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A Study to Assess the Impact of Structured Teaching Programme on Solid Waste Management among Rural Households in Selected Rural Area, Bangalore

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ABSTRACT

Waste management acts as a key factor for a better environment, and the initial step begins with the management of household waste. Proper disposal of waste prevents pollution that could endanger human health and environment. Domestic waste has become one of the most significant causes of severe damage to the rural eco-environmental because of the large amount of waste discharged and improper disposal. Any material that is disposed of and no longer used is considered as waste, which includes paper, vegetables, plastics, metals, glass, containers, etc. The objective of this study is to evaluate the effectiveness of Structured Teaching Programme on knowledge regarding solid waste management among household members in rural community, Bangalore. A quantitative, quasi-experimental research design was used with a purposive sample of 60 household members. The data was collected using self-structured questionnaires to assess their knowledge. Later, intervention was provided regarding solid waste management. The pre-test results showed that 41 participants had average knowledge, 16 participants had moderate knowledge and the least 3 participants had good knowledge. Following the STP, a significant improvement in knowledge was observed, with 46 participants, who had average knowledge, 14 participants had good knowledge regarding solid waste management. There is no significant association between the pre-test scores and their selected socio-demographic variables. The study concluded that the STP was highly effective in improving the knowledge of household members regarding solid waste management.

Introduction

'In looking at waste as an entirely modern, man-made idea, I stopped viewing garbage as garbage and instead slowly started to see it as a commodity[1].

Waste is defined as any substance which is disposed after primary use which is worthless, defective and of no use. The process of collecting, processing, transporting, disposing, monitoring and managing of waste materials is known as waste management[2].

Solid waste management (SWM) is a critical component of the environment which plays a key role in maintaining public hygiene, conserving resources and preventing transmission of diseases. In many rural areas, inadequate awareness and improper waste disposal practices has led to serious health problems and environmental consequences. These rural households often lack knowledge which is necessary to manage waste effectively at the household level.

In India, it is estimated that in rural areas 0.3-0.4 million metric tonnes of solid waste are generated each day respectively[3]. The percentage of production of solid waste in Indian families for vegetables is 72%, dust is 12%, textiles is 3%, metals is 0.5% ,glass 0.4% and others 7.1%[4]. There are millions of tons of waste is generated as a result of the ordinary day to day use of a domestic premises. As per the research study Bangalore generates around 1500-2000 tons of solid waste daily. The concerns regarding solid waste management are growing due to rapid population growth, lack of awareness regarding sustainable development, and improper disposal methods such as open dumping and burning, which are common in rural settings and leads to water, soil and environmental pollution, vector-borne diseases, and other serious health hazards. There are various policies and initiatives which are taken by the government to promote solid waste management, but the lack of public awareness and participation remains a significant barrier in rural settings.

Education and awareness are key to promote knowledge and change in human behaviour. STP serves as an effective educational intervention which improves knowledge, community health outcomes, reduces environmental health pollution, empowers individuals and communities to adopt proper waste segregation, recycling and composting methods,

which reduces the environmental pollution and improves community hygiene.

Need for the study:

According to Journal of environmental and public health 2020, domestic waste composition is most waste generated where organic wastes consist of (69.1%), plastic wastes (10.6%), inert wastes (8.7%), paper wastes (4.6%), textile wastes (2.5%), metal wastes (1.2%), glass wastes (1.1%), wood wastes (0.6%), hazardous materials (1.6%)[5].

The world generates 2.01 billion tonnes of municipal solid waste annually, in which most of the percentage of waste generates due to human's domestic purposes, with at least 33 percent of that extremely conservatively not managed in an environmentally safe manner. Worldwide, waste generated per person per day averages 0.74 kilogram but ranges widely, from 0.11 to 4.54 kilograms. In India generates 62 million tonnes of waste every year[5].

The Municipal solid waste generation is predicted to grow significantly, from approximately 2.3 billion tonnes in 2023 to a projected 3.8 billion tonnes by 2050. This rise is particularly acute in low and middle-income countries, where per capita waste generation is expected to increase by 40% or more. This massive increase puts immense pressure on existing infrastructure, with the UN Environment Programme (UNEP) noting that inaction could cause the total global annual cost of waste management to almost double to a staggering USD 640.3 billion by 2050[6]. Furthermore, the environmental toll is severe, as poor disposal practices are responsible for a full 20% of the world's human-related methane emissions.

In India, the challenge is equally pressing. The country generates an average of 1,70,338 tonnes of solid waste per day (as per the Central Pollution Control Board report for 2021-22). of this generated waste, only about 53.7% is treated (91,512 TPD), leaving a significant portion either untreated or unaccounted for[7]. This inefficiency leads to soil, water, and air contamination which poses direct risks to human and animal health. The primary necessity is to develop and assess effective, targeted educational interventions, such as self-instructional modules, that can bridge this massive knowledge gap and promote responsible waste segregation and disposal practices at the household level, thus contributing to national and global sustainability goals.

Objectives

1- To assess pre-test knowledge of household waste disposal based on self structured questionnaire among rural households in Bangalore.
2- To assess the post-test knowledge of household waste disposal based on self structured questionnaire among rural households in Bangalore.
3- To find out the association between the pre-test scores with the selected demographic variables among the selected houses.

Review of literature:

A descriptive study was conducted with the aim to assess the knowledge and practice of households regarding domestic waste management, and to find out an association between knowledge and practice scores with selected demographic variables among households. The data was collected from 80 households using the structured knowledge questionnaire and practice checklist. The collected data was analysed by using descriptive and inferential statistics. The study findings reveal that on assessing the levels of knowledge, majority of the subjects (52.5%) had only moderate knowledge with total mean and SD of 10.05±3.990 and majority of the subjects had (73.8%) moderate practice score on waste management with total mean and SD of 18.09± 5.413. The knowledge and practice scores in relation to selected demographic variables were compared and tested statistically using chi- square test and found that there is no significant association between knowledge and practice. The overall findings of the study suggest that there is a need for educating the households regarding the proper domestic waste management.

A cross-sectional study was conducted among semi-urban residents of field practice area of a Medical College in Karnataka, India with the aim to determine the knowledge, attitude and practices towards household solid waste management and the perceived barriers for its proper disposal among residents of a semi-urban area. A total of 441 households were included in the study. A face-to-face interview was conducted using a pretested semi-structured questionnaire to assess the knowledge, attitude and practices among the residents towards management of household solid waste. Data was entered using Epi info mobile app and was analyzed using Easy R(EZR) software. The results of the study shows that the overall knowledge (60.3%), attitude (61.5%) and practices (72.8%) towards solid waste among the participants was near satisfactory. More than 90% were aware about the effects of inappropriate management of waste on health and environment. It was identified that having a better education and holding a skilled and professional jobs were the independent predictors of knowledge and attitude. The study concludes that gaining momentum among public towards management of solid waste can be further strengthened by taking in to account the

identified predictors like education and occupation of the residents.

A pre-experimental one group pre-test and post-test design was conducted in Kumarapalayam, Tamil Nadu. The study aims to assess the effectiveness of self-instructional module on knowledge and practice regarding domestic waste management among housewives. The study samples include 60 housewives. The data were collected by using structured questionnaire and self-prepared practice scale. The results of the study reveal that the pre-test knowledge score of mean was 9 post-test knowledge score of mean was 15 and the difference in mean percentage was 24%. The pre-test practice score of mean was 17, post-test practice score of mean was 28 and difference in mean percentage was 27.5%. It seems that the self-instruction module was effective. Paired 't' test knowledge score was 15.49 and paired 't' test practice was 21.298 at the level of significant ($P < 0.05$). Extremely significant difference was found table value of 2.00. Significant association between the knowledge of housewives and their selected demographic variables (family breadwinner occupation, source of information in waste disposal and common method of disposal of waste). No significant association between the practice of housewives and their selected demographic variables. From the findings of the study, the self-instruction module was highly effective on domestic waste management among housewives.

A quasi-experimental design with one group pre-test & post-test design was conducted in Vantamuri village, Belagavi, Karnataka. The study aims to assess the effectiveness of structured teaching programme on knowledge of household waste management among selected women. The total sample of the study consists of 50 women and was selected through convenient sampling techniques. Self-administered structured questionnaire was used as a tool for data collection. Descriptive and inferential statistics had been used for data analysis. The results of the study reveals that the overall mean knowledge score in the pre-test was 52.5% and 83.9 % in the post-test with enhancement of 31.4% and it is significant at 5% level. Among demographic variables analyzed in the study it was inferred that there is a significant association between knowledge score and the selected demographic variables on household waste management among women knowledge scores at 5% level. The study concludes that STP was effective in improving the knowledge of Women on household waste management.

A quantitative non experimental descriptive survey research design was conducted in rural Area of Mehsana District. The aim of this study is to assess the knowledge regarding domestic waste management and its effect on health among homemaker. The study sample consists of 100 homemaker and was selected through simple random sampling technique. Semi structured questionnaire was used as a tool for data collection. The results of the study reveals that the highest percentage in the demographic data including the age group35% (31-40), marital status 87% (Married women), educational qualification 38% (secondary education), type of the family 52% (nuclear family), income of the family 53% (10,000-15000), type of the house 98% (Pakka house), previous knowledge 85% (yes). It also shows that that 10% of the people had poor knowledge (score 0-8), 58% of them had average knowledge (score 9-16) and 32% of them had good knowledge (score 17-24) regarding Domestic waste management and its effect on health.

A pre-experimental one group pre-test post-test research design was conducted in selected Municipal Corporations. The study aims to assess the effectiveness of structured teaching program on knowledge, attitude and practices regarding preventive measures among solid waste collectors. The study sample includes solid waste and was selected using non-probability convenient sampling technique. Semi structured questionnaires, modified attitude scale, observational checklist was used as a tool for data collection. The data was analysed in terms of the objective and hypothesis using SPSS format. The results of the study reveal that Wilcoxon Signed rank Test value for knowledge is 6.757 which is statistically significant at 5% level of significance. Wilcoxon Signed rank Test value for attitude is 6.597 which is statistically significant at 5% level of significance. Wilcoxon Signed rank Test value for practices is 6.897 which is statistically significant at 5% level of significance. The calculated value was statistically significant at 5% level of significance. Hence the null hypothesis is rejected which shows that structured teaching program is effective. The study concludes that structured teaching program on preventive measures was found effective to increase the level of knowledge, change to favourable attitude and follow preventive practices of solid waste collectors.

Materials and Methods

- **Hypothesis:**
  - H1: There may be a significant difference between mean pre-test and post-test knowledge scores of household members regarding household waste management.
  - H2: There may be a significant association between pre-test knowledge scores of household members regarding solid waste management.

- **Research Variable:**

❖ Independent Variables – Structured Teaching Programme.
❖ Dependent Variables - knowledge of the household member.
❖ Demographic Variables- age, type of family, number of family members, religion, gender, qualifications, type of diet, marital status, type of house, ownership of the house.

- **Research Methodology:**

➢ Research Approach-Quantitative Research approach
➢ Research Design- Quasi-experimental research design
➢ Setting- Rural areas of Bangalore
➢ Target Population- Household members
➢ Sampling technique- convenient sampling technique
➢ Sample size-60
➢ Data collection instrument- Self Structured Questionnaires.
➢ Inclusive Criteria- Households who are present at the time of study is included

-Members who were willing to participate in the study.

➢ Exclusive Criteria- Household members who were not available during the time of data collection.

-Household members who were not willing to participate in the study.

- **Data Collection Tool:**

The data was selected through self-administered questionnaires. The tool consists of two parts:

❖ Section A: It consists of socio-demographic variables which includes age, type of family, number of family members, religion, gender, qualifications, type of diet, marital status, type of house, ownership of the house.
❖ Section B: A structured questionnaires were prepared in the form of multiple-choice questions which consists of questions regarding solid waste management among household members.

Results and Discussion

In the pre-test knowledge of study regarding solid waste management, majority of the study participants had average knowledge i.e. out of 60 sample almost 41 participants (17 participants in experimental group and the rest 24 participants belong to control group) had average knowledge and almost 16 participants (11 participants in experimental group and the rest 5 participants of the control group) had moderate knowledge and the least had good knowledge i.e. only 3 participants (2 participants in experimental group and 1 participant of the control group) . In post-test after STP, majority of the participants had average knowledge i.e. 46 out of 60 samples (18 participants in experimental group and 28 participants of the control group) and 14 participants (12 participants in experimental group and 2 participants of the control group) had good knowledge regarding solid waste management.

Table-1: To assess pre-test knowledge of household waste disposal based on self -structured questionnaire among rural households in Bangalore.

Pre-Test					
Sl.no	Knowledge	Experimental Group		Control Group	
		Frequency	Percentage	Frequency	Percentage
1	Poor	11	36.66%	5	16.66%
2	Average	17	56.66%	24	80%
3	Good	2	6.66%	1	3.33%

The above table shows the description of pre-test knowledge of solid waste disposal among households. The table shows that the frequency of poor knowledge in the experimental group is 11 (36.66%) and in control group its 5 (16.66%), the frequency average knowledge in the experimental group is 17 (56.66%) and in control roup its 24 (80%) and %), the frequency of good knowledge in the experimental group is 2 (6.66%) and in control group its 1 (3.33%).

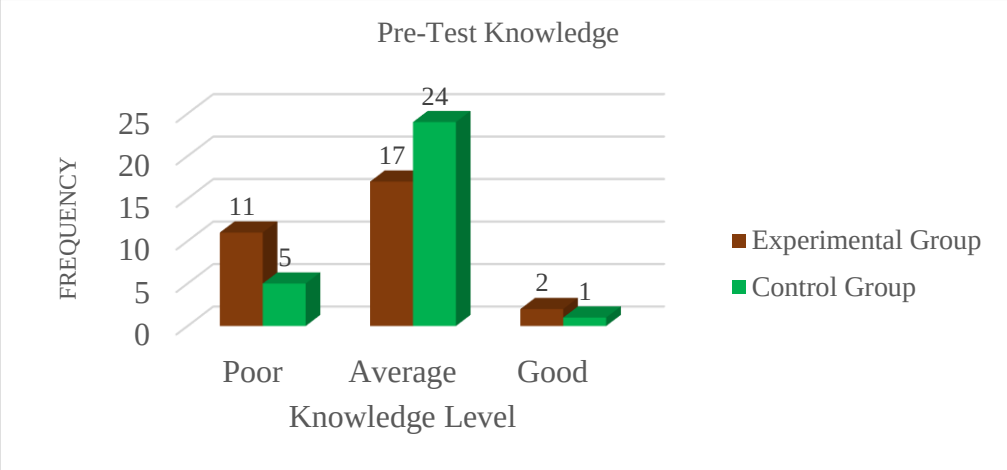

Fig 1- Depicts the pre-test knowledge between experimental group and control group

Table-2: To assess the post-test knowledge of household waste disposal based on self -structured questionnaire among rural households in Bangalore.

Post-Test					
Sl.no	Knowledge	Experimental Group		Control group	
		Frequency	Percentage	Frequency	Percentage
1	Poor	0	0%	0	0%
2	Average	18	60%	28	93.33%
3	Good	12	40%	2	6.66%

The above table shows the description of post-test knowledge of solid waste disposal among households. The table shows that the frequency of poor knowledge of experimental and control group is 0, the frequency average knowledge in the experimental group is 18 (60%) and in control group its 28 (93.33%) and the frequency of good knowledge in the experimental group is 12 (40%) and in control group its 2 (6.66%).

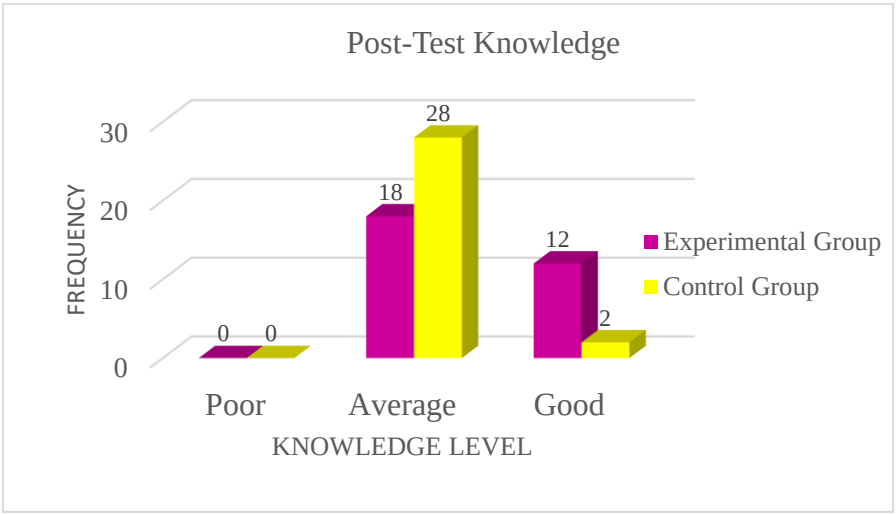

Fig 2- Depicts the post-test knowledge between experimental group and control group

Table-3: To find out the association between the pre-test scores of Experimental groups with the selected demographic variables among the selected houses.

Experimental Group							
PRE-TEST							
Sl. No	Demographic variable	Category	Below median	Above median	Chi square value	P value	Remarks
1	Age	21-30 years	7	5	2.5925	0.458	NS
		31-40 years	8	1			
		41-50 years	3	2			
		Above 50 years	3	1			
2	Type of family	Nuclear Family	15	5	2.619	0.27	NS
		Joint Family	6	3			
		Extended Family	0	1			
3	Total family members	1member	1	0	3.233	0.357	NS
		2 members	5	0			
		3 members	3	2			
		4 and above	12	7			
4	Religion	Hindu	20	9	0.443	0.931	NS
		Muslim	0	0			
		Christian	1	0			
		Others	0	0			
5	Gender	Male	4	0	1.978	0.156	NS
		Female	17	9			
6	Qualification	Illiterate	3	0	2.086	0.719	NS
		Primary school	5	2			
		secondary school	7	3			
		higher secondary school	4	2			
		Degree/diploma	2	2			
7	Type of diet	Vegetarian	2	0	1.031	0.597	NS
		Non-vegetarian	3	1			
		Mixed	16	8			
8	Marital status	Married	19	8	1.212	0.545	NS
		Unmarried	3	0			
		Divorced	0	0			
9	Type of house	Kutcha	1	0	1.027	0.598	NS
		Semi-pucca	14	5			
		Pucca house	6	4			
10	Ownership	Tenant	1	0	3.32	0.19	NS
		Owner	15	8			
		Monthly Rent	6	0			

Table-4: To find out the association between the pre-test scores of control group with the selected demographic variables among the selected houses.

Control Group							
PRE-TEST							
Sl. No	Demographic variable	Category	Below median	Above median	Chi square value	P value	Remarks
1	Age	21-30 years	6	2	6.176	0.103	NS
		31-40 years	2	8			
		41-50 years	1	3			
		Above 50 years	4	4			
2	Type of family	Nuclear Family	10	13	0.194	0.9	NS
		Joint Family	1	2			
		Extended Family	2	2			
3	Total family members	1member	1	0	2.205	0.53	NS
		2 members	3	2			
		3 members	3	5			
		4 and above	6	10			
4	Religion	Hindu	13	13	3.529	0.317	NS
		Muslim	0	4			
		Christian	0	0			
		Others	0	0			
5	Gender	Male	4	2	1.662	0.19	NS
		Female	9	15			
6	Qualification	Illiterate	1	4	1.91	0.752	NS
		Primary school	2	3			
		secondary school	2	2			
		higher secondary school	6	7			
		Degree/diploma	2	1			
7	Type of diet	Vegetarian	1	3	1.534	0.464	NS
		Non-vegetarian	0	1			
		Mixed	12	13			
8	Marital status	Married	11	16	0.739	0.691	NS
		Unmarried	2	1			
		Divorced	0	0			
9	Type of house	Kutcha	1	2	0.145	0.929	NS
		Semi-pucca	9	11			
		Pucca house	3	4			
10	Ownership	Tenant	0	1	1.357	0.507	NS
		Owner	10	14			
		Monthly Rent	3	2			

The major findings of the study were discussed under the following headings:
1. Demographic of household members.
2. Assessment of characteristics of knowledge regarding solid waste management among household members.
3. Assessing the effectiveness of structured teaching programme on knowledge regarding solid waste management among household members.
4. Association between pre-test knowledge scores with selected demographic variables.
5. Testing of hypotheses.

Discussion

The study result shown that out of 60 samples, 41 participants (17 participants in experimental group and the rest 24 participants belong to control group) had average knowledge and almost 16 participants (11 participants in experimental group and the rest 5 participants of the control group) had moderate knowledge and the least had good knowledge i.e. only 3 participants (2 participants in experimental group and 1 participant of the control group) . In post-test after STP, majority of the participants had average knowledge i.e. 46 out of 60 samples (18 participants in experimental group and 28 participants of the control group) and 14 participants (12 participants in experimental group and 2 participants of the control group) had good knowledge regarding solid waste management.

In the pre-test (Experimental Group) the investigator found that majority of the households 56.66% had average knowledge, 36.66% had poor knowledge, and only 6.66% had good knowledge. In control group, the results reveals that majority 80% had average knowledge, 16.66% had poor knowledge and 3.33% had good knowledge.

In the post-test (Experimental Group) the investigator found that 0% had poor knowledge, 60% had average knowledge and 40% had good knowledge. In control group the results shows that 0% had poor knowledge, 93.33% had average knowledge and only 6.66% had good knowledge.

The overall mean of the research study is 8. The results study shows that there is no significant association between the pre-test scores of both experimental and control group as well as the socio-demographic variables.

Recommendations

On the basis of the findings of the study following recommendations have been made:

- A similar may be conducted on a large sample of household members for generalization of the study findings.
- The similar study can be conducted as a descriptive type of study.
- Generalization of the findings is limited to a particular location.
- A similar study can be conducted as true experimental study.
- A similarly study can be conducted through video teaching method.

Conclusion

The aim of the study was to assess the effectiveness of structured teaching programme on knowledge regarding solid waste management among households in selected rural area of Bangalore. The study concludes that in the pre-test test (Experimental Group) 56.66% had average knowledge, 36.66% had poor knowledge and only 6.66% had good knowledge. In control group, the results reveal that majority 80% had average knowledge, 16.66% had poor knowledge and 3.33% had good knowledge.

Therefore, there was a need to provide structured teaching programme to increase their knowledge which leads to the change in the behaviours of waste management. After STP, the study reveals that in experimental group 0% had poor knowledge, 60% had average knowledge and 40% had good knowledge. While, in control group the results shows that 0% had poor knowledge, 93.33% had average knowledge and only 6.66% had good knowledge.

The study concluded that the Structured Teaching Programme was highly effective in improving the knowledge of solid waste management among the household members. The significant difference between pre-test and post-test scores demonstrates that educational interventions can successfully enhance awareness among household members in the community. The study also shows that there is no significant association between the pre-test scores and the socio-demographic variables.

Conflict of Interest: The authors declare that there was no conflict of interest.

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