A STUDY TO IDENTIFY THE BARRIERS FOR IMPLEMENTATION OF STRATEGIES TO MINIMIZE PLASTIC USAGE AT HOUSEHOLD LEVELS IN SRI LANKA

D.K.P.G. Yashodha Swarnamali Polgolla*, W.M.G. Randika Wickramaratne, and K.C. Weerakoon

Department of Zoology, The Open University of Sri Lanka, Nugegoda, Sri Lanka

Abstract

Plastic pollution has damaged the terrestrial and aquatic ecosystems severely. This is leading to the destruction of the ecosystem, harming all living species. Considering the magnitude of the excessive toxic effect of plastic on the biosphere, as a remedial measure, rapidly increasing household-level plastic usage is required to be minimized. To find a possible solution to the thematic area, knowledge, practices and attitudes (KPA) of the community were assessed using a questionnaire. A total of two hundred and ninety-one (covering 19 districts in Sri Lanka) responses were collected from randomly selected spectators of the Kandy Parade within ten days in 2022. The collected data was analysed using a simple calculation method for close-ended questions. According to the significant findings of this study, 41.3% of the respondents were male and 58.7% were female. Out of them, 14.9% were below 20 years, 51.6% were 20-40 years, 27.6% were 40-60 years, and 5.6% were above 60 years. Further, 99.3% of the respondents were aware that plastic causes environmental pollution, 88.4% were aware that burning plastic can cause air pollution and 91.9% were aware that plastic can be recycled. Despite their awareness that plastics are harmful to the environment and should be recycled, 58.3% of them burn plastic, 6.9% bury under the soil, 29.9% give plastic to garbage collecting trucks and 4.9% hand over directly to recycling centres. 75.3% of respondents segregate plastic from other waste as a practice. 34.1% are mostly using single-use plastics than reusable plastics. The majority of the respondents suggested that reducing the usage of plastic, recycling, using eco-friendly alternatives and implementing policies will reduce plastic pollution. However, the majority are aware of plastic pollution despite the lack of taking action as a preventive measure. Findings will directly benefit authorities to rethink to develop a framework to overcome above-stated barriers with the assistance of like-minded institutions and communities. Finally, the findings provide the necessary evidence to implement mitigation measures to reduce pollution and achieve Sustainable Development Goals: SDG 01, SDG 12, SDG 13, SDG 14, and SDG 15 providing benefits to all living species, developing a circular economic model.

Keywords: mitigation, plastic, pollution, recycle, waste

**s17001221@ousl.lk*

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1. INTRODUCTION

Plastic pollution has damaged the terrestrial and aquatic ecosystems severely. This is leading to the destruction of the ecosystem, harming all living species. Considering the magnitude of the excessive toxic effect of plastic on the biosphere, as a remedial measure, rapidly increasing household level plastic usage is required to be minimized. The global production of plastic is currently estimated to be around 300 million tons per year, while plastic pollution in the marine environment alone is estimated to be around 9.5 million tons, with a staggering 1.5 million tons ending up in the ocean annually (The International Union for Conservation of Nature, 2018, as cited in Fernando et al., 2022). Poor waste management at household levels and improper disposal of waste cause the of destruction ecosystems and risk the lives of beings. It was found that the concentrations of pollutants from sites are influenced mainly by local conditions, consumption patterns, and waste management habits of individuals (Doaemo et al., 2021).

The non-biodegradable nature of plastic is the major reason for this environmental destruction. According to Cole et al. (2013), Toxic chemical compounds can accumulate at organisms in higher trophic levels by ingestion of seafood contaminated with plastics and persistent materials, heavy metals, and pharmaceutical compounds. Accordingly, these chemical substances can enter humans through food webs, creating health issues (Thushari & Senevirathna, 2020). Based on experimental conditions, BPA and phthalate in plastic cause significant impacts on reproduction, genetic mutations, and the growth of organisms (Oehlmann et al., 2009, as cited in Thushari & Senevirathna, 2020).

The production and development of thousands of plastic products increased with the growing needs of humans. Currently, more than 400 million tons of plastic are produced every year worldwide. Especially, the single-use plastic products demand became very high covering nearly half of the total plastic production. At present, about 500,000 metric tons of plastic/polyethylene are imported to Sri Lanka annually and about 70% of it is used for domestic purposes (Fernando et al., 2022) consumption and the majority of the products are used at household levels. Increasing the production of plastic products intensifies the climate crisis as plastic is mainly produced from fossil fuels. Also, plastic products create greenhouse gas emissions across their whole lifecycle. If no immediate action is taken, greenhouse gas emissions from the production, recycling and incineration of plastics could account for 19 per cent of the Paris Agreement's total allowable emissions in 2040 if we're on track to limit warming to 1.5 degrees Celsius (Available at www.unep.org accessed on April 28, 2023).

According to these findings, it is clear that immediate and sustained attention and actions are required to overcome these barriers. In order to address the above-stated issues, a research question of "What are the barriers in implementing minimize plastic usage at the household level in Sri Lanka?" is formulated.

The following objectives of the research study formulated to;

1. Review of academic and research literature on plastic pollution at the household level to analyse the existing situation
2. Identify the knowledge on how it will contribute to the pollution of the environment
3. Identify barriers to implementing strategies for minimizing the use of plastic in Sri Lanka
4. Propose suitable policy changes to minimize plastic usage in Sri Lanka to reduce pollution due to plastic usage at the household level whereby to provide support as a means to achieve targets of SDGs and the Paris Agreement

2. METHODOLOGY AND METHODS

In order to carry out the preliminary survey to assess the barriers to the implementation of strategies to minimize plastic usage at household levels for pollution prevention in Sri Lanka, the knowledge, practices and attitudes (KPA) of the community were assessed using a questionnaire. A total of two hundred and ninety-one responses (291) were collected from randomly selected spectators of the Kandy *Esala* Parade held in August 2022 in Kandy City, Sri Lanka. The survey was carried out for ten days and data was gathered by the students of The Open University of Sri Lanka. The surveyors asked the survey questions from randomly selected spectators and recorded their responses in a Google Form. The questionnaire contained twenty questions prepared to gather the responses of the participants on plastic pollution at their household level. The collected data was analysed using a simple calculation method for close-ended questions.

Result (%) = (No. of responses / Total responses for the question) *100

Table 1: Operationalisation and Distribution of Responses

No.	Question	No. of responses	Gender (%)		Age (%)			
			Male	Female	<20	20-40	40-60	>60
1	Most comm plastic product used	282	41.11	58.89	14.07	51.48	27.78	5.93
2	Weekly plastic waste collection	251	39.26	51.48	13.33	45.93	26.3	5.19
3	Disposal of plastic waste	288	41.85	60	15.19	52.22	28.15	5.93
4	Waste segregation at household	271	40	57.04	13.7	50.37	27.41	5.93
5	Toxicity of burning of plastic	285	42.22	59.26	15.19	52.22	27.78	5.93
6	Take polythene bags at shopping	286	41.85	59.63	14.44	52.59	28.15	5.93
7	Take a cloth bag when shopping	285	41.85	59.26	14.07	52.59	28.15	5.93
8	Reduce usage at household	228	34.44	48.52	12.59	41.85	23.33	4.44
9	Alternatives used for plastic	253	37.04	53.7	13.33	46.67	25.56	5.19
10	Decomposing time of plastic	282	41.48	58.52	14.44	51.48	27.78	5.93
11	Environmental pollution by plastic	283	41.85	58.89	14.81	52.22	27.41	5.93
12	Health issues on plastic	284	41.85	58.89	14.81	52.59	27.04	5.93
13	Threat to future generations	275	40.74	56.67	13.7	50.74	26.67	5.93
14	Single-use or reusable plastic	261	39.63	54.07	14.07	47.41	26.3	5.93
15	Willingness to use alternatives	281	41.85	57.41	14.44	51.85	26.3	5.93

16	Microplastic in cosmetics	275	40.37	56.3	13.7	50.37	26.3	5.93
17	Recycling of plastics	270	41.48	55.19	14.81	49.26	26.3	5.93
18	Plastic that causes highest damage	223	35.19	45.56	12.59	41.11	22.59	4.81
19	Plastic is essential or not	280	42.22	56.3	14.44	51.11	26.67	5.93
20	Suggestions to reduce plastic	246	35.93	50.74	13.33	44.44	23.33	5.19

3. RESULTS AND DISCUSSION

A total of 291 respondents participated in this study covering 19 districts in Sri Lanka and from that total 41.3% of the respondents were male and 58.7% were female.

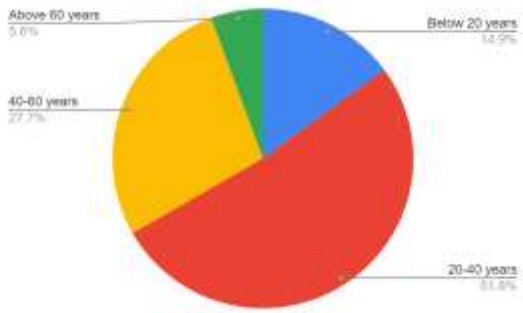

Figure 1: Age categories of the respondents

The Findings revealed that 99.3% of the respondents were aware that plastic can cause environmental pollution, and 0.7% were not aware of it. When considering the awareness of the community on the long decomposing time of plastic, 95% were aware of it, 3.9% were not aware of it and 1.1% have not given a direct answer. The majority stated that polythene bags and plastic bottles mostly cause a bad impact on the environment. Furthermore, 88.4% agreed that burning plastic can release toxic gases into the atmosphere, 7% disagreed and 4.6% of them have not given a direct answer. Of the participants, 91.9% were aware that plastic can be recycled and 8.1% were not. However, 75.3% separate plastic from general waste as a practice and 24.7% do not do so. Despite their awareness that plastics are harmful to the environment and should be recycled, the actions of burning, burying under the soil, giving plastic to garbage collection trucks, and handing them over directly to recycling centers were recorded as follows.

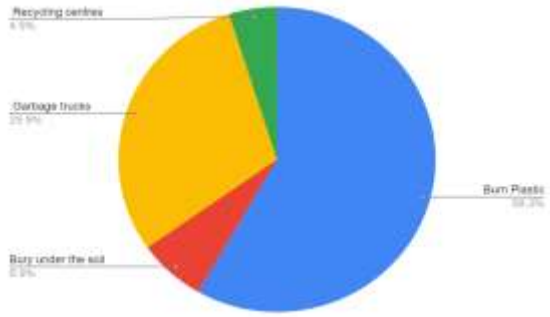

Figure 1: Method of disposing plastics

According to the respondents, the plastic products that they use the most are polythene bags, plastic bottles and plastic cups. Further, 34.1% are mostly using single-use plastic products and 65.9% are mostly using reusable plastic products. 46.9% refuse to take polythene bags from shops, 19.9% sometimes refuse and 33.2% do not refuse. 62.5% take a cloth bag as a practice when they go shopping, 17.5% of them sometimes do so and 20% do not.

According to the survey results, 95% were willing to use eco-friendly alternatives to plastic, 0.7% of them did not like and 4.3% of them didn't give a direct answer. Respondents use cloth bags, glass bottles, paper bags and clay pots mostly as alternatives to plastic. The majority suggested that reducing the usage of plastic, recycling, using eco-friendly alternatives and implementing policies will reduce plastic pollution.

4. CONCLUSIONS/RECOMMENDATIONS

The findings of the research explain that the community awareness of plastic pollution is considerably high and the majority of the respondents were aware of the harmful effects of plastics on the environment. Importantly, they were aware that plastic can be recycled. Despite their awareness of the negative impacts of plastic pollution on the environment, it is emphasized that their commitments and actions to mitigate plastic pollution at the household level are not at a satisfactory stage. In order to overcome this rapidly increasing global crisis, there is a necessity to find urgent solutions for this issue. Motivating the community to get involved in the successful practice of 3R (Reduce, Reuse and Recycle) at the household level, improving waste management systems ensuring that the right infrastructure is available to receive plastic waste can bring better solutions to this issue. Raising awareness and capacity building with more technical facilities and financial support can inspire behavioural change in the community. This can get them engaged in positive actions to enhance circularity by promoting more sustainable consumption and production practices across the entire plastic value chain. Frequent monitoring of causes of pollution, sources, quantities and the fate of the plastic can support effective decision-making in order to strengthen governance and implement suitable policy changes. The findings of this study directly benefit relevant authorities to rethink to develop a framework to overcome the above-stated barriers with the assistance of like-minded institutions and communities to mitigation of plastic pollution. Finally, implementation to reduce pollution occurred and achieved Sustainable Development Goals: SDG 01, SDG 12, SDG 13, SDG 14, and SDG 15 and indirectly all the other SDGs and support to Nationally Determined Contributions of Sri Lanka under the Paris Agreement provide benefits to all livings species and develop a circular economic model.

Keywords: mitigation, plastic, pollution, recycle, waste

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