A Study to Assess the Effectiveness of Structured Teaching Program on Knowledge Regarding Hazards of Plastic on Health and Environment among Adults in Selected Community Areas of Bharatpur Metropolitan City, Ward No-4 Chitwan, Nepal

Archana Poudel, Renjith Thomas

M.Sc Nursing, Community Nursing, SGRRIMHS College of Nursing, Dehradun, Uttarakhand, India

Abstract: *Increasing the use of plastics, improper disposal and poorly managed recycling system of their waste has led to serious loss in biodiversity, soil fertility and created an increased risk in public health in Nepal. In order to assess the awareness regarding the hazards of plastic use on health and environment, a study was carried out at the selected community area of Bharatpur Metropolitan-4, Chitwan, Nepal in 2020. The study adopted one group pre-test post-test design with structured- questionnaire. The sample size was thirty adults. Data was collected using non probability convenient sampling. The data collection were analyzed and interpreted by using descriptive and inferential statistics. In the study area, 50% of respondents were having the age group of 22-32 years, 74 % were secondary and higher secondary level, 47% were joint family type, 53% were housewife, 40 % had salary of above NRs. 15000 and 90 % were Hindu. Among them, 46.7 used dustbins, 26.7% threw in open land and 26.7 did burning for waste management. Education level, Family type and monthly income had not significantly influenced on mean pre-test knowledge score regarding plastic use. After intervention of short term training the impact was clearly seen in the respondents. The respondents' knowledge on storing hot food and impact of burnt plastic were highly significant at 1% level having chi square value of 24.16 and 11.36 respectively. Similarly respondents' knowledge associated with plastic smoke inhalation, plastic use risk for pregnant woman and time taken for plastic decompose was found significant at 5 % level having chi square value of 9.17, 5.89 and 9.82 respectively. After implementing short term teaching method, overall pre-test mean knowledge score of 9.5 was significantly enhanced to 20.46 at 1 % level which indicated that the teaching method was effective to reduce the hazards of plastics in the study area.*

Keywords: Structured Teaching Program, Plastics, Hazard, Adult, Hazard

1. Introduction

Plastic is one of the major toxic pollutants of present time. Being composed of toxic chemicals and most importantly a non-biodegradable substance, plastic pollutes earth and leads to air pollution and water pollution. Around 10 per cent by weight of the municipal waste stream is plastic (Barnes et al., 2009).This mixes with food chain effecting Environment Humans and animals (Koushal et al., 2014).Plastics are also a source of greenhouse gas pollution on burning. The plastic wastes being dumped into rivers, streams and seas contaminate the water, soil, marine life and also the air we breathe. The "Throw away culture" result blockage in the drainage system, health hazards, spreading of water borne disease and many health end environment related problems. The littering reduces the rate of rain water percolation and deteriorates the soil fertility (Karki, 2009).

In order to reduce plastic waste, the popularity of plastic waste management among public has to be enhanced by changing people' knowledge, attitudes, and behaviours towards plastic waste management. The level of formal education people have received seems to correlate directly with the amount of environmental knowledge people have and the formation of positive attitudes. In addition, the more highly educated one is, the more likely one is to engage in environmentally responsible behaviours (Chow, 2017). Some research studies found that either at-home safety consciousness (Okechukwu et al., 2012) or knowledge (Aroj et al., 2004) of waste related deleterious health effects is associated with household waste disposal strategy. Public perceptions may be positively influenced through awareness building, sensitization and education about the negative aspects of inadequate waste collection with regard to public health (Bernstein, 2004).

In Nepal, 16 percent of urban waste is comprised of plastic, which is 2.7 tons of daily plastic garbage production. People of Bharatpur Metropolitan city haphazardly use plastic and they are unaware about the hazards of plastic use. Although, there are many alternative of plastic, but adoption of those methods is very poor and mainly due to lower awareness of hazards of plastic use. So, this study was made at that locality.

2. Objectives

- To assess the pretest knowledge of hazards of plastic use on human beings, animals and on environment in the study area.
- To evaluate the effectiveness of structured teaching program on knowledge of hazards of plastic use with

prevention measures to reduce the impact of haphazard use of plastic.
- To determine the association between pretest knowledge score, different perception on hazards of plastic use with their demographic variables.

Hypotheses

H1:-There is a significant difference between the mean pretest and post-test knowledge scores of sampled households regarding knowledge of hazards of plastic use.

H2:-There is a significant association between the mean pretest knowledge scores and different perception on hazards of plastic use with selected demographic variables.

3. Methodology

The study was carried out in Bharatpur Metropolitan city, ward no. -4, Chitwan district of Nepal from 10th August 2020 to 10th September 2020. It lies almost middle part of Terai region of Nepal. Sample size was 30 young adults residing on that area having age group between 18 to 35 years. The design was Pre-experimental (One group pre-test and post-test research design).The reliability test was administered on three samples using Karl Pearson Co-relation coefficient formula. The tool was found highly reliable (r=0.073). Data was collected using non probability convenient sampling. Demographic characteristics comprised of Age, Religion, education status, occupation, type of family and income were analysed using frequency and percentage. Mean, median and standard deviation (descriptive statistics)were used to assess the effectiveness of planned teaching programme. Thirty close ended questionnaires of multiple choice types regarding all aspects of hazards of plastics on health and environment were made for the study. Paired t-test and Chi-square test (inferential statistics) were applied for analysing and interpretation of the data. Level of significance was set at 0.05 to interpret the hypothesis and finding.

4. Results

Distribution of respondents according to demographic variables

Percentage distribution of sampled households (n=30) showed that, 50 percent of the respondents were in between the age category of 28 to 32 years and 26.67 percent were in between the 23 to 27 years. Secondary and higher secondary level of education was the dominant (74%) education level followed by primary level (16.17%). Majority of respondents were housewife (53%) followed by private (17%), self (13%) and government (10%) employee and rest seven percent were student. 47 % of the sampled household had joint family type followed by nuclear family type (40%). Mainstream of the respondent (40%) had monthly income above NRs. 15000.

Percentage distribution of sampled households according to the ways of waste disposal shows that, 46.67 percent of

use dustbin as a way of waste disposal, 26.67 percent disposes their waste on open land and 26.67 percent of the sampled households dispose their waste by burning.
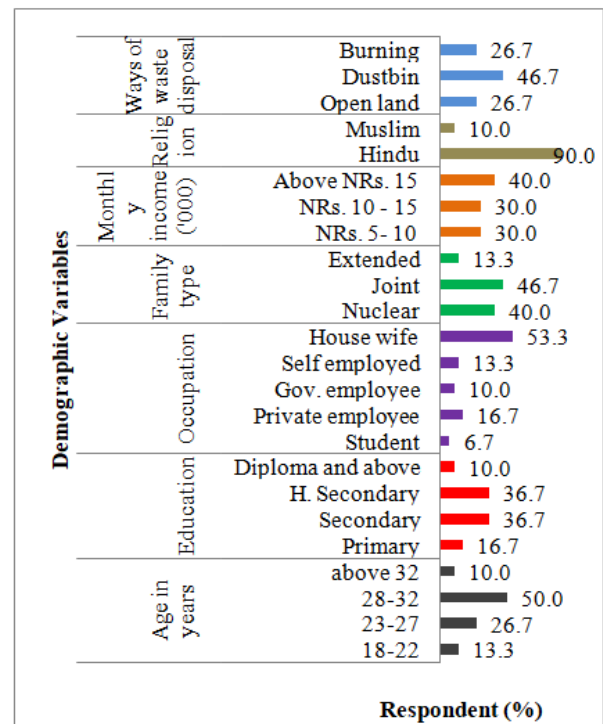
Figure 1: Distribution of respondents according to demographic variables

Association between pre-test knowledge scores and perception variables on hazards of plastic use with their demographic variables

The study revealed that mean pre-test knowledge score on hazards of plastic use was statistically similarly distributed with different education level, family type and different monthly income with the p-value of 0.742, 0.17 and 0.62 respectively. Similarly, the relationship of ways of waste disposal to education level and family type was statistically non significant having chi square value of 7.13 and 3.90 and p value of 0.308 and 0.41 respectively.

Table 1: Association of pre-test knowledge score and different education level, Family type and monthly income of sampled household (N=30)

	Mean pre-test knowledge score	F-value	p-value
Education			
Primary	9 (4.35)	F (3, 26) = 0.41	0.742
Secondary	8.81 (4.04)		
H. secondary	10.18 (1.94)		
Diploma &above	10.33 (2.08)		
Family type			
Nuclear	9.33 (2.87)	F (2, 27) = 1.87	0.17
Joint	8.85 (3.57)		
Extended	12.25 (1.5)		
Monthly income('000)			
NRs. 5 - 10	10.22 (2.77)	F (2, 27) = 0.48	0.62
NRs. 10 - 15	9.66 (2.64)		
Above NRs. 15	8.83 (3.95)		

Impact of short term teaching methods on knowledge of hazards of plastic use and prevention methods

After short term teaching, the significant enhancement of respondents' knowledge from 13.33 to 73.33 percent was obtained regarding on the effect of storing hot food on plastic container with the chi square value of 24.16 at 3 degree of freedom. Similarly, the differences in respondent perception on burnt effect of plastic found statistically significant at 1 % level having chi square and p value of 11.36 and 0.003 respectively at 2 degree of freedom. Respondents' knowledge regarding the produce of toxic smoke due to burnt plastic enhanced from 46.67 to 86.67 percent.

Before training, almost 50 percent of sampled households perceived that baby with defective organs will born if the women haphazardly use plastic during pregnancy period. After teaching, significantly higher (73.33%) of the sampled household were aware and knew that baby with defective organs will born if the women haphazardly use plastic during pregnancy period.

Table 2: Association of Waste disposal method with education level family type sampled household (N=30)

	Waste disposal on			Chi-square Value
	Open land (n=8)	Dustbin (n=14)	Burning (n=8)	
Education				
Primary	1 (12.5)	2 (14.29)	2 (25)	7.13 (p=0.308 at 6 df)
Secondary	3 (37.5)	7 (50)	1 (12.5)	
H.Secondary	2 (25)	4 (28.57)	5 (62.5)	
Diploma & above	2 (25)	1 (7.14)	0 (0)	
Family type				
Nuclear	4 (50)	7 (50)	1 (12.5)	3.90 (p=0.41 at 4 df)
Joint	3 (37.5)	6 (42.86)	5 (62.5)	
Extended	1 (12.5)	1 (7.14)	2 (25)	

In the study area, almost 43.33 percent of the sampled household were aware about the fact that inhalation of the smoke released during plastic burning causes lung problems, 20 percent perceived inhalation causes brain damage, 26.67 percent perceived inhalation causes vomiting and 10 percent perceived inhalation causes diarrhoea. After the implication of short term training, almost 80 percent were aware about the fact that inhalation of smoke released during plastic burning cause lung problems. These differences on knowledge level about the harmful effect of inhalation of plastic burn smoke before and after short term teaching method found statistically significant at 5 percent level having chi square value of 9.17 at 3 degree of freedom.

After teaching, significantly higher (73.33%) of the sampled household were aware and knew that baby with defective organs will born if the women haphazardly use plastic during pregnancy period. These association and differences before teaching and after teaching found statistically significant having chi square value of 5.89 and p value of 0.05.

Table 3: Impact of training on general hazards of plastic

	Before training (n=30)	After training (n=30)	Chi-square value
Hot food should not be stored in			
Plastic container	4 (13.33)	22 (73.33)	24.16*** (p=0.001 at 3 df)
Steel container	4 (13.33)	0 (0)	
Glass container	11 (36.67)	6 (20)	
Mud pots	11 (36.67)	2 (6.67)	
Plastic when burnt causes			
Dark smoke	13 (43.33)	4 (13.33)	11.36*** (p=0.003 at 2 df)
Toxic smoke	14 (46.67)	26 (86.67)	
Ashes	3 (10)	0 (0)	
Inhalation of the smoke released during plastic burning causes			
Lung problems	13 (43.33)	24 (80)	9.17** (p=0.027 at 3 df)
Brain damage	6 (20)	1 (3.33)	
Vomiting	8 (26.67)	4 (13.33)	
Diarrhea	3 (10)	1 (3.33)	
Risk due to plastic use in pregnant women			
Baby with defective organs	15 (50)	22 (73.33)	5.89** (p=0.05 at 2 df)
Baby with more weight	7 (23.33)	1 (3.33)	
Baby with less weight	8 (26.67)	7 (23.33)	
Plastic takes to decompose			
500 years	8 (26.67)	20 (66.67)	9.82** (p=0.02 at 3 df)
400 years	7 (23.33)	3 (10)	
600 years	12 (40)	5 (16.67)	
200 years	3 (10)	2 (6.67)	
Prevention of hazards of plastic will be done by			
Reduce the use	4 (13.33)	3 (10)	7.69* (p=0.05 at 3 df)
Recycle	6 (20)	2 (6.67)	
Reuse	7 (23.33)	2 (6.67)	
All of the above	13 (43.33)	23 (76.67)	

Note: Figures in parentheses indicate percentage. ***, **, and * denotes significant difference at 1, 5 and 10 % level.

The association and differences before and after teaching on knowledge level about decomposition period of plastic found statistically significantly different at 5 percent level with chi square value of 9.82 and p value of 0.02.

Before teaching, almost 43.33 percent of the sampled household agreed to reduce hazards of plastic use by reducing the use, recycling and reusing the plastic and after training almost 76.67 percent of the sampled household agreed to reduce hazards of plastic use by adopting different prevention strategies. After implication of teaching method, respondents' consent on 'say no to plastic' raised from 46.67 to 76.67 percent.

Pre-test and post-test knowledge level

The study revealed that, before teaching, mean knowledge score on hazards of plastic use was 9.5 (3.21%) with standard deviation of 3.21 while after teaching, knowledge score on hazards of plastic use was 20.46 (68.2 %) with standard deviation of 4.24. Significant difference of mean knowledge score before and after teaching was 10.96 which accounts 36.53 enhancement, implying teaching method significantly increased knowledge score on hazards of plastic use.

Table 4: Knowledge score on hazards of plastic use considering impact of teaching

Variable	Before teaching (n=30)	After teaching (n=30)	Mean difference	Paired t-value	p-value
Knowledge score on hazards of plastic use	9.5 (3.21)	20.46 (4.24)	-10.96***	-9.62	0.001

Note: Figures in parentheses indicate standard deviation. *** indicates significant difference at 1% level.

5. Discussion

This study found that, Almost 90 percent of the respondents were between the ages categories of 18 to 32 years old, signifying that most of the respondents were adult. Comparing with national data, almost 26 percent of the total population of Nepal is between the age group of 20 years to 34 years (CBS, 2018). The higher proportion of adult in the study may be due to the purposive sampling method and due to the research interest considering the adults of the community. In Chitwan district of Nepal, almost 22 percent of the educated people have completed bachelor's level of education (CBS, 2016). Main reason for the lower number of diploma and above level educated people in this study may be due to higher proportion of house wife in sample. Employment status in the survey area found comparatively higher than national status and found almost similar with district scenario. Considering the employment of Nepalese people, almost 34 percent of the total population is employed in different private and public sector. In Chitwan district of Nepal, almost 48 percent of the residents are employed in any type of the jobs (CBS, 2018). Distribution of monthly income almost found similar with the national data. Per capita income of Nepalese people is almost 125000 per year (GON, 2019). Almost 85 percent of the sampled household had annual income range of 120000 per year to 140000 per year, which was almost similar with national scenario. Irrational way of plastic disposal found in this study is almost similar with the study of Bharadwaj et. al (2020). He found that, in the urban area like Kathmandu, Biratnagar, Chitwan, Bhaktapur and Lalitpur, almost 70 percent of the household use plastic for different purposes and among them 87 percent had not recycled and reused.

The finding of association of plastic use with education level in this study found contrast with the study of Pokhrel and Viraraghavan (2005). They found that highly educated people with higher degree of education had more knowledge on hazards of plastic use than people having lower degree of education. In case of Chitwan and in recent times, many plastic users, either highly educated or lower educated, carelessly dispose their plastic waste and they do not intend to learn about the negative impact of plastic on human and environment where as the association with family type is in line with the study of Baradwaj, et.al (2020), they found that knowledge on hazards of plastic use is directly related with the education level, training taken, extension services taken by the household but not affected by the size and structure of the family. The finding of non- significant relationship between the education level and ways of waste dispose wasin contrast with the study of Weldan (2020). He found that, education level had significant positive impact on knowledge on hazards of plastic use. Higher educated people had highly reused and recycled plastic than lower educated people. They had used to collect and sell the plastic in recycled organization rather than haphazardly throwing away. The reason behind this contrasting finding may be due to the study location. The non significant association of family type and ways of waste disposal in this study was also found contrasting with the study of Ghimire (2008). He found that, plastic use and disposal is higher for joint family structure than nuclear family. Awareness campaign conducted in that study area, significantly affected the knowledge level of people about the harmful effect of poisonous gases released from burning of plastic. After teaching, significantly higher (73.33%) of the sampled household were aware and knew that baby with defective organs will born if the women haphazardly use plastic during pregnancy period. Study conducted by Alharbi, et.al (2020) found that all the chemical exposures or additives are known to cause developmental problems in children. Additionally, pregnant women are particularly susceptible to the effects of these contaminants, which may eventually affect the fetus.

The study revealed that short term teaching method had enhanced almost 36.53 percent knowledge score on hazards of plastic use and found effective way to increase the knowledge level. The mean difference between pre and post-test knowledge score was true difference and not a chance differences. This indicated that planned teaching program on hazards of plastic use was significantly effective in increasing the knowledge level of selected community.

6. Conclusion

This study found that, before short term teaching, mean pre-test knowledge score on hazards of plastic use was not affected by education level of adults. Statistically similar knowledge score was there for different education level of adults. Distribution of mean pre-test knowledge score according to the family type and monthly income found statistically similar. The relationship of waste disposal ways with the education level and family type found statistically non-significant. Before implementing program adults' mean knowledge score of 9.5suggested that use of plastic is increasing day by day but knowledge level on effects of plastic found very low but after teaching, their mean knowledge score of 20.46 signifies that short term teaching method was effective. Besides raising awareness, this study also gave the possible intervention to reduce, reuse and recycle of plastic to decrease the hazards. With this short term teaching method, knowledge on hazards of plastic use was enhanced by 36.57 percent, which could be very effective to reduce the hazards of plastic in the study area.

7. Implications

The findings of present study held in provided the useful information to the health care providers, health educators and teachers to improve the knowledge and skills of adults. It is also implicated for general education, nursing education, nursing service, nursing research and nursing administration.

8. Recommendations

- A Similar study can be conducted on a larger sample for wider generalization.
- A similar study may be replicated with control groups.
- Effectiveness of health education can be assessed using other focus groups, key informants like NGOs, social workers etc.
- Comparative studies could be conducted considering urban and rural areas.
- A descriptive study can be conducted to find out the attitude and practice regarding hazards of plastic use.
- The study can be conducted at different settings.

Acknowledgement

References

[1] Alharbi, M. H., Mumena, W. A., & Hammouda, S. A. (2020). Use of Plastics with Hot Food among Saudi Pregnant Women Is Associated with Increased Concentrations of A1C, Thyroid-Stimulating Hormone, and Homocysteine and Decreased Concentrations of Vitamins and Minerals. Nutrients, 12(9), 2609.

[2] Aroj B., M. Muhammad, A. Ushahid, & M. Qasim, (2004). "Epidemiology impact of solid waste and assessment of awareness level among rural areas of Pakistan, " American-Eurasian Journal of Agricultural & Environmental Sciences, vol. 14, no. 9, 831–837

[3] Barnes D. K. A., Galgani F., Thompson R. C., Barlaz M. (2009). Accumulation and fragmentation of plastic debris in global environments. Phil. Trans. R. Soc. B 364, 1985–1998 (doi:10.1098/rstb.2008.0205) [PMC free article] [PubMed] [Google Scholar]

[4] Bharadwaj, B., Baland, J. M., & Nepal, M. (2020). What makes a ban on plastic bags effective? The case of Nepal. Environment and Development Economics, 25(2), 95-114.

[5] CBS (2016). Statistical year book Nepal (Sixteenth). Central Bureau of Statistics (CBS). http://cbs.gov.np/image/data/2018/Statistical Year Book 2016.pdf

[6] CBS (2018). Statistical year book Nepal (Eighteen). Central Bureau of Statistics (CBS). http://cbs.gov.np/image/data/2018/Statistical Year Book 2018.pdf

[7] Chow, C., S, Winnie. S, Cheung, Y.T & Yeung Siu, K. (2017). Plastic Waste Problem and Education for Plastic Waste Management. 10.1007/978-981-10-3344-5, 8.

[8] Ghimire, H. (2008). An assessment of the environmental problems in the Kathmandu valley of Nepal (Doctoral dissertation, Miami University).

[9] Koushal V., Sharma, R., Sharma, M., Sharma, R. and Sharma, V. (2014). Plastics: Issues Challenges and Remediation. International Journal of Waste Resources, 4:1 DOI: 10.4172/2252-5211.1000134.

[10] Okechukwu, O. I., Okechukwu, A. A. Noye-Nortey, H. & Agyei, O. (2012). "Health perception of indiscriminate waste disposal—a Ghanaian case study, " Journal of Medicine and Medical Sciences, vol. 3, no. 3, pp. 146–154.

[11] Pokhrel, D., & Viraraghavan, T. (2005). Municipal solid waste management in Nepal: practices and challenges. Waste Management, 25(5), 555-562.

[12] Welden, N. A. (2020). The environmental impacts of plastic pollution. In Plastic Waste and Recycling (pp. 195-222). Academic Press