



Research Paper

## Survey on the Impact of the waste of plastic-made materials, its disposal and their effects on human health and environment: A case study in Mogadishu City, The capital of Somalia, Horn of Africa

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Plastic bag wastes pose serious environmental pollutions and health problems in humans and animals. The situation is worsened in economically disadvantaged countries like Somalia. The objective of this survey was to assess usage of plastic bags and their environmental impacts in Mogadishu City of Somalia. A semi-structured questionnaire was used to collect data from 271 randomly selected respondents. The results indicated that the larger proportion (176, 76.52%) of the respondents used plastic bags more frequently than any other plastic products regardless of their age, occupation, and economic and educational status. Low price (159, 69.13%) and easy availability (152, 66.08%) were the main reasons for the widespread utilization of these products. Among the practices used for disposal of plastic bag wastes, open dumping to surrounding areas (137, 59.56%) was a practice widely used by almost all the residents of the city. Some of the major problems were animal death (167, 72.60%), blockage of sewage lines (162, 70.43%), deterioration of natural beauty of an environment (144, 62.60%) and human health problems (119, 51.73%). The findings of the present study also indicated that the trend of utilization of plastic bags is increasing from time to time in spite of a good deal of awareness of the residents about the adverse effects of these products. In order to reduce the problems associated with plastic bag wastes, it is recommended to educate the public (1) not to use plastic bags, and (2) to use eco-friendly alternative materials (bags) made from clothes, natural fibers and paper. City level legislation is also highly recommended against indiscriminate use and disposal of plastic bag wastes as well as to end free distribution of plastic bags by retailers.

### Key term Definitions:

- ✓ *Plastics* : are a group of materials, either synthetic or naturally occurring, that may be shaped when soft and then hardened to retain the given shape
- ✓ *Wastes*: unwanted or unusable material, substances, or by-products
- ✓ *Health*: is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.
- ✓ *Environment*: is condition of surroundings in which a person, animal, plant lives or operates.

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### I. INTRODUCTION:

Plastics are used widely everywhere in our life and without plastic, modern civilization would indeed look very diverse. This study focuses on the influence of plastic on human health and environment. Plastics are essential materials in modern civilization, and many products manufactured from plastics and in numerous cases, they promote risks to human health and the environment. Plastics are contained many chemical and hazardous substances such as Bisphenol A (BPA), Thalates, antiminitroxide, brominates flame retardants, and poly- fluorinated chemicals etc. which are a serious risk factor for human health and environment. Plastics are being used by Bangladeshi people without knowing the toxic effects of plastic on human health and environment. Different human health problems like irritation in the eye, vision failure, breathing difficulties, respiratory problems, liver dysfunction, cancers, skin diseases, lungs problems, headache, dizziness, birth effect, reproductive, cardiovascular, genotoxic, and gastrointestinal causes for using toxic plastics.

Plastics occurs serious environment pollution such as soil pollution, water pollution, and air pollution. Application of proper rules and regulations for the production and use of plastics can reduce toxic effects of plastics on human health and environment (Okunola A Alabi, April 12, 2019).

Plastic has changed our everyday life. We are involved with plastic made products in various ways. Plastic plays an important part in our life. Plastics are used widely everywhere in our life. Plastic makes our life easier and better. They are composed of a network of molecular monomers bound together to form macromolecules of infinite use in human society. Day by day peoples are becoming more and more dependent on the use of plastics because of the characteristics of plastic such as inert, durability, flexibility and versatility and so on.

The durability of plastics and their potential for diverse applications, including widespread use of disposable items, were anticipated, but the problems associated with waste management and plastic debris was not (Yarsley & Couzens 1945).

Plastic has some special properties such as; high heat combustion, the water content of the plastics is far lower than the water content in the biomass, plastics do not absorb much moisture and increasing availability in the local community. Plastics have many benefits and without plastic, modern society would indeed look very different. Most important advantages of plastic are medical uses and applications in public health. Plastics are cost effective, require little energy to produce, and are lightweight and biocompatible. Plastic is soft, transparent, flexible, or biodegradable and many different types of plastics function as innovative materials for use in engineered tissues, absorbable sutures, prosthetics, and other medical applications (Andrady & Neal 2009).

Plastic debris has become progressively more abundant in the oceans over the past few decades and is still increasing (Ryan & Moloney, 1993; Ryan et al., 2009).

These synthetic and non-biodegradable materials provide attractive alternative substrata for a number of opportunistic colonizers (Barnes, 2002a, b; Gregory, 2009), as they are highly buoyant and can withstand prolonged exposure to UV radiation and wave action (Barnes, 2004). Such durability allows pelagic plastics to remain at sea for long periods and thus to travel distances of more than 3000 km from source (Ryan & Moloney, 1993).

In the last decade, pieces of plastic colonized by rafting biota have been reported as far south as 68°S (Barnes & Fraser, 2003) and as far north as 79°N (Barnes & Milner, 2005), suggesting that drift plastics are expanding the ranges of some rafting organisms Barnes (Thomas Otto Whitehead and Aiden Biccard, 24 February 2011.)

## **II. PROBLEM STATEMENT**

Plastics have become invaluable components of modern building; plastic production has many negative impact on health and environmental effects.

Plastics and their products are littering our cities, oceans, and waterways, and contributing to health problems in humans and animals. Also Plastic occur serious environment pollution such as soil pollution, water pollution, and air pollution, therefore has important in public health For instance, plastic waste fumes release halogenated additives and polyvinyl chloride, while furans, dioxins, and polychlorinated biphenyls (PCBs) are released from incineration of plastics into the environment; therefore this study investigates the impact of plastic-made materials wastes on human health and environment in Mogadishu, Somalia.

## **III. OBJECTIVE OF THE SURVEY/STUDY:**

The goal of this study is to investigate the awareness of the respondents on the influence of plastic-made materials on human health and environment in Mogadishu, Somalia.

Also the researchers aim behind the study will be:

- To investigate the history and the usage of plastic-made materials in Mogadishu – Somalia.
- To explain the Types and the impacts of plastic-made materials on animal health in Mogadishu – Somalia.
- To determine and asses the effects of plastic-made materials on environment in Mogadishu – Somalia.

## **IV. MATERIALS AND METHODS**

The study was conducted in Mogadishu – Somalia, the city that located at coastal Benadir region on the Indian Ocean, (Figure 1). The latitude and longitude of Mogadishu are 02°02'N and 45°20'E, respectively. The average altitude of the city is 9 m above sea level with a temperature range of 24 to 31°C (Mossie, 2002). According to the governments, the city has a total human population of 2,282,000. The city has just one religion which is the Islam practiced in it. The main economic activities are commerce (trading and catering service), Import and Export and manufacturing enterprises.



**Figure 1** Map showing relative positions of the study area (Mogadishu – Somalia)

#### **STUDY DESIGN:**

This study will employ through explanatory research design. The purpose affecting the variables involves in this study and helped to achieve all the objectives of research. However, this study is used quantitative approach; Quantitative is any data collection technique (such as a questionnaire) or data analysis procedure (such as graphs or statistics) that generates or uses numerical data. In addition the method used acquire the data in this study is survey method.

Survey method is a designed to collect primary or secondary data from a sample, with a view to generalizing the results to a population. (Collis & Hussey, 2003).

#### **SAMPLING PROCEDURE**

The sampling procedure will use in this study is a probability sampling procedure particularly systematic random sampling, systematic random sampling would be used to select every  $n$ th or at regular intervals from the sample frame (Sounders, Lewis, 2009).

The main purpose of this technique is to substitute simple random sampling as it provides easy and cheaper to implement them simple random sampling (Sounders, Lewis, 2009). Researchers were select systematic random sampling, because it has the following advantages: First It can be used to analyze. Second every member of the population has equal chance for inclusion (Kombo and Tromp, 2006).

The study subjects were selected using random sampling technique (Marshall, 1996). The selection was made from neighboring households which were in the distance of 100 to 200 m far from each other. Among the visited households, at least one member of the family was picked randomly for the study regardless of his/her age, educational status, sex and occupation as long as he/she was willing. The number of male respondents was higher than female respondents due to the fact that males showed more readiness to be interviewed and fill the questionnaires provided. To collect the data, semi-structured questionnaires were prepared in English. Prior to the administration of the questionnaires, conversations were held with the selected respondents to explain the objective of the study. Those respondents who were willing but not able to attend the questionnaires by themselves were helped by data collectors. Based on the collected data, the respondents were grouped into different categories (Table 1). Analysis of the collected data was carried out using SPSS software version 25.

**Table 1. Demographic profiles of respondents of survey (Mogadishu City).**

Variable	Categories	No.	%
Sex	Male	171	62.9
	Female	100	37.1
Age	<=20 years	180	66.2
	20-29 years	91	33.5
	30-39 years	11	4.1
Educational Status	Illiterate	12	0.87
	Primary education	38	11.74
	High school education	97	33.48
	Higher education	124	54.91
Occupation	Students	77	33.48
	Government employees	127	50.43
	Private	42	10.78
	Others*	25	5.22

\* Daily laborers and house wives.

## V. RESULTS AND DISCUSSION

### (1) Plastic bags and factors responsible for increasing trend of their usage

**Table 2. The Respondents awareness of the influences of plastic wastes**

Do you have an awareness of the influences of plastic wastes on human health and environment?	Frequency	Percent
No	56	20.6
Yes	199	73.2
No Idea	16	5.9
Total	271	99.6
Total	272	100.0

The above table indicates that 199 (73.2%) of the respondents were aware of the hazard of plastic wastes on human health and environment, While 56 (20.6%) were said No. and 16 (5.9%) have no idea about the influence.

### (2) Media exposure of the community and trends in the use of plastic bags

**Table 3. From where you know the Hazards of Plastic wastes?**

If your answer to question number 1 is "Yes", how often or from where you get the alert?	Frequency	Percent
TV/radio	36	13.2
School	136	50.0
From professionals	20	7.4
Published materials	7	2.6
Total	199	73.2
Total	272	100.0

The above table shows that 136 (50%) of the respondents get the alert from the School and teachers. While the rest get the alert differently between Tv/Radio 36 (13.2%), from professionals 20 (7.4%) and published materials 7(2.6%).

**Table 4. Excessive use of plastic package**

Which plastic products do you use excessively?	Frequency	Percent
Plastic bags	125	46.0
Plastic liquid containers (bottles)	4	1.5
Plastic buckets, bins and barrels	4	1.5
Plastic shoes	138	50.7
Total	271	99.6
Total	272	100.0

The above table mentions that 138 (50.7%) of the respondents use plastic shoes excessively, while the rest 125 (46%) uses plastic bags, and also there is some respondents choose bottles, plastic buckets, bins and barrels 4 (1.5%) each.

**(3) Practices of disposal of plastic bag wastes and their environmental impacts**

**Table 5. Cause of plastic product usage**

Why do you prefer to use the plastic product(s)?	Frequency	Percent
They are cheap	93	34.2
They are light in weight	75	27.6
They are easily available	64	23.5
Lack of alternative materials	39	14.3
Total	271	99.6
Total	272	100.0

The above table explains the reason why the respondents use the plastic products as 93 (34.2%) says the plastic products are cheap, where 75 (27.6%) says being light in weight is the reason, While the Availability 64 (23.5%) and lack of alternative materials 39 (14.3%) also are reasons for Plastic products usage.

**Table 6. The problems caused by the plastic product wastes**

If your answer to question 5 is 'Yes', what are the problems?	Frequency	Percent
Animal death	51	18.8
Human health problem	100	36.8
Blockage of sewage (drain) systems	40	14.7
Deterioration of natural beauty of environment	58	21.3
Total	249	91.5
Total	272	100.0

The above table shows that the majority of the respondents 100 (36.8%) believes that the wastes of plastic products cause problems to the human health, where 58 (21.3%) says it causes Deterioration of natural beauty of the environment, While 51 (18.8%) and 40 (14.7%) shows that the wastes causes Animal Death and Blockage of sewage (drain) respectively.

**Table 7. Plastic Bag wastes seriously polluted parts in the city**

Which parts of the city are seriously polluted by plastic bag wastes?	Frequency	Percent
Parks	36	13.2
Waste dumping sites	28	10.3
Market places	86	31.6
Crowded residential areas	59	21.7
Roadsides	41	15.1
any open places in the City	21	7.7

Total	271	99.6
Total	272	100.0

The above table shows that 86 (31.6%) of the respondents clarified that the market places of the city are the most polluted part, while 59 (21.7%) said the crowded residential area most polluted than the market places. Where the rest of the respondents 41 (15.1%), 36 (13.2%) and 28 (10.3%) said Roadsides, Parks and the Waste dumping sites respectively, while the least percentage of the respondents 21 (7.7%) said that any open places in the city are polluted by plastic bag wastes.

**Table 8. Utilization of plastic bags**

Is the trend of utilization of plastic bags increasing or decreasing?	Frequency	Percent
Increasing	213	78.3
Decreasing	58	21.3
Total	271	99.6
Total	272	100.0

The table above indicates that the majority of the respondents 213 (78.3%) believes that the utilization of the plastic bags is increasing. While 58 (21.3%) said that there is no such utilizing seen in the area.

**Table 9. the possible reason of the increasing utilization of plastic bags**

If your answer is to question 9 is "Increasing", what are the possible reasons?	Frequency	Percent
Cheapness (low cost)	96	35.3
Durability	21	7.7
Availability wherever and whenever required	67	24.6
Lack of awareness of the community	29	10.7
Total	213	78.3
Total	272	100.0

The above table Shows that the majority of the respondents 96 (35.3%) said the cause of increasing utilization of plastic bags is its cheapness (Low Cost), While 67 (24.6%) of the respondents believes the availability is the reason behind the increasing. Where 29 (10.7%) and 21 (7.7%) said Lack of awareness and the Durability respectively are the causes of that increase of the utilization.

**Table 10. The alternatives of the plastic-made materials**

If you say plastic bags should not be used, what alternatives can be used?	Frequency	Percent
Paper bags	74	27.2
Fiber bags	67	24.6
Cloth bags	130	47.8
Total	271	99.6
Total	272	100.0

The above table shows 130 (47.8%) of the respondents choice of the alternative were the cloth bags, where 74 (27.2%) and 67 (24.6%) choose paper bags and fiber bags respectively.

## VI. CONCLUSIONS

The result of the present study indicated that most of the respondents, regardless of their demographic background, are (1) in favor of banning of production, distribution and use of these plastic products, and (2) aware of the adverse effects of plastic bag wastes on environment, animal and human health. However, plastic bags are still widely used by the community more than any other plastic products mainly due to their cheapness. The survey results and field observations indicated that the city was seriously polluted by plastic wastes particularly plastic bags wastes. By and large, it can be recommended that various campaigns need to be organized in order to mobilize the public and other stakeholders (Government agencies, business associations, retailers, research institutions, nongovernmental organizations (NGOs), youth associations, women associations, religious institutions, donors and the media) against indiscriminate use and disposal of plastic bags in order to minimize the excessive accumulation of plastic bag wastes in the environment. Moreover, passing legislations alone is not sufficient condition to curb the problem of plastic bag wastes. Therefore, the central government in

collaboration with other concerned authorities of the city should encourage people to use environment-friendly alternative materials, such as cloth bags, paper bags and natural fiber bags.

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