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Building Collective Ownership of Single-Use Plastic Waste in Youth Communities: A Jamaican Case Study

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Abstract: Plastic pollution is a global environmental challenge with serious implications for human health. Most of the work on plastic waste to date has focused on assessing and mapping impacts and remedial activities, which are important but do not attempt to understand the attitude and behaviour of the consumer. The problem will only be resolved by changing behaviour to eliminate non-essential use of plastics and switch to less harmful alternatives, especially for Single-Use Plastic (SUP), which makes a disproportionate contribution to plastic waste. This study examines the attitudes and behaviour of teachers and parents/guardians in school communities as a step towards building collective ownership of SUP towards reducing the use of SUP. It establishes baseline data about attitudes and behaviour in four Jamaican primary schools. It examines the attitude of teachers and parents/guardians towards SUPs and uses cluster analysis to segment them based on attitude. The results identify the heterogeneous nature of groups within the same population and highlights the need for targeted interventions. This research can contribute towards the design of strategic interventions that will build a sense of collective ownership of the SUP problem and motivate effective changes in behaviour to minimise the use of SUPs in Jamaica.



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1. Introduction

Plastic pollution is a global environmental challenge, which impacts terrestrial and marine ecosystems (Xanthos and Walker 2017). Single-use plastics (SUPs) account for 40% of the plastics produced each year. Plastic has many advantages; it is convenient, lightweight, durable and low cost for users. However, it has a very high cost in terms of social and environmental problems; plastic waste is the world's largest source of marine pollution and debris. In 2016, the World Economic Forum reported that plastics consumed about 6% of global oil production and this is projected to increase to 20% by 2050. Over 80% of all the plastic ever produced is now waste. This is because only 9–12% of the plastics produced are recycled globally, which means that most plastic materials end up in landfill or illegal dump sites, and each year, over 8 million tonnes end up in the world's oceans (World Economic Forum 2016). The plastics industry, therefore, represents a one-way conversion of oil into one of the world's worst pollution problems. Single-use plastic (SUP) is particularly problematic as it has a very short useful life of maybe a few minutes, compared to the decades (sometimes centuries) that it will remain in the environment.

As a product and as waste, plastic has both environmental and health implications for society. Cox et al. (2019) estimates that Americans ingest between 39,000 to 52,000 micro particles of plastic annually and these estimates increase to 74,000 and 121,000 when inhalation of plastic dust is included. While the immediate impact on human health is still unclear, there is evidence to link plastic consumption to some specific health concerns (Nara 2018; Karbalaeei et al. 2018; Barboza et al. 2018).

Plastic waste has a number of impacts with associated direct and indirect economic costs in the Caribbean region. Diez et al. (2019) estimates that the Caribbean Sea contributes

more than USD 400 billion annually in tourism and fisheries and loses millions of US dollars in clean-up expenses and loss of tourism revenue. Tourism accounts for 15% of the region's gross domestic product (Diez et al. 2019). Approximately USD 5 billion of this is in trade, 200,000 direct jobs, 100,000 ancillary services and more than USD 2 billion in dive tourism. However, the Caribbean produces 18 billion pounds of plastic debris and contains ten of the world's top 30 plastic polluters, with as many as 200,000 pieces of plastic per square kilometre in the north-eastern region (Ewing-Chow 2019; Diez et al. 2019). This places the Caribbean, its people, marine ecosystems and economies at environmental, social and economic risk. Land-based contribution to reef degradation is already costing up to USD 174 million annually (Diez et al. 2019). Deloitte (2019) estimates that globally, approximately USD 1.97 per capita is lost in economic value per person, with 82% representing the cost of the limited and inadequate clean-up activities. Beaumont et al. (2019) estimates this at up to USD 33,000 per tonne of marine plastic.

To date, thirteen of the fifteen English speaking members of the Caribbean Community (CARICOM) have enforced policies and legislation on plastic use and waste (Clayton et al. 2021); these typically involve a top-down approach, issuing fiats without attempting to understand the local context, to take account of attitudes and behaviour or to see stakeholder groups as potentially part of the solution.

Schools represent a major stakeholder group in the generation of plastic waste, yet no studies have been conducted locally to assess the role that this very significant stakeholder group can play in addressing the problem and reducing plastic pollution. In fact, very little research has been conducted anywhere on this very significant stakeholder group. The Minnesota Pollution Control Agency (2010) concluded that school children between kindergarten and high school generated an estimated total of 220 tonnes of waste each day in the State. The North Dakota Department of Environmental Quality (n.d.) estimates the generation of waste at 31 kg per student each academic year. Given how much SUP waste is produced in schools, particularly as food and beverage cartons, packages and wraps, straws and plastic cutlery, this particular group should not be ignored. It is not just that school snacks and meals are a major source of SUP pollution, it is also important to see children as major change agents in society, partly because both good and bad patterns of behaviour tend to be formed at school, and partly because many children are more environmentally aware than their parents and may influence their family to change.

To address SUP pollution, therefore, there needs to be an understanding of consumption attitudes and behaviour with respect to SUPs in schools, and an integration of this into the solution framework as countries try to build a sense of collective ownership of and responsibility for the plastic pollution problem. This may require governments to create policies and legislation aimed at creating this broader vision. It is likely, however, that each stakeholder group will require a targeted intervention; a program that works with children may not be as effective with adults. This study fills an important knowledge gap by examining the behaviour of the primary school community towards SUPs. It establishes baseline data, which is often missing in the plastic research and policy dialogue in Jamaica. It examines the attitude of teachers and parents towards SUPs in the use of questionnaires, and uses cluster analysis to segment them based on their attitude and outlines the profiles of the attitudinal clusters. This information can be used to identify the variables within the community that require specific attention and aid in the design and execution of any behavioural change intervention mechanism towards building collective ownership of the consumption, management and treatment of SUPs.

1.1. Single-Use Plastic in Jamaica

Jamaica is the third largest of the Greater Antilles in the Caribbean Sea with approximately 2.73 million people (World Bank 2021) and a land area of approximately 10,900 square km (United States Department of State Bureau of Oceans and International Environmental and Scientific Affairs 2004; World Bank 2021). Jamaicans collectively generate 800,000 tons of residential waste each year. About 15% is plastic, the second largest compo-

ment of the wastes collected by the National Solid Waste Management Authority (NSWMA) (Caribbean Policy Research Institute 2017; UNEP 2021). In the past, single-use plastic bags were popular in Jamaica, and ubiquitous in stores. However, they were blocking drains due to high usage and subsequent casual disposal. This brought substantial economic costs and placed a significant burden on the NSWMA (Caribbean Policy Research Institute 2017). The NSWMA lacks the necessary capacity to collect and dispose of much of Jamaica's solid waste in an efficient and environmentally friendly manner. Solid waste management competes with other pressing economic and social issues, such as fiscal deficits, crime, poverty and unemployment. Consequently, only 75% of Jamaica's solid waste is disposed of in formal disposal areas, and these open landfills leave solid waste, including plastic, exposed to rain and wind, as well as animals and informal waste pickers, causing some to fragment and be dispersed, eventually ending up in the ocean (Caribbean Policy Research Institute 2017; UNEP 2021; Shaw 2021). The remaining 25% is either burnt or littered, often ending up in drains, rivers, gullies, beaches and, ultimately, the ocean.

1.2. SUPs Policy Response in Jamaica

On 1 January 2019, Jamaica launched a staged approach to banning some SUPs, primarily, single-use plastic bags and disposable drinking straws. The process for implementation of the ban included consultation between the primary private sector stakeholder groups and the government. Other key stakeholders, such as the education system was not included in the discussions, which also failed to address the provision of suitable alternatives for the items which were affected by the ban (Clayton et al. 2021).

Since the introduction of the ban, different phases of communication and messaging have been introduced to the general public based on the phased approach of the legislation. In 2019, the focus was on the details of the ban, while subsequent initiatives were designed to engender a feeling of stewardship for the environment. These involve using the TV and radio stations with the best viewership and wide following and posting messaging at critical or most impactful times. There was also a billboard campaign. The impact and success of the communication strategy and action plan were considered 'far reaching'. Unfortunately, there was no attempt to collect baseline data, so it is difficult to evaluate the effectiveness of the ban.

Jamaica's waste management challenges are further compounded by the lack of a formal waste separation or recycling policy. SUPs are included in general waste and disposed of in a mixed waste stream, combined with both organic and other inorganic matter. Furthermore, the ban was limited; it only addressed some SUP items and did not include plastic bottles. This has resulted in a noticeable surge in the presence of SUP plastic bottles among the waste in local gullies, rivers and on local coastlines. SUP bottles below 500 mL are currently among the most common items found at beach clean-up activities. In a recent beach clean-up activity in Port Maria, Jamaica, plastic bottles, primarily those of 500 mL or less, accounted for 72% of the waste collected (Figure 1). These are predominantly used for bottled water and juices.

The results were similar in Durban Harbour, South Africa, where a collaborative clean-up was conducted. Plastic made up 67% of the waste that was collected (ACU 2021), which is a common pattern in many countries. These plastics persist in the environment (Diez et al. 2019). UNEP (2018) highlights the 'welfare losses' associated with plastic litter, which include health related pandemics as a result of blocked drains, which can give rise to vector-borne diseases, such as malaria, dengue, zika and chikungunya.

Jamaica's current problem with plastic waste is partly due to the lack of legislation mandating the NSWMA to manage plastics. Plastic is regarded as an environmental problem and, therefore, falls within the remit of the National Environment and Protection Agency (NEPA) (Caribbean Policy Research Institute 2017). To address this, NEPA uses a waste management approach focused on recycling, which includes community engagement through the Plastic Waste Minimisation Project and corporate partnership with collection

centres and recycling partners in an attempt to strengthen the island's capacity to manage plastic marine litter.

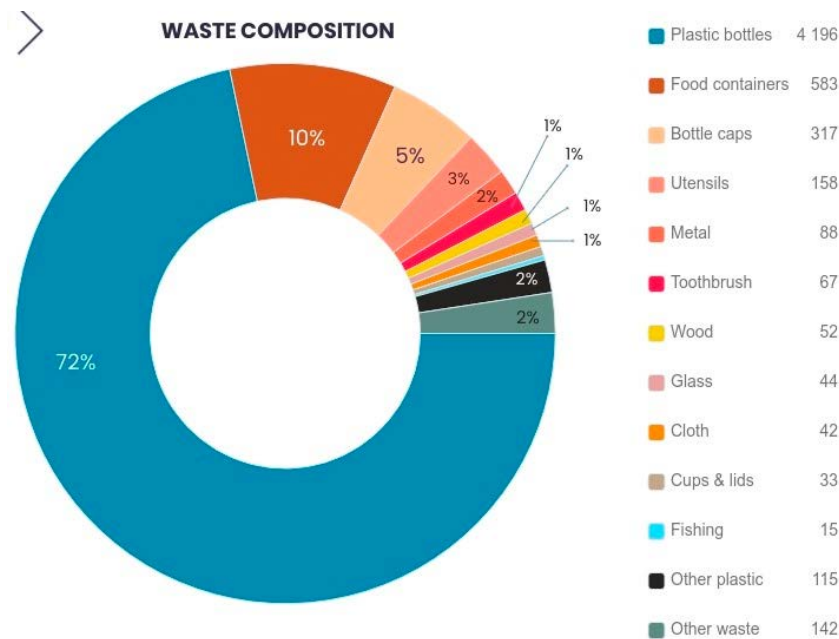


Figure 1. Waste composition from Port Maria beach clean-up activity in units (June 2021).

Other initiatives have also emerged across the island over time. The NSWMA and companies, such as Wisynco, have focused some effort on collecting polyethylene terephthalate (PET) bottles for recycling. Wisynco through its ECO program and the NSWMA's via the Northern Belt Initiative in Kingston, Jamaica. However, these initiatives are sporadic in nature, which limits their overall effectiveness. None of these initiatives or the legislation involved any attempt to understand the attitudes and beliefs regarding plastic. For example, there are quite widely-held beliefs in Jamaica about food contamination and poisoning that reinforce the view that plastic wrapping is the best way to keep food clean and that pre-packaged items are safer.

Internationally, very little attention has been paid to the beliefs that shape market behaviour. The 2020 Eurobarometer Survey attempted to gauge public attitude towards plastics, but this was limited in scope and depth. Emphasis was placed on the public's perception of the impact of plastic and of what needed to be conducted to address the problem, rather than their cognitive or affective attitude and behaviour towards plastic (European Commission 2020). Nevertheless, the survey helped to highlight the changes in public perceptions of plastic over time, which has evolved positively for the more developed societies in Europe. This is not the case for developing countries. There is some research that examines the perspective of the consumer in developing countries, mainly in Africa (O'Brien and Thondhlana 2019; Van Rensburg et al. 2020; Adam et al. 2021). However, no such research has been published for the Caribbean region. Enge (2018) suggests that for developing countries, there is a high dependence on SUP products, which makes SUPs favourable to the public or at best indifferent. SUPs are favoured because of their inexpensive packaging material and perceived cleanliness and safety which makes them very much part of the daily lives of most residents (Enge 2018; Omondi and Asari 2019; Adam et al. 2021).

1.3. Plastic Use in Schools

Many parents rely on the benefits that plastic products offer. Plastic bags, food packaging and containers are convenient, lightweight and durable, which makes them commonplace in schools. This makes schools one of the primary generators of plastic waste

and 24% of total waste generated centres around the meals provided (mainly discarded wrap and packaging) (Minnesota Pollution Control Agency 2010). Each student can create 31 kg of waste during a nine-month school year, with each school producing more than 14 tonnes of waste from lunch alone (North Dakota Department of Environmental Quality). Much of this waste is sent to landfills, although in principle the waste generated by the schools could be diverted from the trash to either composting and/or recycling (Minnesota Pollution Control Agency 2010). This highlights the importance of including educational stakeholders as a part of the solution (So and Chow 2018; Cheang et al. 2019; Dalu et al. 2020), especially in small island states, such as Jamaica, who are net importers of plastic.

Knowledge and attitudes are key elements for changing human actions and efforts are being made to change both via environmental education in many educational institutions. Dalu et al. (2020) highlights the need for educational awareness within the formal education system as a part of the solution to addressing the problem of plastic pollution, with the emphasis beginning at the primary level. Currently, there is an emphasis on encouraging recycling (So and Chow 2018; Cheang et al. 2019) but there have been implementation problems, which have been ascribed to the lack of positive environmental attitudes by the school educators (So and Chow 2018). So and Chow (2018), therefore, argue that in order for these programs to be effective, they must first improve the level of awareness among educators, suggesting that improving their awareness will improve their attitudes and subsequently improve their ability to influence the children. It is known, of course, that positive environmental attitudes do not always translate into good environmental actions (Heberlein 2012). However, understanding attitudes towards SUPs is clearly important (Cavaliere et al. 2020). The components that affect attitude and behaviour are often classified into socio-demographic factors (age, gender, income status and education level), cognitive factors (environmental awareness) and affective factors (attitudes and values) (O'Brien and Thondhlana 2019). This means that any attempt to build collective ownership to reduce plastic consumption and subsequent plastic pollution in schools must first influence the attitudes and the accompanying behaviour of the teachers and parents who are the primary stakeholders in the school population.

2. Materials and Methods

2.1. Approach

The study adopts an established questionnaire, which has been used to assess the attitudes of residents in Ghana towards SUPs (See Adam et al. 2021). It utilises both quantitative and qualitative methodologies (mixed methods), specifically, the sequential explanatory mixed method. First, the qualitative approach is used in the review of literature to contextualise the study, followed by the quantitative methodology to administer the questionnaires. The combination of both methodologies minimised instances of speculation in explaining the findings.

The study engaged the tri-component model of attitude using the underlying characteristics of attitude, specifically, cognitive, affective and behavioural (Grimm 2005). The cognitive component of attitude refers to beliefs and perceptions (environmental awareness) relating to SUPs (O'Brien and Thondhlana 2019). The affective component of attitude assesses the feelings of likes and dislikes that one has towards SUPs (Grimm 2005). Overt actions or responses could be positive or negative depending on the type and nature of the cognitive and affective dimensions of underlying attitude. This study assumes that the beliefs, perceptions and feelings do shape subsequent behaviour.

2.2. Study Setting

A case study approach was used to select the institutions and participants selected by established criteria for each institution. The study engaged teachers and parents of children in grades 2 and 3 in four primary schools in Jamaica, using a purposeful sampling approach to select the institutions. The schools were selected based on their geographic location

(proximity to water channels as well as the ocean), zoning (rural and urban) and primary source of funding. Two schools were from the Kingston, the capital city and two were from rural communities; two schools were located along the coastal region of the island while two schools were inland. The two schools located inland were located alongside a river or a drainage system. Additionally, two schools were privately funded while two schools received public funding. Figure 2 shows the location of the schools with public schools denoted in orange and private schools in blue.



Figure 2. Map location of the schools in the study.

2.3. Questionnaire Items

The questionnaire is based on an instrument that was previously used to assess the attitudes of residents in Ghana towards SUPs for a National Geographic study (See [Adam et al. 2021](#)). The instrument was reviewed by specialists in environmental psychology as well as an officer from the Environmental Protection Agency in Ghana. All the attitudinal items were gauged on an eleven-point scale ranging from zero (0) to ten (10) with a score of zero suggesting the non-applicability of an attitudinal measure to the respondent with a higher score representing greater relevance and vividness of an attitudinal item to the respondent. Some of the socio-demographic characteristics captured on the questionnaire included sex, age, marital status, educational attainment, monthly earnings and household size.

2.4. Data Collection

A questionnaire was used to collect data for the survey. However, the questionnaire was transformed into a digital format for easy administration and management. Specifically, the Kobo Toolbox was used as the survey data collection tool. Kobo Toolbox is a Computer Assisted Personal Interview data collection system that was designed jointly between United Nations Office for the Coordination of Humanitarian Affairs (OCHA), Harvard Humanitarian Initiative (HH) and the International Rescue Committee (IRC). It is regarded as user-friendly but robust and has the capability to be deployed both online and offline,

allowing it to be used in areas where there is poor internet connectivity and data is expensive. The data collection exercise lasted from April 2021 to May 2021.

The list of teachers of grades 2–3 were collected from each institution, along with the corresponding number of students belonging to the respective classes. Each student represents one household. As attitudes and behaviours are often transmitted through socialisation and given the primary role of the family as the first educational environment for a child, households were used to determine the attitudes and behaviour towards SUP that may have been passed on to the child. A sample frame of 335 parents was established from the general population of 2600 students, using a confidence level of 95% and a margin of error of 5%. A questionnaire was used to solicit data from 335 parents. All 27 teachers at the grades 2 and 3 levels were included in the sample frame for the teachers. Subsequently, the parents/guardians were contacted through the school, and any adult member of the household was included in the sample.

The data were collected with the assistance of the school administrators and teachers who provided regular follow-up with the parents. Prior to the administration of the questionnaire, project introductory sessions comprising four focus group sessions were held with parents/guardians, teachers and administrators from the four participating schools. These sessions provided an opportunity for the team to explain details of the project and the data collection instrument, as well as to answer any questions that parents/guardians and school personnel had pertaining to the activity. A total of 191 questionnaires were fully completed by the parents, representing a completion rate of 57% and 24 from the teachers, which represents a response rate of 89%.

2.5. Data Analyses

Data was imported from the Kobo Toolbox directly into IBMs Statistical Package for the Social Sciences (SPSS) version 26 for processing and analysis. Two statistical estimation techniques were used in analysing the data: the two-step clustering technique and the chi-square test of independence. The two-step clustering technique was used to classify the respondents based on their cognitive, affective attitude on SUPs and subsequent behaviour. This technique was necessary as it allowed for the clustering of both continuous and categorical variables, and it helps to address the problem of cluster algorithms associated with some clustering techniques (Rundle-Thiele et al. 2015). Additionally, the chi-square test of independence was used to establish the levels of association between the socio-demographic variables and the corresponding attitudes and behaviour of the respondents.

3. Results and Discussion

3.1. Profile of Respondents

3.1.1. Teachers

There were more female teachers (92%) than male teachers (8%) among the respondents (Table 1). Respondents can be described as mature as the majority (66.6%) of them fall between 31 and 50 years of age. The remaining groups of those between 21 and 30 years and those over 50 years both accounted for 16.7% each. Three quarters (75%) of the teacher respondents possess a diploma or undergraduate with those having postgraduate qualifications and those with senior high school qualifications each accounting for 12.5%. Further, approximately 42% of respondents earn less than the equivalent of JMD 100,000 (USD 670) per month, while approximately 29% earn between JMD 100,001 to JMD 200,000 (USD 670–USD 1333) per month.

Table 1. Socio-demographic characteristics of respondents.

Socio-Demographics	TEACHERS		PARENTS/GUARDIANS	
	Frequency	Percent	Frequency	Percent
Sex				
Male	2	8.3	33	17.3
Female	22	91.7	158	82.7
Age (years)				
≤20	0	0	2	1
21–30	4	16.7	58	30.4
31–40	7	29.1	90	47.1
41–50	9	37.5	37	19.4
≥51	4	16.7	4	2.1
Family structure				
Nuclear family			89	46.6
Single-parent			68	35.6
Extended		N/A	25	13.1
Blended			7	3.7
Grandparent			2	1.0
Household size				
1–4			149	78
5–8		N/A	39	20.5
>8			3	1.5
Educational attainment				
Basic (Primary/Junior High School	0	0	35	18.3
Senior High School	3	12.5	76	39.8
Diploma/Undergraduate	18	75.0	38	19.9
Postgraduate	3	12.5	42	22
Monthly income (JMD) *				
≤100,000	10	41.7	66	34.6
100,001–200,000	7	29.1	55	28.8
200,001–300,000	4	16.7	26	13.6
300,001–400,000	3	12.5	14	7.3
>400,000		N/A	30	15.7

* Exchange rate: USD 1 = JMD 150.00.

3.1.2. Parents/Guardians (PG)

The majority of the respondents were females (82.7%) with males accounting for 17.3% (Table 1). Nearly half of the parents describe their family structure as nuclear (46.6%), followed by single-parents (35.6%). The extended family accounted for 13.1%, while 3% were from blended families. Households headed by grandparents accounted for 1% of the participants. Most parents/guardians ranged between 31 and 40 years (47.1%), followed by those aged between 21 to 30 years (30.4%). Those between 41 to 50 years accounted for 19.3% of the participants with 2.1% being over 50 years. Furthermore, the majority (81.7%) of the parents/guardians were educated at/or above the senior high school level. Parents/guardians possessing university level qualifications at the diploma/undergraduate

level accounts for 19.9% and those with postgraduate qualifications accounts for 22%. A further 18.3% received basic education at the primary and junior high school level. Most families live in households with one to four members (78%) with 34.6% earning below JMD 100,000 (USD 670) monthly. This was followed by those earning between JMD 100,001 to JMD 200,000 (USD 670–USD 1333) per month (29.35%), along with 15.42% earning in excess of JMD 400,000 (USD 2666) (15.42%). The remaining 13.93% were earning between JMD 200,001 and JMD 300,000 (USD 1334 and USD 2000).

3.2. Cognitive and Affective Attitudes toward SUPs

Attitude was measured using the tri-component attitude approach comprising the cognitive, affective and behavioural dimensions. The attitudinal measurements are written in the positive, which means that a higher score represented a favourable attitude towards SUPs compared to a lower score on the scale. The characteristic of each cluster is based on distinctiveness of the responses to each variable when compared to the score of that variable at the sample level. The results suggest that in all clusters, both parents and teachers scored low with regards to three of the four measures of cognitive attitude towards SUP. Both groups scored higher when asked about the need to educate children about the environment and SUPs, and both groups presented higher scores at the affective level. This suggests that while cognitively, the groups are less environmentally aware, their affective attitude (likes and dislikes) show less support for SUPs.

3.2.1. Cognitive and Affective Attitudes of Teachers

The results identify two clusters of cognitive and affective attitudes among teachers. Cluster 1 is the larger of the two (58.3%) with low cognitive scores in all but one variable, that is, the need to educate our children about the environment (Table 2). At the affective level, this cluster scored very high, suggesting that they do not favour SUPs. Cluster 2 scored low on all elements of cognitive and very low on affective attitude, suggesting that the teachers in this cluster favour SUPs. This represents two very extreme groups. Teachers need to believe in what they are teaching in order to effectively transfer knowledge. With almost 42% of the respondents favouring SUPs, specific interventions need to address teacher attitudes towards SUPs.

Table 2. Cognitive and affective attitudes of teachers.

Group Variable	Sample (<i>n</i> = 24)	Cluster 1 58.3% (<i>n</i> = 14)	Cluster 2 41.7% (<i>n</i> = 10)	Predictor Importance
Mean scores				
Cognitive Attitude				
SUPs are harmful to marine ecosystems	1.67	1.07	2.50	0.33
SUPs make our beaches unattractive	1.46	1.07	2.00	0.19
Single-use plastics negatively affect the tourism industry	1.58	1.14	2.20	0.26
We must educate our children	5.71	8.64	1.60	0.89
Affective Attitude				
There should be proper recycling arrangements for SUPs	5.87	8.79	1.80	1.00
SUPs should be banned	4.92	7.36	1.50	0.71
People should be levied for using SUPs	4.38	6.57	1.30	0.71
Businesses should not deal in SUPs regardless of the cost to the economy	4.75	7.00	1.60	0.70
We should stop producing SUPs	4.92	7.21	1.70	0.67

3.2.2. Cognitive and Affective Attitudes of Parents/Guardians

Parents and guardians were systematically ordered into three clusters. All three clusters score low in three of the four cognitive attitude variables; however, the degree varied across the groups (Table 3). Cluster 1 presents the lowest of all three clusters while Cluster 3 has the highest. The outlier variable for all three clusters was the need for educating children on the environment. Clusters 2 and 3 scored high in this regard. With regard to the affective attitudes, all three clusters scored low for all variables except one in Cluster 2. This suggests that parents and guardians favour SUPs. The outlier variable addresses the need for proper recycling facilities, which suggests that the largest group of parents/guardians (56.5%) feels very strongly about recycling plastics.

Table 3. Cognitive and affective attitudes of parents/guardians.

Group Variable	Sample (n = 191)	Cluster 1 23.6% (n = 45)	Cluster 2 56.5% (n = 108)	Cluster 3 19.9% (n = 38)	Predictor Importance
Mean scores					
Cognitive Attitude					
SUPs are harmful to marine ecosystems	1.41	0.00	1.29	3.45	0.33
SUPs make our beaches unattractive	1.49	0.00	1.35	3.66	0.26
Single-use plastics negatively affect the tourism industry	1.53	0.00	1.43	3.63	0.19
We must educate our children	6.14	2.87	6.97	7.66	0.89
Affective Attitude					
SUPs should be banned	4.83	4.82	4.99	4.89	0.71
We should stop producing SUPs	5.04	5.00	4.97	5.29	0.67
Businesses should not deal in SUPs regardless of the cost to the economy	4.90	5.58	4.87	4.18	0.70
People should be levied for using SUPs	4.19	5.80	3.69	3.68	0.71
There should be proper recycling arrangements for SUPs	5.90	3.89	7.09	4.89	1.00

3.3. Behaviour

3.3.1. Teachers

The results identified two behavioural clusters for parents and teachers (Table 4). Among the teachers there are high behavioural scores in the smallest group, Cluster 1 (37.5%). Using the scores as indicators of behaviour, this group is inclined to reduce their consumption of SUPs by declining to use them even when offered for free, using alternatives, and paying extra to avoid SUPs. This group has been identified as 'Abstainers' to represent their lack of support for SUPs. Cluster 2 is the largest of the two clusters (62.5%) among the teachers and scored low in all variables; it is identified as 'Advocates' for SUPs. The primary variable of predictor importance amongst the teachers is their use of reusable alternatives (1.00). It is, therefore, important that any response for this group focuses on the provision of reusable alternatives.

Table 4. SUP behaviour-based clusters of teachers.

Group Variable	Sample (<i>n</i> = 24)	Cluster 1 37.5% (<i>n</i> = 9)	Cluster 2 62.5% (<i>n</i> = 15)	Predictor Importance
Mean scores				
I use reusable alternatives	5.67	9.89	3.13	1.00
I avoid SUPs	4.87	8.89	2.47	0.97
I sometimes pay extra	5.25	9.33	2.80	0.97
I decline/avoid SUPs even when free	4.87	8.33	2.80	0.79

3.3.2. Parents/Guardians

Behaviourally, the parents and guardians represent the highest group of persons with the potential to adjust their behaviour to SUPs. Among the parents, there were also two clusters, both of which recorded relatively moderate behavioural scores, with Cluster 2, the largest of the two (70.2%), showing the greater propensity to reject the use of SUPs and pay extra for alternatives (Table 5). This suggests that while cognitive level scores are low among parents/guardians, they still make attempts to reduce their use of the items, although not as strongly as the *Abstainers* in Cluster 1 among the teachers. This is encouraging, as it indicates the possibility for influencing their attitudes and behaviour. They are, therefore, combined as a group of '*Potentials*' who can be encouraged to become abstainers of SUPs. The primary variable of predictor importance amongst the parents/guardians is their paying extra for reusable alternatives (1.00). It is, therefore, that any initiative targeted at this group address the cost for reusable alternatives.

Table 5. SUP behaviour-based clusters for parents/guardians.

Group Variable	Sample (<i>n</i> = 24)	Cluster 1 29.8% (<i>n</i> = 57)	Cluster 2 70.2% (<i>n</i> = 134)	Predictor Importance
Mean scores				
I decline/avoid SUPs even when free	4.39	3.23	4.88	0.12
I avoid SUPs	4.66	4.04	4.93	0.04
I use reusable alternatives	5.03	5.35	4.90	0.01
I sometimes pay extra	4.25	1.37	5.48	1.00

3.4. Profile of Clusters

To further assess the composition of the clusters to determine the levels of association between the attitudinal variables used and the socio-demographic profiles of the respondents (strong, moderate or weak association), the Pearson chi-square test of independence was used.

The findings indicate that all clusters (abstainers, potentials and advocates (APA)) are statistically distinctive across the socio-demographic characteristics of the respondents. Among the teachers, there is no statistical significance between the socio-demographic dimensions and the attitudinal clusters presented (Table 6). This means that neither educational level, age, gender or income is associated with whether the teachers respond as supporters (*Advocates*) or rejecters (*Abstainers*) of SUPs. However, more women (63.6%) fall within the advocate category and younger teachers (21–30 years) are abstainers. Additionally, more of the teachers who are educated up to the postgraduate level (66.7%) are categorised as abstainers and when categorised by income, it is the teachers within the lowest income group that form the largest group (70%) of avoiders of SUPs. This suggests that the most effective response for teachers should be targeted at female teachers over the age of 31 years who are qualified at or below an undergraduate degree.

Table 6. Teacher cluster profiles by socio-demographic characteristics.

Socio-Demographic Characteristics	Abstainers	Advocates	χ^2 (ρ Value)
Sex			0.145 (0.703)
Male	50.0	50.0	
Female	36.4	63.6	
Age			9.209 (0.162)
≤20	-	-	
21–30	75.0	25.0	
31–40	28.6	71.4	
41–50	33.3	66.7	
≥51	25.0	75.0	
Educational Attainment			1.244 (0.537)
Basic (Primary/Junior High School)	-	-	
Senior High School	33.3	66.7	
Diploma/Undergraduate	33.3	66.7	
Postgraduate	66.7	33.3	
Monthly Income (JMD) *			10.062 (0.073)
≤100,000	70.0	30.0	
100,001–200,000	0.0	100.0	
200,001–300,000	25.0	75.0	
>300,001–400,000	33.3	66.7	

* Exchange rate: USD 1 = JMD 150.00.

Among the parents, all variables have strong statistical significance (Table 7). The socio-demographic characteristics of age (0.537), educational levels (0.531) and monthly income (0.447) all show a relatively strong association to the cluster that they are assigned. The strength of association of the family structure and family size are quite moderate at 0.357 and 0.279, respectively, while the weakest association was that of gender at 0.147. The results for this group of *Potentials* show that younger parents (under 30 years), grandparents (100%), households of four or less (75.2%) and single-parents (89.7%) are more likely to reject the use of SUPs. It also submits that households at the lower income level and lower educational level are also less likely to support SUPs. This means that the more educated and higher income earning categories are more likely to engage in the throw-away lifestyle that SUPs support, and the associated responses should, therefore, be tailored to address this group.

In summary, APAs are all impacted by SUPs and their views on and treatment of SUPs are as distinct as they are. Current policies and interventions aimed at addressing the problem of SUP waste have primarily applied a one-size-fit-all approach with varying degrees of results (Adam et al. 2021; Clayton et al. 2021). This study highlights the need for targeted attitudinal and behavioural change interventions that are aimed at reducing the use of SUPs and, subsequently, the waste that is generated in an attempt to build collective ownership of the problem of SUP pollution.

Table 7. Parents cluster profiles by socio-demographic characteristics.

Socio-Demographic	Potentials		χ^2 (p Value)
	Cluster 1 (%)	Cluster 2 (%)	
Sex			4.112 (0.043)
Male	15.2	84.8	
Female	32.9	67.1	
Age			55.121 (<0.001)
≤20	0.0	100.0	
21–30	5.2	94.8	
31–40	27.8	72.2	
41–50	73.0	27.0	
≥51	50.0	50.0	
Family Structure			24.279 (<0.001)
Nuclear family	40.4	59.6	
Single-parent	10.3	89.7	
Extended	36.0	64.0	
Blended	71.4	28.6	
Grandparent	0.0	100.0	
Household Size			14.881 (0.005)
1–4	24.8	75.2	
5–8	46.2	53.8	
>8	66.7	33.3	
Educational Attainment			53.885 (<0.001)
Basic (primary/Junior High School)	8.6	91.4	
Senior High School	10.5	89.5	
Diploma/Undergraduate	47.4	52.6	
Postgraduate	66.7	33.3	
Monthly Income (J\$) *			38.17 (<0.001)
≤100,000	16.7	83.3	
100,001–200,000	16.4	83.6	
200,001–300,000	38.5	61.5	
300,001–400,000	50.0	50.0	
>400,000	66.7	33.3	

* Exchange rate: US\$1 = J\$150.00.

4. Conclusions and Implications

Building collective ownership to solve the problem of SUP pollution requires all the stakeholders to play their part, which demands an understanding of the groups involved. The three groups discussed in this study highlight the heterogeneous nature of groups in the same small communities in very similar environments, and, therefore, highlight the need for responses that are carefully tailored. While there is ongoing research, and policy and legislative mechanisms are being introduced, there is very little empirical evidence on the attitudes and behaviours of the population towards SUPs and even less among the school population, which is an important contributor to plastic pollution. The problem cannot be solved without taking this group into account. There has to be a conscious

and organised integration of attitudinal variables into the analysis and formulation of policy initiatives.

This study examined the attitudes of teachers and parents/guardians within the school population based on their attitude and behaviour towards SUPs to inform targeted behavioural change interventions towards reducing SUP pollution. The conclusions are as follows:

Consumers of SUPs are heterogeneous, and a homogeneous approach will not necessarily resolve the problem of SUP waste pollution.

Consumers can be grouped into clusters, identified here as APA. Each of these clusters has a distinct pattern of attitudes and behaviour regarding SUPs. Among the three identified clusters, attitude vary across the socio-demographic characteristics of the parents, namely, age, educational attainment, income level and household size. This suggests that targeted strategies will be needed to address the gaps identified in each group in order to achieve the desired goal of reduced SUP consumption, waste and pollution. This means that a homogeneous policy that does not address the drivers of attitudes and behaviour among different groups may not achieve the desired objectives. For example, as presented in this study, the attitudinal variables among the parents indicate strong statistical significance among the 'potential' cluster. However, among this group, those at the higher income bracket are more inclined to use SUPs. This implies that policies and programmes aimed at reducing SUP pollution should be designed to leverage or change these different attitudes. Such targeted efforts are likely to be more effective and yield better long-term results.

Each cluster reacted strongly to the need for educating children about the environment. Given the role that socialisation plays in the formation of attitude, this may suggest the need for an ongoing educational and socialisation process that emphasises the immediate and long-term dangers of SUPs. This will improve the cognitive attitudinal scores in all groups and could help to incrementally encourage anti-SUP attitude and behaviour. This could be achieved through formal and informal socialisation mechanisms, such as inclusion in the school curricular, as well as broader societal based programmes which target specific groups, such as those within the higher income bracket who are more supportive of SUP consumption.

Parents set the tone for what happens within the household and teachers do the same within their classroom. These two groups help to shape the lives of the children in their care. It is, therefore, important to understand how these groups view and use SUPs.

Most government policies are generic, and some—including the attempts at plastic bans in the Caribbean—have had limited success. People have found ways to evade and bypass regulations or have switched to equally harmful alternatives. This paper suggests that the policy goal may be universal, but the implementation strategy has to be based on a better understanding of behaviour and values and tailored to persuade and induce change in disparate groups.

Furthermore, the findings suggest that generic exhortations do little to change actual behaviour. The more educated and higher income earning categories are more likely to be aware of the environmental issues involved in using plastics but are also more likely to have a throw-away lifestyle regarding SUPs. The convenience of plastics clearly outweighs the knowledge of consequences, especially with people who may be a little better off financially but time-poor. Economic factors are clearly not the sole determinant of outcomes, as many are willing to pay at least a little more for less harmful alternatives, but the availability (or lack thereof) of acceptable substitutes is a factor. Awareness clearly is a factor, especially among teachers, who tend to know more about environmental issues than most, but that is not a large group.

This suggests that an effective government intervention would have to address a number of points at once. These would include bans for the most problematic plastics but accompanied by measures to ensure that alternatives are widely available. These alternatives would need to be price-comparable, or cheaper than the initial plastic items

when durability is taken into account. Additionally, strategically framed educational programs would be required to increase awareness, particularly focused on teachers. This could stimulate a multiplier effect as the teachers educate and influence the children to change their behaviour, who will in turn influence their parents to switch to better, longer-life alternatives to SUP.

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References

- ACU. 2021. Dr. Andrea Clayton and Dr. Refilwe Precious: The Power of International Collaboration. The Association of Commonwealth Universities. Available online: <https://www.acu.ac.uk/get-involved/cop26-commonwealth-futures-climate-research-cohort/themes-safeguarding-the-oceans/beach-clean-dr-andrea-clayton-dr-refilwe-precious/> (accessed on 15 July 2021).
- Adam, Issahaku, Tony R. Walker, C. Andrea Clayton, and Joana Carlos Bezerra. 2021. Attitudinal and behavioural segments on single-use plastics in Ghana: Implications for reducing marine plastic pollution. *Environmental Challenges* 4: 100185. [CrossRef]
- Barboza, Luís Gabriel Antão, A. Dick Vethaak, Beatriz R. Lavorante, Anne-Katrine Lundebye, and Lúcia Guilhermino. 2018. Marine microplastic debris: An emerging issue for food security, food safety and human health. *Marine Pollution Bulletin* 133: 336–48. [CrossRef] [PubMed]
- Beaumont, N. J., M. Aanesen, M. C. Austen, T. Börger, J. R. Clark, M. Cole, T. Hooper, P. K. Lindeque, C. Pascoe, and K. J. Wyles. 2019. Global ecological, social and economic impacts of marine plastic. *Marine Pollution Bulletin* 142: 189–95. [CrossRef] [PubMed]
- Caribbean Policy Research Institute. 2017. *Managing Plastic Waste Single-Use Plastic Bags*. Kingston: Caribbean Policy Research Institute.
- Cavaliere, Alessia, Silvia Pigliafreddo, Elisa De Marchi, and Alessandro Banterle. 2020. Do Consumers Really Want to Reduce Plastic Usage? Exploring the Determinants of Plastic Avoidance in Food-Related Consumption Decisions. *Sustainability* 12: 9627. [CrossRef]
- Cheang, Chi Chiu, Tsz Yan Cheung, Winnie Wing Mui So, Irene Nga Cheng, Lincoln Fok, Chi How Yeung, and Cheuk Fai Chow. 2019. Enhancing Pupils’ Pro-environmental Knowledge, Attitudes, and Behaviours toward Plastic Recycling: A Quasi-experimental Study in Primary Schools. In *Environmental Sustainability and Education for Waste Management. Education for Sustainability*. Edited by Winnie So, Cheuk Chow and John Lee. Singapore: Springer, pp. 159–88. [CrossRef]
- Clayton, C. Andrea, Tony R. Walker, Joana Carlos Bezerra, and Issahaku Adam. 2021. Policy responses to reduce single-use plastic marine pollution in the Caribbean. *Marine Pollution Bulletin* 162: 111833. [CrossRef] [PubMed]
- Cox, Kieran D., Garth A. Covernton, Hailey L. Davies, John F. Dower, Francis Juanes, and Sarah E. Dudas. 2019. Human Consumption of Microplastics. *Environmental Science and Technology* 53: 7068–74. [CrossRef] [PubMed]
- Dalu, Mwazvita T., Ross N. Cuthbert, Hulisani Muhali, Lenin D. Chari, Amanda Manyani, and Tatenda Dalu. 2020. Is Awareness on Plastic Pollution Being Raised in Schools? Understanding Perceptions of Primary and Secondary School Educators. *Sustainability* 12: 6775. [CrossRef]
- Deloitte. 2019. *The Price Tag of Plastic Pollution*. Amsterdam: Deloitte Touche. Available online: <https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/strategy-analytics-and-ma/deloitte-nl-strategy-analytics-and-ma-the-price-tag-of-plastic-pollution.pdf> (accessed on 18 June 2021).
- Diez, Sylvia M., Pawan Patil, John Morton, Diego J. Rodriguez, Alessandra Vanzella, David Robin, Thomas Maes, and Christopher Corbin. 2019. *Marine Pollution in the Caribbean: Not a Minute to Waste*. Washington: World Bank Group.
- Enge, Caroline. 2018. *The Kenyan Ban on Plastic Bags: A Study of Attitudes and Adaptation in Nairobi*. Ås: Norwegian University of Life Sciences. Available online: <https://nmbu.brage.unit.no/nmbu-xmlui/bitstream/handle/11250/2586328/Enge%20Caroline.%20Msc%20thesis.%20The%20Kenyan%20Ban%20on%20Plastic%20Bags.%20A%20study%20of%20Attitudes%20and%20Adaptation%20in%20Nairobi.pdf?sequence=1&isAllowed=y> (accessed on 16 June 2021).

- European Commission. 2020. *Attitudes of European Citizens towards the Environment*. Brussels: European Commission. Available online: <https://europa.eu/eurobarometer/surveys/detail/2257> (accessed on 6 June 2021).
- Ewing-Chow, Daphne. 2019. Caribbean Islands Are the Biggest Plastic Polluters in the World. *Forbes*. Available online: https://www.forbes.com/sites/daphneewingchow/2019/09/20/caribbean-islands-are-the-biggest-plastic-polluters-per-capita-in-the-world/?fbclid=IwAR0UtXf_ZhpaIw1kCrolivIZPjn274ZSb2yTnT06E1wQ4POIOJ_TaoDySNk#24529a4b774b (accessed on 15 September 2020).
- Grimm, Pamela E. 2005. Ab components' impact on brand preference. *Journal of Business Research* 58: 508–17. [CrossRef]
- Heberlein, Thomas A. 2012. Navigating environmental attitudes. *Conservation Biology* 26: 583–85. [CrossRef] [PubMed]
- Karbalaei, Samaneh Sedat, Parichehr Hanachi, Tony Robert Walker, and Matthew Cole. 2018. Occurrence, sources, human health impacts and mitigation of microplastic pollution. *Environmental Science and Pollution Research* 25: 36046–63. [CrossRef] [PubMed]
- Minnesota Pollution Control Agency. 2010. *Digging Deep through School Trash*. St. Paul: Minnesota Pollution Control Agency. Available online: <https://www.pca.state.mn.us/sites/default/files/p-p2s6-14.pdf> (accessed on 28 May 2021).
- Nara, Ramakrishnan. 2018. Microplastic Contamination of the Food Supply Chain. *Food Safety Magazine*. Available online: <https://www.foodsafetymagazine.com/magazine-archive1/december-2018january-2019/microplastic-contamination-of-the-food-supply-chain/#References> (accessed on 10 September 2020).
- North Dakota Department of Environmental Quality. n.d. *Reducing and Recycling of Plastic Waste in Schools*; Bismarck: North Dakota Department of Environmental Quality. Available online: <https://deq.nd.gov/Publications/WM/ReducingAndRecyclingPlasticWasteInSchools.pdf> (accessed on 28 May 2021).
- O'Brien, Joshua, and Gladman Thondhlana. 2019. Plastic bag use in South Africa: Perceptions, practices and potential intervention strategies. *Waste Management* 84: 320–28. [CrossRef] [PubMed]
- Omondi, Isaac Onyango, and Misuzu Asari. 2019. Impact of Plastic Bag Ban on Behavior and Attitudes in Kenya. In *The 30th Annual Conference of Japan Society of Material Cycles and Waste Management*. Tokyo: Japan Society of Material Cycles and Waste Management.
- Rundle-Thiele, Sharyn, Krzysztof Kubacki, Aaron Tkaczynski, and Joy Parkinson. 2015. Using two-step cluster analysis to identify homogeneous physical activity groups. *Marketing Intelligence and Planning* 33: 522–37. [CrossRef]
- Shaw, Kaydian. 2021. *Landfill Waste and the Ocean*. Kingston: Earth Ambassadors. Available online: https://www.youtube.com/watch?v=muclFg_rk6k (accessed on 10 June 2021).
- So, Winnie Wing Mui, and Stephen Cheuk Fai Chow. 2018. Environmental education in primary schools: A case study with plastic resources and recycling. *International Journal of Primary, Elementary and Early Years Education* 47: 652–63. [CrossRef]
- UNEP. 2018. *Single-Use Plastics: A Roadmap for Sustainability*. Nairobi: United Nations Environment Programme.
- UNEP. 2021. *Jamaica: Plastics Ban Creates New Opportunities*. Nairobi: United Nations Environment Programme. Available online: <https://www.unep.org/news-and-stories/story/jamaica-plastics-ban-creates-new-opportunities> (accessed on 18 June 2021).
- United States Department of State Bureau of Oceans and International Environmental and Scientific Affairs. 2004. *Limits in the Seas No. 125 Jamaica's Maritime Claims and Boundaries*; Washington: United States Department of State Bureau of Oceans and International Environmental and Scientific Affairs. Available online: <https://2009-2017.state.gov/documents/organization/57677.pdf> (accessed on 16 June 2021).
- Van Rensburg, Melissa L., Sphumelele L. Nkomo', and Timothy Dube. 2020. The 'plastic waste era': social perceptions towards single-use plastic consumption and impacts on the marine environment in Durban, South Africa. *Applied Geography* 114: 102132. [CrossRef]
- World Bank. 2021. *Land Area (sq.km)—Jamaica*. Washington: World Bank. Available online: <https://data.worldbank.org/indicator/AG.LND.TOTL.K2?locations=JM> (accessed on 16 June 2021).
- World Economic Forum. 2016. *The New Plastics Economy—Rethinking the Future of Plastics*. Available online: http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf (accessed on 12 September 2020).
- Xanthos, Dirk, and Tony R. Walker. 2017. International policies to reduce plastic marine pollution from single-use plastics (plastic bags and microbeads): A review. *Marine Pollution Bulletin* 118: 17–26. [CrossRef] [PubMed]