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RESEARCH ARTICLE

EVOLVEMENT OF THE STANDARD SCALE TO APPRAISE THE CURRENT KNOWLEDGE OF HOMEMAKERS REGARDING HOUSEHOLD WASTE MANAGEMENT.

***Ms. Kalpana Srivastava (Ph.D.Scholar) (SICART)[1] and Dr.Nidhi Gupta[2].**

1. Associate Professor, Dept.of Family Resource Management, S.M.Patel College of Home Science, Vallabh Vidya Nagar, Gujarat.E-amil: kalpanaisha14@gmail.com
2. Associate Professor, Dept.of Family Resource Management, S.M.Patel College of Home Science, Vallabh Vidya Nagar, Gujarat.

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Abstract

Waste management is all the activities that required to manage waste from its origin to its final disposal. There are a number of concepts about household waste management which vary in their usage between rural and urban zones of different countries. For appropriate household waste management it's essential that homemakers should have knowledge about types of waste, segregation of waste, means of waste and 3R i.e. reducing, reusing and recycling of household waste. In the present study the scale was evolved to appraise the current knowledge of homemakers regarding household waste management. The reliability, difficulty index and discrimination index were analysed on 470 respondents to formulate the standardized scale. The scale was divided into two groups of household waste segregation and household waste disposal. Initially there were 48 statements with the .86 reliability. Statements with high difficulty index and low discrimination index were eliminated from the scale and that resulted into the increase of the reliability of the scale. Finally the scale was evolved with 28 statements in total that consisted of 12statements in segregation of household waste and 16 statements in disposal of household waste and with .89 reliability of the scale.

Introduction:-

Solid waste may be defined as generation of undesirable substances which is left after they are used once. They cannot be reused directly by the society for its welfare because some of them may be hazardous for human health. The amount of solid waste generation is directly proportion to population.As the result of rapid increase in production and consumption, urban society rejects and generates solid material regularly which leads to considerable increase in the volume of waste generated from several sources such as, domestic wastes, commercial wastes, institutional wastes and industrial wastes.(2009-Rajput, Prasad &Chopra)

Corresponding Author:-Ms. Kalpana Srivastava
Address:-Associate Professor, Dept.of Family Resource Management, College of Home Science, Vallabh Vidya Nagar, Gujarat.

The study on reduction, reuse and recycling of solid waste in a town of Nigeria shows that above72% people have the knowledge that solid waste can be reduced, reused and recycled. However, it should be noted that having knowledge that waste can be reduced does not mean that they have knowledge of how to reduce waste from source. For the fact that residents know so as to waste can be reused doesn't mean that they are reusing wastes. The trouble is, merely knowing something is not, by itself, sufficient to generate beneficial outcomes. There is a need for the residents to be educated or informed on how solid waste can be reused and reduced from source. The continuing exponential growth of solid waste generation in the study areas suggests that the widespread knowledge of the need to cut back on waste production is hardly producing practical beneficial effects. Knowledge must be backed by willingness and ability to act upon it. (2013- Awopetu, Coker, Booth, Fullen)

It is communal that people in the society face lot of problems due to waste, and household waste is one of the significant issue. It should be noted that if waste management is not a felt need, this will have consequences for their participation in the service and their willingness to pay for waste management services. A possible solution to the problem of lack of community priority for proper waste management is knowledge related to household waste management.

Rationalization of the present study:-

Knowledge simply refers to the condition of knowing something. Knowledge is powerful and important part of life. Knowledge of the respondents is one of the significant variables in any research study. To evaluate the knowledge of the respondents is difficult. In many research studies the scale for measuring the knowledge regarding waste were used which were indistinguishable in many components. From the review it had been revealed that no standardized scale was used consisting all the aspects of knowledge regarding household waste management. Therefore to overcome this lacunae, evolvement of the standard scale consisting various aspects e.g. segregation of household waste, disposal of household waste and knowledge about reusing, reducing and recycling of household waste, has been undertaken in the present study .

Objectives of the study:-

(1) To carry out thorough review of literature with reference to the area of research.
(2) To develop a list of assorted statements based on facts and related researches on household waste.
(3) To test the reliability, item difficulty and discrimination index to standardize the knowledge scale to appraise the current knowledge of homemakers regarding household waste management

Methodology:-

Selection of Tool: To prepare knowledge scale on household waste management comprehensive review of literature was conducted with the help of research studies, research papers and articles from newspapers and online magazines. A list of assorted statements related to types of waste, segregation of household waste, disposal of household waste and reusing, reducing and recycling of household waste was prepared that included 48 statements in total where the score was YES=2 and NO=1.

The scale was also divided in to two division of household waste management

- Knowledge regarding Segregation of household waste- Comprise of 21Statements.
- Knowledge regarding Disposal of household waste- Comprise of 27 Statements.

Sample Selection:- To check the reliability of the scale and each statement a pilot study was conducted on 45 homemakers. Sample selection was done through stratified random sampling technique. The study area had 9 wards in total out of which 5 homemakers were randomly selected from each ward. The reliability of the scale, item difficulty and discrimination index were tested on 470 total respondents including those 45 respondents.

Scoring of the Scale:- Seeing as Cronbach's alpha is the most common measure of internal consistency ("reliability"), it was selected to check the reliability of the given statements.

Item analysis of the statements:-The item analysis was done on the lines of technique used by Jha and Singh (1970) which yielded three kinds of information viz., index of item difficulty, index of item discrimination and index of item reliability. The index of item difficulty indicated the extent to which an item was difficult to understand while the index of item discrimination was to find out whether an item really discriminated a well-informed from poorly informed group. The index of item reliability provided the information on how well an item

measured or discriminated in agreement with rest of the test. The 35 items were administered to 45 respondents who were included in the sample of total 470 respondents as well as in the pre-testing. Each statement was provided with two options either correct or incorrect. Each correct answer the score given was '2' while incorrect answer it was given '1'. The total score secured by all individual respondents on 35 items for correct answers was the knowledge score.The scores obtained by 470 selected respondents were arranged in descending order and divided into six groups i.e. 78 respondents in the four groups and 79 respondents in the two groups. The groups were named as G1, G2, G3, G4, G5 and G6. The ranges of score obtained by the respondents of six groups were as follows:

Table 5:-Range of Scores obtained by the respondents.
N= 470

Sr. No.	Score out of 35	Respondents
G1	35 – 33	78
G2	32 – 31	78
G3	30 – 29	79
G4	28 – 25	79
G5	24 – 18	78
G6	17 - 10	78

For the purpose of item analysis, the middle two groups G3 and G4 were eliminatedkeeping four extreme groups with high and low scores. The data pertaining to the correct response for all the items in respect of these four groups were tabulated forcalculating the difficulty and discrimination indices.

Item difficulty index (P):-Item difficulty is simply the percentage of respondentstaking the test who answered the item correctly. The larger the percentage gettingan item right, the easier the item. The higher the difficulty index, the easier the itemis understood to be (Wood, 1960). To compute the item difficulty, divide the numberof people answering the item correctly by the total number of people answeringitem. The proportion for the item is usually denoted as p and is called item difficulty(Crocker & Algina, 1986).

An item answered correctly by 85% of the examinees would have an item difficulty, or p value, of .85, whereas an item answered correctly by 50% of the examineeswould have a lower item difficulty, or p value, of .50. The index of item difficultywas worked out as the percentage of the respondents answering on items correctly.

The assumption in this item index of difficulty was that the difficulty is linearlyrelated to the level of respondent's knowledge about household waste management.

When a respondent answered an item, it was assured that the item was less difficultthan his ability to cope with it. It was calculated by following formula:

$$p_i = \frac{Ai}{Ni}$$

Where: *p*i = Difficulty index of item *i.*
*A*i = Number of correct answers to item *i.* and
*N*i = Total Number of respondents *i.*
\To illustrate, P or item no.9 (Table 6) was worked out in this way

$$P_i = 318 / 470$$
$$P_i = 0.68$$

Discrimination Index:-If the test and an item measure the same ability or competence, we would expect that those having a high overall test score would have a high probability of being able to answer the item. We would also expect the opposite, which is to say that those having low test scores would have a low probability of answering the item correctly. Thus, a good item should discriminate between those who score high on the test and those who score low. Usually two ways of determining the discriminative power of an item are use: the discrimination index and the discrimination coefficient. Although there are various similar ways of calculating the discrimination index, in this work we will use the following formula:

$$Di = \frac{(G1+G2)-(G5+G6)}{N/3}$$

Where:
Di = Discrimination Index
G1 and G2 are higher group frequencies of correct answer.
G5 and G6 are lower group frequencies of correct answer
N = Total number of respondents in the study

Substituting the value for item number 9 of the table the value arrived at was:

$$D_9 = \frac{(65+59)-(54+36)}{470/3}$$

$$D_9 = 0.22$$

As a rule of thumb, in terms of discrimination index, .40 and greater are very gooditems, .30 to .39 are reasonably good but possibly subject to improvement, .20 to.29 are marginal items and need some revision, below .19 are considered poor itemsand need major revision or should be eliminated (Ebel & Frisbie, 1986).

Results and discussion:-

The reliability of the overall scale came out to be ,86 with 48 statements but it was found that some statements had .0 to .1 Corrected Item-Total Correlation and if that particular item is deleted the reliability would increase. For this reason all those 13 statements having .0 –to .1 corrected item-total correlation were eliminated from the scale.

It was revealed through the analysis that the reliability of the scale has increased from .86 to .88 (Ref. Table No.1). The reliability for Segregation of Household Waste and Disposal of Household waste were also checked by the same technique (Ref. Table No.2 & 3). The remaining 35 statements were again analyzed on the basis of difficulty index and discrimination index.

Reliability of Overall Scale:-
Table 1:-

Reliability Statistics		Scale Statistics			
Cronbach's Alpha	**No. of Items**	**Mean**	**Variance**	**Std. Deviation**	**No. of Items**
.88	35	61.32	43.17	6.57	35
.86	48	87.76	46.87	6.84	48

Segregation of Household Waste:-
Table 2:-

Reliability Statistics		Scale Statistics			
Cronbach's Alpha	**No. of Items**	**Mean**	**Variance**	**Std. Deviation**	**No. of Items**
.73	15	26.69	7.44	2.72	15
.69	21	38.20	8.31	2.88	21

Disposal of Household Waste:
Table 3:-

Reliability Statistics		Scale Statistics			
Cronbach's Alpha	**No. of Items**	**Mean**	**Variance**	**Std. Deviation**	**No. of Items**
.84	20	36.64	17.64	4.20	20
.80	27	47.92	18.53	4.30	27

Item difficulty index and Discrimination index of the Knowledge Scale:-

Table 4:-Comprehensive Test Score on the Knowledge of Homemakers regarding Household Waste Management.

Descriptive Statistics	
N (Total number of Homemakers)	470
Mean	26.32
Median	29.00
Std. Deviation	6.571

Item difficulty analysis And Discrimination Index:-

The item difficulty index and discrimination index were analyzed for the knowledge scale consisted of 35 statements and divided into two groups.

Knowledge related to Segregation of Household Waste:-

This section consisted of 15 statements with .73 reliability. Difficulty index and discrimination index for each statement was analyzed. It was discovered from the analysis that three statements had high difficulty index and low discrimination index. The statement number 5, 11 and 41 indicated 0.80 to 0.99 difficulty index and discrimination index below 0.19. Therefore, these three statements were eliminated from the scale. (Ref. Table No.6)

Knowledge related to Disposal of Household Waste:-

In this section there were 20 statements with .84 reliability. Difficulty index and discrimination index for each statement was analyzed. It was revealed from the analysis that four statements had high difficulty index and low discrimination index. The statement number 12, 15, 32 and 39 indicated difficulty index 0.80 to 0.99 and discrimination index below 0.19. Therefore, these four statements were eliminated from the scale. (Ref. Table No.6)

Table 6:-Statements Eliminated in the Scale of Current Knowledge of Respondentsregarding Household Waste Management.

S.No.	Statement No.	Statements	Difficulty Index	Discrimination Index
1	*5*	*Used batteries are included in hazardous household waste*	*0.82*	*0.18*
2	*11*	*For waste segregation every house should have two bins*	*0.95*	*0.15*
3	*12*	*Meaning of recycle*	*0.99*	*0.02*
4	*15*	*Recycling is a habit of reducing waste*	*0.91*	*0.12*
5	*32*	*Burning of waste in open affects the health of all*	*0.92*	*0.10*
6	*39*	*Item that can be recycled*	*0.92*	*0.19*
7	*41*	*Throwing oil paints in open is dangerous*	*0.90*	*0.18*

It had been discovered from the analysis that after eliminating the above mentioned statements from the scale due to their high difficulty index and low discrimination index, the reliability of the scale increased from .88 to .89. Following this the total statements in the knowledge scale retained were 28. (Ref. Table No.7)

Table 7:-Final Reliability of the Knowledge Scale.

Reliability Statistics		Scale Statistics			
Cronbach's Alpha	**No. of Items**	**Mean**	**Variance**	**Std. Deviation**	**No. of Items**
.89	28	49.92	38.40	6.19	28
.88	35	61.32	43.17	6.57	35

Conclusion:-

As a result the Standard Scale to Appraise the Current Knowledge of Homemakers Regarding Household Waste Management was successfully evolved with 28 statements, with 12 statements in Segregation of Household Waste and 16 statements in Disposal of Household Waste and .89 reliability of the overall scale.

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