

PLASTIC POLLUTION AND YOUTH ENGAGEMENT:
ADDRESSING NEGATIVE HEALTH IMPACTS

By

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DEDICATION

To my loving parents

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ABSTRACT

The health impacts of plastic pollution are critical issues to be addressed in Nigeria and globally. It is speculated that the engagement of youth in tackling plastic pollution will prove effective. Youth, who represent a significant proportion of the Nigerian population are said to not be fully active in finding solutions. This thesis, “Plastic Pollution in Nigeria and Youth Engagement: Addressing Negative Health Impacts” examines youth engagement and influencing tools for addressing plastic pollution. The study used an online platform to administer an anonymous survey to 43 Nigerian youth members of an environmental organization, aged 18 to 24 years. On the basis of demographic indicators, results indicated that most participants were actively involved in fighting plastic pollution in Nigeria. The majority of the participants agreed that awareness exercises, peer influence, use of social/behavioural applications and economic incentives such as scholarships are useful influencing tools for addressing plastic pollution.

LIST OF ABBREVIATIONS USED

ACI	African Clean Up Initiative
BEM	Behavioural Ecological Method
CI	Confidence Interval
EAICI	Environmental Action Internal Control Index
EAS	Environmental Action Scale
HAHP	Human and Health Performance
HND	Higher National Diploma
TPB	Theory of Planned Behaviour
MP	Microplastics
NP	Nanoplastics
OND	Ordinary National Diploma
PEBS	Pro-Environmental Behaviour Scale
RRR	Reduce, Reuse, Recycle
TPBS	Theory of Planned Behaviour Scale
UNEP	United Nations Environment Programme

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CHAPTER 1 INTRODUCTION

1.1 Background and Context

In 2019, the production of plastics totalled around 368 million metric tons worldwide (Tiseo, 2021). Increase in demand and the resultant high level of production of plastics, especially single-use plastics, increases the health threats plastic pollution poses to humans, animals, and nature (Afeez, 2018; Keswani, 2016; Wright & Kelly, 2017). These harms include the degradation of plastic into debris (microplastic and nanoplastic), leaching out toxins and negatively affecting the soil, water and air in which humans and animals live (Afeez, 2018; Muktar-Muhammad, 2018). This is a major environmental problem with negative effects on global economic development, public health, and a sustainable environment (Giarrizzo et al., 2019; Lotze et al., 2018; Shen et al., 2020; United National Environmental Programme [UNEP], 2018).

Plastic pollution is defined by Parker (2018) as the accumulation of plastic objects and particles (e.g. plastic bottles, bags and microbeads) in the earth's environment that adversely affects wildlife, humans and their habitats. Around the world, plastic pollution has been an important health, economic and social issue for decades, with an increasing threat to environmental sustainability (Afeez, 2018). This threat is caused by anthropogenic activities through increasing demand and high production of plastics, especially single-use plastics, for our everyday needs, as well as improper disposal or management (Wright & Kelly, 2017). The issue of plastic pollution is an urgent environmental emergency that needs immediate attention (Akdogan & Guven, 2019). If left unaddressed, it will continue to contribute to other environmental problems such as

climate change (Kosuth et al., 2017) and soil degradation (Hammami et al., 2017) through the breakdown of plastics into secondary microplastics (MP; < 5 micrometres) and further into secondary nanoplastics (NP; < 100 nanometres) (Cole et al., 2011; Rhode, 2018).

The degradation process and properties of plastic, makes it ubiquitous, non-biodegradable and bio-persistent in nature (Barnes et al., 2009; Duis & Coors, 2016; Gall & Thompson, 2015; Plastic Pollution in the Environment, 2020; Wright & Kelly, 2017). As indicated in health and environmental research literature, plastics and its toxic substances, such as bisphenol A, ethylates, etc. (Lam et al., 2018; Zhang et al., 2017), (known endocrine disruptors), pose great danger to human health (Vethaak & Leslie, 2016). These health dangers include infertility, human reproductive anomalies, early sexual maturation, as well as communicable diseases that are caused by pathogens and other adverse non-communicable health issues like cancer and respiratory diseases in different countries such as China, England, Belgium, Canada, etc. (Barouki et al., 2012; DeMatteo et al., 2013; Halden, 2010; Wright & Kelly, 2017). Plastic waste fragment into smaller toxic components that eventually pollute the soil and waterways, clogging up the drains, causing water and sewage to overflow, which can become the breeding grounds for germs and bacteria that spread disease (Akinola et al., 2014). Edogo et al. (2008) reported that 70% of Nigerians consume at least one bag of sachet water daily; plastic sachets are made of nonbiodegradable elements that do not decompose, thus affecting the physical environment. Some of the environmental risks of sachet water disposal are drainage obstruction/blockage, water pollution, and air pollution (from burnt plastic sachets - a common practice in Nigeria) (Ezeokpube et al., 2014). Lagos State alone contributes 450,000 tonnes of plastic to the ocean per annum (Olowoapejo, 2018) and generates 9000

tonnes of waste daily; 86% of the waste generated consists of plastic bottles and bags (Salami, 2018). The lack of an efficient waste management system in the country can contribute to incidence of flood disasters (Satterwaite et al., 2007) which has surmounting effects on human livelihoods (Potschin, 2009); an example is the June, 2020 Lagos flood that led to displacement of families, loss of lives and property (Floodlist, 2020).

In recent years, there have been diverse programs and innovations focused on curbing the effects of plastic pollution (Adebiyi-Abiola et al., 2019). Some of these programs make use of tools, such as new technologies involving information sharing as a means to achieve a sustainable environment (Akdogan & Guven, 2019). Researchers suggest that youth and future generations will be the most affected by plastic pollution risks (Aceves-Martins et al., 2019; Ergen et al., 2015; Hammami et al., 2017), as they will be around longer than the older generation and this is enough reason to encourage youth participation in the fight against losing our environment and health to plastic pollution. The future of humanity and our planet lie in the hands of today's youth who will pass the torch to future generations.

This research considers the environmental, economic and human health impacts of plastic pollution, with particular focus on the health implications of plastic use and the reduction of its overwhelming effects on humans through youth engagement. It also analyses how youth are engaged in tackling the problem of plastic pollution in Nigeria.

1.2 Rationale

The research literature has explored the subject of youth in reducing plastic pollution, with most highlighting how badly plastic pollution affects health and environment and some suggestions on its control by using influencing tools (Engler, 2016; Schmaltz, 2020).

In India, Annanya Joshi, a university student and member of the global youth movement, Tide Turners Plastic Challenge, launched a grassroots effort to encourage restaurants and shops at her school to ditch plastic utensils and bags; her work shows the impact of Tide Turners and why it is so important to equip young people to address marine plastic pollution in their communities. It has been a massive success in India, where it has created an army of youth who are addressing the scourge of plastic pollution (UNEP, 2020). In Santa Monica High School, located in the USA, a group of students calling themselves “Team Marine”, have become active in the legislative process to ban disposable plastics, the major source of trash in the oceans and at Brentwood School, the 6th Grade class initiated a “Water Bottle Project” to stop the waste from plastic water bottles on their campus; the students researched issues such as adding spouts to the drinking fountains, the environmental impact of the school’s plastic water bottle use, policies in place at other neighbourhood schools, as well as the cost of various canteens (Boyle, 2010). During the 2020 Tide Turners challenge at the African Youth Summit in Nairobi, the role of more than 400 youth champions were acknowledged for their show of leadership by raising awareness through social media, championing plastic waste collection campaigns and demonstrating sustainability in their own lives, among other

things (UNEP, 2020). There is however, a dearth of information on the engagement of Nigerian youth and effective tools for influencing positive behaviours to curb the harmful effects of plastic pollution on the health and wellbeing of Nigerians.

There exists an urgency for communal efforts to be channelled into plastic pollution control and as United Nations (2017) notes, considerable progress has been made over the past two decades in reducing poverty, alleviating hunger, reducing inequality and improving outcomes for many of the world's poorest and most vulnerable, but such progress has been uneven (United Nations, 2017). Inequality has not only persisted, but in many instances widened, with substantial numbers of people, including youth, excluded from full participation in economic, political and social life (United Nations, 2017). The situation of young people from groups considered vulnerable or marginalized - including indigenous peoples, persons with disabilities, migrants and refugees, people living in poverty, and girls and young women - underlines the fact that the 2030 Agenda will not be a success unless it is based on the ideals of inclusiveness and shared prosperity (United Nations, 2017). Tackling plastic pollution has therefore, become an integral part of the 2030 Agenda of the United Nations Sustainable Development Goals (SDGs) hence, the implementation of SDG 12 on sustainable consumption and production patterns as an important avenue for curbing plastic waste generation (Plastic Soup Foundation, 2018) and according to Westerbos (2019), SDG target 14.1 is often referred to when combatting international plastic pollution; it reads: "by 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution." (p. 2).

This study is, therefore, necessary to bridge the gaps that exist between the problem of plastic pollution and the solutions through provision of information on youth engagement and influencing tools that are effective in encouraging positive behaviours towards pollution reduction in Nigeria.

CHAPTER 2 REVIEW OF THE LITERATURE

2.1 Evolution of Plastic Pollution

Between 1950 and 2015, a total of 6.3 billion tonnes of primary and secondary (recycled) plastic waste was generated (Rhode, 2018) of which 9% was recycled, 12% incinerated and the rest (79%) were either being stored as landfills (40%) or released (32%) directly into the natural environment by several factors (such as air, transportation, leaking from collection system, illegal dumping of waste by community members, not collected or mismanaged) or burned (7%) in bonfires resulting in acrid smoke (Rhodes, 2018; UNEP, 2017). In 1970, Plastic pollution was first noticed by scientists in North Atlantic Ocean as it impacted on a variety of marine animals' health (Gill, 2019). The focus then shifted to high concentrations of plastic litter in the North Pacific in the same year (Rosane, 2018). By early 1980, there was a growing concern over the potential impacts of marine litter, and this resulted in a series of meetings on marine debris (Rosane, 2018); this eventually led to the development of a research agenda for the next decades. According to Moore (2020), most impacts of marine litter were reasonably well understood, and attention shifted to seeking effective solutions to tackle the marine litter problem by the end of 1980. However, to date, plastic pollution continues to rapidly increase due to high plastic production, resulting in overwhelming impacts on human and environmental health.

In Africa alone, an estimated 230 mt of plastic waste was recorded between 1990 and 2017, with Nigeria (39 mt, 17.0%) having the second-largest share (Babayemi et al., 2019). Plastic waste presents not only an environmental issue for Nigeria but also a major

socio-economic development challenge that impacts biodiversity, health, housing and infrastructure, agriculture, tourism and livelihoods such as income and employment (Dumbili & Henderson, 2020); especially with their inadequate plastic waste management systems and lack of effective regulations (Adebiyi-Abiola et al., 2019). Going by the present rate of plastic production and waste generated, it is estimated that by the year 2025, the ocean will contain one ton of plastics for every three tons of fish and in 2050, the weight of plastics might be greater than the weight of fishes in the oceans (Geyer et al., 2017; Jambeck et al., 2015; Rhodes, 2018; Welden, 2016).

This increase in plastic products, due to high demand, will cause an increase in the level of plastic pollution (Babayemi et al., 2019; Dumbili & Henderson, 2020). This is because of the slow degradation process of plastic, poor waste management/collection practices (such as recycling, upcycling, etc.), major debris from poorly managed landfill and disposal sites, as well as lack of transportation and poor roads (Adebiyi-Abiola et al., 2019; Giarrizzo et al., 2019).

2.2 Impact of Plastic Pollution on Human Health and the Environment

Plastic waste causes various health problems when it leeches into the environment. According to Adebiyi-Abiola et al. (2019), plastic bag litter can aggravate pandemics (Patrício et al., 2021), exacerbate environmental disasters (Kehinde et al., 2010), cause water pollution (Blettler et al., 2018), contribute to greenhouse emissions (Alabi et al., 2019), block sewage systems and waterways (Pattanayak, 2018) and provide breeding grounds for mosquitoes and other pests, which raise the risk of transmission of vector-borne diseases such as malaria (Dumbili & Henderson, 2020), zika virus, dengue fever

and water-borne diseases such as cholera, typhoid, dysentery (Agamuthu et al., 2015; Jambeck et al., 2018). In low-income countries, plastic waste is often burned for heat or cooking, compromising human health through inhalation of toxic emissions (Adebiyi-Abiola et al, 2020; Dumbili & Henderson, 2020). Disposing of plastic waste by incineration or burning it in open-air pits releases harmful gases that can be considered carcinogenic or mutagenic (Alabi et al., 2019). This release of harmful gases can also lead to additional health complications such as irritation in the eye, muscle stiffness (Yorifuji, 2012), skin cancer, liver dysfunction, hypersensitivity, in-utero baby abnormality (Lam et al., 2018; Wright & Kelly, 2017), reproductive/birth effect (Metz, 2016), cardiovascular, genotoxic, gastrointestinal diseases (Helal & Elshafy., 2013; Proshad et al., 2018), including adverse effects on the nervous, respiratory, and reproductive systems, and possibly on the kidneys and liver.

Plastic production growth and “business-as-usual” scenarios of mismanaged plastic waste present an overwhelming significant risk and ripple effect on human health, the environment, and the economy. For example, in Lagos, Nigeria, plastic bags and other plastic consumer goods was accumulated in waterways and clogged drains during heavy rains in June 2020 (Salami, 2018). These plastic products caused a significant flooding event in which there were reported cases of deaths, family displacement, flooded houses, and millions of dollars in related damages (FloodList, 2020).

The economic damage caused by plastic waste is vast. Plastic litter alone can cause depreciation in tourism and housing (Dumbili & Henderson, 2020), leading to perceived income losses associated with within these sectors. As reported by Matsangou (2018) many popular destinations rely heavily on the lure of pristine beaches, sparkingly clean

waters and beach-fronted hotels; but as many tourists have witnessed in recent years, numerous beaches in the Caribbean and Thailand are now lined with a tangled mess of plastics, putting many off revisiting these sorry sights; in South Korea, a single marine litter event caused a revenue loss of about €29m (\$34m) in 2011 compared to 2010, as a result of over 500,000 fewer visitors to the country.

Plastic pollution poses a general liability insurance issue as businesses may face more risks related to plastic pollution if individuals suffer damage as a result of plastic pollution and seek compensation from those whom they consider responsible (UNEP 2019). It also contributes to environmental problems that can have direct results on some property claims; for example, urban plastic pollution is clogging drains and already contributing to floods that damage homes and other landed property in India (Chaudhari, 2018). Removing plastic waste from the community can cost millions of dollars (Agamuthu et al., 2015). Healthcare services needed to address the health implications of plastic pollution will also be costly (Jambeck et al., 2018). Studies suggest that the total economic damage to the world's ecosystem caused by plastic amounts to at least US\$13 billion every year in several developed countries, such as the United States of America (UNEP, 2014; Yorifuji, 2012). This increases the indirect social cost of plastic pollution and economic burden, potentially affects the life expectancy rate, mortality/morbidity rate, especially in vulnerable populations/communities in Nigeria (UNEP, 2010).

Plastic pollution represents one of the major perceived threats to biodiversity (Moore, 2020). Due to the abundance, durability and persistence of plastics in the environment, plastic pollution is a cause of special concern. In the oceans, plastic debris accounts for over 90% of all encounters between debris and individuals (Gall & Thompson, 2015). By

comparing the listed encounters with the International Union for Conservation of Nature (IUCN) Red List, at least 17% of species affected by entanglement and ingestion were listed as threatened or near threatened species (Gall & Thompson, 2015). The interaction of organisms with plastic debris results in a wide range of direct and indirect consequences, including the potential occurrence of sub-lethal effects (i.e., effects that are not strong enough to kill) which may be of considerable concern (Ašmonaitė & Almroth, 2019).

Broadly, the presence of larger plastic materials in the ocean may result in entanglement and ingestion, potential creation of new habitats, and dispersal via rafting, including transport of invasive species. Entanglement and ingestion frequently causes harm or death, although gathered data appears to suggest that entanglement is far more fatal (79% of all cases) than ingestion (4% of all cases). Debris may also constitute new habitats, and derelict fishing gear, for example, has been shown to cause not only death by “ghost fishing”, but also to constitute new habitats for invertebrates (Valderrama et al., 2018). The dispersal of species in the marine environment, particularly species with no pelagic larval stage, has increased in recent decades (Valderrama et al., 2018). Highly dependent on oceanic currents, numerous species have rafted on natural materials such as wood, but industrialisation and the continuous increase of the presence of plastic debris in the oceans suggest that rafting is playing an active role in their scattering (Gall & Thompson, 2015). This holds true for invasive species as well. A clear example is the detailed presence of a ciliate, *Halofolliculina*, a pathogen that may be the culprit of the skeletal eroding disease that has affected Caribbean and Hawaiian corals (Goldstein, Carson, & Eriksen, 2014). Less attention has been paid to the effects of plastics in freshwater

systems, in spite of the fact that rivers are the dominant source of plastic pollution to oceans, as well as a significant sink accumulating plastics originating from multiple sources (Winton, et al, 2020). It is therefore reasonable to assume that the potential effects are identical to those described for plastic debris found in the marine environment.

Plastics not only pose an immense pollution problem, but they also exacerbate climate change (Cho, 2020). The Center for International Environmental Law Community (CIEL) report warns that the greenhouse gas emissions from plastic at production stage jeopardize our ability to keep the global temperature rise below 15°C. After use, plastics are incinerated, recycled or end up in a landfill; carbon from the fossil fuel feedstock is locked into plastic products and emitted when plastic is incinerated or decomposes (Cho, 2020). Most plastics are not actually being recycled and instead accumulates in landfills and in these massive heaps, as the plastic breaks down, they release harmful toxins into groundwater which negatively affects human health (Goodwin (2020). Chlorinated plastic can release harmful chemicals into the surrounding soil, which can then seep into groundwater or other surrounding water sources and this can cause a range of potentially harmful effects on the species that drink the water (UNEP, 2018). Plastics can also affect plant lives by altering the soil chemistry, increasing water evaporation and drying out the soil and plastic surfaces could allow toxic substances to accumulate in ways that they could not in organic soil (Salt, 2019). These economic, health and environmental implications of plastic pollution, therefore, give clear reasons to act on reducing plastic pollution.

2.3 Relevance of Reduction of Plastic Pollution to Youth and Nigeria

Nigeria is among one of the top two countries on the continent of Africa and ninth in the world that uses single-use plastic daily, especially in the use of packaging plastics (Babayemi et al., 2019; Dumbili & Henderson, 2020; Rhodes, 2018), which is largely produced, durable, affordable, and accessible (PlasticEurope, 2018) but sadly, cannot be recycled. The environmental pollution and the health consequences of plastics cut across all ages, genders, races, ethnicities, and populations (Heidbreder et al., 2019). However, these consequences are felt on the health and socio-economic stability of the vulnerable population such as youth because they make up approximately 80% of the population in developing countries, for example, Nigeria (UNEP, 2010).

The adverse effects of plastic pollution (Dumbili & Henderson, 2020), such as respiratory infection, cancer, malaria, etc. (Babayemi et al., 2019), may be experienced primarily among the youth (World Health Organisation (WHO), 2020). Since youth make up the highest proportion of the population in Nigeria (Worldometer, 2020; United Nations Population Fund [UNFPA], 2020), they are central to advocating for positive environmental practice and reduction of the potential impacts of plastic pollution on humans and environment (Aminrad et al., 2013; Ergen et al., 2015; Hammami et al., 2017; Heidbreder et al., 2019). There is sufficient evidence that acknowledges the importance and potential of youth as the key actors of change to achieve a more sustainable world (Percy-Smith & Burns, 2013; UNEP, 2010), provided they are implored to participate and their feedback are utilized (Toth et al., 2013). Youth participation can be encouraged through involvement in plastic pollution awareness programs and

intervention planning, training in knowledge and skill acquisition with the much-needed attitude as well as motivation to influence longer-term behavioural changes (Toth et al., 2013). The influence towards maintaining behavioural change can come from an array of influencing tools, such as incentives, games (Reese & Junges, 2017; Santti et al., 2020) etc. and through channels like media, peers, parent, school, organization, government (Gilliam et al., 2018; Grønhøj & Thøgersen, 2012).

2.4 The Influence of Knowledge on Attitudes toward Plastic Pollution Reduction

According to the World Health Organization, health promotion is the process of enabling people to increase control over, and to improve their health (World Health Organization [WHO], 2020). It uses educational, organizational, economic and political action, designed by individual members and group participation to increase community control and improve health through changes (via advocacy, enabling and mediation) in knowledge, attitude, behaviour, policy and socio-environmental conditions (Bunton et al., 2003; Howat et al., 2003; Howat et al., 2004; Raphael et al., 1999; Thompson, Watson, & Tilford, 2018). Furthermore, it is an educational approach to influence attitudinal-behavioural change (Davies, 2013; Hartley et al., 2015), in isolation from other system-levels drivers which may not be feasible or sustainable in changing both knowledge and behaviour (Hammami et al., 2017). However, combined with other approaches such as community environmental programs, incentives, policies etc. as motivating factors, this might be feasible to achieve attitude-behaviour change (Howat et al., 2004; North, & Halden, 2013; Toth et al., 2013).

This statement aligns with the environmental research by Aminrad and colleagues (2013) that was conducted in Malaysia among secondary students. The findings showed that 80% of all students had positive attitudes towards caring for the environment from educational literacy linked to participation, use of media, and surprisingly, age. While Esa (2010) argued that knowledge has no influence on behaviour but contributes little to environmental attitude, Barr (2007) countered the statement, with evidence that there is a good relationship between knowledge and attitude, though not influencing behaviour. This study suggests that environmental knowledge is an important factor that influences attitude, but not behaviour (Ergen et al., 2015).

Hammami et al. (2017) conducted about the same environmental study with high school students in the United Arab Emirates and showed a positive relationship between knowledge and attitude towards changing plastic pollution. This was backed up by Fabrigar et al. (2006), stating that knowledge can only directly influence attitude, based on relevance, complexity, amount, and accessibility but no effect on behaviour. The above studies suggest that the new challenge for environmental education aimed at influencing behaviour is that it must move beyond the role of simply transferring knowledge and also recognizes that knowledge is needed to raise environmental awareness.

2.5 The Influence of Tools on Pro-environmental Behaviour towards Plastic Pollution

Bacon (2010) defines influence as the application of power to accomplish a specific purpose. Influencing tools, as it relates to behaviour, are mechanisms used to affect attitudes (Verissimo, 2013). Acharya (2018) opines that everyone needs to be on board to

solve this problem of plastic pollution and individual actions count. Research shows that people typically try to lead and/or influence others using ten positive influence techniques: logical persuading, legitimizing, exchanging, stating, socializing, appealing to relationship, consulting, alliance building, appealing to values, and modelling (Bacon, 2010).

To broaden involvement and to gain commitment to the cause of fighting plastic pollution, a number of tools can be used to encourage participation across communities. According to Walker (2016), clean-up activities have been proposed as mitigation strategies, as well as tools for awareness. Citizen science and education is also a powerful tool in the fight against (micro)plastic pollution (Potts et al., 2011), as demonstrated by the higher amounts of marine litter recovered from beaches frequented by citizens of low literacy in Brazil (Santos et al., 2016) and by the refusal of microbeads products by citizens subjected to awareness campaigns (Chang, 2016). Also, buy-back programs can help reduce littering, illegal dumping, and costs of collection. For example, the number of beverage containers in the coast of the United States and Australia decreased after the implementation of container deposit legislation and a buy-back program (Schuyler et al., 2018).

Knowledge transfer alone is ineffective to influence the desired behavioural change (Barr (2007). Therefore, if Nigerian youth are not encouraged, through engagement and empowerment such as capacity building, to taking responsibility and ownership in resolving these issues that are likely to positively influence family and community's knowledge and behaviour, there will be a negative contribution to environmental degradation (Dumbili & Henderson, 2020) and the likelihood of higher plastic pollution

health issues which can further cause mortality and morbidity of youth and the future generation (Babayemi et al., 2019). These are the reasons why youth engagement interventions are needed and this can be done, according to Justice (2020), by “giving youth a voice” that promotes a structured integration plan for youth and “structured aid and guidance” through which youth participation in climate action can be improved by giving initiatives started by youth, structured educational, financial, monitoring and evaluation aid.

Behavioural change towards plastic pollution in Nigeria could also be influenced by following the example of Kenya and other African (BBC News, 2008; Rayne, 2008) and Western countries (Xanthos, 2017), some of whom have either banned plastic bags or introduced levies/taxes on them, with the aim of helping to solve the problem of marine- and land-based plastic pollution (Knoblauch, 2018).

2.6 The Role of Governmental and Non-Governmental Organisations towards Plastic Pollution Reduction in Nigeria

The research literature acknowledges that community-based organizations such as non-governmental organizations (NGOs) are one of the best health promotion settings in delivering possible interventions with influence in sustaining behavioural consistency through the promotion of plastic waste management and educational awareness programs and activities. Merzel and D’Afflitti (2003) however argue that despite the strong design and conceptual foundation of programs, community-based organizations only have a limited impact but not a sustainable effect on behavioural change.

Goodman et al. (1993) further substantiated why these organizations lack the power to effectively impact on health promoting behaviour through their intervention(s). These reasons may be due, but not limited to paucity of funds, poor community penetration and engagement, insufficient tailoring to the community's socio-cultural beliefs and limited ecological reach (Merzel & D'Afflitti, 2003; Adebisi-Abiola et al, 2020). The lack of emphasis on multiple interventions around an issue at a time, inadequate reevaluation of the strategic plan, insufficient use of tools (like social media) for engagement (Korda & Itani, 2013) and emphasis on program institutionalization and policy have also been implicated (Goodman et al., 1993). To date, most interventions have been unsustainable and inadequate for use as feasible routes to engage young people in long-term practice and behavioural change on reducing the effects of plastic pollution on human health (Dumbili & Henderson, 2020).

The effects of plastic pollution in Nigeria led the government to announce the Plastic Pollution Prohibition Bill in 2013 (Obateru, 2016). This bill was enacted in 2019, but an appropriate enforcement mechanism remains a challenge (Anichebe, 2019; Olanrewaju & Oyebade, 2019). These challenges include the need for alternatives to plastic bags, such as paper bags, penalty (in cash or jail term), prohibition on use, manufacture and importation of all types of plastic bags, as well as addressing harmful impacts to humans and the environment, with relevance to reducing pressure on landfills and waste management (Obateru, 2016; Anichebe, 2019). Adebisi-Abiola et al. (2019) opined that consumers' motivation might be the missing piece to having an effective waste management practice, other than just the law enacted for change.

In 2015, local Nigerian organizations, such as Wecycler, RecyclePointsNg, Africa Clean-Up Initiative (ACI) Nigeria etc., adopted, modified, and started applying strategic tools from other countries, like Kenya (Adebisi-Abiola et al., 2019). These strategic tools range from volunteerism and commitment to incentive-based recycling and upcycling methods that involve giving monetary or non-monetary item(s) when products are made from plastic waste. All strategic actions are intended to reduce the effects of plastic pollution and to indirectly create a circular plastic-economy system. However, evidence on broad accessibility, sustainability of practice and their effects on plastic reduction have not been felt (Adebisi-Abiola et al., 2019; Dumbili & Henderson, 2020). According to Gingerich et al. (2012), increase in incentives offered for engaging youth to promote positive environmental behavioural change may not necessarily guarantee sustainability of practices.

2.7 Barriers to Youth Engagement

The research literature acknowledges that youth are important actors of social change (Percy-Smith & Burns, 2013). Investing in them creates long-term growth plan that the country can rely on and with the youth, there is strong positive impact on solving community's issue (UNEP, 2010). The change, according to Toth et al. (2013), can be achieved when the youth are empowered, engaged, motivated and their impact is utilized. Yahaya (2003) and Emeh (2012) suggest that youth engagement is hampered by constraints arising from cultural, structural, behavioural, and social determinants of health. Other factors such as values, unemployment, substandard education, location, gender, cultural and religion, poor financial and low social status, lack of coping skills and lack of access to social support from organizations and government are also barriers

to youth engagement. These factors result in their lack of skills, support, innovativeness, creativity and capacity to take responsibility for and influence or engage other community members to foster positive human and environmental health behaviours.

According to environmental psychologists, there is a need for people to be motivated and feel concerned about the environment in order to take necessary action that will mitigate plastic pollution (Steg, 2015); values also determine whether or not individuals will accept or reject a policy that is aimed at reducing the consequences of plastic pollution. Typically, people with altruistic and biospheric values are more inclined to practice behaviours that will reduce plastic pollution as compared to individuals with hedonistic or egoistic values (Steg, 2015). Environmental psychologists believe that the values individuals hold significantly motivate how their behaviour will change in terms of their actions regarding plastic pollution (Van den Broek et al., 2015). In the Nigerian context, it could be argued that the use of plastic sachet water bags is clearly beneficial because of the sheer convenience of the plastic product, and there may then be little public support for regulation or bans on their use.

2.8 Gaps and Limitations in Existing Knowledge

It is understandable that knowledge might influence positive attitude (Aminrad et al., 2013; Toth et al., 2013; Ergen et al., 2015), and establishing positive behavioural consistency can be influenced by applying influencing tools either independently or collaboratively (Anichebe, 2019; Adebisi-Abiola et al., 2019; Heidbreder et al., 2019).

There is an obvious gap around youth and attitudinal-behavioural change related to plastic waste use and management in Nigeria and even more specifically in Lagos. This may be

connected to lack of youth inclusion and consideration of relevant socio-cultural factors such as beliefs, knowledge, and social norms that influence social determinants of health. Some socio-culturally specific popular practices in Nigeria, which may aggravate plastic pollution, include dumping of refuse along major highways (Ike et al., 2018) and under bridges (Imam et al., 2008), the use of plastic waste bags and containers to store waste in households (Adegboye, 2018), as well as the use of plastics as improvised fuel in Nigeria to generate fire for cooking and industrial activities (Kehinde et al., 2020). Environmental attitudes and behaviours relevant to plastic pollution could also be influenced by personal, social, and situational factors such as awareness, knowledge, values, attitudes, and social norms and while these factors can propel individuals to act, they can also constitute a barrier to behaviour change (Science Advice for Policy by European Academies [SAPEA], 2019).

There is limited literature on Nigerian youth's behavioural patterns towards plastic pollution (Dumbili & Henderson, 2020), including on sampling methodology design and analysis solely on plastic pollution (Koelsman et al., 2017; Liu et al., 2019). Addressing this limitation requires utilizing other environmental literature conducted on plastic pollution to inform the research methodology and measurement for a new research study (Barboza et al., 2018; Liu et al., 2019).

For the purpose of this research, a voluntary community-based approach through an online survey to examine youth engagement within a selected environmental organization could provide outcome(s) useful for achieving long-term participation and behavioural change. Based on the review of the literature, the survey for this study takes into

consideration, factors such as culturally-relevant social determinants of health specific to the context of Nigerian youth.

2.9 Problem Statement

The massive growth in plastic production and consumption has resulted in the unprecedented scale of plastic waste. Specifically, the production of plastic waste has risen to about three hundred (300) million tonnes and it is nearly the equivalent of the entire human population (UN Environment Report, 2018). The oceans have been used as a dumping ground and plastic waste which finds its way into the food chain, thereby affecting marine life as species feed on these waste that harm, kill, and jeopardize the survival of already endangered species. Plastic waste, therefore, is not just one of our planet's greatest environmental challenges but also one that poses serious threat to the human health.

Environmental problems such as waste management cannot only be solved at government level but need to be addressed also at the individual level. Bartlett (2002) recommends that individuals will have to develop the awareness, gain knowledge and implement practices which will guide them to more environmentally supportive behaviour. Young people's capacities in knowledge and technology, as described by Bartlett (2002), are active agents in identifying problems in their surroundings, especially as youth are seen as being able to both identify issues that concern them and propose new ones of their own.

According to Duan and Foirtner (2005), researchers also argued over the years, that youth are knowledgeable about their local area and are acutely susceptible to negative and positive changes. It can therefore, be further argued that youth are amongst the key

enablers of sustainable waste management in Nigeria and worldwide. However, in striving to positively influence the views and mindsets of youth toward sustainable waste management, it is important to understand plastic waste management knowledge and practices of youth in the country.

Diverse influencing tools such as incentives, plastic ban policies, campaign programs, volunteerism etc. have been utilized as measures geared at the reduction of plastic pollution and its resultant effect on human and environmental health. These measures have, however, been insufficient in sustaining pro-health and pro-environmental behaviours; this could be traced to low participation of youth community members and poor reception and cultural relevance of already existing intervention(s) (Alabi et. al., 2019).

This research study sets out to determine the level at which a select sample of Nigerian youth affiliated with an environmental organization are engaged in plastic pollution reduction in Nigeria and what influencing tools are effective in encouraging youth participation and behaviours that result in plastic pollution reduction. The collective attitude of Nigerian youth towards addressing plastic pollution issue influence their pro-health and pro-environmental behaviours and practices.

2.10 Research Questions

1. To what extent and in what way is the African Clean-Up Initiative in Lagos impacting Nigerian youth's level of engagement in achieving sustainable behaviour related to plastic pollution?

2. How does the level of Nigerian youth engagement in plastic pollution reduction efforts differ by sex, education and other demographic indicators?
3. To what extent are Nigerian youth (those who are between the ages 18-24 years, members of the African Clean-up Initiative in Lagos) engaged in addressing the issue of plastic pollution in Nigeria?
4. What influences youth to engage in addressing plastic pollution reduction in Nigeria?

2.11 Aim and Objectives

The aim of this thesis is to evaluate the level of engagement of Nigerian youth and the influencing tool effective in addressing plastic pollution. The specific objectives of this thesis are to conduct a survey of the youth members of African Clean-Up Initiative (ACI) in Lagos, Nigeria, to ascertain their involvement in plastic pollution reduction through positive environmental practice; to gauge the influence of selected influencing tools; to provide data that will guide organizations, community members, government and researchers in the inclusion of youth in their strategic plans, programs, policy making and research to reduce plastic pollution in Nigeria.

2.12 Significance

Scholarly, findings from this research will serve as a resource base for other scholars from disciplines such as health promotion, information technology (IT) on the use of channels like gamification, social media campaigns, etc. to promote awareness and education on specific subject matter; it will also furnish future researchers with information on the importance of youth engagement to effective reduction of plastic

pollution in marginalized communities and sustainable ways through which the youth can be empowered and engaged, while also showing how IT can be used as a tool for knowledge sharing, education, awareness/sensitization, record keeping and strategizing for plastic pollution control. Additionally, the study outcome will also influence research on innovative intervention to build a sustainable environment for the present and future generations. This research will reveal gaps in the field of education and technology that should be investigated for use in the stead of incentives for encouraging youth engagement; such gaps include technology such as gaming (Schoech et al., 2013; Reese & Junge, 2017).

The significance of this study to policy is the usefulness of its findings in building relationships between community members, government and stakeholders to influence plastic waste management policies. Through collaborative efforts, the government can implement innovative, sustainable actions by providing resources like properly labelled waste disposal bins, collection/recycling sites, waste disposable vans that will first and foremost, reduce the escalating threat of plastic pollution to human existence and secondly, provide jobs that will improve structural, economic and social determinants of health in the community.

On the community front, this research is significant in providing information that will be useful for engaging Nigerian youth in the creation of a healthy environment through the use of available resources to convert plastics into the circular economy (such as recycling, upcycling) to gain power to influence structural, social and economic determinants of health and to advocate for change in policies to include reduction of single-use plastics. Youth engagement will promote Pro-Environmental Behaviour (PEB) and spread of

information to community members (family, neighbours, etc.) which is required to promote human health and maintain healthy environment (Aminrad et al., 2013; Ergen et al., 2015).

2.13 Theory and Conceptual Model

The value of applying theory in research is to establish a framework for accurate information regarding the aim of a study towards achieving its intended goals (Nutbeam, Harris, & Wise, 2010; Rural Health Information Hub [RHIHub], 2020). Different theories have been designed to serve as a guide for the delivery of health promotion and disease programs or interventions. Such theories include the health belief model, which is one of the most widely used models in health promotion that help to understand individual beliefs and predict their changes in health behaviours, and transtheoretical model which explains an individual's readiness to change their behaviour and describes the process of behaviour change as it occurs in stages (Kok, 2018; Nutbeam, Harris, & Wise, 2010; RHIHub, 2020; Glanz et al., 2002; US Department of Health and Human Service, 2005).

These theories are useful because of their ability to explain individual behaviour as well as suggest how to develop efficient ways to influence and change behaviour. However, the drawback is that they mostly focus on individual behavioural change through education only (Glanz, 2009; Glanz et al., 2015; Rural Health Information Hub, 2020).

Whereas, to efficiently address prevention gaps and intervention design for youth and community members, it is pertinent to use the theory of planned behaviour (TPB) (Ajzen, 1991) as an overarching theory and behavioural ecology model (BEM) (Hovell et al., 2002) as conceptual framework due to their relevance to individual intention, engagement

and behaviour. This also includes individual and community engagement in knowledge, skill acquisition, personal development, and social capacity through empowerment (Nutbeam, Harris, & Wise, 2010; RHIHub, 2020) and motivation to promote behavioural consistency.

These theories might be feasible as framework for this study to address the stated research questions. However, it must be noted that the selected participants for this study work in an environmental organization, therefore, they are environmentally aware enough to attain the seven stages of TPB but may be lacking in factors such as actual control needed to achieve behavioural sustainability. The TPB actual control stage contributes motivational - empowerment tools such as skills and capacity building needed to promote engagement of individuals such as youth, to gain behavioural sustainability while the BEM uses this actual control as a source of influencing tools to promote behavioural sustainability. This explains this study's use of TPB to examine the level of youth engagement, in connection with BEM to know their preferred actual control tool, known as the influencing tool needed to achieve and promote behavioural sustainability in maintaining human and environmental health.

2.13.1 Theory of Planned Behaviour

The theory of planned behaviour (TPB) is an eight-stage theory-based behaviour model that was established in 1991 by Ajzen, (Ajzen, 1991; Anderson, 2017). Its central focus is on an individual's intention with actual control as a predictor to perform a given behaviour consistently and the purpose of focus is to capture motivational factors that contribute to behaviour change (Ajzen, 1991; Ajzen, 2005). This theory is very useful for

identifying and considering where and how to target strategies for changing behaviours, youth engagement, and influencing them in achieving a positive behaviour while also considering socio-cultural factors that might limit possibilities of behavioural change (Anderson, 2017). It guides transforming intentions and attitudes into behaviour consistency via actual control mechanism, for the long-term sustainability of environmental and human health, especially with the influencing tool as motivation. Its weaknesses however, include its assumption that the person has acquired the opportunities and resources to be successful in performing the desired behaviour, regardless of the intention; its failure to account for other variables that factor into behavioural intention and motivation, such as fear, threat, mood, or past experience; its assumption that behaviour is the result of a linear decision-making process, and failure to consider that it can change over time (LaMorte, 2019).

The theory of planned behaviour thrives on predictability and its use in this research will take into consideration the motivating factors behind participants' actions and how they translate into positive behaviours. Participants are queried on what drives their involvement in plastic pollution reduction and from literature, some of the factors include the growing need to maintain a green environment, availability of incentives and/or economic benefits of using methods such as recycling/upcycling of plastic waste, and the overall health benefits of plastic pollution control. The theory permits the survey questions to also cover factors that are out of the participants' control, such as sensitization as an influencing tool and other control factors like government policies and how they may affect plastic pollution control.

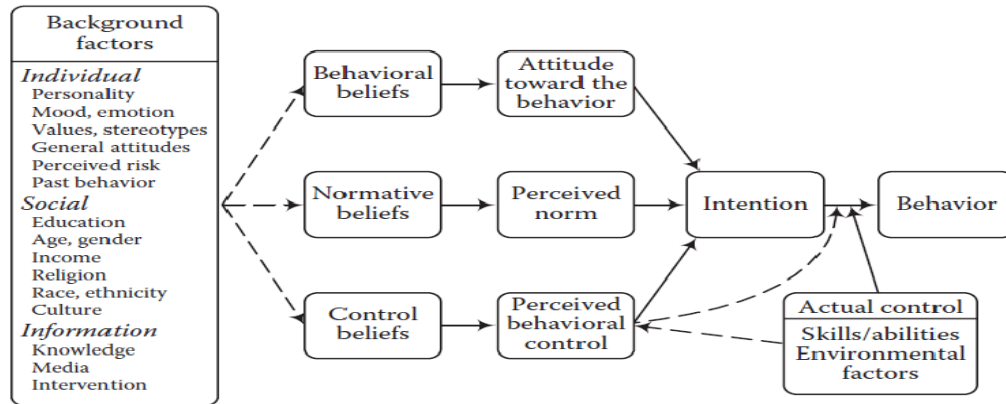


Figure 1 Diagram of TPB

Source: Anderson (2017)

2.13.2 Behavioural Ecological Model

The behavioural ecological model (BEM) is a multifaceted and bidirectional four-step behavioural model created by Hovell et al. (2002). The model is useful to the health promotion discipline (RHIhub, 2020) because of its core principles of equity and community involvement, which are good for influencing behavioural changes that lead to improved population health and prevention of mortality and morbidity (Dresler-Hawke, & Whitehead, 2009).

According to RHIHub (2020), the ecological perspective is a useful framework for understanding the range of factors that influence health and well-being. It is a model that can assist in providing a complete perspective of the factors that affect specific health behaviours, including the social determinants of health; it can therefore, be used to integrate components of other theories and models, thus ensuring the design of a comprehensive health promotion or disease prevention program or policy approach. The

approach has also been useful in resolving health-related behavioural interventions like tobacco use and physical activity etc. (Hovell et al., 2002), as it identifies that means for information used by individuals and communities can also serve as influencing tools, to affect an individual's behaviour at any given stage, especially at a young age (Dresler-Hawke & Whitehead, 2009). Therefore, youth could be proactively influenced through information sources to support the reduction of plastic pollution in the environment, provided the means is culturally relevant, accessible, widely distributed (Dresler-Hawke & Whitehead, 2009; Hovell et al., 2002).

While the strengths of the model are contained in its allowance for integration between behavioural and environmental change, education on how different factors can play a role in the overall outcome; its weak points are noticed in its failure to give insight into how much one factor affects an outcome over another factor, making it hard to uncover what aspect of the model to focus more on to effect change and its heavy cost burden for implementation.

The behavioural ecological model (BEM) shows how different factors affect environmental change. In this research, its application is emphasized in the crafting of survey questions within the context of environmental, ecological, cultural and economic factors that influence plastic pollution. The model will be used to evaluate the impact of reinforcing positive attitudes among the whole community; the survey requires that participants share the impacts their involvement in plastic pollution reduction through the select NGO on immediate communities, as it is believed that youth engaged in plastic pollution reduction are more willing to sensitize and encourage their community members to maintain positive behaviours. The model also allows for examining effectiveness of

plastic pollution mechanisms and combination of intervention methods that can lead to improved behaviours and sustainable practices.



Figure 2 Diagram of BEM

Source: Dresler-Hawke and Whitehead (2009)

2.14 Summary of Chapter 2

This study applies the theory of planned behaviour (TPB) to engage individuals, especially youth and community members, to achieve sustainable behaviour change that will impact on their community through practicing efficient plastic waste management, using the behavioural ecological model (BEM) to build influencing tool, that helps to influence their attitudinal-behavioural consistency, reduce plastic pollution and its toxic effects on human health.

CHAPTER 3 METHODOLOGY

3.1 Research Design

This study applied a pragmatic philosophical worldview, defined by Creswell (2008) as an ideology that is not committed to any one system of philosophy and reality, but rather, makes use of mixed methods research where inquirers draw liberally from both quantitative and qualitative assumptions as they engage in their research. The inquirers are free to choose the methods, techniques, and procedures of research that best meet their needs and purposes (Creswell, 2008). The pragmatic philosophical worldview was chosen for this study because it seeks potential solutions to problems with concern for a sustainable outcome (Crist et al., 2009; Creswell & Creswell, 2017; Creswell & Creswell, 2018; Fox & Frye, 2010).

A quantitative (survey) research design was utilized for this research study, to provide descriptive statistics of a selected study sample of youth affiliated to an environmental organization, on the reduction of plastic pollution in Nigeria (Creswell, 2005; Creswell & Creswell, 2018).

3.2 Research Setting

The Africa Clean-Up Initiative (ACI) Nigeria is a local organization, presently in Lagos. It was created and registered in 2010 as a Non-Governmental environmental organization. It has a large network of people that are passionate about environmental sustainability to bring about desired change in the members' communities. They take advantage of the internet and social media to actively share knowledge of their programs on environmental sustainability and use incentives, such as scholarships, and material gifts to influence

social determinants of health in the communities. Their mission and vision involve inspiring and engaging citizens of African communities to commit to environmental sustainability through environmental cleanup projects, education, and advocacy programs as environmentally responsible citizens/stewards (African Cleanup Initiative [ACI], 2020).

The researcher selected, assessed, and engaged youth from this organization because of the organization's active involvement of young people in their advocacy and application of influencing tools to promote positive behaviours that help in achieving their goal of reducing the negative impacts of plastic pollution on health and environment.

3.3 Recruitment

Youth participants were invited from the selected organization to voluntarily complete the online survey, based on the inclusion and exclusion criteria for this study. The online survey method is effective in communicating and reaching out to the respondents and gives advantage to the recruiter to answer questions, share resources (if available), reach a wider audience through link sharing and save money.

A timeframe of two weeks was allowed for completion of the survey. During this timeframe, study information (appendix D and E) were sent via email to the organization for distribution to potential voluntary participants.

3.4 Sample

The research was conducted using the voluntary participation of youth aged 18-24 years, from a youth-led environmental organization in Lagos, Nigeria called Africa Clean-Up

Initiative (ACI). According to United Nations Population Fund Agency [UNFPA] (2020), youth in Nigeria with median age 18.3 constitute the highest population percentage (19.81%) that are educated in the country (Olley, 2006; UNFPA, 2020; Worldometer, 2020). Therefore, the research criteria included youth of all genders between the ages of 18 and 24 years who are members of the organisation and resident in Lagos, knowledgeable about plastics, fluent in the English language as the dominant language of communication and have access to the internet. Individuals with ages outside of specified range and living outside of Lagos State were excluded.

ACINigeria has an approximate staff capacity of 200; however, the sample size for this study was 43 youth, selected using purposive non-probabilistic sampling. This implies that not all members of the population (ACINigeria) had an equal chance of participating in the study and this was because of the application of the exclusion and inclusion criteria stated above.

3.5 Informed Consent

Participants were invited to complete an online survey (Opinio) which included information about the research, duration, reasons for engaging them, their rights to confidentiality and information in the consent form of the research. Consent forms incorporated in the surveys were dated by willing participants upon receiving the survey (Appendix E) as online links.

3.6 Data Collection

This study was conducted using a voluntary online survey to query a sample of environmentally aware Nigerian youth about their level of engagement and influencing

tools used in addressing the global health crisis caused by plastic pollution. The study also sought to understand the impact of the influencing tools on attitudinal-behaviour consistency towards maintaining a plastic-free, healthy environment.

3.7 Material and Instrumentation

The quantitative design survey for this research study utilized a 7-point Likert scale. This scale was chosen for its accuracy, ease of use, time-efficiency and to allow participants to choose their opinions, importance, frequency, etc. of a particular issue. This survey helped answer the research questions by assessing the possible barriers to youth engagement, level of engagement/impact of youth, effects and sustainability of preferred reinforcement tools, as well as other possible reinforcement tool (such as an incentive, environmental behavioural game).

This survey consisted of three sections: 1) demographic information, 2) engagement/level of impact of youths, and 3) effectiveness/sustainability of their influencing tools for pro-environmental behaviour. The survey was administered to participants from the ACINigeria organization, completed using participants' devices and collected online via Opinio platform. An Opinio account was specifically created for the study and the researcher's email was added so that potential participants can contact the researcher or supervisor for questions or concerns regarding the survey and study. The study data were deleted from the Opinio server at the end day of the survey collection deadline and downloaded and stored in a password-secure folder on a laptop.

This survey was developed using a collection of approaches, such as reviewing and altering already existing surveys based on their relevance and what the questions were

measuring. The survey underwent review for feedback from the thesis supervisor and committee members and the input was incorporated in the final survey questions.

3.8 Data Analysis

The survey data were analyzed using IBM SPSS statistical software version 25 and the open-ended survey data section was subjected to manual, narrative (thematic) qualitative data analysis. Descriptive analysis was performed and reported on demographic information, including the level of youth engagement and impact, effectiveness/sustainability of influencing tools for pro-environmental behaviour and how often the influencing tools are applied to promote attitudinal-behavioural consistency. The frequency (count, percent, and frequency), central tendencies (mean, median and mode), and variability (range, variance, standard deviation) of each response was calculated; this was necessary to determine the normality of the distribution.

Narrative (thematic) analysis is a form of qualitative research method and analysis that extracts themes from the open-ended comments made by individuals (Joffe & Yardley, 2004; Riessman, 2008). For this study, the narrative (thematic) analysis was done with primary focus on the content within the text. The analysis process consisted of five stages: (a) organization and preparation of the data, (b) obtaining a general sense of the information, (c) the coding process, (d) categories or themes, and (e) interpretation of the data (Creswell & Creswell, 2018; Glesne, 2016). This analysis was used in this study to provide a detailed outline of factors that shape the subjective experiences of health and well-being (Braun & Clarke, 2014; Riessman, 2008) and how they impact the suggested strategies for improving youth engagement in plastic pollution reduction.

The preparation of the data for analysis began with transcription of participants' responses following data collection. While transcribing, all patterns or themes were noted in the transcript margins and the transcripts were compiled into one document for each participant. Participants were assigned fictitious names, and any participant identifiers (e.g. names, locations) and non-narrative lines, such as casual responses were deleted.

The next stage involved the manual data coding process. While qualitative analysis software programs exist, the researcher elected to complete the data analysis manually. According to Glesne (2016), "coding is a progressive process of sorting and defining those scraps of collected data that are applicable to your research purpose" (p.38). The coding process involves re-reading the transcripts and identifying recurring words, ideas, or patterns generated from the data. The researcher re-read the narratives and highlighted, within each narrative, prominent ideas and any recurring words or messages. Then, developed a corresponding code, a shorthand designation to easily identify the recurring words/ideas, for that passage and placed it in the margin. Upon coding of the first transcript, a master code list was constructed and new codes were added as the researcher proceeded with subsequent transcripts. The initial master code list contained codes (recurring patterns) that were placed in logical categories or on the basis of a word or phrase describing some segment of your data that is explicit (Butina, 2015). Categories should reflect the themes that have become apparent and represent the major findings of the study. For this study, the codes were condensed into various major categories or themes based on the participants response to the open-ended questions. The last stage of the analysis, which is interpretation, consisted of studying the themes and their corresponding codes to determine if there were any overarching themes.

3.9 Ethical Consideration

In conducting this research, the researcher obtained approvals from Dalhousie University Research Ethics Board and the partner organization in Nigeria. The informed consent which was incorporated in the survey for the participants was dated as signature to promote confidentiality and de-identification of participants. Before the commencement of the research, the code of conduct, research process and timeline (about 2 months) were collaboratively created and agreed by the researcher and research committee and same was shared with the organization. These were discussed and a memorandum of understanding was agreed upon, to promote power-sharing, transparency, relationship building, trust, validity, and to cover modalities necessary in conducting research.

The steps taken to ensure confidentiality and to secure non-identifying information included limiting access to raw data by using a password available only to the researcher. The Opinio survey platform used for the study respects data privacy laws; therefore, the ethical privacy considerations of the participants were met. Participants were also given the option to skip questions or terminate their participation at any time of the survey period.

3.10 Knowledge Transfer, Sharing and Mobilization

A one-page summary of the study report with key findings will be shared with the participants through email, with the aim of empowering them through information, to take responsibility for their environment and health, suggest ways of seeking internal and external support to advocate for change in policy from government and stakeholders. This descriptive summary includes the participants' socio-cultural beliefs and practices to ease

understanding and the document is shared via the organization's email. This document is expected to mobilize the youth to engage in campaigns, knowledge sharing, advocacy workshops, utilize influencing tools and engage more youth/community members to promote social actions towards reduction of plastic pollution.

The organisation will also receive the study outcome as a one-page document via their email. If utilized, the findings will help create and achieve sustainable ways of resolving lack or low youth engagement in the search for sustainable interventions for plastic pollution crisis in their environment and provide sustainable influencing tools to mobilize them. The document to be shared with the organization, alongside progress reports might be published on the organization's social media platforms (such as Twitter, Facebook, Instagram). This could pave way for the organization to create or organize outreach programs and workshops for training, skill acquisition and capacity building all geared towards the reduction of plastic pollution.

The findings will be translated and published in relevant health promotion, public health or environmental science journals and shared on social media platforms to increase access to information for researchers. The results will be shared through presentations at relevant human health and environmental health discipline conferences and workshops with the aim of mobilizing health promotion and providing information for other researchers looking to conduct research on plastic waste and pollution especially in developing countries.

CHAPTER 4 RESULTS

This chapter begins with an overview of the demographic characteristics of the participants in the study. The results of the data collected are arranged based on the research questions answered. Table F1 (see appendix F) is a summary of the participants' demographic characteristics. 46.51% of the participants reported to be 24 years old; 53.5% were male and 46.5% were female. The majority, 60.47% were Yoruba and 48.83% had Bachelor of Science degree as their highest educational level. 97.7% of the participants were single and 41.9% had spent 16 to 20 years living in Lagos.

4.1 Research Question One: To What Extent and in What Way is the African Clean-Up Initiative in Lagos Impacting Nigerian Youth's Level of Engagement in Achieving Sustainable Behaviour Related to Plastic Pollution?

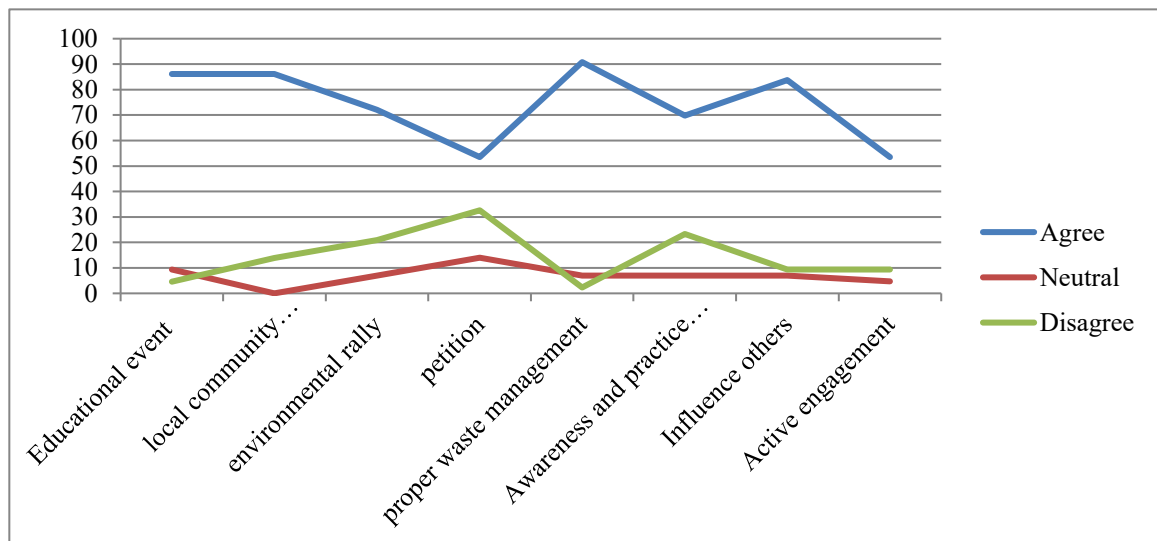


Figure 3 Way The African Clean-Up Initiative in Lagos is Impacting Nigerian Youth's Level of Engagement in Achieving Sustainable Behaviour Related to Plastic Pollution

Figure 3 above shows that 86.1% ‘agreed’ that they have participated in an educational event (e.g., workshop) and in a local community engagement event related to plastic pollution and environmental issues. 72.1% ‘agreed’ that they organized an environmental rally with the ACINigeria to promote plastic pollution reduction while 53.5% ‘agreed’ that they organized a petition (including online petitions) for environmental issues (e.g., climate change, plastic pollution). The table also indicates that 90.8% ‘agreed’ that they engage in proper waste management/recycling/upcycling that might be impactful on plastic pollution reduction. From these findings, it can be deduced that the African Clean-up Initiative in Lagos engage youth in addressing the menace of plastic pollution in Nigeria.

4.2 Research Question Two: How does level of Nigerian Youth Engagement in Plastic Pollution Reduction Efforts Differ by Sex, Education and other Demographic Indicators?

The descriptive statistics (cross-tabulation) of level of participants’ engagement in plastic pollution reduction efforts by sex, education, and other demographic indicators are shown in Tables F2 and F3 (see appendix F). Among the male respondents, 23% strongly engaged in plastic pollution reduction efforts while 4.70% and 2.30% indicated neutrality and very strong disengagement respectively, in plastic pollution reduction efforts. 18.60% of male participants are engaged in plastic pollution reduction, and no female participant reported that they are disengaged. The data indicate that 18.60% and 16.30% are engaged and very strongly engaged respectively in plastic pollution reduction. On the basis of age, one participant (18-19years) that is 2.4% is disengaged in reducing plastic pollution and 16.70% of the participants (aged 24years) indicated engagement in the plastic pollution

reduction. Table F2 revealed that most of the Yoruba participants engage in plastic pollution reduction, while only one Yoruba participant indicated disengagement; 7.10% of the Igbo participants acknowledged that they engage and 14.30% indicated that they strongly engage. 23.30%, 14.00% and 2.30% of the participants who possess a bachelor's degree, secondary school certificate and others respectively stated that they engage, while one participant with secondary education strongly disengaged in the efforts to reduce plastic pollution. The table shows that 37.20% of the participants are single and engaged in the efforts. Only one participant that had spent 16-20years in Lagos disengaged in reducing plastic pollution efforts. Data based on the various demographic indicators show that participants are strongly engaged in reducing plastic pollution efforts.

To show the level of engagement in plastic pollution reduction efforts of the youth based on gender, education and other demographic indicator in Nigeria, central tendency statistics was used. Central tendency is a statistical measure that identifies a single value as representative of an entire distribution (Gravetter & Wallnau, 2000). It was used for this study because it is more precise than measure of dispersion, easy to calculate and inexpensive (Statistical Aid, 2021). Table F3 reveals that on the basis of overall level of engagement in plastic pollution reduction efforts, the male participants had a mean of 5.35 while the female had a higher mean of 5.90. Based on age differences, participants within the age range of 20-21years had the highest mean (6.00); this was followed by a mean of 5.75 by participants aged 24years, 5.64 by ages 22-23 and the least mean of 3.67 was derived from those between ages 18-19years. For the ethnicity of the respondents, Hausas had the highest mean of 6.14; Yorubas had 5.58, Igbos had 5.50 and other ethnic groups had the least mean of 5.17. Participants with Diploma certification (HND and

OND) had a higher mean score (5.90) in level of engagement than those with bachelor's degree (5.67) and Secondary school certificate (5.23). By marital status, it was observed that 5.60 of the participants who were single engaged more in plastic pollution reduction activities than the married ones, with a mean of 5.00.

4.3 Research Question Three: To What Extent are Nigerian Youth (Ages 18-24 Years and Members of the African Clean-Up Initiative in Lagos) Engaged in Addressing Plastic Pollution in Nigeria?

As indicated in Table F4 (see appendix F), the extent Nigerian youth members of ACINigeria, who are between the ages of 18-24 years are involved in addressing plastic pollution varies. The majority (83.7%) of youth self-reported being very interested in reducing environmental pollution caused by plastics, while 41.9% of the youth in this study 'strongly agree' that it is important to engage youth in reducing plastic pollution. 46.5% 'agreed' that they have participated in an educational event (e.g., workshop) related to plastic pollution and the environment and 34.9% 'agreed' that they took part in a local community engagement event on environmental issues. In addition, 30.2% 'agreed' that they organized an environmental rally with the organization to promote plastic pollution reduction while 32.6% 'agreed' that they organized a petition (including online petitions) for environmental issues (e.g. climate change, plastic pollution). The table shows that 32.6% 'very strongly agree' that they engage in proper waste management/recycling/upcycling that might be impactful on plastic pollution reduction, 44.2% 'strongly agreed' that their engagement is needed to reduce plastic pollution in the

environment and 32.6% 'agreed' that they are more actively engaged in addressing plastic pollution than other people their age. From these findings, it can be deduced that the Nigerian youth (ages 18-24 years), who are members of the African Clean-up Initiative in Lagos strongly engage in addressing the menace of plastic pollution in Nigeria.

4.4 Research Question Four: What influences Youth to Engage in Addressing Plastic Pollution in Nigeria?

Table F5 (see appendix F) shows descriptive statistics of factors that influence youth engagement in plastic pollution reduction in Nigeria. The majority of the participants 'strongly agreed' that environmental programs such as plastic waste management activities and volunteering, use of social/behavioural application or games, economic incentives such as scholarships are useful for addressing plastic pollution. Most of the participants 'strongly agreed' with the use of such influencing tools as incentives, mobile app or games with educational and behavioural practice/activities and committed practice of proper plastic use and disposal management. Volunteerism and peer influence were 'strongly agreed' upon by the majority of participants as influencing tools to reducing plastic pollution.

The table (appendix F) also shows that the highest number of participants 'agreed' that their family, incentive, and program/activities influenced their participation in plastic pollution reduction behaviour. Some also 'strongly agreed' that their school, peers, game, and commitment to proper plastic use/disposal/management influence their participation in addressing plastic pollution. The participants 'strongly agreed' that if incentive is provided and a commitment is made, positive behaviour towards plastic pollution

reduction will be encouraged. Many ‘agreed’ that if they have access to game/app, if program/activities are implemented or they are pressured by peers, their behaviour towards reducing plastic pollution will be positively influenced. Also, majority of the participants agreed that inadequate social support, inadequate environmental activities, lack of peer pressure and inadequate commitment negatively affect their environmental sustainability behaviours.

4.5 Open-ended Survey Questions Findings

Themes were manually generated from data obtained from the open-ended questions on participants’ capacity to be engaged in plastic pollution reduction through ACINigeria. The questions focused on training received on plastic pollution reduction through ACINigeria, the influencing tools (such as incentives, peer support, program/activities, volunteerism, social media etc.) used by their organization, suggested ways to improve youth engagement in promoting a plastic-free environment and comments about plastic pollution reduction among youth. The major themes and subthemes identified with a summary of the participants’ comments are as follows:

4.5.1 Capacity to be Engaged through ACINigeria in Reducing Plastic Pollution

Majority of the participants indicated that they engage in reducing plastic pollution through ACINigeria by means of:

Volunteerism: Twenty-three of the participants indicated that they volunteer by engaging in basic clean- up of roads, surroundings and community and by participating in the 2020

World clean-up day activities, plastic bottle donations, street clean-up and working as projects lead and as parts of the content development team of ACINigeria.

Enlightenment: Ten ACINigeria youth indicated that they participate in reducing plastic pollution through educating the public on negative effects of plastic pollution and the merits of recycling; they did these through online campaigns especially through the Whatsapp platform.

Plans to be engaged: Five participants indicated, having recently joined the ACINigeria team, they plan to be actively involved in programs that champion plastic pollution reduction.

Household waste management: Three participants indicated that they separate their household wastes, carry out regular clean-up exercises and donate used plastic bottles from their homes.

Nothing: From the data collected, two participants in the study indicated that they do not, in any way, engage in reducing plastic pollution.

4.5.2 Training Received on Plastic Pollution Reduction Through ACINigeria

It was observed that twenty-one (21) participants had not received any training on plastic pollution reduction through ACINigeria; twenty-two (22) participants however reported that they have received trainings and their responses are grouped as follows:

Through clean-up: One participant indicated that they underwent training on plastic pollution reduction through clean-up exercise by the ACINigeria organization.

Waste management and Recycling: Fourteen participants stated that they were trained on waste management and recycling through the ACINigeria.

Waste conversion, sustainable waste management and the business of recycling: Ten participants highlighted that they were trained on waste conversion, sustainable waste management and taken through the rudiments of recycling business.

4.5.3 Influencing Tools (Such as Incentive, Peer Support, Organization Program/Activities, Volunteerism, Social Media etc.) Used by Their Organization

The participants had diverse opinions on the various influencing tools used by their organization. They include:

Social media: Six of the respondents identified Instagram, Twitter, Facebook and YouTube as social media platforms used as influencing tools for plastic pollution reduction by ACINigeria.

Volunteerism: Three participants indicated volunteerism as an influencing tool used by the organization in plastic pollution reduction.

Environmental Education: Sixteen participants suggested that environmental education and awareness is an influencing tool that can be used by their organization.

Engaging other Organizations and Private/Public Bodies: Eight participants indicated engagements of other organizations through ACINigeria programs, as a useful tool for influencing reduction of plastic pollution.

Combination of influencing tools: Ten participants suggested that combination of influencing tools by the organization can result in plastic pollution reduction. Some of the combinations are ‘incentives, education and organizational program’; ‘incentives, volunteers, social media and organizational activities’; ‘incentives, program/ activities and social media’; ‘peer support, program and volunteerism’; ‘social media, volunteerism, incentives and organizational program’; ‘social media, volunteerism and organizational activities’; ‘volunteerism and social media’; ‘volunteerism, organizational program and social media’.

4.5.4 Suggested Ways to Improve Engagement of Youth in Promoting Plastic Free Environment

The participants suggested some approaches in improving the engagement of youth in promoting a plastic-free environment. The following are their suggestions:

Creating awareness: It was observed from the response to the open-ended questions that majority (twenty-six) of the participants suggested that creating awareness through channels (such as social, advocacy campaign) will help improve youth engagement in reducing plastic pollution. Others suggested enlightenment, orientation on proper disposal or handling of plastic wastes via social media (Facebook, Whatsapp, Twitter), creation of public awareness on the effects of plastic pollution, advocacy programs, house-to-house sensitization, organization of events and rallies to create awareness, intensive sensitization on the environmental effects of plastic pollution, Creating awareness on the ills of indiscriminate plastics disposal and the need to avoid blockage of drainages, education through social media, outreaches to religious institutions, campaigns in schools,

market places, etc., using social media to encourage volunteerism and encouraging youth to take care of the environment.

Environmental Education: Six participants suggested the following measures: inclusion of environmental education in school curriculum, organizing step-down trainings for the reduction of plastic use in Nigeria and sensitization on re-use of plastics.

Incentives: Three participants suggested incentivizing youth who partake in plastic pollution reduction. Their suggested approaches include the provision of rewards for participating in plastic pollution reduction activities, giving stipends to volunteers, provision of incentives to encourage environmental sustainability practices and setting up of reward system by government for returning used plastics.

Government and other Stakeholder Roles: Eight of the participants pointed out government and stakeholders roles in reducing plastic pollution. They suggested that stakeholders and government should contribute to reducing plastic pollution by raising new policies to protect the environment, organizing environment-focused programs, ensuring adequate sensitization of the youth, giving incentives for plastic wastes returned, setting up more recycling agencies, giving credibility and endorsements to programs that promote plastic-free environment, regulating the production and use of plastics and collaborating with industry stakeholders.

4.5.5 Comments about Plastic Pollution Reduction among Youth

Participants commented on plastic pollution reduction among the youth. The main themes are:

Need for raising awareness and environmental education: Twenty-eight participants emphasized the need for raising awareness on plastic pollution reduction through their responses to the open-ended questions. Comments such as “I believe that the major communities being polluted by misuse of plastics are ill-informed about its dangers and means of eradicating plastic pollution, such as recycling”, “awareness is necessary because some people are not even aware of it” point to the knowledge gap that exists in the control of plastic pollution. The advantage of youth involvement was advocated for by some participants who commented as follows: “engage and sensitize the youth”, “it is good to educate more youth”, “the youth should be educated on the effects of plastic pollution”. Education and dissemination of information should be at the forefront of plastic pollution reduction efforts; when communities are armed with plastic pollution reduction ideas that, their actions will be shaped to yield positive change. Participants echoed this by suggesting the following: “by posting information of plastic pollution reduction on social media”, “a plastic pollution reduction club should be introduced in schools for proper awareness”, “learn proper plastic disposal”, “should enlighten students about plastic pollution by introducing it into curriculum”, “a child should be made to understand waste and plastic pollution”. The role of youth in environmental education should not be overlooked and one participant stated a reason: “youth are the future of any growing economy and should be engaged in achieving environmental sustainability.”

Emphasis on youth engagement: Seven participants indicated that there is need to engage youth in plastic pollution reduction programs. Government laws and policies exist for plastic use and the effectiveness of youth involvement on implementation should not be undermined; this sentiment was shared in the comments: “active engagement of youth in environmental sustainability initiatives while collaborating with community leaders, local governments and the federal government to provide viable solutions that will lead to a rapid environmental change”, “if the youth can abide by the rules of reducing plastic pollution, the environment will be theirs”. Comments such as “from recent orientation exercises, youth have learnt to be engaged in proper handling of used plastic”, “engage and sensitize” emphasize the importance of equipping young people with information to properly engage in the control of plastic pollution. The comment, “more youth are now getting involved in plastic pollution reduction than before” indicates that progress is being made in getting more youth to be actively involved in environmental sustainability.

Summarily, these comments indicate that the participants recognize how important it is, to create opportunities for youth to fully participate in plastic pollution reduction programmes; it can be deduced that youth in communities are encouraged to participate when they see the hands-on work done by youth who are members of pro-environment organisations. The importance of government and key stakeholders’ roles as drivers of change is also emphasized; the work done by youth will have more pronounced results if they are backed up by government policies and the cooperation of stakeholders.

Need for plastic pollution reduction: Eight participants highlighted the rationale for plastic pollution reduction in the society. There is urgency in the need to drastically reduce its use, or at best, properly manage plastic wastes; this is echoed by participants’

comments, such as “plastic pollution reduction is a big issue that needs practical approach’, “more workshops, walks, adverts, cleanup programs should be organized with focus on the cons of improper disposal of plastics; RRR should be promoted at every opportunity”, “there should be recycling and proper storage of plastic materials” “there should be collaboration with alternative energy companies to utilize plastic wastes for electricity generation or use them in buildings”; comments like: “plastics are harmful to humans and animals; so many diseases are transferred from person to person through plastic materials”, “plastic pollution is a menace and it must be mitigated for a better life”, “plastic pollution should be looked into critically to secure our environment”, “plastics are non-biodegradable and have so many negative effects on both humans and animals, if we can work together to curb pollution, then we can make the world a safer place to live in” indicate some of the concerns about plastic use and how its disposal affects human and environmental health.

There is a growing body of literature on potential health risks of plastic on human population; a range of chemicals that are used in the manufacture of plastics are known to be toxic (Thompson et al., 2009); this is supported by participants’ comments like “plastic use should be avoided if possible”, “the rate at which plastic materials are used by today is alarming, therefore all environmental sustainability measures should be taken to reduce it”.

4.6 Discussion

This health promotion research study was conducted to ascertain the level of engagement and impact of youth members of the African Clean-Up Initiative (ACI) organization in Lagos, Nigeria on the reduction of plastic pollution, through positive environmental practice as well as the impacts of selected influencing tools. The study narrowed its findings on the basis of age, sex, education, and other demographic indicators; the extent ACINigeria youth members are engaged and the influencing tools for youth engagement in plastic pollution reduction in Nigeria. Open-ended questions were used to contextualize participants' engagement in achieving a plastic pollution-free environment and their suggestions and comments on plastic pollution reduction were obtained.

The behavioural ecological model (BEM) was instrumental in answering the research questions by revealing how the different factors (demographic indicators) affect environmental change and the theory of planned behaviour (TPB) established the link between the participants' beliefs, as revealed in their comments in the open-ended questions, and their inclinations to influencing their community members to actively combat plastic pollution.

4.6.1 Extent and Ways the African Clean-Up Initiative in Lagos is Impacting Nigerian Youth's Level of Engagement in Achieving Sustainable Behaviour Related to Plastic Pollution

It was observed that the African Clean-up Initiative in Lagos actively involve youth in their programs geared towards the reduction of plastic pollution in Nigeria. The behaviour ecological model (BEM) is evident in their programs, which involve the integration of

behavioural and environmental change exercises (e.g., sensitization campaigns, clean-up exercises, education) to influence behaviours and activities of their members to achieve the desired outcome – plastic pollution reduction. Youth members, through the initiative are empowered with information to affect their immediate communities; this is reflected in their comments and suggestions.

The organisation, according to respondents, makes use of influencing tools, such as incentives to encourage youth participation in plastic pollution reduction. The BEM model, as expressed in the findings, asserts that youth who engaged in plastic pollution reduction are more willing to sensitize and encourage their community members to maintain positive behaviours and are more inclined to engage in activities that result in reduced plastic pollution.

4.6.2 Level of Engagement in Plastic Pollution Reduction Efforts as it Differs by Sex, Education, and Other Demographic Indicators in Nigeria

The findings show that the participants are strongly engaged in reducing plastic pollution and this agrees with the research literature by Percy-Smith and Burns (2013) that states that youth are the actors of change. According to UNEP (2010), investing youth creates long-term growth that the country can rely on and their involvement ensures strong positive impact on community issue. This positive impact can be achieved when youth are empowered, engaged, motivated and their impact is utilized (Toth et al., 2013).

Summary of these findings echo the theory of planned behaviour which posits that attitude, subjective norms and perceived behavioural control, together shape an individual's behavioural intentions; the findings reveal the key motivating factor behind

participants' involvement in plastic pollution control, to be, advanced level of education.

It can therefore be said that, based on this study, education and empowerment of youth by an organized body (in this case, the African Clean-up Initiative in Lagos) are motivating factors for youth engagement in plastic pollution reduction.

From the results, participants with higher educational qualifications are more engaged than those with secondary school certification, indicating that with more advanced learning comes greater exposure and knowledge on the need and ways to actively promote the reduction of plastic pollution. This assumption leans on the report of Dalu et al. (2020) that the integration of plastics issues into the educational system of both primary and secondary schools has often been overlooked, especially in Africa, presenting a major challenge to environmental awareness. This is therefore a wakeup call to early years' educators to incorporate plastic pollution and the safe use of plastics into learning curriculum.

The female participants' responses indicated more engagement in plastic pollution reduction as compared to their male counterparts. Even though there is very limited literature on the relationship between gender and plastic pollution, this study offers an interesting insight for evaluating the roles of male and female members of society as agents of change in reducing the impacts of plastic on environment and human health.

There are suggestions as to why women (and girls) would be more involved, such as the sense of personal responsibility arising from the fact that they are most affected by Endocrine Disrupting Chemicals (EDCs) found in cosmetics and personal care products (Women Engage for a Common Future [WECF], 2008). According to Lynn et al. (2017), waste management cannot generally be attributed to male or female members of a

community, even with the presence of gender roles which differ by culture. Therefore, educational campaigns should target both men and women as change agents to combat plastic pollution.

4.6.3 Extent of Nigeria Youth (Ages 18-24 Years and Members of the African Clean-Up Initiative In Lagos) Engagement in Addressing Plastic Pollution

The findings indicate that most participants were 'very interested' in reducing environmental pollution caused by plastics. This is similar to findings by Aminrad et al. (2013) where 80% of all students indicated positive attitudes towards caring for the environment from educational literacy linked to age. A large percentage of youth in the study agreed that it is important to engage youth in reducing plastic pollution, that they have participated in an educational event (e.g., workshops) related to plastic pollution and the environment, that they took part in local community engagement events on environmental issues, organized an environmental rally with the organization as a way of reducing plastic pollution, started petitions for environmental causes, engage in proper waste management/ recycling/ upcycling, that their engagement is needed to impact reduction of plastic pollution in the environment and that they are more actively engaged in addressing plastic pollution than other people their age. This is contrary to the claim by Merzel and D'Afflitti (2003) that despite the strong design and conceptual foundation of programs, community-based organization only have a limited impact but not a sustainable effect on behavioural change.

From the results, the impact made by ACINigeria resonates with the report from Hulsken (2014) that Non-governmental actors play an important role in the problem of plastic pollution and work to influence companies to change their course of action. The multiple approaches used by ACINigeria to influence youth to fight plastic pollution, while it can be improved upon as suggested by the participants, is a viable framework which can be adopted by other parastatals and organisations in Nigeria to foster the reduction of plastic pollution.

4.6.4 Factors that Influence Youth Engagement in Addressing Plastic Pollution Reduction in Nigeria

The majority of participants agreed on all the factors influencing and promoting pro-environmental behaviours such as the influencing tools affecting youth plastic pollution reduction activities, factors influencing their participation in plastic pollution reduction behaviour and factors that affect their environmental sustainability behaviour. These findings support the idea of local organizations, such as Wecycler, RecyclePointsNg, Africa Clean-Up Initiative (ACI) Nigeria, etc. that adopted, modified, and are applying strategic tools from other countries, like Kenya (Adebiyi-Abiola et al., 2019). These strategic plans are applied to help reduce the plastic pollution effect as well as indirectly create a circular plastic-economy system.

Most participants agreed that environmental programs, economic incentives and scholarships are useful influencing tools in curbing plastic pollution. This finding contrasts with research literature from Gingerich et al. (2001) that states that offering incentives for engaging youth in promoting behaviour change may be helpful but that

sustainability does not necessarily follow. However, the theory of planned behaviour is reflected in the findings, in the sense that, it did not fail in its assumption that acquiring the opportunities and resources to address a specific problem will lead to success in performing the desired behaviour, regardless of the intention.

The majority of participants 'strongly agree' that if incentive is provided and commitment is made to the cause, it would influence positive behaviours and practices to reduce plastic pollution. Findings also reveal that inadequate social support, inadequate environmental activities, and inadequate commitment can all impact environmental sustainability behaviours of participants and community members. For example, 30.2% of participants disagreed that a lack of peer pressure affects their environmental behavioural consistency. These responses highlight the utility of behaviour ecological model (BEM) as it recognizes that influence from peers can affect individual's behaviour at any given stage especially at a young age (Dresler-Hawke, & Whitehead, 2009).

4.6.5 Open-ended Survey Questions

This study revealed that participants engage in plastic pollution reduction through ACINigeria by volunteering, program planning/activities and personal engagements (such as separating their household wastes, regular clean-up and plastic bottle donation). This was corroborated with the literature by Toth et al., (2013), that participation can be done through engaging youth in plastic pollution awareness programs and intervention planning, training in knowledge and skill acquisition with the much-needed attitude as well as motivation to influence or drive long-term behavioural changes. The findings also

buttresses the suggestion of Ries et al. (2016), that teaching the next generation of leaders how to be part of the solution of plastic pollution is vital to correcting the problem.

Twenty-three participants received training on plastic pollution reduction through the organisation and participated in trainings on clean-up exercises, waste management and recycling, waste conversion, sustainable waste management and the business of recycling. This finding is supported by research literature by Percy-Smith & Burns (2013) on the importance and potential of youth as the key actors of change to achieve a more sustainable world, provided they are encouraged to participate, motivated, and that their feedback is utilized. The findings also highlight the application of behavioural ecological model (BEM) in uncovering the impacts of reinforcing positive attitudes among the whole community.

The participants indicated that social media, volunteerism, environmental education, engagement of youth organization and other private and public bodies can promote behavioural change. This finding is supportive of the work of Reese & Junges (2017) stating that the influence towards maintaining behavioural change can come from an array of influencing tools, such as incentives, games, etc.

Participants made suggestions for improving the engagement of youth and emphasized the need to raise awareness and environmental education, engage the youth in plastic pollution reduction programs and the rationale for plastic pollution reduction in society; these suggestions highlight the theory of planned behaviour (TPB) that was employed in the survey questions to help identify the ways to target strategies for increased youth engagement and how to influence positive behaviours (Anderson, 2017).

The lack of action will increase the negative impacts of plastic use, resulting in environmental degradation, heightened health issues which can deteriorate to mortality and morbidity of future generations. On the flip side, when there are positive impacts on behavioural changes to reduce plastic pollution, there will be improved human and environmental health.

4.7 Limitations

Several limitations were encountered in the course of this research; the most evident being the sample size. The research investigator originally intended to carry out an in-person, mixed methods research in Nigeria, but the events of the COVID-19 pandemic (e.g. lockdowns, travel ban, physical distancing guidelines, and transition to remote work) posed a constraint to the methodology and necessitated a change of strategy to the use of online surveys through a Non-Governmental Organisation, ACINigeria. This change resulted in a limited pool of potential participants to choose from. Following the application of the inclusion and exclusion criteria, the sample size was further reduced from 80 to 43, a number too small to cover the qualitative and quantitative elements required for this kind of research.

Ideally, larger numbers should be recruited to participate in the survey, to obtain a more robust result. Using a small sample poses a concern in statistical analysis as it is unreliable to generalize the study's implications on an entire population on the basis of an insignificant fraction of it. For example, the participants were from African Clean-up Initiative in Lagos, Nigeria; hence, it is not feasible to conclude that their thoughts and feelings are that of the youth from other regions of the country. It can be said, however,

with this small sample, a snapshot of youth involvement has been described and that it can assist as a reference for future work in this aspect of plastic pollution.

Another limitation in the study was the limited literature on youth behavioural patterns towards plastic pollution in Nigeria from health promotion journals, reliable sampling methodology and analysis solely on plastic pollution. Resolving this limitation required utilizing other environmental literature conducted on plastic pollution and adopting the methodology and measurement. There is also, a dearth of information on the effectiveness of intervention(s) and enacted policies in Nigeria.

4.8 Summary of Chapter 4

This chapter discussed the key findings from the survey distributed to the participants. It described the participants – age, sex, ethnicity, education, marital status and years of living in Lagos – and presented the data analysed through the research questions: how does level of Nigerian youth engagement in plastic pollution reduction efforts differ by sex, education and other demographic indicators? To what extent are Nigerian youth (those who are between the ages 18-24 years, members of the African Clean-up Initiative in Lagos) engaged in addressing the issue of plastic pollution in Nigeria? What influences youth to engage in addressing plastic pollution reduction in Nigeria? Cross-tabulation was used to explain the levels of youth engagement in plastic pollution reduction in Nigeria and content analysis was used to assess the open-ended items in the survey. The discussion compared the results to the other notable literature on youth engagement and plastic pollution; as deduced from the results, youth members of ACINigeria are committed to plastic pollution reduction and their intentions are backed up by their active

participation in plastic pollution reduction programs; the discussion also covered the influencing tools useful for plastic pollution control.

CHAPTER 5 CONCLUSION

This study has furthered the understanding of youth engagement in reduction of plastic pollution in Nigeria. From the results, participants indicated that they engage in plastic pollution reduction and noted that they intentionally make efforts to educate and get others involved as personal engagement was a catalyst for interest and involvement in their case; thus affirming the theory of planned behaviour (TPB), where an individual's beliefs (internal factor) and social norms (external factor) shape their behaviours, intentions and tendencies. The participants' agreement on the effectiveness of influencing tools such as incentives, use of awareness campaigns, and partnership with government and stakeholders, leans on behavioural ecological model (BEM) that seeks to establish the relationship between multiple levels of influence, such as psychological, social, educational etc. on behaviours.

The participants' shared comments on youth involvement and effective influencing tools are useful insights that could serve as leads in drawing up blueprints for strategic intervention. Responses also reveal that family, incentives, and programs/activities can influence youth participation in plastic pollution reduction behaviour and this can form a base for more specific studies of plastic pollution and control. Reese and Junges (2017) and Santti et al. (2020) assert that the influence towards maintaining behavioural change can come from an array of influencing tools, such as incentives, games etc. and through channels like media, peers, parent, school, organization, government (Gilliam et al., 2018; Grønhøj & Thøgersen, 2012). This statement and the findings from this study, once again, highlight behavioural ecological model (BEM) by showing that behavioural changes can stem from community involvement and education can lead to improved population health.

Additionally, the open-ended responses revealed that social media (Instagram, Twitter, Facebook and YouTube), games, volunteerism, environmental education, engagement of youth organizations and other private/public bodies and a combination of influencing tools are vital tools; the participants' agreement on the effectiveness of social media and online games point to the opportunities that exist for collaboration in the fields of health promotion, information technology and new age media.

This research hints at the relevance of youth engagement in the control of plastic pollution as a health promotion strategy; an assertion supported by Aceves-Martins et al. (2019) reports that youth involvement enables young people to influence processes and decisions that affect them, leading to changes in themselves and their environment (e.g. peers, services, communities and policies); this strategy could be applied to improve health and prevent diseases. The study has compiled data on youth involvement in plastic pollution reduction that may be useful to other researchers, policy makers and health promoters; it gives insight on the extent to which persons and organizations are involved, how much work is required and the influencing tools for effectively stimulating youth engagement in plastic pollution control, thereby improving the health and wellbeing of the entire populace.

It can therefore be said that youth participation can be encouraged by creating opportunities for hands-on involvement in awareness programs and intervention planning, training in knowledge and skill acquisition with the much-needed attitude as well as motivation to influence longer-term behavioural changes (Toth et al., 2013).

This study contributes to furthering our understanding of plastic pollution. Future studies should focus on how to establish synergy between organizations and youth in developing programs that encourage widespread activism in plastic pollution control and surveys should be conducted to develop blueprints for effective enforcement of all enacted government policies and laws against plastic pollution in Nigeria.

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APPENDIX A SUPPORT CORRESPONDENCE FORM



16th June, 2020

Organization Permission Form

The Organisation have read the information presented in the information letter about a study being conducted by *Edith Uba* of Health Promotion department at Dalhousie University, Halifax, under the supervision of Dr. Jacqueline Gahagan at Dalhousie University. We have had the opportunity to ask any questions related to this study, to receive satisfactory answers to our questions, and any additional details we wanted.

We are aware that the name of our organization will only be used in the thesis or any publications that comes from the research with our permission.

We were informed that our organization may withdraw from assistance with the project at any time. We were informed that study participants may withdraw from participation at any time without penalty by advising the researcher.

We were also informed that if we have any comments or concerns within this study, we may reach out to the student investigator or supervisor

Edith Uba,
Student investigator
Health Promotion
School of Health
Dalhousie University
ed436388@dal.ca

AFRICAN
CLEANUP
INITIATIVE

Jacqueline Gahagan, PhD
Supervisor
Health Promotion
School of Health
Dalhousie University
jacqueline.gahagan.dal.ca

We have agreed to help the researchers recruit participants for this study from among our organisation staff, who are partakers of environmental sustainability especially on plastic pollution reduction and service in *CleanUp Initiative*, Lagos, Nigeria.

YES NO

APPENDIX B SUPPORT CORRESPONDENCE APPROVAL



We have also agreed to the use of the name of the *African CleanUp Initiative, Lagos, Nigeria* in any thesis or publication that comes from this research.

YES NO

If NO, a pseudonym will be used to protect the identity of the organization.

Director Name: **AKHIGBE ALEXANDER**

Director Signature: _____

Witness Name: **BLESSING ONYELEKWE**

Witness Signature: _____

Date: 16th June 2020

The research you plan on undertaking is of great interest to our organisation and we do hope that it will benefit us and the youth community in engaging to reduce plastic waste and its impact(s) on human health, in Nigeria. So, we fully support your research project and are willing to assist with the effort by allowing you to access (through us) our staff and volunteer members (adequate for your study sample size) in our database via email.

We look forward to working with you.

Sustainably yours,

AKHIGBE ALEXANDER
Director
African Cleanup Initiative

Website: www.acuinitiative.ng | Telephone: 08033340972, 08021349281. | Twitter: @acinigeria | Instagram: @acinigeria | Facebook: acinigeria. | Suite 5, Block H, Atinuke Plaza, Okota Road,

APPENDIX C ETHIC RESEARCH APPROVAL LETTER

Fri 11/6/2020 10:30 AM

To: Edith Uba -

Cc: Jacqueline Gahagan -

Research Ethics



Social Sciences & Humanities Research Ethics Board Letter of Approval

November 06, 2020
Edith Nonye Uba
Health\School of Health and Human Performance

Dear Edith Nonye,

REB #: 2020-5292
Project Title: Plastic Pollution and Youth Engagement: Addressing Negative Health Impacts

Effective Date: November 06, 2020
Expiry Date: November 06, 2021

The Social Sciences & Humanities Research Ethics Board has reviewed your application for research involving humans and found the proposed research to be in accordance with the Tri-Council Policy Statement on *Ethical Conduct for Research Involving Humans*. This approval will be in effect for 12 months as indicated above. This approval is subject to the conditions listed below which constitute your on-going responsibilities with respect to the ethical conduct of this research.

Effective March 16, 2020: Notwithstanding this approval, any research conducted during the COVID-19 public health emergency must comply

Letter of Approval

November 06, 2020
Edith Nonye Uba
Health\School of Health and Human Performance

Dear Edith Nonye,

REB #: 2020-5292
Project Title: Plastic Pollution and Youth Engagement: Addressing Negative Health Impacts

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Effective March 16, 2020: Notwithstanding this approval, any research conducted during the COVID-19 public health emergency must comply with federal and provincial public health advice as well as directives from Dalhousie University (and/or other facilities or jurisdictions where the research will occur) regarding preventing the spread of COVID-19.

Sincerely,

Dr. Karen Foster, Chair

**APPENDIX D ONLINE (VIA ORGANIZATION) INVITATION
POSTER**

Department of Health Promotion

at

Dalhousie University

PARTICIPANT NEEDED FOR RESEARCH

in

Addressing Plastic Pollution Impact on Human and Environmental Health in Nigeria

We are looking for volunteers to take part in a study “***Plastic Pollution and Youth Engagement: Addressing Negative Health Impacts***”

As a voluntary participant in this study, you would be asked to: *complete an anonymous online-based survey to examine the level of engagement of youth and preferred influencing tool in achieving sustainable practice to reduce plastic pollution impacts on human and environmental health.*

Your participation would be, for approximately 30-45 minutes.

To participate in this study, you must be between 18 to 24 years of age, able to write and understand English, access the internet, an affiliated with this organization, interested in resolving plastic pollution issues, and reside in Lagos state.

The exclusion criteria involve, youth who are not staff members of the selected environmental organization, not within the selected age range and reside outside the stated location (Lagos). This is open to both males and females.

Your decision to participate or not will not influence your work with the organization as an employee

In appreciation for your time, you will receive an online *gift voucher of \$5 on exit or submission of your survey data.*

For more information about this study, please contact:

Edith Uba (student investigator)

Health Promotion at Email:

This study has been reviewed by and received ethics clearance through Dalhousie University Research Ethics Committee.

APPENDIX E CONSENT FORM



Consent Form

Plastic Pollution and Youth Engagement: Addressing Negative Health Impacts.

Date _____

Dear Participant,

You are invited to participate in a research study being conducted by Edith Uba, a graduate student in health promotion department at Dalhousie University. This study is affiliated with Dalhousie University, Canada as my university of study and in partnership with African Clean-up Initiative, Nigeria because we share the same understanding of achieving high engagement of youth, to mitigate plastic pollution and its negative impacts in Nigeria. The purpose of this research is to assess youth engagement in resolving plastic issues and its impact as well as knowing the effect of chosen influencing tool in achieving positive behavioral practice to reduce plastic pollution and promoting human and environmental health.

This is a survey study, which will be conducted online via a secured platform called Opinio, this is to promote confidentiality, privacy, and security. The youth needed

for this study are invited, based on eligibility. To be eligible for this study, you must be between 18 to 24 years of age, able to write and read in English, accessible to the internet, an employee of this organization, interested in resolving plastic pollution issues, and reside in Lagos state. This is an inclusion of all gender. This study is funded by the researcher.

If you choose to participate in this research, you will be required to answer approximately 38 questions, in an anonymous online survey, sectioned into demographic, engagement and effect of influencing tools used by the organization on reduction of plastic pollution. This research will require approximately 30-45 minutes of your time.

Your participation in this research is entirely voluntary and anonymous. If any survey question makes you uncomfortable, you can choose not to answer, and you are welcome to exit the survey at any time if you no longer want to participate. All you need to do is an exit from the Opinio platform in your browser. If you do this, all information from your survey (if any) will not be saved or retained, in my analysis. If you do complete your survey and you change your mind later, I will not be able to remove the information you provided as I will not know which responses are yours.

Your responses to the survey and open-ended questions will be anonymous. This means that identifying details such as your name, address, date of birth, email address and any unique identifiers are not needed. All online data will be collected, via Opinio and destroyed by the researcher, once it has been transferred to a laptop,

that is strongly passworded and encrypted, using BitLocker. The data will only be accessed by Edith Uba (researcher) and Jacqueline Gahagan, Ph.D. (supervisor), to promote security, privacy, and confidentiality. Only the key result and anonymized quotes from this study will be sent to the NGO by email for sharing with the interested participants on their website and the researcher and supervisor will have access to the survey results. I will describe and publish general findings of this research for my honor's thesis, in health journals, and presentation in person during any health and environmental conferences. I will destroy all information after reporting the results.

There are some anticipated potential risks associated with staff involvement in research, such as social risk, employment risk, loss of confidentiality, identification etc. However, several steps have been taken to mitigate these anticipated risks for this study, such as applying anonymity in the consent form and online survey to prevent identification and promote confidentiality. To reduce the social and employment risk, know that your decision to participate or not will have no effect on your work with the organization as they have given their support and consent.

There will be no direct benefit to you in participating in this research. The research, however, might contribute to new knowledge on understanding the impact of engaging youths in mitigating plastic pollution and issues surrounding it. This study also hopes to inform organizations, and government, in decisions and plans on sustainably engaging youths in promoting plastic free environment.

To thank you for your time, in participating, you will receive a five-dollar (\$5)

online gift voucher. However, if you withdraw from the study at any time, you will be allowed to access your online gift voucher of \$5. To access this voucher kindly, click on the link provided in the survey section on the exit or submission of your survey data. Note that this link has no access to your identification.

If you need more information or to ask questions about this study before or after participating, from the researcher please send an email to Edith Uba, Dalhousie University

If you have any ethical concerns about your participation in this research, you may contact Research Ethics, Dalhousie University at _____ or email _____ (and reference REB file # 2020-5292).

If you agree to participate, kindly date the space provided, click on the radio box, check eligibility, and proceed to survey section.

I have read the above information regarding this research study, and consent to participate in this study.

_____ (Date)

SCREENING PROCEDURE TO DETERMINE ELIGIBILITY

Kindly 'X' the radio boxes on your choice of answer

- Are you between the ages of 18 to 24? YES NO
- Can you read and write in English? YES NO
- Do you have access to the internet? YES NO
- Are you a volunteer of this organization? YES NO
- Do you have interest in reduction of plastic pollution issues? YES NO
- Do you reside in Lagos? YES NO

ONLINE SURVEY

Kindly 'X' the radio boxes to answer the questions where needed.

Demographic Questions

1. What is your age range? Please specify _____
 - a) 18-19
 - b) 20-21
 - c) 22-23
 - d) 24
 - e) Choose not to specify

2. What is your sex?
 - a) Male
 - b) Female
 - c) Others: Please specify _____
 - d) Choose not to specify

3. What ethnicity do you consider yourself?
 - a) Yoruba
 - b) Hausa
 - c) Igbo
 - d) Others: please specify _____

4. What is your highest level of completed education?
 - a) Primary School
 - b) Secondary School

- c) Bachelor's Degree
- d) Master's Degree
- e) Doctorate Degree
- f) Others: please specify _____

5. How many years have you lived in Lagos?

- a) 1-5 years
- b) 6-10 years
- c) 11-15 years
- d) 16-20 years
- e) Other: please specify

6. What is your marital status?

- a) Single
- b) Married
- c) Separated/divorced
- d) Others: please specify
- e) Choose not to specify

7. How interested are you in reducing environmental pollution caused by plastics?

- a) Very Interested
- b) Interested
- c) Not Interested
- d) Others: Please specify

8. How long have you worked with ACINigeria?
- a) 0-2 years
 - b) 2-4 years
 - c) 4-6 years
 - d) Others: please specify
 - e) Choose not to specify
9. In what capacity have you been engaged through ACINigeria to reducing plastic pollution? Please specify:
-

10. Have you received any training on plastic pollution reduction through ACINigeria? If so, please specify _____

11. What are the known influencing tools (such as incentive, peer support, organization program/activities, volunteerism, social media etc.), used by your organization?

Please specify: _____

Engagement and Impact of Youth

*1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neither Agree nor

Disagree 5 = Agree 6 = Strongly Agree 7 = Very Strongly Agree

QUESTIONS	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
1. I am concerned about environmental plastic pollution and its consequences	1	2	3	4	5	6	7
2. I am aware but not concerned about environmental plastic pollution and its consequences	1	2	3	4	5	6	7
3. I do agree it is important to engage youth in reducing plastic pollution	1	2	3	4	5	6	7
4. I have participated in an educational event (e.g. workshop) related to plastic pollution and the environment?	1	2	3	4	5	6	7

QUESTION: 5. To what extent do you think the following are engaged in environmentally sustainable behavior and activities on a regular basis?	Very Strongly Disengaged	Strongly Disengaged	Disengaged	Neither engaged nor Disengaged	Engaged	Strongly Engaged	Very Strongly Engaged
Community members	1	2	3	4	5	6	7
Parents	1	2	3	4	5	6	7
Local environmental Organization	1	2	3	4	5	6	7
Peers	1	2	3	4	5	6	7
Local Government	1	2	3	4	5	6	7

QUESTION: 6. To what extent do you think the following are engaged in discussing environmental issues:	Very Strongly Disengaged	Strongly Disengaged	Disengaged	Neither engaged nor Disengaged	Engaged	Strongly Engaged	Very Strongly Engaged
Spouse	1	2	3	4	5	6	7
Partner	1	2	3	4	5	6	7
Parents	1	2	3	4	5	6	7
Children	1	2	3	4	5	6	7
Friends	1	2	3	4	5	6	7

QUESTION	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
7. I took part in a local community engagement event about an environmental issue	1	2	3	4	5	6	7
8. I organized an environmental rally with the organization as a way of impacting positively to achieve plastic pollution reduction	1	2	3	4	5	6	7
9. I organized a petition (including online petitions) for any environmental issues (e.g. climate change, plastic pollution)	1	2	3	4	5	6	7
10. I was engaged in organizing community events which focused on environmental awareness and practices	1	2	3	4	5	6	7
11. I believe it is wise to engage youth in plastic pollution reduction	1	2	3	4	5	6	7
12. I believe most people who are important to me take steps in practicing plastic reduction activities	1	2	3	4	5	6	7
13. I believe I am responsible for the environment we are living in.	1	2	3	4	5	6	7

QUESTION	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
14. I engage in proper waste management/recycling/upcycling might be impactful on plastic pollution reduction	1	2	3	4	5	6	7
15. Your engagement is needed to impact on reducing plastic pollution in the environment?	1	2	3	4	5	6	7
16. You are more actively engaged in addressing plastic pollution than other people your age.	1	2	3	4	5	6	7
17. How do you rate your overall level of engagement in plastic pollution in comparison with your peers?	1	2	3	4	5	6	7

	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
18. Youth engagement in plastic pollution reduction behavior and activities							
Can promote environmental sustainability	1	2	3	4	5	6	7
Can have positive health impacts	1	2	3	4	5	6	7
Can create lot of inconvenience	1	2	3	4	5	6	7
Can consume too much time	1	2	3	4	5	6	7
Can cost too much money for Organizations	1	2	3	4	5	6	7

QUESTION: 19. To help stop plastic pollution:	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
We should be paid for recycling our plastics	1	2	3	4	5	6	7
We should not use plastic if we have a choice and recycle what plastics we do use	1	2	3	4	5	6	7
We should make the government stop the use of plastics through environmental laws	1	2	3	4	5	6	7
We should make the government pay to collect our plastic rubbish and recycle it	1	2	3	4	5	6	7

Effectiveness/Sustainability of Influencing Tools

*1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neither Agree nor

Disagree 5 = Agree 6 = Strongly Agree 7 = Very Strongly Agree

QUESTION: 1. Which is most effective for influencing and promoting pro-environmental behaviour?	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
Environmental program (such as organization/community plastic waste management activities, volunteering)	1	2	3	4	5	6	7
Social/behavioral app or game (such as knowledge, identification/disposal of waste behavioral app or game)	1	2	3	4	5	6	7
Economic Incentive (earning money, household materials, scholarship etc.)	1	2	3	4	5	6	7

2. Do you think the following can be used as influencing tools?	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
Incentives	1	2	3	4	5	6	7
Mobile app or Games that contains educational and behavioral practice/activities to reducing plastic pollution	1	2	3	4	5	6	7
Commitment to practice proper plastic use and disposal management	1	2	3	4	5	6	7
Volunteerism	1	2	3	4	5	6	7
Peer influence to engage	1	2	3	4	5	6	7

QUESTION: 3. My participation in plastic pollution reduction behavior is mostly influenced by	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
My family	1	2	3	4	5	6	7
My school	1	2	3	4	5	6	7
My peers	1	2	3	4	5	6	7
Incentives	1	2	3	4	5	6	7
Gamification/game	1	2	3	4	5	6	7
Commitment to proper plastic use/disposal/management	1	2	3	4	5	6	7
Programs/activities	1	2	3	4	5	6	7

4. Would you practice positive behavior in plastic pollution reduction based on the following:	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
If incentive is provided	1	2	3	4	5	6	7
If accessible to game/app/influenced by game/app	1	2	3	4	5	6	7
If programs/activities are implemented	1	2	3	4	5	6	7
If pressured by peers	1	2	3	4	5	6	7
If committed	1	2	3	4	5	6	7

5. What affects your environmental behavioural consistency?	Very Strongly Disagree	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Very Strongly Agree
Inadequate social support affects my environmental sustainability behaviour	1	2	3	4	5	6	7
Inadequate environmental activities affect my environmental sustainability behaviour	1	2	3	4	5	6	7
Inadequate commitment affects my environmental sustainability behaviour	1	2	3	4	5	6	7
Lack of peer pressure influence affect my environmental sustainability behaviour	1	2	3	4	5	6	7

GENERAL QUESTIONS

Before completing this section, do you consent to the researcher quoting your data anonymously from this section for publication, presentation, and thesis report?

YES NO

1. What suggestions would you make to improve engagement of youth in promoting plastic free environment?
2. Please share any other comment you have about plastic pollution reduction among you

APPENDIX F DATA TABLES

Table F1

Descriptive Statistics of Participants' Demographic Characteristics

Demographic Characteristics	Frequency (%)
Age	
18-19years	3(6.97)
20-21years	6(13.95)
22-23years	14(32.56)
24years	20(46.51)
Sex	
Male	23(53.50)
Female	20(46.50)
Ethnicity	
Yoruba	26(60.47)
Igbo	4(9.30)
Hausa	7(16.27)
Others	6(13.96)
Highest level of education completed.	
Bachelor of Science	21(48.83)
Secondary	12(27.90)
Other (HND/OND)	10(23.27)
Marital Status	
Single	42(97.70)
Married	1(2.30)
Years lived in Lagos.	
1-5years	6(20.90)
6-10years	3(9.30)
11-15years	2(7.00)
16-20years	13(41.90)
Above 20years	7(20.90)

Table F2

Descriptive Statistics (Cross-Tabulation) on Level Of Engagement In Plastic Pollution Reduction Efforts Differ by Sex, Education, and other Demographic Indicators in Nigeria.

Demographic indicators	Very strongly engaged (%)	Strongly engaged (%)	Engaged (%)	Neither engaged nor disengaged (%)	Very strongly disengaged (%)
Sex					
Male	4.70	23.00	18.60	4.70	2.30
Female	16.30	7.0	18.60	2.30	0.00
Age					
18-19years	0.00	0.00	4.80	0.00	2.40
20-21years	4.80	4.80	4.80	0.00	0.00
22-23years	4.80	14.30	11.90	2.40	0.00
24years	11.90	11.90	16.70	4.80	0.00
Ethnicity					
Yoruba	16.70	14.30	19.00	7.10	2.40
Igbo	2.40	0.00	7.10	0.00	0.00
Hausa	2.40	14.30	0.00	0.00	0.00
Others	0.00	2.40	11.90	0.00	0.00
Highest Educational Level					
B.Sc	7.00	16.30	23.30	0.00	0.00
Secondary	7.00	4.70	14.00	2.30	2.30
Others	7.00	9.30	2.30	4.70	0.00
Years lived in Lagos					
1-5years	4.70	7.00	9.30	0.00	0.00
6-10years	2.30	2.30	4.70	0.00	0.00
11-15years	0.00	2.30	4.70	0.00	0.00
16-20years	11.60	9.30	16.30	2.30	2.30
Above 20years	2.30	9.30	4.70	4.70	0.00
Marital Status					
Single	20.90	30.20	37.20	7.00	2.30
Married	0.00	0.00	2.30	0.00	0.00

Table F3

Central Tendency Statistics (Mean and Standard Deviation) on Level of Engagement in Plastic Pollution Reduction Efforts Differ by Sex, Education, and other Demographic Indicators in Nigeria

Demographics	N	Mean	Standard deviation
Sex			
Male	23	5.35	1.22
Female	20	5.90	1.00
Age			
18-19years	3	3.67	2.30
20-21years	6	6.00	0.89
22-23years	14	5.64	0.84
24years	20	5.75	1.02
Ethnicity			
Yoruba	26	5.58	1.39
Igbo	4	5.50	1.00
Hausa	7	6.14	0.38
Others	6	5.17	0.08
Highest Level of Education			
Bachelor	20	5.67	0.70
Secondary school	13	5.23	1.59
Others	10	5.90	1.19
Marital Status			
Single	42	5.60	1.15
Married	01	5.00	1.14

Table F4

Descriptive Statistics on Extent Nigeria Youth (Ages 18-24 Years) Members of the African Clean-Up Initiative in Lagos Engaged in Addressing the Issue Of Plastic Pollution in Nigeria.

Items	%
How interested are you in reducing environmental pollution caused by plastics	
Interested	16.3
Very interested	83.7
I do agree it is important to engage youth in reducing plastic pollution	
Very strongly agree	32.60
Strongly agree	41.90
Agree	16.30
Disagree	4.70
Very strongly disagree	4.70
I have participated in an educational event (e.g. workshop) related to plastic pollution and the environment	
Very strongly agree	25.60
Strongly agree	14.00
Agree	46.50
Neither agree nor disagree	9.30
Disagree	2.30
Very strongly disagree	2.30
I took part in a local community engagement event about an environmental issue	
Very strongly agree	23.30
Strongly agree	27.90
Agree	34.90
Disagree	9.30
Strongly disagree	2.30
Very strongly disagree	2.30
I organized an environmental rally with the organization as a way of impacting positively to achieve plastic pollution reduction	
Very strongly agree	23.30
Strongly agree	18.60
Agree	30.20
Neither agree nor disagree	7.00
Disagree	11.60
Strongly disagree	7.00
Very strongly disagree	2.30

Items	%
I organized a petition (including online petitions) for any environmental issues (e.g. climate change, plastic pollution)	
Very strongly agree	9.30
Strongly agree	11.60
Agree	32.60
Neither agree nor disagree	14.00
Disagree	20.90
Strongly disagree	7.00
Very strongly disagree	4.70
I engage in proper waste management/ recycling/upcycling might be impactful on plastic pollution reduction	
Very strongly agree	32.60
Strongly agree	32.60
Agree	25.60
Neither agree nor disagree	7.00
Very strongly disagree	2.30
Your engagement is needed to impact on reducing plastic pollution in the environment	
Very strongly agree	27.90
Strongly agree	44.20
Agree	25.60
Very strongly disagree	2.30
I was engaged in organizing community events which focused on environmental awareness and practices	
Very strongly agree	11.60
Strongly agree	25.60
Agree	32.60
Neither agree nor disagree	7.00
Disagree	16.30
Strongly disagree	4.70
Very strongly disagree	2.30
I believe it is wise to engage youth in plastic pollution reduction	
Very strongly agree	53.50
Strongly agree	20.90
Agree	23.30
Very strongly disagree	2.30
I believe most people who are important to me take steps in practicing plastic reduction activities	
Very strongly agree	20.90
Strongly agree	23.30
Agree	39.50
Neither agree nor disagree	7.00
Disagree	2.30
Strongly disagree	4.70
Very strongly disagree	2.30

Items	%
You are more actively engaged in addressing plastic pollution than other people your age	
Very strongly agree	23.30
Strongly agree	30.20
Neither agree nor disagree	4.70
Disagree	7.00
Very strongly disagree	2.30

Table F5

Descriptive Statistics on Factor that Influences Youth to Engage in Addressing Plastic Pollution Reduction in Nigeria.

	Very Strongly Disagree (%)	Strongly Disagree (%)	Disagree (%)	Neither Agree nor Disagree (%)	Agree (%)	Strongly Agree (%)	Very Strongly Agree (%)
1. Which is most effective for influencing and promoting pro-environmental behaviour?							
<i>Environmental program (such as organization/community plastic waste management activities, volunteering)</i>	2.30	-	-	-	25.60	44.20	27.90
<i>Social/behavioral app or game (such as knowledge, identification/disposal of waste behavioral app or game)</i>	4.70	-	-	-	25.60	41.90	16.30
<i>Economic Incentive (earning money, household materials, scholarships etc.)</i>	2.30	-	-	4.70	25.60	41.90	25.60
2. Do you think the following can be used as influencing tools?							
<i>Incentive</i>	2.40	-	2.30	2.30	27.90	34.90	30.20
<i>Mobile apps or games</i>	2.30	2.30	4.70	4.70	41.90	27.90	16.30
<i>Commitment to practice proper plastic use and disposal management</i>	2.30	-	-	2.30	30.20	34.90	30.20
<i>Volunteerism</i>	2.30	2.30	-	-	30.20	27.90	37.20
<i>Peer influence to engage</i>	2.30	-	-	2.30	23.30	30.20	41.90

	Very Strongly Disagree (%)	Strongly Disagree (%)	Disagree (%)	Neither Agree nor Disagree (%)	Agree (%)	Strongly Agree (%)	Very Strongly Agree (%)
3. Would you practice positive behavior in plastic pollution reduction based on the following:							
<i>If incentive is provided</i>	4.70	-	4.70	9.30	20.90	30.20	30.20
<i>If accessible to game/app</i>	7.00	2.30	4.70	16.30	32.60	27.90	9.30
<i>If programs are implemented</i>	2.30	-	-	4.70	39.50	34.90	18.60
<i>If pressured by peers</i>	4.70	4.70	11.60	16.30	30.20	18.60	14.00
<i>If committed</i>	2.30	-	-	4.70	23.30	44.20	25.60
4. What affects your environmental behavioural consistency?							
<i>Inadequate social support</i>	4.70	-	7.00	9.30	48.80	25.60	4.70
<i>Inadequate environmental activities</i>	4.70	2.30	14.00	4.70	37.20	25.60	11.60
<i>Lack of peer pressure</i>	4.70	4.70	30.20	11.60	25.60	18.60	4.70
<i>Inadequate commitment</i>	4.70	4.70	14.00	7.00	44.20	18.60	7.00