on urban waste management. Recommendations about improving work conditions, health outcomes, and socio-economic status of a marginalised group were made based on findings obtained from the study.

**Keywords:** *Circular Economy, Collection, Municipal Solid Waste, COVID-19, Rag-picker, Socio-Economic Status.*

### Introduction

Solid waste management is an increasingly complex challenge for towns everywhere, and Varanasi, one of India's oldest and most densely populated cities, is no different. As the city faces the challenges of managing waste while striving to be an environmentally sustainable city, informal waste collectors have come to play a vital, though not often recognised, role in the mechanism of waste management. Rag-pickers play a crucial role in recycling and trash minimisation; nonetheless, they face numerous socio-economic and health difficulties with quick urbanisation and insufficient infrastructure.

This study aims to deliver a thorough analysis of the present status of integrated solid waste management in Varanasi, underlining the roles and circumstances of rag-pickers within this framework. The study's primary aim is to analyse the socio-economic state of rag-pickers, especially in the wake of the COVID-19 outbreak. The epidemic has significantly affected informal sectors such as waste collection, changing labour patterns, and exacerbating the vulnerabilities of these individuals.

This paper will discuss changes in labour practices due to the pandemic and assess the health risks of rag-pickers amid the crisis. The COVID-19 pandemic spotlighted the dangerous health situation of informal waste scavengers, who often do not wear proper gear and are exposed to many environmental hazards while working. This research investigates the

health consequences of the pandemic to elucidate the physical and mental burdens experienced by rag-pickers and the obstacles they encounter in obtaining healthcare.

Rag-pickers play a vital role in a circular economy, as they are grassroots agents for the recovery, segregation, and recycling of municipal solid waste. Their work completely resonates with the principles of the circular economy while optimising waste reduction and resource utilisation, eliminating the efforts to delve into developing closed-looped systems for developmental purposes. Despite their critical role, rag-pickers generally operate in the informal sector in precarious conditions, without access to safety measures, health benefits, and social recognition. They significantly reduce environmental pollution and conserve natural resources by diverting waste from landfills and enabling the reuse of valuable materials. Still, these contributions remain undervalued and unacknowledged in formal urban waste management systems. To achieve the most genuine promise of a circular economy, rag-pickers need to be mainstreamed into formal waste management frameworks (Morais et al., 2022). This will help them be provided better work conditions, social security, and recognition for their impact on the environment. Integration would ensure the recovery of resources and create an opportunity for economic and social sustainability by empowering an otherwise marginalised group.

The study finally highlights recommendations to improve the work environment, health outcomes, and socio-economic status of rag-pickers. Based on this proposal, immediate remedial measures on enhanced personal protection measures and health care are developed along with planned interventions for integrating rag-pickers into a formal waste management system with long-term sustainability and more significant inclusion in Varanasi.

This research will shed light on the essential role of rag-pickers in urban trash management, inform the formulation of laws that protect their rights and welfare, and enhance the effectiveness and sustainability of the city's waste management systems.

### **Objectives**

- To know the socio-economic condition of rag-pickers and understand the changes in their job habits after the pandemic.
- To examine their health condition during the COVID-19 pandemic.
- To analyse their role in closing the loop in the waste management sector and suggesting remedial measures for improving rag-pickers health.

### **Literature review**

The pandemic due to COVID-19 throws up several issues related to the significant yet largely invisible contribution of informal waste workers to public health and sanitation. This review will discuss existing knowledge on the socio-economic conditions and the health status of rag-pickers in Varanasi with special reference to challenges faced during the pandemic. ISWM is an integrated approach that acknowledges the role of all stakeholders involved in waste management, including informal workers. Sharholly et al. (2007) and Sekhar. K.C. (2015) has also mentioned that ISWM needs to be appropriately implemented in Varanasi and other cities in India.

The rag-pickers are the poorest and the most vulnerable group in India - who recycle waste with hands; its members work for the lowest wages in the job market. The COVID-19 pandemic has exacerbated socio-economic factors that led to reduced incomes, increased food insecurity, and further societal discrimination (Chikarmane, 2012). In Varanasi, lockdowns and the disruption of the economy have further enhanced rag-pickers vulnerability: many rag-pickers are forced to shift to precarious employment to survive (Gidwani, 2015; Andrianisa et al., 2018). This section will likely experience a poor health status because of the likelihood of injury, infection, and chronic disease caused by hazardous working conditions. (Gebreslassie & Raman 2023).

Ragpickers play a strategic role in promoting the circular economy, significantly in low and middle-income countries, acting as crucial agents in waste management and recycling processes. Their efforts in collecting, sorting, and reintegrating discarded materials substantially improve resource recovery and reduce environmental impacts (Gutberlet, 2023). Rag pickers are a specific workforce that beats formal systems at recovering materials, making the recycling

industry economically more efficient (Da Silva et al., 2019; Gall et al., 2020). Moreover, their work has significant environmental implications, including reducing plastic pollution and minimising greenhouse gases, which addresses urgent local and global environmental issues (Barford & Ahmad, 2021). Despite these contributions, ragpickers face significant challenges. They often work in hazardous conditions with little social protection, and health risks are incredibly high, as are low-income levels (Ganguly & Chakraborty, 2021; Barford & Ahmad, 2021). In addition, these contributions are not valued much since they get the least remunerations and no official recognition regarding the discussion held on the circular economy (Gutberlet & Carenzo, 2020).

Integrating the ragpickers into a circular economy requires cooperative models and supportive policies. Cooperatives are formed by better access to markets, technology, and training. Therefore, it can be done to formalise ragpickers' roles and increase economic opportunities for them (Kumar & Agrawal, 2020; Kaza et al., 2018). In addition, coordinated policy interventions that support and recognise ragpickers' contribution can improve their working conditions and social status, achieving a more equitable and sustainable waste management system (Kochukalam, 2013; Ramitha, 2023). Such essential elements should be recognised and addressed to create a sustainable and inclusive circular economy. Another scenario created by the COVID-19 pandemic is the need for proper recognition and empowerment of rag-pickers to maintain public health and hygiene (Das et al., 2023).

## Materials and methods

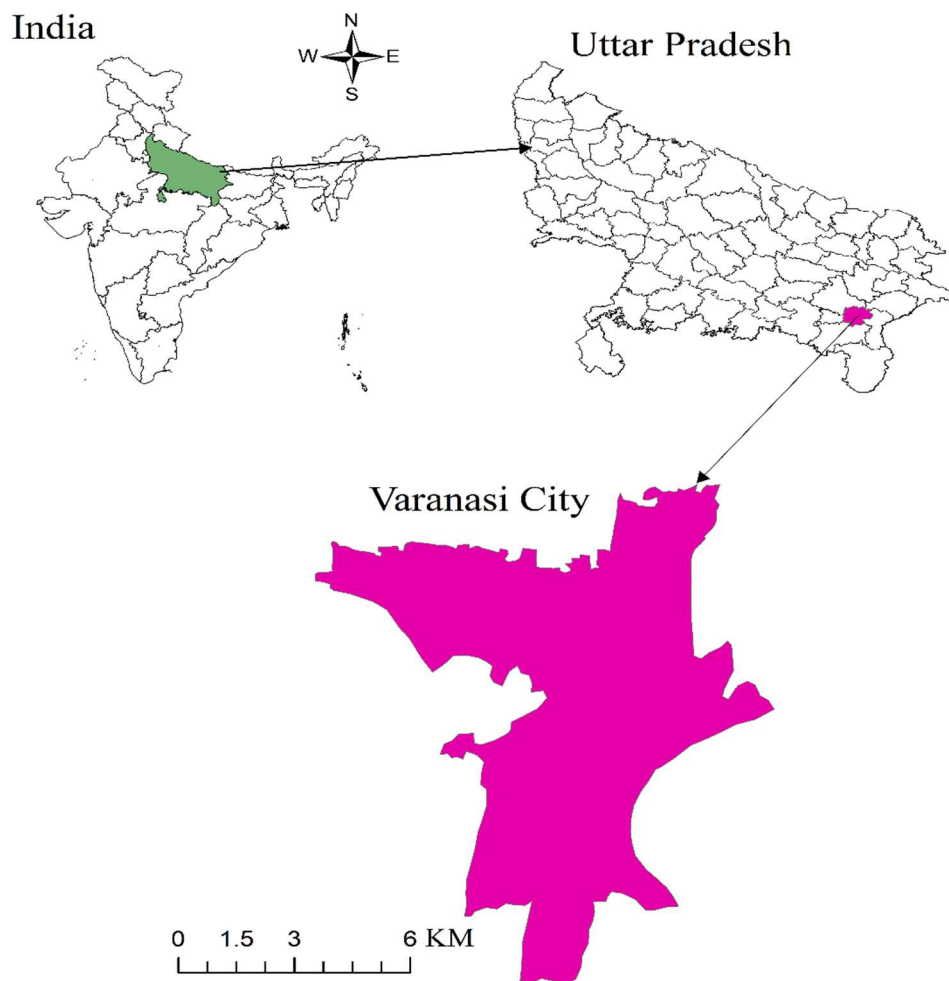
### Study Area (*Varanasi*)

Varanasi, also referred to as Banaras or Kashi, is situated on the banks of the Ganges River in Uttar Pradesh, India. According to traditional etymology, "Varanasi" takes its name from the names of two Ganges tributaries that constitute the city's borders: "Varuna", which still flows in the city's northern region, and "Assi", which is now a minor stream in the city's southern region, close to Assi Ghat. The old town is situated on the northern banks of the Ganges, bordered by the Varuna and Assi rivers. As a central religious hub in India, it is regarded as the holiest among the seven sacred cities in Hinduism and Jainism, and it has significantly contributed to the development of Buddhism and the teachings of Ravidas (*Fig 1*). Varanasi emerged as a significant industrial centre renowned for its muslin and silk textiles, perfumes, ivory craftsmanship, and sculpture. The selected location for our survey is Bajardiha in Varanasi City. Numerous small rag picker colonies exist, housing thousands of rag pickers. The majority originate from Bihar and West Bengal.

**Fig: 1- Study area (Varanasi city)**

**Sampling technique and data collection.**

This study is based on the condition of municipal solid waste management with the help of rag-pickers. To study the involvement of these rag-pickers, we used a mixed-method approach; the quantitative data is collected through the primary survey via questionnaires, and qualitative data is collected through personal interviews. Data was gathered using a structured questionnaire that was asked with the rag pickers. The questionnaire included questions related to social demography information, mode of work, health and government schemes, and perks. We relied on a local bilingual



interpreter of Hindi and Bengali. Sometimes, they used the Bhojpuri language for answering. Based on their feedback, we have concluded our results and learned about their daily routine of rag-picking. Municipal waste collection data was extracted using their official consultation with the municipality of Varanasi. We used a random sampling method and selected 50 ragpickers, of which 38 agreed to respond while 24 responded appropriately to all our questions in the survey we performed. We chose Bazardiha of Varanasi as our site for sampling. The questionnaire and interview questions were developed generously after discussing them with a field expert and mentor. The questionnaire discussed

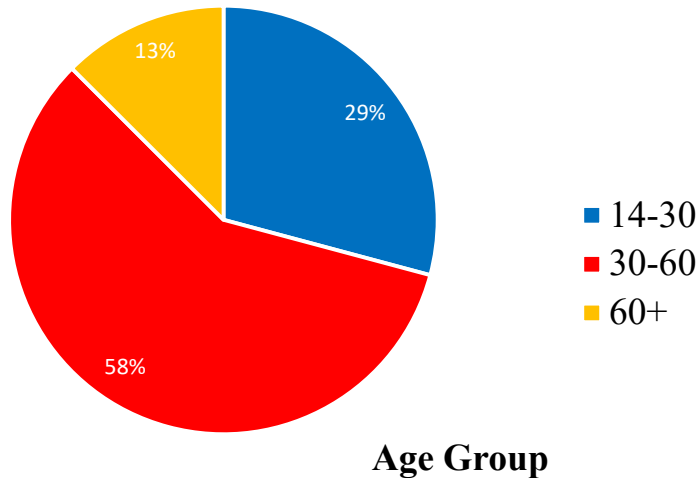
opportunities and challenges that rag pickers faced during work and daily life. Some questions were asked on the spot to get better results and understand their work experiences.

### Results & Discussion

#### Social Demographic information

**Age group** - The respondents in Varanasi range between the ages of 14 to 60 years. If we look at minor dissections, from age 14 to 30 years, only 29.2 % of people do this work, and from age 30 to 60, 58.3 % of people do this work. Only some (12.5%) people above 60 are involved

Fig 2: Age group of rag pickers (respondents)



in this work. In old age, doing this job is hazardous and detrimental to their health (Da Silva et al., 2019). It is a sign of satisfaction that we found few minors doing this work (Fig 2).

**Gender** - Rag-pickers in Varanasi are reported to be

female and male in an almost equal ratio. Males comprise 58.2% of the total respondents, and females constitute 42.8 % of the total respondents (Fig 3).

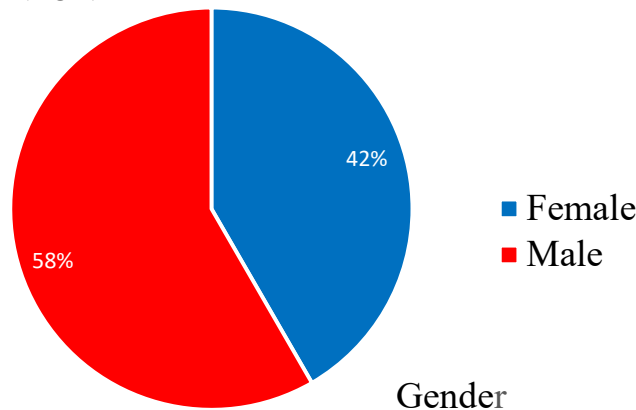


Fig 3: Gender of rag pickers (respondents)

**Educational status** is

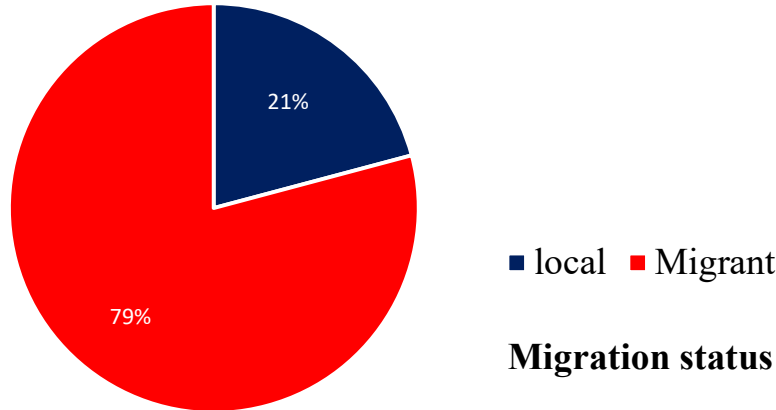
pickers, financial status and awareness. One factor could be that they think children are the helping hand for sorting and collecting waste (Chatterjee, 2015). Unaware of the benefits of education, 91.7% of respondents are uneducated, and only a tiny portion are found to be educated up to the primary level (Verma & Verma, 2016). They barely know how to write names or identify alphabets of any language.

Gender of rag pickers

**status** - educational meagre for rag-

**Migration status** – Most people move toward the city for a better life expectancy but indulge in rag-picking due to a lack of skills or unavailability of work/jobs. In Varanasi, 79.2% of rag pickers are from other towns and states, mostly from Bengal, Jharkhand, and Bihar,

Fig 4: Migration Status of rag picker's



respectively (Venkatesh, 2023). Locals are also doing this work, but they are found to be only 20.8% of the total response collected (Fig 4). **Family size & individual**

**involvement in Rag picking-** Generally, it has been seen that most of the rag-pickers in the majority of families have 4 to 5 members. Of these, 33.3 % said that other members are also doing the same work for a living, and 66.7% said they are the only ones doing this as they did not get any job. This shows they got this role due to the compulsion of unemployment, not by their choice (Fig 5).



Fig 5: Family size of rag pickers

**Role of Rag-Pickers in Waste Management.**

**Type of waste collected** - In Varanasi, rag-pickers collect all kinds of waste, like plastic, metal, glass, and rubber, except bio-degradable material because this material is not sellable. However, if it reaches the collection, it may soak the paper and start degrading waste; hence, rag-pickers no longer pickup biodegradable material. Sometimes, they pick bio-medical waste, which may be hazardous to their health (Kumari & Kiran, 2022).

**Sorting and selling** - Most (96 %) rag-pickers sort their collected waste to get a reasonable rate for every item. Plastic and metal have different rates. when they sort out their collected waste. They might get a fair price for some items. After sorting all the rag-pickers sell their waste material to the scrapper, only a few people go to the municipal corporation. This is because they are unaware of the municipal working environment (Fig 6).

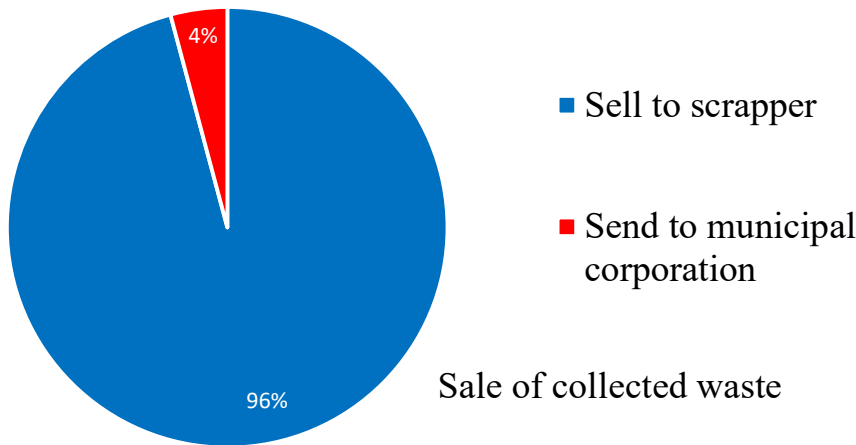


Fig 6: Preference of sale for rag pickers

**Distance and Duration of Waste Collection**

Most of the rag-pickers travel about 2 km to 10 km in the city to collect waste. A

few respondents said that they travelled only 2 km to collect. Travelling depends on their physical strength and the scope of availability of garbage in their proximity. For rag-picking, they travel 2 km to 10 km daily and spend 3 to 8 hours of the day. They start their day very early in the morning. About 50 % of rag pickers spend 3 to 5 hours of the day, and 42.2% spend about eight hours on rag-picking to earn their living (Fig 7).

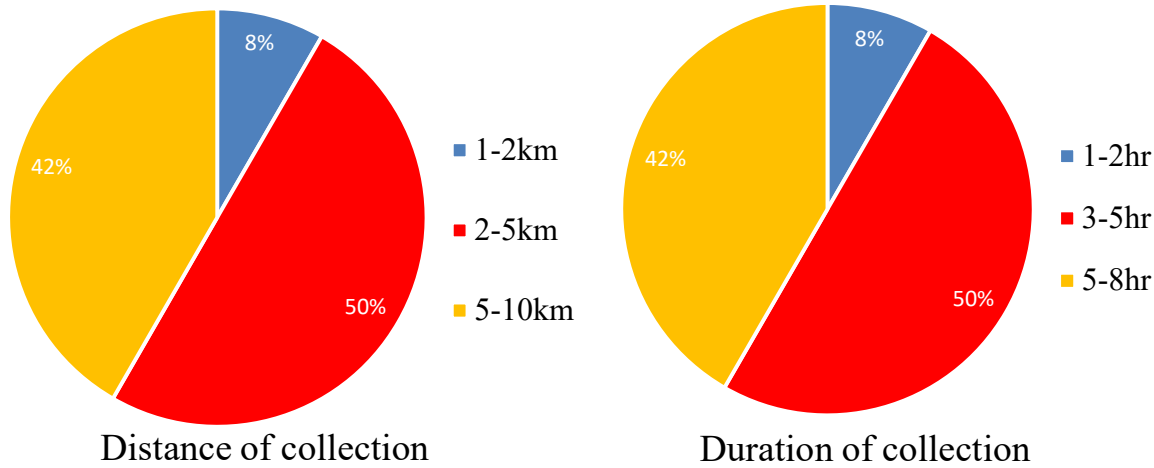
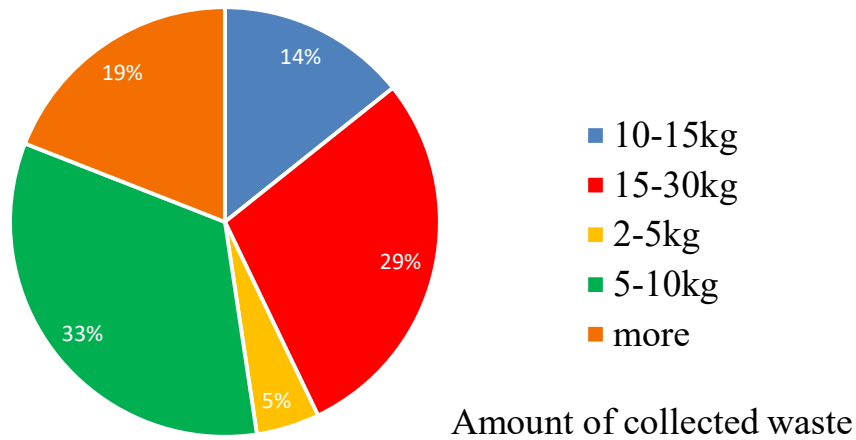


Fig 7: Distance travelled and duration of daily work of rag pickers

**Amount of Waste Collected and Daily Earning** - Upon travelling that much time and distance, they generally collect significantly less amount of waste, 28.6% collect only 5 kg to 10 kg of waste, and the same number of people collect only 15 kg to 30 kg of garbage (*Fig 8a*). Only 19% can make up to 30 kg—people who used to spend more time picking up used bicycles/tricycles to carry waste. Depending upon the amount of collected waste, they earn from a minimum of Rs 100 to Rs 500 daily, so the average earning in a day is about Rs 300 as sometimes they collect more waste and sometimes less (*Fig 8b*). Earning is affected by many conditions like weather, carrying capacity, type of area, festive seasons, etc. (Venkatesh, 2023)

*Fig 8 (a): Amount of waste collected by rag pickers daily*





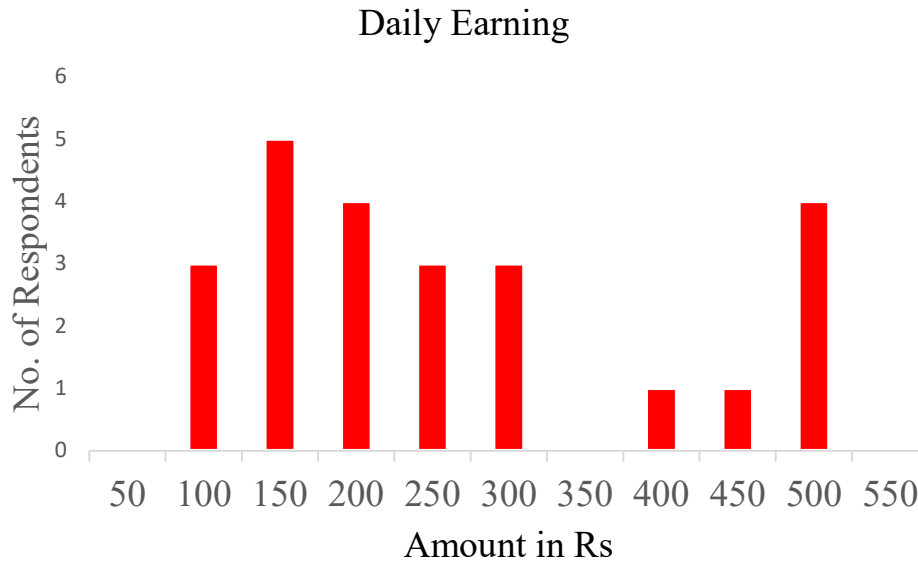


Fig 8(b): Daily earnings of rag pickers

**Socio-Economic & Health Condition**

**Housing and Basic Amenities** - All the respondents live in temporary houses made up of plastic sheets and bamboo or rented houses or plots. They may pay 500 to 1000 Rs. per month for their piece of land. Some rag-pickers live on the roadside in very poor condition. They lack basic facilities like water supply, sewerage system, electricity, etc.

**Voting Right & Benefits of Government Schemes** - Yes, they cast their vote, but the majority of them are from other states, so they have voter ID cards of their states; 58.3% said yes to voting, and 37.5% said no to voting. Some people say that they vote sometimes. They also have a Ration Card, and 62.5 % nodded for that, and 37.5% denied having a Ration Card when we asked them about the govt. Schemes like PM Awash Yojana and Ayush Bharat Yojana. They lack to avail. This is because they do not have proper knowledge and awareness of government schemes. Even if they do not have any such card for the facility, education plays a significant role in making them available (Fig 9).

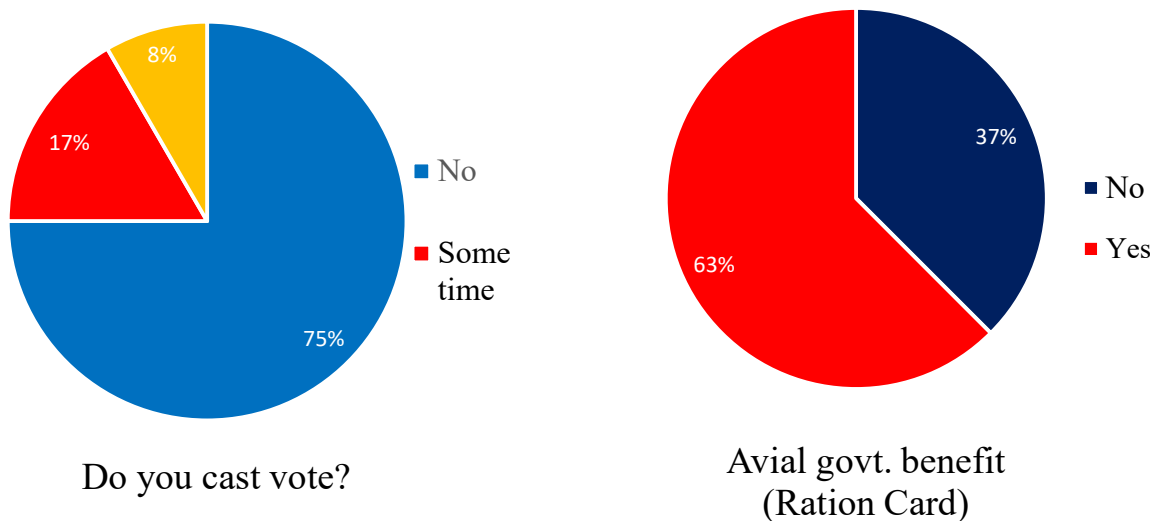
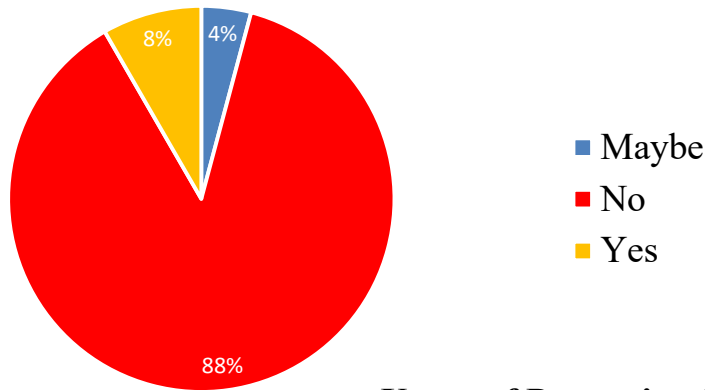


Fig 9: Voting Rights & Government schemes availed by rag pickers

**Impact of COVID-19** - COVID-19 affects their jobs badly as they do not get much waste and money. Due to restrictions, they could not roam around the city much when we talked to them about the changes observed before and after the COVID-19 period. They said very few people get infected by this virus, and 1 or 2 casualties occurred due to COVID-19. (Ramitha, 2023) These deaths have happened because they did not get proper treatment and were unaware of the conditions. Money may be a significant factor in this.

**Usage of Protective Gear and General Health Impacts** - As we observed during the survey, none of the rag-pickers wore protective gear. The survey graph says 88 % do not practice using this protective gear while collecting due to ignorance, and they might get exposed to hazardous conditions, which affect their health in many ways (Thakur et al., 2018). If they get hurt by a Sharp, they may get infected with tetanus and may be exposed to many pathogens in these wastes that might cause serious complications (Fig 10).

Fig  
Gear  
Social



Usage of Protective Gear

10: Usage of Protective  
by Rag Picker's

**Perception and Inclusion.**

**Registration in the Municipality** - None of

registered in any municipality as they were

of government officials were unaware of how to

registered. There are no

them

afraid

and

get

proper guidelines yet in the municipality of Varanasi, for formally integrating these rag pickers. However, they have few rag-pickers details available in the office, which are negligible compared to the actual population.

**Police Harassment and Public Perception** - Rag-pickers said that police did not harass them very much, but some accepted they did if they entered a non-permitted area or during the lockdown. Only 8.3 % of people said that police harass them. Like the police, the public sometimes supported them during the lockdown period by giving them clothes and food. Some people hate them for doing this nasty job. Sometimes, they also abuse them for no reason. No NGO is found to engage with them for their betterment and to help them achieve good societal conditions in the surveyed area (Fig 11).

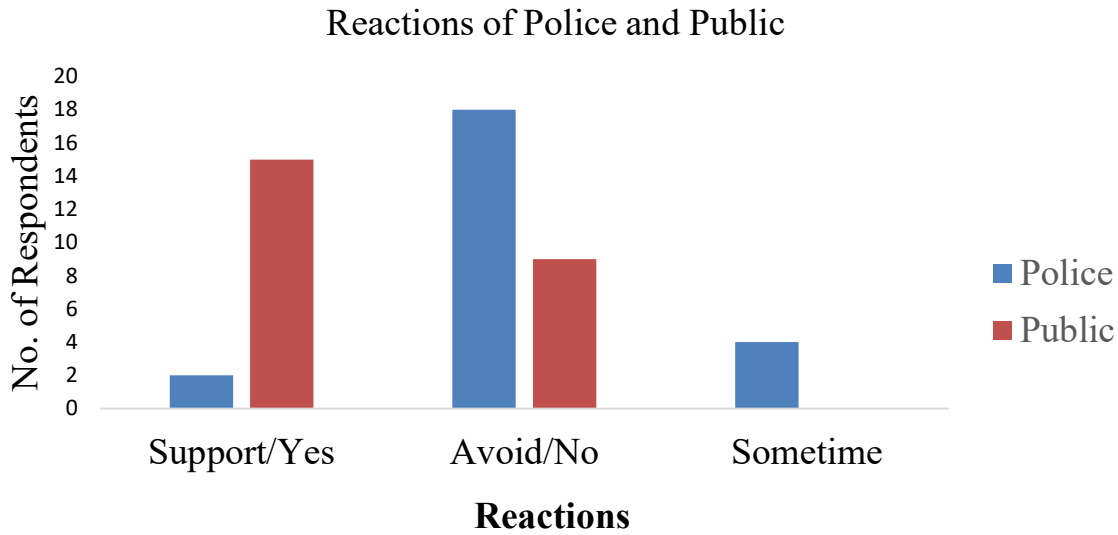


Fig 11: Police & Public Perception in Rag picker's

**Site Selection for Rag-Picking** - In Varanasi, city rag-pickers go to all sites to collect waste, such as office areas, roadsides, residential colonies, and railway stations. However, the roadside is the preferred area for collection as there is no restriction for picking waste. While very few ragpickers responded that they often collected waste from healthcare premises. Hospital waste may contain bio-hazardous matter and be sharp, which might compromise collectors' health.

**Conclusion:**

In conclusion, rag-pickers in Varanasi and other Indian cities face numerous challenges, even though they are vital in managing waste and maintaining public health during the pandemic lockdown. The COVID-19 pandemic has highlighted the urgent need for policies and interventions that address the socio-economic and health hardships faced by this marginalised population. The study reveals their role in municipal solid waste management, where they acted as warriors or key players to support the transition from a linear economy to a circular. The study shows that integrating rag-pickers is necessary and can accelerate our effort toward closing the municipal solid waste management loop. We can work towards a more equitable and sustainable waste management system by recognising their contributions and providing them with the support and protection they need.

**Recommendations**

- Rag pickers should be integrated into a formal waste management system to properly recognise and compensate for their contributions in the circularity transition.
- Offering education and skill development opportunities to rag picker and their family member to ensure their high efficiency and transition to a sustainable livelihood.
- Government policy should ensure economic support and social upliftment.
- Proper safety gear usage and easy access to health facilities ensure healthy security because they work in very susceptible conditions.
- Awareness must be raised to sensitise rag-pickers role in municipal solid waste management. The attitude of the public should be encompassing and sympathetic.

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**Author's contribution**

The authors take complete responsibility for the following: Ravikant Dubey contributed to the study by overseeing the conception and design, collecting data, analysing and interpreting the results, and preparing the manuscript. Anjali Bala & Deepak Rathore Responsible for the analysis and interpretation of results. Dr. Amrita Dwivedi has contributed to editing and final proofreading.

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#### References

1. Andrianisa, H. A., Randriatsiferana, F. M., Rakotoson, S. L., & Rakotoaritera, F. (2018). Socio-economic integration of the informal recycling sector through an NGO intervention at the Andralanitra dumpsite in Antananarivo, Madagascar. *Waste Management & Research*, 36(1), 86-96.
2. Barford, A., & Ahmad, S. R. (2021). A call for a socially restorative circular economy: waste pickers in the recycled plastics supply chain. *Circular Economy and Sustainability*, 1(2), 761-782.
3. Chikarmane, P. (2012). Integrating Waste Pickers into Municipal Solid Waste Management in Pune, India. *WIEGO*. <https://www.wiego.org/research-library-publications/integrating-waste-pickers-municipal-solid-waste-management-pune-india/>
4. Chatterjee, P. (2015a). Child Ragpickers in India and Violation of Their Human Rights. *European Researcher*, 91(2), 155–162. <https://doi.org/10.13187/er.2015.91.155>
5. Da Silva, C. L., Weins, N., & Potinkara, M. (2019). Formalising the informal? A perspective on informal waste management in the BRICS through the lens of institutional economics. *Waste Management*, 99, 79-89.
6. Das, A. K., Mukherjee, J., & Chatterjee, U. (2023). From trash to treasure: advancing the socio-ecological practice of rag picking for sustainable development in the Chandannagar town of Hooghly, West Bengal, India. *Socio-Ecological Practice Research*, 5(3), 325-340.
7. Ganguly, R. K., & Chakraborty, S. K. (2021). Integrated approach in municipal solid waste management in COVID-19 pandemic: Perspectives of a developing country like India in a global scenario. *Case Studies in Chemical and Environmental Engineering*, 3, 100087.
8. Gall, M., Wiener, M., De Oliveira, C. C., Lang, R. W., & Hansen, E. G. (2020). Building a circular plastics economy with informal waste pickers: Recyclate quality, business model, and societal impacts. *Resources Conservation and Recycling*, 156, 104685. <https://doi.org/10.1016/j.resconrec.2020.104685>
9. Gebreslassie, M., & Raman, P. V. (2023). Socio-Economic and Health Status of Rag Pickers in the Dump Site of Mekelle City, Northern Ethiopia. *J Waste Resour Recycl*, 5(1), 103.
10. Gidwani, V. (2015). The work of waste: inside India's infra-economy. *Transactions of the Institute of British Geographers*, 40(4), 575-595.
11. Gutberlet, J. (2023). Global Plastic Pollution and Informal Waste Pickers. *Cambridge Prisms Plastics*, 1–38. <https://doi.org/10.1017/plc.2023.10>
12. Gutberlet, J., & Carenzo, S. (2020). Waste Pickers at the Heart of the Circular Economy: A Perspective of Inclusive Recycling from the Global South. *Worldwide Waste*, 3(1), 6. <https://doi.org/10.5334/wwwj.50>
13. Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). What a waste 2.0: a global snapshot of solid waste management to 2050. World Bank Publications.
14. Kochukalam, C. (2013). Municipal Solid Waste Management in India and the Emerging Role of Rag

- Pickers. *Deecee Journal of Organization & Management*.
15. Kumar, A., & Agrawal, A. (2020). Recent trends in solid waste management status, challenges, and potential for the future Indian cities–A review. *Current Research in Environmental Sustainability*, 2, 100011.
  16. Kumari, S., & Kiran, U. V. (2022). Prevalence of health problems of rag pickers due to various hazards at Lucknow city. *Human Factors in Healthcare*, 2, 100023.
  17. Morais, J., Corder, G., Golev, A., Lawson, L., & Ali, S. (2022). Global review of human waste-picking and its contribution to poverty alleviation and a circular economy. *Environmental Research Letters*, 17(6), 063002.
  18. Ramitha, K. (2023). Solid waste workers in India and the COVID-19 pandemic: A Review of Intersecting challenges. *International Journal of Occupational Safety and Health*, 13(1), 126–139. <https://doi.org/10.3126/ijosh.v13i1.43113>
  19. Shekar, K. C. (2015). Status and Role of urban informal workers in solid waste management: A study on Rag Pickers in Hyderabad city. *Journal of Governance & Public Policy*, 5(1), 31.
  20. Sharholly, M., Ahmad, K., Mahmood, G., & Trivedi, R. (2007). Municipal solid waste management in Indian cities – A review. *Waste Management*, 28(2), 459–467. <https://doi.org/10.1016/j.wasman.2007.02.008>
  21. Thakur, P., Ganguly, R., & Dhulia, A. (2018). Occupational health hazard exposure among municipal solid waste workers in Himachal Pradesh, India. *Waste Management*, 78, 483-489.
  22. Venkatesh, G. (2023). Rag-Pickers as Benefactors and Beneficiaries of the Sustainable Development Goals: A Brief Literature Review. *Studia Ecologiae et Bioethicae*, 21(2), 87-106.
  23. Verma, A., & Verma, A. (2016). Socio-economic analysis of rag pickers of Punjab: a case study of district Faridkot. *Splint International Journal of Professionals*, 3(3), 129-135.