



## Plastic Pollution: A Menace to the Society

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### Abstract

*This study reviewed the effect of plastic pollution to the society, as human environment in recent times is associated with pollution arising from different sources. One of the sources of environmental pollution is plastic. The increased use of plastic by man is in no doubt contributing to the high rate of environmental pollution with its associated effects unknown to many people. The objectives of this study were to find out the effects of plastic pollution on human life, wildlife and aquatic life. Findings from the study revealed that plastic pollution had negative effects on human, terrestrial (land) animals and aquatic (water) animals. It reduces the level of oxygen intake to both aquatic and wildlife, causing suffocation and even death. It even causes skin cancer and skin dermatitis to humans. Conclusion was drawn based on the findings, and recommendations were made among others that government should promulgate laws prohibiting the indiscriminate disposal of plastic waste leading to plastic pollution in the environment. Governments and individuals should begin to recycle plastic waste into useful products, especially making bricks for building houses - a novel invention.*

**Keywords:** Bricks, Dermatitis, Environment, Plastic, Pollution, Recycle

### Introduction

Thousands of plastic factories are producing tons of plastic goods which are popularly used by the people because of their ease, cheapness and convenience. Due to their non-biodegradable nature, they cause hazardous negative impact on the environment. Indiscriminate disposal of plastic waste, which is a major cause of environmental pollution, poses significant health risks, which include cancer, birth defects, impaired immunity, © CSN Zaria Chapter

endocrine disruption, and reproductive disorders. Marine animals are mostly affected through entanglement and ingestion of plastic litters. Less conspicuous forms, such as plastic pellets and scrubbers, are also hazardous [1].

The word plastic is derived from the greek (*plastikos*) meaning capable of being shaped or molded. Some plastics are made up of polymer chains having only aliphatic (linear) C atoms in

their backbone chains. e.g.: polypropylene, and there are also some plastics that are made up of heterochain polymers containing O, N, S in their backbone chains. Plastics are a range of synthetic or semi-synthetic polymerization products that can be molded into a permanent object or otherwise. Plastics have extensive industrial applications [2].

Plastic has low specific gravities, ease of fabrication, resistance to low thermal and electrical conductivities. Many plastics have varieties of colours to make them useful for decorative purposes. Plastics are widely used in making electrical instruments, telephones, panels for walls, instrument boards, automobile parts, lamps, goggles, optical instruments, household appliances, e.t.c. Plastic materials dumped into the earth prevent the production of nutrients in soil, as a result, the fertility of the soil is reduced, and affects the agricultural sector [3]. When it is persistent in the environment, it can do great harm. It causes immune and enzyme disorders, hormonal disruption leading to endocrinal disorders and even infertility and is also considered as carcinogenic (cancer). Not only human health, it dangerously affects other animal life and alters the environmental sustainability causing hazardous pollution [3].

When plastics are burnt, disposed off or left in the environment as litters, they break down and release harmful chemicals which include heavy metals such as cadmium and lead. Most plastics are being sent to landfills or incinerators, incinerators release toxic heavy metals and chemicals [4]. Incinerators

produce a variety of toxic discharges into the air, water, and ground that are significant sources of powerful pollutants, including dioxin and other chlorinated organic compounds that are well known for their toxic effects on human health and the environment. Many of these toxins enter the food supply and become more concentrated as they move up through the food chain. Incinerators create toxic ash - or slag - which contains heavy metals, and other pollutants, the toxic ash mixes with the soil, and the pollutants present in the ash leach into the groundwater [5].

Garbage incinerators and medical waste incinerators are the largest sources of dioxin identified by the U.S. Environmental Protection Agency. Dioxin is the common name for a class of 75 chemicals. It is a toxic waste product formed when waste containing chlorine is burned or when products containing chlorine are manufactured. Dioxins are among the most potent synthetic chemicals ever tested, causing cancer and harm to immune and reproductive systems even at very low concentrations.

Pollution is the release of unwanted materials or substances into the environment. These materials could be liquid, solid or gaseous materials. Plastic is one of the examples of solid waste materials discharged into the environment resulting to environmental pollution. Plastic wastes are thrown into the environment resulting to harm in human, wildlife, and aquatic life [5]. Plastic Pollution occurs in many forms, including but not limited to littering, marine debris (pieces of waste that are

released into lakes, sea, oceans, or rivers), plastic netting and friendly floaters.

A large percentage of plastic produced each year is used to make single-use items, disposable packaging items or products which will get permanently thrown out within one year. Chlorinated plastics can release harmful chemicals into the surrounding soil, which can then seep into ground water or other surrounding water sources. This can cause serious harm to the species that drink this water.

The effects of plastic on the environment are as follows:

**1. Land:** Landfill areas are constantly piled up with many different types of plastics. In landfills, leachate is produced when water picks up toxins as it seeps through the trash. This trash includes plastics of all types, even older plastics that have been proven to be toxic but are still in our landfills. Although landfills attempt to hold this toxic leachate, it also leaks into ground and surface water, releasing pollutants into the environment and causing health risks for humans and wildlife [5]. Plastic pollution on land poses a threat to the plants and animals including humans. The amount of plastic waste on land is greater and more concentrated than that in the water [6],[7].

**2. Humans:** Plastics contain many different types of chemicals, depending on the type of plastic. The addition of chemicals is the main reason why these plastics have become so multi-purposed, however this is a problem associated with it. Some of the

chemicals used in plastic production have the potential to be absorbed by human beings through the skin causing dermatitis. A lot is unknown on how severely humans are physically affected by these chemicals. In many plastics industries these toxic chemicals are only used in trace amounts. Some of the additives are used as phthalate plasticizers and brominated flame retardants [7]. Through bio-monitoring, chemicals in plastics, such as BPA and phthalates, have been identified in the human population. Humans can be exposed to these chemicals through the nose, mouth, or skin. Although the level of exposure varies depending on age, most humans experience simultaneous exposure to many of these chemicals. Average levels of daily exposure are below the levels deemed to be unsafe, but more research needs to be done on the effects of low dose exposure on humans [8]. An estimated 95% of adults in the United States have had detectable levels of BPA in their urine. Exposure to chemicals such as BPA and phthalates have been correlated with disruptions in fertility, reproduction, sexual maturation, and other health effects.

Environmental impacts can be both direct and indirect. Direct impacts occur when marine life is physically harmed by marine debris through ingestion or entanglement (e.g., a turtle mistakes a plastic bag for food) or marine debris physically alters a sensitive ecosystem (e.g., a fishing net is dragged along the ocean floor by strong ocean currents and breaks and smothers a coral reef). Environmental impacts can be indirect, when

plastic debris harm humans through food chain. Though plastic make a significant contribution to man and the economy, the effects it causes to the environment are enormous.

Plastic can also affect humans because it may create an eyesore that interferes with the aesthetic nature of the natural environment [9].

### **Sex hormones**

BPA can disrupt normal physiological levels of sex hormones. It does this by binding to globulins that normally bind to sex hormones such as androgens and estrogens. It often acts as an antiandrogen or estrogen, which can cause disruptions in gonadal development and sperm production.

**3 Ocean:** Nurdles are plastic pellets (a type of microplastic) that are shipped in this form, often in cargo ships, to be used for the creation of plastic products. A significant amount of nurdles are spilled into oceans, and it has been estimated that globally, around 10% of beach litter is nurdles. Nurdles are the most common types of plastic pollution in oceans, combined with plastic bags and food containers, they make up the majority of oceanic debris. In 2012, it was estimated that there was approximately 165 million tons of plastic debris in the world's oceans. Plastic pollution has the potential to poison animals, which can then adversely affect human food supplies. Some marine species, such as sea turtles, have been found to contain large proportions of plastics in their stomachs [10]. When this occurs, the animal

typically starves, because the plastic blocks the animal's digestive tract. Marine mammals sometimes become entangled in plastic materials such as nets, which can harm or kill them. Over 260 species, including invertebrates, have been reported to have either ingested plastic or become entangled in plastic webs. When a species gets entangled, its movement is seriously reduced, therefore making it very difficult to find food. Entanglement usually results in death or severe lacerations and ulcers. It has been estimated that over 400,000 marine mammals perish annually due to plastic pollution in oceans. In 2004, it was estimated that seagulls in the North Sea had an average of thirty pieces of plastic in their stomachs.

### **Effects of plastic pollution on Ocean animals**

#### **Sea Turtles, Fish, Seals and Birds**

Fish, seals, turtles, and birds get caught in the debris and end up suffocating or drowning, because they are unable to untangle themselves, they also die from their inability to escape predator [11]. In a 2006 report known as Plastic Debris Oceans [12], it was estimated that at least 267 different animal species have suffered from entanglement and ingestion of plastic debris. Marine organisms get caught in discarded fishing equipment, such as ghost nets. Ropes and nets used to fish are often made of synthetic materials such as nylon, making fishing equipment more durable and buoyant. These organisms can also get caught in circular plastic packaging materials, and if the animal continues to grow in

size, the plastic can cut and get into their flesh. Equipment such as nets can also drag along the seabed, causing damage to coral reefs [8].

### **Whales**

Large amounts of plastics have been found in the stomachs of beached whales [8]. Plastic debris started appearing in the stomach of the sperm whale since the 1970s, and has been noted to be the cause of death of several whales. In June 2018, more than 80 plastic bags were found inside a dying pilot whale that washed up on the shores of Thailand [13]. In March 2019, a dead Cuvier's beaked whale washed up in the Philippines with 88 lbs of plastic in its stomach.

In April 2019, following the discovery of a dead sperm whale off Sardinia with 48 pounds of plastic in its stomach, the World Wildlife Foundation warned that plastic pollution is one of the most dangerous threats to sea life, noting that five whales have been killed by plastic over a two-year period. Some of the tiniest bits of plastic are being consumed by small fish, in a part of the pelagic zone in the ocean called the Mesopelagic zone, which is 200 to 1000 metres below the ocean surface, and completely dark. Not much is known about these fish, other than that there are many of them. They hide in the darkness of the ocean, avoiding predators and then swimming to the oceans surface at night to feed.

Plastics found in the stomachs of these fish were collected during Malaspina circumnavigation, a research project that studies the impact of global

change on the ocean [12]. A study conducted by Scripps Institution of Oceanography showed that the average plastic content in the stomachs of 141 mesopelagic fish over 27 different species was 9.2%. Their estimate for the ingestion rate of plastic debris by these fish in the North Pacific was between 12000 and 24000 tons per year [12]. The most popular mesopelagic fish is the lantern fish. It resides in the central ocean gyres, a large system of rotating ocean currents that accumulate plastic waste, turning them into massive pollution dumps. Since lantern fish serve as a primary food source for the fish that consumers purchase, including tuna and swordfish, the plastics they ingest become part of the food chain. The lantern fish is one of the main bait fish in the ocean. Deep sea animals have been found with plastics in their stomachs [13].

### **Plastic pollution and climate Change**

In 2019, a new report "Plastic and Climate" was published. According to the report, plastic will contribute greenhouse gases to the tune of 850 million tons of carbon dioxide (CO<sub>2</sub>) to the atmosphere. In current trend, annual emissions will grow to 1.34 billion tons by 2030. By 2050 plastic would emit 56 billion tons of greenhouse gases, as much as 14 percent of the earth's remaining carbon budget. By 2100 it will emit 260 billion tons, more than half of the carbon budget. Those are emissions from production, transportation, incineration, but there are also effects [14].

## Conclusion

The level of pollution caused by plastic is a major issue of concern to environmentalists. It affects every aspect of the environment and the living organisms found in it. Specifically, it affects man, wildlife and aquatic life. The plastic pollution can adversely affect lands, waterways and oceans. The prominence of plastic pollution is correlated with plastics being inexpensive and durable, which leads to high levels of plastics used by humans. Animals can be significantly harmed or killed by plastic pollution. All of these result in serious problems to man and the nation's economy. Hence, in tackling the problems of plastic pollution, all hands must be on deck.

## Recommendations

1. Government must come out with laws prohibiting the indiscriminate disposal of plastic in the environment.
2. Individuals should be educated on the negative effects of plastic pollution to help reduce the rate of its disposal into the environment.
3. Recycling of plastic materials should be encouraged in the environment among residents.
4. Alternatives should be encouraged and made by the government and individuals.

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