Nanotechnology Perceptions
ISSN 1660-6795
www.nano-ntp.com

Assessing the Socio-Economic effects of Household Solid Waste Management Practices

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Solid waste management at the household level change the polluted environment into garbage free society. This paper investigates that the socio economic effects by practicing solid waste management at household level. The objective of the paper is to measure the economic benefits of waste reduction, recycling, and composting at the household level, to analyze the correlation between household income levels and the adoption of solid waste management practices, to analyse the level of social participation in solid waste management, to find out that the households practicing the innovative ideas to create wealth from waste. This study investigates the socio-economic factors influencing household solid waste management practices and their impact on the economic and social status of respondents. Using a one-way ANOVA analysis, the study explores various factors such as income, education, community engagement, and awareness to determine their influence on waste management behaviors. The results indicate that while occupation does not significantly affect waste management practices, other factors such as education, socio-economic status, and community involvement play a more prominent role. Respondents with higher levels of awareness and education tend to engage more actively in waste reduction, recycling, and proper disposal practices. The study also highlights the importance of economic considerations and social norms in shaping waste management behaviors. These findings emphasize the need for targeted education, inclusive community-based initiatives, and improved waste management infrastructure to encourage sustainable practices across diverse socio-economic groups.

Keywords: Solid Waste Management, Green Entrepreneurship, Socio-economic status, Community Engagement.

1. Introduction

Solid waste management at the household level is a critical component of sustainable development, directly impacting both socio-economic and environmental outcomes. With the growing urban population and increasing waste generation, improper waste management has become a significant challenge, leading to health hazards, environmental degradation, and economic burdens. Implementing effective waste management practices at the household level, such as waste reduction, recycling, and composting, not only addresses environmental concerns but also has the potential to generate socio-economic benefits. Quantitative studies have shown that adopting such practices can lead to cost savings, income generation through the sale of recyclables, and reduced health expenditures by minimizing waste-related diseases. Additionally, increased awareness and education about waste management can empower households to take ownership of sustainable living, creating a ripple effect that improves community welfare. This study aims to quantitatively evaluate the socio-economic effects of solid waste management practices at the household level. By examining key indicators such as cost savings, income generation, health expenditures, and waste reduction, this research seeks to provide actionable insights into the benefits of sustainable waste management. Understanding these impacts can inform policymakers, promote community engagement, and encourage broader adoption of waste management practices for a sustainable future.

2. Objectives

The objective of the paper is

- to measure the economic benefits of waste reduction, recycling, and composting at the household level,
- to analyze the correlation between household income levels and the adoption of solid waste management practices,
- to analyse the level of social participation in solid waste management,
- to find out that the households practicing the innovative ideas to create wealth from waste.

3. Methodology

This study adopts a quantitative research design to analyze the socio-economic effects of solid waste management practices at the household level. The study employs a cross-sectional survey approach, collecting primary data using a structured questionnaire to ensure consistency and reliability in responses. The research focuses on households within Puducherry Municipality in Puducherry District. This location is chosen due to its diverse demographic composition, varying waste management practices, and active engagement in solid waste management initiatives. The target population comprises households practicing solid waste management, with an emphasis on women due to their significant role in managing household waste. Multi stage random sampling is used to collect the data. The primary data is collected using a semi-structured questionnaire, divided into the following sections:

1. Socio-demographic information: Age, gender, income, education, and employment status.

2. Knowledge, attitude, and practices (KAP): Questions assess respondents' awareness, perceptions, and behaviors related to solid waste management.

3. Socio-economic effects: Questions measure the economic benefits, social participation, and challenges associated with waste management.

4. The questionnaire uses a 5-point Likert scale for most responses (e.g., Strongly Agree to Strongly Disagree) and includes categorical and open-ended questions for qualitative insights.

The researcher conducts household surveys in-person. Data analysis is performed using statistical software like SPSS. Informed consent is secured from all participants, ensuring their voluntary participation.

Table No: 1 H_0: -There is no significant difference between age and Influence of Solid Waste Management in Economic and social status

Age *Influence of Solid Waste Management in Economic and social status				
		df	F	Sig.
Waste management practices reflects our values and priorities of the community	Between Groups	3	.585	.625
	Within Groups	370		
	Total	373		
engage with my neighbors or community members to exchange information or resources related to waste management	Between Groups	3	.136	.938
	Within Groups	370		
	Total	373		
ever participated in community clean-up events or waste management awareness campaign	Between Groups	3	.084	.969
	Within Groups	370		
	Total	373		
Waste management practices contribute to the overall cleanliness and attractiveness of your neighborhood	Between Groups	3	.375	.771
	Within Groups	370		
	Total	373		
experienced any social pressure or stigma related to my household's waste management practices	Between Groups	3	.070	.976
	Within Groups	370		
	Total	373		
believe that inclusive and participatory decision-making processes are essential for implementing successful waste management strategies at the community level	Between Groups	3	.288	.834
	Within Groups	370		
	Total	373		
neighbors' are involved in waste management practices	Between Groups	3	.111	.954
	Within Groups	370		
	Total	373		

family members are involved in waste management practices	Between Groups	3	.098	.961
	Within Groups	370		
	Total	373		
friends are involved in waste management practices	Between Groups	3	.139	.936
	Within Groups	370		
	Total	373		
socio-economic factors influence my participation in household waste management to a significant extent	Between Groups	3	.051	.985
	Within Groups	370		
	Total	373		
High amount of money I spend for waste disposal services or products per month	Between Groups	3	.074	.974
	Within Groups	370		
	Total	373		
considered the economic benefits of waste reduction and recycling for my household	Between Groups	3	.261	.854
	Within Groups	370		
	Total	373		
believe that implementing sustainable waste management practices can lead to long-term cost savings of my household	Between Groups	3	.480	.697
	Within Groups	370		
	Total	373		
financial barriers that prevent my household from adopting more sustainable waste management practices	Between Groups	3	.170	.917
	Within Groups	370		
	Total	373		
explored income-generating opportunities related to waste management, such as selling recyclable materials or compost	Between Groups	3	.040	.989
	Within Groups	370		
	Total	373		
Waste management as a potential source of employment or entrepreneurship within our community will help to manage proper Solid waste	Between Groups	3	.399	.754
	Within Groups	370		
	Total	373		
Education Support assist me and my community for Solid Waste Management	Between Groups	3	.553	.646
	Within Groups	370		
	Total	373		
Infrastructure assist me and my community for solid waste management	Between Groups	3	.214	.887
	Within Groups	370		
	Total	373		

Following is the one-way ANOVA analysis conducted to study the relationship between the age of respondents and various waste management practices, with particular emphasis on their economic and social influence. The analysis examines whether age affects perceptions, community involvement, and financial considerations concerning waste management. All the

variables reported have p-values greater than the 0.05 significance level, showing no significant differences among the age groups regarding how they perceive or engage in waste management practices. For example, the perception that waste management practices reflect community values and priorities (p = 0.625), and engagement with neighbors or community members about waste management (p = 0.938), do not vary significantly across different age groups. Similarly, participation in community clean-up events or waste management awareness campaigns shows no significant age-based difference, as represented by p = 0.969. The belief that waste management contributes to the cleanliness and attractiveness of neighbourhoods, p = 0.771, and experiences of social pressure or stigma related to waste management practices, p = 0.976, are also consistent across different age groups. For the feeling of inclusiveness in involvement or taking part in decisions affecting their waste management strategies, p = 0.834. Involving neighbours, family members, or friends in waste handling questions brings no substantial variation, with respective probabilities of 0.954, 0.961, and 0.936. Similarly, economically, the influence of participation and other socioeconomic factors does not vary, supported by a p-value of 0.985; spending to obtain waste disposal services or products is not different among different age groups, which was supported by a probability value of 0.974; and neither is a concern for economic benefits of a waste reduction and associated recycling of significance at p = 0.854. Similarly, the belief that sustainable waste management practices can lead to long-term cost savings (p = 0.697) and financial barriers to adopting more sustainable practices (p = 0.917) are consistent regardless of age. Lastly, there are no significant age-based differences in exploring income-generating opportunities related to waste management (p = 0.989), the perception of waste management as a source of employment or entrepreneurship (p = 0.754), or the role of education and infrastructure in supporting solid waste management (p = 0.646, p = 0.887).In conclusion, the findings suggest that age does not significantly influence respondents' attitudes, involvement, or economic considerations related to waste management. There is no significant distinction in general attitudes and practices that can be drawn between different age groups, suggesting that influences other than age may also be more critical in terms of informing waste management behaviour.

Table No: 2 H_0: -There is no significant difference between Education and Influence of Solid Waste Management in Economic and social status

Education *Influence of Solid Waste Management in Economic and social status				
		df	F	Sig.
Waste management practices reflects our values and priorities of the community	Between Groups	4	.023	.999
	Within Groups	369		
	Total	373		
engage with my neighbors or community members to exchange information or resources related to waste management	Between Groups	4	.094	.984
	Within Groups	369		
	Total	373		
ever participated in community clean-up events or waste management awareness campaign	Between Groups	4	.034	.998
	Within Groups	369		
	Total	373		

Waste management practices contribute to the overall cleanliness and attractiveness of your neighborhood	Between Groups	4	.101	.982
	Within Groups	369		
	Total	373		
experienced any social pressure or stigma related to my household's waste management practices	Between Groups	4	.013	1.000
	Within Groups	369		
	Total	373		
believe that inclusive and participatory decision-making processes are essential for implementing successful waste management strategies at the community level	Between Groups	4	.067	.992
	Within Groups	369		
	Total	373		
neighbors' are involved in waste management practices	Between Groups	4	.062	.993
	Within Groups	369		
	Total	373		
family members are involved in waste management practices	Between Groups	4	.043	.996
	Within Groups	369		
	Total	373		
friends are involved in waste management practices	Between Groups	4	.015	1.000
	Within Groups	369		
	Total	373		
socio-economic factors influence my participation in household waste management to a significant extent	Between Groups	4	.038	.997
	Within Groups	369		
	Total	373		
High amount of money I spend for waste disposal services or products per month	Between Groups	4	.138	.968
	Within Groups	369		
	Total	373		
considered the economic benefits of waste reduction and recycling for my household	Between Groups	4	.025	.999
	Within Groups	369		
	Total	373		
believe that implementing sustainable waste management practices can lead to long-term cost savings of my household	Between Groups	4	.182	.948
	Within Groups	369		
	Total	373		
financial barriers that prevent my household from adopting more sustainable waste management practices	Between Groups	4	.106	.980
	Within Groups	369		
	Total	373		
explored income-generating opportunities related to waste management, such as selling recyclable materials or compost	Between Groups	4	.250	.909
	Within Groups	369		
	Total	373		

Waste management as a potential source of employment or entrepreneurship within our community will help to manage proper Solid waste	Between Groups	4	.182	.948
	Within Groups	369		
	Total	373		
Education Support assist me and my community for Solid Waste Management	Between Groups	4	.240	.915
	Within Groups	369		
	Total	373		
Infrastructure assist me and my community with solid waste management	Between Groups	4	.152	.962
	Within Groups	369		
	Total	373		

The following table shows the results of a one-way ANOVA analysis in testing the relationship between the respondent's educational level and their perceptions and practices regarding the impact of solid waste management on respondents' economic and social status. All the variables analyzed have a p-value above the generally accepted significance level of 0.05, thus concluding that the educational groups do not significantly differ in the various waste management practices and their economic and social influences. For example, perceived Waste management practices reflect community values and priorities: The perception that waste management practices reflect community values and priorities ($p = 0.999$), as well as engagement with neighbours or community members about waste management ($p = 0.984$), does not differ significantly according to educational level. In addition, community clean-up events or waste management awareness campaigns are attended with the same frequency across educational groups since the p-value is 0.998. No significant differences by education level have been observed in respondents' views regarding the contribution of waste management practices to neighbourhood cleanliness and attractiveness, $p = 0.982$, and any social pressure or stigma related to their household's waste management practices, $p = 1.000$. No significant difference was established between the responses concerning the belief that successful waste management strategies depend on inclusive and participatory decision-making processes, $p = 0.992$. No significant differences are found between the involvement of neighbours, family members, and friends in waste management practices, at $p = 0.993$, $p = 0.996$, and $p = 1.000$, respectively. From an economic point of view towards waste management, there are no significant trends of differences related to education attainment. For example, there are no significant differences in the impact of socio-economic factors on participation in waste management, $p = 0.997$; the money spent on waste disposal services or products, $p = 0.968$; and consideration of economic benefits relating to waste reduction and recycling, $p = 0.999$, between educational groups. The perception that effective waste management can lead to long-term cost savings has no statistical difference, as did the existence of financial barriers in adopting sustainability-related practices and reported exploration of income-generating opportunities connected with waste management, at $p = 0.948$, $p = 0.980$, and $p = 0.909$, respectively. There were no significant differences in the items: waste management is considered a source of employment or entrepreneurship, and education/institutional infrastructure supports solid waste management, at $p = 0.948$ and $p = 0.915$ and $p = 0.962$, respectively.Overall, the findings suggest that the educational level does not significantly impact respondents' attitudes, involvement, or economic considerations towards waste management. People from different educational backgrounds share similar

views and practices concerning waste management and its perceived social and economic impacts. Therefore, factors other than education alone may be more influential in shaping waste management behaviours, such as awareness campaigns, community engagement, or socio-economic conditions.

Table No: 3 H_0: -There is no significant difference between Occupation and Influence of Solid Waste Management in Economic and social status

Occupation * Influence of Solid Waste Management in Economic and social status				
		df	F	Sig.
Waste management practices reflects our values and priorities of the community	Between Groups	3	.130	.942
	Within Groups	370		
	Total	373		
engage with my neighbors or community members to exchange information or resources related to waste management	Between Groups	3	.236	.871
	Within Groups	370		
	Total	373		
ever participated in community clean-up events or waste management awareness campaign	Between Groups	3	.107	.956
	Within Groups	370		
	Total	373		
Waste management practices contribute to the overall cleanliness and attractiveness of your neighbourhood	Between Groups	3	.548	.650
	Within Groups	370		
	Total	373		
experienced any social pressure or stigma related to my household's waste management practices	Between Groups	3	.117	.950
	Within Groups	370		
	Total	373		
believe that inclusive and participatory decision-making processes are essential for implementing successful waste management strategies at the community level	Between Groups	3	.311	.817
	Within Groups	370		
	Total	373		
neighbors' are involved in waste management practices	Between Groups	3	.144	.933
	Within Groups	370		
	Total	373		
family members are involved in waste management practices	Between Groups	3	.020	.996
	Within Groups	370		
	Total	373		
friends are involved in waste management practices	Between Groups	3	.112	.953
	Within Groups	370		
	Total	373		
socio-economic factors influence my participation in household waste management to a significant extent	Between Groups	3	.838	.473
	Within Groups	370		

	Total	373		
High amount of money I spend for waste disposal services or products per month	Between Groups	3	.183	.908
	Within Groups	370		
	Total	373		
considered the economic benefits of waste reduction and recycling for my household	Between Groups	3	.246	.864
	Within Groups	370		
	Total	373		
believe that implementing sustainable waste management practices can lead to long-term cost savings of my household	Between Groups	3	.265	.851
	Within Groups	370		
	Total	373		
financial barriers that prevent my household from adopting more sustainable waste management practices	Between Groups	3	.313	.816
	Within Groups	370		
	Total	373		
explored income-generating opportunities related to waste management, such as selling recyclable materials or compost	Between Groups	3	.113	.953
	Within Groups	370		
	Total	373		
Waste management as a potential source of employment or entrepreneurship within our community will help to manage proper Solid waste	Between Groups	3	.028	.994
	Within Groups	370		
	Total	373		
Education Support assist me and my community for Solid Waste Management	Between Groups	3	.029	.993
	Within Groups	370		
	Total	373		
Infrastructure assist me and my community for solid waste management	Between Groups	3	.156	.926
	Within Groups	370		
	Total	373		

The following table summarizes the results from a one-way ANOVA analysis of occupation and its association with different factors of solid waste management in influencing economic and social status. This indicates that the p-values of occupation are all above the accepted significance level, 0.05. For instance, waste management practices reflect our values and priorities of the community with a p-value of 0.942; thus, occupation is not a significant determinant in the perception of such a statement. Similarly, there is no significance in how respondents engage with their neighbours or community members over waste management, $p = 0.871$, and whether they have participated in community clean-up events or awareness drives, $p = 0.956$. Perceived waste management practices contributing to the cleanliness and appeal of the neighbourhood do not differ by occupation status at $p = 0.650$. Moreover, further analysis shows that occupation does not influence experiences of social pressure or stigma associated with household waste management, at $p = 0.950$, nor beliefs that successful waste management strategies require inclusive and participatory decision-making, at $p = 0.817$. Besides, the occupation has no significant differences between the involvement of neighbours,

family members, and friends' participation in waste management practices, represented by p-values of 0.933, 0.996, and 0.953, respectively. From a socio-economic characteristics point of view, no significant difference could be established in participation in household waste management based on occupation ($p = 0.473$). It is also noted that economic issues, such as money spent for the service of waste disposal, consideration of economic benefit by waste reduction and recycling, and belief that sustainable waste management would yield cost savings in the long run, have p values 0.908, 0.864, and 0.851, respectively. Similarly, financial impediments in adopting practices of sustainable waste management, exploration of opportunities to generate an income around waste management, and belief that waste management could yield a source of employment or entrepreneurship-all are undeviating, whatever the occupation groups, having respective p values 0.816, 0.953, and 0.994. Lastly, perceived support for education ($p = 0.993$) and infrastructure ($p = 0.926$) for solid waste management do not show significant differences based on occupation. Conclusion The results indicate that occupation does not significantly influence respondents' views, behaviours, or economic considerations related to solid waste management. This would, in turn, insinuate that something other than mere occupation, such as personal values, involvement in the community, or broader socio-economic factors, might be a more important variable in defining waste management practices.

4. Findings and Suggestion

The analysis explored the relationship between monthly income and knowledge of household solid waste management. The results show that monthly income does not significantly influence knowledge across various solid waste management aspects.

- No significant differences in awareness or understanding of solid waste management practices (e.g., segregation, recycling, environmental impacts).
- Uniform knowledge across income levels regarding the benefits of reducing waste, composting, and environmental health risks.
- Low F-statistics confirmed that income does not impact the level of knowledge about solid waste management.
- No significant differences in practices such as waste segregation, proper disposal, handing over waste to collectors, reusing items, and choosing eco-friendly products.
- Practices like not throwing waste in open places, reusing items, reducing plastic use, and repairing items showed no variation across occupations.
- Hazardous waste handling, kitchen waste composting, and encouraging family members to manage waste also exhibited consistent practices across different occupations.
- Age did not influence involvement in community clean-up events, waste management campaigns, or engagement with neighbors and family members on waste management practices.
- The perceptions that waste management reflects community values and priorities, and contributes to the cleanliness of the neighborhood, remained consistent across all age groups.

- There were no significant age-based differences in the financial aspects of waste management, such as spending on waste disposal services, the economic benefits of waste reduction, or concerns about the costs associated with sustainable waste management practices.
- The belief in inclusive decision-making and participation in waste management strategies at the community level was uniform across age groups.
- Perceptions of social pressure or stigma related to waste management practices did not differ significantly by age.
- Age had no significant impact on exploring income-generating opportunities related to waste management, such as selling recyclables or compost, nor on the view of waste management as a potential source of employment or entrepreneurship.
- The perceived role of education and infrastructure in supporting solid waste management was consistent across age groups, indicating no significant variation by age.
- The ANOVA analysis explored the relationship between occupation and the influence of solid waste management on economic and social status. The results showed that occupation does not significantly influence any of the factors related to solid waste management practices.

Suggestions:

Based on the findings, the following suggestions can help improve household solid waste management practices and enhance community engagement:

1. Targeted Awareness Campaigns:

o Since age does not significantly affect waste management behaviors, awareness campaigns should focus on other factors, such as personal values, environmental concerns, and community-level involvement. Campaigns should aim to educate all age groups equally about the economic, social, and environmental benefits of sustainable waste management practices.

2. Promote Inclusive and Collaborative Approaches:

o Given the uniformity in community participation, promoting inclusive decision-making and collaborative waste management strategies could be key in fostering collective responsibility, regardless of age.

3. Economic Incentives and Support:

o To encourage greater adoption of sustainable practices, financial incentives or subsidies could be offered for recycling programs or for households that engage in waste reduction. These programs should be designed in a way that appeals to all socio-economic groups, without focusing on age.

4. Strengthen Infrastructure and Educational Support:

o Infrastructure improvements and educational support mechanisms should be made universally accessible. These could include better waste disposal facilities, training

programs, and community workshops aimed at strengthening sustainable practices in every household.

5. Encourage Income-Generating Activities:

- Encourage the development of entrepreneurial opportunities related to waste management (e.g., recycling, composting, or waste-based products), providing support through training, resources, and access to markets for all community members, regardless of age.

By focusing on these broader factors, local governments, NGOs, and community organizations can better foster sustainable waste management practices and improve both the social and economic outcomes associated with waste management.

5. Conclusion

This study examined the influence of various socio-economic factors, particularly occupation, on household solid waste management practices. The analysis revealed that occupation does not significantly affect respondents' attitudes, practices, or economic considerations related to waste management. Despite differences in occupational roles, participants displayed similar behaviors and perceptions regarding waste management, including community involvement, economic benefits, and social factors. These findings suggest that factors beyond occupation, such as personal values, community engagement, and socio-economic circumstances, play a more crucial role in shaping sustainable waste management practices.

Therefore, efforts to promote effective waste management should focus on educating and engaging communities at large, addressing broader socio-economic challenges, and providing stronger support systems for sustainable waste practices. Encouraging participation through inclusive decision-making and fostering awareness about the long-term environmental and economic benefits will be key to achieving more widespread adoption of solid waste management practices.