SOCIOECONOMIC CHARACTERISTICS INFLUENCE HOUSEHOLD SOLID WASTE DISPOSAL OF MUZAFFARABAD, AZAD JAMMU AND KASHMIR, PAKISTAN

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Abstract

The impact of various socio-economic characteristics on household solid waste disposal practices in Muzaffarabad is investigated in this study. This study examines factors like education level, occupation, income, and family size to understand the complex relationship between socio-economic factors and practices for disposal of solid waste. The study findings indicates that these socio-economic characteristics plays vital role in generation and management of solid waste such as, higher income tend to increase solid waste production because of changes in living standards. This paper also identifies the major types of household solid waste like plastic, paper, debris, hazardous and kitchen wastes. Additionally, the study reveals that residents of Muzaffarabad use municipal waste collection services and even some of them repay for waste collection services. This paper highlights the importance of socio-economic characteristics when developing strategies for managing solid waste. Specifically, issues related to affordability and accessibility are critical to address, mostly for low-income families. The goal of this study is to promote the well-being of inhabitants of Muzaffarabad, by the promotion of environment friendly management practices of solid waste, reduction of environmental pollution and improvement in quality of life. Moreover, this paper will be applied to provide similar instances globally. This research paper supports, UNSDGs goal for Well-being (SDG-06), Sustainability of Communities (SDG-11), and Responsibility of Consumption and Production (SDG-12)
Keywords: Socioeconomic; Sustainable Waste Management; Environmental Pollution; Municipal Waste Collection Services; UNSDGs

Introduction

Metropolitan areas are facing chronic challenges in managing solid waste. The issue of improper management of solid waste intensified because of population and economic growth, rapid urbanization, and the advancement of industrial sectors. In fact, Pakistan is facing major threats for managing household solid waste (Mohanty et al., 2022; Ainooson, 2023; Maalouf & Agamuthu, 2023; Sukanya & Tantia, 2023). The complex nature of managing solid waste is increasing due to its geographical socio-economic variation, demanding a deep understanding of those factors that are affecting production and discarding techniques for solid waste (Salvia et al., 2021; Islam, 2023).

Solid waste generation is closely linked with the socio-economic factors like income, education, profession, and size of family (Albert & Olutayo, 2021; Kayode, Muhammad, & Bello, 2021; Rath & Swain, 2023). As progress in society, living standards are enhanced which results in increase consumption level and generate high level of solid waste (Das et al., 2019). As Soma (2020) expressed that higher level of income tends to increase production of solid waste as compared to low level of income, due to their less access to appropriate services for solid waste management, lead to utilize unhygienic methods for discard their household solid waste. Moreover, World Bank report (2016) indicates that approximately 1.5% more waste was generated by household with high income in South Asia than those with low income. Further,

Balasubramanian (2019) indicates that 95% of the households pay approximately 0.34 USD willingly for the services of solid waste management and for clean environment in India.

Moreover, Deshpande, Ramanathan, & Babu, (2024) point out that the generation of household solid waste is a complex issue which is impacted by a number of socio-economic factors. Many studies focus on the relationship between level of income with patterns of solid waste generation. For instance, Özbük, Coşkun, & Filimonau, (2022) and other scholars (Principato et al., 2022; Bogevska et al., 2022; Pappalardo et al., 2020; Jribi et al., 2020; Vásquez et al., 2022) featured that household with high income demonstrate an increased tendency to solid waste generation because of buying non-essential goods and increase level of consumption. A study indicates that approximately 56% of solid waste collected from Faisalabad, Pakistan, and discard in an open site that makes environment worse (Yasin & Usman, 2017; Jabeen et al., 2021).

Education is also influencing practices for the management of solid waste such as higher education tends to have high levels of awareness while less education may unaware of appropriate ways to discard household solid waste and environmental concerns. For example, Liao & Li, (2019) expressed that individual with high level of education are engaged with proper ways to use of eco-friendly products, waste segregation techniques and aware of solid waste recycling to avoid environmental and health problem (Mustafa et al., 2022). Moreover, Hidalgo et al. (2019) also indicated that education has significantly affected the practices for management of household solid waste, as higher education level shows responsibility and disposal behavior of an individual. Kattoua, Al-Khatib, & Kontogianni (2019) shows that educated individuals were found more probable to participate in recycling and segregation program than those with less education. However, the report of Statista (2024) indicates that recycling with access to educational material on waste segregation increase 15% of recycling in South Korea.

Different types of occupation can affect waste production and its quality. For example, Meeks, Sims, & Thompson, (2019) highlights that professional or business activities of an individual as compared to labor or agricultural worker tends to generate different forms of solid waste. the availability and affordability of services for appropriate management of solid waste can be influenced by occupational activities of an individual (Fernando, 2019). The widespread inappropriate techniques for solid waste disposal are open burning and dumping, and insufficient services for solid waste collection in many developing countries, which contribute to health hazards and environmental pollution such as air pollution, water and land contamination (Hasan, Shahriar, & Jim, 2019).

The quality and availability of services for solid waste management disparate significantly with socio-economic status as shown in numerous studies. According to Han et al. (2019), higher income levels of individuals afford services for discarding their household solid waste, while low-income levels of individuals depend on improper informal services for solid waste collection led to suboptimal methods of disposal. Furthermore, Isaiah & Blessing (2022) highlights the need for broad policies for all socio-economic groups because of inconsistency for accessibility to appropriate services for the management of solid waste.

Social stratification theory (Davis & Moore, 1945) analyses that how socio-economic inequalities affect the behavior of an individual and suggest that socio-economic status of an individual extremely influences in their ability to effectively manage solid waste (Luo, Zhao, & Zhang, 2020; Piras et al., 2021; Cerqueira, & Soukiazis, 2022). Individuals with higher status have a great approach to resources, information and essential infrastructure for appropriate management of solid waste (Trang et al., 2017).

Furthermore, the psychological perspective on the practices for solid waste disposal can be analyzed by Ajzen's theory of Planned Behavior (1985). Behaviors of an individual are shaped by attitudes, societal norms, and their ability to regulate their actions and these factors are influenced by socio-economic attributes (La Barbera & Ajzen, 2021). Moreover, Jain et al. (2022) expresses that high levels of education of an individual have positive attitude that leads to responsibility for proper management of solid for environmental sustainability. Additionally, socio-economic factors shape social norms, which can determine appropriate behavior for solid waste management (Adzawla et al., 2019).

Socio-economic factor like income and education has an impact on awareness, attitude, and abilities of an individual on environmental problems for sustainable practices for appropriate administration of solid waste (Massoud et al., 2021; Fadhullah et al., 2022; Olukanni, Pius-Imue, & Joseph, 2020; Kattoua, Al-Khatib, & Kontogianni, 2019). However, Han et al., (2019) also highlighted that higher income level of household have a greater access to facilities and services of solid waste management lead to efficient and eco-friendly method for managing solid waste.

As Tassie, Endalew, & Mulugeta (2019) expressed that growing population, urbanization especially in the developing nations tends to increase production and improper administration of solid waste. Managing solid waste efficiently is very important for public health and for the maintenance of environmental or natural resources (Murthy, & Ramakrishna, 2022). Socio-economic factors influence management of household solid waste in order to establish schemes for sustainable management of solid waste (Nguyen et al., 2022).

The objective of this research paper is to investigate the impact of socio-economic characteristics on practices for managing household solid waste in the capital city of Azad Jammu & Kashmir, Pakistan. Muzaffarabad is facing significant challenges in the management of household solid waste. This paper examines socio-economic factors such as income, education, size of family, and profession, to provide significant findings into relationship between socio-economic factors and practices for management of household solid waste. The ultimate goal of this paper is to enhance quality of life by dropping environmental contamination and support for sustainable management of household solid waste in Muzaffarabad.

Material and Method

The methods utilized for the collection of data and analyzing data highlight the importance of this research in the development of new knowledge and progress in different fields. This is a quantitative research approach, which means that mathematical methods are used to interpret data. The population of the study includes households from the Lower Plate to Shah Sultan Mohala, sited on the bank of the Neelum River, Muzaffarabad. For the selection of respondents, systematic random sampling approach was used, whereas the sample size indicates that n= 331 however the data of total population of study area was collected from officials in Muzaffarabad (N=1939). Prior to the main study, a pilot study was conducted to identify potential issues and enhance the research design. The finalized schedule was pretested for further improvements. The main data collection tool is a managed interview schedule, utilizing closed-ended questions for efficient and comprehensive responses. Data analysis will be performed using SPSS, employing descriptive statistics and the correlation method. Ethical considerations ensure participants' willingness, informed consent, confidentiality, and privacy protection. The study focuses on the Lower Plate area near the Neelum River in Muzaffarabad, exploring waste management practices and their environmental impact. The area's scenic beauty and residents' health are being affected by increasing waste amidst declining water levels in the river.

Results and Discussions

The study focused on the relationship between socioeconomic characteristics and household solid waste disposal practices in Muzaffarabad, Azad Jammu and Kashmir, Pakistan. Socioeconomic characteristics are the social and economic factors which indicate the position of an individual in society. They include income level, education level, household size and occupation. In the context of household solid waste disposal, socioeconomic characteristics plays a vital role in making a solid waste management practice.

The sample consisted primarily of middle-aged individuals, with 23% aged 45 and above, and 21.10% falling within the 27-32 age range. Most respondents were married with the percentage of 63.70, with a notable proportion employed in government jobs (33.2%), running businesses (24.80%), or working in the private sector (20.80%). The educational distribution showed a mix, with 32.00% having completed intermediate education, 23.30% holding bachelor's degrees, and a smaller percentage being illiterate (3.90%), however only 0.3% of the respondents are having Ph.D. Moreover, the majority of participants by the percentage of 77.90 reveal that they have their own house, while 88.50% of them have paved houses. Furthermore, 45% of the participants indicated that the average household member lies in 5-7. Whereas the Global Data Lab reports that the average household member of AJK is 7.59. Additionally, the primary occupation is held by 44.70% with government employees, with the average income of the participant indicates "46,000 PKR 55,000 PKR". Income increase led to the corresponding rise in the production of solid waste due to changes in living conditions of individuals.

The study also examined the types of waste produced by the participants on a daily basis. The findings reveals that the respondents predominantly produce kitchen waste with 98.80%, however, 55.90% by plastic, and 68.30%, 27.50%, and 41.40% of paper waste, debris, and hazardous waste are produced respectively. Moreover, 77.30% of participants use waste collection services while only 62.50% of them use waste collection services from the municipality. Also, they are paying for the benefits of waste collection (23.0%). A study of Bayked et al. (2024) indicates that high income households and educated individuals are more likely to pay willingly for appropriate solid waste management services. The respondent's strategy for disposal was unsatisfactory and 42.30% of them discard their household waste in an open area while, 8.20% of them burned it, and disposed of it in vessels (10%), despite this, they also handover their waste to waster collector (39%). A study of Yasin et al. (2017) in Faisalabad also shows that just 56.0% of waste is gathered, however 43.0% is discarded in an open site without any protection or treatment. It roots many forms of environmental deprivation and acts as a fountain of infectious illnesses. The study indicates that the amount of waste generation shows that the respondents per day generate approximately less than 5-kilogram waste.
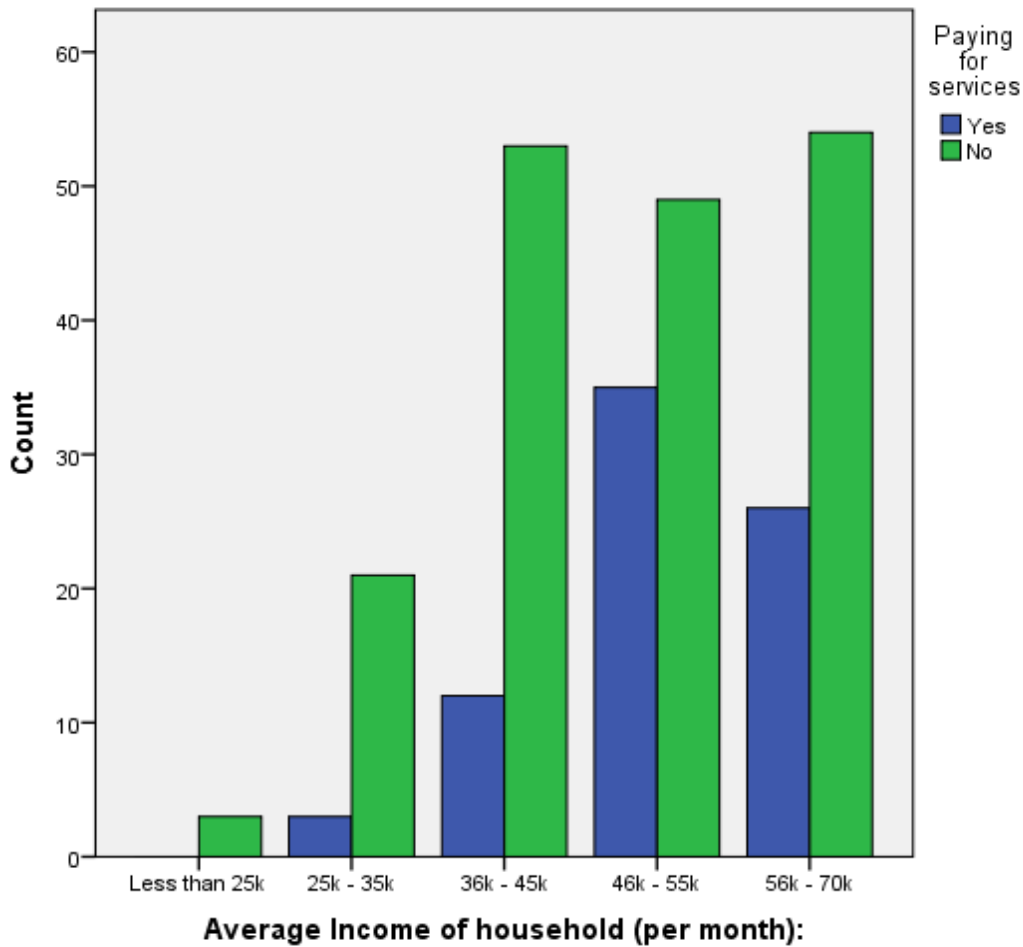
Figure 1: Household Earnings and the Likelihood of Paying for Waste Collection Facilities

The above chart indicates a positive connection between household income and the likelihood of paying for waste collection services. As household income increases, the proportionality of households willing to pay for these services also rises. Lower-income households (under 35k per month) show limited participation in paid services, while higher-income households (46k and above) demonstrate a stronger inclination to pay. This trend suggests that income level is a significant factor in access to and pursuit of investing in waste management services.
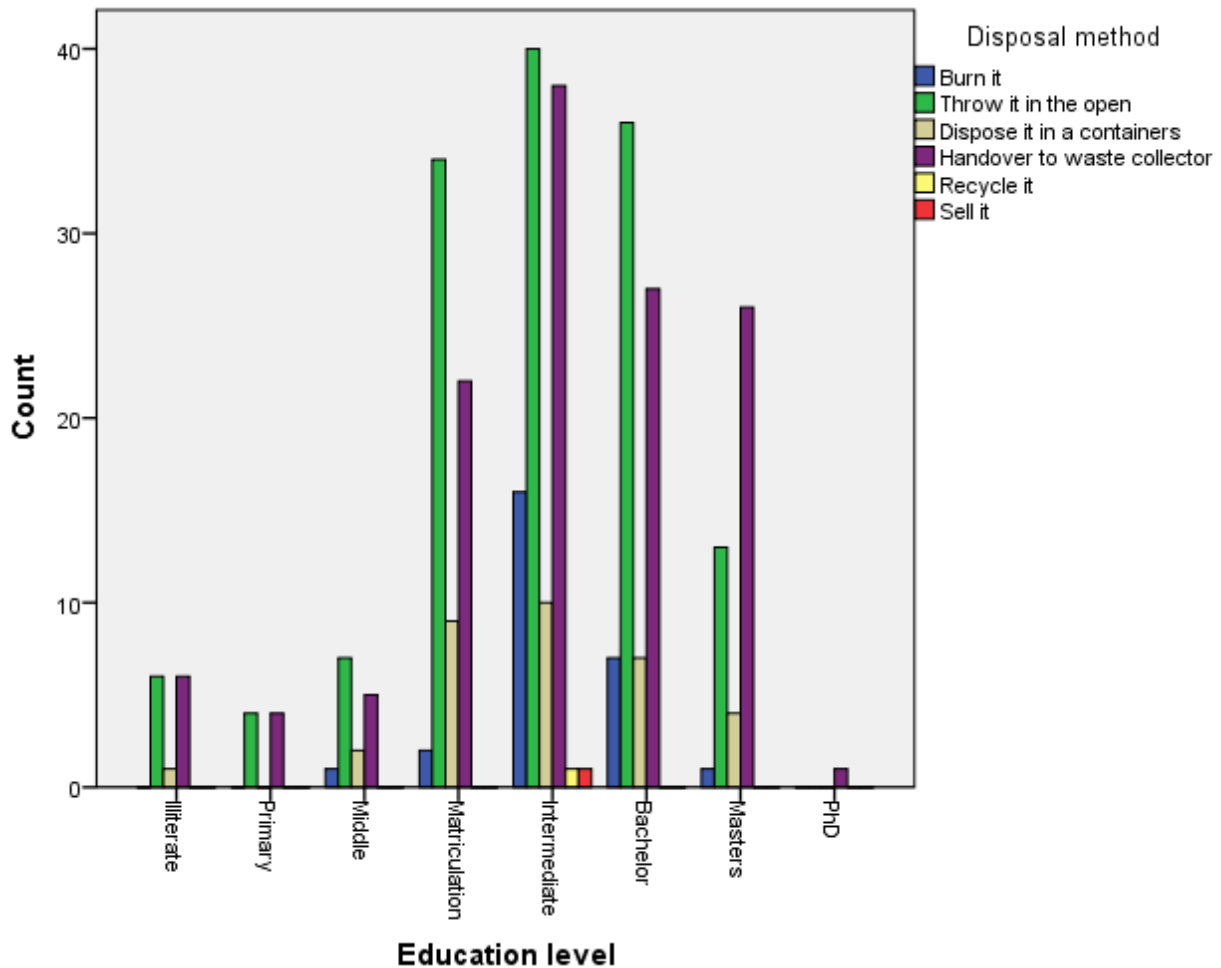
Figure 2: Education Level and Waste Discarding Methods

The above chart shows the link between education level and waste disposal methods. Higher education levels correlate with greater use of formal disposal methods (like municipal collection), while lower education levels are associated with informal methods (e.g., open dumping or burning). Socioeconomic characteristics can influence the types and quantities of waste generated by households. Different income groups may have distinct consumption patterns, result distinctions in the composition and volume of solid waste produced. Furthermore, factors like education and awareness levels can impact the knowledge and behavior of individuals regarding waste segregation, recycling, and composting. In this study, the Chi-Square test was conducted to weigh the relationship involving household waste generation per day and occupation. The results indicate in table 01, that there is significantly no association between educational attainment and awareness at the conventional level of significance ($\alpha = 0.05$). The Pearson Chi-Square value is 16.848, resulting in a p-value of 0.078. The finding proposes that occupation does not have a significant influence on the amount of household waste generated per day. The lack of association may indicate that waste generation is not influenced by the type of occupation individuals are engaged in.

Relationship between	Pearson Chi-Sq	df	Asymptotic Significance (2-sided)

Waste /day generation	Occupation Waste	16.848	10	0.078
	Education Level	14.671	14	0.401
	Family Size	57.699	6	0.000
	Income	14.665	4	0.005

The relationship between education level and household waste generation per day indicates in table 01 that there is no statistically meaningful link between these variables at the conventional level of significance ($\alpha = 0.05$). The Pearson chi-square value is 14.671 with df=14, bring about in a p-value of 0.401. These findings reveal that there is no meaningful impact of education on waste generation amount of household per day. The lack of association indicates that waste generation patterns may not be strongly influenced by the educational attainment of individuals within a household.

The chi-square test was conducted to weigh the relationship between family size and waste generation in table 01. The results reveal a significant relationship between family size and waste generation at the conventional level of significance ($\alpha = 0.05$). The Pearson chi-square value is 57.699, which yields a p-value of 0.000. The finding suggests that the size of a family has a substantial influence on the amount of waste generation. According to these result, large family size tends to generate more solid waste as compared to small family in size. The findings suggest that due to disparities in solid waste generation by the size of family there is a need to focus for more appropriate management of solid waste (Table 01).

The result of relationship between level of income and payment for waste collection services reveal in table 01. The value of Chi-sq is 14.665 with p-value of 0.005, demonstrating that income of the participants has significant association with payment for waste collection services. Payment pattern of households for waste collection services are expected to vary. This association demonstrated that income is an essential factor while studying payment behavior for waste collection services. This emphasizes the importance to address issues of affording and accessing proper management of solid waste collection services, specifically, for lower income families.

The relationship between socio-economic characteristics and practices for solid waste management can be explain using Social Stratification Theory, which highlights how social inequalities based on income, education and occupation affect behavior of an individual. Wang & Hao (2020) express that high socio-economic status of an individual, shapes their practices and strategies for adequate management of solid waste because of more resources and accessibility to knowledge. For instance, van der Werf, Seabrook, & Gilliland, (2019) and Rajashekar, Bowers, & Gatoni (2019) illustrates that the individual with higher income buy more products an also afford a good service for household's solid waste, may generate more solid waste. On the contrary, low-income families have lack of resources and lack of access for safe or appropriate method of solid waste management, which can lead to health hazards and environmental degradation (Kwenda et al., 2022). Moreover, Debrah, Vidal, & Dinis (2021) highlighted that education also significantly affect the behavior of an individual on knowledge and awareness for proper management of solid waste.

Furthermore, Theory of Planned Behavior suggests that actions of individuals are influenced by social norms, attitudes and recognized control on actions. With this in mind, the underlying reasons why socio-economic conditions are greatly influenced by managing solid waste

management revolve around people's perception toward social norms and the environment. (Nahar, Hossain, Mahiuddin 2013) For instance, individuals with higher education are more aware of the impact that unscientific solid waste management methods have on environmental degradation (Debrah et al. 2021; Vidal and Dinis 2021). Using a number of examples like these, people's behaviors can be explained and predicted based on proper scientific theories. These will help us later sections to explore the psychological and matter-of-fact process of waste management at individual levels more. Moreover, just as Raghu and Rodrigues (2020) repeatedly stressed social norms at the community level determines what residents regard correctly and wrongly about merged solid waste management. Besides, Zhang et al. (2019) says that the amount and type of incentives for municipal waste collection are determined by two things: proximity to landfills of different characters and incomes of residents. These theories together give us a rich and extensive picture of the process of waste management

Conclusion

Socio-economic characteristics significantly influence management practices of solid waste in Muzaffarabad. In this study, various factors such as income level, education level, profession, and family size, impact on both management and generation of solid waste. High income level is simultaneous with strengthening in generation of solid waste due to consumption patterns and high living standards. Moreover, this study also indicates that larger families generate high levels of solid waste as compared to smaller families. It also indicates a positive relationship between income and willingness to pay for the services of managing solid waste. However, this study reveals no relationship between occupation and education level with the generation of solid waste, indicating that these two variables do not concern generation pattern of solid waste in Muzaffarabad. So, the socio-economic factors in this study significantly affect disposal practices of household solid waste in Muzaffarabad. The findings highlighted the importance of weighing up socio-economic factors in executing specific strategies for the management of solid waste. Promote well-being by reducing environmental contaminations, improving quality of life, and upgrade the management practices of solid waste in Muzaffarabad. This research paper supports, UNSDGs goal for Good Health and Well-being (SDG-06), Sustainable Communities (SDG-11), and Responsible Consumption and Production (SDG-12). By understanding the complex dynamics between socioeconomic characteristics and waste disposal practices, it is possible to promote sustainable waste management, environmental pollution reduction, and improve the overall quality of life for inhabitants of Muzaffarabad.

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References

Ainooson, O. (2023). *Rapid Urbanization and its Impact on Municipal Solid Waste Management in the Greater Accra Region of Ghana* (Master's thesis).

Albert, A. O., & Olutayo, F. S. (2021). Cultural dimensions of environmental problems: a critical overview of solid waste generation and management in Nigeria. *American International Journal of Multidisciplinary Scientific Research*, *8*(1), 1-15.

Aluko, O. O., Obafemi, T. H., Obiajunwa, P. O., Obiajunwa, C. J., Obisanya, O. A., Odanye, O. H., & Odeleye, A. O. (2022). Solid waste management and health hazards associated with

residence around open dumpsites in heterogeneous urban settlements in Southwest Nigeria. *International Journal of Environmental Health Research*, *32*(6), 1313-1328.

Bayked, E. M., Assfaw, A. K., Toleha, H. N., Zewdie, S., Biset, G., Ibirongbe, D. O., & Kahissay, M. H. (2024). Willingness to pay for National Health Insurance Services and Associated Factors in Africa and Asia: a systematic review and meta-analysis. *Frontiers in Public Health*, *12*, 1390937.

Bogevska, Z., Berjan, S., El Bilali, H., Allahyari, M. S., Radosavac, A., & Davitkovska, M. (2022). Exploring food shopping, consumption and waste habits in North Macedonia during the COVID-19 pandemic. *Socio-Economic Planning Sciences*, *82*, 101150.

Cerqueira, P. A., & Soukiazis, E. (2022). Socio-economic and political factors affecting the rate of recycling in Portuguese municipalities. *Economic Modelling*, *108*, 105779.

Das, S., Lee, S. H., Kumar, P., Kim, K. H., Lee, S. S., & Bhattacharya, S. S. (2019). Solid waste management: Scope and the challenge of sustainability. *Journal of cleaner production*, *228*, 658-678.

Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, *6*(1), 6.

Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, *6*(1), 6.

Deshpande, A., Ramanathan, V., & Babu, K. (2024). Assessing the socio-economic factors affecting household waste generation and recycling behavior in Chennai: A survey-based study. *International Journal of Science and Research Archive*, *11*(2), 750-758.

Fadhullah, W., Imran, N. I. N., Ismail, S. N. S., Jaafar, M. H., & Abdullah, H. (2022). Household solid waste management practices and perceptions among residents in the East Coast of Malaysia. *BMC public health*, *22*, 1-20.

Fernando, R. L. S. (2019). Solid waste management of local governments in the Western Province of Sri Lanka: An implementation analysis. *Waste management*, *84*, 194-203.

Han, Z., Zeng, D., Li, Q., Cheng, C., Shi, G., & Mou, Z. (2019). Public willingness to pay and participate in domestic waste management in rural areas of China. *Resources, conservation and recycling*, *140*, 166-174.

Hasan, M. K., Shahriar, A., & Jim, K. U. (2019). Water pollution in Bangladesh and its impact on public health. *Heliyon*, *5*(8).

Islam, M. M. (2023). *The Management of Medical Waste in Bangladesh: A Policy and Practices Analysis* (Doctoral dissertation, Teesside University, UK).

Jabeen, F., Adrees, M., Ibrahim, M., Yamin, M., Batool, S. A., Mahmood, A., & Khalid, S. (2021). Estimation of greenhouse gases emission from domestic solid waste of Faisalabad city and schemed formula thereof. *Pakistan Journal of Agricultural Sciences*, *58*(1).

Jain, S., Singhal, S., Jain, N. K., & Bhaskar, K. (2020). Construction and demolition waste recycling: Investigating the role of theory of planned behavior, institutional pressures and environmental consciousness. *Journal of Cleaner Production*, *263*, 121405.

Jribi, S., Ben Ismail, H., Doggui, D., & Debbabi, H. (2020). COVID-19 virus outbreak lockdown: What impacts on household food wastage?. *Environment, Development and Sustainability*, *22*(5), 3939-3955.

Kattoua, M. G., Al-Khatib, I. A., & Kontogianni, S. (2019). Barriers on the propagation of household solid waste recycling practices in developing countries: State of Palestine example. *Journal of material cycles and waste management*, *21*, 774-785.

Kayode, S. J., Muhammad, M. S., & Bello, M. U. (2021). Effect of Socio-Economic Characteristics of Households on Housing Condition in Bauchi Metropolis, Bauchi State, Nigeria. *Traektoriâ Nauki= Path of Science*, *7*(7), 2001-2013.

Kwenda, P. R., Lagerwall, G., Eker, S., & Van Ruijven, B. (2022). A mini-review on the causes of poor household solid waste management in low-income developing countries: a case study of Urban Harare City, Zimbabwe. *The Journal of Solid Waste Technology and Management*, *48*(3), 375-388.

La Barbera, F., & Ajzen, I. (2021). Moderating role of perceived behavioral control in the theory of planned behavior: A preregistered study. *Journal of Theoretical Social Psychology*, *5*(1), 35-45.

Liao, C., & Li, H. (2019). Environmental education, knowledge, and high school students' intention toward separation of solid waste on campus. *International journal of environmental research and public health*, *16*(9), 1659.

Luo, H., Zhao, L., & Zhang, Z. (2020). The impacts of social interaction-based factors on household waste-related behaviors. *Waste Management*, *118*, 270-280.

Maalouf, A., & Agamuthu, P. (2023). Waste management evolution in the last five decades in developing countries–A review. *Waste Management & Research*, *41*(9), 1420-1434.

Massoud, M., Lameh, G., Bardus, M., & Alameddine, I. (2021). Determinants of waste management practices and willingness to pay for improving waste services in a low-middle income country. *Environmental management*, *68*(2), 198-209.

Meeks, R., Sims, K. R., & Thompson, H. (2019). Waste not: can household biogas deliver sustainable development?. *Environmental and resource economics*, *72*, 763-794.

Mohanty, S., Saha, S., Santra, G. H., & Kumari, A. (2022). Future perspective of solid waste management strategy in India. In *Handbook of Solid Waste Management: Sustainability through Circular Economy* (pp. 191-226). Singapore: Springer Nature Singapore.

Murthy, V., & Ramakrishna, S. (2022). A review on global E-waste management: urban mining towards a sustainable future and circular economy. *Sustainability*, *14*(2), 647.

Mustafa, S., Hao, T., Jamil, K., Qiao, Y., & Nawaz, M. (2022). Role of eco-friendly products in the revival of developing countries' economies and achieving a sustainable green economy. *Frontiers in Environmental Science*, *10*, 955245.

Nahar, N., Hossain, Z., & Mahiuddin, S. (2023). Assessment of the environmental perceptions, attitudes, and awareness of city dwellers regarding sustainable urban environmental management: a case study of Dhaka, Bangladesh. *Environment, Development and Sustainability*, *25*(8), 7503-7531.

Nguyen, K. L. P., Chuang, Y. H., Chen, H. W., & Chang, C. C. (2020). Impacts of socioeconomic changes on municipal solid waste characteristics in Taiwan. *Resources, Conservation and Recycling*, *161*, 104931.

Olukanni, D. O., Pius-Imue, F. B., & Joseph, S. O. (2020). Public perception of solid waste management practices in Nigeria: Ogun State experience. *Recycling*, *5*(2), 8.

Özbük, R. M. Y., Coşkun, A., & Filimonau, V. (2022). The impact of COVID-19 on food management in households of an emerging economy. *Socio-Economic planning sciences*, *82*, 101094.

Pappalardo, G., Cerroni, S., Nayga Jr, R. M., & Yang, W. (2020). Impact of Covid-19 on household food waste: the case of Italy. *Frontiers in nutrition*, *7*, 585090.

Piras, S., Pancotto, F., Righi, S., Vittuari, M., & Setti, M. (2021). Community social capital and status: The social dilemma of food waste. *Ecological Economics*, *183*, 106954.

Principato, L., Secondi, L., Cicatiello, C., & Mattia, G. (2022). Caring more about food: The unexpected positive effect of the Covid-19 lockdown on household food management and waste. *Socio-Economic Planning Sciences*, *82*, 100953.

Raghu, S. J., & Rodrigues, L. L. (2020). Behavioral aspects of solid waste management: A systematic review. *Journal of the Air & Waste Management Association*, *70*(12), 1268-1302.

Rajashekar, A., Bowers, A., & Gatoni, A. S. (2019). Assessing waste management services in Kigali. *UK: London: International Growth Centre, London School of Economic and Political Science*.

Rath, S., & Swain, P. K. (2023). *Social contexts of solid waste in urban households: uncovering the practices of waste segregation and littering in bhubaneswar* (Doctoral dissertation, NISER Bhubaneswar).

Salvia, G., Zimmermann, N., Willan, C., Hale, J., Gitau, H., Muindi, K., ... & Davies, M. (2021). The wicked problem of waste management: An attention-based analysis of stakeholder behaviours. *Journal of Cleaner Production*, *326*, 129200.

Soma, T. (2020). Space to waste: the influence of income and retail choice on household food consumption and food waste in Indonesia. *International Planning Studies*.

Sukanya, R., & Tantia, V. (2023). Urbanization and the impact on economic development. In New Perspectives and Possibilities in Strategic Management in the 21st Century: Between Tradition and Modernity (pp. 369-408). IGI Global.

Tassie, K., Endalew, B., & Mulugeta, A. (2019). Composition, generation and management method of municipal solid waste in Addis Ababa city, central Ethiopia: A review. *Asian Journal of Environment & Ecology*, *9*(2), 1-19.

van der Werf, P., Seabrook, J. A., & Gilliland, J. A. (2019). Food for naught: Using the theory of planned behaviour to better understand household food wasting behaviour. *The Canadian Geographer/Le Géographe canadien*, *63*(3), 478-493.

Vásquez Neyra, J. M., Cequea, M. M., Gomes Haensel Schmitt, V., & Ferasso, M. (2022). Food consumption and food waste behaviour in households in the context of the COVID-19 pandemic. British Food Journal, 124(12), 4477-4495.

Wang, Y., & Hao, F. (2020). Public perception matters: Individual waste sorting in Chinese communities. *Resources, Conservation and Recycling*, *159*, 104860.

Yasin, H., & Usman, M. (2017). Site investigation of open dumping site of Municipal Solid Waste in Faisalabad. *Earth Sci. Pak*, *1*(1), 23-25.

Zhang, B., Lai, K. H., Wang, B., & Wang, Z. (2019). From intention to action: How do personal attitudes, facilities accessibility, and government stimulus matter for household waste sorting?. *Journal of environmental management*, *233*, 447-458.