

Health Impact of Solid Waste Management on Sanitary Workers: with Special Reference to Palakkad Municipality

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Introduction

The major environmental problem that pose serious threat today includes solid waste disposal, waste water management, corrosion, fouling, deforestation, pollution due to xenobiotic, heavy metals, toxic chemicals, industrial emission, automobile emission, oil spills, faecal coli forms, viruses and other contagious micro organisms. 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 contributing to overall environmental problems. We are at a critical juncture, compelled to devise and adopt suitable remedial measures to solve these issues for having a healthy environment through a total sanitation drive related to solid waste management, liquid waste management, safe disposal of human excreta, and provision of safe drinking water, personal hygiene, home sanitation and community sanitation

In earlier days waste did not create many problems to the community as the quantity of waste generated was within the assimilative capacity of nature. Today the scenario is quite different and the urban environment all over the world posses serious threat that from excessive generation on solid waste.. A major chunk of solid waste generated in cities and townships remain unattended, causing health hazards or nuisance to the inhabitants. Sanitation workers provide an essential public service but often at the cost of their dignity, safety, health, and living conditions. They are some of the most vulnerable workers. They are far too often invisible, unquantified, and ostracized, and many of the challenges they face stem from this fundamental lack of acknowledgment. Sanitation workers are exposed to serious occupational and environmental health hazards risking illness, injury, and death. (World Bank Report 2019)

Health Impact of Solid Waste Management on Sanitary Workers

This paper made an attempt to present an overview of the health and the environmental problems due to the generation of solid wastes and handling on sanitary workers on the event of Covid 19 in Palakkad municipality. This study attempted to analyse the impact of solid waste on the health of sanitary workers, and the socio-economic, health and environmental problems that arise at the waste disposal activities in the study area.

Research Problem

The risks associated with an inadequate system of solid waste management were to human health, environment, and that of the aesthetic risks. Human health risk involved the spread of the diseases caused by the pathogenic organisms and vector borns. Environmental risks were related to pollution of land, water and air. Aesthetic risks related to bad odour, unpleasant vision and litter. Absence of policy guidance and improper waste management practices in the case of sanitary workers could have been creating serious health impact and threat of contagious diseases on the society on the event of Covid 19 pandemic.

Objectives of the Study

The study carried out with the objectives of

1. To analyze the socio-economic aspects of the sanitary workers in Palakkad municipality.
2. To study the impact of solid waste management on the health condition of the sanitary workers in the study area

Statement of Hypothesis

H0:

1. The socio economic condition of sanitary workers and handled waste has not much significantly related.
2. Educational level and gender status was not statistically associated with total waste collection

Methodology and Research Design

Solid waste was essentially an outcome of rapid industrialisation, growth of consumerism, changing lifestyles and aspiration of various strata of municipal societies and was a difficult problem to be managed. Palakkad municipal areas had been selected for this study. This research study is based on primary as well as secondary data. For collecting data related to sanitary workers, they were interviewed at their work site in different wards. An interview cum schedule questionnaire was prepared to understand the socio economic features and the health impact due to handling of the waste.

Sources of Data

Primary data related to sanitary workers were collected from Palakkad municipality by using questionnaire. Out of 420 sanitary workers a sample size of 10 percentage i.e. 42 sanitary workers were randomly selected by using purposive sampling at work site. The secondary sources of information was collected from Government documents and reports and municipal office related to waste generation, type, mode, transportation, dumping, information about sanitary workers, impact on health and environment.

Tools of Analysis

Multiple regression Analysis is applied to identify the casual effect of independent variable on the dependant variable. Chi-square test had been adopted for measuring the magnitude of the discrepancy between expected and observed frequencies of the different categories of responses. In order to assess the association between socio economic status and also between collection of waste and health condition of sanitary workers chi-square test is applied.

Analysis and Findings

Table: 01 Salient features of solid waste generation in Palakkad municipality

Sl. No.	Description	Details
1	Precipitate waste generation (kg per day)	0.312
2	Waste generated per day	42 T
3	Waste collected per day	30 T
4	Bio-degradable waste 9% of total waste)	50-55%
5	Non- biodegradable wastes	50-45%

Source: Municipality

The salient features indicates that the generated waste is in a optimum size, But the analysis based on sampling and testing conducted by the municipality indicated that 42 tons per day of wastes had been generated, the quantum of wastes had been assumed as the optimum size of generated waste, due to street sweeping which would not have any adverse impact on the waste processing activities since street sweeping wastes contained mostly inert materials.

Organizational setup

The Municipal sanitation staff handles entire waste collection and transportation at present. Details of municipal staff associated with sanitation works are given below.

Table: 02 Waste Collections –Man Power Status

Sl.No.	Staff	Number
1	Health Officer	1
2	Health Supervisor	1
3	Health inspector	6
4	Joint Health Inspector	10
5	Sanitary workers	420

6	Drivers	9
7	Mechanics	1
8	Temporary workers	93
Total		541

Source: Municipality

The socio economic status of the sanitary workers who engaged in sanitation work of the municipality is shown in the following table

Table No. 03 Socio Economic Status of the Sanitary Workers

Gender		Education		Monthly income(in ₹)	
Male	12 (52.38)	Primary level	20 (47.61)	Low income 2500 to7500	28 (66.5)
		Secondary level	6 (14.28)	Middle income 7501-12500	12 (28.53)
Female	20 (47.62)	Illiterates	16 (38.09)	High income Above 12501-	2 (4.76)
		Total	42 (100.00)	Total	42 (100.00)

Source: Computed from field survey

The socio-economic characteristics of the sample sanitary workers had been shown in the table. The number of female workers had exceeded the number of male workers, the educational statuses of sanitary workers are shown that 47.61 percentages were studied at primary level, a major part of the sanitary workers about 66 percentages belonged to low income category which ranges between ₹ 2500 to ₹ 7500.

The sanitary workers monthly health expenditure is shown in the following table

Table No.04 Monthly Income and Monthly Health Expenditure of Respondent

Monthly health Expenditure (in₹)	Monthly Income(in ₹)				
	Low Income Group		Middle Income Group		High Income Group
	Number of sample respondents	Percentage	Number of sample respondents	Percentage	Number of sample respondents
300-600	3	21.4	0	0	0

601-900	9	64.2	1	16.7	0
901-1500	1	7.2	1	16.6	0
Above 1500	1	7.2	4	66.7	1
Total	24	100.00	12	100.00	2

Source: Computed from field survey

The low income groups of the sanitary workers had incurred huge expenses on health care per month when compared to the middle and high income groups of categories of sanitary workers. Among the low income groups of sanitary workers 64.2 percent or 9 respondents had spent ₹ 600 to ₹ 900 every month. Middle income groups of respondents 66.7 percent or 4 respondents out of 6 were spent an amount of above 1500 per month. Due to low income some respondents are not ready to expend anything for health purpose. They are seeking free medical care facilities provided by the Govt. authorities.

The efficiencies of solid waste collection of the sanitary workers also depend up on their age. Their association is explained in the table

Table No.05 Total Waste Collection and the Age Groups of Sanitary Workers

Variable (waste collection in kg)	No. of sanitary workers	Sanitary Workers Age Groups			Chi Square	P Value
		22-33	34-43	Above 43		
200 to 500	16	8	6	2	12.952	.043
501 to 800	6	4	2	0		
801 to 1100	8	2	4	2		
Above 1100	12	2	2	8		
Total	42	16	14	12		

Source: Computed from field survey

Table had presented the association between the two attributes namely age group and groups of categories of waste collection. The chi-square test was applied for the analysis. The Pearson's Chi-square test had indicated that the age was statistically significantly associated with total waste collection. ($\chi^2=12.952$, $df=6$, $N=21$, $p<.05$). The respondents belonging to the age group of 33 to 43 categories were found to be more likely to contribute to waste collection

The association between quantity of waste collection and trips per day is given in the following table

Table No.06 Frequency of Waste Collection in Trips per Day

Variable (waste collection in kg)	No. of sanitary workers	Sanitary Workers Waste Collection Trips		Chi Square	P Value
		1 to 2 Trips	3 to 4 Trips		
		200 to 500	16		
501 to 800	6	1	1		
801 to 1100	8	0	5		
Above 1100	12	0	6		
Total	42	9	12		

Source: Computed from field survey

To find out the strength of the relationship between total waste collection and the number of trips per day, the chi-square test was applied. The Pearson's chi-square test had indicated that the number of trips was significantly associated with total wastes collected. ($\chi^2 = 74.261$, $df = 3$, $N = 21$, $p < .05$). The strength of association between the frequencies of waste collection in trips per day is strongly associated.

Table No.07 Gender and Waste Collection

Variable (waste collection in kg)	No. of sanitary workers	Sanitary Workers		Chi Square	P Value
		Male	Female		
200 to 500	16	6	10	2.609	.455
501 to 800	6	4	2		
801 to 1100	8	6	2		
Above 1100	12	6	6		
Total	42	22	20		

Source: Computed from field survey

To investigate the association between gender and waste collection, the Chi-square test was applied. Table revealed that the result of the Pearson's chi-square test which had indicated that gender was not statistically associated with total waste collection. ($\chi^2 = 2.609$, $df = 3$, $N = 21$, $p > .05$).

The association between the educational levels and quantity of waste collection of sanitary workers is given in the table

Table No.08 Educational Level and Quantity of Waste Collection

Variable (waste collection in kg)	No. of sanitary workers	Educational level of Sanitary Workers			Chi Square	P Value
		Illiterate	Primary	Secondary		
200 to 500	16	4	8	4	11.970	.062
501 to 800	6	2	4	0		
801 to 1100	8	6	2	0		
Above 1100	12	4	6	2		
Total	42	16	20	6		

Source: Computed from field survey

To analyse the strength of the association between the educational level of the sanitary workers and the total waste collected by them the Pearson's chi-square statistics test was applied. The result had indicated that the educational levels were not significantly associated with the total waste collection at 10 percent level of significance ($\chi^2=11.970$, $df = 6$, $N=21$, $p<.1$).

The relationship between the permanency or temporary nature of sanitary workers and the quantity of waste collection is presented in the table.

Table No.09 Employment Status of the Sanitary Workers and the Waste Collection

Variable (waste collection in kg)	No. of sanitary workers	Employment status of Sanitary Workers		Chi Square	P Value
		Permanent	Temporary		
200 to 500	16	14	2	25.487	.000
501 to 800	6	4	2		
801 to 1100	8	2	6		
Above 1100	12	4	8		
Total	42	24	18		

Source: Computed from field survey

The table shown that the Pearson's chi-square test results. It had indicated that the working status, namely temporary or permanent was significantly associated with the total waste collection ($\chi^2=25.487$, $df=3$, $N=21$,

p<.05). The ‘Phi’, which had indicated that the strength of the association between the two variables. Moreover, the lack of sufficient number of sanitary workers in the study area was found to be one of the serious problems faced by the municipal authorities.

The expenditure on health and the monthly income of the sanitary workers is given in the table

Table No.10 Expenditure on Health and the Monthly Income

Variable (Monthly income in ₹.)	No. of sanitary workers	Expenditure on health (in ₹)				Chi Square	P Value
		₹.500- 1000	₹.1000- 1500	₹.1500- 2000	Above ₹.2000		
₹ 7500- ₹ 10000	26	6	14	4	2	54.671	.000
₹.10000 to ₹ 15000	14	0	2	2	10		
Above 15000	2	0	0	0	2		
Total	42	6	16	6	14		

Source: Computed from field survey

To analyse the association between expenditure on health of the sanitary workers and the various categories of their monthly income ranges, the chi-square test was applied. The Pearson’s chi-Square test had indicated that the monthly health expenditure was significantly associated with monthly income categories of the sanitary workers ($\chi^2=54.671$, $df=6$, $N=21$, $p<.05$). This meant that the low income groups had to spend large amounts of their health expenditure per month.

The health status of the sanitary workers, who engaged in the sanitation works of solid waste management are shown below.

Table No.11 Health Threat faced by of the Sanitary Workers

Diseases	Scores								Total scores	Rank
	1	2	3	4	5	6	7	8		
Diarrhea	1	1	4	2	2	38	26	14	88	4
Typhoid	1	3	1	1	2	27	31	19	85	5
Hepatitis	2	1	7	2	4	15	21	37	89	3
Malaria	19	9	41	4	33	1	2	6	115	2

Cholera	30	26	12	5	43	2	1	2	121	1
Gastroenteritis	25	34	13	1	0	1	3	3	80	6
Measles	2	0	4	36	0	0	0	3	54	7
Tetanus	1	1	2	33	0	0	0	0	37	8

Source: Computed from field survey

Major parts of the generated solid wastes are infectious, which contains infectious medical wastes and toxic wastes. Due to lack of segregation, household wastes are mixed with these wastes. The improper handling of mixed wastes causes a wide array of diseases or health risk to the sanitary workers. Now a days, cholera being the most contagious diseases ranks first among the diseases faced by the sanitary workers. Malaria and hepatitis possess the second and third rank in the score sheet with a total score of 115 and 89 as in the table. The workers were exposed to high occupational health risks on the event of present Covid threat. The risk is due to the direct handling generated waste. The exhaust fumes of waste collection trucks to and from the disposal sites, the dust from the disposal operations, leachate from wastes heaps, open burnings of wastes containing plastic wastes etc. contributes to occupational health hazardous and health problems to sanitary workers. It is a fact that the municipality has not been giving any training and capacity building programmes to the sanitary workers who are handling solid waste. Even though there is some protective care like gloves, boots, masks etc, many of them do not know how to handle these wastes. The authorities are reluctant to provide any training programme to handle different types of waste. The authorities did not organize any type of medical checkup or immunization programme to protect the health status of the sanitary workers. All these would have been aggravating the health risk of these workers in the threat of Covid.

Table No.12: Problems faced by Sanitary Workers

(Inter Correlations, Means, Standard Deviation for Sanitary Workers (N=42))

Variables	1	2	3	4	5	Mean	S.D
1.Waste Collection	-	.029	.12	.15	.061	2.3810	1.26971
2. Health Problems	-	-	.64**	-	.40**	76.5238	1.70383
				.042			
3. Nuisance Problems	-	-	-	.12	.11	28.2262	1.21587
4. Problems of Waste Collection	-	-	-	-	-.039	36.7857	6.29988
5. Diseases	-	-	-	-	-	12.5357	.91106

** Correlation is significant at the 0.01 level (2 tailed)

Table shown that the variables were significantly correlated. The strongest positive correlation was between waste problems, nuisance and diseases among the solid waste collection workers. The chi-square result had

disclosed that the correlation was significant at the 1 percent level of significance. The result had disclosed that those who were affected by nuisance problem had also been also been affected by water borne diseases. The table had disclosed that 64 percent of sanitary workers were highly affected by the nuisance problem and it was also highly statistically significant for water born diseases, and 40 percent were affected by them. This meant that all the sanitary workers had felt that it was due to the lack of equipments, cloths, and other safety equipments for the sanitary workers in the study area. The inefficiency in respect of the solid waste management services had been noticed in the study area.

Conclusion

Sanitation workers are the backbone of the waste management system, but most of them work under unhealthy working conditions — without safety gear and social security. It is suggested that they should provided with proper training, vaccinations, basic hygiene practices, social security schemes, sufficient income, health checkup, insurance packages and other health protocols. The role of the local bodies cannot be underestimated, it is the duty of the authority to maintain and implement hygienic health condition and environmental protection in the locality. With the novel corona virus disease (Covid-19) pandemic showing no signs of abating, sanitation workers are at an increased risk of exposure. Sanitation workers should be considered essential and allowed to continue their work even if movement restrictions are implemented. They should follow standard safety precautions and hygiene practices when handling waste. Additional Covid-19 related precautions are necessary only to prevent person to person transmission between workers in the workplace including physical distancing and frequent hand hygiene.

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