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Solid Waste and Its Negative Impact – A Comparative Study of Koyilandi and Kalpetta Municipalities in Kerala

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Abstract – In spite of Governments' sincere efforts with projects like Swach Bharath Mission, systematic solid waste management is growing at snail's pace in India. Low sanitation level, air pollution, water pollution, environmental degradation and lot of health issues to humans and animals are the potential threats in the country as of mismanaged solid wastes. These problems are multiplied in Kerala because of its high population density. As a result the municipalities of Kerala are stinking from north to south and east to west. The study compares the two major municipalities of Kerala, Koyilandi and Kalpetta in respect of negative impact of improper solid waste management. The study compares the two municipalities in terms of their performance in environmental pollution, air pollution, water pollution, noise pollution and health issues. It reveals that the environmental problems and pollution are comparatively higher in Kalpetta while health problems are higher in Koyilandi.

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1. INTRODUCTION

Materials which are not in liquid form and useless to the original user are known as solid wastes. All human activities essentially create waste in different forms. Increased consumerism coupled with convenience practices of humans multiplied the generation of waste. Solid waste is a social menace as it ruins our eco system, environment, quality of air and water. People generate waste but less concerned about the healthy disposal and treatment of it. They consider dealing with the stinking waste is a wasteful effort. They simply cast upon the responsibility of waste treatment and disposal on the shoulders of the local bodies and escape from their personal responsibilities. They didn't realize that it is the fundamental responsibility of the waste generator to treat and dispose the waste so generated. In a consumer state like Kerala with advanced human development indices the per head waste generation figures are very high as compared to other states. Especially urban areas of Kerala are finding acute shortage of free space and waste management facilities to dispose waste in a healthy manner. It increases the quantum of throw-away waste by the inhabitants ultimately leading to unhygienic urban environment. Kerala has around sixty municipalities and being urban centres the authorities are struggling for effective waste management. It is creating a variety of problems to the inhabitants in the form of health issues, air pollution, water pollution and noise pollution. Therefore municipal solid waste management is a critical area to be addressed in the present context in the state of Kerala.

2. STATEMENT OF THE PROBLEM

Solid waste is instrumental in generating a variety of health issues to humans. It includes waterborne and airborne diseases starting from minor fever to severe epidemics. Hepatitis, Malaria, Dengue, Chikungunya etc are some of the examples. The thrown-away waste by inhabitants in public places is acting as agents for spreading such diseases. Scavenging animals and mosquitoes act as spreaders of such diseases. People of Kerala are known for their household sanitation level but least concerned about their environmental sanitation level. The municipalities of Kerala except a handful are failing to manage waste effectively. Unmanaged waste ultimately leads to littering and reaches water bodies. It contaminates drinking water and air essentially consumed by humans and animals. As a model two municipalities from Kerala one Koyilandi and the other one Kalpetta are selected and compared to form an opinion about negative impact of lack of proper waste management and the problem is stated as **"SOLID WASTE AND ITS NEGATIVE IMPACT - A COMPARATIVE STUDY OF KOYILANDI AND KALPETTA MUNICIPALITIES IN KERALA".**

3. OBJECTIVES OF THE PAPER

Generally the study is meant to make a comparison of the two municipalities Koyilandi and Kalpetta in terms of negative impact of solid waste. The study specifically meant;

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1. To make a comparison of the environmental impact of the two municipalities Koyilandi and Kalpetta.

2. To make a comparison of the levels of air, water and noise pollution of the two municipalities.

3. To make a comparison of the health issues affecting the residents of the region due to lack of proper management of solid waste.

4. METHODOLOGY AND SAMPLING DESIGN

In this study both primary and secondary data are used. Secondary data is gathered from various published sources of Government Departments, other Agencies and Municipal Authorities. For collecting primary data, two major municipalities of Kerala, Koyilandi and Kalpetta are selected. Primary data is collected by using Simple Random Sampling from residents who are living in the municipal limits. It is collected in proportion to the total population of the two municipalities. A structured questionnaire is used in the study to assess the negative impact of solid waste.

5. TOOLS USED FOR DATA ANALYSIS

The tools used for analysis of primary data and hypothesis testing consist of Arithmetic Mean, Standard Deviation, Standard Error, Mean Difference and Independent Sample t-test.

6. NEGATIVE IMPACT OF SOLID WASTE MANAGEMENT

For analyzing the negative impact of solid waste on the environment and society of the two selected municipal regions four parameters namely, Environmental Impact, Air Pollution, Water Pollution and Noise Pollution are identified and used. Primary data is collected through a well structured questionnaire from sixty five residents from Koyilandi and sixty eight from Kalpetta. The respondents are selected by Simple Random Sampling in the ratio 65:68. The ratio is fixed based on the proportion of total number of residents on these two municipalities. The Negative Impact is analyzed by using t-test.

Table 1: Group Statistics – Negative Impact of Solid Waste

Variables	Name of the Municipality	N	Mean	Std. Deviation	Std. Error Mean
Environmental Impact	Koilandy	65	44.5077	7.20920	.89419
	Kalpetta	68	**46.3529**	6.16384	.74748
Air Pollution	Koilandy	65	19.2154	5.03579	.62461
	Kalpetta	68	**20.0147**	2.93966	.35649
Water Pollution	Koilandy	65	21.9538	4.43505	.55010
	Kalpetta	68	**26.3971**	6.36018	.77129
Noise Pollution	Koilandy	65	**4.3077**	2.89354	.35890
	Kalpetta	68	3.9706	3.35897	.40734

Source: Primary Data

From Table 1 it is seen that relating to Environmental Impact, Air Pollution and Water Pollution the Mean Scores of Kalpetta is ***46.35, 20.01*** and ***26.40*** respectively where they are only ***44.51, 19.22*** and ***21.95*** respectively for Koyilandi. In all the above three cases Kalpetta is leading over Koyilandi Municipality. Hence the Environmental Impact, Air Pollution and Water Pollution due to solid waste is comparatively higher in Kalpetta. Meanwhile, Noise Pollution is higher in Koyilandi with Mean Scores ***4.31*** while in Kalpetta it is only ***3.97***. Comparatively Noise Pollution is lesser in Kalpetta than in Koyilandi.

Now it is required to test whether there is significant variation in negative impact of solid waste management between Koyilandi and Kalpetta Municipalities. T-test is used for it by framing the following hypothesis

H0: There is no difference in the mean scores of Environmental Impact, Air Pollution, Water Pollution and Noise Pollution between Koyilandi and Kalpetta Municipalities.

H1: There is difference in the mean scores of Environmental Impact, Air Pollution, Water Pollution and Noise Pollution between Koyilandi and Kalpetta Municipalities.

Table 2 Independent Samples t-Test

Variables	F	Sig.	t	df
Environmental Impact	4.742	***.031****	-1.589	131
Air Pollution	28.905	***.000****	-1.124	131
Water Pollution	4.489	***.036****	-4.653	131
Noise Pollution	.079	.779	.619	131

Source: Primary data
**Significant at 5% Level of Significance*

In the above Table the significance level is tested by using t-test. All values referred above that is, Environmental Impact, Air Pollution, Water Pollution except Noise Pollution are significant at 5% level of significance as ***p<0.05*** (vide last column of Table 2)**.** For Noise Pollution it is 0.779 which is above 0.05. Hence the null hypothesis is rejected for Environmental Impact, Air Pollution and Water Pollution but accepted for Noise Pollution. That means except for Noise Pollution the variation is significant and for Noise Pollution the variation found in mean score is not relevant and considerable.

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Table 3 Group Statistics

Diseases	Name of the Municipality	N	Mean	Std. Deviation	Std. Error Mean
Respiratory Problems	Koilandy	65	**1.6000**	1.70294	.21122
	Kalpetta	68	1.3382	.83951	.10181
Water Borne Diseases, Cholera	Koilandy	65	**1.3077**	.88252	.10946
	Kalpetta	68	1.0000	.00000	.00000
Water Borne Diseases, Dysentry	Koilandy	65	**1.1385**	.70438	.08737
	Kalpetta	68	1.0882	.44839	.05438
Water Borne Diseases, Typhoid	Koilandy	65	**1.0308**	.24807	.03077
	Kalpetta	68	1.0147	.12127	.01471
Water Borne Diseases, Hepatitis	Koilandy	65	**1.0769**	.50952	.06320
	Kalpetta	68	1.0000	.00000	.00000
Water Borne Diseases, Diarrhea	Koilandy	65	1.0615	.29984	.03719
	Kalpetta	68	**1.0882**	.61657	.07477
Eye Diseases	Koilandy	65	**1.6615**	1.22827	.15235
	Kalpetta	68	1.3971	.77536	.09403
Skin Diseases	Koilandy	65	**1.3385**	1.14941	.14257
	Kalpetta	68	1.3088	.67487	.08184
Congenital Abnormalities	Koilandy	65	**1.1231**	.57303	.07108
	Kalpetta	68	1.0000	.00000	.00000
Dengue Fever	Koilandy	65	**1.0769**	.50952	.06320
	Kalpetta	68	1.0147	.12127	.01471
Chikungunya	Koilandy	65	**1.3077**	1.15816	.14365
	Kalpetta	68	1.0147	.12127	.01471
Malaria	Koilandy	65	**1.0615**	.29984	.03719
	Kalpetta	68	1.0147	.12127	.01471

Source: Primary Data

It is observed from Table 3 that according to the opinion of selected respondents of the study health problems such as Respiratory Problems, Cholera, Disentry, Typhoid, Hepatitis, Eye Disease, Skin Disease, Congenital Abnormalities, Dengue Fever, Chikungunya and Malaria are higher in Koyilandi Municipal limits ***(Mean Scores 1.60, 1.31, 1.14, 1.03, 1.08, 1.66, 1.33, 1.12, 1.08, 1.31 and 1.06 respectively)*** compared to Kalpetta. Diarrhea as a health problem is found higher in Kalpetta with Mean Score of ***1.09*** as compared to Koyilandi Municipality (Mean Score ***1.06***).

Now whether there is significant variation in health problems between Koyilandi and Kalpetta municipalities has to be tested by using t-test. The following hypothesis is formulated;

H0: There is no variation in the mean scores of health problems between Koyilandi and Kalpetta Municipalities.

H1: There is variation in the mean scores of health problems between Koyilandi and Kalpetta Municipalities.

Table 4 Independent Sample t-test

Diseases	F	Sig.	t	df
Respiratory problems	7.908	***.006****	1.132	131
Water Borne Diseases, Cholera	30.950	***.000****	2.876	131
Water Borne Diseases, Dysentry	1.024	.314	.493	131
Water Borne Diseases, Typhoid	.940	.334	.478	131
Water Borne Diseases, Hepatitis	6.381	***.013****	1.245	131
Water Borne Diseases, Diarrhea	.446	.505	-.315	131
Eye Diseases	4.000	***.048****	1.492	131
Skin Diseases	.832	.363	.182	131
Congenital Abnormalities	13.768	***.000****	1.771	131
Dengue Fever	3.903	***.050****	.979	131
Chikungunya	18.364	***.000****	2.075	131
Malaria	5.882	***.017****	1.190	131

Source: Primary data
****Significant at 5% Level of Significance***

While using t-test for testing significance at 5% level, it is visible from Table 4 that the variations are significant regarding the health problems Respiratory Problems, Cholera, Hepatitis, Eye Disease, Congenital Abnormalities, Dengue Fever, Chikungunya and Malaria as ***p<0.05*** in those cases. It is shown in the above Tables ***(vide last column of table 4).*** Hence, the null hypothesis is rejected and it is proven that there is significant difference in those health problems between the two municipalities. In the remaining cases Disentry, Typhoid, Diarrhea and Skin Disease ***(p>0.05)*** the null hypothesis is accepted where the variations are not considerable.

Hence it is concluded that, Respiratory Problems, Cholera, Hepatitis, Eye Disease, Congenital Abnormalities, Dengue Fever, Chikungunya and Malaria are higher in Municipal limits of Koyilandi than in Kalpetta.

9. FINDINGS OF THE STUDY

1. Considering Environmental Impact, the Municipal limits of Kalpetta is affected more than that of Koyilandi as the Mean Score is ***46.35*** against ***44.51***.

2. Similarly Air Pollution due to solid waste is comparatively higher in Kalpetta as the Mean Score is ***20.01*** as against ***19.22*** for Koyilandi.

3. Water Pollution also is higher in Kalpetta with a Mean Score of ***26.40*** as against ***21.95*** for Koyilandi Municipality.

4. The variation in Noise Pollution is not found significant at 5% Level.

5. While considering health problems Respiratory Problems, Cholera, Hepatitis, Eye Disease, Congenital Abnormalities, Dengue Fever, Chikungunya and Malaria are higher in Municipal limits of Koyilandi than in Kalpetta.

6. Disentry, Typhoid, Diarrhea and Skin Disease are not varying significantly at 5% Level and hence not considered for comparison.

7. Environmental Problems and Pollution are higher in Kalpetta while Health Problems are higher in Koyilandi Municipality.

10. SUGGESTIONS

From the above findings of the study the following suggestions are being evolved:

1. Unmanaged solid waste is responsible for a series of health issues and hence urgent measures should be taken by the municipalities to treat and dispose waste in a healthy and environmentally friendly manner.

2. Widespread campaigning should be undertaken by municipal authorities to make inhabitants decent waste managers.

3. Facilities for treatment and disposal of waste at source must be provided to ensure household wastes not reaching public places because decentralized waste management is less prone to health issues.

4. Integrated Solid Waste Management (ISWM) system should be implemented for a clean and healthy life in municipal limits.

11. CONCLUSION

Kerala, renowned for its scenic beauty and greenery is not really in top position in its solid waste management initiatives. It is the state with highest population density in India and its growing consumerism is a threat for its waste management efforts. The people of Kerala are highly educated, politically and socially well motivated but the state's environmental sanitation level is surprisingly low. They are in the clutches of NIMBY (Not In My BackYard) Syndrome and concerned about making their surroundings clean. Hence, in spite of high household sanitation level the urban areas of the state are stinking which in turn attract a lot of health issues and pollution. Thrown away waste, scavenging animals and birds and untidy surroundings are reflections of a typical Kerala town. Authorities should strive for the ways and means to implement a sustainable solid waste management system, technically known as Integrated Solid Waste Management to tackle the ever mounting waste problems.

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