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25. A COMPARATIVE ANALYSIS OF SOLID WASTE MANAGEMENT IN RURAL AND URBAN AREAS OF TAMIL NADU

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ABSTRACT

The major environmental problems that pose serious threat today include solid waste disposal, waste water management, corrosion, fouling, deforestation, pollution etc. These problems deny a clean and healthy environment for living. Rapid industrialization, population growth and urbanization, sophistication in life style and unlimited use of synthetic chemicals are of specific concerns among others in one side and changes in economic structure in rural areas on the other in contributing to overall environmental problems. These wastes have been proved to be extremely toxic and infectious the uncontrolled and unscientific dumping of such wastes has brought about a rising number of incidents of hazardous to human health. More serious risk to human health is envisaged due to contamination of surface and ground water. The management of urban and rural solid waste suffers from many problems and constraints, which inhibit the proper and effective disposal of solid waste, these problems and constraints result in operational and maintenance functioning and in inadequate salvaging of resources present in the wastes. These problems need to be highlighted, discussed and overcome through political will, administrative determination, technical skills, reorientation of efforts and overcoming of barriers in decision making at all levels. Thus, there is a need to understand the implementation issues related to solid waste management with a view to provide Eco-friendly, Sustainable and community-based solutions to waste management problems. Based on the above, the present paper entitled "A Comparative Analysis of solid Waste Management in Rural and Urban Areas of Tamil Nadu" makes an attempt to study the aspects of solid waste management in rural and urban areas of Nagappattinam district. However, the specific objectives are to analyse the region wise sources and quantum of solid wastes in the study area; to study the causes for solid wastes generation and disposal in the study area; to probe in to the methods of disposal of

solid wastes in the study area and to find the difference if any, in the method of disposal between rural and urban areas; and to explore the problems in the Solid Waste Management among the respondents in the study area; and to suggest possible measures to formulate strategies for effective solid waste management in the study area. This paper suggests that proper measures to be taken to create public awareness and to bring about changes in public behaviour through development of public awareness programs, such as Promotion of "Reduce, Re-use and Re-cycle (R-R-R)" of Waste principle; Promotion of Public Participation in SWM Systems; Provision of Information Hotline; Inculcation of Public Education through Group Education by Group Meetings in the community, Workshops, Exhibitions, Lecture series, Panel Discussions, etc.; Promotion of Mass Education through the Use of Print and Electronic Media, Use of School Children, Provision of Primary School Curriculum to cover the subject, Involvement of National Cadet Corps (NCC), National Social Service, Involvement of Religious Leaders, Involvement of Medical Practitioners, Involvement of SHGs, Resident Associations and Voluntary Organizations/NGO involvement

RATIONALE

The solid wastes have become significant political, social and environmental issues; setting new disposal facilities to manage these wastes have become difficult as the population to grow rapidly. Much of what has come to be considered the "Garbage crisis" in the world is not the product of immediate past practices or present inaction, but a series of chronic problems interrelated in such a way as to defy a clear solution. Rapid industrialization, population growth and urbanization, sophistication in life style and unlimited use of synthetic chemicals are of specific concerns among others in one side and changes in economic structure on the other in contributing to overall environmental problems. The waste management in India is the responsibility of local governments, though it has been intended that local government

would raise the financial resources required for the provision of basic civil amenities, including waste management. As a result, local authorities are not strongly placed to have a comprehensive set of waste management policies of their own. Instead; they act only as implementing agencies for scheme formulated at the national level. Urbanization and industrialization in general terms, the urban population produced two to three times more of the municipal solid waste than the semi-urban and rural population per capita per year. The management of urban and rural solid waste suffers from many problems and constraints, which inhibit the proper and effective disposal of solid waste, these problems and constraints result in operational and maintenance functioning and in inadequate salvaging of resources present in the wastes. These problems need to be highlighted, discussed and overcome through political will, administrative determination, technical skills, reorientation of efforts and overcoming of barriers in decision making at all levels. Some of these problems such as in sufficient funds available with local bodies, lack of established and efficient system of collection, transportation, disposal of wastes, lack of trained and knowledgeable manpower in local bodies, inadequate employees performance monitoring, motivation, discipline to mention a few.

Across the country, many organization and individuals have found innovative ways to reduce and manage the solid wastes through a coordinated mix of practices. Thus, there is a need to understand the implementation issues related to solid waste management with a view to provide Eco- friendly, Sustainable and community-based solutions to waste management problems. Based on the above, the present paper entitled "A Comparative Analysis of solid Waste Management in Rural and Urban Areas of Tamil Nadu" makes an attempt to study the aspects of solid waste management in rural and urban areas of Nagapattinam District, Tamil Nadu.

OBJECTIVES AND HYPOTHESES

However, the specific objectives are to analyse the region wise sources and quantum of solid wastes in the study area; to study the causes for solid wastes generation and disposal in the study area; to probe in to the methods of disposal of solid wastes in the study area and to find the difference if any, in the method of disposal between rural and urban areas; and to explore the problems in the Solid Waste Management among the respondents in the study area; and to suggest possible measures to formulate strategies for effective solid waste

management in the study area.

Based on these objectives the following hypotheses have been formulated. It is assumed that there are host of factors influencing the household solid wastes management, such as, religion, educational status, family size, income, consumption pattern, occupation etc. among these factors, the economic factors are influencing more than that of others.

There is a significant difference registered in the quantity of wastes disposal and method of solid wastes management followed between the urban and rural area

There is a significant difference registered in the incidence of problems in the disposal of solid wastes between rural and urban areas. However, the urban respondents are suffering more than that of rural respondents

MATERIALS AND METHODS

Nagappattinam district has been purposively chosen as the study area since it is one of the environmental disaster prone and recently trifurcated districts of Tamil Nadu. Then to represent urban area, one taluk from the district, Mayiladuthurai was chosen, followed by Five representative wards of the Municipality and to represent the rural area, Five representative revenue villages of the taluk have been chosen. A total of 208 respondents consisting 94 respondents from urban area and 114 respondents from rural area were selected at randomly.

The present study has been based on Primary data; Survey Method has been adopted for the data collection. The data relating to demographic characteristics, socio-economic profiles of the households, information on waste generation, components of solid wastes, waste disposal practices, problems faced by the respondents in the wastes disposal and management, etc. have been gathered through a well structured interview schedule.

MAJOR FINDINGS

The solid waste generation and disposal is closely associated with the social variables the basic social profile such as the sex, religion, community, age, family type and family size is taken for analysis and it is found from the analysis that around 85 % are male and only 15 % are female, more than 70 % are the Hindu and negligible per cent of Muslim and Christian are found in both the rural and urban areas of the study. Further the community distribution registers more than 40% belong to BC, about 20 % belong to SC/STs and MBCs and only less than 8 % are OC respondents in the study area. It is also observed that still the joint family system prevails in the region i.e. 16% of the respondents in the urban area and 20 % of the rural

respondents reside with joint family system. There is no vast difference in the medium family size distribution i.e. 27 % of the respondents but 19% of the respondents' households belong to the large family size group.

As the aspects of solid waste management is closely related to the economic status of the respondents the major economic variables such as income, expenditure, savings position, Asset Position, indebtedness of the respondents have been taken for analysis and it is found that with regard to income distribution only 2 % of the urban respondents and 9 % of the rural respondents have earned less than Rs.5000/- monthly and it is 38 % of the urban respondents and 23 % of the rural respondents have earned more than Rs. 15000/- per month. Majority of the respondents about 60 % have earned up to 15000/- per month in both the regions. However, comparatively the income of urban respondents is higher than that of the rural respondents in the study area. The same trend is attributed in the case of expenditure and savings also. Since the income has its influence on the level of consumption and savings 12 % of the urban respondents and 27 % of the rural respondents have spent less than Rs.4000/- per month and 38 % of the urban respondents and 19 % of the rural respondents have spent more than Rs.12000/- per month on consumption.; while 7.5 % of the urban respondents and 25 % of the rural respondents have not saved any amount so far in one side and it is appreciable to note that about 10 % of the urban respondents and 2 % of the rural respondents have saved more than Rs.40000/- on the other. Similarly, the indebtedness is also more among urban respondents than that of rural respondents. since about 10 % of the urban respondents have indebted more than Rs.5 Lakhs while only less than 1 % of the rural respondents have highly indebted in the study area. Further it is observed that there are variations in the economic status between the urban and rural respondents in the study area.

Since the environmental awareness is closely associated to level of education the educational status of the respondents has been compared. It is found that still 2 % of the urban respondents and 6 % of the rural respondents are illiterates in one side and 7 % of the urban respondents and 3 % of the rural respondents are higher educated on the other. Further it is known that more than 50 % of the rural respondents are primary educated and about 50 % of the urban respondents are higher secondary educated. From the analysis, both the rural urban areas the literacy level exceeds the state average.

The income wise quantity of solid waste

generation in the study area shows that there is a direct association between the income and quantity of solid waste generated both the rural and urban areas. However, the respondents whose income is up to Rs.5000 generate 520 Gms of solid waste per day while it is 810 Gms for the respondents whose monthly income is above Rs.20000 in urban areas whereas it was 480 Gms and 600gms respectively in the rural areas. The average difference between urban and rural regions ranges between 40 Gms and 110 Gms.

There is a significant difference registered between the rural and urban respondents in the case of waste generation with regard to educational status since the difference in the absolute quantity of waste ranges between 50 Gms and 180 Gms. From the hypotheses testing, it can be inferred that the quantity of waste is dependent on education (Chi square value 43.74); on Community Status (Chi- value 89.83) of the sample respondents.

The average quantity of waste is increased with the level of consumption in both regions. But there is a significant difference registered between the rural and urban respondents in the case of waste generation with regard to monthly consumption expenditure since the difference in the absolute quantity of waste ranges between 40 Gms and 165 Gms.

The average quantity of waste is increased with the value of asset position in both regions. But there is a significant difference registered between the rural and urban respondents in the case of waste generation with regard to asset position since the difference in the absolute quantity of waste ranges between 40 Gms and 135 Gms respectively. Further there is a significant difference registered between the rural and urban respondents in the case of waste generation with regard to occupation since the difference in the absolute quantity of waste ranges between 20 Gms and 240 Gms.; Further, it is found that the quantity of waste is dependent on the occupation (Chi- Square value is 67.56) of the sample respondents.

It is also found that the average quantity of waste is increased with the family size in both regions and there is a significant difference registered between the rural and urban respondents in the case of waste generation with regard to family size since the difference in the absolute quantity of waste ranges between 55 Gms and 165 gm.

To measure the factors influencing the quantity of household solid waste generation the regression model has also been applied. It is calculated that the value of R^2 is 0.79 which implies that 79 % of variation in the quantity

of generation of solid wastes is influenced by these variables which are included in the model. From this model, it is found that among these variables, the Consumption Expenditure is primarily influencing the quantity of waste generation since the calculated regression coefficient for consumption expenditure is 0.26 followed by income (0.21), Family Size (0.19), Asset Position (0.14), Level of Education (-0.16) and Occupation (0.17). From this model it could be inferred that the economic variables such as consumption expenditure, income, asset position come together having 61.5% of influence on the waste generation. The hypothesis that there are host of factors influencing the household solid wastes management, such as, religion, educational status, family size, income, consumption pattern, occupation etc. among these factors, the economic factors are influencing more than that of others is proved.

Further based on the t-value given in the analysis, it could be obvious to infer that there is a significant difference registered in the quantity of waste generation at 1% level between urban and rural areas and hence the hypothesis that there is a significant difference registered in the quantity of wastes generation between the urban and rural area is also proved.

In the present study area, among the urban respondents majority (56.5%) have thrown the wastes into their Backyard followed by thrown in to Common garbage Bin (15.9%) and it is appreciable to note that only 12 respondents have burnt the wastes. Whereas in the rural areas, more than 75% of the respondents have thrown the wastes into their Backyard and it is to be noted that the plastic wastes have not been properly managed as they disposed off either in open place, or other unsafe modes.

It is pathetic to find that the other than plastic, glass, tin, kitchen wastes, paper, polythene wastes are also been not effectively managed in the study area as about 5.5% of the urban respondents and 11.4% of the rural respondents have burnt the wastes.

With regard to storing of solid waste, in the study area, about 45% of the urban respondents have kept their wastes inside of their home and only 25% of the rural respondents have kept their wastes inside of their home. This difference may be mainly due to availability of outside place which is normally short in urban areas than rural areas. It is known that out of total sample respondents 66% have kept the wastes outside.

The source wise dumping of the wastes in the be noted that in the urban area, the concrete bin was primarily used (32%) followed by

plastic basket (28%), plastic container (23%), plastic bag (14%) and slurry pits (3%) where as in the rural area, the slurry pits stands first i.e. 52% respondents have dumped their wastes into slurry pits followed by plastic basket (23%), plastic bag (11%), plastic container (8%) and only 6% have dumped into concrete bin. From this it is clear that in the urban area the concrete bin is used as the prime source and in the rural area the slurry pit is used as the prime source of container of dumping of solid wastes. It is also observed that the rural people save their domestic wastes for some times and some extent of urban people are having habit of disposal of wastes immediately it was generated.

In the study area this it is found that in the rural area the Lorry is used as the prime vehicle and in the urban area the Tricycle is used as the prime vehicle for waste collection. Further, the collection of solid waste is done by three different modes viz, directly by Municipal Corporation, Panchayats or through contract or through community organizations.

The gender wise incidence of problems in the solid waste management i.e. collection, storage and disposal of solid wastes reveal that among the urban respondents 26% (85% are male and 15% are female) are facing problems in collection, 46% (82% are male and 18% are female) are facing the problems relating to storage and 28% (74% are male and 26% are female) are facing problems relating to disposal of solid waste. Whereas in the rural area, 28% (39% are male and 61% are female) are facing problems in collection, 39% (57% are male and 43% are female) are facing the problems relating to storage and (54% are male and 46% are female) 33% are facing problems relating to disposal of solid waste. It is found that the male are comparatively realizing more problems than that of female. Further it is known that among these three major problems, the problems in the storage stands first followed by disposal and collection. It could also be observed that in both the areas, as the level of education improves the incidence of problems in the solid waste (collection, Storage and disposal) declines. It is found that there is a significant difference registered in the incidence of problems in the disposal of solid wastes between rural and urban areas. However, the urban respondents are suffering more than that of rural respondents.

SUGGESTIONS

It is observed from the analysis that in the study municipality, the solid-waste collection in residential and commercial sites has been done by street-sweeping services and waste collection from households and commercial

areas.

It is suggested that the effective solid waste management system viz, resource recovery through sorting and recycling i.e., recovery of materials such as paper, glass, metals or recovery of energy through biological, thermal or other processes. Waste transformation leads to reduction in volume and toxicity, which helps in safe and sustainable disposal in landfills should be followed.

Measures may be taken to create awareness on the incidence of the problems of waste accumulation and the way it affects their lives directly.

The practice of minimisation of generation of solid wastes should be encouraged through inculcation of educating people about it like using less of plastics or reduce waste disposal by recovering maximum possible recyclable materials from it.

It is also suggested that the municipal solid waste should be segregated into organic, inorganic, recyclable and hazardous waste, which has not been observed in the study area. For effective solid waste management possible alternatives such as Composting – from organic portion of waste and Incineration- for non-recyclable portion of waste can be considered for working out the economic value for the solid waste disposal besides land filling of solid waste for the study area.

It is suggested that the Local bodies may introduce fiscal control measure such as penalty of administrative charges or special cleaning charges for those who litter the streets or cause nuisance on the streets to punish them.

It is suggested that Green Productivity and Other Waste Minimization Approaches may be adopted by the study area like already it has been practiced the Metropolitan city Delhi.

Proper measures may be taken to promote public participation in waste management efforts through private partnership where feasible.

Above all, proper measures to be taken to create public awareness and to bring about changes in public behaviour through development of public awareness programs, such as Promotion of “Reduce, Re-use and Re-cycle (R-R-R)” of Waste principle; Promotion of Public Participation in SWM Systems; Provision of Information Hot-line; Inculcation of Public Education through Group Education by Group Meetings in the community, Workshops, Exhibitions, Lecture series, Panel Discussions, etc.; Promotion of Mass Education through the Use of Print Media, Use of TV / Cable TV / Radio/Web Site, Use of Cinema Halls, Street Plays, Puppet Shows, etc., Posters, Pamphlets, Use of Public Transport

System, Use of School Children, Provision of Primary School Curriculum to cover the subject, Involvement of National Cadet Corps (NCC), National Social Service, Involvement of Religious Leaders, Involvement of Medical Practitioners, Involvement of SHGs, Resident Associations and Voluntary Organizations/NGO involvement There is need to bring all stakeholders i.e., municipal authority, development authority, community, NGO's and waste collectors together to manage solid waste in the study area environmentally and economically viable manner. This requires to create awareness about the environmental aspects and to develop sustainable solid waste management public practices to all stakeholders. It is appreciable to suggest that in the study area recently Tamil Nadu Central University (Tiruvarur) was established with special attention. More Research and Development activities may be undertaken by the university authorities for the effective Solid Waste Management through its Department of Environment in this district on model basis which can be disseminated in all other areas in future.

CONCLUSION

The solid wastes have become significant political, social and environmental issues; setting new disposal facilities to manage these wastes have become difficult as the population to grow rapidly. Much of what has come to be considered the “Garbage crisis” in the world is not the product of immediate past practices or present inaction, but a series of chronic problems interrelated in such a way as to defy a clear solution. What once was considered simply a nuisance or even more seriously a health hazard in the past has become a major environmental plight in the 20th centuries the problem of environmental pollution in India crises more from the rivers which have been heavily polluted by the discharged of effluents from factories and the dumping of sewage. It is fond hope that through wide propagation of the message that the “Clean City Program” and “Clean Village Program” through government initiatives and public participation, the problem of solid waste management can be solved to the desirable extent both in rural as well as in urban areas.

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